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**Title: Freeway quality of service: What really matters to
drivers and passengers?**

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Freeway quality of service: what really matters to drivers and passengers?

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ABSTRACT

Although the concept of Level of Service for freeways is usually defined in terms of users' perceptions, there have been very few studies that have sought drivers' or passengers' views about what is important to them. Such information is particularly important for evaluating extended trips on freeways, as opposed to a single section or segment. Not only is such information valuable for improving the Highway Capacity Manual, but it is also important in establishing appropriate criteria for assessing ITS proposals. This paper reports on the results of focus group sessions in which a group of commuters discussed their views about determinants of the freeway quality of service they experienced. Total travel time is the most important determinant for them, but a number of other aspects of the trip also matter, including safety, traveler information, and maneuverability (density). The importance of travel time is a reminder that travel is a derived demand, and not something commuters do for the pleasure of the drive.

INTRODUCTION

Identification of the quality of service provided by a transportation facility is an important and integral component of capacity analysis, and underpins all of the work that is done in Intelligent Transportation Systems (ITS). The Highway Capacity Manual (HCM) uses the concept of Level of Service (LOS) for this purpose. In the 1998 version of the HCM, the concept is described as follows (1).

“The concept of *levels of service* uses qualitative measures that characterize operational conditions within a traffic stream and their perception by motorists and passengers. The descriptions of individual levels of service characterize these conditions in terms of such factors as speed and travel time, freedom to manoeuvre, traffic interruptions, and comfort and convenience.”

The quotation states that the perception of driving conditions by drivers and passengers is an essential element in evaluating the quality of service on a highway facility. However, specific information about these perceptions has not always been available. As Pfefer (2) states it, “Historically, the measures and standards used in the HCM, and therefore used by public agencies to make decisions about investments, reflected the perspective of those managing the system.” For example, Kittelson (3) describes how the five levels of service, A through E, were defined by the Task Force members who drafted the 1965 HCM (4), based on discussions with members of the Highway Capacity Committee.

ITS projects are undertaken to improve the quality of the transportation system. Often, the specific measures of that quality remain only implicit. Ultimately, however, ITS is intended to provide transportation systems that are ‘better’ in the eyes of the users of those systems. Hence it is important for ITS, as well as for the HCM, to know what it is that matters to travelers.

Recently, there has been interest in finding out more about the perceptions of the users of the transportation system. Pfefer (2), for example, discusses ways to reflect “public perception of quality of service in planning, designing, and operating highway facilities”. He also reports on the results of a focus group session in which participants viewed video-clips of traffic, and rated the adequacy of the flow. Those ratings were then compared with field measurements of the same situations. Surprisingly, although there is a large literature on performance measures, ITS, and traveler information systems, the literature that directly addresses users’ perceptions is very small. Perhaps the users’ perspective is deemed to be self-evident. Nevertheless, it is reassuring that some research is directly addressing these perceptions.

At the Fourth International Symposium on Highway Capacity, held in June 2000, four papers (in addition to Kittelson’s) dealt with aspects of drivers’ perceptions.

Nakamura et al. (5) used ratings from 22 drivers, who drove both ways along a 9.3 km basic section of an uncongested freeway, and compared those ratings with various traffic flow characteristics. Kita (6) attempted to infer drivers' utility functions from the observations of merging behaviour at an on-ramp, but did not directly obtain drivers' perceptions, although that term is in his title. Pécheux et al. (7) addressed the issue of perception of Level of Service for signalised intersections, using a number of volunteers who rated videotapes, taken from the driver's perspective, of a set of intersections. McLeod (8) discussed methods for obtaining pedestrian and bicyclists' perspectives about the quality of facilities for them.

We concur with the importance of raising these issues, but believe it is necessary to start one step further back, at least in the freeway context. In particular, what are the aspects of freeway travel that are important to motorists? The importance of the users' perspective was reinforced during the development of a new chapter for the HCM on the analysis of freeway systems. The 1998 HCM (1) suggests identifying the LOS for each segment, but does not provide a way to combine them. Mathematically, it is possible to calculate both an average speed and an average density, over the whole length of freeway in question (for example, a 30 km (18 mile) stretch). Does either speed or density correspond to what the users find to be important? This question could not be resolved at that time, and is the added impetus to seeking information on drivers' perceptions specifically about freeways.

