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Sept
1986

OLIVER MANGIONE McCALLA
& Associates Limited, Consulting Engineers
154 Colonnade Road South Nepean, Ontario K2E 7J5

KANATA LAKES
STORM DRAINAGE REPORT
CAMPEAU CORPORATION
ADDENDUM NO. 1

SEPTEMBER 1986

JOB NO. 86-5140

PREPARED BY:

OLIVER, MANGIONE, McCALLA & ASSOCIATES LIMITED
CONSULTING ENGINEERS
154 COLONNADE ROAD SOUTH
NEPEAN, ONTARIO
K2E 7J5

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CONSULTING ENGINEERS

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1. INTRODUCTION

This report is an addendum to the March 1985 Kanata Lakes Storm Drainage Report prepared by Oliver, Mangione, McCalla & Associates Limited for Campeau Corporation. The original report was produced as part of the design for the boundary clusters (Nos. 1, 2, 7 and 9) of Kanata Lakes. Subsequently, development of Cluster No. 1 proceeded, and along with it, a portion of the trunk storm sewer was installed.

This addendum report is prepared to update the original study to account for 'as constructed' conditions in Cluster No. 1 and specific design adjustments related to the detailed designs for Clusters 2, 7 and 9. Accordingly, this report evaluates the drainage patterns, flood attenuation and storage requirements in the revised portions of the minor and major systems.

2. STORM WATER MANAGEMENT SYSTEM

The major-minor basic design concept is to remove the runoff due to frequent storms (1 to 5 years) as quickly as possible

through the minor or storm sewer system, while providing a major system for protection against flooding for the large 100 year event.

This concept has not been changed as a result of the proposed modifications to the storm drainage system to be detailed herein. The only real change is in the method of convenyance of the runoff.

3. MINOR SYSTEM

Typically, the 1:5 year runoff is conveyed by the underground piped storm sewers. A trunk sewer network was designed and evaluated as illustrated in the previous drawing #84-4286-SW2. The present proposal is illustrated in drawing #84-4286-SW2-Rev 1.

Changes to the previous design consist of the following:

a. The storm trunk route at the upstream and downstream portion has been realigned. At the upstream end, it follows the realigned portion of Knudson Drive to Campeau Drive. At the downstream end, the outlet into Beaver Pond is proposed to be relocated as shown.

b. The southern tributary system has been changed upstream of junction 773. A combination of open channels and underground pipe will be utilized to convey the 1:5 year runoff.

where is junction
778 →

impact on →
Beaverbrook Road
plus Pond 6

what was the →
previous discharge rate
10.3 m^3/s 1:5
12.7 m^3/s 1:100

c. Minor system flows from the catchment area boundary of Pond 2 will be directed north to the sewer segment located between junctions 764 and 774.

d. The 1:5 year runoff upstream of junction 778 will be carried overland by swales and ditches (integrated into the golf course design) into Ponds 8 and 9.

In addition, 'as built' information is now available for a section of storm sewer (approximately from junction 767 to 763) and the computer model for the main trunk has been adjusted utilizing these sewer sections.

Information on Pond 7 has been revised also to account for 'as built' conditions. Pond 7 drains to the storm sewer along Beaverbrook Road.

The performance of the central trunk sewer during the 1:5 year event was checked. The 1:5 year hydraulic grade line for the central trunk storm sewer is plotted on the attached drawing #84-4286-SW4-Rev 2. It can be seen from this drawing that no surcharging occurs in this central trunk. The discharge from this trunk into Beaver Pond is 9.3 m^3/s.

The performance of Beaver Pond as an attenuation system was also checked and no change was found in the water elevation rise or peak outflow.

As mentioned, changes in the method of conveyance of the runoff to the central trunk are proposed. Referring to

what effect does
3:1 side slopes make →

Is TABLE II of
the March 1985 Report
still valid →
now there is a Pond 5A

is there a draw down →
feature to you.

drawing #84-4286-SW2-Rev.1, an open channel from junction 773 to junction 753 is proposed. This golf course channel would effectively be the primary conveyor of minor storm runoff from the catchment areas of Ponds 1, 3 and 4 to the central trunk. Under the 1:5 year storm, the maximum runoff into the channel would be 1.5 m^3/sec (52 cfs). For modelling purposes this section was represented by a trapezoidal channel having a 3 metre (10 foot) base with 2:1 side slopes and a slope of 0.2%. The 1:5 year flow for this particular section would be carried at an average depth of 0.55 m (1.8 feet). At the main inlet structure (junction 773), the maximum 1:5 year flow is 1.8 m^3/sec (64 cfs).

Minor system flows from the catchment area of Pond 2 have now been modelled as tributary to the sewer segment from juntion 764 to junction 774. The additional flow requires an increase in pipe size to 1,050 mm diameter for this segment.

