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# Ottawa Transitways: The Legend of 10,000 Per Hour

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## Abstract

OC Transpo, the primary transit undertaking in Ottawa, Canada's capital, claims that its transitway network carries a "Peak hour one-way passenger volume" of "10,000" - that is, a peak-hour passenger volume of 10,000 passengers per hour per direction (phd). This figure has been quoted widely from the mid-1980s but independent verification is lacking. The authors conclude that passenger volumes of 10,000 phd do not occur at any point along the Ottawa transitway network, and have not occurred from the time of opening. The authors conclude that the claimed "10,000 phd" is based on observations during intervals less than 60 minutes, with results scaled to a uniform hourly rate for system management purposes. Passenger flows in the range of 700 - 900 per five-minute interval do occur along Ottawa's transitways, and at multiple locations. However, these are not sustained during any 60-minute interval, and for this reason the observed maximum volumes fall in the range of 3,000 - 5,000 phd. The undertaking has not explained how the claimed "volumes" are measured, as requested, and promised.

## Introduction

Ottawa, Canada's capital, opened its first busway ("Transitway") segment in 1983. For the past two decades, OC Transpo has claimed a "peak hour one-way passenger volume" of "10,000" - that is, a peak-hour passenger volume of 10,000 passengers per hour per direction (phd). The transportation literature contains many repetitions of this claim; it has become common currency among many transit professionals and advocates. However, one wishing to observe this remarkable performance will find that key details are not available: when (i.e. in what season) to visit Ottawa, where to stand (or sit), and at what time of day (i.e. a.m. or p.m. peak). A cynic might conclude that such details are closely guarded secrets. The authors have attempted for more than a decade to secure independent verification. This effort has not been successful.

(The former Ottawa-Carleton Regional Transit Commission (OCRTC) was organized in 1972 and traded as "OC Transpo." OCRTC was abolished in 2001 when the local authorities of all suburbs and rural townships within the Regional Municipality of Ottawa-Carleton, and the RMOC itself, were amalgamated into an expanded City of Ottawa. The municipal transport undertaking continues to trade as "OC Transpo.")

The authors, based on personal observation, data collection and analysis, conclude that passenger volumes as high as 10,000 phd do not occur at any location on the Ottawa transitway network, and have not occurred from the time of opening. The actual maximum falls in the range of 3,000 - 5,000 phd. This is an impressive performance but falls well below the level claimed; moreover, passenger volumes approaching 10,000 phd have been carried aboard light rail (LRT) trains in Calgary, where the authors have personally observed nearly 8,000 phd.

Passenger flows in the range of 700 - 900 per five-minute interval do occur along Ottawa's transitways, and at multiple locations. It is reasonable and standard practice to scale such observations up to a uniform hourly rate. Such information is important for highway - and busway - planning and operations management. In fact, volume data are of relatively little use for highway - and busway - operations management. The undertaking has failed to explain how it measures the claimed "volumes," as requested, and promised.

## I.) Terminology

The terms “passenger volume” and “passenger flow” describe two distinct indicators, although both are stated typically as hourly rates. This distinction is neither trivial nor ambiguous, and is well-known and well-documented in the transportation literature.

Passenger volume is defined as the number of passengers passing a given point in one hour.

Passenger flow (or rate of flow) is defined as the number of passengers passing during some other interval, scaled up to an hourly rate (Meyer and Miller 1984).

A “passenger volume” of 10,000 passengers per hour per direction (phd) - that is, a “one-way volume” - therefore refers explicitly to 10,000 people, transported past a fixed location (the “given point”), during a 60-minute interval.

A “passenger flow” (or “passenger flow rate”) of 10,000 phd therefore does not refer to any particular number of people - or minutes. This statistic might be based, for example, on 5,000 passengers during 30 minutes, 2,500 passengers during 15 minutes, or 833 passengers during five minutes.

The magnitude of the “passenger volume” associated with a given “passenger flow” need not correspond with the magnitude of that flow. In other words, a passenger flow of 10,000 phd does not imply that 10,000 passengers actually traveled past the point of observation during a 60-minute interval. In fact, a passenger flow does not imply any particular number of passengers during a 60-minute interval. The underlying observation (e.g. 833 passengers during five minutes) establishes a “minimum” but this is seldom made explicit.

It should be obvious that, for the sake of clarity, a passenger flow rate of 10,000 phd should not be labeled as a “volume.” However, this does occur in the literature:

. . . the 35,000 passengers per shown or the Toronto Yonge Street Subway in Table 8.2 is actually a rate projected on the basis of the peak 20-minute observation (Canadian Transit Handbook, Second Edition 1985, p. 8-22; “Table 8.2 appears on page 8-21).

This source also states, with reference to “Suggested Design Flows For Selected Modes:”

. . . clearly, the critical assumptions relate to the maximum number of units per hour, which should be considered as a rate of flow that may not always be maintained throughout the entire 60-minute period (ibid., page 8-22).

