Canadian Canal Society

Société des Canaux du Canada

CANALS CANADA/CANAUX DU CANADA

Newsletter of The Canadian Canal Society/Société des Canaux du Canada

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President's Message

Another year is fast waning, but again, it has been one of considerable activity on the part of the C.C.S. and its members. We have had our usual spring and fall Field Trips, to the Rideau Canal and Canada's capital city, Ottawa, and to the Wellandport-Dunnville feeder area. But this year, for (I think) the first time, the general meetings have not coincided with those Field Trips! Instead, the AGM, usually held during the Spring Field Trip was, instead, combined with the Spring Social, held at the Legion Hall in Port Dalhousie and the fall general meeting was held at the Fall Social.

Attendance at the Spring Tour was disappointing, but those who were able to attend thoroughly enjoyed the event, organized by C.C.S. members **Bob Sears** and **Tom Grasso** (also President, CSNYS). The Fall Tour was completely subscribed, although at the last minute some members were unable to take their places due to various health problems. For those of us on board, the day was a smashing success, due to the efforts of tour leaders **Ken Mackenzie** and **Jim Purdie**. Unfortunately, Jim was among the "casualties," but I'm pleased to say that he's back to his usual cheerful self, and Ken acquitted himself with full honours. Then, on 9 November, we held a very successful Fall Meeting and Social in the Burgoyne Room at the St. Catharines Museum."

Some of you will have already heard that this year's World Canals Conference, held in Edinburgh, Scotland, 24-26 September, was not as well attended as had been expected. I'm happy to say that Canada was well represented, with 26 delegates, including C.C.S. members from both the West and East coasts. There were 35 Americans, and only 13 from European countries outside the British Isles (see report elsewhere in Canals Canada by **Tom Whitelaw**). The low turn-out, especially from the U.S., was in part because of the high cost of registration, on top of increasing travel costs. The highlight for North Americans was undoubtedly the revolving boat lift (the Falkirk Wheel), but many people from the British Isles and nearby European countries had probably visited it earlier, and did not feel that the extra costs warranted another visit. It is hoped that the lower registration fee, combined with a favourable (to foreigners!) exchange rate, will tempt larger numbers to come to St. Catharines in June for our World Canals Conference.

As I wrote in the Spring 2003 issue of Canals Canada, we will need lots of volunteer help in order to make **OUR** conference a success, and I've written a further note on our needs elsewhere in this issue.

And to all of you, wherever you are — my best wishes for a happy holiday season — and may your bookshelves increase their coverage of canals and related activities!

Bobbie Styran

P.S. We have just learned of the death of long-time stalwart of the Society, **Bob Voaden**. I'm sure all C.C.S. members will want to join me in extending our sympathy to **Marg** and his family.

Bob Voaden an Appreciation

The community of Canal enthusiasts has lost a longtime friend and supporter in the November 12th passing of R.N. (Bob) Voaden in his 78th year.

Born, raised and lifelong resident of St. Catharines, Bob was an early member of the Canadian Canal Society and ably filled the post of secretary and membership secretary from 1966 to 1995. It was in this capacity that he phoned me some twenty years ago as an old St. Catharines Collegiate, YMCA camp and St. George's Church contemporary, gave a commercial on the virtues of the CCS, asked if Barbara and I would be interested in joining (we said yes) and in the same conversation convinced me to join the Board of Directors; hence my sad role as author of this notice.

Bob and Margaret were active participants in CCS events and field trips, in particular, the 1996 trip to England and the 2001 trip to Ireland. Attendees at the former will always envision Bob occupying an almost-reserved seat at the Bow of *Czarina*, having "seconds" of the excellent desserts and folding his ± 6'-6" frame into the Canal-barge bunks of *Czarevna*.

In addition to almost year-round golfing, Bob enhanced his Canal activities with active participation in church, Kiwanis Club, Coin Club and Camera Club.

He will be sadly missed at future Canal events, not the least of which will be the 2004 World Canals Conference in his native St. Catharines. That this prestigious event is being held in Canada is a tribute to the Bob Voadens and other early members of our Society.

We fellow gongoozlers won't be seeing you again, Bob, on this world's waterways, but will be with you in our thoughts as you navigate the Great Canal in the Sky.
Norman Macdonald

Membership Renewal

Please check that your information on the membership roster is correct, especially your email address. Please make a point of marking your renewal with a "correction" notion, the better to bring it to our attention.

NEW MEMBERS

John & Betty Ballanger
983 1st. Concession, R.R. #2
Canfield, ON N0A 1C0

Isabel Bachmann
13 Battersea Avenue
St. Catharines, ON L2P 1L4
gbachman@computan.on.ca

Rae Tomlinson
3527 Guyatt Road
West Hannon, ON L0R 1P0

Pat Logan -- Jamie and Tim
Apartment 408
500 Queen Street
Dunnville, ON N1A 1J4
logan@linetap.com

Robert and Elaine Cragg
6924 Armview Avenue
Halifax, NS B3H 2M4
efgordon@hfx.eastlink.ca

Tom Wroe
Wolfe Island Canal Committee
of the Township of
Frontenac Islands Box 116
Wolfe Island, ON KOH 2Y0
tom@metalcraftmarine.com

John & Shirley Rednall
PO Box 1222
NOTL, ON L0S 1J0

Keith Black
651 Wilson Street
Hamilton, ON L8L 1V3

Vice-Admiral Sir Peter Berger

Vice-Admiral Sir Peter Berger is not a name that most people would associate with Canadian Canal History. But in the long history of inland navigation in Canada there are many people who have played their own small part; Peter Berger was one of them.

In 1959 the St Lawrence Seaway was opened by the Queen and the President of the United States. HMS Britannia was the home for the Queen at the opening and the subsequent tour of the Seaway. Peter Berger served as the Navigating Officer during the tour. He claimed two records for a ship flying the White Ensign (Royal Navy) when the vessel arrived in Thunder Bay: a height record of 600 feet above sea level and the furthest from the sea 2,800 miles.

Returning from the Great Lakes, the Royal Yacht lost her anchor at midnight off Montreal. It was Berger's responsibility as the navigator to ensure that the inboard end of the cable was secured, but he was exonerated after it was discovered that the chain had broken mid-length rather than run out from its locker.

