

Using Travel Time Reliability Measures to Improve Regional Transportation Planning and Operations

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Estimation of travel time is of increasing importance to travelers and transportation professionals alike as congestion worsens in major urban areas. In fact, the reliability of travel time estimates on a given corridor may be more important for travelers, shippers, and transport managers than the travel time itself. This paper examines the uses of measured travel time reliability indices for improving real-time transportation management and traveler information with the use of archived intelligent transportation system data. A literature review of travel time reliability and its value as a congestion measure is followed by a description of a content analysis of 20 regional transportation plans from across the nation. Results from the content analysis indicate that travel time reliability is not currently used as a congestion measure and that the most common measures of congestion are the volume-to-capacity ratio, vehicle hours of delay, and mean speed. As a case study using data from Portland, Oregon, several reliability measures are then tested including travel time, 95th percentile travel time, travel time index, buffer index, planning time index, and congestion frequency. The buffer index is used to prioritize freeway corridors according to travel time reliability. Metropolitan planning organizations should use travel time reliability in the following ways: (a) incorporate it as a systemwide goal, (b) evaluate roadway segments according to travel time reliability measures, and (c) prioritize roadway segments using those measures.

Travel time reliability is defined as the consistency of a given trip's travel time. More formally, it is said to be "the consistency or dependability in travel times, as measured from day to day and/or across different times of the day" (1). It is possible to consider reliability in the historical sense such that a distribution of travel times is examined and specific statistics can be reported, such as the mean, median, standard deviation, and variance, among others. Thus, the degree of historical variability of travel times can be reported as the reliability of a particular repeated trip. Reliability can also be considered in a real-time sense, in which a trip being taken now is compared with some sort of preset standard. It is clear that reliability is an important measure of the health of a region's transportation system. Individual travelers and industries depend on the transportation system, and reliability can make a significant difference in efficient use of the

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transportation system. Despite its importance, transportation planners have not begun to include reliability as a performance measure. Instead, planners typically use other measures of congestion as well as measures of accessibility, mobility, connectivity, and safety to evaluate the transportation system's health and determine where future investments are needed.

This paper will describe how measures of congestion are used in that evaluation and will suggest that adding travel time reliability measures to those currently in use can result in a better understanding of the transportation system. A content analysis performed on a random sample of regional transportation plans (RTPs) from across the nation focused on uses of reliability in each plan and revealed that reliability measures are not currently in use.

Nonetheless, ways in which travel time reliability is measured will be explored in this paper using archived data over a segment, a corridor, and an entire urban area. It is important to communicate the ways that transportation investments can benefit an entire region. Increased amounts of information on travel time reliability can better inform travelers of the most appropriate use of the system for their purposes. By means of data from 2004 through 2007, travel time reliability measures are demonstrated and described in the context of the Portland, Oregon, metropolitan region. The analysis shows changes in travel time reliability over time, and a case study compares rankings of instrumented Portland freeways according to their travel time reliability ratings versus more traditional congestion measures.

BACKGROUND

Congestion Measures in Transportation Planning

Congestion measures are used to evaluate the performance of the transportation network and to diagnose problem areas. They can describe how well the system meets stated goals and targets and can also explain variations in user experiences on the system. Some measures explain the duration of congestion experienced by users, including delay, risk of delay, mean speed, travel time, and vehicle hours traveled (VHT). Other measures describe how well the system is functioning at a given location, including the volume-to-capacity (V/C) ratio, usually expressed as a level of service (LOS). There are also spatial measures, such as queue length, queue density, and vehicle miles traveled (VMT), and finally other measures such as travel time reliability and the number of stops (2).

The V/C ratio compares the number of vehicles using a facility with the number that the facility was designed to accommodate. The V/C ratio is easy to use and understand but can lead to some philosophical

problems, such as whether transportation systems should be built to handle the highest demand or the average demand and what LOS is acceptable for each roadway type. The V/C ratio is an important tool for comparing a roadway's performance with that of other roadways and over time, but does not necessarily reflect the overall user experience and values in the system (3). As part of an overall performance program, FHWA encourages agencies to consider travel time experienced by users as a source for congestion measurement, in addition to other measures (4). It also states that currently used measures of congestion are inadequate for determining the true impact of the congestion that clogs up the transportation system from a user's perspective and that they are not able to adequately measure the impacts of congestion mitigation strategies (5).

Reliability Definitions

Travel time reliability is a measure of the amount of congestion users of the transportation system experience at a given time (6). Measures of travel time reliability attempt to quantify the variability in travel times across different days and months and the variability across different times of day. A network that provides a high level of service has a high level of travel time reliability. Reliability is also a measure of the extent to which external events influence travel times. At the same average congestion level, a facility or trip with a lower measure of reliability is the one most influenced by events. Five standard measures of travel time reliability are used by FHWA; they are based on travel time estimates directly calculated from continuous probe vehicle data, estimates from continuous point-based detector data, data collected in periodic special studies, or estimation created through simulation (1):

- 90th or 95th percentile travel time: how much delay there will be on the heaviest travel days;
- Travel time index: mean time it takes to travel during peak hours compared with free-flow conditions, computed as mean travel time divided by free-flow travel time;
- Buffer index: extra time so one is on time most of the time, computed as difference between 95th percentile travel time and mean travel time, divided by mean travel time;
- Planning time index: total time needed to plan for an on-time arrival 95% of the time, computed as 95th percentile travel time divided by free-flow travel time; and
- Frequency that congestion exceeds some expected threshold: percent of days or time that mean speed falls below a certain speed.

Note that a set of measured historical travel times can be analyzed and their key statistics (such as variance) reported. Further, a specific trip's travel time can also be compared with preset standards. A number of recent studies have pointed to the usefulness of travel time reliability and the need for more data on traveler preferences and responsiveness to different measures (2, 7–9). However, researchers differ from FHWA on how to accurately define and measure travel time reliability. Emam and Al-Deek describe travel time reliability as the probability that a trip between a given origin–destination pair can be made successfully within a specified time interval (10). Van Lint and van Zuylen state that the reliability of a given route is a function of the time of day, day of week, month of year, and external factors such as congestion. With that in mind, the wider the travel time distribution, the more unreliable the corridor. They argue that travelers prefer routes with higher mean travel times and smaller

travel time variation to routes with a lower mean travel time and larger variability (11). Other researchers state that the best definition of travel time reliability is the percent of similar trips (in regard to trip purpose and time of day) that occur within a given range of travel times (12).