For Pond 3, a design incorporating storm sewers and channels is proposed. This system will discharge into a permanent wet pond located on the golf course lands. Outflow from the pond will enter the main golf course channel at junction 753.

The discharge into the channel was analysed as controlled by a 1.5 metre (5 foot) wide broad crested weir. At a normal water elevation of 97.35 metres, the water elevation rise for the 1:5 year event would be 0.4 metres (1.3 feet) with a maximum discharge of 0.8 m^3/sec (27 cfs).

In the vicinity of Pond 5A, the minor system will be comprised of storm sewers draining the medium density block on the north side of Campeau Drive to a short section of open channel across the golf fairway. A storm sewer will then accept this inflow and convey it to junction 761 at the central trunk. The 1:5 year inflow to this sewer from the channel is 0.4 m^3/sec (14 cfs).

4. MAJOR SYSTEM

The major system is detailed on the attached drawing #84-4286-SW3-Rev 1.

This drawing illustrates the revised subcatchments and street segments input to the computer model. Adjustment of catchment area boundaries can be seen for nine of the eleven storage locations previously depicted in the original drawing #84-4286-SW3.

While new street layouts have altered subcatchments and street segments internally within the catchment area boundaries of Ponds 1, 2 and 3, the overall boundaries themselves have not changed significantly. Consequently, the volumes of storage required for these locations show no major change from the previous calculations. Ponded water from Ponds 1 and 2 will drain to the minor system through an outlet pipe and catch basin, as before. For Pond 3, the 1.5 metre (5 feet) wide weir structure will have a maximum discharge of 1.6 m^3/sec (56 cfs) at a water elevation of

IS $2.72 m^3/sec$
still valid
check with UMA
PREVIOUS.

impact on Beaverbrook Road

98.03 metres. The normal water elevation would be 97.35 metres.

With respect to Pond 4, the 1:100 year storage volume is 2.47 ha-m (20.0 ac-ft). The inlet structure conducting the flow into the storm sewer should be designed to allow a maximum discharge of 2.72 m^3/sec (96 cfs) into the sewer.

Storage within the previous catchment area boundary of Pond 5 is now proposed to be divided among two locations. Referring to drawing #84-4286-SW3-Rev 1, the new storage locations are indicated as Ponds 5 and 5A. The outlet structure for Pond 5A would be located on the north side of the fairway and should be designed to allow a maximum discharge of 0.45 m^3/sec (16 cfs) into the local storm sewer.

The catchment area boundary for Pond 7 has remained unchanged. The pond has been constructed to store the 1:100 year runoff volume of 0.15 ha-m (1.2 ac-ft) from the catchment area illustrated. Discharge from the pond is into the storm sewer along Beaverbrook Road.

The revised catchment area boundaries for storage locations 6, 8, 9 and 11 are illustrated on drawing #84-4286-SW3-Rev.1. Ponds 8, 9 and 11 show a significant restructuring of their previous individual limits but their overall combined boundary has not changed substantially. As a result, the only major impact is the relocation of runoff volumes for storage, with a greater amount of runoff to be

stored in the Pond 9 location and reduced amounts for the Pond 8 and 11 locations.

Storage volume requirements for the major storm are tabulated in Table I. It should be noted that the water level elevations in this table are first order design elevations only. Final precise design water elevations will be established during the detailed design of the clusters and adjacent golf course areas. The final water level elevations will depend upon completion of the final golf course contouring, green and tee-off modifications.

TABLE I

POND STORAGE VOLUMES

MAJOR STORM

Pond	Previous Volume	Volume ha-m(ac-ft)	Approximate * Water Elevation m(ft)
#1	(3.8)	0.48 (3.9)	100.74 (330.5)
#2	(2.4)	0.33 (2.7)	99.90 (327.8)
#3	(7.1)	0.81 (6.6)	98.00 (321.5)
#4	(11.1)	2.47 (20.0)	97.5 (320.0)
#5	(3.2)	0.17 (1.4)	98.30 (322.5)
#5A		0.20 (1.6)	101.04 (331.5)
#6	(2.8)	0.36 (2.9)	95.40 (313.0)
#7	(1.2)	0.15 (1.2)	94.79 (311.0)
#8	(2.6)	0.28 (2.3)	97.70 (320.5)
#9	(1.7)	0.30 (2.4)	96.50 (316.6)
#10	(3.0)	0.37 (3.0)	101.80 (334.0)
#11	(1.7)	0.19 (1.5)	95.70 (314.0)
Beaver	(151.7)	18.76 (151.7)	92.81 (304.5)

* Precise elevations to be determined at detailed design stage for golf course areas and adjacent clusters.

The analysis for Beaver Pond was carried out accounting for the local major system flows and the Shirley's Brook diversion as before, together with the flow from the minor system trunk sewer. No change in water elevation rise or peak outflow was found.