DATA COLLECTION APPROACH

This research uses focus groups in order to determine what aspects of freeway travel are most important to motorists. Focus group analysis is a form of qualitative research that facilitates the exploration of phenomena in relation to daily life experiences in a more comprehensive way than is possible using traditional quantitative or questionnaire approaches (9, 10). Using focus groups is particularly appropriate in this case given the exploratory nature of this research: little is known about how freeway users perceive the quality of their trips, so researcher-directed questioning (e.g. in the form of a structured, closed-ended survey) might miss issues that were important to motorists but unanticipated by the researchers.

Because of the significant differences between traditional quantitative investigations and qualitative approaches (such as the one undertaken here), qualitative research is evaluated using different criteria. The most commonly used evaluative criteria for qualitative research are neutrality, credibility, dependability, and applicability (11, 12). These criteria are analogous to the traditional quantitative standards of objectivity, validity, reliability, and generalizability. This paper is too brief to allow for a discussion of evaluation standards for qualitative research, and excellent summaries already exist (e.g. (12)). Instead, a number of specific techniques from the literature (e.g. triangulation,

prolonged engagement, and member-checking) to enhance the rigor of this research are discussed briefly where relevant.

This qualitative inquiry consisted of two focus groups, one with five, the other with seven members. The use of multiple groups provides an opportunity to triangulate the findings (that is, to corroborate the information collected by identifying similarities across groups (13)). Focus group participants were chosen using a snowball sample selection process to identify commuters coming from the city of Toronto to McMaster University (the research centre) in Hamilton, Ontario. Focus group members were all university faculty members, in a wide range of departments. The total population of drivers obviously includes non-commuters as well as commuters, truck drivers as well as drivers of passenger cars, and a much wider range of backgrounds and education. More men than women (9 and 3, respectively) participated in this study. This is a higher ratio than those initially contacted, which were only 2:1 male (20 and 9 respectively). While this sample cannot be considered representative of any population, the rationale for this sample selection procedure was to ensure that all of the participants travelled the same stretch of freeway, so that all knew about the situations that were being discussed, and had relatively similar experiences. The research team felt that this would provide the most productive context for an exploratory analysis of users' perceptions. The commute for all participants was approximately 65 km, taking an average of 50 minutes of travel time under good conditions. Participants travelled on freeways for the bulk of their trips; three freeways were used by participants, and all participants travelled on the same stretch of highway for the final portion (about 30 km) of their trips (Figure 1).

The two focus groups were conducted in April, 2000. Both groups were facilitated by the same member of the research team (Wakefield), ensuring consistency in technique across groups. Another member of the research team (Hall) was present in each case to take detailed notes and provide debriefing. The focus groups lasted an average of 1.5 hours, which allowed adequate time for prolonged engagement (12) among the facilitator and group participants around the subject matter. In the focus groups, perceptions of trip quality and the factors that influence trip quality were investigated, as were the factors that influence changes in perception from trip to trip.

The facilitator guided focus group participants using an "interview topic checklist" containing a list of the topics relevant to the research, and a series of semi-structured, open-ended questions designed to draw out information on these topics. No initial questions were asked about specific factors of interest to the researchers, in order to prevent bias in the results. The opening question was simply, "Tell me about the usual freeway route you take when you're commuting." That was followed by, "Have your perceptions of the drive changed over time?" The next question was, "I want you to talk about both the ideal or best trip you've ever made and also the worst trip ever." In response to these kinds of general questions, a variety of factors were mentioned by participants. Once a particular factor was mentioned, the facilitator might ask additional questions to elicit more specific information from respondents. The order in which

questions were asked varied according to participants' responses to previous questions. The use of semi-standardized questions helps to minimise researcher bias from group to group, and contributes to a thorough, focussed interview (11). At the same time, the ability of the interviewer to pursue unanticipated topics and to flesh out less developed ones adds flexibility and responsiveness to the design, and enhances interview flow (13).

