Eastern Canada’s new ‘super port’

Harry Valentine, Transportation Research Engineer, Cornwall, Canada

Introduction
The present day Port of Montreal serves as eastern Canada’s major international maritime port, replacing Halifax, which for decades earlier had served as the major port for the area. Montreal’s rise to maritime prominence was the result of ongoing improvements to ship and navigation technology that allowed ships to sail up the lower St Lawrence River. The volume of maritime traffic subsequently increased at the Port of Montreal and until recently, the navigation depth (draught) of the lower St Lawrence River assured passage to all sizes of ships that sailed the ocean during an earlier period.

Ongoing advances in ship technology led to the development of large oil tankers that exceeded the navigation draught of the lower St Lawrence River for several hundred kilometres downstream of Montreal. However, the Port of Halifax was able to accommodate the larger ships. With river water levels at normal depth, ‘Panamax’ container ships could just barely sail the lower St Lawrence River fully laden, with the bottom of the keels barely clearing the riverbed. During periods of reduced navigation draught, ‘Panamax’ size ships need to be partially off-loaded at a port located far downstream of Montreal.

The ‘post-Panamax’ challenge
The development of the new generation of larger ‘post-Panamax’ ships poses a problem for the Port of Montreal, as their fully laden navigation draught exceeded that of the lower St Lawrence River by the equivalent height of two floor levels. Government and maritime officials has previously discussed dredging the lower St Lawrence River and a section of the St Lawrence seaway to the Port of Toronto, the biggest container port on the Great Lakes. Environmental concerns cancelled both proposals and maritime research personnel subsequently evaluated the Ports of Quebec City and of Halifax as possible terminals for ‘post-Panamax’ ships.

During high tide, the Port of Quebec City barely offered sufficient water depth to accommodate a ‘post-Panamax’ ship and insufficient space to accommodate an expanded intermodal container port. The old Port of Halifax barely offered sufficient navigation depth to accommodate a ‘post-Panamax’ ship and insufficient space to accommodate greatly expanded intermodal container operations. Canadian transport officials conceded that ‘post-Panamax’ ships would likely sail into the Ports of Boston or Newark carrying Canadian-bound containers. Interlining smaller ships would then carry the containers to Canadian ports located along the St Lawrence River, between the Gulf of St Lawrence and Lake Ontario.

Partially-laden ‘post-Panamax’
Canadian transportation officials opted to modify the Port of Montreal to include a new dock facility capable of berthing a ‘post-Panamax’ vessel that could only sail up the lower St Lawrence River at part-load capacity, or close to the container load of the smaller ‘Panamax’ ships. A fully laden post-Panamax ship carrying both American and Canadian bound containers would sail into the Port of Boston, where the ship would be partially off-loaded before sailing partly-laden to Montreal, mainly during periods when water levels in the St Lawrence River were near maximum.

A new ‘super port’
The Melford Group owns several ports internationally, most being operated by the Maher Group. Melford’s strategic staff recognised the economic benefit of a deep-sea port capable of berthing ‘post-Panamax’ ships, being built in eastern Canada. They located a potential site in the deep and narrow ocean channel that separates Nova Scotia and Cape Breton Island, the Strait of Canso.

Many years ago, the Government of Canada installed navigation locks along the Strait of Canso to reduce the volume flow rate of sea water through the channel as the tide rose, producing a torrent that resembled a river in flood.

Construction is presently under way at the proposed Melford super port in eastern Canada and is scheduled for completion some time in 2014, to coincide with the opening of the new and enlarged Panama Canal. Melford Terminal would be located some 180 degrees of longitude from the ports of Hong Kong, Taipei and Manila, less that 170 degrees from the ports of Jakarta, Singapore, and Kuala Lumpur, with less than 140 degrees from the Indian ports of Mumbai and Cochin. It is a potential port of call for ‘post-Panamax’ ships sailing between north eastern American ports and European Ports, or Asian ports via the Suez Canal.

