

SHORT SEA SHIPPING and the SUPPLY CHAIN

A Review of Cross Lake Ferry Economics and Benefits

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EXECUTIVE SUMMARY

The paper reviews the potential role of short sea shipping in US/Canada cross border trade. It demonstrates that marine transportation has a viable role in enhancing supply chain reliability and reducing border congestion.

Reference is made to European experience as well as the problems facing North America in responding to rapidly expanding transportation needs, particularly relative to trucking. The paper reviews US/Canada trade, concentrating on the three primary lower lake gateways. Three proposed ferry operations on Lake Erie and Lake Ontario are reviewed, together with their traffic potential, catchment areas and environmental benefits.

The paper shows that the ferry routes have the ability to significantly reduce border congestion, by offering new gateways between the US and Canada. However, despite attractive cost margins between direct trucking and use of the ferry, institutional barriers, that discriminate against the marine mode, could well prevent them being introduced.

RESUME

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He is a member of the Chartered Institute of Logistics and Transport; The Society of Naval Architects and Marine Engineers and has been associated with IMTA/Interferry since 1986.

He has been involved in ferry projects from Shetland (UK) to South Korea, and is currently working on five ferry studies in North America, two of which are Short Sea freight ferries.

SHORT SEA SHIPPING AND THE SUPPLY CHAIN

Since Just-in-Time was pioneered by Taiichi Ono for Toyota, in the early 1970's, manufacturing of not just automobiles has been revolutionized. An example of the complexity of the input side of a vehicle assemble operation was given recently for GM Brazil¹. 600 parts suppliers, 350 in Europe, 150 in North America and the balance in Brazil. As will be appreciated, transportation and its reliability play a critical role in the success of this operation.

In Europe, and in North America, the same approach to outsourcing of parts and components has required a finely tuned distribution system, most commonly based on trucking. However, this is not to imply that marine, and other modes, are not involved. The development of the international container industry, starting in the mid-1960's, enabled manufacturers to place increasing dependence on international outsourcing of products, trading on the inherent

¹ Containerization International, March 2005.

reliability of the container lines². Reliability of transportation, as the glue that holds supply chains together, seems to be little appreciated. Perhaps this is because transportation has been rolled into “logistics”, and then outsourced. Even a major study by Cranfield University in the UK for the Dept. for Transportation into resilience of supply chains, gives scant recognition of the critical importance of physical transportation³. This report does provide one apposite comment that relates to the distribution problems we face today:

“There is no common language other than cost”.

This bottom line driven approach to every link in the supply chain, rather than tempering cost with reliability, is the root cause of transport capacity issues around the world, extending from port and intermodal rail capacity to road and border congestion.

Road congestion is not just a problem in North America, it is creating growing problems in Europe and is driving a thorough reappraisal of goods movements. The recently introduced LKW Maut road toll system in Germany (although 18 months late) is part stick to force the private sector to re-evaluate routing and part revenue generation to fund modal growth. There are plans to introduce a pan-European toll for vehicles over 3.5 tonnes by July 2008 and for all vehicles by July 2011⁴.

An example of the impact of road congestion in Europe is that in the UK alone it is estimated to cost industry £20bn per year⁵. Cross border congestion between Canada and the USA is estimated at

² The severe winter of 1993/94 created considerable schedule disruption in the Europe-Montreal container trade resulting in a number of manufacturers having to fly components into North America to keep production going.

³ Creating Resilient Supply Chains – A Practical Guide. 2003

⁴ Comment by dr. Wolfgang Reinhardt, Director Regulatory Affairs for the European Automotive Association at the UK Freight Transport Assoc. “Freight Summit 2005”. London UK, Feb 2005.

⁵ Bo Lerenius, CEO, Associated British Ports at the 2nd National Sea & Water Conference. Hull UK, March 2005.

US\$4.01bn per year⁶. Another study by the Canada-US-Ontario-Michigan Border Transportation Partnership has not estimated a current US-Canada border congestion cost, but has estimated that costs for the Detroit/Windsor region alone will reach US\$7.5-8bn by 2020.