Focus group discussions were tape-recorded and transcribed verbatim for subsequent thematic analysis using the NUD.IST qualitative software package (14, 15). The use of recordings and software to assist in data organisation and analysis helped ensure accuracy and completeness. Theme codes (that is, keywords used to identify relevant themes in the data) were developed using a combination of deductive (i.e., *a priori*, researcher identified) coding and inductive coding (i.e., an exhaustive 'line-by-line' investigation of transcript content (16)). The most important themes were then identified according to a number of criteria, including: relevance to the research focus; frequency (the number of focus groups in which a theme was mentioned); intensity (indicated by the number of mentions of an issue within each focus group, and by the amount of text taken up to address the issue); universality (the predominance of the same themes among different participants) and/or differentiation (the importance of different themes to different sets of participants); and emphasis (e.g., emphatic or emotional speech) (17). Data was independently coded at varying levels of detail by two members of the research team. Preliminary results were circulated to research participants (i.e. member-checked) to help assess the credibility of the researchers' interpretations of respondent experiences (12). Responses indicate that the focus group participants concur with the researchers' interpretations of their discussions.

RESULTS

The analysis of focus group discussions suggests that certain issues are of particular importance to perceptions of trip quality. Table 1 lists the number of text units in which each theme is mentioned, as well as the amount of text taken up to discuss each issue, expressed as a percentage. This table is provided to give context to the authors' interpretation of results (note that the amount of text taken up by a theme is only *one* way to assess the relative importance of each theme – (17)). In this section of the paper, the four primary factors identified in the focus groups are discussed: travel time, density, safety, and traveller information. Because of the importance of density in defining freeway levels of service in the HCM, we probed on the issue of manoeuvrability (which is closely related to density). All other topics were discussed spontaneously by participants. In addition, several secondary issues mentioned by respondents are also noted, including driver civility, and weather conditions. Some participants also raised the matter of photo radar, with which Ontario had experimented a few years previously; those comments also shed light on what affects the quality of a trip. Finally, we asked about the differences between being a driver and being a passenger, since the quote at the start of the paper from the HCM states that the perceptions of both drivers and passengers are important.

Quotations are used to illustrate each section. Items in square brackets [] have been inserted to improve clarity.

Travel time

A primary finding that arises from the focus groups is the reminder that transportation is a derived demand. The people we interviewed are not on the freeway for the pleasure of the drive; they are on the freeway because they need or want to be somewhere other than where they were when they got in their vehicle. Since we focused on the commuting trip, they either needed to be at work, or they were on their way home from work. Furthermore, they often have a schedule to meet at either end of the trip. This means that travel time is important, not as a summary measure of how the freeway travel went, but because the time matters to them: how long it takes to get from where they are to where they need to be next is the most important measure for them of the quality of that particular trip. That is potentially a fundamentally different perspective than we traffic engineers have brought to the discussion. A short quotation helps to make this point:

Facilitator: Taken as an average of the trips you generally make, what's your average commute like, say out of 10?

Are you asking for quality of the trip or how we feel about commuting 2 hours a day? There's a difference. That's 2 hours a day I could be spending with my children. ... If the question is, how painful is the actual drive, then I'd probably be saying it's around 7, partly because I've created conditions where I come very early and [leave] later. ... Making the changes has made the drive better, [but] in some sense it's made my quality of life worse, because I often don't see the children in the mornings. I've gone before they get up. That's why I say it's two different questions.

There are three points to be made about the importance of travel time to the respondents. The first is that travel time is the first thing they use to describe the quality of particular trips. This helps to explain why it was the most frequently volunteered factor (Table 1). The second point is that having time constraints on their arrival from a trip greatly increases the stress involved in the trip, and with it the perceived quality of the trip. The third is their point that the time spent commuting is lost time as far as they are concerned.

The fact that the participants thought of the journey in terms of the travel time can be illustrated with several quotations, as follows:

Facilitator: what is the best trip you've ever had [for this commute]?

Well, the best is in the middle of winter when the roads are good because some of the traffic and tourists who go to Toronto [aren't travelling at that time of year] so I think, for me I can do it in 50 minutes on a good trip, door to door.

The definition of the best trip is road conditions, total traffic on the road, and travel time.

When we asked about trips that were less than the best (for example a 6 or 7 rating on a 10-point scale), the first item that came up in response was construction. When we probed to find out what it was about construction, the answer came back to travel time:

Facilitator: What was the effect of the construction on the trip?