If you have seen the movie "Yangtze Incident" you have seen the part that Berger played navigating HMS Amethyst up the Yangtze River during the Chinese Civil War between the Communists and Nationalists. For his actions on 20 April 1949 he was awarded the Distinguished Service Cross.

Berger, who died on 19 October 2003, was 78

Hercule Poirot is on the case

Many people in North America only know David Suchet as an actor. But he is also active in canal restoration in Britain, and has done much campaigning for the restoration of the Lichfield and Hatherton Canals.

David and his wife Shiela were both recently appointed as Vice-Presidents of The Inland Waterways Association. In their new capacity they look forward to supporting the less well developed waterway restoration projects.

World Canals Conference, St. Catharines, 2-4 June 2004

The Planning Committee for the Conference is hard at work, on a number of fronts. A tentative program has been worked out, and many of the proposed speakers are confirmed. Schedules for the afternoon tours (Port Colborne and Welland on Wed., 2 June, Thorold and St. Catharines on Thurs., and Port Dalhousie on Fri.), and detailed manuals of information for the guides (both on the busses and on site) are being prepared. Fund raising has begun, with offers of services and hard cash beginning to come in. A feature film being produced by Norflicks of Toronto, under the aegis of the Welland Canals Foundation, is proceeding apace, and plans for a "Then and Now" book of photographs are under way.

As mentioned in the President's Message, we do need volunteers — lots of them. Do, please, consult the list published in the Spring 2003 issue, and let me know if you would be available to help us in any of the categories mentioned. A number of you have already done so, and I'm keeping my list updated! We will be issuing a call in the press throughout the Peninsula, but the Committee would certainly appreciate advance sign-up if you think you can help. This will be the C.C.S.'s biggest venture yet, so do plan to take an active part.

Some of you have seen the T-shirts emblazoned with the Conference logo, and I'm happy to say that these will be available for sale before and during the Conference! As will, we trust, the aforementioned book of photos.

We hope to have our information package in the mail and available on the Internet by mid-January 2004, so watch for it — and watch your daily newspaper! The City of St. Catharines is setting up a web-site www.worldcanals2004.com .

Bobbie Styran

World Canals Conference, 2003 – Edinburgh, Scotland

The World Canals Conference for 2003 was held in Edinburgh, Scotland from September 24 to 26. The Conference provided the host, British Waterways (Scotland), with an opportunity to showcase the recent £85 million restoration of the Forth and Clyde Canal and the Union Canal. The two canals link Edinburgh and Glasgow and provide a through route between the Firth of Forth and the Clyde estuary. The centrepiece of the restoration is the Falkirk Wheel, an innovative and spectacular rotating boatlift that transports boats a vertical distance of about 90 feet between the two Canals. The Wheel replaced a flight of 11 locks that had been buried beneath roads. The restoration also required the removal of 33 blockages (swing or lift bridges that had become fixed crossings or replaced by road embankments), the digging of a new section of canal where roads and industrial buildings covered the original route and the excavation of a section that had been infilled for a road.

The first and third days of the Conference featured presentations and workshops, not only on Scottish Canals but also on the Gota Canal in Sweden, the Rideau Canal and proposed restorations of locks in New York State and Florida. A common theme of several presentations was the need to maximize the economic benefits from canal restorations in order to attract government funding for future restorations. Other presentations and workshops addressed the details of canal restorations – how to gain political support through community involvement and the use of innovative solutions where heritage features cannot be restored. For example, the dramatic design of the Falkirk Wheel helped to obtain government funding.

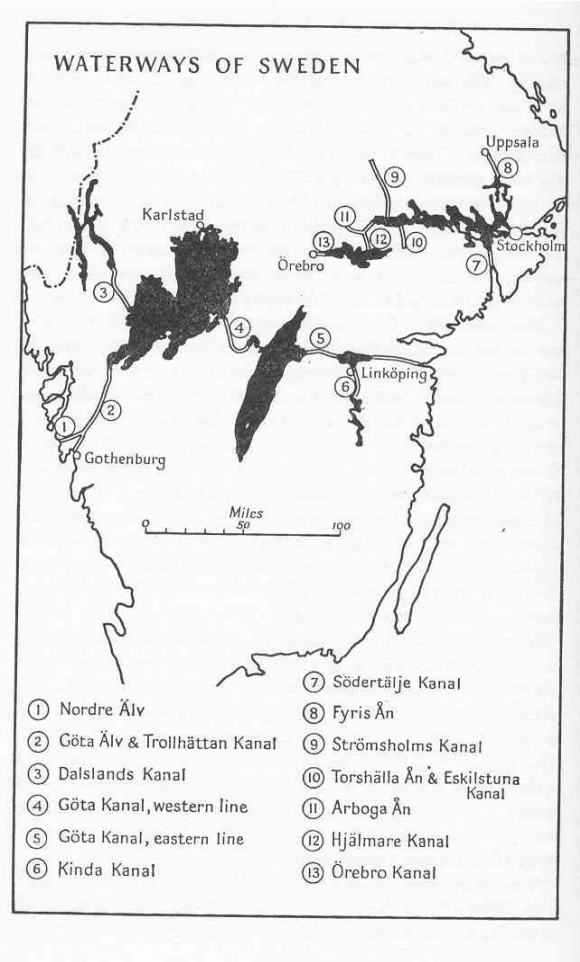
The middle day of the Conference was devoted to tours of the Forth and Clyde Canal and the Union Canal. Half the delegates toured canals in the Edinburgh area while the rest visited canals in the Glasgow area. Both groups had a boat ride on the Falkirk Wheel. The Wheel has been a huge success for British Waterways, attracting 400,000 tourists last year. Additional information on the two Canals and the Falkirk Wheel can be obtained from the website: http://www.scottishcanals.co.uk.

Conference delegates also attended two special events. The first night, a dinner was held at the Falkirk Wheel Visitor Centre. One could watch the Wheel turning as one was eating and listening to presentations. The second night, delegates were invited to a reception in the Great Hall at Edinburgh Castle. These were two unique and memorable venues.

Ten C.C.S. members attended the Conference along with Regional Niagara Councillor and C.C.S. member **Bruce Timms** and three staff from the City of St. Catharines. C.C.S. President **Bobbie Styran**, Councillor **Timms** and St. Catharines City staff made a presentation inviting all delegates to the 2004 World Canals Conference to be held in St. Catharines from June 2 to 4.