While there is recognition in both Europe and North America that congestion is costly, Europe is actively working on multimodal solutions within both the public and private sector. In North America there is no effective leadership on the issue in either public or private sectors and the marine option is effectively ignored. The Border Partnership study did not explicitly discuss the role of the barge ferry operating at the foot of the Ambassador Bridge, and only mentioned marine options in passing.

Canada-US Trade Flows

Canada’s trade with the US and v.v. is considerable and the US Dept. of Commerce reported 2004 value at US\$446bn, up from US\$392bn in 2003. This was about the same level of activity as US trade with the EU-15. Data from Stats Canada is somewhat lower as the following table shows. Note that in looking at trade data in value terms it is necessary to take into consideration the changes that have occurred in the value of the C\$ relative to the US\$; the trends are somewhat different in US\$ vs Canadian dollars.

**US/CANADA CROSS BORDER TRADE
Five Year Trend \$bn**

	2000	2001	2002	2003	2004
US\$ value	397	368	359	378	428
C\$ value	589	570	563	531	557
Implied exchange rate	.67	.65	.64	.71	.77

⁶ The US-Canada Border: Border Economic Costs, their Causes and Alternative Management Strategies. John C. Taylor & Assoc. Nov 4, 2003. Delays and transit times only, excludes an estimated \$6.28bn for trade policy related costs.

Modally⁷, in 2000, trucks moved about 66% by value and 41% by weight; rail 24% by weight; water 13% by weight. However, weight data is imputed from value. Actual weight data is not readily available from any consistent source for truck or rail cross border movements and what is available is scattered across several sources⁸.

For 2001 it was estimated⁹ that rail freight carried 54.8m tonnes of cargo cross border, of which 54% by weight and 71% by value moved through the three border crossings of Buffalo/Niagara Falls, Detroit/Windsor, and Port Huron/Sarnia. Tonnage estimates for truck freight in 1999, based on a Canadian National Roadside Study, indicated 145.3m tonnes of cross border cargo¹⁰. Of this, 56% by weight and 68.6% by value moved through the three primary Ontario border crossings. This demonstrates the extraordinary concentration of Canada/US trade around the lower Great Lakes of Erie and Ontario.

Projections for rail freight volumes indicate a 30% increase in both volume and value by 2020¹¹. The forecast for truck freight indicates a 60% growth in bi-directional transit numbers to 2020¹². A projection (below) of traffic through the three primary Ontario gateways suggests a somewhat lower, but still high growth.

⁷ US Dept. of Transport, Bureau of Transportation Statistics – North American Trade & Travel Trends.

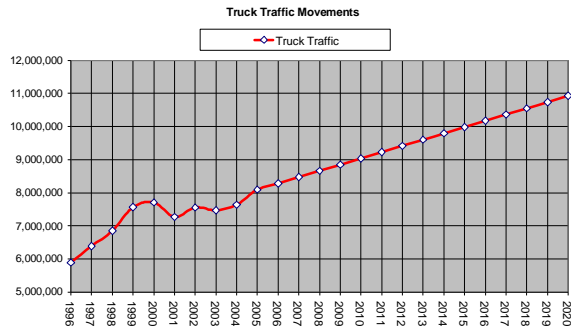
⁸ Comments in two studies for the Eastern Border Transportation Coalition.

⁹ Cambridge Systematics EBTC study of rail freight crossing the Canada-US border. Nov 2004.

¹⁰ Parson Brinkerhoff Quade & Douglas Inc. Truck freight crossing the Canada-US border. Eastern Border Transportation Coalition. Sept 2002.

¹¹ A generic forecast in reference 9 from US sources.

¹² Reference 10 does not provide actual weight or value forecasts. Numbers of two-way moves are predicted from regression analysis of long term trends at each crossing. Time series vary.



Growth in road freight volumes is not something that is unique to Ontario and the US border crossings. In the USA, commentators have pointed to growing congestion and the inability to invest in new transportation infrastructure. For example, vehicle miles grew 80% between 1990 & 2000, while highway lane miles grew only 2%¹³. In Europe, goods transport volumes through Germany, which lies at the centre of EU traffic, is projected to rise 90% between 1998 & 2015¹⁴.