Value of Travel Time Reliability as a Congestion Measure

Travel time reliability measures, although valuable by themselves, can also be used to supplement other congestion measures. There is an increasing awareness of the importance of travel time reliability, particularly for commuters and industries that depend on definite travel times to deliver their goods (2). Chen et al. state that travel time reliability is “an important measure of service quality for travelers” (8). They argue that travel time reliability can be used to gauge the benefits of intelligent transportation systems investments and can also be used as a measure of freeway service quality that is superior to LOS. With the use of travel time data from I-5 in Los Angeles, they show that unexpected delays are more costly to travelers than expected delays. Shao et al. assert that travelers consider not only the mean travel time but also the reliability of a given route when choosing a route (13). Other researchers state that presenting anticipatory travel time information in route guidance systems and trip planners can improve freeway network performance (14). Nam et al. argue that travelers' tastes for travel time and reliability vary across times of day and that route choice is based on a combination of travel time, travel time reliability, and cost (7). The importance of travel time reliability has also begun to gain attention in the Portland, Oregon, metropolitan region (15).

ANALYSIS OF REGIONAL TRANSPORTATION PLANS

To investigate the use of travel time reliability in transportation planning, 20 RTPs were analyzed from the 382 total metropolitan planning organizations (MPOs) in the nation. None of the RTPs used reliability in a comprehensive way in the document, although a few set overarching goals of improving regional travel time reliability. Most MPOs did not use travel time reliability as a congestion measure in their RTPs. Many mentioned reliability within the components of other goals, such as transit service reliability as part of a goal of increasing overall transit ridership or freight service reliability as part of a goal of improving freight connectivity in the region, but few used travel time reliability as a systemwide goal for all modes. According to this sample, RTPs do not tend to vary in their use of travel time reliability according to geography or regional population size (16).

Every MPO studied used the V/C ratio as its primary measure of congestion on its roadways and most used it to prioritize roadways for capacity improvements. Some MPOs listed other congestion measures, such as vehicle hours of delay or travel time to work. Others used VMT per capita, person hours of travel, or mean peak-hour speed. Five of the 20 MPOs used travel time reliability as a transportation system performance goal, but none of them used reliability as a specific performance measure. Many could easily do so given the data they already use for their existing congestion measures. For example, raw travel times can easily be converted to the

buffer index if it is possible to compute both the mean travel time in a corridor and the 95th percentile travel time

TRAVEL TIME RELIABILITY IN PORTLAND, OREGON

Given the need to include reliability measures in transportation planning, it is fortunate that increasing quantities of transportation system data are being collected as part of intelligent transportation system deployments. As one example, the Portland Oregon Regional Transportation Archive Listing (PORTAL) serves as the archived data user service for the Portland, Oregon, metropolitan region. Figure 1 shows a basic map of the Portland freeway system. Containing count, speed, and occupancy data from more than 500 freeway sensors (at 20-s resolution) since 2004, PORTAL is the foundation for the analysis that follows.

Segment-Level Analysis

Figure 2 shows travel time data from all of 2005 for the Going Street detector station (see Figure 1), which covers a 0.75-mi segment. The figure illustrates several important features: first that the travel time across the segment varies considerably throughout the day (solid line) and, second, that its variability during the year increases

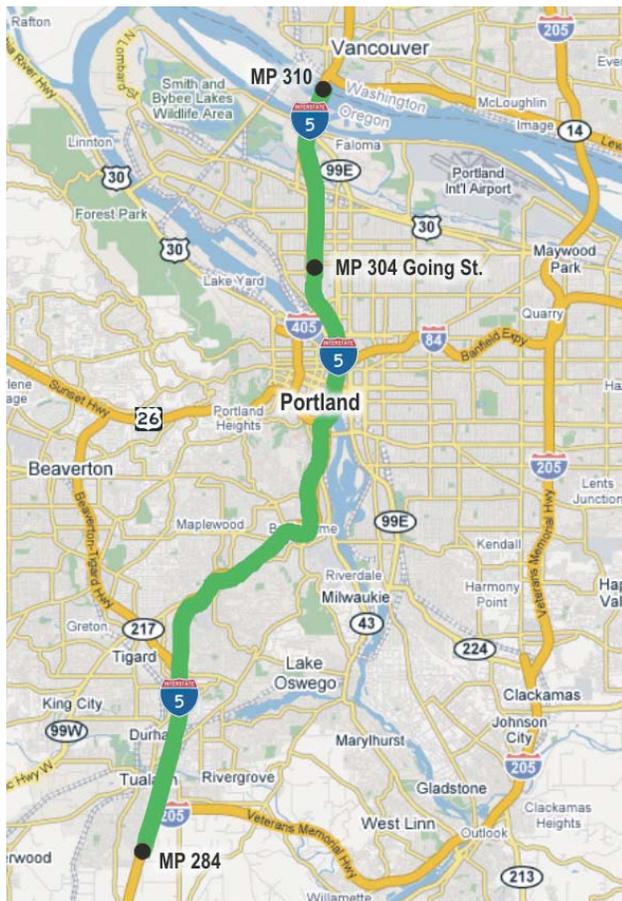


FIGURE 1 Portland freeway system.

during the afternoon peak period (the vertical error bars show plus and minus one standard deviation). As expected, the measured traffic flow also drops during the most congested period. This figure, made up of more than 1.5 million data points, would be difficult to construct without an archive such as PORTAL.

Corridor-Level Analysis

The northbound Interstate 5 corridor is a major freeway through Portland, Oregon, and has been chosen for this analysis. Figure 1 highlights the 23.5-mi corridor. With the use of PORTAL's monthly report system, the collection of all measured corridor travel times were extracted at 5-min intervals for all of 2005. Figure 3 shows the sorted distribution of estimated travel times for northbound I-5.

