Kansas Department of Transportation

Wichita, Kansas
ACKNOWLEDGEMENTS

The 2014 Annual Report brought to you by the Kansas Department of Transportation (KDOT).

With the Assistance of:

Kansas Department of Transportation

TranSystems

HIGHWAY PATROL

EXPERIENCE | Transportation
EXECUTIVE SUMMARY

WICHway is KDOT’s Traffic Management Center (TMC) in the Wichita Metro Area. Currently, Intelligent Transportation System (ITS) devices are located on I-135, I-235, US-54 (Kellogg) and K-96 in the areas shown in green on the coverage map. Installation of ITS devices began in 2009 and today includes 23 Dynamic Message Signs (DMS’s) that display messages for highway travelers, 41 Closed Circuit Television Cameras (CCTVs) used to view traffic and incidents, and 52 sensors that detect traffic congestion that are monitored by TMC staff. Sign messages, camera snapshots and traffic congestion are displayed on the WICHway website at www.WICHway.org.

KDOT has contracted with TranSystems and Sedgwick County 911 to staff and actively monitor the TMC Monday through Friday, 6 am to 7 pm, and during special events. The TMC is co-located in the Sedgwick County 911 center in downtown Wichita. Emergency 911 operators may post messages 24/7, including weekends if needed. KDOT began collecting statistics for the system in July of 2013. This report represents the first full calendar year of operational data for WICHway.

<table>
<thead>
<tr>
<th>2014 WICHway Quick Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Dynamic Message Signs (DMS)</strong></td>
</tr>
<tr>
<td><strong>Number of Closed Circuit Television Cameras (CCTV)</strong></td>
</tr>
<tr>
<td><strong>Number of Incidents Managed by WICHway</strong></td>
</tr>
<tr>
<td><strong>Number of Minutes to Clear an Incident (average)</strong></td>
</tr>
<tr>
<td><strong>Percentage of Major Crashes (greater than 2 hours)</strong></td>
</tr>
<tr>
<td><strong>Number of Public Contacts by Motorist Assist</strong></td>
</tr>
<tr>
<td><strong>Number of First Responders trained in Traffic Incident Management (TIM)</strong></td>
</tr>
<tr>
<td><strong>Number of new WICHway.org unique user visits</strong></td>
</tr>
</tbody>
</table>

Average clearance time for incidents was reduced by 102 minutes from July, 2013 to July, 2014 after a TIM program was initiated by WICHway.
The co-location of the Wichita TMC with Sedgwick County 911 allows direct communication between 911 personnel, first responders, WICHway personnel and the public. It also allows faster incident recognition and response saving time, money and lives.

WICHway’s mission is to provide time critical field data to enable coordinated interagency response to provide and improve:

- Safety for the highway drivers and first responders through traveler information and training
- Traffic management aimed towards travel time reliability and reduced congestion delays

More specifically, WICHway has goals in three areas:

- Traffic Incident management (TIM) – better response and clearance times, reduction of secondary accidents
- Transportation System Efficiency – reduce congestion, improve travel times, reduce vehicle emissions
- Traveler Information – public web site, travel times on DMS

This report presents various indices and metrics that have been compiled to measure progress toward these goals. For benchmarking purposes, this report references some of the key metrics from both the Kansas City and Houston metropolitan TMC annual reports. Both Midwest cities have long established traffic management centers and incident management programs.

Metrics and indices such as incidents by time of day, average incident duration, incident location “heat” maps, motorist assistance program metrics and congestion indices such as Travel Time Index, Buffer Time Index and Planning Time Index are included in the report.

Although all of the presented data provides interesting details about transportation in the city, perhaps the most intriguing metrics highlight accident duration and clearance times. Specifically, the average clearance time for an incident, excluding stalled vehicles and vehicles marked for tow, was forty-eight minutes. This is an improvement of almost two hours or over three times less than 2013’s average of two hours and 30 minutes. Traffic incident management (TIM) training, which is also mentioned in this report, is a significant reason in the decreased incident time. While a significant improvement has been shown since 2013, it continues to be an improvement goal for the Wichita area. The Kansas City and Houston metropolitan TMCs have a much more mature system and average incident clearance times of 36 minutes (2014) and 34 minutes (2013) respectively. WICHway will continue to work to meet or exceed such benchmarks.

WICHway is expanding its coverage and will add fiber optic communications to provide additional coverage on high volume highways in the metro. There are also planned expansions to add additional devices on East Kellogg (US-54) through two road projects and the I-235 and Kellogg interchange project.

