

DATA REPORT  
ON  
GREAT LAKES  
CURRENT SURVEYS  
1975

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ABSTRACT

In 1975, the Tides and Water Levels Section of the Canadian Hydrographic Service, Central Region, conducted a current survey in the major harbours in Lake Ontario, at some locations on Lake Huron, and on the St. Lawrence River. The main purpose of this survey was to produce data for inclusion on hydrographic charts which would be useful to the small craft boater.

This report presents the station location and the magnitude and the direction of the currents observed. It also gives recommendations regarding the publication of these observations on CHS charts.

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## INTRODUCTION

There are three types of surface currents: those affected mainly by the strength and direction of the wind, those occurring naturally due to the shape and the slope of the body of water, and those occurring as a result of man made constructions such as control dams, sluices, flood gates, etc. The latter two types of currents are usually relatively predictable and more easily measurable. This report deals with the measurement of these types of currents and presents methods of depicting them on CHS charts. The majority of data obtained are the result of a field program described in the Canadian Hydrographic Service Final Field Report entitled "Lake Ontario Current Survey - 1975". Data were also obtained during the Lake Huron survey and the Revisory II survey of 1975.

## OPERATIONS

The currents were measured with ENDECO and GURLEY portable current meters, using an anchored launch as the measurement platform. Each station was positioned using either sextant, radar or photo-identification. Current profiles were obtained at several locations, with observations taken at the surface, at  $0.2 \times$  depth,  $0.4 \times$  depth,  $0.6 \times$  depth and at the bottom.

Each station location is listed in Appendix I, along with the depth of observation, current speed and direction and total depth of water.

### DISCUSSION OF DATA AND RECOMMENDATIONS

Some of the major criteria considered when deciding whether the current data is significant to navigation, are:

1. The strength of the current must be in excess of 0.2 knot (Standing Order 70-4, Section VI).
2. The depth at which observations are obtained should be equivalent to the draft of vessels using the waters (Hydrographic Tidal Manual).
3. The relationship of current magnitude, direction, frequency and duration to seasonal and atmospheric changes must be considered.

Since no current observations were taken in winds greater than 15 m.p.h., wind effects on the observations can be disregarded.

A total of 149 stations were occupied. At the majority of these, a current speed of less than 0.2 knots was measured. A few stations did show currents between 0.2 and 0.5 knots but they were classified as areas of secondary importance due mainly to their remote locations. However, five locations - namely: Port Weller, Port Dalhousie, Port Hope, Kingston, Thousand Islands and the St. Lawrence River - yielded currents of 1.0 knot or more. These currents, their location and their possible effect on small boat navigation are discussed below.

It is recommended that the pertinent data be added to new editions of the particular charts affected.

Port Weller

This artificial harbour forms the Lake Ontario entrance to the Welland Canal. During the dewatering of Lock No. 1, a current of 1.0 knot was observed between signal L/A 1 and signal L/A 2 at station WEL-1. Increased current would result if the regulating weir beside Lock No. 1 were put to use at the same time that dewatering occurs. This flow is of little importance to large ships but may affect small craft manoeuvring in and out of the small boat wharf north of Lock No. 1.

Recommendation

A note should be placed on the Chart 2042 stating: "Currents of up to one (1) knot can be expected during the dewatering of Lock No. 1."

# WELLAND CANAL

### DEPTHS IN FEET

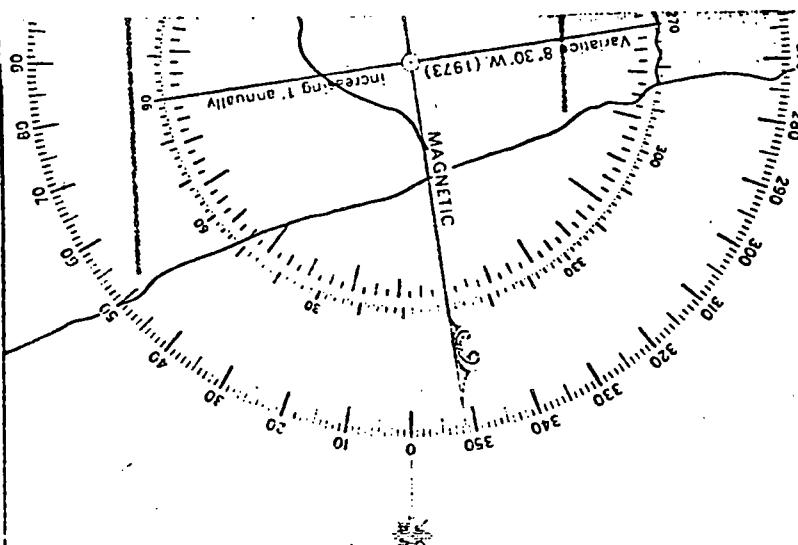
reduced to chart datum which is the level surface of Lake Erie when the Canadian Hydrographic Service gauge at Port Colborne reads 568.6 feet (173.3 metres) and the level surface of Lake Ontario when the Canadian Hydrographic Service gauge at Kingston reads 242.8 feet (74.0 metres).

In the canal, water areas with depths less than 27 feet are tinted blue. The canal channels with the controlling depth of 27 feet are uncoloured.

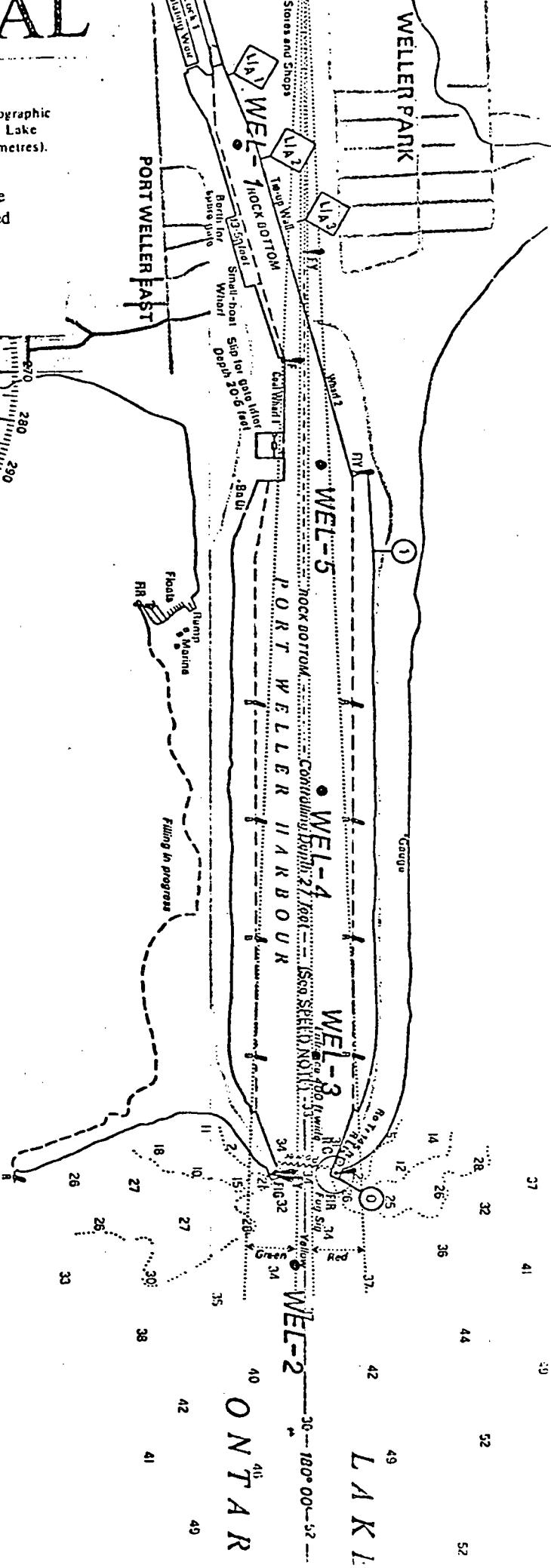
Heights are expressed in feet above the datum of soundings

For complete list of Symbols and Abbreviations see Chart No. I

Scale 1:15,000



## chart 2042



Port Dalhousie

This harbour is used mainly by small craft. Skill and care must be exercised when navigating near Snug Harbour Marina which is situated just downstream (150 metres) of a structure controlling the flow from Martindale Pond to the harbour. Currents up to 3 knots are common, especially in high water years. Strong eddies and cross-currents are visible in the area.

Observations taken along the length of the canal showed a gradually decreasing velocity to approximately 1.0 knot opposite the Dalhousie Yacht Club, and negligible currents at the harbour entrance.

Recommendation

Standard current arrows should be placed on Chart 2070 showing direction and magnitudes at stations DAL-3, DAL-2 and DAL-1.

The chart presently shows a note stating "Fast water when sluice gates open." This note should be changed to read: "Currents of up to 3.0 knots when the sluice gates open".

Scale of Metres

200 100 0 400 500 600 700 800 900 1000

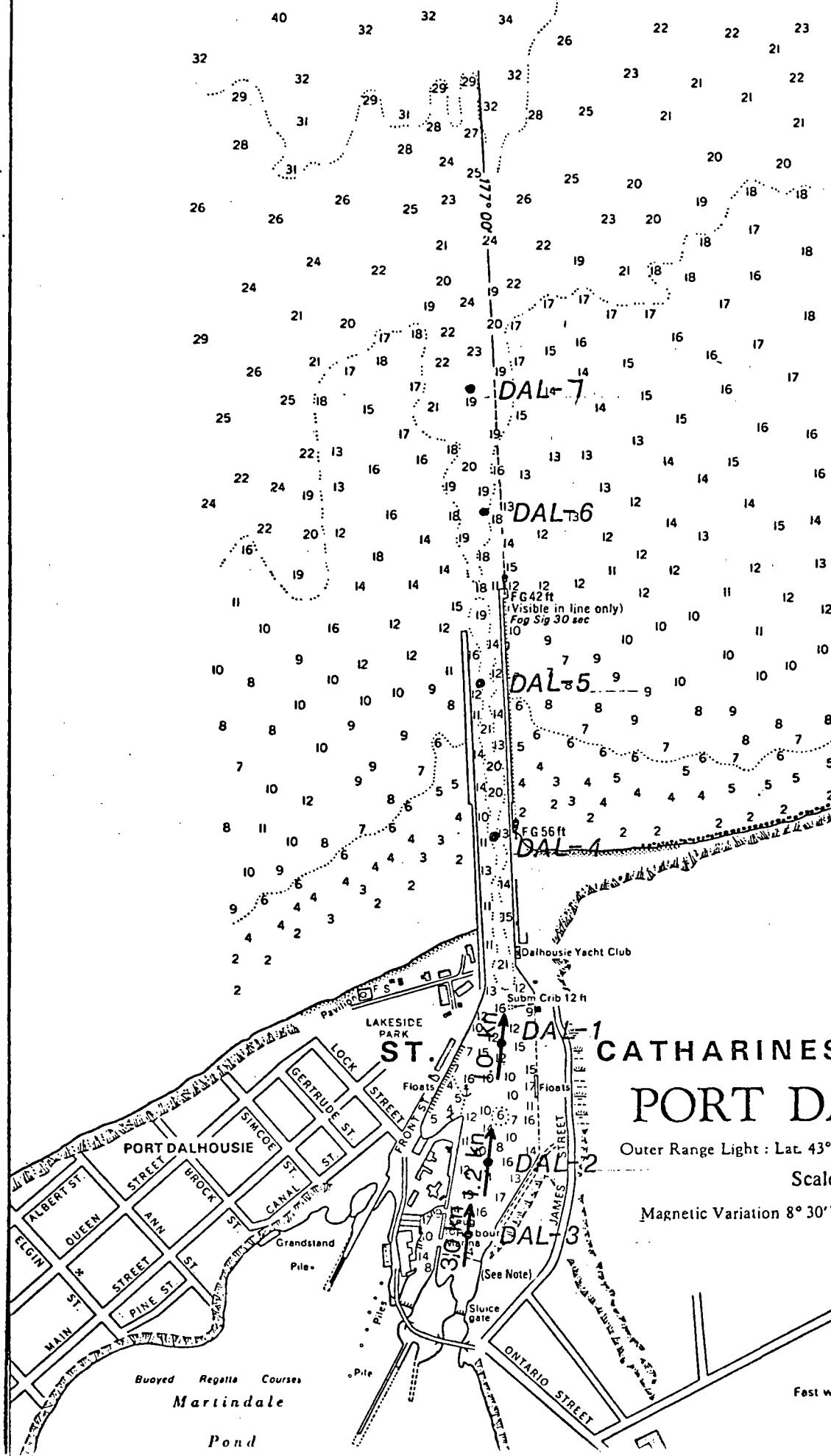


chart 2070

## CATHARINES

## PORT DALHOUSIE

Outer Range Light : Lat.  $43^{\circ} 12' 39''$  N., Long.  $79^{\circ} 15' 49''$  W.