As shown in the figure, the free-flow travel time was 23.5 min, the mean travel time was 27.3 min, the standard deviation was 5.75 min, the coefficient of variation was 21%, and the 95th percentile travel time was 41.0 min. The figure also shows the buffer time of 13.7 min. Reliability measures shown also include the planning time index (1.74) and the buffer index (0.50). For a traveler who wants to traverse the corridor and be on time 95% of the time (i.e., late once per month), a total travel time of 41.0 min should be reserved for this trip.

PORTAL produces automated monthly performance reports that include mean travel time, the 95th percentile travel time, and the percent of monthly readings (at a 5-min level) that were congested (threshold is defined at 1.3 times the free-flow travel time). Figure 4 shows a monthly performance report for northbound I-5 from September 2006. As shown in the figure, the free-flow trip time is about 23 min, and the mean travel time for a trip at 8:00 a.m. would be about 35 min. However the 95th percentile travel time at 8:00 a.m. is about 67 min, revealing a required buffer time of 32 min at that time of the morning. Clearly, as the 95th percentile curve drops closer to the mean travel time curve, the buffer time requirement is reduced.

By using measured travel time data from 2006, Figure 5 displays an additional way of comparing the travel conditions on northbound I-5 and attempts to illustrate how these conditions vary by time of day. First, the figure shows a time-space plane for the morning peak period (7:00–11:00 a.m. on the *x*-axis) and the entire northbound corridor (milepost is shown on the left *y*-axis). A time series line plot of the 2006 mean travel time is also shown at 5-min intervals (using travel time in minutes on the right *y*-axis). This time series is augmented by vertical error bars (or whiskers) showing plus and minus one standard deviation for the entire year. Thus, each value of mean travel time is shown along with its standard deviation, which reveals that the travel time variability heightens by 8:00 a.m. and then decreases by 10:00 a.m. (the same concept is illustrated for the Going Street segment in Figure 2).

The effects of an 8:00 a.m. northbound departure are shown in Figure 5 using the left-hand *y*-axis with hypothetical vehicle trajectories superimposed on the diagram. For the first 8:00 a.m. departure, the trajectory with free-flow travel time 23.5 min is on the left. A trajectory traveling at the actual measured travel time (on Friday September 29, 2006) of 29.3 min is shown next, followed by the trajectories for the 2006 mean (34.5 min) and the 95th percentile (63.8 min), respectively. By virtue of the shaded horizontal bars across the top of the figure, the horizontal (time) magnitude of the buffer time is clear in the figure, as is the point that travel time experienced on a particular day may be more or less (in this case) than the mean. For the 8:00 a.m. departure, the 95th percentile travel time is more than twice the actual travel time on this day.

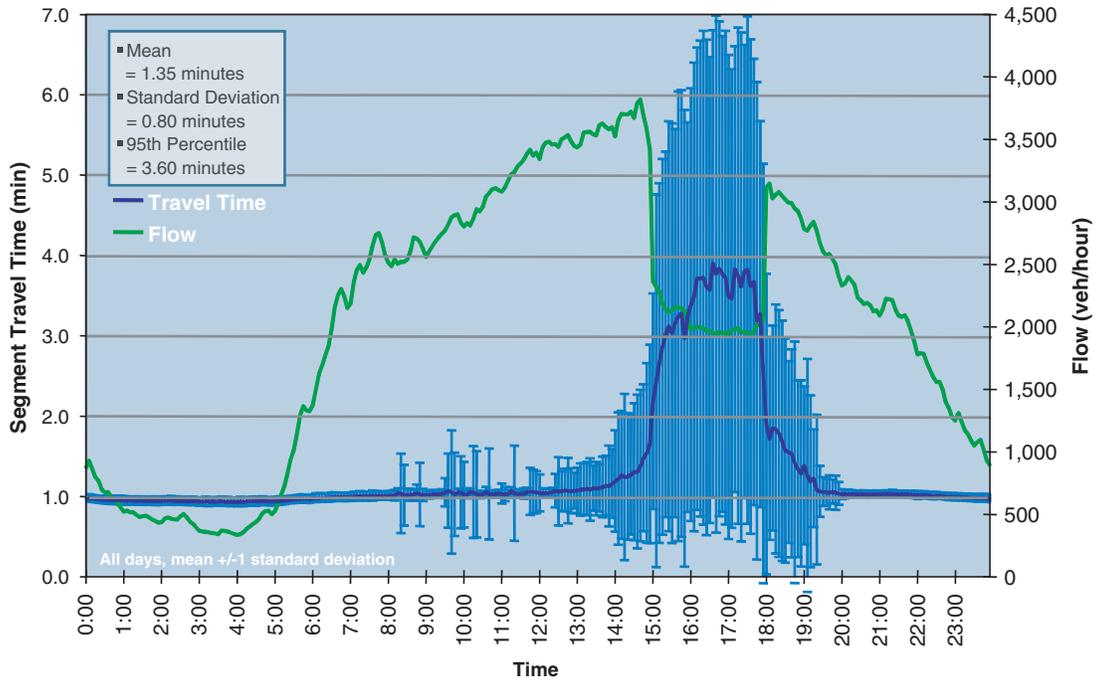


FIGURE 2 Going Street segment travel time for 2005 (0.75 mi) (all days).

For a hypothetical traveler departing on northbound I-5 at 10:00 a.m. on September 29, the trip would require 26.2 min, compared with the 2006 mean (25.9 min) and 95th percentile (31 min). Not only is the later departure saving several minutes on the sample day in question, but also in 2006 there was a substantial savings in mean travel time and improvement in reliability. This is also revealed by the horizontal bars across the top of the figure, which show that the 95th percentile travel time for the 10:00 a.m. departure is only slightly longer than the actual travel time on that day.

