WICHITA AREA METROPOLITAN PLANNING ORGANIZATION

MOVE 2040

MAKING STRATEGIC INVESTMENTS IN OUR REGIONAL TRANSPORTATION SYSTEM

Congestion Management

Supplemental to Chapter 5

Planning Process, pg. 102

Congestion Management Process

Congestion and MOVE 2040

One of the driving factors behind MOVE 2040 was the recognition that Wichita, somewhat unusually for a city our size, does not have a significant traffic congestion problem. This influenced MOVE 2040 in many ways, including the choice of investment strategy, goal statements, and ultimately the projects chosen for WAMPO funding.

Since the adoption of MOVE 2040 in July 2015 and the WAMPO certification review issued in September 2015 WAMPO staff have been analyzing congestion (or the lack thereof) in the WAMPO region using the congestion-related performance measures included in the long-range plan as part of our federally required Congestion Management Process. These measures are: delay across the system, travel time uncertainty at identified areas of concern, and travel time uncertainty across the system. Staff have operationalized the performance measures by defining specific metrics for each measure and selecting appropriate data sources for each metric. Baseline data were developed for each of these metrics and used to inform the selection of the targets.

This supplement details the performance measures, metrics, baseline data, and targets, assesses congestion in the WAMPO region, and lays out a plan for ongoing monitoring going forward.

Congestion Related Performance Measures

The federal regulations governing the establishment of CMP performance measures (23 CFR § 450.320(c)(2)) state:

> *Definition of congestion management objectives and appropriate performance measures to assess the extent of congestion and support the evaluation of the effectiveness of congestion reduction and mobility enhancement strategies for the movement of people and goods. Since levels of acceptable system performance may vary among local communities, performance measures should be tailored to the specific needs of the area and established cooperatively by the State(s), affected MPO(s), and local officials in consultation with the operators of major modes of transportation in the coverage area;*

MOVE 2040 contains three congestion-related performance measures that form the basis of our Congestion Management Process. These measures are:

- Measurement of delay across the system
- Measurement of delay across identified areas of concern
- Measurement of travel time uncertainty across the system

Each of these measures is intended to quantify different aspect of congestion in the WAMPO region. Delay across the system provides a big-picture view across the entire region. While delay across the entire system sums up the experience of the average commuter in a single performance measure, this big picture approach could obscure congestion that is concentrated in particular places or at particular times. The travel time at identified areas of concern zooms in from the big picture and concentrates on those areas where issues have been noted in the past. Finally, travel time uncertainty looks at how well the system performs on its worst days, when it suffers from weather events, major accidents, special events, etc. These three performance measures give a multifaceted view of the any potential congestion issues on the roadway system in the WAMPO region.

In addition to these three performance measures from MOVE 2040, USDOT has suggested the inclusion of a performance measure focused on transit. After consultation with Wichita Transit, WAMPO staff have identified "the percentage of time points more than 5 minutes late" as a potential measure. Wichita Transit is in the process of gathering baseline data for this measure.

Delay Across the System

The measurement of delay across the system was selected as a congestion-related performance measure in MOVE 2040. Of the measures identified in MOVE 2040, delay across the system provides the best view of the performance of the entire system in a single measure.

Operationalization

Data Source

WAMPO has operationalized this measure using data from the WAMPO Travel Demand Model. The model uses the 4-step modeling process that has dominated travel models in small and medium-sized communities in the U.S. for several decades. Its inputs include roadway and transit networks, traffic counts, population data, and jobs data. It uses these to assess current year and future year demand on the regional transportation system. The WAMPO model uses a baseline year of 2010 and is set up to forecast out to 2040. More detail on the model can be found in MOVE 2040 Appendix 6.

Of the available data sources, the model provides the broadest view of the transportation system in the WAMPO region. Unlike other options, it allows future system performance to be forecast into the future.

Metric

The metric for this performance measure is the average delay per trip during the afternoon peak period (5-6pm). The afternoon peak is WAMPO's standard reference period for congestion issues and was used for the assessment of congestion in MOVE 2040 and it is used here to maintain comparability. The delay across the system metric is calculated by summing the total delay for all trips in the model during the peak period and dividing by the number of trips.