Scale 1:10,596

Magnetic Variation  $8^{\circ} 30'$  W. (1974) increasing 1' annually

NOTE

Fast water when sluice gates open.

Port Hope Harbour

No significant currents were measured in the entrance of the main harbour but a curious phenomena did present itself in the channel leading into the Ganaraska River. The water seems to build up for a period of time rather than flow continuously through the channel. This build up has a period of approximately 20 minutes and produces maximum currents of 0.7 knots. Accompanying this were changes in water levels of approximately 0.4 feet (opposite Skeena Marina).

Recommendation

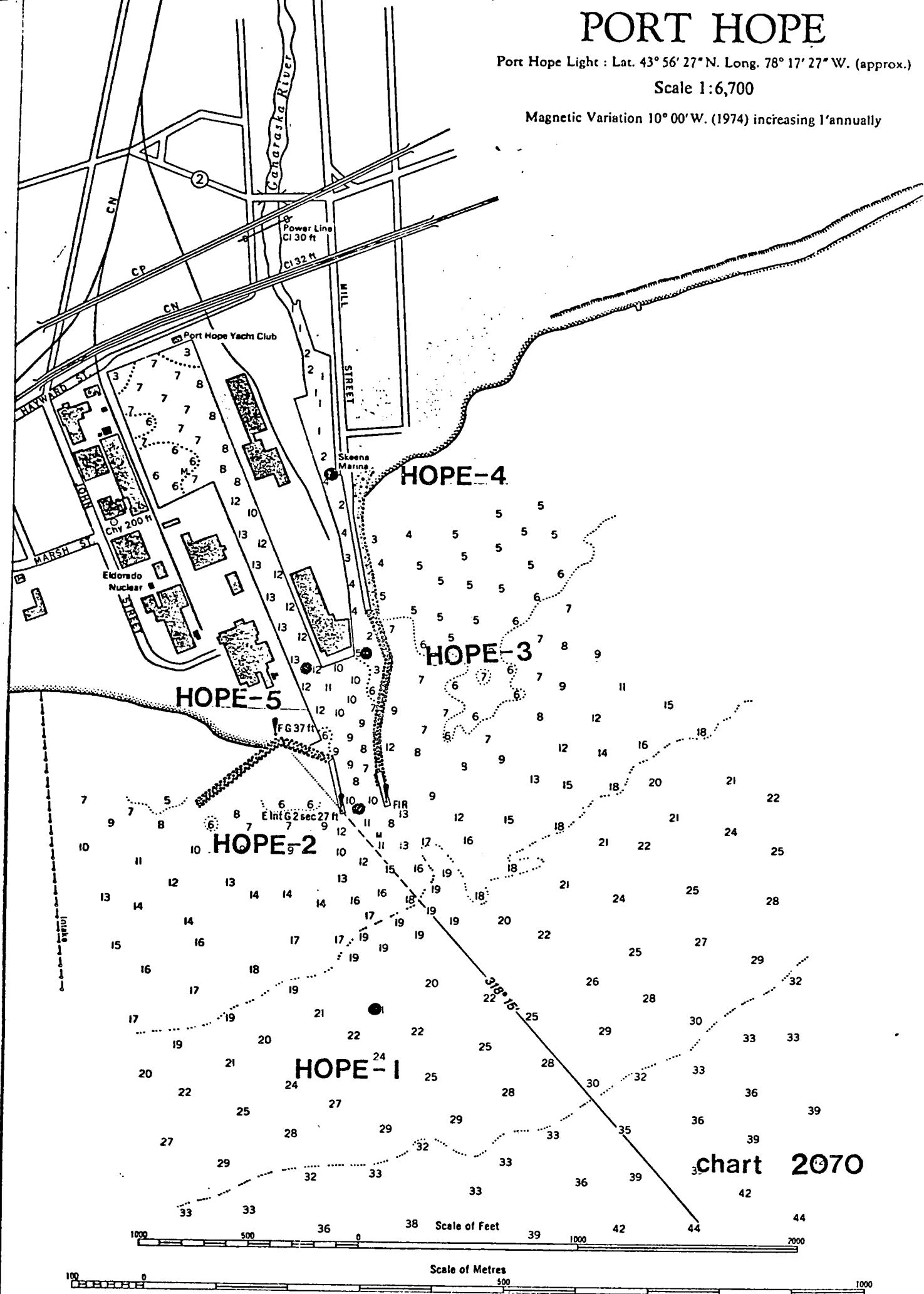
A note should be placed on Charts 2070 and 2058 stating: "Fast water during periods of high outflow from Ganaraska River."

# PORT HOPE

Port Hope Light : Lat.  $43^{\circ} 56' 27''$  N. Long.  $78^{\circ} 17' 27''$  W. (approx.)

Scale 1:6,700

Magnetic Variation  $10^{\circ} 00' W.$  (1974) increasing 1' annually



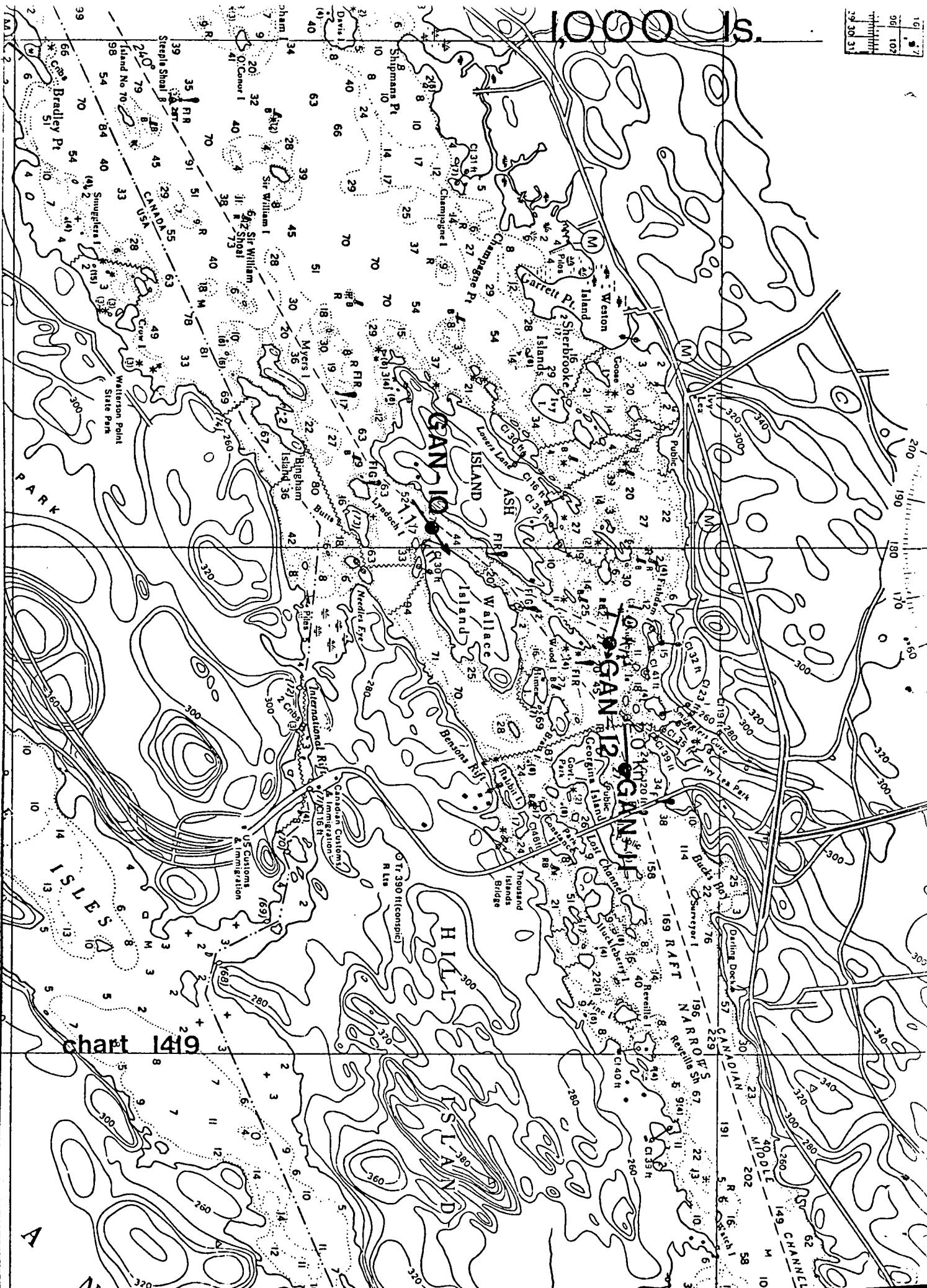
### Kingston and Thousand Islands

The natural flow eastward of the St. Lawrence River is first detected just north of Wolfe Island at station KING-20 (0.3 knots). Moving eastward, the current increases to an average of 0.8 knots west of Howe Island at stations KING-17 and KING-18. At Howe Island, the flow divides and the major flow runs south of the island. The currents in Bateau Channel accelerate from 0.2 to 0.6 knots before scattering at the east end of the channel.

The general eastward flow in the Thousand Islands can be measured almost anywhere but the currents are very small (0.3 knots and less). However, two areas did produce significant currents. The first area is within the Canadian Middle Channel used by tour boats. Current speeds of 1.1, 0.9 and 1.0 knots were measured at stations GAN-1, GAN-2 and GAN-3, respectively. The second area is located in the mid-channel just upstream of the Thousand Island Bridge. Here it was impossible to anchor the survey vessel due to heavy traffic and a swift current estimated to be 2.0 knots.

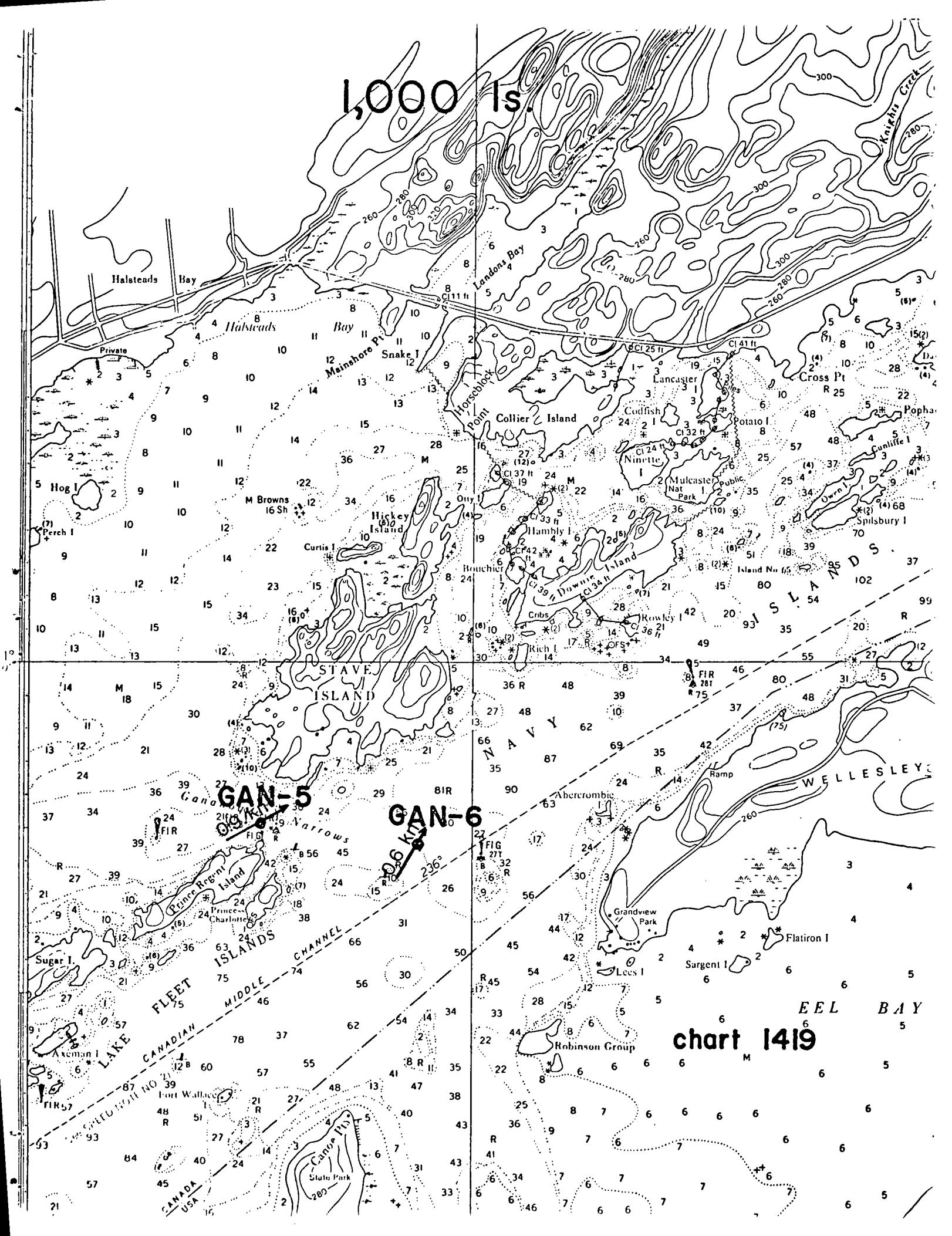
### Recommendation

A representative set of arrows should be used on the charts affected (see copies attached) showing the magnitude and direction of the more significant currents.