Tom Whitelaw

World Canals Conference, Sweden, 21-27 August 2005



Some of you may wonder why the Swedes are holding such a lengthy Conference!

Well, actually, the Conference itself will be held 23-26 August, but our hosts have put together a package which they title "Six Canals in Six Days" — and that is exactly what they are offering. It is assumed that visitors will fly to Göteborg, and delegates will be met by bus at the nearby airport on Sunday 21 August, dinner and overnight in Trollhattan. On the 22nd visit the Tröllhatte canal and waterfall, then bus to Dalslands canal etc., dinner & stay at Tröllhattan. Then on Tuesday bus to Göta Canal with various stops; boat across Lake Vättern to Motala on the Göta Canal.

On Tuesday those attending only the Conference will be met by bus at Linköping Airport and taken to Motala. Wednesday, the conference commences in Motala. Thursday will include a visit to the Kinda canal. Accommodation in Motala will be in your choice of hotel, canal boat or youth hostel. If not continuing with the tour, delegates will be returned to Linköping Airport on Friday.

The tour continues on Friday, by bus and boat on the Hjälmare canal, then via Södertälje canal to Stockholm. Saturday the 27th there will be a boat trip among the 25,000 islands of the Stockholm archipelago, with lunch aboard. Participants may then fly home from Stockholm, or continue on their own and make arrangements to fly home from elsewhere in Europe.

This promises to be a unique opportunity to visit the highlights of Sweden's waterways, with expert guides. No definite price has as yet been established, but I should think the trip would work out to be at least $200 per diem, plus the cost of airfare. We will pass on information as it become available, or you can check the internet at www.gotakanal.se or e-mail at WCC2005@gotakanal.se. Oh yes, early registration forms are already available, you may contact the editor for a copy by mail or email!

World Canals Conference 2006

The conference for 2006 has been awarded to the National Canal Museum in Easton, Pennsylvania, USA. Based in Bethlehem the conference will explore the Delaware and Lehigh National Heritage Corridor.

World Canals Conference 2007

The site for the 2007 conference has yet to be picked. The Inland Waterways Association in the United Kingdom will be making a proposal to hold it in Liverpool/North-West England. The conference if held there would be in mid-June, in conjunction with the Mersey River Festival. In the area there are a number of fast track restorations; several more will be underway by 2007. The Liverpool link is planned to be built across Pier Head and redevelopment of Liverpool docks is taking place. The docks area has been identified for potential World Heritage Site designation; 2007 is also the 800th anniversary of Liverpool. In addition preparations will be underway in Liverpool for 2008 when it will be the European City of Culture. A very interesting package; good luck!

Spring Field Trip, 2003 to Ottawa and the Rideau Canal

Colonel John By

The spring field trip was a joint tour with the Canal Society of New York State to explore the Rideau Canal over a three-day period from Friday, June 20 to Sunday, June 22.

On Friday evening, members from both Societies boarded a tour boat for a two hour cruise along the Rideau Canal from downtown Ottawa to Dows Lake and back. The Canal is an important asset to the City for its scenic park-like setting and its historic and recreational attractions.

Saturday morning, the combined group boarded two buses to tour the Rideau Canal outside Ottawa. We were accompanied by Parks Canada canal employees who provided valuable commentary. Our first stop was at Smiths Falls where we visited the Rideau Canal Museum and the locks. The Museum tells the story of why and how the Canal was built and its changing roles. Beside the Museum, the original 3 lock combination was replaced with a modern lock operated by electricity. However, Parks Canada assumed responsibility for the

Rideau Canal in 1972 and since then the Rideau, including the remaining original locks, has been preserved as a historic canal. Apparently, the original manually operated locks are just as efficient to operate and can be more easily fixed.

We then journeyed onto Jones Falls which is noted for its impressive engineering works and its magnificent scenery. First we had a box lunch at the historic Hotel Kenney, established in 1877. After lunch, we visited the dam, several locks and displays and demonstrations at a lockmaster's defensible house and the blacksmith shop. The dam at 62 feet high and over 300 feet long was the largest stone arched dam in North America at the time of its construction in 1832.

The last stop on the bus tour was at Merrickville to explore "Canada's Most Beautiful Village", the lock and the blockhouse. The blockhouse was one of several defensive structures built to protect the Canal from a feared American invasion.

Saturday evening, a dinner was held at the National Arts Centre beside the Rideau Canal. After dinner, Peter Conroy, author of *Our Canal – the Rideau Canal in Ottawa*, gave a slide presentation showing his photos of the Canal, then and now.

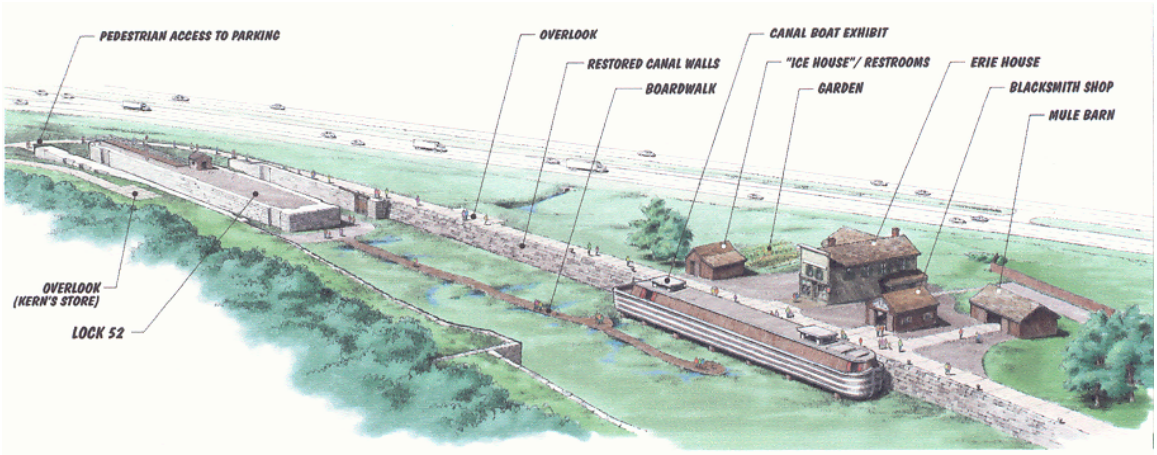
Sunday morning, we took a boat cruise of the Ottawa River, departing at the foot of the 8 flight locks beside the Chateau Laurier Hotel. The boat trip provided unique and spectacular views of Ottawa and Hull (now renamed Gatineau), including the Rideau River Falls. Afterwards, everyone made their way home.