Short Sea Shipping as a Solution to Congestion

The European Union, in recognition of the true nature of short sea trade has, since 2001, used the term “motorways of the sea” as the type of activity they wish to develop. Essentially this is to try and control growth of truck traffic. The three main objectives for the Motorways of the Sea initiative are:

- Reducing road congestion through modal shift
- Increase cohesion (within the EU)
- Freight flow concentration on sea-based logistical routes.

¹³ Journal of Commerce. July 10-25, 2004.

¹⁴ European Short Sea Network position paper 24 Sept 2004

This goal is exactly what is being targeted in North America. As in Europe, there are opportunities for at least four types of long and short haul ferry operations.

- A true intermodal system built around a 53' container, similar in concept to Geest NSL's 13.5m (45') container operation
- Drop trailer freight ferries, probably where runs are over about eight hours
- Full roll-on, roll-off freight ferries on shorter runs
- Ro-pax ferries, although these are possibly less likely, given the significant differences between North American and European passenger traffic.

Proposals for the Great Lakes, in the core Ontario area, cover each of the three ferry types noted above:

- A ro-pax ferry between Cleveland (OH) and Port Stanley (ON)
- A roll on/roll off ferry between Erie (PA) and Nanticoke (ON)
- A drop trailer ferry between Hamilton (ON) and Oswego (NY)

While other ferry routes are possible it is these that will be discussed and the Hamilton-Oswego ferry reviewed in detail. The Cleveland and Erie ferries would both operate across Lake Erie. The Oswego ferry would operate on Lake Ontario.



CLEVELAND-PORT STANLEY

Distance 86sm
Transit time 3hr 30min
Number of vessels 1
Season:
 Closed Feb 1-Mar15
 Shoulder 1 round trip/day Mar 16-May 31, Oct 1-Jan 31
 Peak 2 round trips/day Jun 1-Sep 30
Vessel TBD
Speed 18kts
Capacity 3,600 lane feet, 1,200 pax
Off interstate driving 19sm
Period of study May 2003-May 2004.

The analysis, for truck/commercial interest, was geared towards time saving primarily between the immediate Cleveland hinterland and the London/St. Thomas area in Ontario. The estimates of activity were derived from broader statistical data using employment to proportion probable goods traffic in the primary market. Overall market projections for the service were in the range 20-25,000 truck moves per annum.

Author's Comments

The traffic potential for the route may well be understated because it concentrated on the immediate hinterland of the ferry termini and did not, specifically, look at cost savings for long haul truck operations. Also, as this is targeted at a roll-on, roll-off type of operation, there are potential benefits for the truck driver being off duty. As the primary freight mode is tractor trailer traffic, space could well be at a premium during summer months, despite two round trips/day, due to competition with passenger-related vehicles. Also, shutting down the ferry for a part of the season will not encourage users to integrate the operation into their cross border strategies.

The primary truck route on the US side of the Detroit/Windsor crossing is I-75/I-71/I-65, with activity levels of about 20,000 trucks

per week to/from Ontario¹⁵. The ferry could divert a portion of this traffic at Cincinnati via Cleveland saving 172 miles driving. At current long haul costs, fuel surcharges and border costs, this is about \$400/tractor trailer before ferry charges. In addition to this traffic about 5,000 vehicles per week each through Port Huron on I-75/I-94 and on I-71/I-90 through Niagara would also be candidate for ferry use

ERIE-NANTICOKE

Distance	48sm
Transit time	3hrs 30min
Number of vessels	1
Round trips/day	2
Season	year round apart from scheduled downtime
Vessel	TBA
Speed	16kts
Capacity	5,900 lane feet, 0 pax
Off interstate	54sm heading west in Ontario 38sm heading east in Ontario
Period of study	2003.

The route is proposed as a commercial ro-ro service that will complement a separate high speed passenger vehicle ferry between Erie (PA) and Port Dover (ON). The analysis looked at shipping routes and, through a modelling process, predicted a percentage of traffic that could be captured by the ferry. In 2005 the potential volume of business was estimated at just under 100,000truck moves/year. Survey work associated with the analysis indicated a high level of interest in the service for both ro-ro and drop trailer service.