1,000

Is.



Scale 1:25,000

1000 IS.

KING-16

GAN-1

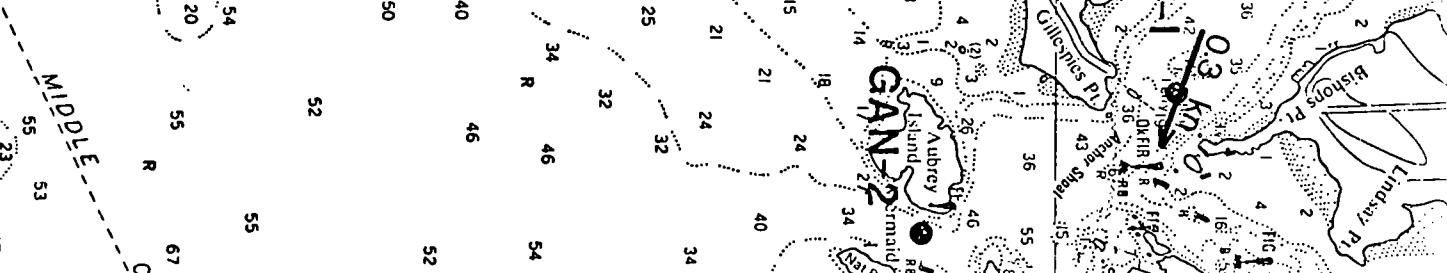
GAN-2

chart 1420

MIDDLE

R

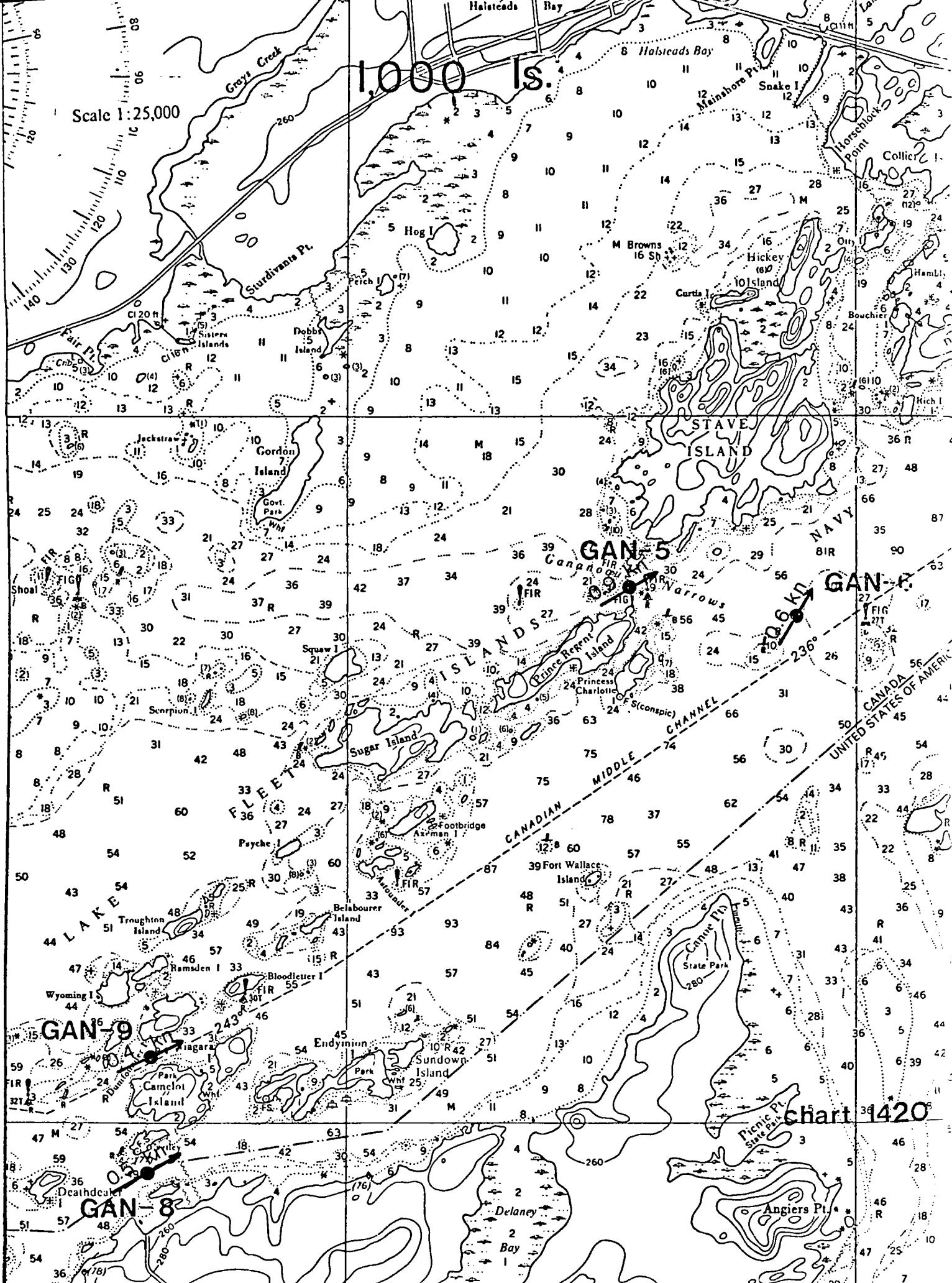
C

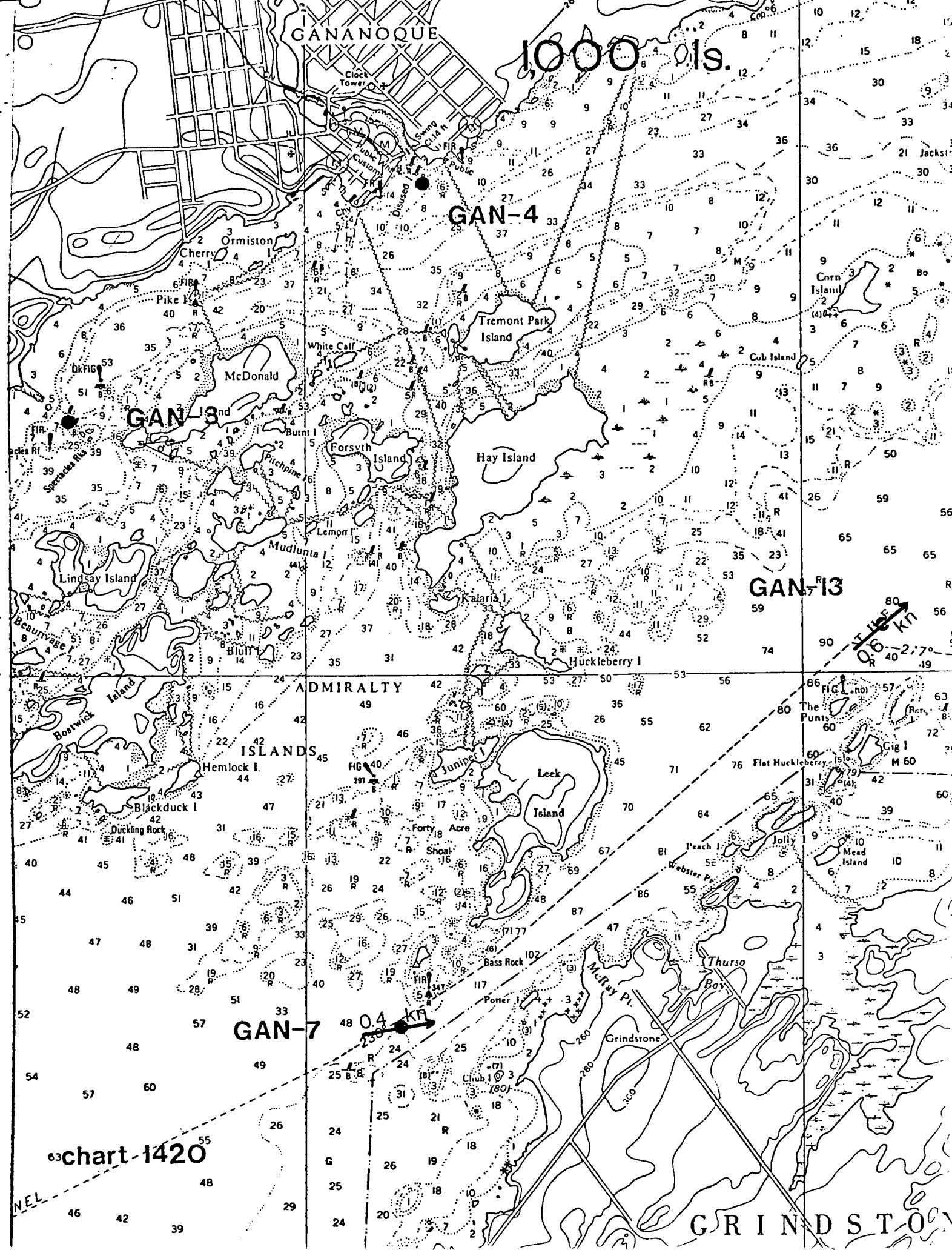


480 02

Scale 1:25,000

1,000 ls

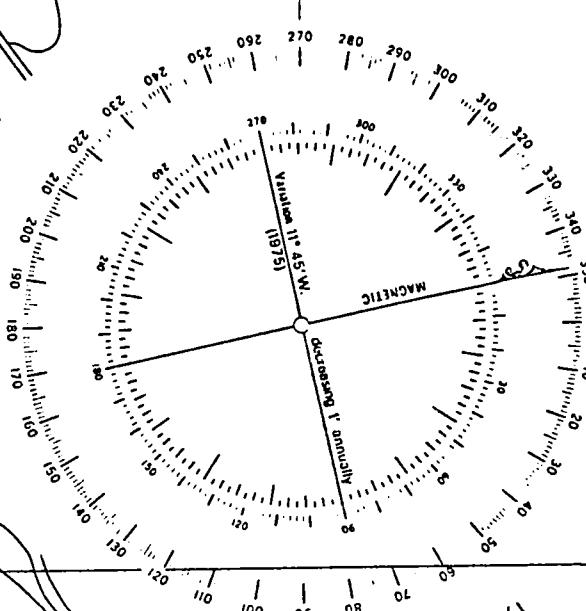
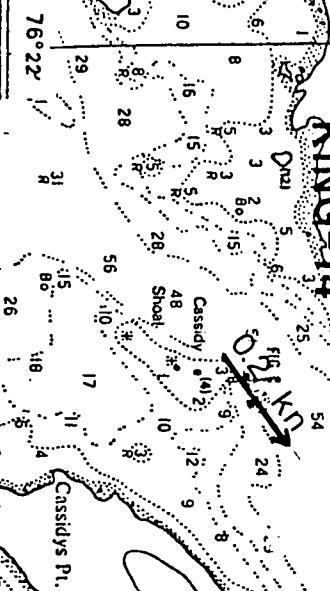




# BATEAU CHANNEL

KINGSTON

KING-14



HOWE  
ISLAND

chart 1420

KING-15 06

12 13 14 15 16 17  
72 78 84 90 96 102  
22 23 24 25 26 27 28 29 30 31

important naviga-  
tions. Tide Tables  
may be obtained on  
Sailing Directions,  
Post Office, Depart-  
ment of Ottawa.