Our tour gave everyone a better appreciation of the significant role played by the Rideau Canal in Canada's history and in the development of eastern Ontario. The construction of the 202 kilometre (125 mile) Canal through the wilderness between 1826 and 1832 was an impressive engineering feat. As a testament to its design and the quality of its construction, the Rideau is the oldest continuously operated canal system in North America. The Rideau Canal certainly deserves its designations as a National Historic Site and the Rideau River as a Canadian Heritage River. For more information on the Rideau Canal, visit the website www.rideau-info.com/canal/.

Tom Whitelaw

A Truly Unique Historical Canal Development, Port Byron, New York

The Canal Society of New York state has embarked on a truly one of a kind project in the United States and possibly all of North America as well. The centerpiece of the restoration project is the abandoned old Erie Canal bed, an 1895 old Erie Canal Tavern and "boarding house"--*the Erie House* built for and catering to the "needs" of boatman-- on the North side of the canal and the 1852 old Enlarged Erie Canal Lock 52-Port Byron, a mere 700 feet West.



Often times, at least on this side of the pond, the English language is not used with great precision, perhaps because we Americans prefer the easier route of "just getting the idea across as quickly as possible while generally being understood" without regard for proper usage and accuracy as this can often be time consuming if not laborious. One of these words is *unique* and the other peruse. We often use the word unique for anything that is just a bit unusual or not quite average instead of its proper meaning, *"being the only one of its kind"*. Countless times in endless meetings I have heard the word *peruse* used in the context of-- casually glancing over a document, perhaps over a cup of coffee or tea or just before bedtime--instead of--*to study carefully, in great detail*. I am sure other cultures are equally lax. However, this brings me back to the title of this short article. What the Canal Society of New York State is attempting to accomplish at Port Byron, New York (approximately 50 miles East of Rochester and 25 West of Syracuse) will be the *only one of its kind* to date.

The project is entitled *"The Port Byron Old Erie Canal Heritage Park"*. What makes it unique is that it will be a site directly accessible from Interstate 90, the New York State Thruway. There is no other sight in America, other than rest stops for petrol, toilets, and food that will have its own off ramp, parking, and return on ramp onto the high speed, divided, motorway.

The basic plan is too provide parking for over 50 automobiles and several buses. Trails will lead from two parking lots (another, smaller, one will be built on the village side of the site distinct and separate from the lot off the Thruway) through the abandoned cut-stone, dual chambered, side-by-side lock, (one of which was lengthened in 1886 to permit the lockage of two boats lashed together in tandem). Future plans call for a complete restoration of the lock "IN THE DRY" with lock gates and other apparatuses such as, gate valves (paddles), wood walkways,

piers, lock shanty, and the water powered winch or capstan that was used to pull boats into the lock and first used on the entire Erie Canal here at Lock 52 in 1880(see World Wide Waterways No. 13, Spring 2001, p.5). The Society believes, that the best way to interpret a lock, and teach school children and adults how it operated is to keep it unwatered. It would be very difficult to teach medical students anatomy by making observations on an undissected, fully clothed, human body. But perhaps more significant is the fact that the old canal bed could not be restored for boating, even if we wanted to, as the old alignment was completely obliterated by the superhighway just west of the lock and other roads East of the site, rendering a scheme for rewatering less than impotent. The lock chambers will contain appropriate and substantive interpretation signage and image kiosks telling the story of the history of the lock and the old canal.

The trail will eventually lead the visitor to the fully restored Erie House--not dispensing spirits or other beverages or "services"-- that will house exhibits portraying typical 19th Century canal-side businesses, Peter Van Detto and his family who built, operated, and lived at the site until his daughter's death in 1994, after which the Society eventually purchased the property. We have in our collection the original "Erie House" sign that hung over the entrance, various and sundry artifacts from the establishment such as beer mugs, beer signs, water pitchers, wash basin, and the cash register with, interestingly, the 5 penny (nickel) key completely worn away.

Immediately east of the Erie House is the old blacksmith shop now joined with the mule barn now, the blacksmith shop was readapted by the Van Detto's for use as a garage. The shop will be separated and moved to its original location and both structures will be fully restored.

Future elements of the project included in Phases II and III (pending sufficient future funding) will be to build a full scale replica of an old Erie Canal cargo vessel of the time and place it in the canal bed in front of the Erie House and develop the South side of the old canal bed that now contains a buried dry dock which we plan to restore and beyond that an existing 1910, brick, trolley powerhouse that transformed AC current to DC current. The trolley line was called the Rochester, Syracuse and Eastern Railroad and was a high-speed interurban line that fell to the depression and the onslaught of the automobile in the early 1930's. The power house is a vast open space now used as a warehouse that can be revitalized as our Canal Museum and Research Library telling the story not only of the old Erie Canal but the present day canal completed in 1918 and almost completely overlooked, even by the Canal Society of New York State in the early years after its founding in Buffalo, New York in 1956.