The performance of the central trunk was assessed for varying conditions as before. Hydraulic grade lines are plotted on the attached drawing #84-4286-SW4-Rev 2. These 1:100 year hydraulic grade lines plus an additional 0.3 m (1.0 ft.) allowance represent the minimum basement elevation for units connected to this sewer.

5. INTERIM DRAINAGE

It is important to note that the storm drainage system detailed herein has been analysed under full development. As development proceeds, the design of individual clusters will require evaluation of the handling of interim storm runoff in addition to the provision of the final designs required. Thus for any downstream area developing before final upstream drainage systems are in place, interim drainage must be assessed and accounted for.

6. CONCLUSIONS

The following conclusions have been made based on the analyses carried out for this report:

1. Revisions to the method of conveyance of some of the minor storm flows to the central trunk will not result in any significant change in the performance of this central trunk. The discharges for a 1:5 year and a 1:100 year storm from this trunk into Beaver Pond are 9.3 m^3/s and 12.9 m^3/s respectively.

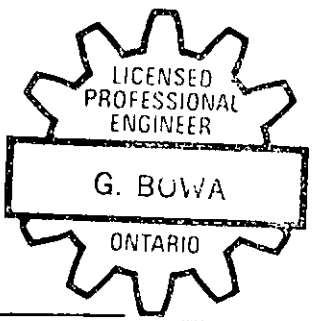
2. An open drainage channel within the golf course will replace the south tributary sewer pipe for conveyance of runoff to the central trunk. The inlet structure is to be designed to discharge 1.8 m^3/sec and 2.7 m^3/sec for the 1:5 year and 1:100 year storms respectively.

3. The runoff from the western subcatchments of Ponds 8 and 9 (upstream of the golf course) will be conveyed by open channels within the golf course to the central trunk.

4. Storage volumes required in Beaver Pond for a 1:5 year and a 1:100 year storm are 8.29 ha-m and 18.71 ha-m respectively. Water levels for the 1:5 year and 1:100 year storm would be at elevations of 91.7 m and 92.8 m respectively. The normal water level in Beaver Pond will be 91.0 metres.

5. The temporary storage sites require runoff storage in the volumes as set out in Table I of this report.

All of which is respectfully submitted.



PREPARED BY: _____
George Bowa, P.Eng.

APPROVED BY: _____
Joseph B. Mangione, P.Eng.

1. CONTRACTOR TO ENSURE MIN 300mm SUBSOIL THROUGH OUT GRADING AREA I DELINEATED PARIMETER

2. ALL BLASTED AREAS TO BE COVERED WITH MIN 450 mm SUBSOIL (INCLUDING ROCK AREAS) IRRIGATION TRENCHING WHICH MUST HAVE MIN. 300 mm SOIL COVER, MUST BE FLUSH WITH SURROUNDING GRADES. MOUNDING OVER TRENCHING TO ENSURE MIN REQUIRED SOIL COVER WILL NOT BE ACCEPTED (N.I.C.)

3. AGP LANDSCAPE ARCHITECT MAY PERMIT MORE SUITABLE LOCATION IN FIELD

4. PERIMETER DRAINAGE TO BE ENGINEERED THROUGHOUT

5. DETAIL KEY PLAN DOES NOT FORM PART OF THIS CONTRACT

EXISTING CONTOUR

PROPOSED CONTOUR AT GRADE ELEVATION

SURFACE DRAINAGE

CART PATH

CONTOUR INTERVAL .5m

DELINEATED FAIRWAY

Eaked Crescent

POTENTIAL DITCH DISPOSAL AREA

NOTE:
ALL WORK WITHIN ROAD ALLOWANCE TO N.I.C. - ROAD TO REMAIN FULLY OPEN THROUGH OUT DURATION OF CONTRACT

NOTE:
WORK WITHIN ROAD ALLOWANCE TO N.I.C. ROAD TO REMAIN FULLY OPEN THROUGH OUT DURATION OF CONTRACT

Reference Drawings

- GIFFELS ASSOCIATES LTD
  KANATA LAKES S.A. ARTERIAL DESIGN
  SITE GRADING PLAN, BLADE AREA / BRIDGE DRIVE
  W86073/DWG NO 11 JAN 87
- GIFFELS ASSOCIATES LTD
  KANATA LAKES S.A. ARTERIAL DESIGN
  SITE GRADING PLAN EAKED CRESCENT
  W86073/DWG NO 10 JAN 87
- J.L. RICHARDS + ASSOCIATES LTD
  KANATA LAKES "THE PINES"
  SITE GRADING PLAN
  DWG NO #6 8744-GC FEB 87
  #8 8744 REV JAN 88
  #10 JAN 88
  #9 DEC 87

1:1000 NO.5

NO	REVISIONS	DATE	BY	APP'D
-	ISSUED FOR REVIEW	FEB/88		
2	REVISED GRADING/LOT ELEV.	1/29/88		
1	Alterations as per reference dwg.	15/12/87	jh	

Project:
KANATA GOLF & COUNTRY CLUB

Prepared for:
CAMPEAU CORPORATION
365 LAURIER AVE. W.
OTTAWA, ONTARIO

Prepared by:
THOMAS McBROOM ASSOCIATES LTD.
Suite 305 120 Carlton Toronto
Golf Course Architects

Drawing Title:
Grading & Drainage
ULTIMATE NO 5

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS SIGNED BY THE LANDSCAPE ARCHITECT

DESIGN	TM / JH
DRAWN	JH / MC
CHECKED	
SCALE	1:500
DATE	JULY 15/86
DWG. NO.	5-G-2

NO. 3.