# KINGSTON

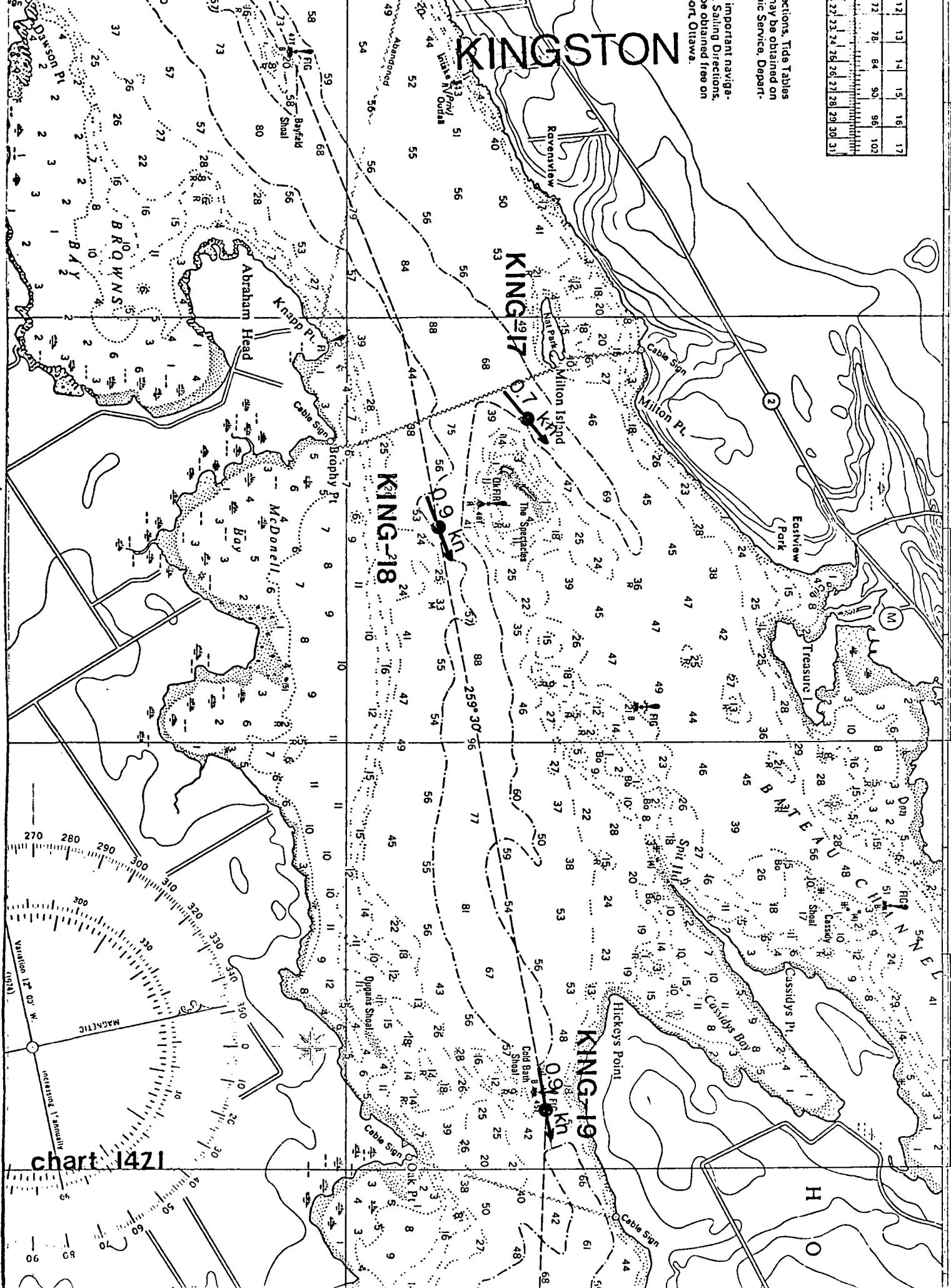


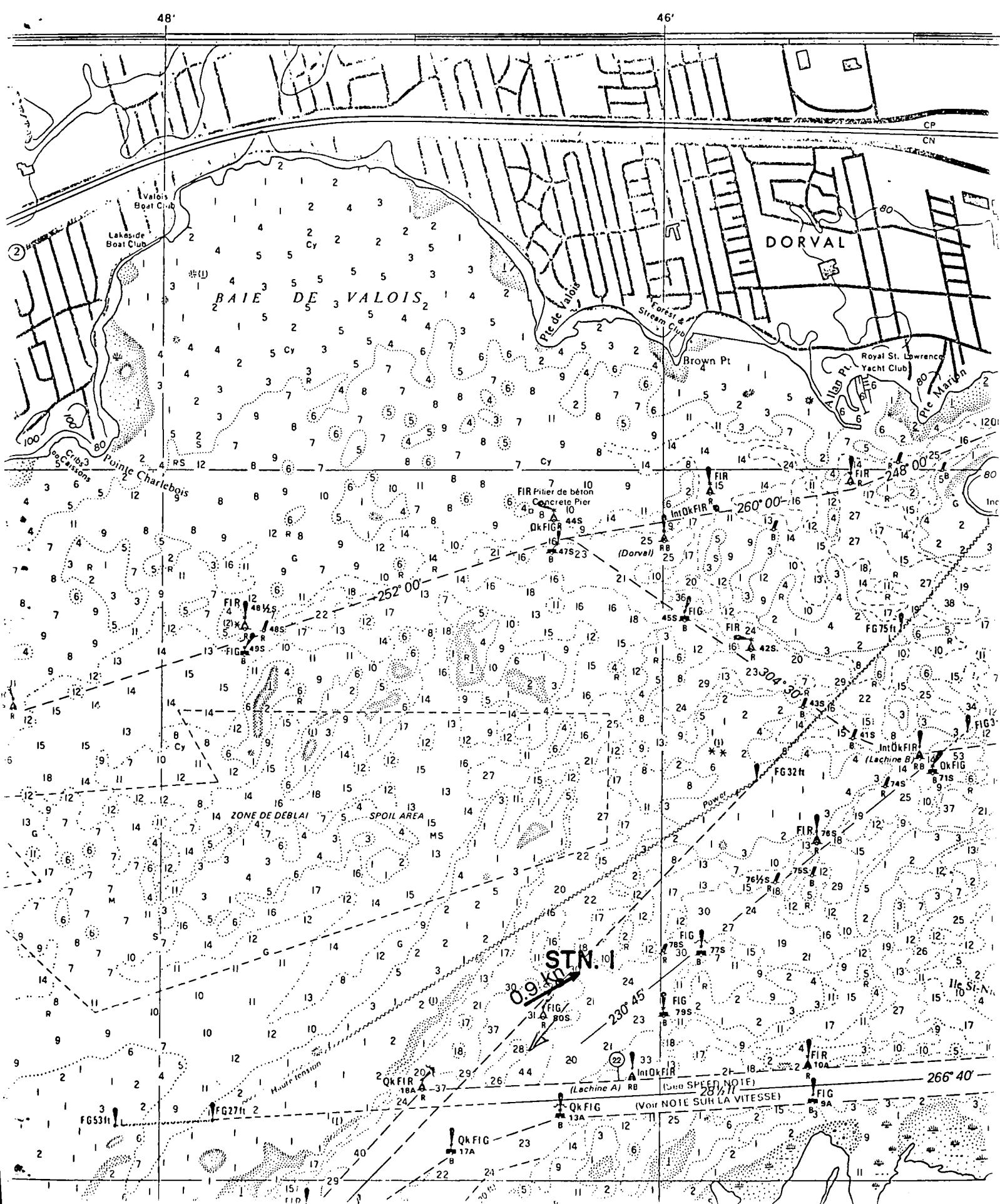
chart 1421

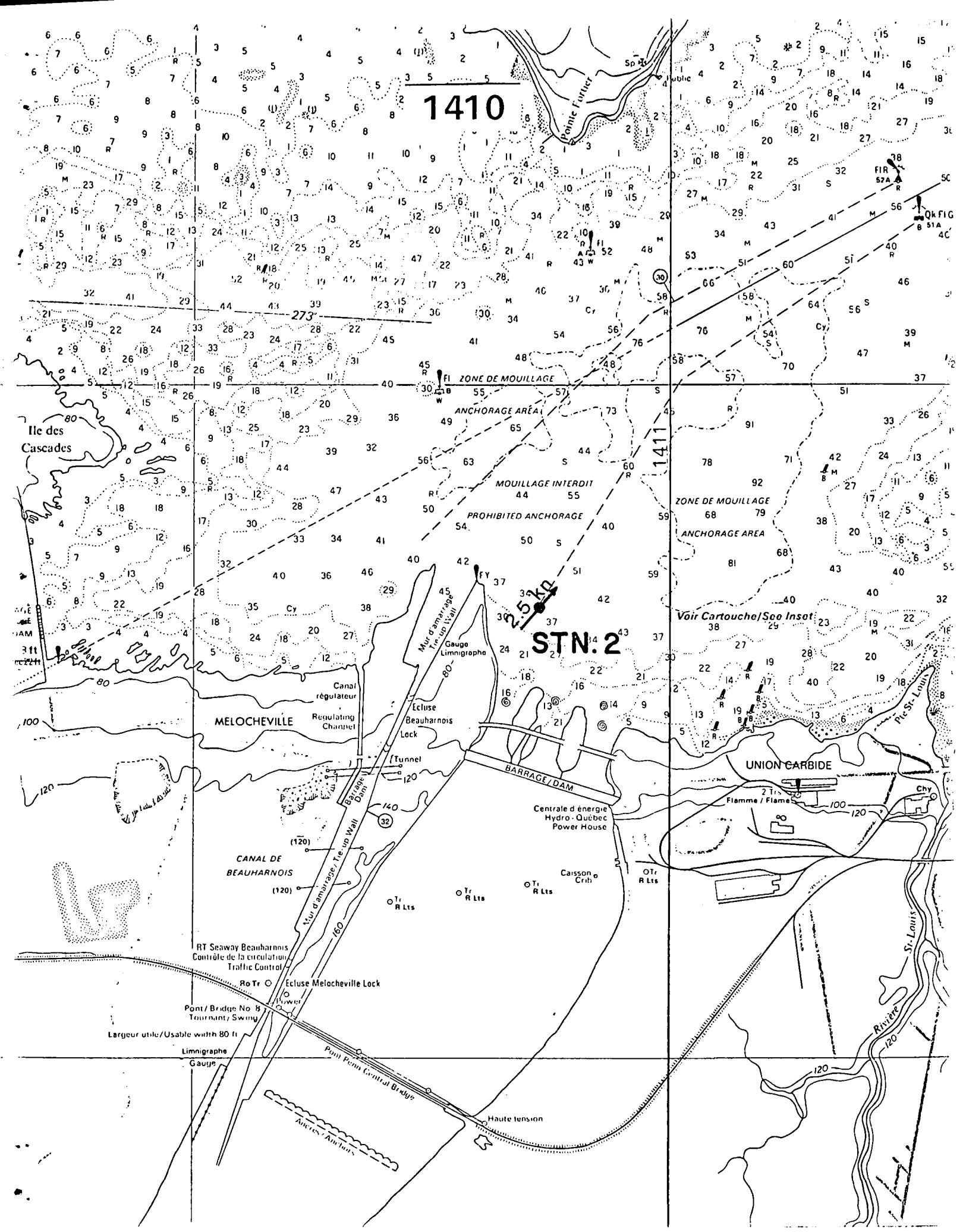
St. Lawrence River

Some of the locations for these measurements were preselected, based on possible hazardous conditions as observed from charts. Such conditions as sharp bends, narrow sections, heavy traffic and shallow water were considered.