Baseline Data

WAMPO staff ran several Travel Demand Model scenarios to evaluate this performance measure. These included the Base 2010, the 2040 Existing and Committed, and 2040 All Projects scenarios. The Base 2010 scenario represents the transportation network, population, and jobs data for the WAMPO region as they were in 2010. The two 2040 scenarios represent the population and jobs data projected for the year 2040. The Existing and Committed scenario includes only the changes to the transportation network that were included in the 2015-2018 TIP (those that had been committed to at the time MOVE 2040 was being developed). The 2040 All Projects scenario includes these projects, plus all of the projects listed in MOVE 2040.

In the Base 2010 scenario the average delay per trip was 26 seconds. Under the 2040 All Projects scenario, the delay would be 45 seconds. In the 2040 Existing and Committed scenario (which involves building fewer projects) the delay increases to 49 seconds. To provide some context, the model shows the average trip time is approximately 10 minutes. So during the afternoon peak period delay only accounts for about 5% of the travel time (rising to 7.5% in 2040).

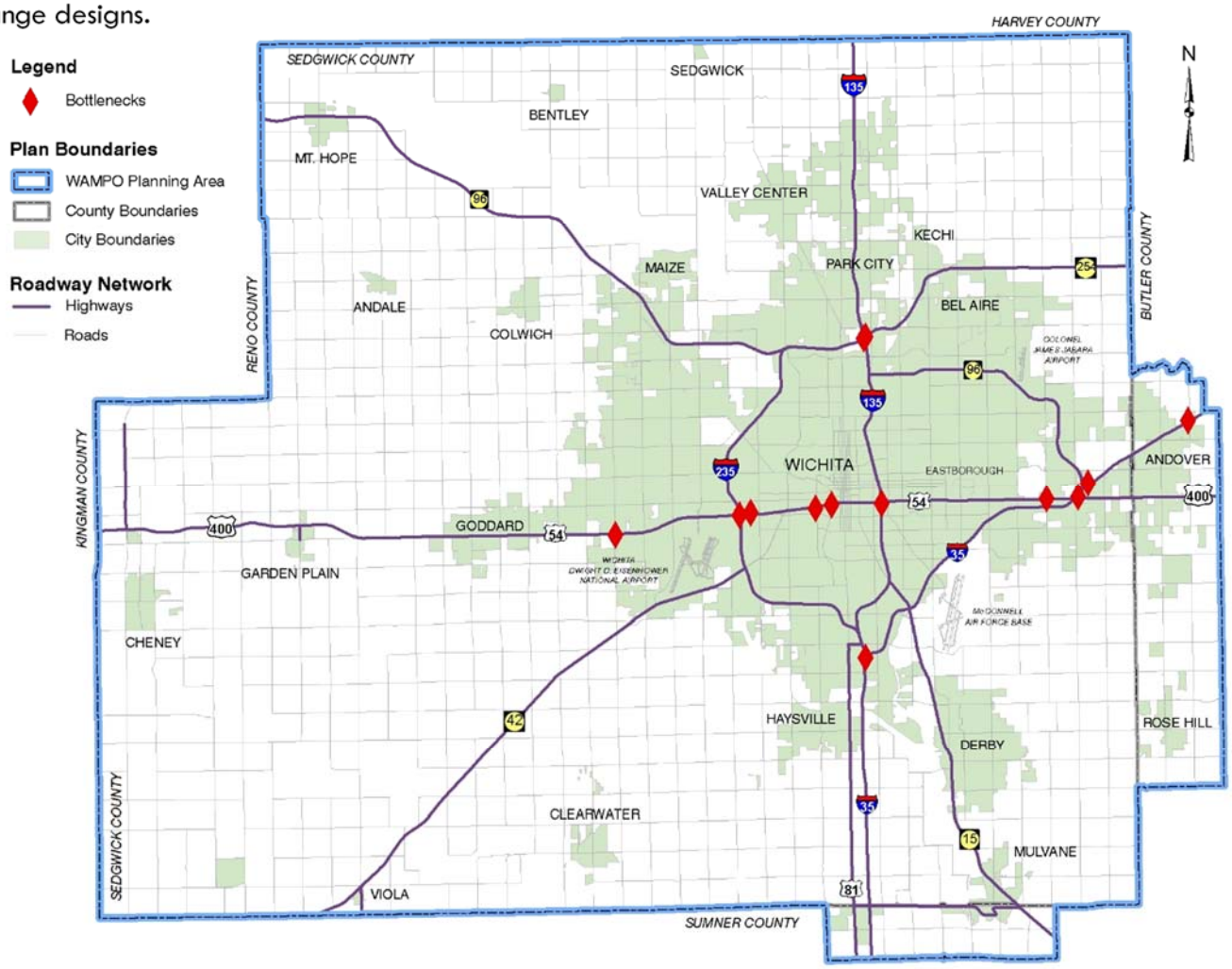
Target

To define the level of congestion considered acceptable in the region, WAMPO adopted a target of 60 seconds for this metric. This represents a delay equal to 10% of the average commuter trip. Because the current (and forecast) values for this metric are lower (better) than the target, this metric indicates that the WAMPO region does not have an unacceptable level of congestion at the system level.

Delay Across Identified Areas of Concern

In order to add some geographic specificity to the congestion related performance measures MOVE 2040 also selected measurement of delay across identified areas of concern as one of the measures. These "identified areas of concern" are the sites of potential bottlenecks. They are essentially the parts of the system where we would expect performance to be the worst.

This measure currently uses a set of potential bottlenecks identified in the WAMPO 2010 Freight Plan. These locations are shown on the map below and listed in the table that follows. WAMPO tentatively plans to update this list of potential bottlenecks in 2017 either as part of an update of the freight plan or a separate effort. Several of these locations are already the subject of major KDOT projects to remedy outdated interchange designs.