Maritime hub
While small towns surround the eastern Canadian Melford Terminal, it will serve as a transportation hub for containers that move between international ports and inland Canadian ports such as Montreal, Toronto, Hamilton and American inland ports such as Ogdensburg, Oswego and Rochester. With the exception of...
Montreal, the waterway that connects between Montreal and the other inland ports operates between late March and late December, with peak container traffic moving between July and December. While the cranes at Melford Terminal are being designed to offer vessel-to-vessel transfer, a variety of maritime technologies may sail between the terminal and inland ports.

Like the Port of New Orleans, river traffic that sails to and from Melford Terminal will have to cross over a section of ocean on the Gulf of St Lawrence. At New Orleans, river traffic has to sail on to the Gulf of Mexico between the entrance to the port and the mouth of the navigable Mississippi River. Lower amplitude wave conditions occur on the western side of the Gulf of St Lawrence where domestic inland shipping will sail, compared to the more energetic wave conditions that occur along the northern region of the Gulf of Mexico.

Inland ship technology

The 1000 mile waterway that connects Melford Terminal and the Port of Montreal is free from navigation locks and offers generous navigation draught, beam and overhead clearance of some 40 metres (136 feet). A ‘Panamax’ ship could operate as an interconnecting vessel between the super port and Montreal, as could the smaller ‘Seawaymax’ size of ships. The comparatively gentle wave conditions on the western Gulf of St Lawrence can allow tugs to push or tow barges coupled into trains, or even flotillas of 40 barge units. Proven and tested new generation automated navigation technology from Autonav can ease navigation along the inland waterway.

In recent years, several ship owners have converted inland and coastal ships into tug barges, to increase payload capacity. More recently, research has focused on a coupled train of two ship-size barges that a tug may push and navigate from the stern. While the technology shows promise, its operation will require the lengthening of navigation locks between Montreal and Lake Ontario. Melford Terminal’s vessel-to-vessel transfer operations would be able to accommodate transferring containers between ‘post-Panamax’ ships and a variety of alternative ship technologies, both inland and coastal maritime technologies.

The barge option

To be cost-competitive against the railways, transportation economics requires that inland waterway technology carries at least 1,000 twenty-foot equivalent units (TEU) between Melford Terminal and Lake Ontario. Ship owners need to cover the cost of moving vessels through seven sets of navigation locks between Montreal and Lake Ontario. While sailing along the lower St Lawrence River between Melford Terminal and Montreal, there would be scope to automatically uncouple barges from extended length barge trains at select points. Local tugs would await their arrival and couple to them before pushing or towing them into a nearby local port, for transfer to trucks.

Trains of small (200 feet by 35 feet) barges arriving on Lake Ontario may be divided amongst multiple shallow draught (12 feet) ports located around the lake its tributaries. American river ports might include Syracuse (Oswego River), Rochester (Genesee River) and a dock located north of Buffalo (Niagara River). Shallow draught Canadian ports on Lake Ontario would include Oakville, Mississauga, Belleville and Kingston. Tugs pushing two unit trains of ‘Seawaymax’ size barges would sail to the main (deeper draught) ports at Toronto, Hamilton, Oswego (NY) and Ogdensburg (NY), with the option of splitting the train between two nearby ports.

In conclusion

Critics initially doubted the future success of the proposed Melford Terminal, due to its close proximity to the Port of Halifax. Restricted land space at Halifax required that container transfer and related terminal operations be spread over multiple distant locations. Melford Terminal’s location at the Strait of Canso allows smaller inland vessels to sail across the comparatively calmer waters of the western Gulf of St Lawrence to access the strait’s northern entrance, bypassing the much rougher seas off Halifax. As Canada’s only eastern super port able to berth ‘post-Panamax’ vessels, Melford Terminal may likely evolve into a viable international intermodal terminal.

ABOUT THE AUTHOR

Harry Valentine was born in Cape Town, South Africa and lives in Cornwall, Canada. He holds an engineering degree from Carleton University, where he pursued postgraduate studies in transportation and undertook extensive research at the University’s Transportation Research Centre. He has research experience in the passenger and freight transportation sectors.

ENQUIRIES

Harry Valentine Research
205 529 14th Street West
Cornwall, Ontario, Canada K6J-3J5
Telephone: 1-613-933-5616
Email: hvalentine1@cogeco.ca