Just general delay I would say, you know, in four or five spots on the trip home, you know you're going to have to slow down and get slow for five or ten minutes and then you're on your way again.

When we asked for worse trips, for example a 3 on the 10-point scale, the answer was again defined in terms of travel time:

Facilitator: What's a 3 [out of 10 commute]?

That's when it takes you an hour and a half to get from Burlington to Oakville [which is only about 1/3 of the total trip distance].

The importance of time is also emphasised in a number of things respondents said in response to questions which were initially unrelated to travel time. A few examples follow:

It's very irritating for me to [have to drive for] over an hour (all laugh). I can cope with 60 minutes. So if the traffic is bad and if it's in a good spot then I'll speed up. I'm always cognisant of the time.

I found that generally the trip going back to Toronto is a lot worse than coming down. On the trip coming down here I've made it in as little as 43 minutes. That's my record. Going 140 all the way, but usually it takes 50 minutes. Going back it can range from 50 minutes to an hour and a half.

I'm aware of [the fear or tension related to lost loads and potential accidents], but for me it's mostly time. No matter what happens on the way there, if I'm there in an hour it's a good trip.

The other indicator of the importance of the travel time is the length some people will go to in order to keep the journey time relatively short.

I have started to try to make myself a best drive by coming out at 4:00 in the morning for example, so it's clear sailing. When I leave at 4:00 I can be here in 40 minutes. I find that incredible -- 20 minutes [shorter than the normal travel time].

Having constraints on their arrival, at work or at home, increased both the importance of travel time and the stress they felt from the trip:

If I have an 8:30 appointment and I leave at 6:45 or 7:00 and there's an accident or something, I find that very stressful. I've had this happen a couple of times when I've thought I had plenty of time and I got on the highway, and that's very stressful.

Another replies:

Certainly it is stressing to be in a situation where you know you're not going to get to work. Be it a class, or a meeting on time, though I have found that by having a phone in my car, it makes a huge difference there because I'd simply phone my secretary and say that I'm going to be late and my conscience feels better. So, it's been an enormous thing to relieve tension.

And it is not only the journey to work that can lead to time pressures. Those with small children in particular noted the pressures they face, or have faced:

I'm more anxious when I'm held up in traffic and I have to get home, because I have to pick up my daughter from day-care and all I can think of is her being there, the last one, and at 6 o'clock the doors close and they charge a dollar a minute if you're late.

Several people mentioned the fact that the time spent on the road was basically lost time, and commented on their desire to make better use of the time with the result that they made more use of the cell phone than they recognised they should. The following comes from a sequence of three speakers:

1st Speaker: People who talk on the phone while they're driving, especially on the highway are really a menace... Just last week when I was driving back after class, a guy chatting away on his phone pulled in almost right into me, came within inches, went into the left lane. And so I flashed my lights, but he was completely oblivious.

2nd Speaker: I'd better not tell you about the telephone meetings I've had on the phone while driving.

1st Speaker: Well, I was completely stuck in front of the Ford plant and then I got on the phone and talked to people. But if you're switching lanes and you're on the phone, then you're a problem.

3rd Speaker: I can relate to your wanting to make that time productive though. If you have a meeting over the phone at least you're not wasting that time on the road.

2nd Speaker: I think the loss of time is very frustrating. I don't take notes while I'm on the phone (all laugh). I have once or twice but I don't normally do that. But I prefer to use the time somehow.

Manoeuvrability

As mentioned above, we probed to ensure that people in the focus groups thought about the issue of traffic density (or, as we phrased it, manoeuvrability). This approach may well account for the high frequency with which this factor is mentioned (Table 1). The first set of responses to this question were in terms of accident avoidance, such as the ability to manoeuvre around debris in the road, or to avoid a collision. Other responses, however, dealt with the issue more as the HCM does:

I find that in terms of manoeuvrability I draw a distinction between forward and backward and side to side. If I've got lots of space in front of me and nobody sitting on my rear bumper, I'm reasonably happy... I know that nobody's going to bump into me if I have to stop quickly because I've had that happen to me a couple times, where I've stopped and the other person has come frighteningly close to my rear end, but if I've got that space fore and aft, I don't care so much about the side to side.