Reliability Measures over Time

PORTAL also allows comparisons over time, which is consistent with a similar analysis in the literature (17). Data in the present study

were monthly travel time data at 5-min intervals from September 2004, 2005, and 2006 for I-5 northbound at the I-205 junction to the Interstate bridge. These data were used to calculate travel time reliability using three different measures for each year. Results of this comparison are presented below. Because the travel time index is calculated as the ratio of the mean travel time to the estimated free-flow travel time, a plot of travel time will look exactly like one of the travel time index. This can provide a metric for comparing actual conditions to those that might be experienced during an off-peak period (or overnight).

Figure 6 shows the mean travel times on this corridor in September 2004, 2005, and 2006. Mean travel times rose substantially during the morning peak, and in 2006 there was a rise during the early afternoon. Apparently the peak period spread in 2006, resulting in lower mean travel times between 4:00 and 6:00 p.m. This means that during the

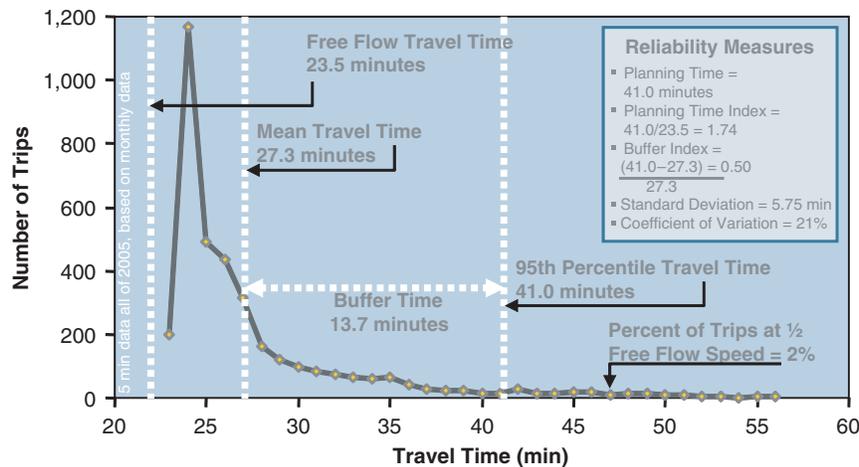


FIGURE 3 Northbound Interstate 5 travel time distribution for 2005 (23.5 mi).

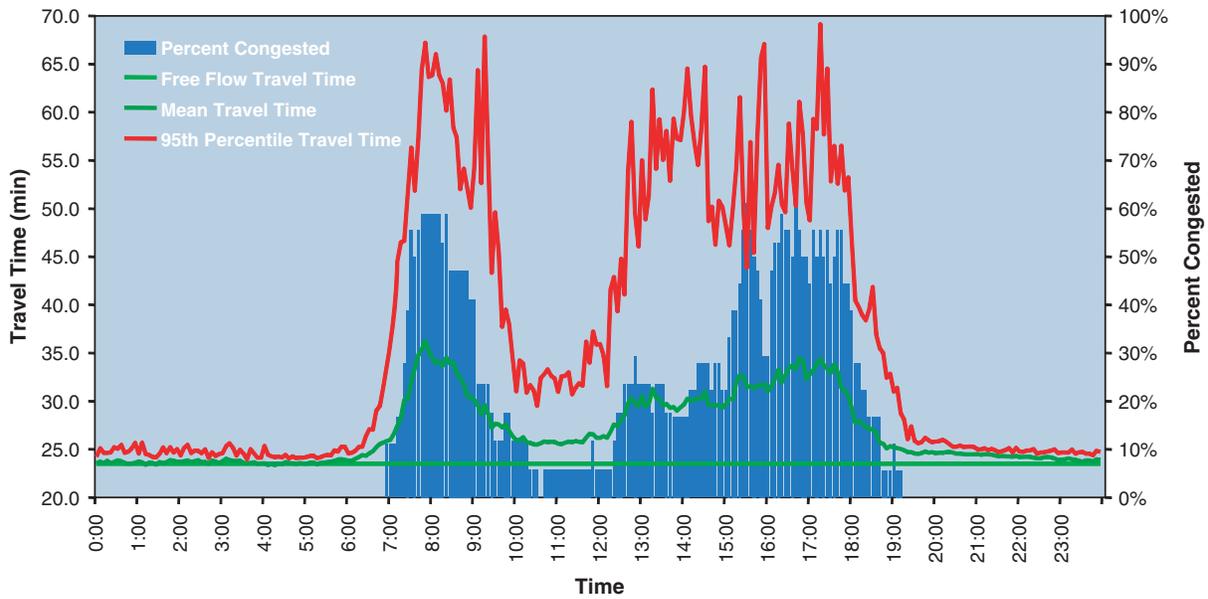


FIGURE 4 PORTAL monthly report for Interstate 5 north in September 2006.

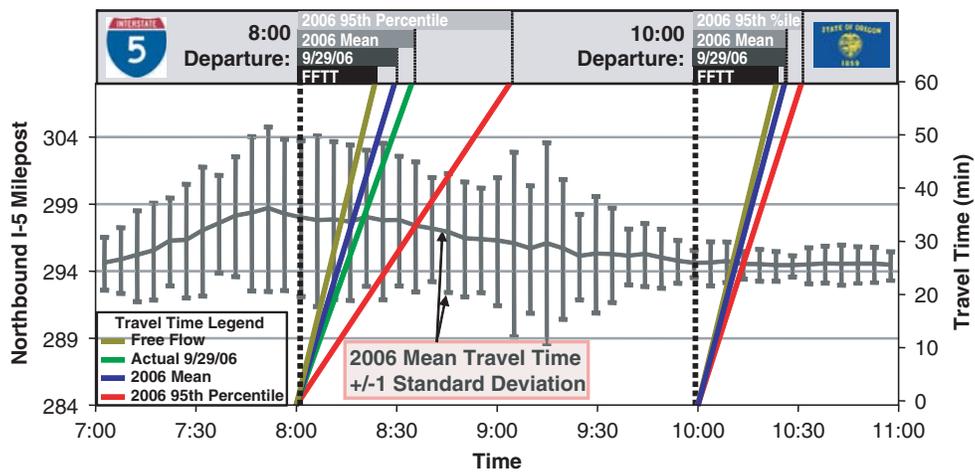


FIGURE 5 Northbound departure time comparison (2006).