Tom Grasso (President Canal Society of New York State, member CCS)

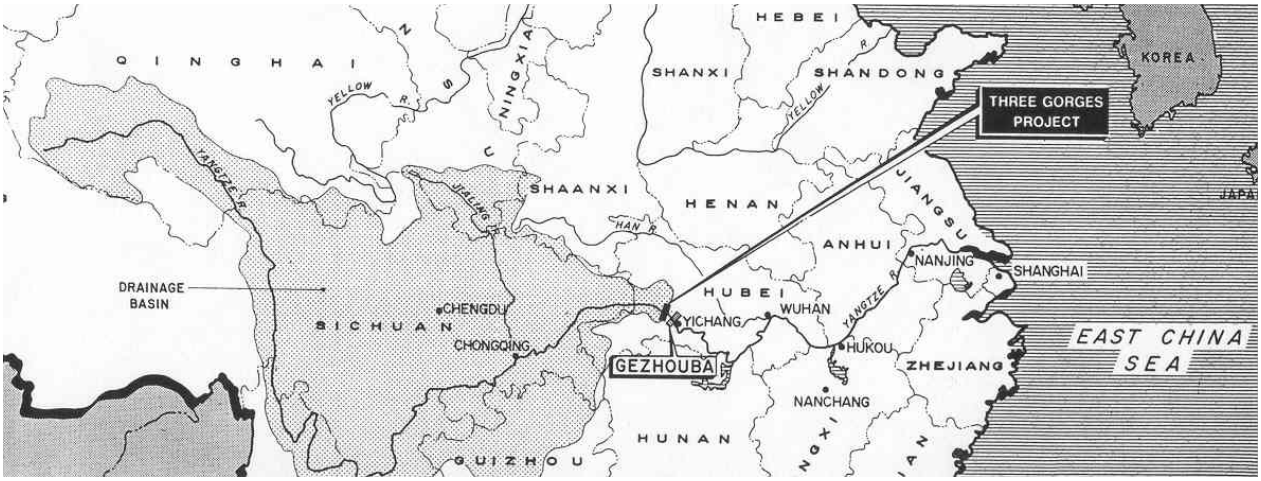
In the Footsteps of James Brindley and Thomas Telford and the Birth of England's Industrial Revolution

The Canal Society of New York State is planning a tour to England in August or September 2004. If you are interested in further details please contract Tom Grasso, (585) 387-0099.

China's Three Gorges Project on the Yangtze River - A navigation overview

Yangtze River

The Yangtze is China's largest river stretching some 6,300 km across central China and flowing into the East China Sea at Shanghai. It carries a heavy sediment load and an immense peak flow (summer) which is some ten or more times the minimum flow (winter).



There is substantial navigation on the river. From the sea to Wuhan (1,100 km) the deep draft accommodates ocean going freighters. Above Wuhan the shallow channel limits traffic to passenger "ferries" and tug and barge "tows". The larger "ferries" are about 84m x 17m x 2.4m with a capacity of some 1,100 passengers. The larger "tows" consist of a tug and one, two or three 500t - 1000t barges. The "tow" configuration is usually with the tug pushing or lashed alongside the barge(s). This latter traffic extends right up through the Three Gorges and on to the Chongqing area and to some extent on to Yubin (2800 km above Shanghai).

The first dam across the river, Gezhouba (some 1,831 km above Shanghai and about 40 km downstream of the Three Gorges Project) was built in the 1980s. It has a normal head of some 27m and navigation is accommodated in three locks in parallel. The two larger locks being 280m x 34m x 5m (the same size as the future flight locks at Three Gorges). It provides only local improvements to navigation and limited flood control but has an installed generating capacity of 2,715 MW.

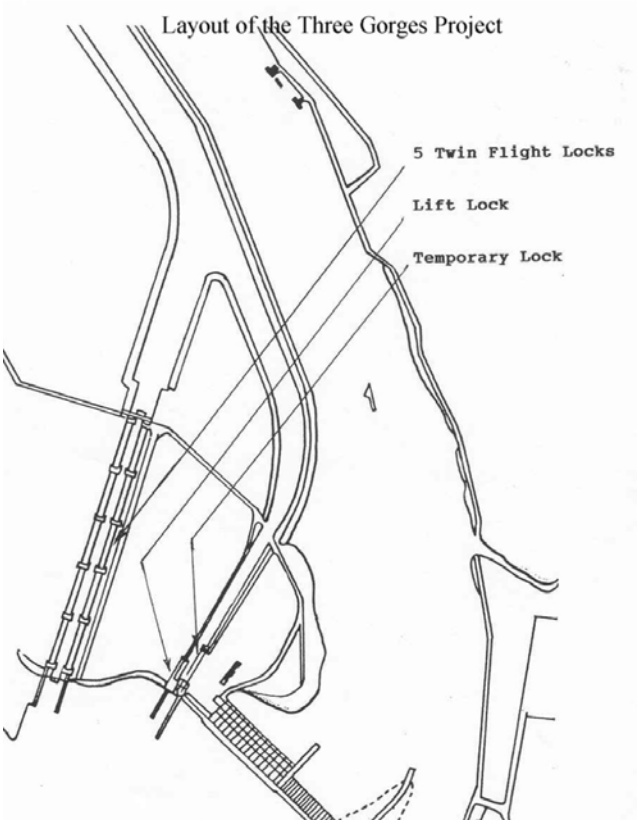
Upstream of the Three Gorges site the winding channel still presents substantial difficulties for navigation - shallow depths - fast currents - narrow "one way" sections. These conditions continue to affect navigation - slow transit times - the need of winching stations for low powered traffic - the size of "tows" and traffic control limitations.

Three Gorges

The Three Gorges project has been included in planning projects throughout most of the 20th century. Detailed designs and feasibility studies have been undertaken since the 1970s including

a CIDA funded feasibility study in 1986/87. Preliminary work on site facilities has been in progress through the 1980s and construction started in 1993. The principle features of the final design are as follows:

Maximum head	113m
Number of generators/turbines	26
Total installed capacity	18,200 MW
Navigation locks	5 twin flight locks 280m x 34m x 5m
	1 temporary lock 280m x 34m x 4m
	1 lift lock 120m x 18m x 3.5m



A two level strategy for the reservoir:

- during the flood season the reservoir will be lowered to the "flood control level" (E1 145m) to provide storage capacity which will mitigate downstream flooding. The lower level will also facilitate the sluicing of sediments on down through the dam.

- during the remainder of the year the reservoir will be raised to the "normal pool level" (EI 175m) to maximize power generation. At this level the reservoir will extend some 600km above the dam to the Chongqing area.

The scheduled completion is 2009.

The size of the project will be quite extraordinary:

- The dam will have a total length of some 2,300 m consisting of a central spillway section with a powerhouse on each side - 12 units on the right and 14 units on the left. The generating capacity of 18,200 MW will be the largest in the world - both Churchill Falls in Labrador and LG2 in Quebec are just over 5,000 MW.