It is worth noting that several participants made a distinction between fore-and-aft, and lateral mobility, asserting that distance between cars was more important to them than the ability to change lanes easily. Indeed, some participants voiced the opinion that drivers who took advantage of left-to-right manoeuvrability were endangering others by "weaving in and out of traffic".

Others spoke about the fact that driving is simply easier in lighter traffic:

I think part of it is that I find that on an easy trip I can actually use 45 minutes to an hour of time organizing my day during the drive, [but when there is] bad weather or traffic or construction I suddenly have to focus very much on driving.

Another person agreed with this general view, but noted that being able to think about other issues was not always such a good thing:

I find that if I'm driving on an open highway with relatively light traffic, I probably don't concentrate as much as I do in heavy traffic, because in heavy traffic you're always worried about things, whereas a straight highway with relatively light traffic, I find my mind wanders, so that's a bad thing from the driving point of view, but [good] from a relaxing point of view.

But overall, the view of the focus groups seemed best summarized by the following two comments:

Even if there's an extraordinary volume of traffic, as long as it's clicking along, even if there's cars all around you, and trucks and everything, as long as everybody's going then it's just a question of time. If you make good time that's great. So it's not even connected necessarily to the volume of traffic.

I think, from my perspective, what you want to do is lock yourself into a single lane and stay there and just go a consistent speed. I'd rather not have to worry about manoeuvrability. If everything's going right I don't have to worry about changing lanes.

Safety

Another important issue for participants was safety. We had not probed for this item, but it was mentioned with the third highest frequency (Table 1). Participants were concerned about accidents not only in terms of congestion, but also but also because of the risk to their personal safety. Two people mentioned that they had bought larger, heavier cars, for the reason, as one respondent put it,

... that I would survive a crash as opposed to the much smaller car I was driving, which I didn't believe I would survive a crash at all. I had too many close calls, too many trucks losing materials off the back in front of me and too many sociopaths (laughs) driving too quickly.

Material lost from trucks, and other debris on the road, was a concern for many participants:

For me it's the local, little catastrophes that are bothering me more now. For example, when materials fall off trucks and you realize, in a moment that would be all over. Twice now I've seen trucks lose stuff and stuff has

bounced right over the car, oil drums full of god knows what. And you think, man that thing could have come right through my windshield and you wonder whose windshield did it go through behind.

The distance they could see ahead mattered to them, and the effect of SUVs and mini-vans on that visibility brought out several comments, such as:

When you've got cars in front of you, you can see three or four cars in a row, you can see what's happening, but when you put a van in front of you - I must say I often will change lanes just to make sure I'm not behind a van or SUV.

To which another participant responded,

It's only the rear lights, brake lights in front of you that tells you whereas with a line of cars, usually you can usually see it and start braking. It makes a huge difference in safety.

The value of traveller information

Having adequate information about what was happening to traffic while they were on the road was also important to participants. This issue came up spontaneously. We had not included it in our list of topics to be covered. Some participants praised the traveller information systems that are operated by the Ministry of Transportation:

The thing that worries me most are sudden slow-downs. ... On the [Highway] 401 with the COMPASS system of signs, I really like that it will say, slow down ahead in 3 kilometres, so you slow down a little bit, but more importantly, you're alert for that, you know that at some point you may have to slow down and they're usually pretty accurate.

There was also a call for better information on other highways. First, people were just curious to know why they had been slowed down. There is also the practical matter of being able to devise alternate routes. Even when the accident is so bad that the road is closed, and people are sent off it, information on what to do next is sorely lacking. As one put it, very succinctly,

They only show you how to get off the highway, but not what to do then.

Several people mentioned that they listened to the radio in order to stay updated on travel conditions. However, they often found the reports inaccurate, or out of date. In response to the lack of reliable information, several participants noted that they pay more

attention to the scheduling of special events, such as baseball or hockey games, because of their effect on traffic:

[Even] if you're not a sports fan, suddenly you become very aware. I plan my day around them...

Other Factors

A number of other issues were mentioned occasionally in the focus groups: driver civility (or incivility), the use of photo radar, and weather and its effect on driving conditions.

A number of participants in both focus groups noted that they felt that the lack of driver civility and politeness was a problem on area freeways. This was particularly tied to the notion of lane etiquette (i.e. using different lanes for different speeds and to pass). Concerns were also expressed about driver anger ("road rage") and impolite (and perhaps dangerous) driving such as weaving in and out of traffic.