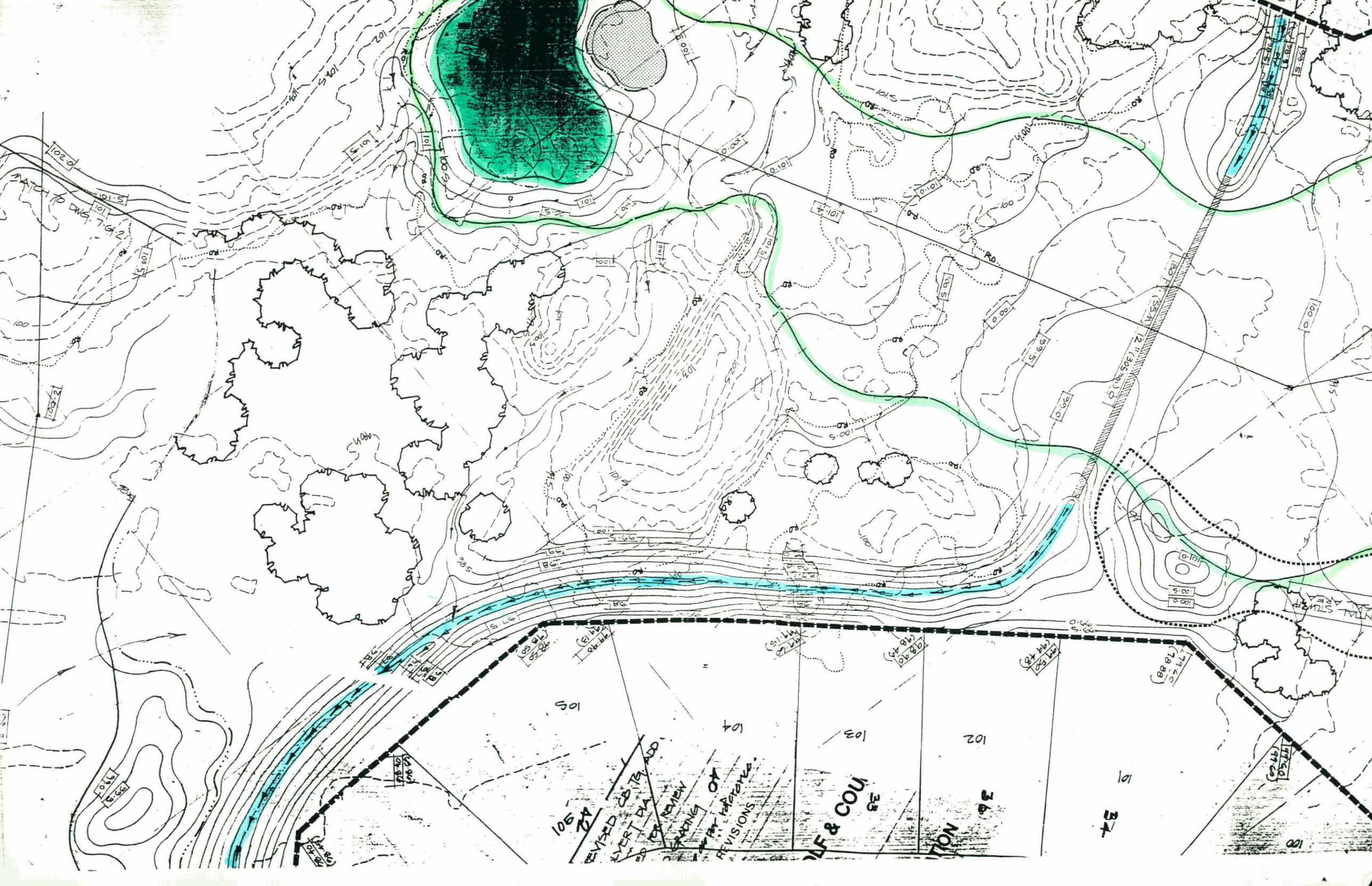
Prepared by:
THOMAS McBROOM ASSOCIA...
Suite 305 120 Carlton Toronto
Golf Course Architects