- The five flight locks will be immense with filling systems that will have the highest head of any major locks although the 5m depth on the gate sills is basically for tug/barge "tows" and not for deep draft ocean going shipping. The locks are equipped with mitre gates, floor filling systems and reverse taintor valves. One unusual feature is the extra depth of the upstream locks to accommodate the wide variation in reservoir levels.

- The lift lock too will be immense with a lift of 113m and a caisson weight (including water) of 11,800t and will be the largest in the world - the recently completed Belgian lift lock Strepy-Thieu is 73m/8,400t! The single caisson will be mechanically counterbalanced. An unusual feature will be the variable sill arrangement at the dam to accommodate the wide variation in reservoir levels.

There are three main benefits of the project:

- The generation of badly needed power.
- Flood control for the downstream plains and Wuhan areas.
- Improved navigation conditions upstream to the Chongquing area.

The one main disadvantage is perhaps the flooding of the reservoir submerging farms, towns, etc. and the relocation of some one million farmers and townspeople.

The very large scale of the project and the effect on the environment has resulted in some controversy and criticism from various entities. Certainly the generation of power will be very beneficial as will be the mitigation of downstream flooding benefiting millions of people. The improved navigation conditions will result in lower transportation costs and a substantial increase in the capacity of the reach from Three Gorges to the Chongquing area.

Work on the project has been progressing steadily since 1993 but it has been difficult to obtain details. Navigation has continued during construction except for periods of very high flows and for a short period during the initial raising of the reservoir. The following is a general outline of the routing of navigation:

- Phase I (1993-97). Navigation remained in the main river channel while work on the locks in the left bank and the excavation of the bypass channel along the right bank proceeded.

- Phase II (1997-02). Navigation started using the bypass channel Oct. '97 and/or the temporary lock May '98, depending on the flow velocity.

- Phase III (2002-09). When the bypass channel was closed - Nov. '02 - navigation was initially limited to the temporary lock. Then it was interrupted for some two months - mid April to mid June '03 during the initial raising of the reservoir. It is now reported to have recommenced June 16 using the permanent flight locks with the reservoir at E1 135m. During the remainder of construction the reservoir should be raised in stages and navigation will continue to use the flight

locks and eventually the lift lock and this will also be the routing after construction with the reservoir raised to the normal operating levels.

When the project is completed navigation should enjoy greatly improved conditions. The lift lock should provide a fast transit of the dam site for the passenger ferries. The flight locks should accommodate maximum tows of a tug and four 2,500t barges (10,000t total). With the reservoir at the normal pool level navigation should be able to proceed right up to the Chongqing area without any problems although at the flood control level there may remain some minor difficulties for a short distance downstream of Chongqing. Then, as the fleet mix evolves with demand a substantial increase in the capacity of the river should result, and oh yes despite the higher water level the cliffs along the three gorges will still tower above the shipping and most of the beautiful scenery will remain.

Note. This article is based on information obtained from a China Ministry of Water Resources report (1992) and a Three Gorges Development Corporation report (internet 1999) and other news sources along with preliminary information obtained while participating in the CIDA feasibility study (1986/87) and this information is generally believed to be reliable.

Walter E Webb

CANALS – PART TWO

Ken Mackenzie, FCSCE

(This article originally appeared in History Notes of the Canadian Civil Engineer. a publication of the History Committee of the Canadian Society of Civil Engineers, and is reproduced here with the permission of the author)

Maturity — The 20th Century

By the year 1900 Canada possessed a commercial waterway system between the Atlantic Ocean and the Great Lakes which substantially fulfilled the dreams of the early European settlers. The extensive channel improvements and canal works on the St. Lawrence, together with the construction of the third Welland Canal, now meant that ships up to 85m long of 13m beam and 4.2m draft had access throughout the Great Lakes. In the years before the First World War, huge dredging contracts were carried out in the St. Lawrence so that, by 1914, depths of 10 m had been cleared. There was constant need to accommodate increased shipping. Other canals provided additional commercial access. Many were increasingly used for recreation, as the railways, and later the highways, took over more and more freight haulage.

By the year 1900 it was also clear that ship sizes, both on the upper lakes and internationally, now exceeded the capacity of the upper St. Lawrence River and the third Welland Canal. The country had now developed the ability and economic strength to tackle the challenge of yet another series of massive canal projects. Once again Government was heavily involved in

planning, and it was now felt that the required skills and methods were available. A number of parliamentary reports were tabled, leading to the concept of a coordinated St. Lawrence Seaway.

There now existed a cadre of experienced professional engineers capable of proficiently handling the work. The Canadian Society of Civil Engineers had been organized in 1887. The first president of the Society was Thomas Coltrin Keefer, who had been involved in the planning of the second Welland Canal and had worked on the Ottawa and the St. Lawrence Canals. He was the author of an essay "The Canals of Canada" published in 1850. T.C. Keefer died aged 94 in 1915, having had a lifelong interest in the development of the country's waterways systems. The scale of inland navigation projects had increased greatly in the last decades of the old century. One of the decisive factors in planning such grand scale enterprises was the more widespread use of Portland cement concrete, which had been first used in large civil works in Canada as recently as 1835. Engineers had been unnecessarily concerned about its cost, and more understandably concerned about its freeze-thaw resistance. Mechanical excavating, dredging and hoisting equipment had more than kept pace with ever-increasing project size. Much had been learned from the sizeable works on the third Welland Canal which continued well into the 20th century.

The Fourth Welland Canal

Before the 1914–1918 war, and indeed from the time of the opening of the third Welland canal in 1887, there were groups pressing for a larger canal into the upper Great Lakes. There were excellent reasons for the lobbying. The third Welland canal was a bottleneck which required the large upper lakers to trans-ship their downbound cargoes onto smaller ships at the southern end of the third Welland at great expense and with serious loss of time. There were still at this time many who favoured the Georgian Bay Ship Canal proposal which would use the Ottawa River route to Lake Huron. Even though this Ottawa River route had the distinct advantage of bypassing the 14-foot (4.3 m) depth restriction of the St. Lawrence locks, the end result of a number of parliamentary reports was the decision in 1909 to construct a new Welland canal. It appears that this had been foreseen by the local engineers of the Federal Department of Railways and Canals, who had been quietly running route surveys across the Niagara Peninsula since about 1906.