Another side issue to arise was photo radar, which had been introduced by a previous provincial government. When the current government was elected, photo radar was cancelled on the grounds that it was a cash grab rather than a contribution to safety. The rationale was that it did not necessarily penalise the speeding driver, but rather the owner of the car, because it assessed the fine to the owner of the license plate that had been photographed when the vehicle exceeded the speed limit.

Some interesting perspectives on the effect of photo radar came out in the focus groups. On balance, the view, even from people who had been caught by it, was that photo radar had improved the trip:

I found that when they had the photo radar, it was a much more relaxed trip. The trip has become more tense.

Other speakers agreed with this, including one who said,

After a couple months, people really got used to it and people accepted that they have to go ten kilometres an hour slower and they spaced themselves out and I agree with you, it was a much more relaxing trip and as you were saying, it probably added five minutes to your hour trip, going 110 instead of 120, but [vehicles] were well spaced-out. People were a little more, I think, alert or aware of what was going on around them. I wish they'd bring it back in.

Another factor that affected trip quality was the weather. All agreed that weather was one of the factors that could make a trip less than ideal. There were several references to major snowstorms, and to the added tension these created for the driver. Rain, and the spray kicked up by trucks, were also mentioned.

Differing Passenger, Transit Rider, and Driver Perceptions

The responses of both focus groups made it clear that people have a very different perspective on the trip when they are passengers. The tension and sense of responsibility are much less. Moreover, there is not the same degree of concern about the travel time. Some respondents explained the difference in terms of their ability to use the travel time for other things. When travelling on the bus, for example, they almost didn't notice the traffic conditions. They were reading, or listening to music, or even sleeping. If they noticed anything about one trip versus another, it was just the total journey time. This could be affected by the quality of the driving, however:

Some of the GO [Government of Ontario] Transit drivers are excellent and you don't know you're in traffic. But some of them are like on the brakes, off the brakes and then you're very tense, but otherwise you can just sit there and read your newspaper and work or whatever and get to think about your day coming up which I never get to do when driving the car.

Being a passenger in a car (for example, when car pooling) is not as relaxed an experience, but it is still quite different from being the driver for most people. Some are still 'driving' even when they are a passenger, but that is not the norm. The typical view is represented by these two quotations.

You don't have to pay as close attention to what's happening on the road, so it is more relaxing. Although I find that when traffic is slow, I still tend to get very tense even though I'm not the one driving.

When I'm a passenger, the time passes very quickly. You can absorb in a conversation and I don't pay any attention to what's going on around me on the highway and before I know it, I'm at work.

Some participants commented that when they were passengers they could use the time to work or socialize, thereby reducing the sense that travel time was "lost time". This was not true of all respondents, however, since some felt ill or uncomfortable when trying to read or work as a passenger in a private vehicle.

Different modes of transport also influenced participant perceptions of the trip. Again, the ability to undertake activities (other than driving) while travelling by train or bus was important to respondents. For example, in response to a comment that the train

from Toronto to Hamilton was slow, one participant responded that “it’s good for getting work done.” However, trip time was still an important factor for transit users, and concerns about travel time were exacerbated by differences in the level of service provided among transit types and days of the week:

For me it's an hour and 45 minutes [by bus and then train. If I take] the 5:20 bus I walk into my apartment at 7 o'clock. So it's a very, very slow trip home. I would use Go Transit more often if that trip were quicker. Friday afternoons there's an express bus and I'm home in 50 minutes. They pick you up at the campus and take you right to the Bay St. terminal and I'm a few blocks from there. Great. If they had those every day I'd use Go Transit every day. I'd never drive.

IMPLICATIONS FOR LOS ANALYSIS

There are two final implications to be drawn from the discussions. The first was mentioned only obliquely in the focus group discussions. The participants do not think of the freeways in terms of the distinct sections as classified by the HCM (basic sections, ramp-freeway junctions, and weaving). Either they see it only as a single trip, or they see their trip as being divided into two or three recognizable segments, which for the commute made by these participants tended to be 20-30 km in length. For example, the most frequently mentioned division point, which all participants recognized, was the Ford automotive assembly plant in Oakville, which occurs where the QEW not only has a long horizontal curve (with poor sight distances), but also where Highway 403 meets the QEW. This is roughly half-way between Hamilton and Toronto. Even when they encounter congestion during the trip, they tend to discuss the trip as a whole, rather than the location where they encountered stop-and-go conditions:

If you've got a momentary block, you think, okay this is going to lighten up, I'll get past this. And if you get past it you soon forget that short time. You haven't really been slowed down as much as you think at the time. So for me I always judge the trip as a whole.