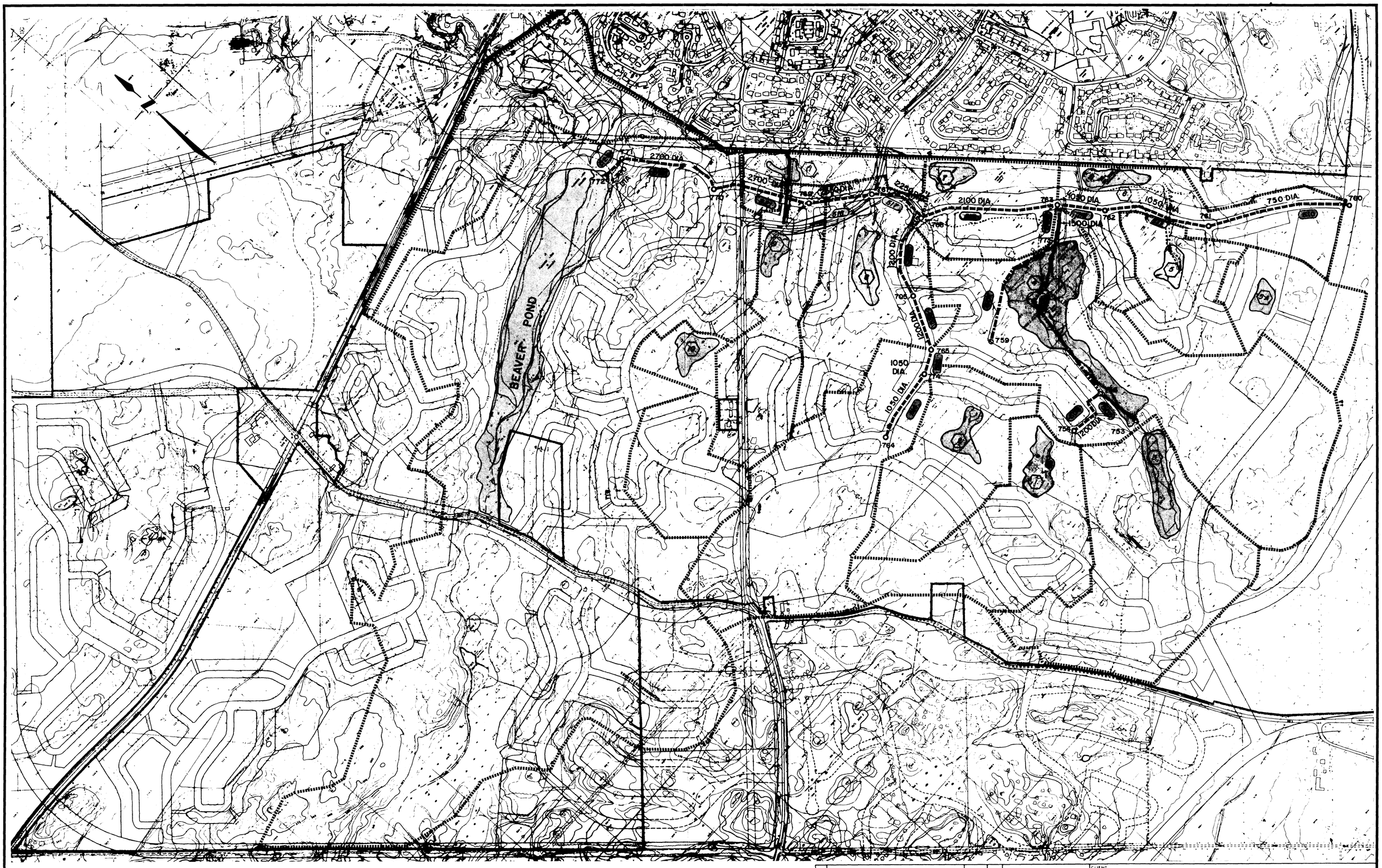
Drawing Title:
GRADING & DRAINAGE
ALTERNATE No 5 (SOUTH HALF)
ALTERNATE No 7

THIS DRAWING SHALL NOT BE USED FOR CONS... POSES UNLESS SIGNED BY THE LANDSCAPE ...

DESIGN -

SCALE 1:1000


MATCH TO DWG. 7-G-2
REVISED CB TO ADD
CULVERT DIA.
REVISIONS
101
102
103
104
105



LEGEND

- MINOR SYSTEM TRUNK SEWERS
- 2100 DIA. — SIZE OF STORM TRUNK IN MILLIMETERS
- (512) — STORM SEWER SEGMENT NUMBERS
- MAJOR STORM POND AREAS (100 YR.)
- 760 — MANHOLE NUMBER
- (11) — POND NUMBERS
- MAJOR SYSTEM CATCHMENT AREA BOUNDARY
- OPEN CHANNEL

No	REVISIONS	DATE	BY
1	GEN. REV. AS PER ADD. NO.1 REPORT SEPT./86	4/9/86	G.J.R

APP'D

DESIGN G.B.
DRAWN T.J.W.
CHECKED D.F.M.