The Welland Ship Canal, as it was then named, would run south from a new Lake Ontario entrance to be called Port Weller, about five kilometres east of the earlier entrances at Port Dalhousie. It would run south for about 10 km with three single-chamber locks to the foot of the Niagara escarpment, where it would climb 45 m in three twinned pairs of locks. There would be a single lock between the top of the escarpment and the Lake Erie guard lock at Port Colborne. The canal would be 43 km in length with a total lift of 100 m. The lock widths were 24.3 m, the lengths 222.5 m, except for the Guard Lock no. 8 at Port Colborne, which was 350 m in length. The general canal prism dimensions were 94 m on top, 60m bottom and 8.2 m depth. The canal was sized for vessels of about 30,000 tonnes deadweight. It was thought that, all being well, the canal could be constructed in about five years, starting in 1913. The canal in fact opened 19 years later, on August 6th, 1932, after being halted in 1917 during the Great War, and only restarting in 1919.

The sheer size of the enterprise was unprecedented, and the logistics were daunting. Popular imagination was intrigued by the idea of lifting 30,000-ton ships nearly 50 m up such a steep incline. Worldwide attention was directed at the mammoth project, to continue during the ups and downs of the next 20 years.

The new alignment of the fourth Welland canal meant that the city of St. Catharines was essentially bypassed, but the line went through Thorold, Welland, Port Colborne and several smaller communities. It went through a region of richly productive farmland. It cut across a complex road system and five major railroads, which serviced a mature industrial and commercial area. The new route conflicted with much of the busy third canal. Keeping navigation on the third unimpeded while constructing the fourth, building 20 new bridges, handling road and rail traffic, and moving several existing bridges called for exceptional planning and execution. At times the demand for labour, steel, cement and skilled contractors put a strain on the provincial economy. Land assembly costs alone finally amounted to about $ 2 million or 1.5% of the final project cost of $130 million; the cost of engineering was almost $9 million.

The contracts called in 1913 were mostly based on unit price. The canal line was divided into eight sections, and some of the excavation contracts were for an entire section. Labourer wage rates were about 20 cents per hour. With the loss of men to the armed forces after 1914, and the lessened priority given to the canal, the pace of the work slackened and a halt was called in 1917.

When the work began again in 1919, labour was at first plentiful, and the labourer's wage rates had increased to 40 cents an hour. The contractors were reluctant to take fixed price work or even unit price work, so the contracts were now called cost plus. The pace of work picked up, and a vast array of men, equipment and materials was mobilized. In 1919 the work was put in the hands of Alexander J. Grant as Engineer-in-Chief. Grant was a native of Banffshire, Scotland, who had joined the federal Department of Railways and Canals in 1886, just before the third Welland canal was opened and not long after the Department was established. He worked on the Soulanges Canal, and on the harbour improvements at Port Colborne from 1903 to 1906. He was in charge of the Trent Canal works from 1906 until he arrived on the Welland in 1919, and did not retire until after the new canal opened. Grant at one time was president of the Engineering Institute of Canada.

The large staff assembled under their new Engineer-in-Chief faced a formidable series of challenges in the next 14 years. They could count on many capable and experienced construction people in their own ranks and those of the contractors as they built up their companies after the war. They now had at their disposal equipment developed and improved by the demands of pre-war heavy construction. The canal works would require 40,000,000m3 of earth excavation, 7,000,000m3 of rock excavation and they would consume 2,300,000m3 of concrete. Excavation equipment ranged from 5m3 steam and electric power shovels to grader mule teams, which were still used as late as the early 1930s. Single-lift moveable concrete forms 30 m in height were in general use on the lock walls. Reliable underwater blasting techniques were developed.

The temporary works such as concreting towers, very large cranes and hoists mounted on rail track, piling rigs and coffer dams were on the same massive scale. An early decision had to be

made during the course of the work to change from the proposed single leaf lock gates to double mitre gates. So that these 30m by 15 m steel gates could be readily transported and placed in position, a pontoon was devised to incorporate a 25-ton crane. This remarkable craft stood about 40 m high and its stability and verticality were controlled by raising or lowering the level of ballast water in tanks on its periphery. A submarine saw, mounted on a tapered structural frame, was built to cut pile caps at a depth of over 20 m.

Grant and his people knew that they could expect some mishaps. At the north end of the canal there was one of the great harbour works for the canal, at Port Weller. Among the early work here were two groynes or training walls of rock fill which were being constructed about one kilometre into Lake Ontario using a temporary rail bridge. A fierce winter storm late in 1915 took out much of the work, fortunately with no loss of life, but adding huge cost. The early 20th century engineers suffered like their predecessors on the first Welland Canal from their imperfect knowledge of soil behaviour. There were many embarrassing slides into the work, sometimes only from a side cut excavation, but also at times involving constructed facilities such as piers and piled foundations. It is interesting to note that in those less litigious times accidents and failures were not only thoroughly investigated, but their lessons were widely disseminated.

Over and above the straightforward work of the canal proper there were the two large port facilities, an aqueduct at Welland which was a large project in itself to take the Chippawa Creek under the new canal, several dams as high as 30 m to impound the various head ponds, a power station utilizing the fall of water down the escarpment to generate enough electric power to supply the entire canal system, as well as the 20 bridges. These are impressively sized structures, providing either open overhead clearance, in the case of the rolling lift bridges, or a minimum 36 m clearance in the case of the lift bridges. The bridges are only minor auxiliary elements in the system, but when their number and size are considered, the magnitude of the fourth Canal is again put into perspective.

The economic cost for the fourth Welland Canal was stated to be $130 million. The cost in human life is shocking to engineers of the late 20th century. One hundred and eighteen men died in building the canal.

There have been a number of related construction projects since World War II which add to the efficiency and serviceability of the Welland Canal. In 1963 the high-level Garden City Skyway at St. Catharines provided uninterrupted vehicle passage over the canal. In 1968 the Thorold Tunnel under the canal retired two of the 20 original bridges. In 1973 the 13 km Welland Canal Bypass opened. It replaced some of the winding original channel, and provided the community of Welland with a lovely linear park.

To be continued

Upgrades on the Welland Canal

The St Lawrence Seaway Management Corporation plans to spend C$40 million over the next six years to upgrade the equipment that operates the lock gates and valves on the Welland Canal. The current electric motor-driven, wire rope and chain systems for gates, valves and ship arresters will be converted to modern hydraulic drives.