Author's Comments

The traffic potential for the route is probably of the correct order of magnitude as it incorporated both local and long distance movements. However, specific cost savings based on comparative route miles and border costs were not assessed, although it was noted that there would

¹⁵ Based on observation of truck flows in Reference 10

be driver benefits for the time on the ferry. The analysis did not appear to be based on actual candidate truck moves. One of the potential problem areas may be the off highway driving needed on the Ontario side, almost all of which is on tertiary roads.

Volumes on I-90/I-79 through the Niagara border crossing are in the region of 10,000trucks/week to/from Pittsburgh, plus a further 5-10,000 moves per week into and through Cleveland. This latter traffic would be competition for the Cleveland ferry, and Erie Nanticoke could be preferred, given that it is a year round operation , with two sailings per day in each direction. Driven distance savings are not as great as for the Cleveland route, at 110sm. At current short haul truck pricing plus border costs, the savings would be in the order of \$400/tractor trailer before ferry charges.



OSWEGO-HAMILTON

Distance	166sm
Transit time	12hrs
Number of vessels	2
Round trips/day	.5
Season	Year round apart from scheduled down time
Vessels	TBD
Speed	16kts
Capacity	3,200 lane feet, 0 pax
Off interstate driving	11sm

Period of study 2000 & 2004.

The analysis, given the length of the routing, was targeted entirely at drop trailers and focused on comparative truck routings and costs either direct or via the ferry. This enabled a margin, before ferry charges, to be established based on current truck costs, border crossing costs and surcharges. An analysis of origin/destination pairs that met a minimum margin criteria was then used to help determine the catchment area, and potential traffic level. This showed a potential market of some 200-260,000 moves/year, at 1999/2000 levels, which was 20% of all movements at the Niagara border. Ferry capacity, with two units, was 15% of market or 3 % of all traffic.

TYPICAL TRUCK MARGINS US\$¹⁶
Excludes Border Surcharge & Bridge Fees

	Boston	N.York	Philadelphia	Norfolk	Syracuse
Hamilton	\$452	\$499	\$415	\$175	\$424
Kitchener	\$452	\$499	\$399	- nc -	\$424
N. Bay	\$156	\$232	\$232	- nc -	- nc -

Author's Comments

The traffic potential is probably realistic, but the potential for take up by shippers has yet to be tested. Interest may be higher today than when the study was undertaken as trucking costs have risen considerably and margins are higher. Service reliability was deemed critical, with two vessels offering nightly sailings in each direction. Anecdotal information suggests considerable interest, with added savings to shippers of being able to use a day dray service on either end of the route.

Comparison of Service Factors

An assessment of service factors included with the Cleveland and Erie ferry studies showed a high ranking for Price, Reliability and

¹⁶ Based on industry advice as of Oct 2004 of short haul rates of US\$2.37/mile, plus \$.27/mile fuel surcharge. Long haul rates are about US\$1.34/mile with the same fuel surcharge. A recent check has shown that these rates are still valid in 1Q 2005.

reduced Customs delays. The same factors are likely to be the key determinants for the Oswego/Hamilton route as well.

These factors were certainly critical in attempts over the last few years to establish a truck ferry between France and Italy. The original proposal of alternate day service between Fos and Savona was changed to daily, but still failed because of high port costs and a route that did not offer a time saving¹⁷. A service has now been established between Toulon and Civitavecchia, which offers a 14-hour sailing time versus 22 hours driving, although again it is only alternate days. However, traffic is growing and a second vessel is expected shortly¹⁸.

Role of the Three Cross Lake Routes

The analysis of potential catchment area for the Oswego-Hamilton route showed the ferry is likely to have a very specific area of application.



Although no comparable analysis is available for the other routes, the brief analyses in this paper, of US routes to the Canadian border and

¹⁷ Lloyd's List. 28 April, 2004.

¹⁸ Lloyd's List. 07 Feb 2005.

distances saved, strongly suggests that each ferry will have a distinct market, with little crossover.

What the ferries offer is reduced cost and enhanced reliability relative to border crossings. By providing a comprehensive documentation of en route cargo with advanced notice, clearance by Customs in both Canada and the USA can be expedited. This could be of particular value where a steady stream of goods needs to be moved on a particular route, in that the ferry becomes an integral component of the calculation of time and goods in transit, with border uncertainty removed. This does presuppose a year round reliable marine service.