CLIENT: CAMPEAU CORPORATION

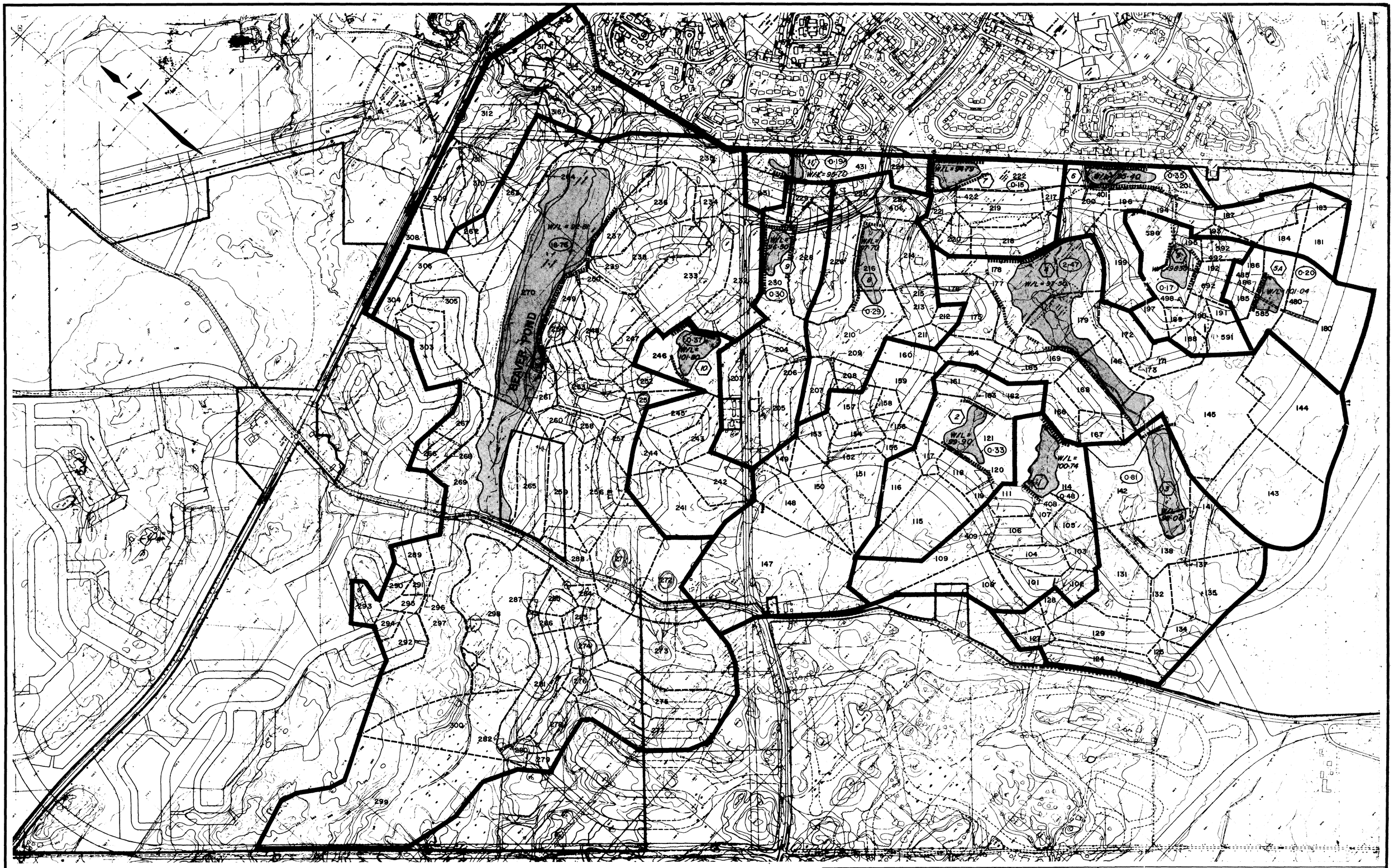
PROJECT: KANATA LAKES

TITLE: MINOR SYSTEM PLAN

OLIVER MANGIONE McCALLA & ASSOCIATES LIMITED
Consulting Engineers — Nepean Ontario

DATE	SCALE	DRAWING NO	REV
FEBRUARY 1985	1 : 5000	84-4286-SW2	1

K+E HERCULENE



LEGEND

- MAJOR STORM POND AREA (100 YR)
- MAJOR SYSTEM CATCHMENT AREA BOUNDARY
- SUBCATCHMENT BOUNDARY
- 270 — SUBCATCHMENT & STREET SECTION NUMBER
- (11) — POND NUMBERS
- W/L=99.70 — 100 YR. WATER ELEVATION IN METERS
- (18.71) — 100 YR. STORAGE VOLUMES, ha.-m
- GRADE CONTROL LIMIT

No.	REVISIONS	DATE	BY
1	GEN. REV. AS PER ADD. NO 1 REPORT SEPT/86	4/9/86	G.J.R.