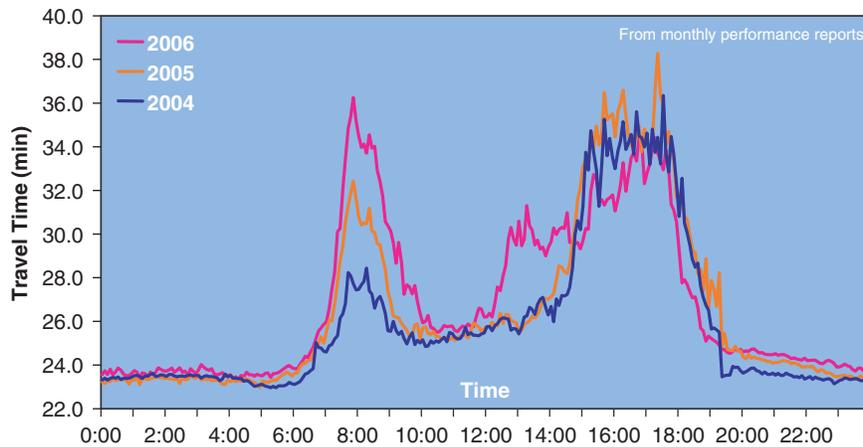


FIGURE 6 Mean travel time comparison, northbound Interstate 5, September 2004, 2005, and 2006.

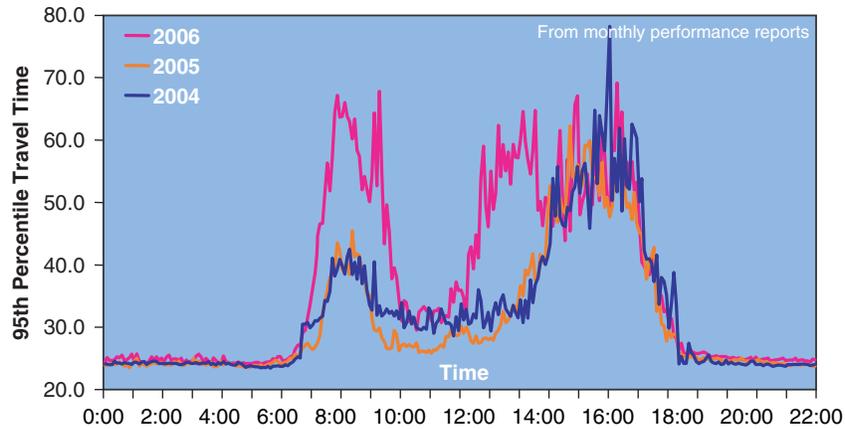


FIGURE 7 Comparison of 95th percentile travel time, northbound Interstate 5, September 2004, 2005, and 2006.

afternoon peak, the travel time (and travel time index) decreased slightly between 2004 and 2006. In 2006 an improved ramp metering software system was installed, which could partially explain that result.

Figure 7 shows the 95th percentile travel time at 5-min intervals for northbound I-5 (a 23.5-mi-long corridor) for September 2004, 2005, and 2006. The main notable feature is that apparently the 95th percentile increased significantly during 2006. The 2004 measurements were slightly higher than those from 2005 during the midday period and spiked highest in the afternoon peak. As mentioned, the buffer index (the difference between the 95th percentile travel time and the mean travel time, divided by the mean travel time) is the extra time that travelers or shippers must add to their trip to ensure on-time arrival 95% of the time (or to be late on average once a month). The buffer index for northbound I-5 would look exactly like the graphs in Figure 7.

REGIONAL CONGESTION AND RELIABILITY MEASURES

PORTAL includes monthly reports highlighting basic congestion and reliability measures for the entire Portland freeway system. Figure 8 shows the format, based on an FHWA template, used for May 2006.

The percent congested travel, travel time index, and buffer index are the three chosen performance measures, and the report shows how each measure changed from the previous month, as well as the 12-month high and low values. This snapshot of the region’s traffic conditions has proved useful to regional transportation planning and operations personnel as well as to decision makers.

Corridor Prioritization Using Reliability Measures

The buffer index shown as a component of the monthly report in Figure 8 is used here as the primary measure of travel time reliability because it is nuanced enough to give a percentage that travelers can relate to and is more likely than congestion frequency or the travel time index to reflect the kinds of decisions that travelers make. Figure 1 shows a map of the Portland freeway network. Eleven total freeway segments were studied between July 2004 and April 2007, including I-5 north and south; I-84 east and west; I-205 north and south; Highway 217 north and south; Highway 26 east and west; and I-405 south. There were no data available for I-405 north at the time of this study.

The buffer index was calculated by subtracting the 95th percentile travel time from the mean travel time and then dividing that result

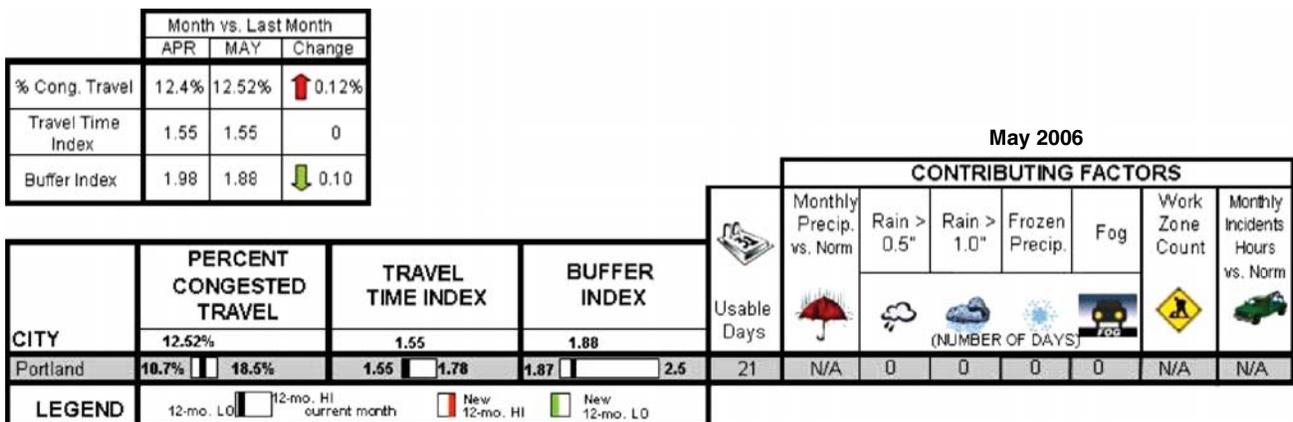


FIGURE 8 Portland congestion report, May 2006.