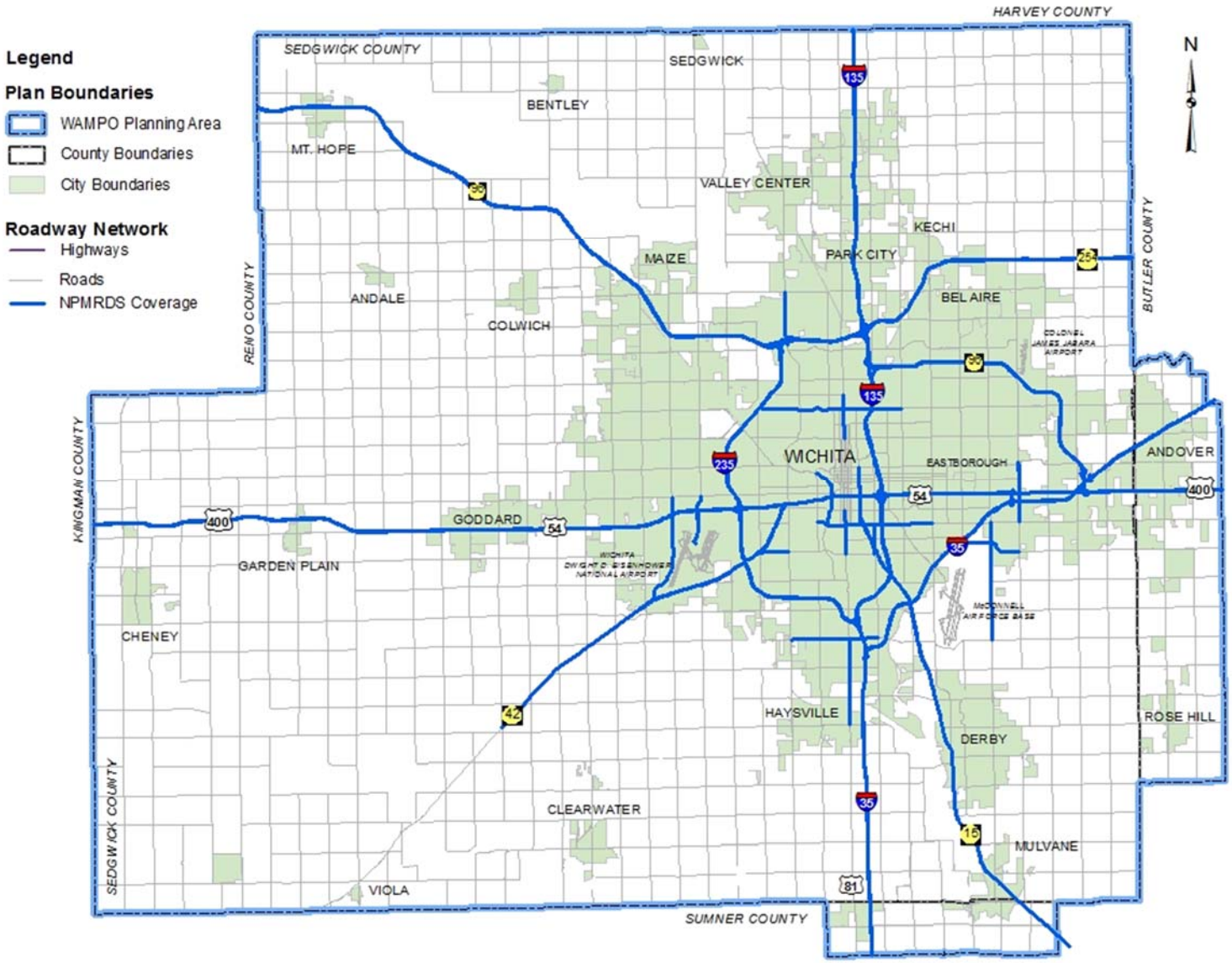


Location	Description
Kellogg and approximately Tracy	Freeway
Kellogg and Seneca	Freeway
Kellogg and McLean	Freeway
I-35 and Prairie Creek Road	Freeway
Kellogg and I-235	Interchange
I-135 and I-235	Interchange
Kellogg and K-96	Interchange
Kellogg and I-135	Interchange
I-35 and I-135	Interchange
I-135 at exit to K-96	Interchange
Kellogg and 119th St West	Highway
Kellogg and Greenwich	Highway

Operationalization

Data Source

The primary data source for this measure is the National Performance Management Research Data Set (NPMRDS). This is a dataset of average real world travel times on roadway segments. It covers the entire National Highway System (the coverage in the WAMPO region is shown below). The average travel time data is available in 5 minute increments. The data is gathered from cellphones and in-vehicle navigation systems by HERE Inc. FHWA has a contract with HERE to make this data available at no cost to MPOs and state DOTs.



The NPMRDS data is available for freeways going back to October 2011 and for surface streets going back to October 2013. While the NPMRDS dataset includes travel times for freeway to freeway ramp segments, many of these suffer from missing or limited data due to their lower volumes. They have been excluded from the dataset used to calculate these measures.

Metric

The metric for this performance measure is the Travel Time Index within a half-mile of the potential bottleneck points identified in the 2010 Freight Plan.

The Travel Time Index is the ratio of the average peak-period travel time to free flow travel time. A Travel Time Index of 2 would indicate that a potential bottleneck that normally takes one minute to traverse would take two minutes during the peak period.