Moreover, passenger (or vehicle) flows based on five-minute rates provide important information for highway operations management. “Volume” data, based on a 60-minute average, provide relatively little useful information for highway management, e.g. the interval is too long for effective “incident management.”

Busways with “off-line” stations (i.e. with stations built to permit buses to “pass through” without stopping) are virtually identical to highways from the standpoint of operations management. In this respect, busways with “on-line” stations more closely resemble railways or street tramways. However, most “exclusive busways” in Canada and the U.S. have “off-line” stations; the significant exception is the Downtown Seattle Transit Tunnel. (Some Japanese railways have one or more “off-line” stations; elsewhere, this configuration is confined mostly to dedicated high speed rail lines.)

It is therefore reasonable that highway (and busway) planners and managers would have a different, “mode-appropriate” understanding of “10,000 phd” than railway planners and managers. However, the potential for confusion should be obvious.

## 2.) The Reports

The table below contains a partial list of sources that state “maximum” or “peak-hour” passenger volumes for the Ottawa transitway network in the range of 9,000 - 11,000 phd.

Source and Date	Reported Maximum Volume, phd	Citation
Bonsall 1987	9,000	None
FTA 1992	9,000	None
Kain 1992	9,000	“Bonsall (1989a, p. 10)”
Levine 2000	10,000	None
Martinelli 1996	10,000	None
Sawka 1999	10,000	None
Turnbull and Hanks 1990	11,000	None
ITE 1988	8,100 (Southeast Transitway)	None

Source and Date	Reported Maximum Volume, phd	Citation
	6,900 (Southwest Transitway)	
	4,200 (West Transitway)	
Wilkins 1985	* 12,600	* None

**Notes:** Kain's reference reads in full: "Bonsall, John. (1989a). 'Transitways: The Ottawa-Carleton Experience.' OC Transpo. (June)."

Wilkins (page 13) states that the transitway segment north of Hurdman station "is expected to carry the heaviest traffic of any part of the system, with a peak hour/peak direction **flow** of 12,600 riders in 179 buses" [emphasis added]. His article makes clear that this information was provided during interviews with OC Transpo staff.

It is reasonable to assume that, in the absence of citations, the sources cited above reported information that was obtained from OC Transpo. It is also reasonable to assume that information obtained in this manner is correct - in other words, that management or staff, with reference to "their own" operations, know and report accurate statistics, e.g. "Maximum Volume, phd." In turn, it is reasonable to assume that "correct" information from any source can be verified independently. The latter, as we outline below, is not the case with OC Transpo's claimed maximum "volume" of 10,000 phd.

### 3.) Independent Verification - First Attempt

Seeing is believing.

A corollary: "not seeing" tends to stir disbelief.

*10,000 per hour? Boy, would we like to see that for ourselves!*

The sentence above illustrates the spirit of the authors' initial attempt at independent verification of 10,000 phd along the Ottawa transitway network. This observation was conducted at Lees station on 1992 August 28, a Friday, during the p.m. peak. The location was selected based on the description by Wilkins (1985) of the anticipated "maximum-load" point. The authors did not take particular notice of a very significant fact: Wilkins described the anticipated

maximum traffic - explicitly - as a “flow.” Results of this single initial observation are summarized below.

Location	Date and Time	Observed Maximum Volume, phd
Lees (East and Southeast Transitways)	1992 August 28 (Fri., p.m.)	3,390

The result above was surprising. Significant - and negative - variation from 10,000 phd was anticipated. In the U.S., transit traffic may vary by 20 percent between seasons (Homburger 1967) and a.m. peak volumes are larger typically than p.m. peak volumes. Similar trends were anticipated in Canada. However, the observed maximum volume was little more than one-third of the claimed 10,000 phd. Relevant facts - p.m. peak, summer, Friday - did not appear to provide sufficient explanation for the implied large volatility of “maximum peak” volume. Nor, based on Wilkins (1985) was there reason to believe that a volume significantly larger than 3,390 might have been observed at a different location. (OC Transpo states that the claimed maximum “volume” occurs around Campus station, one station north of Lees.) OC Transpo reported declines in annual ridership from 1985 to 1997 - but published sources (Bonsall 1987, Kain 1992) stated, explicitly, that peak-hour ridership had not declined.

#### 4.) Passenger Volumes and Passenger Flows

Analysis of data from the initial observation above provided evidence of passenger flows - as distinct from passenger “volumes” - exceeding 7,000 phd at Lees station on 1992 August 28:

Time	Interval Length	Passengers	Observed Passenger Flow, phd
1635-1645	10 min	607	3,640
1637-1640	3 min	210	4,200
1654-1657	3 min	371	7,420
1655-1700	5 min	412	4,900
1715-1725	10 min	632	3,790
1715-1720	5 min	398	4,780

Time	Interval Length	Passengers	Observed Passenger Flow, phd
1720-1725	5 min	234	2,810

(The table above is reproduced from a report published more than seven years prior to writing of this paper (Demery 1998). No response by OC Transpo is known to the authors.)