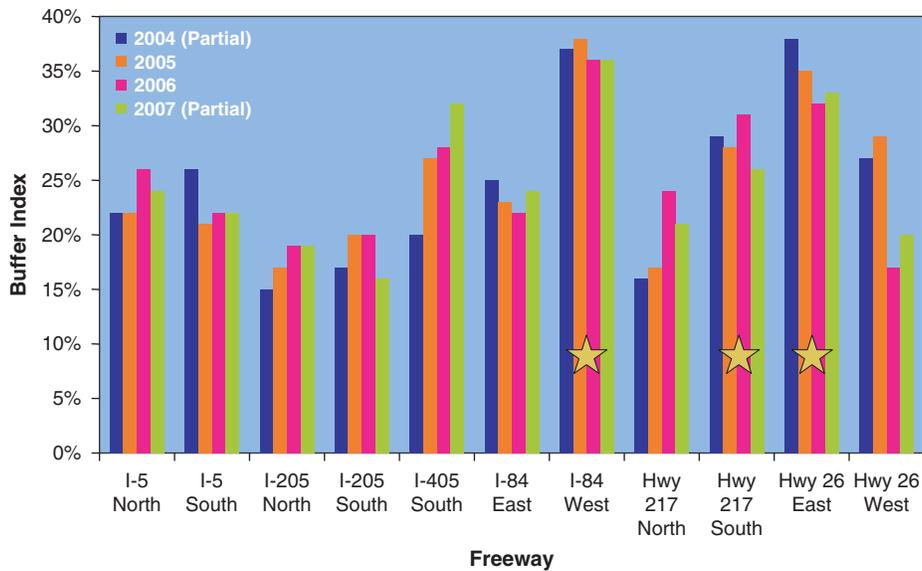


FIGURE 9 Portland freeway corridor daily buffer index.

by the mean travel time, so as to represent the percentage of extra travel time that most people would need to add on to their trips to ensure on-time arrival. For example, a buffer index of 50% at 5 p.m. on a freeway whose travel time is 10 min at midnight (when there is no congestion) would indicate that travelers should allow for 15 min at 5:00 p.m. to make sure that they are on time. Figure 9 details the daily buffer index values for each freeway corridor for 2004 to 2007. The daily buffer index provides a measure of the corridor’s reliability during an entire day. Because data are not available for the full years of 2004 and 2007, values from those years should be used with some caution. The freeways with the worst daily reliability ratings (highest buffer index) for all years are I-84 west, Highway 26 east, and Highway 217 south (shown with stars). These corridors are denoted with stars indicating that they may be worth considering for further detailed analysis for planning or prioritization purposes.

Because most freeway corridors are directional in nature with different characteristics in the a.m. peak, midday, and p.m. peak, Figure 10 shows a comparison of a.m. peak (7:00–9:00 a.m.) buffer indices for each freeway corridor for each year between 2004 and 2007. The figure shows how the buffer index has changed during the years analyzed for each corridor and facilitates a comparison across the corridors as well. For example, several corridors have lower buffer indices in the range of 50%, and several corridors have higher buffer indices. As shown in Figure 10, I-84 west has the highest buffer index in the a.m. peak in 2004 through 2006, followed by Highway 26 east in 2007. Intuitively, this makes sense in the Portland region, because I-84 west and Highway 26 east are commute corridors inbound toward downtown Portland. I-84 east has a very low buffer index because traffic is flowing in the nonpeak direction.

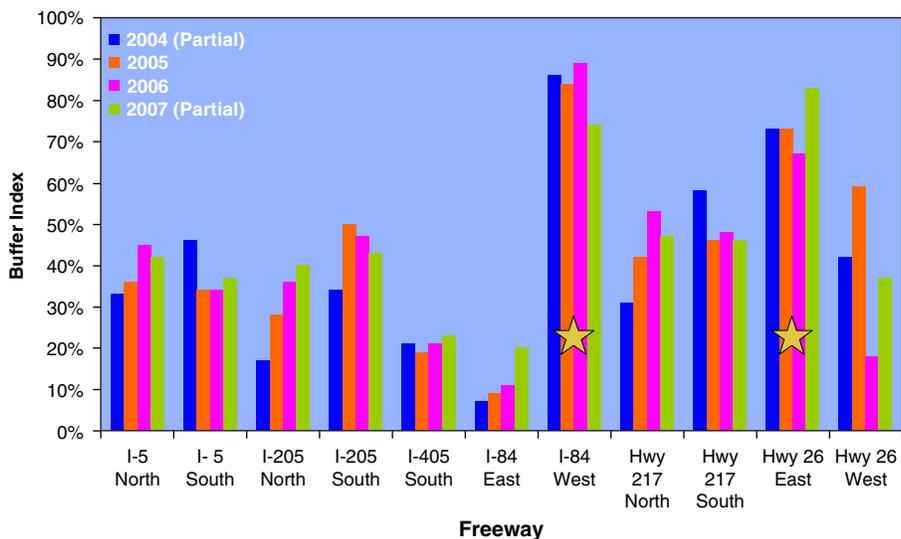


FIGURE 10 Portland freeway corridor a.m. peak buffer index.