WICHway’s second annual report summarizes incident and congestion metrics from January 1, 2014 to December 31, 2014 and is the culmination of months of hard work by individuals from the Kansas Department of Transportation (KDOT), Kansas Highway Patrol (KHP), Sedgwick County, the City of Wichita, Wichita Area Metropolitan Planning Organization and TranSystems Corporation. KDOT would like to thank all of the transportation partners, first responders and individuals who have been involved in making Wichita’s highways a safer and less congested place over the last year. We are excited to share this information with you and hope you share our enthusiasm for the future of the WICHway system!
# TABLE OF CONTENTS

ACKNOWLEDGEMENTS ........................................................................................................................................................................ iii
EXECUTIVE SUMMARY .......................................................................................................................................................................... iv
TABLE OF FIGURES ................................................................................................................................................................................ viii
WICHway SYSTEM FRAMEWORK .............................................................................................................................................................. 1
INCIDENT SUMMARY ................................................................................................................................................................................ 2
  Introduction .................................................................................................................................................................................................. 2
  Incident Types .................................................................................................................................................................................................. 3
  Total Incidents ........................................................................................................................................................................................ 4
  Incident Clearance Time ....................................................................................................................................................................... 7
CRASH SUMMARY .................................................................................................................................................................................... 9
  Introduction .................................................................................................................................................................................................. 9
  Crash Clearance Times ..................................................................................................................................................................... 10
  Crashes by Severity ........................................................................................................................................................................ 12
SMART WORK ZONE (SWZ) ................................................................................................................................................................... 14
MOTORIST ASSISTANCE PROGRAM .................................................................................................................................................. 15
TRAFFIC INCIDENT MANAGEMENT TRAINING ........................................................................................................................................ 16
CONGESTION INDEX REPORTS ............................................................................................................................................................... 17
  Introduction .................................................................................................................................................................................................. 17
  WICHway Sensor Framework .......................................................................................................................................................... 18
  Average Annual Daily Traffic (AADT) by Route ........................................................................................................................................ 19
  Average Travel Speed by Segment ...................................................................................................................................................... 21
  Travel Time Index (TTI) ..................................................................................................................................................................... 22
  Planning Time Index (PTI) ................................................................................................................................................................. 24
  Buffer Time Index (BTI) ..................................................................................................................................................................... 26
# TABLE OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>WICHway Coverage Area</td>
<td>iv</td>
</tr>
<tr>
<td>WICHway Framework</td>
<td>1</td>
</tr>
<tr>
<td>Total Incident Summary</td>
<td>3</td>
</tr>
<tr>
<td>Incident Summary by Time</td>
<td>4</td>
</tr>
<tr>
<td>Incident Types by Month</td>
<td>6</td>
</tr>
<tr>
<td>Incident Clearance Times</td>
<td>7</td>
</tr>
<tr>
<td>2014 Injury/Fatality Crash Heat Map</td>
<td>9</td>
</tr>
<tr>
<td>2014 Non-Injury Crash Heat Map</td>
<td>9</td>
</tr>
<tr>
<td>Cumulative Distribution of Crash Clearance Time</td>
<td>10</td>
</tr>
<tr>
<td>Total Crash Summary</td>
<td>11</td>
</tr>
<tr>
<td>2014 Crashes</td>
<td>12</td>
</tr>
<tr>
<td>2013 Crashes</td>
<td>12</td>
</tr>
<tr>
<td>Crashes by Severity</td>
<td>12</td>
</tr>
<tr>
<td>Motorist Assist Summary</td>
<td>15</td>
</tr>
<tr>
<td>Traffic Incident Management (TIM) Summary</td>
<td>16</td>
</tr>
<tr>
<td>Travel Reliability Index Summary</td>
<td>17</td>
</tr>
<tr>
<td>Location of Wichita’s ITS Traffic Sensors</td>
<td>18</td>
</tr>
<tr>
<td>Highway AADT</td>
<td>19</td>
</tr>
<tr>
<td>Average Peak Hour Speeds</td>
<td>21</td>
</tr>
<tr>
<td>Travel Time Index (TTI) Maps</td>
<td>23</td>
</tr>
<tr>
<td>Planning Time Index (PTI) Maps</td>
<td>25</td>
</tr>
<tr>
<td>Buffer Time Index (BTI) Maps</td>
<td>27</td>
</tr>
<tr>
<td>WICHway.org Website Summary</td>
<td>28</td>
</tr>
</tbody>
</table>
WICHWAY SYSTEM FRAMEWORK

WICHway currently utilizes 41 closed circuit television cameras (CCTVs) to observe and locate incidents and 23 dynamic message signs (DMS's) are used to communicate with roadway users. The devices are securely connected to the Traffic Management Center (TMC), located in the Sedgwick County Emergency Management building, through a combination of radio, cellular and fiber connections. KDOT does not routinely record video from traffic cameras but snap shots can be viewed by visiting the website at www.WICHway.org.