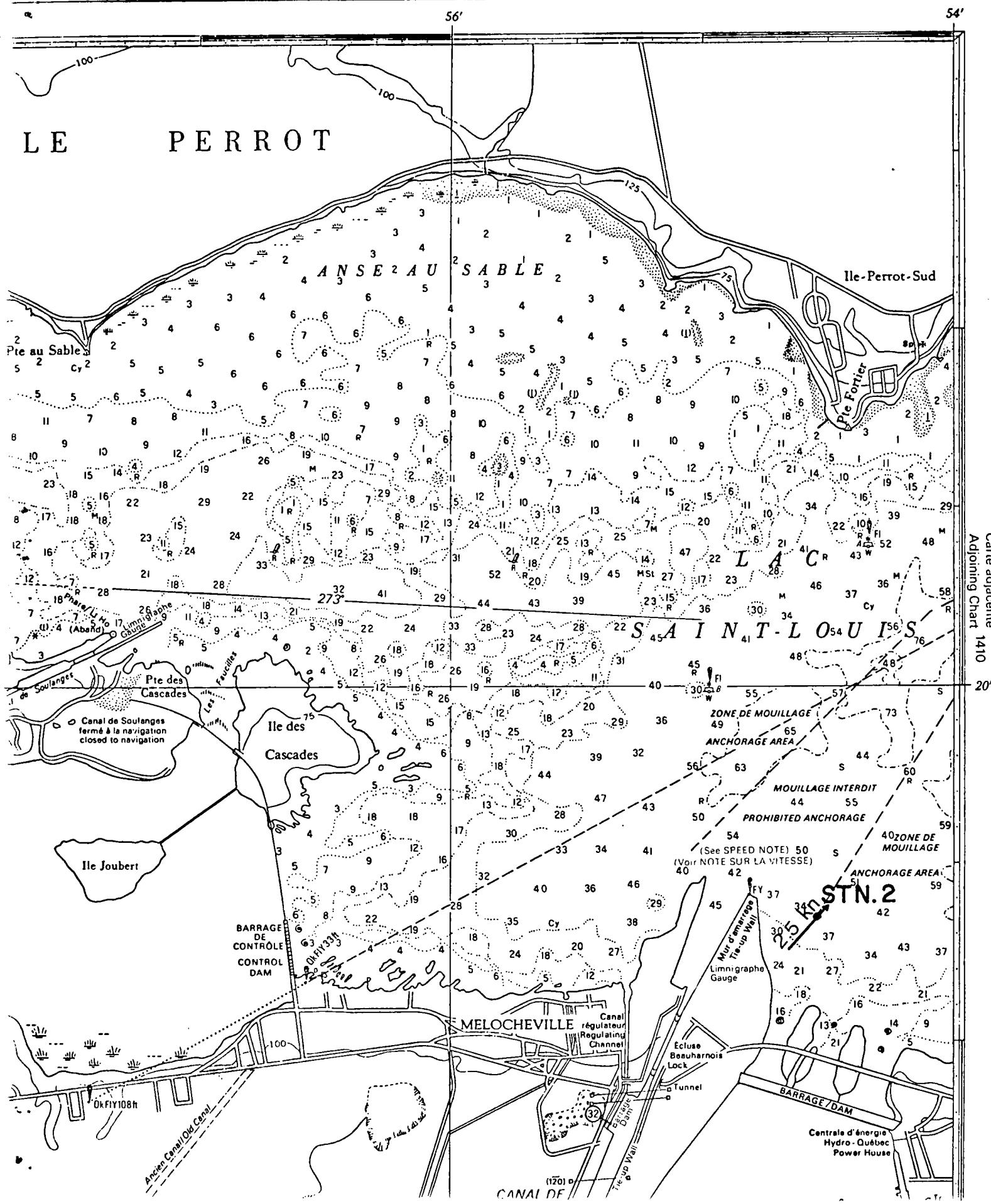
Recommendation

Arrows showing direction and magnitude as shown on the copies of charts attached should be printed on the next edition of Charts 1410 to 1419.