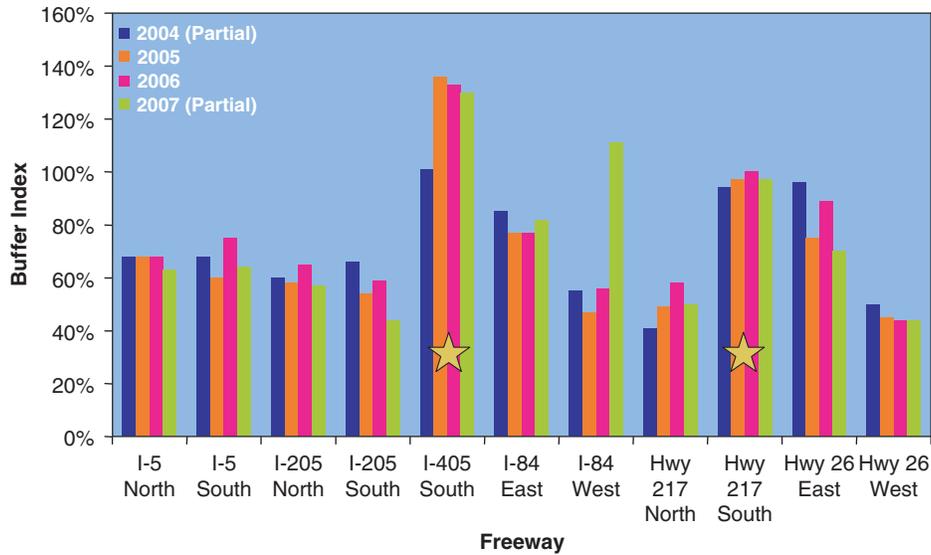


FIGURE 11 Portland freeway corridor p.m. peak buffer index.

Similarly, Figure 11 shows the annual buffer index comparison for each freeway corridor during the p.m. peak only (4:00–6:00 p.m.), for the years 2004 through 2007. By using the same comparative technique as in Figures 9 and 10, Figure 11 reveals that I-405 south has the highest buffer index in the p.m. peak for all years, followed by Highway 217 south (labeled with stars). An outlier due to incomplete data appears for I-84 west. These three figures illustrate how an MPO might begin to prioritize freeway corridors for further detailed analysis or for operational or capital improvements.

To further explore techniques for prioritizing freeway corridors based on reliability measures, a two-dimensional measure was tested using freeway volume data (for 1 month) and daily buffer indices for 2004–2006. As shown in Figure 12, a VMT/unit length value was computed for each corridor during each year (*x*-axis) and mapped against the daily buffer index (*y*-axis). Volume was incorporated to reflect the degree to which a freeway corridor is performing by serving travelers. The figure reveals that with these considerations,

Highway 26 east and I-84 west have buffer indices greater than 30% and also serve between 1 and 2 million VMT/mile in a month. The other useful fact, revealed by Figure 1, is that both of these corridors “tee” into Interstate freeways, indicating that these interchanges may be bottlenecks. This realization is helpful for future planning and bottleneck analysis. A second tier of corridors includes Highway 217 south, I-5 north, and Highway 26 west.

All freeway segments included in this analysis show higher buffer indices in the p.m. peak than in the a.m. peak. This could be because traffic volumes are generally higher in the p.m. peak or because the p.m. peak has experienced peak spreading to a greater degree than the a.m. peak. Many of them show very high spikes during specific years at specific times—which is possible evidence of special circumstances such as construction during the same hour each day. Many freeways also showed a higher buffer index in 2007 than in previous years, but that may be because only data from January through April of 2007 were included. In Portland, priority should be

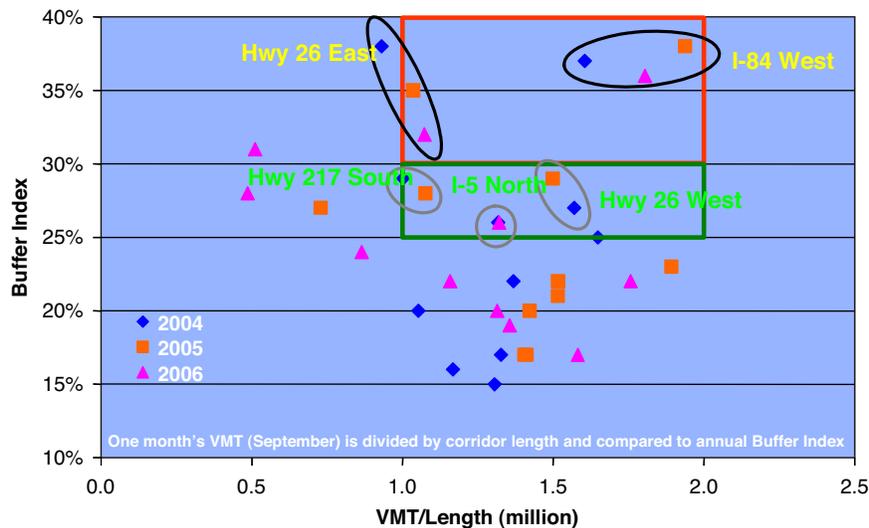


FIGURE 12 Portland freeway corridor volume versus daily buffer index.

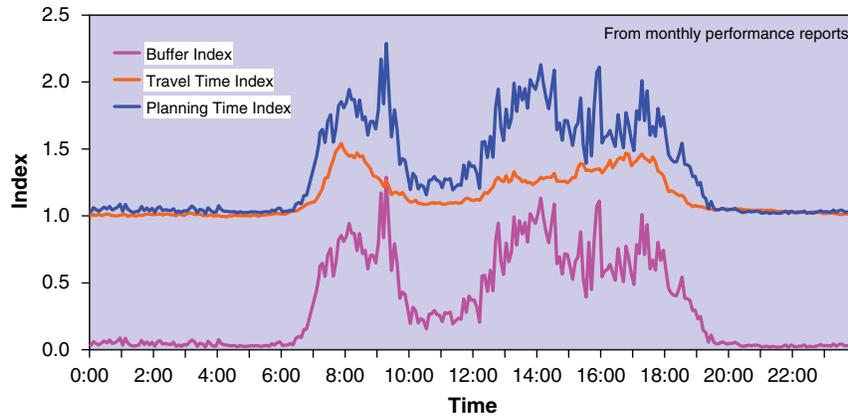


FIGURE 13 Comparison of reliability measures for northbound Interstate 5, September 2006.

given to I-84 west in the a.m. peak and I-405 south in the p.m. peak to improve reliability ratings.