The modernization may eventually allow the canal to have an 11 month or even year-round season.

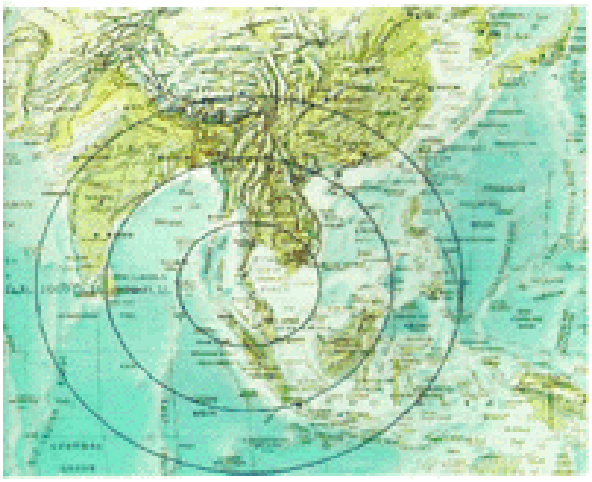
Calendar

4 April 2004	2:00 pm	Spring Social	St Catharines Museum
21 April 2004	7:30 pm	Brant Historical Society (Brantford)	Bruce Hill presentation on the Brantford cut of the Grand River Navigation
29 May 2004		WCC 2004	Pre-conference events start
2 – 4 June 2004		WCC 2004	Brock University

Note: there will be no Spring Field Trip so that members may participate in WCC 2004 by attending the conference in full or for a day only

5 -6 June 2004		WCC 2004	Post-conference events
3 July 2004		Wreath laying at Merritt statue – anniversary of birth	
3 July 2004	launch of canal-schooner Lois McClure – Burlington, Vermont		
9 July 2004		100th Anniversary Peterborough Hydraulic Lift Lock	
10 August 2004		50th Anniversary of the start of the St Lawrence Seaway	
August or September 2004		CSNYS – trip to Great Britain	
25 – 26 September 2004		Fall Field Trip – Peterborough Hydraulic Lift Lock	
27 November 2004		Merritt Day	
30 November 2004	(tentative)	Fall Social/AGM	
Spring 2005	(tentative)	Field Trip	Ohio and Erie Canal Heritage Corridor
21 – 27 August 2005		WCC 2005	Sweden – Six Canals in Six Days

Thailand's Kra Canal



The idea of a canal across Thailand's southern peninsula first arose in 1677. Over the centuries a number of surveys have been made of potential routes.

The approximately 100 km canal would shorten the sea route from the South China Sea to the Indian Ocean by 700 to 1,000 km (three days sailing). It would reduce the congestion (and piracy) in the Straits of Malacca.

The projects estimated cost is US$30 billion to build a canal for 500,000 tonne gross vessels. Its ten year construction period could create jobs for 3,000,000 people.

Ⓐ Ranong-Chumphon (2A) running from Ban Ratchakrud to Ban Pak Nam Tako, 82km.
Ⓑ Krabi-Trang-Phatthalung-Nakhon Si Thammarat (9A), 110km.
Ⓒ Satun-Songkhla (5A), 102km.

Route A gives the best access to Thai ports but passes through 49 km of mountains. Route C, which has become the preferred route has only 7 km of mountains.

China is keen to have the canal built as industrialization of the country creates a greater demand for Middle East oil. There is also concern over Islamic fundamentalism in Indonesia which borders on the Straits of Malacca route. The strait which is as narrow as 1.5 miles and passes some 50,000 ships a year could be too risky as the sole lifeline to East Asia's economic powerhouses.

In Vietnam, Van Phong Bay is to become a transhipment hub. The port will become even more important if the Kra Canal is built.

But, in Singapore and other countries that rely on the Straits of Malacca traffic the proposed Kra Canal is seen as a threat to their future economic viability.

It remains to been seen if a project which has been under discussion for 300 years will finally come to fruition.

Bob Sears

The Library – Reviews and Books for Sale

The Grand River Navigation Company by Bruce Hill

The Brant County Museum and Archives now have copies of Bruce Hill's book available at $24.95 each. Orders may be placed with Ms Shannon Dunlop, Assistant Curator,
Tel: 519-752-2483

A Link in the Great Chain: a History of the Chemung Canal

by Gary Emerson, Published by Purple Mountain Press in conjunction with the Chemung County Historical Society, 120 pages, illustrated, 7 x 10, paperback, US$15.00 (inquire for shipping charges, all major credit cards accepted). **Forthcoming in February 2004**. This is the first history of this important Erie Canal lateral. The citizens of Elmira, New York, were overjoyed with the completion of this canal in 1833. By connecting the Chemung River to Seneca Lake at Jefferson (Watkins Glen), this canal became a link in the great chain of canals across the state and allowed boats access to the Erie Canal through the Cayuga and Seneca Canal.

This publisher also offers **NEW YORK STATE CANALS: A SHORT HISTORY** by F. Daniel Larkin, US$12.00, paperback (now in its fourth printing, it is a very accessible history of very canal built in New York State) and **LIMESTONE LOCKS AND OVERGROWTH: THE RISE AND DESCENT OF THE CHENANGO CANAL** by Michele A. McFee, US$25.00, paperback (now in its second printing, it is the story of the awesome canal that connected Utica and the Erie Canal with Binghamton, New York, 1837-1878).
Our number 1-845-254-4062, fax: 845-254-4476.
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The Canadian Canal Society

Executive Officers for 2002-2003

President:	Bobbie Styran
Vice-President:	Tom Whitelaw
Secretary:	Ken Mackenzie
Treasurer:	Carol Gaspari
Past President:	George Hume

Send correspondence to:
Secretary
Canadian Canal Society
PO Box 23016, Mid-Town Post Office
124 Welland Avenue
St. Catharines, Ontario
L2R 7P6

Contributions for Canals Canada to:

Bob Sears, Editor
Canals Canada
248 Tower Drive
Toronto, Ontario
M1R 3R1

Phone: 416-285-7254
Email: dawnofdestiny@sympatico.ca

Website: http://people.becon.org/~ccs/

The Editor's Desk
A big thank you to the many contributors to this edition of *Canals Canada*.
Bob Sears