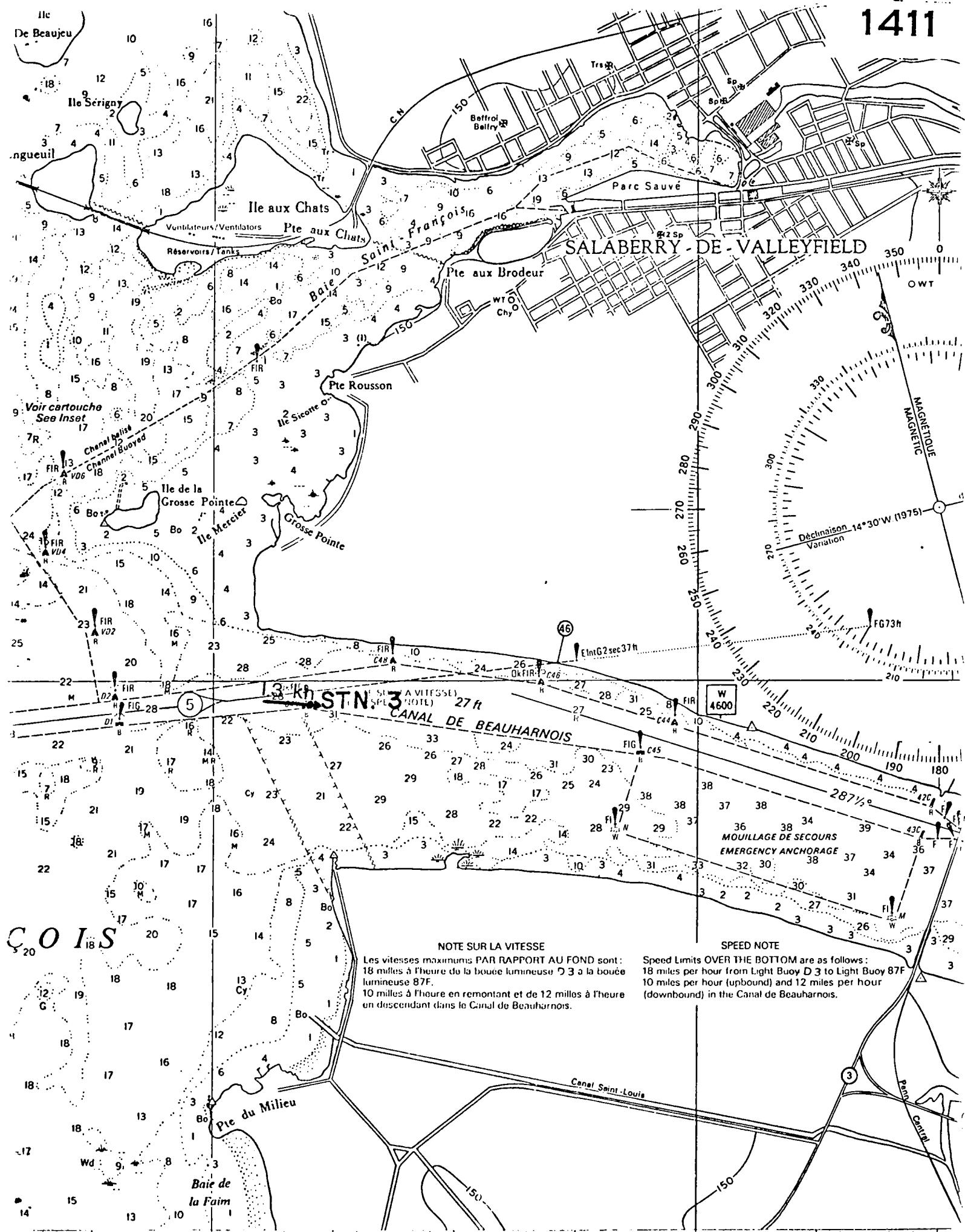


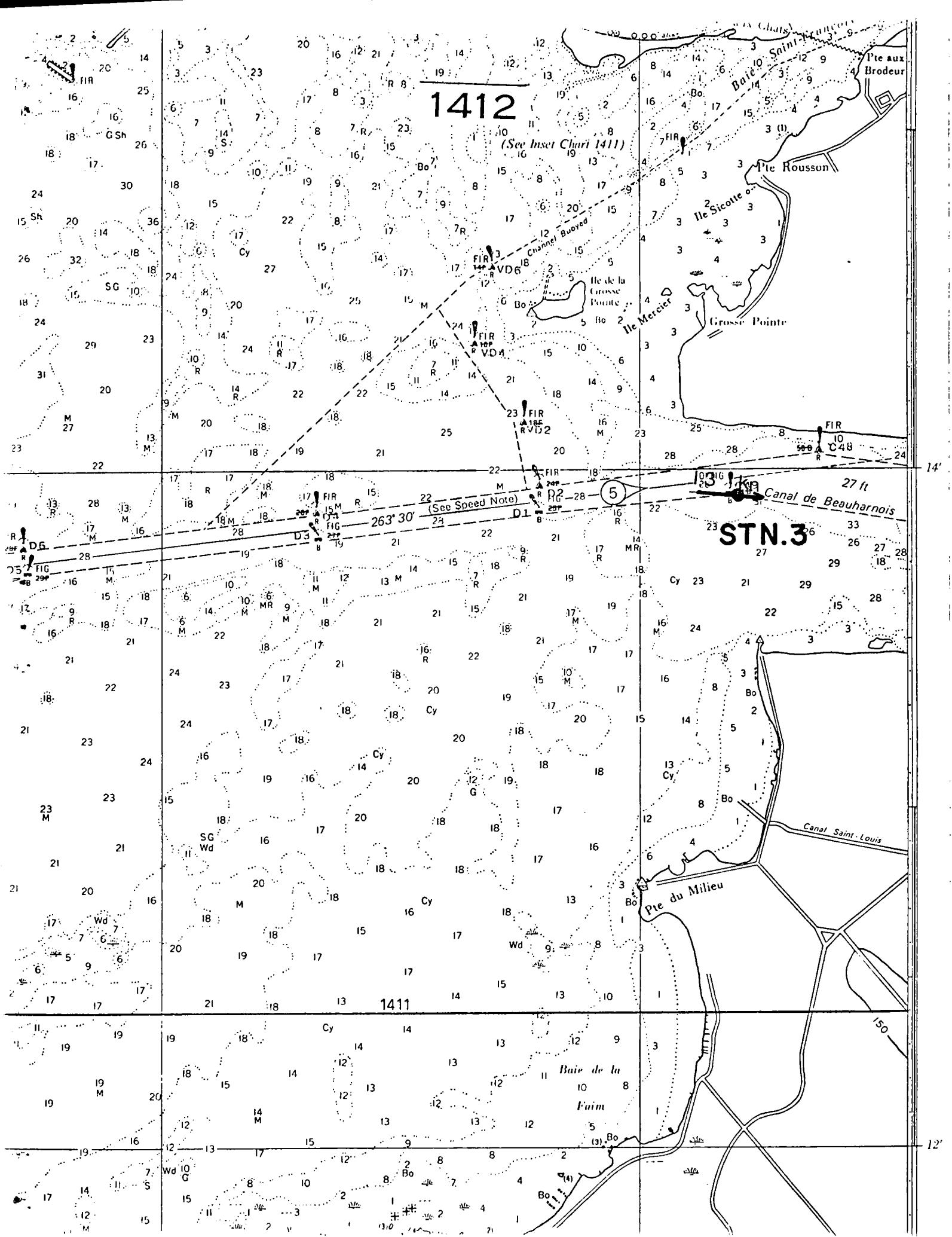


## P E R R O T

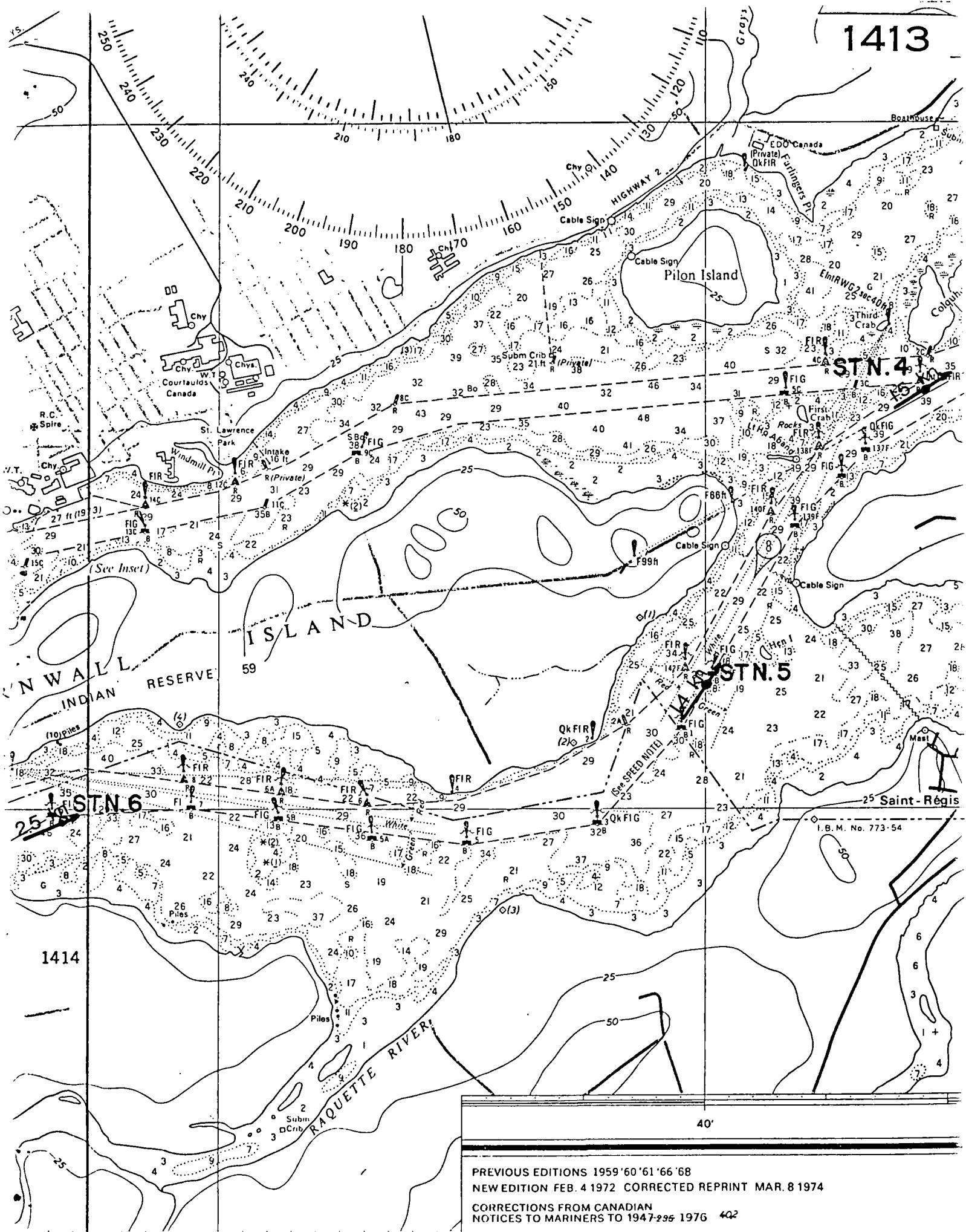


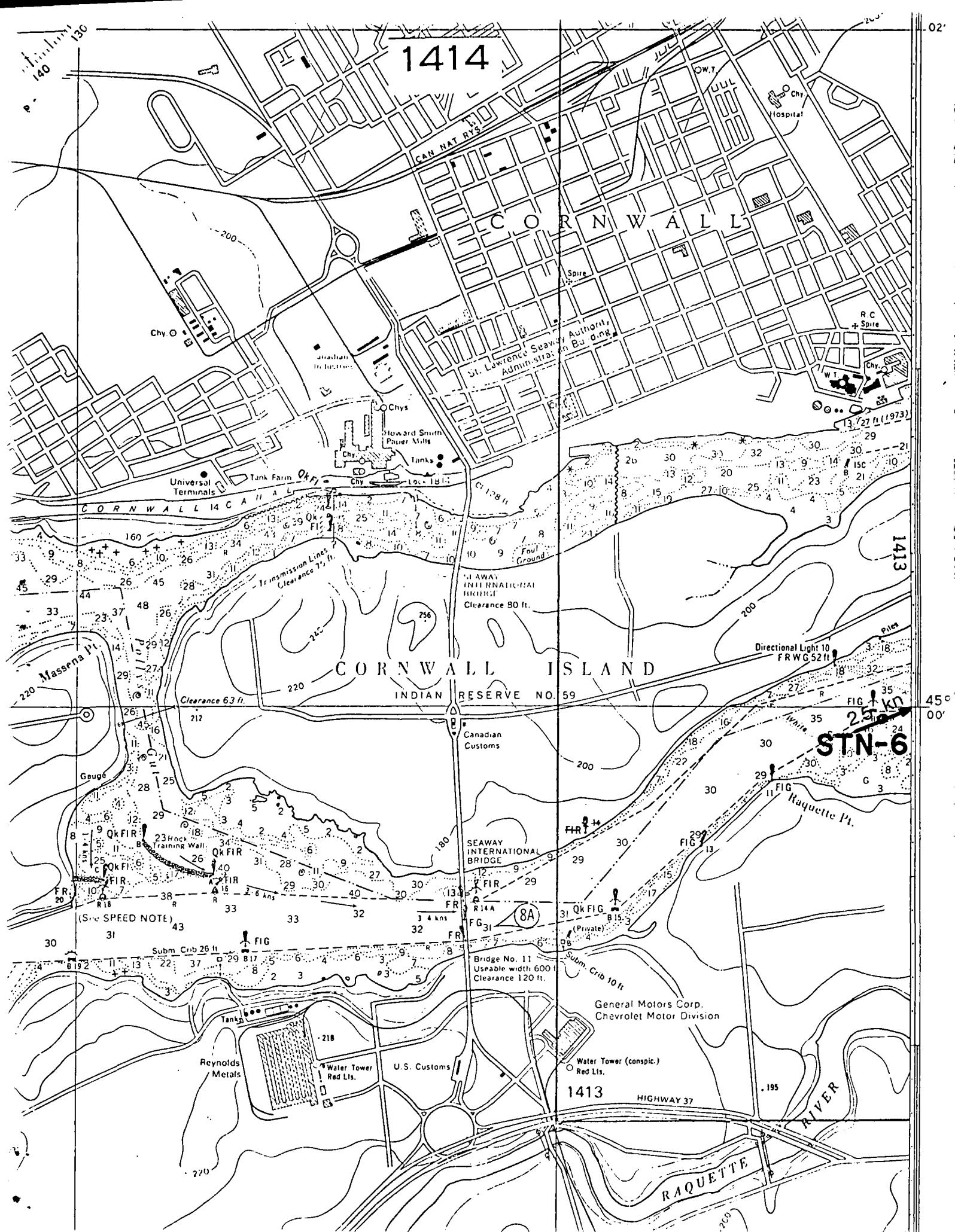
Carte adjacente  
Adjoining Chart 1410

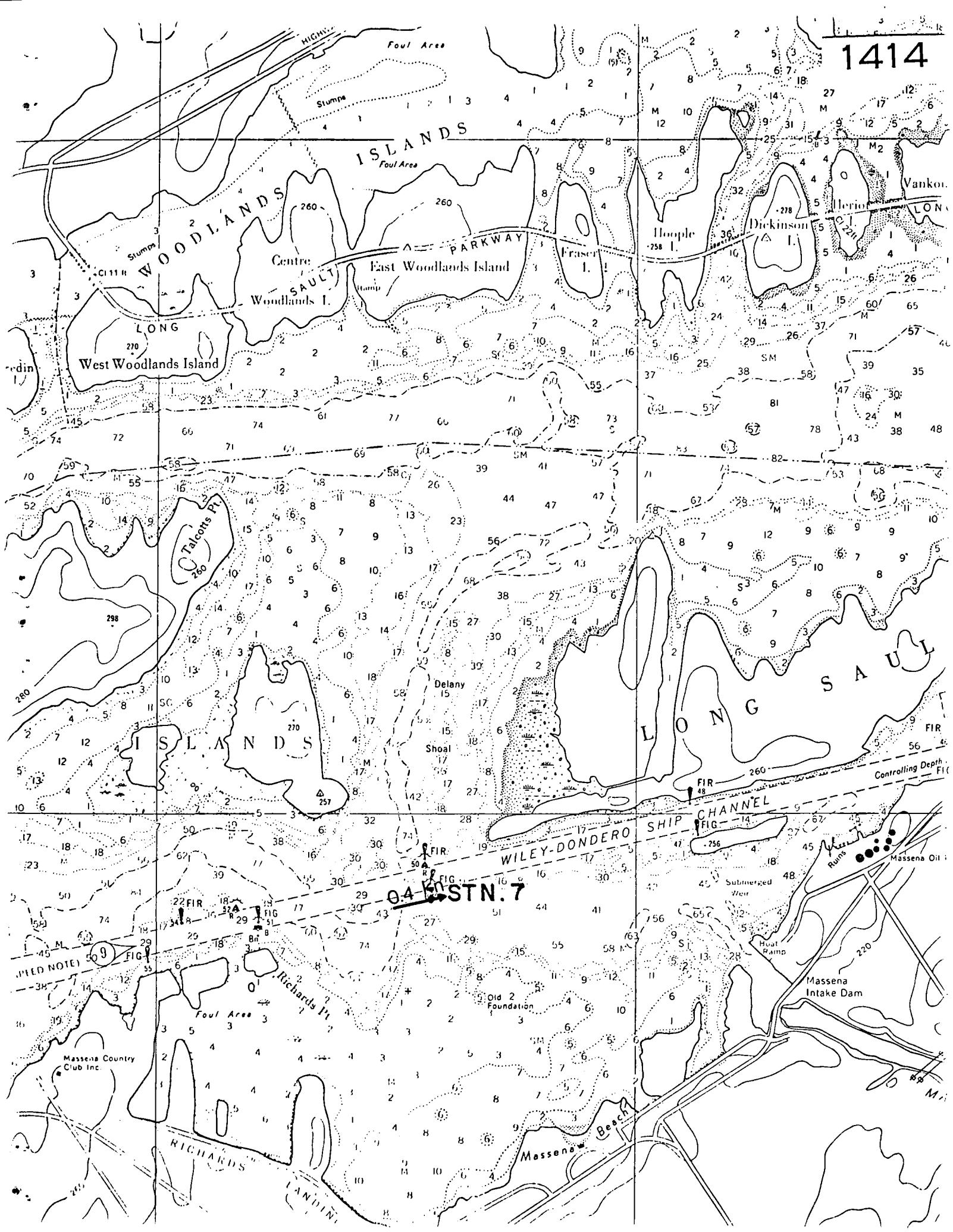




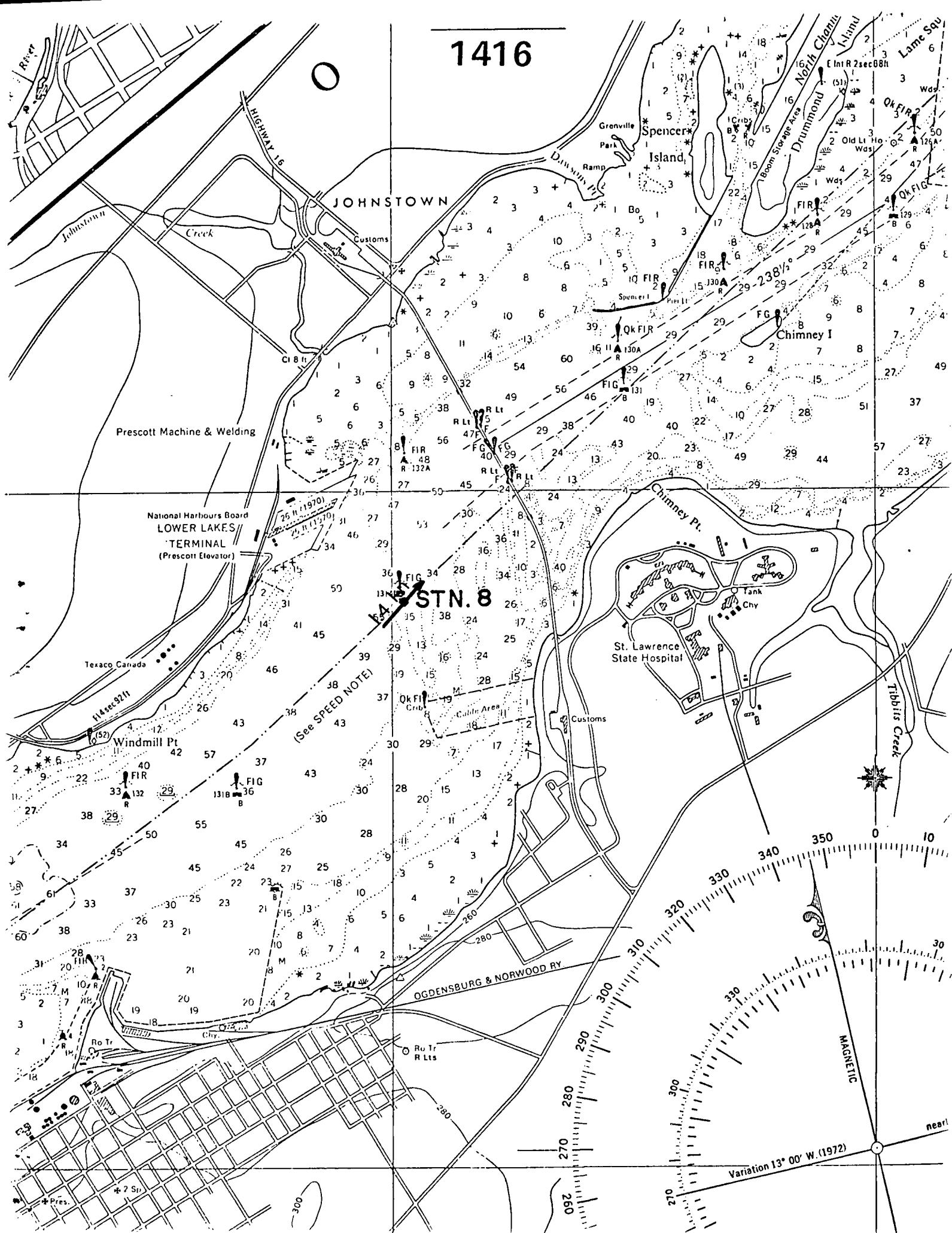
1413



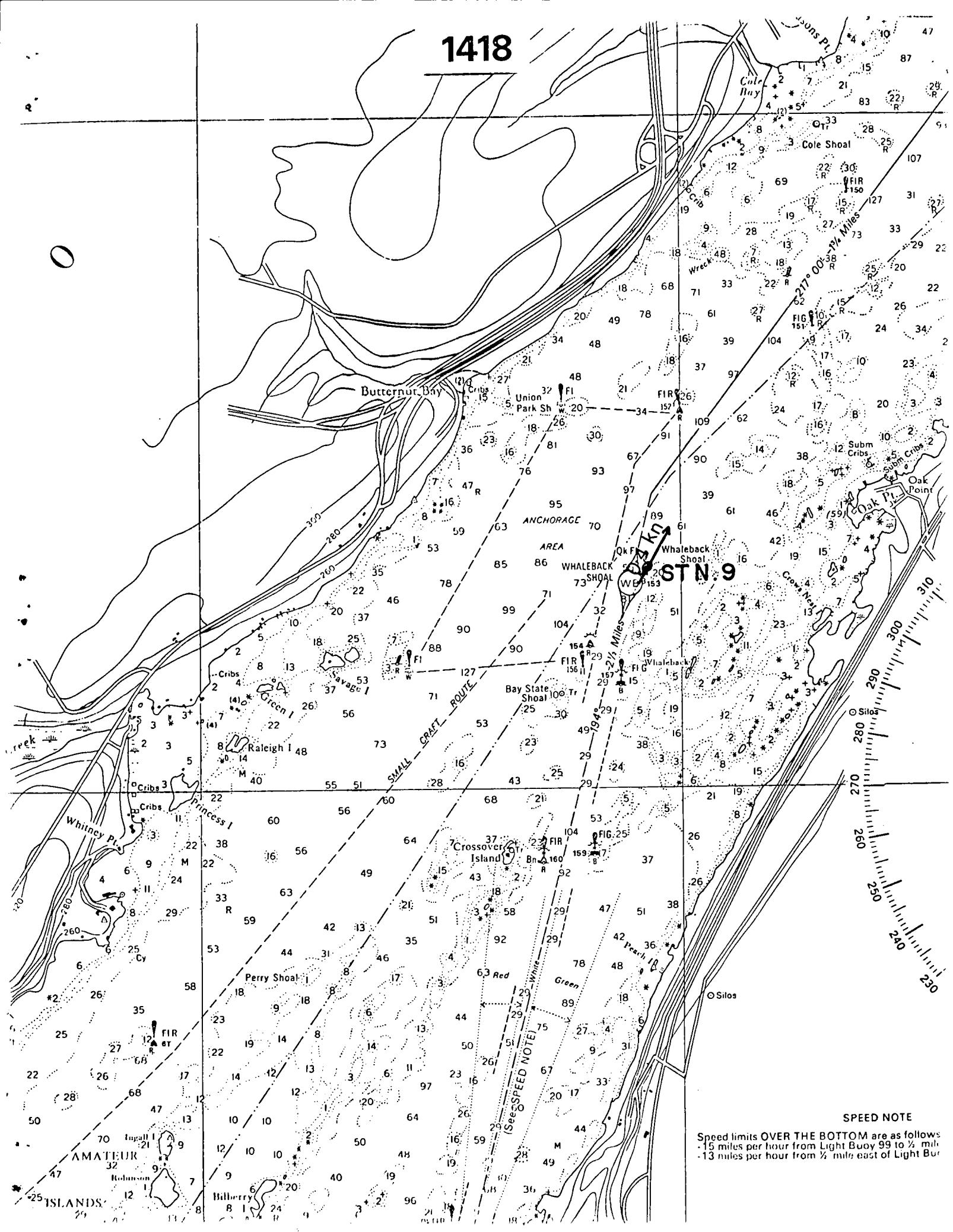




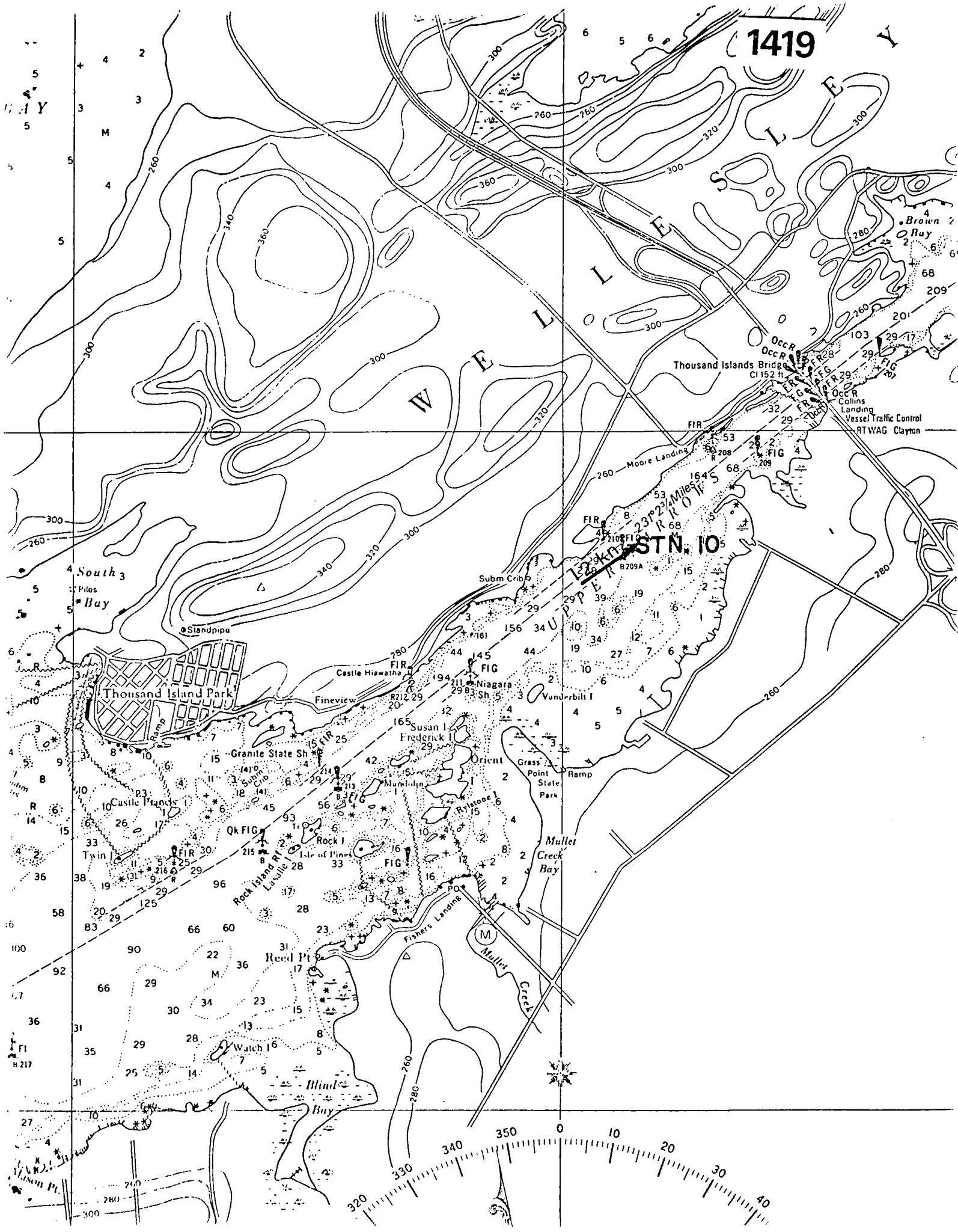
1416



1418



1419



**APPENDIX 1**

## LAKE ONTARIO CURRENT DATA - 1975

STATION LOCATION	STATION CODE	DATE OBSERVED	SOUNDING (METRES)	POSITION		RATE (KNOTS)	DIRECTION ( TRUE)	DEPTH (METRE)	CHART N
				LATITUDE	LONGITUDE				
Port Weller	WEL-1	May 28	10.0	43-12-00	79-13-00	1.0	335	5	2042
	WEL-2	May 28	10.5	"	"	nil			2042
	WEL-3	May 28	10.5	"	"	0.3	215	1	2042
	WEL-4	May 29	10.0	"	"	nil			2042
	WEL-5	May 29	10.0	"	"	nil			2042
Port Dalhousie	DAL-1	May 26	4.5	43-12-42	79-15-48	1.0	005	1	2070