Comparison of Reliability Measures

Figure 13 illustrates the differences between the three travel time reliability indices approved by FHWA and discussed earlier in this paper: buffer index, travel time index, and planning time index. The figure indicates that the indices recommended by FHWA would show approximately the same trends along a roadway, although the planning time index appears to exaggerate the trends more than does the buffer index or the travel time index. The buffer index is probably the most conservative measure to use because of its tendency to dilute the trends along a roadway.

Going a step further, Figure 14 shows the results of a comparison between Portland freeway corridor ranking using the buffer index and the travel time index. By using the 5-min data for 2006, daily buffer indices and travel time indices were computed for each of the 11 corridors. The left-hand bars in the figure show the ranking (highest priority is Rank 1) using the buffer index, and the right-hand

bars show the ranking using the travel time index. As shown, there are some differences, but overall there is value in viewing both the reliability and travel time index measures. The question now is which corridor is the “highest priority” for action, either in regard to operations or in the regional planning process for future capital improvements. It is recommended that MPOs develop their own composite ranking systems in which, for example, through a public participation process different weights are assigned to the congestion and reliability measures. So if a region decides that reliability is twice as important as congestion, a composite ranking system could be developed that would rank corridors accordingly.

CONCLUSIONS AND NEXT STEPS

Measures of travel time reliability can be important indicators of the health of a transportation system, can reveal changes in system conditions from year to year, and can supplement existing sources of traveler information. This paper has explored ways in which travel time reliability is measured, briefly referencing recent literature analyzing measures and applications of travel time reliability. The analysis

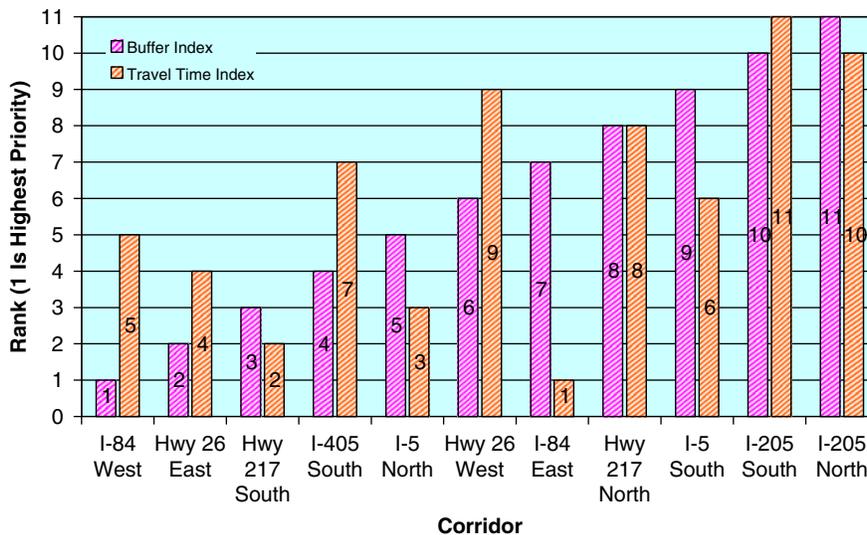


FIGURE 14 Comparison of ranking methods for freeway corridor prioritization.

used archived freeway data to illustrate ways of reporting reliability, analyze changes in travel time reliability between 2004 and 2006 using different travel time reliability measures, and explore methods for prioritizing freeway corridors. Some trends were noticed, including increasing travel times and worsening reliability in the morning peak, travel time increases during the early afternoon, and decreases in the later afternoon and evening. Future research using the same data source should consider breaking the overall freeway corridors into shorter segments where freeway network logic dictates.

Nearly all MPOs investigated use straightforward congestion measures to prioritize corridors. The authors are recommending the use of reliability measures in addition to the traditional congestion measures for more informed planning. Of course, exactly how a composite measure would be constructed needs to be developed through public involvement and local and regional practices as part of a regional planning process. One easy way to begin would be to develop a simple weighted measure that combines rankings from congestion and reliability perspectives. It is left to a next step in this research to specifically define a specific weighted measure. Figure 12 illustrates that particular “clusters” of corridors are most worthy of further consideration on the basis of the two measures shown (volume and reliability). Figure 14 shows that when taken separately, measures of congestion and measures of reliability would reveal different priorities for improvement. Note that the reliability measures can be used to highlight corridors that are good candidates for operational measures, such as traveler information, focused incident management, or ramp metering. A transportation agency could, for example, choose to implement some form of “guerrilla” incident management on the least reliable corridors, those that are the most susceptible to external events. Such a program would be worth evaluating to measure its effects.

Travel time reliability measures are currently underused in regional transportation planning. In addition to other goals, improving and maintaining a standard of travel time reliability for all modes should be stated as a regional goal. The literature suggests that travelers are less concerned with the actual time that their trip takes than with the consistency of that time (*I*). Reliability goals can be set according to time of day and roadway classification in the same way that MPOs set LOS goals. For example, the Portland region’s 2004 RTP commits to developing a safe, cost-effective, efficient transportation system that supports regional land use goals; it would be easy to add the word “reliable” and carry this through to the description of policies and evaluation strategies.

MPOs should evaluate the existing transportation system for measures of travel time reliability. This paper exhibits how reliability can vary across roadway segments and how important this variation is in prioritizing corridors for improvements. In cases for which data are available, regional roadways should be evaluated in conjunction with measures such as safety and V/C ratios. Finally, MPOs should use travel time reliability measures to prioritize improvements that could help to improve these ratings. Improvements could include better incident response systems, bottleneck improvements, or better traveler information. Once these improvements have been implemented, monitoring the reliability ratings will be crucial in assessing their effectiveness. Further research could investigate how well specific improvements improve reliability ratings or how reliability improvements can also improve safety and overall travel time.

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