The average peak period travel time for each segment was calculated by looking at all of the average travel times for 5 minute periods between 5pm and 6pm for a given month and taking the 50th percentile travel time.

The free flow travel time was calculated by looking at all the average travel times for 5 minute periods outside of the peak hours (before 7am, from 8am to 5pm, and after 6pm) and taking the 15th percentile travel time.

The travel time index is calculated for each segment within half a mile of each potential bottleneck location. Each segment's travel time index is weighted by length to come up with an overall travel time index within a half-mile of the potential bottleneck location.

In selecting the half-mile distance around each potential bottleneck point WAMPO staff analyzed possible distances ranging from one-tenth of a mile to two miles around each potential bottleneck location. A radius of one-half mile consistently did the best job of representing congestion associated with the potential bottlenecks and differentiating the conditions associated with the potential bottleneck from the general conditions of the roadway network in the WAMPO region.

Baseline Data

WAMPO staff calculated the travel time index for around each potential bottleneck for each month going back to October 2011 (the start of the NPMRDS data). The potential bottlenecks display some month to month variation. In order to smooth out this variation and remove any seasonal effects staff employed a 12 month rolling average. The rolling average did not display any significant long term trends for any of the potential bottlenecks so further analysis for the target setting process was confined to the 12 month period from February 2015 through January 2016 (the most recent available at the time of this analysis). The average travel time index for each potential bottleneck during this period is shown in the following table:

Location	Average TTI	Description
Kellogg and approximately Tracy	1.104	Freeway
Kellogg and Seneca	1.109	Freeway
Kellogg and McLean	1.119	Freeway
I-35 and Prairie Creek Road	1.092	Freeway
Kellogg and I-235	1.103	Interchange
I-135 and I-235	1.312	Interchange
Kellogg and K-96	1.218	Interchange
Kellogg and I-135	1.112	Interchange
I-35 and I-135	1.176	Interchange
I-135 at exit to K96	1.155	Interchange
Kellogg and 119th St W	1.458	Highway
Kellogg and Greenwich	1.449	Highway

Rather than set targets individually for each of the potential bottlenecks WAMPO has grouped into 3 categories: freeways, interchanges, and highways. The freeway category includes main line locations on divided, limited access roadways. The Interchanges category includes potential bottleneck locations that are located at interchanges between divided, limited access roadways. The highway category includes locations that are not divided or limited access, but are fairly high speed facilities (both are on the non-freeway sections of Kellogg/US-54).

For the freeway locations the Travel Time Index ranges from 1.09-1.12. To define the acceptable level of congestion for this metric WAMPO has adopted a target of 1.2 (roughly equivalent to 55 mph). For the interchange locations, the Travel Time Index ranges from 1.10-1.32. The adopted target is 1.4 (equivalent to 45 mph). For the highway locations the Travel Time Index ranges from 1.45-1.46. WAMPO adopted a target of 1.5 (equivalent to 40 mph). These targets represent approximately the current level of performance for each category, plus a margin amounting to less than 10% of the free flow travel time to account for random variation.

Because the baseline values for this metric are lower (better) than the targets, this metric indicates that the WAMPO region does not have an unacceptable level of congestion, even in the areas where we would expect the worst system performance.

Travel Time Uncertainty

MOVE 2040 also identified travel time uncertainty across the system as a performance measure related to the reliability of the transportation system. Travel time uncertainty is driven by the difference between how the system performs on its worst days compared to normal conditions. The reliability of the transportation system plays a significant role in the public perception of it and its usefulness for moving freight.

Operationalization

Data Source
The primary data source for this measure is the National Performance Management Research Data Set (NPMRDS). See above for a description of the NPMRDS.

Metric
The metric for travel time uncertainty is the Planning Time Index during the PM peak hour (5-6pm) on all freeway segments in the WAMPO region.

The Planning Time Index is the ratio of the 95th percentile travel time during the peak period compared to the free flow travel time.