APP'D

DESIGN G.B.
DRAWN T.J.W.
CHECKED D.F.M.

CLIENT: CAMPEAU CORPORATION

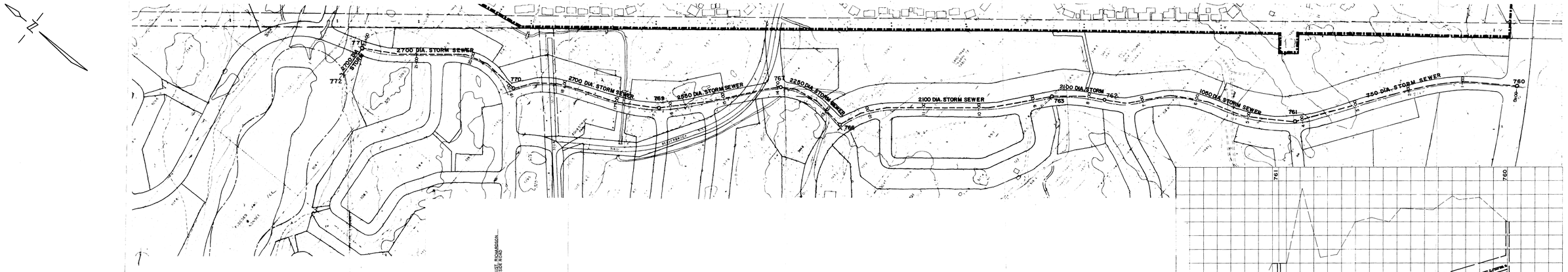
PROJECT: KANATA LAKES

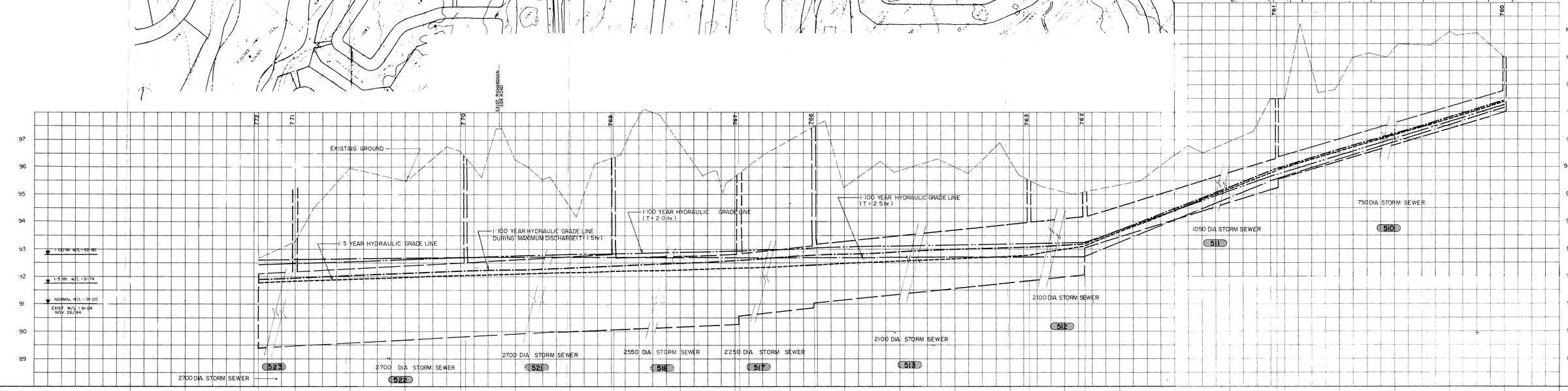
TITLE: MAJOR SYSTEM PLAN

OLIVER MANGIONE McCALLA & ASSOCIATES LIMITED
Consulting Engineers — Nepean, Ontario

DATE	SCALE	DRAWING Nº	REV.
FEBRUARY 1985	1 : 5000	84-4286-SW3	1

K&E HERCULENE® DRAFTING FILM





LEGEND

522 STORM SEWER SEGMENT NUMBERS

770 MANHOLE NUMBERS

No.	REVISIONS	DATE	BY
2	GEN. REV. AS PER ADD NO. 1 REPORT SEPT/86	4/9/86	G.J.R.
1	GENERAL REVISIONS	13/3/85	G.J.R.

APP'D. _____

DESIGN G.B.
DRAWN T.J.W.
CHECKED D.F.M.