	DAL-2	May 26	6.2	"	"	1.2	005	2	2070
	DAL-3	May 27	6.0	"	"	2.8	005	surface	2070
	DAL-4	May 27	7.0	"	"	0.7	000	1	2070
	DAL-5	May 27	7.0	"	"	0.6	000	2	2070
	DAL-6	May 28	6.5	"	"	0.2	000	4	2070
	DAL-7	May 28	8.0	"	"	nil			2070
Hamilton Hbr.	HAM-1	May 21	20	43-18-36	79-46-30	nil			2067
	HAM-2	May 21	18	43-18-24	79-47-12	0.4	305	7	2067
	HAM-3	May 21	7	43-16-48	79-53-06	0.2	140	1	2067
	HAM-4	May 21	10	43-17-48	79-49-00	0.4	095	7	2067
	HAM-5	May 23	20	43-17-48	79-49-42	nil			2067
	HAM-6	May 23	8	43-16-36	79-50-06	nil			2067
	HAM-7	May 23	15	43-16-42	79-51-48	nil			2067
	HAM-8	May 23	19	43-17-48	79-50-54	nil			2067
Bronte Harbour	BRONTE-1	May 22	3	43-23-30	79-42-24	nil			2070
	BRONTE-2	May 22	3	"	"	nil			2070
	BRONTE-3	May 22	3	"	"	nil			2070
Oakville Hbr.	OAK-1	May 22	3	43-26-24	79-40-00	nil			2070
	OAK-2	May 22	3	"	"	nil			2070
	OAK-3	May 22	3	"	"	nil			2070
	OAK-4	May 22	3	"	"	nil			2070
	OAK-5	May 22	4	"	"	nil			2070