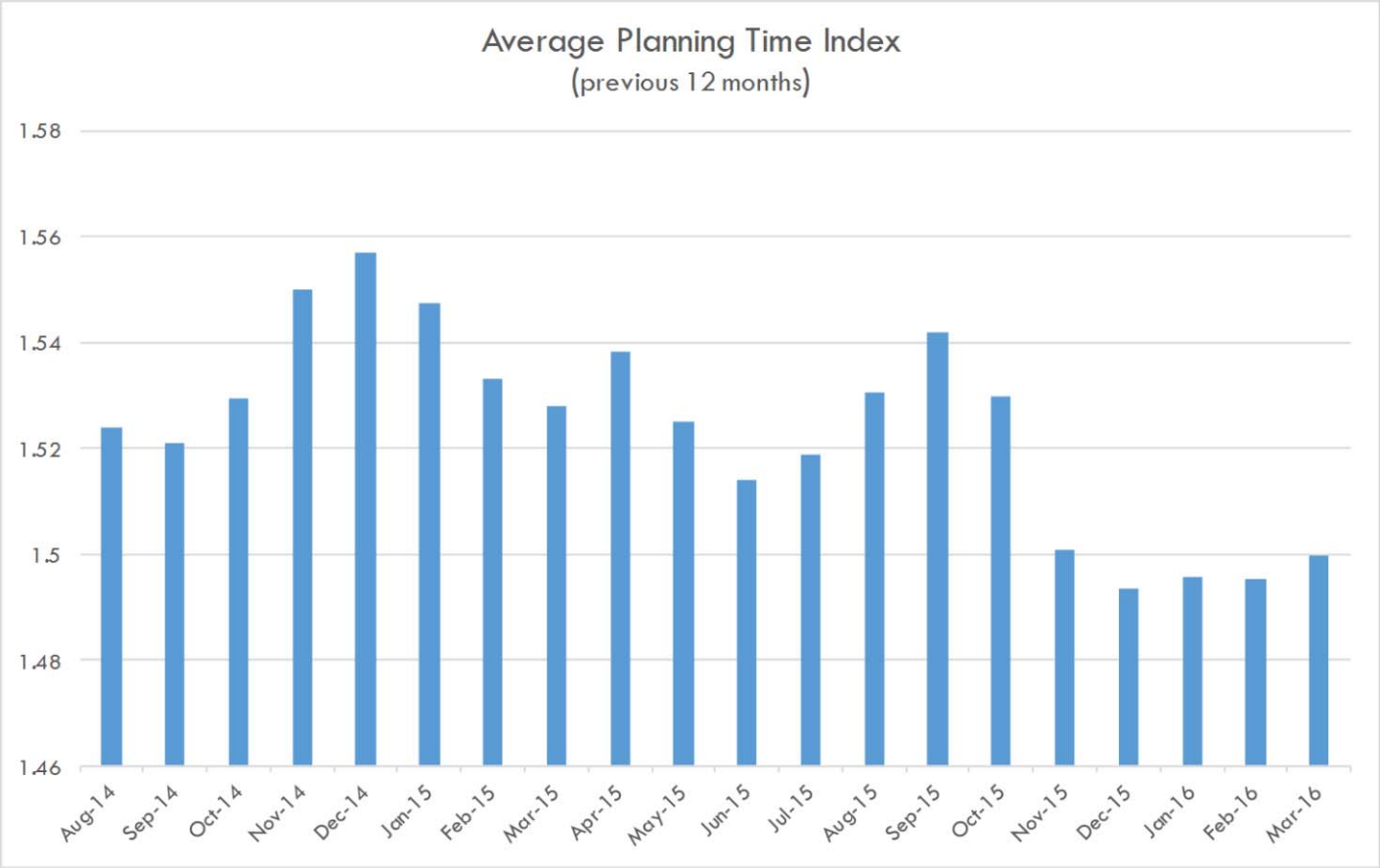
The 95th percentile peak period travel time for each segment was calculated by looking at all of the average travel times for 5 minute periods between 5pm and 6pm for a given month and taking the 95th percentile travel time.

The free flow travel time was calculated by looking at all the average travel times for 5 minute periods outside of the peak hours (before 7am, from 8am to 5pm, and after 6pm) and taking the 15th percentile travel time.

Since there are roughly 20 weekdays in a month the 95th percentile travel time is essentially the travel time on the worst weekday of the month. This makes the measure very sensitive to disruptions to the regular travel patterns, including weather events, accidents, and other special events. A Planning Time Index of 2 means that a trip that takes 10 minutes outside of rush hour would take 20 minutes on the worst weekday PM peak hour of the month.

Baseline Data
WAMPO staff calculated the freeway planning time index for the WAMPO region going back to October 2011. In order to remove any seasonal effects and reduce the impact of random variation, WAMPO staff employed a 12 month rolling average. There are several discontinuities in this data, indicating gaps or changes in the NPMRDS data coverage in the WAMPO region. To avoid these gaps and ensure maximum consistency in the data, WAMPO staff limited the analysis to the September 2013 and later.

During this period, the 12 month rolling average varied from 1.49 to 1.56 (see chart below).



WAMPO has adopted a target of 1.6 for this metric. This targets represent approximately the current level of performance, plus a margin amounting to approximately 10% of the free flow travel time to account for random variation.

Because the baseline values for this metric are lower (better) than the targets, this metric indicates that the WAMPO region does not have an unacceptable level of congestion, even in the areas where we would expect the worst system performance.

Congestion Assessment

Based on these performance measures, their associated metrics, and proposed targets, the WAMPO region does not suffer from an unacceptable level of congestion. Accordingly, WAMPO is not proposing the addition of any congestion management strategies for implementation as part of MOVE 2040.

Ongoing Monitoring

WAMPO will continue to monitor the MOVE 2040 performance measures going forward. New data will be collected on an ongoing basis: each time the WAMPO travel demand model changes and whenever HERE publishes new NPMRDS data. This data will be analyzed and published as part of WAMPO's biannual Transportation Systems Report starting in 2018 and as part of future Metropolitan Transportation Plans.

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