CLIENT: CAMPEAU CORPORATION

PROJECT: KANATA LAKES

TITLE: PLAN & PROFILE
STORM TRUNK SYSTEM

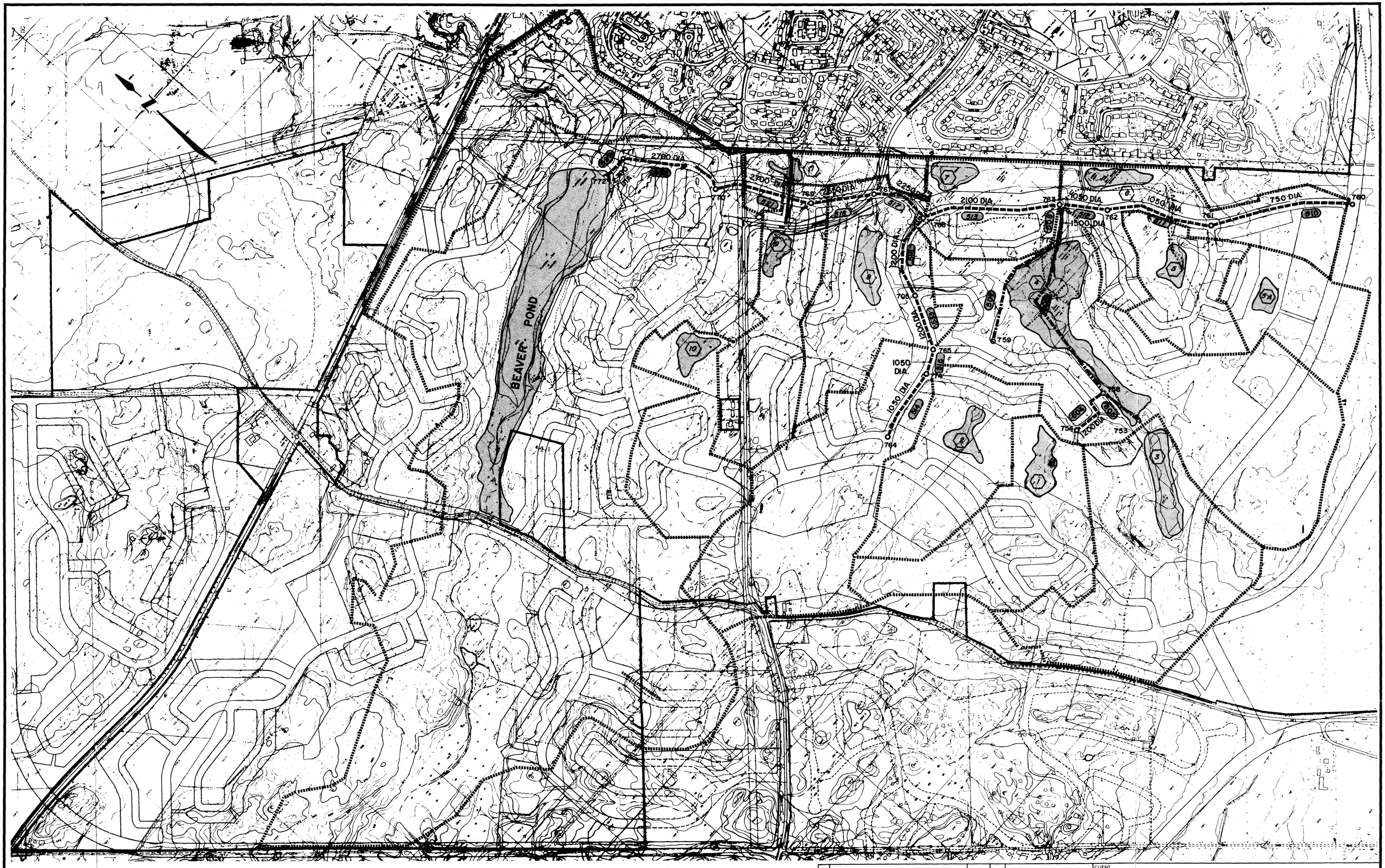
OLIVER MANGIONE McCALLA & ASSOCIATES LIMITED
Consulting Engineers
Ottawa

DATE: DECEMBER, 1984

SCALE: HORZ. : 1:2500
VERT. : 1:50

DRAWING No. 84-4286-SW4

REV. 2



LEGEND

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- OPEN CHANNEL

No.	REVISIONS	DATE	BY
1	GEN. REV. AS PER ADD. NO. 1 REPORT SEPT./86	4/9/86	G.J.R

APP'D

DESIGN G.B.
DRAWN T.J.W.
CHECKED D.F.M.

CLIENT: CAMPEAU CORPORATION

PROJECT: KANATA LAKES

TITLE: MINOR SYSTEM PLAN

OLIVER MANGIONE McCALLA & ASSOCIATES LIMITED
Consulting Engineers
Nepean, Ontario

DATE: FEBRUARY 1985 | SCALE: 1:5000 | DRAWING Nº: 84-4286-SW2 | REV.: 1

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