



# **Transportation System Efficiency Study Executive Summary**

**OTA Select Committee  
November 13, 2002**

## **Executive Summary**

### **Background**

In mid-fall 2001, Transport Canada, Ontario region set out to consider truck tractor logs as a source of empirical data on “dwell-times” at border crossings and other related bottlenecks in the freight transportation system.

Taking this on, as a pilot project, evoked a broad spectrum of support. A partnership of “shared interest” quickly emerged.

For border managers and transportation planners, there is a pressing need for consistent and reliable quantitative data on border “dwell-times” both to validate planning assumptions and enable performance measurement over time. For Industry departments, both federal and provincial, the ability to effectively manage border delays and bottlenecks throughout the transportation system has a direct bearing on investor confidence and Canada’s competitive access to U.S. markets. For carriers, and shippers as well, delays and bottlenecks, whatever their source, simply increase the day-day costs of doing business and create a drag on productivity across the system.

### **Data Sources**

With OTA endorsement, Erb Transport and Verspeeten Cartage both agreed to provide data for the pilot project.

Each carrier was asked to identify high frequency, cross-border trips, originated in and/or destined to Ontario; the primary coverage area being the main 400 series corridors and the major commercial crossings from the Niagara Frontier to Windsor.

Erb Transport supplied copies of Tachograph cards, documenting some 1500 one-way trips from December 2000 to April 2002. Verspeeten Cartage, in turn, supplied GPS-based tractor logs covering some 1100 two-way trips from January to April 2002.

In total, there were some 3700 one-way trip records. Not a large sample, relative to the total volume of daily/yearly commercial traffic, but more than enough for the Study Team to:

- compare and contrast the relative merits of both (Tachograph & GPS) technologies,
- demonstrate what simple, yet powerful, tools can be developed from the empirical data stored in the tractor logs, and
- provide preliminary data on border crossing times, and initial profiles of the whole O/D trip.

### **“Dwell-Time” at Border Crossings**

The Tachograph and GPS data were both used to compile/construct a database of “crossing times over a predefined border zone”. Both were analyzed separately, and then together, in whatever statistical detail possible, but not before adjustments were made to compensate for apparent limitations in the available GPS data.

Tachograph cards are labour intensive and tedious to work with manually, but they often provide a visible fingerprint of elapsed border-crossing time that can be measured with almost pinpoint precision. The GPS data, in contrast, polled each truck at 15minute intervals only, which proved too coarse to clearly delineate the border zone. To compensate, the GPS data was adjusted via a procedure known as linear referencing to assign distances to the latitude/longitude coordinates contained in the tractor logs.

The results of the analysis are too limited to be conclusive, but they demonstrate the method, and do paint a useful and instructive picture of dwell-times and dwell-time patterns at four (4) major border crossings.

### **Other Delays & System Bottlenecks**

Working with both data sets and sifting through the strengths and the limitations of each paid one further dividend.

It was soon apparent that the GPS data readily lends itself to automating the process of compiling/constructing discreet databases, or data sets. This makes it possible to profile the entire O/D trip, not just border crossing segments. Travel speeds, time spent on the road, in the shippers/receivers yard and at the border, as well as total trip duration, can all be recorded and then subject to statistical analysis.

This enables assessment of dwell-times at border crossings in the context of the entire trip; i.e., as a fraction of total trip time affected with uncertainty and a higher probability of delay. More importantly, it is also possible to measure dwell-times and delays across the entire O/D trip, be it in the shipper or receivers yard, at the border, or as a consequence of other bottlenecks that persist throughout the system.

### **Highlights of Results**

- Border crossing times were longer for US-bound than for Canada-bound trips except at the Niagara Crossings
- 00 hrs to 600 hrs and 1200 hrs to 1500 hrs were, generally, the fastest times to cross the border
- Only 3 to 6% of the total travel time was spent crossing the border compared to 18 to 40% of the time spent in yards

- There were no significant differences in border crossing times pre- and post 911
- It took, on average, 17 minutes to drive across the 13 k.m. “Huron Church Road” trip segment for U.S.-bound *and* Canada-bound trips

## **Conclusions**

The Pilot falls short of any conclusive results, or definitive estimates, but it does demonstrate the inherent potential of truck tractor logs as an untapped, and increasingly abundant, source of empirical data.

Much of what can be said here in conclusion has an immediate bearing on the likely course and content of further research and development (R&D) efforts.

A larger cross-section of carrier data would be required to generate more definitive results. This would include a more diverse set of carriers, categorized at the very least by carrier type, goods carried and (Customs) release status, and would provide better coverage by time of day and day of the week.

More frequent polling intervals would be required to utilize the GPS data to its full potential. Checkpoints generated at more frequent, if not minute-minute, intervals would provide an equivalent measure of distance traveled and speeds calculated over specific trip segments. Reliability of travel times and speeds over defined sections of roadways are essential performance indicators when analyzing infrastructure-related questions. Yet typically, they are all but impossible to develop without resorting to large and costly sample surveys.

Preliminary research indicates that it would be technically feasible to electronically access (E-exchange) carrier data via customized interface with existing Telematic service systems and route the data – ideally as anonymous trip records – to a “purpose-built” data warehouse. The functional specifications, and the estimated cost of any such initiative warrant further consideration.

This pilot analysis could not have taken place without the test carriers. Any further research and (system) development will require stable relationships with data providers to ensure that data is accessed in a reasonable and cost-effective manner, and the confidentiality of the carriers is respected.