The second implication arises from what was not said. The participants did not mention the kinds of distinctions in speed, density, or other indicator that are implied by the existing LOS boundaries. The following exchange indicates that if these drivers think about LOS breakpoints, they are different ones than the standard ones used for freeway LOS (of for example 65, 64, 62, or 52 mph, for a 65 mph free-flow speed). Note that the speed limit on the freeways being referred to is 100 km/h.

Facilitator: How slow do you have to be going before you're experiencing congestion?

1st Speaker: You hate to say it, the speed limit. (laughs) Feels like it's crawling along.

2nd Speaker: Under 110.

3rd Speaker: Yeah, when you're reduced to what I regard as slow, below the speed limit I would say that's slow for me.

The point of these comments is that although speed can be used to identify LOS, the breakpoints that matter to drivers may well not correspond to the ones used in the HCM for individual sections of a freeway. It would be worthwhile to investigate further, with a larger sample and a more structured questionnaire, to obtain drivers' perceptions about the location of or need for LOS breakpoints.

CONCLUSIONS

Traffic engineers have usually thought of a driver's total travel time and average speed as being equivalent indicators of the quality of service. Certainly, they are the flip sides of the same coin. From the engineering perspective, average speed is often easier to calculate, so it tends to be the one that is used more often. That will probably still continue to be the case. It is also a variable that is easily understood by motorists, although not one that they can easily or readily calculate themselves. They can see spot speeds, from their speedometer, and they can see the total journey time, but they cannot directly see the average speed. Consequently, in presenting LOS indicators as average speeds over long stretches of freeway, it may be useful from time to time to translate those into travel times (especially as the US works to convert to SI units!).

There is an added benefit in using travel times (or speeds), namely that these measures allow for direct comparison between modes of transportation, as well as between highway facilities. The only problem is that the response to, and importance of, travel time can be different for different modes of transportation, and for different people. An additional implication arises from the observation that passengers have very different perceptions than do drivers. In particular, since passengers do not pay as much attention to the trip, it is probably inappropriate to include their perceptions in the assessment of LOS for freeways. It would be better to place the emphasis for those facilities only on drivers' perceptions.

Admittedly, these results come from a very small sample. It will be desirable to conduct focus groups with other types of drivers, such as non-commuters, truck drivers, vacationers, and those who experience a different kind of commuting trip. Nevertheless, there was considerable benefit in dealing with a group of people who experience the same general commute, and therefore have a common basis from which to discuss these important issues. It seems likely that, when trying to learn about users' perceptions, more can be learned from focused discussions such as these than from large samples that are

drawn at random from the travelling public. Such discussions enable the participants to emphasize issues that matter to them, rather than forcing them to respond to the issues that the researchers expect to be important. If larger samples are desirable, the qualitative results presented here could be used to help design a questionnaire for a quantitative survey investigating these same issues across a wider population of road users.

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TABLE 1
Factors Mentioned as Affecting Perceived Trip Quality*

Number of Text Units (TUs) in which Theme is Mentioned			
Factor	Focus Group 1 (TUs=885)	Focus Group 2 (TUs=892)	Total (TUs=1777)
Travel time	78 (9%)	25 (3%)	103 (6%)
Density/ Manoeuvrability	50 (6%)	36 (4%)	86 (5%)
Road Safety	45 (5%)	36 (4%)	81 (5%)
Commuter Information & Communication	24 (3%)	41 (5%)	65 (4%)
Civility	21 (2%)	17 (2%)	38 (2%)
Photo Radar	2 (0.2%)	29 (3%)	31 (2%)
Weather	18 (2%)	5 (1%)	23 (1%)
* in response to the following questions: 1. What would constitute an ideal commute? 2. What factors make a commute less than ideal?			

Figure 1. Highways and locations referred to in focus groups