STATION LOCATION	STATION CODE	DATE OBSERVED	LOUDING (METRES)	POSITION		RATE (KNOTS)	DIRECTION ( TRUE)	DEPTH (METRE)	CHART NO
				LATITUDE	LONGITUDE				
larkson Hbr.	CLARK-1	May 30	10	43-29-36	79-36-12	nil			2070
	CLARK-2	May 30	14	"	"	nil			2070
ort Credit Hbr.	CRED-1	June 6	4	43-32-48	79-34-36	nil			2070
	CRED-2	June 6	5	"	"	nil			2070
oronto Harbour	TO-1	June 3	5	43-37-12	79-23-30	nil			2065
	TO-2	June 3	3	43-37-12	79-23-00	nil			2065
	TO-3	June 3	5	43-37-18	79-23-30	nil			2065
	TO-4	June 3	5	43-37-30	79-23-24	nil			2065
	TO-5	June 3	10	43-37-36	79-24-30	nil			2065
	TO-6	June 3	9	43-38-06	79-23-42	nil			2065
	TO-7	June 3	8	43-38-36	79-21-30	nil			2065
	TO-8	June 4	10	43-36-24	79-23-18	nil			2065
	TO-9	June 4	2	43-36-36	79-23-24	0.3	260	1	2065
	TO-10	June 4	4	43-36-54	79-20-42	nil			2065
	TO-11	June 4	3	43-37-48	79-21-30	nil			2065
	TO-12	June 4	3	43-37-30	79-22-18	nil			2065
	TO-13	June 4	4	43-37-36	79-23-00	nil			2065
	TO-14	June 6	4	43-36-30	79-23-18	nil			2065
	TO-15	June 6	4	43-39-30	79-18-48	nil			2065
renchman Bay	FRENCH-1	June 16	3.0	43-49-00	79-05-30	nil			
	FRENCH-2	June 16	2.0	43-48-50	79-05-15	nil			
hitby Harbour	WHIT-1	June 17	9.0	43-51-03	78-55-39	nil			2070
	WHIT-2	June 17	6.5	"	"	nil			2070
	WHIT-3	June 17	3.0	"	"	nil			2070
	WHIT-4	June 17	7.0	"	"	nil			2070
oshawa Harbour	OSH-1	June 18	9.0	43-51-52	78-49-19	nil			2070
	OSH-2	June 18	7.5	"	"	nil			2070
	OSH-3	June 18		"	"	nil			2070

STATION LOCATION	STATION CODE	DATE OBSERVED	SOUNDING (METRES)	POSITION		RATE (KNOTS)	DIRECTION ( TRUE )	DEPTH ( METRES )	CHART NO.
				LATITUDE	LONGITUDE				
Port Hope Hbr.	HOPE-1	June 19	7.5	43-56-27	78-17-27	nil	165	surface	2070
	HOPE-2	June 19	4.0	"	"	0.2			2070
	HOPE-3	June 19	2.5	"	"	0.4			2070
	HOPE-4	June 19	2.3	"	"	0.7			2070
	HOPE-5	June 19	3.8	"	"	nil			2070
Cobourg Hbr.	CBRG-1	June 20	6.0	43-57-05	78-09-56	nil	nil	surface	2070
	CBRG-2	June 20	6.5	"	"	nil			2070
	CBRG-3	June 20	6.5	"	"	nil			2070
Presqu'ile Bay	BRGT-1	June 23	6.5	44-00-00	77-40-00	nil	070	surface	2069
	BRGT-2	June 24		44-00-20	77-40-55	nil			2069
	BRGT-3	June 24	4.2	44-01-55	77-40-30	0.2			2069
	BRGT-4	June 24	3.0	44-01-45	77-41-36	0.2			2069
	BRGT-5	June 24	3.5	44-01-30	77-42-10	nil			2069
Trenton Hbr.	TRENT-1	June 24	5.0	44-03-50	77-34-30	nil	065	surface	2069
	TRENT-2	June 25	3.5	44-03-45	77-34-50	0.3			2069
	TRENT-3	June 25	6.5	44-06-30	77-29-30	nil			2069
	TRENT-4	June 25	5.4	44-06-10	77-34-18	0.2			2069
Belleville	BELL-1	June 26	3.2	44-09-33	77-23-03	nil	nil	surface	2007
	BELL-2	June 26	7.5	44-08-35	77-23-05	nil			2007
	BELL-3	June 26	10.5	44-09-06	77-17-06	nil			2007
	BELL-4	June 26	3.0	44-09-15	77-22-45	nil			2007
Bay of Quinte	QUIN-1	June 27	9.5	44-04-45	77-05-20	0.4	185	7	2006
	QUIN-2	June 26	6.4	44-09-30	77-08-24	nil			2069
	QUIN-3	June 26	4.0	44-09-50	77-07-20	0.2			2069
	QUIN-4	June 28		44-10-24	77-05-24	nil	055	1	2069
	QUIN-5	June 28	8.5	44-11-10	77-03-15	0.2			2069
	QUIN-6	June 28	5.0	44-11-45	77-01-45	nil			2069
	HAY-1	June 27	5.5	44-07-45	77-00-45	nil	110	5	2006
	HAY-2	June 27	9.5	44-05-50	77-03-00	nil			2006

STATION LOCATION	STATION CODE	DATE OBSERVED	SOUNDING (METRES)	POSITION		RATE (KNOTS)	DIRECTION ( TRUE )	DEPTH ( METRES )	CHART NO
				LATITUDE	LONGITUDE				
Picton	PIC-1	June 27	5.6	44-01-03	77-07-48	0.2	020	surface	2006
	PIC-2	June 27	10.0	44-02-15	77-07-20	nil			2006
Adolphus Reach	ADOL-1	June 27	19.5	44-03-00	77-03-45	nil			2006
	ADOL-2	July 1	20.0	44-02-45	77-01-25	0.2	125	1	2006
	ADOL-3	July 1	9.0	44-04-20	76-57-10	0.2	090	surface	2006
Kingston	KING-1	July 2	11.0	44-12-25	76-41-21	nil			2005
	KING-2	July 2	16.5	44-11-24	76-44-20	nil			2005
	KING-3	July 2	9.0	44-10-50	76-46-20	nil			2005
	KING-4	July 2	23.0	44-10-30	76-41-55	nil			2005
	KING-5	July 3	10.5	44-12-30	76-38-05	0.3	065	surface	2005
	KING-6	July 3	7.7	44-13-10	76-37-30	nil			2005
	KING-7	July 3	3.0	44-14-20	76-36-30	nil			2005
	KING-8	July 3	6.5	44-13-58	76-28-30	0.3	260	surface	1459
	KING-9	July 3	6.5	44-14-10	76-28-28	nil			1459
	KING-10	July 3	15.0	44-13-22	76-28-50	nil			1459
	KING-11	July 4	7.0	44-13-05	76-30-56	nil			1459
	KING-12	July 4	3.4	44-13-03	76-32-28	nil			1459
	KING-13	July 3	9.3	44-12-57	76-32-10	nil			1459
	KING-14	July 7	16.0	44-15-52	76-21-14	0.2	055	surface	1420
	KING-15	July 7	17.5	44-17-55	76-17-10	0.6	065	surface	1420
	KING-16	July 7	13.5	44-18-15	76-15-50	0.6	140	surface	1420
	KING-17	July 7	22.0	44-14-45	76-23-35	0.7	050	surface	1421
	KING-18	July 7	34.0	44-14-23	76-22-30	0.9	070	3	1421
	KING-19	July 8	13.5	44-14-45	76-20-20	0.9	080	1	1421
	KING-20	July 4	12.5	44-10-01	76-30-45	0.3	060	surface	
Olympic Site	OLYN-1	July 4	19.0	44-09-30	76-35-53	nil			
	OLYN-2	July 4	26.5	44-06-06	76-37-30	nil			

STATION LOCATION	STATION CODE	DATE OBSERVED	SOUNDING (METRES)	POSITION		RATE (KNOTS)	DIRECTION ( TRUE)	DEPTH (METRE)	CHART NO
				LATITUDE	LONGITUDE				
1,000 Islands	GAN-1	July 9	18.0	44-18-15	76-11-50	0.3	110	surface	1420
	GAN-2	July 9	16.0	44-17-50	76-11-25	0.3	110	surface	1420
	GAN-3	July 9	12.0	44-18-45	76-10-55	0.3	025	surface	1420
	GAN-4	July 9	5.0	44-19-25	76-09-30	nil			1420
	GAN-5	July 9	5.5	44-19-30	76-04-26	0.9	060	surface	1420
	GAN-6	July 9	12.0	44-19-26	76-04-15	0.6	030	1	1420
	GAN-7	July 10	15.0	44-17-00	75-09-36	0.4	080	surface	1420
	GAN-8	July 10	29.0	44-17-50	76-06-50	0.5	060	6	1420
	GAN-9	July 10	32.5	44-18-10	76-06-48	0.4	065	3	1420
	GAN-10	July 10	11.5	44-21-10	76-00-06	1.1	055	surface	1419
	GAN-11	July 10	21.5	44-21-45	75-59-10	0.9	080	surface	1419
	GAN-12	July 10	20.5	44-21-43	75-59-38	1.0	105	surface	1419
	GAN-13	July 11	25.0	44-18-10	76-07-40	0.6	050	3	1420

LAKE HURON CURRENT DATA - 1975

STATION LOCATION	STATION CODE	DATE OBSERVED	SOUNDING METRES	POSITION		RATE KNOTS	DIRECTION (TRUE)	DEPTH (METRE)	CHART NUMBER
				LATITUDE	LONGITUDE				
Southampton	SOHAM-1	June 3		44 30 03	81 22 06	0.2	100	surface	2292
	SOHAM-2	June 3		44 30 05	82 22 30	0.4	110	surface	2292
	SOHAM-3	June 3		44 30 06	81 22 36	0.4	130	surface	2292
	SOHAM-4	June 4		44 30 09	81 22 54	0.3	220	surface	2292
	SOHAM-5	June 4		44 30 10	81 23 18	0.3	260	surface	2292
	SOHAM-6	June 4		44 30 12	81 23 56	0.2	120	surface	2292
	SOHAM-7	June 4		44 29 42	81 23 18	0.2	140	surface	2291
Port Elgin	PELG-1	May 28				0.2	040	surface	2291
	PELG-2	May 28				0.2	0	surface	2291
	PELG-3	May 28				0.3	070	surface	2291
	PELG-4	May 28				0.2	160	surface	2291
	PELG-5	May 28				0.3	030	2.0	2291
	PELG-6	May 28				0.4	040	2.2	2291
	PELG-7	May 28				0.4	310	surface	2291

ST. LAWRENCE RIVER - 1975

STATION LOCATION	STATION CODE	DATE	SOUNDING	POSITION		RATE KNOTS	DIRECTION	DEPTH	CHART NUMBER
				LATITUDE	LONGITUDE				
South of Dorval, Quebec	STN. 1	May 23	6.1	45 24 27	73 46 24	0.9	059	2.4	1410
South of Beauharnois Canal	STN. 2	May 23	14.6	45 19 19	73 54 32	2.5	040	4.2	1411
West of Beauharnois Canal	STN. 3	June 4	11.3	45 13 56	74 09 36	1.3	094	3.0	1411
Northeast of Cornwall Island	STN. 4	June 6	11.6	45 01 15	74 39 07	1.5	060	2.7	1413
East of Cornwall Island	STN. 5	June 6	10.1	45 00 20	74 40 00	1.4	035	2.7	1413
South of Cornwall Island	STN. 6	June 6	12.2	44 59 58	74 42 39	2.5	067	3.0	1413
West of Long Sault Island	STN. 7	June 6	15.2	44 57 46	74 56 50	0.4	077	3.0	1414
South of Johnstown	STN. 8	June 21	10.7	44 43 41	75 27 58	1.4	041	2.7	1416
Butternut Bay	STN. 9	July 4	14.6	44 30 39	75 46 09	0.4	030	3.0	1418
Southwest of Thousand Island Bridge	STN. 10	July 4	16.]	44 17 38	75 59 45	1.2	055	3.0	1419