Environmental Benefits

The short sea ferries proposed for the lower Great Lakes will only be successful if they reduce driving distance and/or time. The margins for the Oswego-Hamilton route were in fact calculated based on trucking costs and distance differentials. Typical savings/trip in terms of driving were estimated at 150 miles, thus at full capacity the two ferries would remove 10.5 million miles of driving in a 350-day operating year. Assuming a one-hour border delay with the truck engine idling, this is equivalent to 13.65m miles of avoided truck driving. The Cleveland and Erie crossings had estimated savings of 172 and 110 miles respectively, thus each crossing could contribute similar savings in terms of reduced emissions, incidents, pavement wear and tyre disposal. The crossings would also mitigate the growing shortage of drivers for cross border activity.

The marine mode is well recognized as the most energy efficient, least polluting and safest transportation mode, as the following table shows. Thus moving cargo to the marine mode should enhance quality of life in urban areas, as well as helping reduce greenhouse gases and atmospheric pollution.

There are other, un-quantified benefits related to the congestion impact of accidents, particularly truck accidents on busy highways. Even a minor accident can close lanes or complete roads for 4-12 hours and in congested urban areas, the time cost of delays and atmospheric emission impact can be significant.

**COMPARATIVE ENVIRONMENTAL INDEX OF
TRANSPORTATION MODE¹⁹**

	Marine	Rail	Road
Energy efficiency	1	2.2	9.7
Air emissions	1	1.4	7.6
Accidents	1	13.7	74.7
Spills	1	10.0	37.5
Noise	1	1.4	1.3

Institutional Issues

There are a number of factors that materially impact cost and feasibility of short sea ferries on the Great Lakes.

Pilotage

The Great Lakes are a bi-national region; there are no international waters and the US Offshore Petroleum Act of 1990 has created a Pilotage cost nightmare for ships that are neither US nor Canadian flag. A foreign flag operation of the services being considered would incur pilotage costs of a least US\$1,500/ship trip.

Putting the ship under Canadian flag is not necessarily a viable option as a non-NAFTA vessel incurs 25% duty plus full upgrades to current MARPOL and SOLAS. The alternative is US flag, which does not incur a duty provision, but does involve upgrade work. However, USCG will consider reasonable alternative and waivers where it can be demonstrated that ship safety will not be compromised.

Customs & Immigration

US and Canadian authorities take very different approaches. On the US side, service is provided without charge, but the operator must meet all the technical requirements as laid out by Customs and

¹⁹ Hamelin-CFORT- Gesco 11.2000 on behalf of SODES.
Comparison based on Tonne Kilometres

Immigration. The main problem is that getting the service in place can take 12-18 months, even with political assistance. In Canada, service will be provided promptly and there is some flexibility with regard to interim facilities. However, it has to be paid for. Canada has grandfathered existing border crossings and airports as well as some ports of entry for free service. For new operations, or enhanced activities at ports that have resident customs facilities, Canada is in full cost recovery mode. This can add significantly to operating expenses. The Windsor/Detroit ferry, for example, has to pay about \$50,000/year for a single customs officer 08:00-16:00, five days a week. This is more than a little limiting.

Habor Maintenance Fee

The HMF is value based at .125% on all imports into US ports (the export portion was struck down by the Supreme Court some years ago). The fee applies equally in domestic as in international trade and is supposed to support dredging programmes in the USA. There are some exclusions, and ferries that carry some truck traffic are excluded where “freight is a minor portion of the business”.

Until there is a broad exclusion for freight ferries (i.e. cargo on wheels) it will be difficult to convince shippers that a ferry route which is taxed is better than the traditional all-road route, which is not. An analysis of the Hamilton/Oswego route done using Stats Canada data, see figure below, suggested that 68% of all moves that would be taxed, could be contained at under about US\$40/load. There are also a large number of international freight containers through the US to/from Ontario which are exempted from the fee, as well as a significant number of empty trailers which would be zero rated. Thus the overall impact of accommodating the HMF might be manageable in the short term on this route, but it would certainly impact traffic levels and restrict growth.