The maximum observed flow of 371 passengers during 3 minutes, or 7,420 phd, was 75 per cent of the 10,000 phd claimed by OC Transpo. Considering the season, the day of week and time of day, this observation appeared perfectly consistent with a “maximum” of 10,000 phd. But for one key detail: OC Transpo, from the time when transitways were placed in service, has described this “maximum,” consistently and exclusively as a “volume.”

## 5.) Independent Verification - Second Attempt

Results from observations at two points along the Ottawa transitway during a subsequent visit are summarized below. Lees station was selected for conformity with previous observations. Tunney’s Pasture station was selected because this is the first station west of the Ottawa CBD with ramps permitting buses to enter and leave the transitway

Location	Date and Time	Observed Maximum Volume, phd
Lees (East and Southeast Transitways)	2000 August 17 (Thu, a.m.)	4,500
“	2000 August 18 (Fri, p.m.)	3,200
Tunney’s Pasture (West Transitway)	2000 August 18 (Fri, a.m.)	4,700
“	2000 August 17 (Thu, p.m.)	3,900
Calgary LRT, east entrance to CBD	2002 April 3 (Wed, a.m.)	7,600
“ “ “ “ “ report by undertaking	2000 spring	9,210

The largest passenger volume observed, 4,700 phd, fell 53 percent below the claimed “maximum” of 10,000 phd. The p.m. volume observed at Lees station fell less than six percent below the 3,300 phd observed eight years previously, on the same day of the week.

## 6.) Conclusion

OC Transpo states (in French and in English) that the maximum “peak hour one-way passenger volume” along its transitway network is “10,000” - that is, 10,000 phd. This claim remained current as this paper was written (2005 October).

The authors conclude that, notwithstanding the claim above, passenger volumes as high as 10,000 phd do not occur at any location on the Ottawa transitway network, and have not occurred from the time of opening. The actual maximum falls in the range of 3,000 - 5,000 phd.

The authors could find no published information that supports OC Transpo’s claim - nor that describes how the claimed “volume” is measured. Requests to the undertaking for clarification brought reiteration of the claimed maximum “volume” of 10,000 phd, with location specified as Campus station, as determined by “APC” (Automatic Passenger Counter) data. However, the undertaking has not explained how the claimed maximum volume is derived - as requested, and promised.

Statements in the transportation literature describing the maximum peak passenger “volume” carried along Ottawa’s transitways, in the absence of explicit citation (e.g. as provided by Kain 1992), may be attributed reasonably to OC Transpo.

The apparent confusion about maximum peak passenger volumes on the Ottawa busway is difficult to explain. Wilkins, known to the authors as a patient, diligent and thorough researcher, interviewed OC Transpo staff and took care to note that the anticipated maximum traffic was a “peak-hour/peak direction **flow**” (emphasis added). This establishes that the source believed the term “flow” was significant (it does not establish understanding, but this inference is reasonable).

The passenger volumes observed along the OC Transpo transitway network are impressive in absolute terms, and by comparison with peak-period passenger volumes typical of U.S. light rail facilities opened from 1980. That, however, begs the point that Ottawa, Ontario, Canada is not part of the U.S.; the more relevant comparison is with other Canadian cities. Peak-period passenger volumes observed personally by the authors in Calgary exceed those observed in

Ottawa by more than 60 percent. Moreover, data reported by the undertaking provide evidence that peak-period passenger volumes - not merely passenger flow rates - approaching 10,000 phd have occurred in Calgary. Parkinson and Fisher (1996) report the peak volume for Vancouver's "Skytrain" line at 6,932 phd.

The authors hope that OC Transpo will in time see fit to clarify the matter. Absent documentation, the authors believe that "The Legend of 10,000 Per Hour" is an appropriate label for OC Transpo's claimed "peak hour one-way passenger volume" along transitways of 10,000 phd.

(Incorrect identification of Ottawa transitway segments by name led to the following erroneous assertion by Demery and Higgins (2003): "Based on the configuration of the network and the anticipated location of the maximum-load point before construction (Wilkins 1985), the sum of the ITE numbers should approximate the reported system maximum volume. But this sum, 12,300 phd, is 12 to 37 percent higher than the published "maximum" figures." The error was discovered during preparation of this paper.

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[http://www.octranspo.com/Main\\_MenuE.asp](http://www.octranspo.com/Main_MenuE.asp)

An interactive map of the transitway network is here:

[http://www.octranspo.com/mapscheds/transitway/tway\\_map.html](http://www.octranspo.com/mapscheds/transitway/tway_map.html)

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