TMC operators view live video and can control traffic cameras and message signs from their consoles. The TMC is staffed Monday through Friday, 6 am to 7 pm and during special events. Emergency personnel also post messages and view cameras during off hours, including weekends.

The data used in this report summarizes incident types, totals and locations of confirmed incidents actively logged during operational hours from January 1, 2014 to December 31, 2014.
INCIDENT SUMMARY

Introduction

What is an incident? For our purposes, it’s an event that occurs on the highway that affects the safety or capacity of the highway. This may be an accident, stalled vehicle, grass or vehicle fire, pedestrians on the highway, or roadway debris. Quick detection and response is essential to minimizing the incident duration, preventing secondary accidents and lessening the effects of the initial incident. Detecting incidents and organizing appropriate responses is a primary focus of the WICHway system.

There are many different ways to look at incidents and in the next few pages you’ll find summaries that:

- Group the number of incidents by type (e.g. percentage of stalled vehicles) which gives you an idea of how prevalent each incident is as a whole

- Group incidents by time of day, weekday, and month of the year which allow you to examine when an incident is likely to occur

- Group average clearance times by month and incident type which allows review of any patterns by the same factors

- Group crashes by severity as well as crash rates per route which allows a further examination of the accident data by time of crash as well as the ability to prioritize possible safety improvements
Incident Types

By identifying incident types as well as their effects on the travelers, efforts can be made to reduce the impact to motorists. There were a total of 2,117 logged incidents on the four highways monitored by WICHway during 2014. The top three incident types are stalled vehicles, accidents and debris accounting for 96.7% of logged events. Stalled vehicles and roadway debris may sound innocuous in nature but often lead to reduced capacities, increased congestion and occasionally result in secondary accidents. Of the tracked incident types, accidents have the greatest impact to the highway system; not only because of the implications to the motorists involved but also the safety of the first responders and other traveling public. Secondary accidents are often more severe than the initial collision, require additional responders, and introduce additional delays. Tow, Congestion, Construction, Fire and Pedestrian incidents make up the remaining 3.3% of the total incidents.

*The 2013 report data covered 6 months, July 1, 2013 to December 31, 2013*
Total Incidents

Identifying trends in incidents is the first step in targeting countermeasures to reduce the number of incidents. The graphs below show the number of logged incidents by weekday, time of day and month. Over 50% of incidents occur during peak driving times, 7:00 to 9:00 am and 4:00 to 6:00 pm. When comparing the data to National Highway Traffic Safety Administration (NHTSA) crash data, the general trends appear to match the national crash data.

Over 50% of incidents occur during peak driving times, 7-9 am and 4-6 pm.
In 2014, February had the highest number of incidents and March had the lowest.

*The 2013 report data covered 6 months, July 1, 2013 to December 31, 2013*
Monthly data illustrates the relationship of incident types to the time of the year. Weather, such as snow and rain, or seasonal temperatures, such as hot summers and cold winters, may contribute to incident trends. Months when school is in session affects travel and incidents differently than when students are out of school. The graph to the left depicts incident types broken down by month. Due to the somewhat random nature and the number of events, stalled vehicles, construction, congestion and vehicles logged to be towed are not shown. Also, months with zero incidents in that grouping are not shown (e.g. there were no pedestrian incidents in January). The data trends for debris, pedestrian and fire would appear to be typical of what you would expect (e.g. pedestrian activity is higher during warmer months). Generally, months with snow have a higher number of property damage only (PDO) accidents, so the month of May recording the most PDO accidents is unusual.
Incident Clearance Time

Incident clearance time is an important factor to consider with traffic management. The longer an incident remains on the roadway, the larger the effect on traffic (including congestion and secondary collisions). Safely and quickly reducing traffic exposure to incidents is essential to an efficient transportation system.

The average clearance time by month shown below excludes stalled vehicles, tow and construction incidents since these events often last multiple days and would be difficult to show in relationship to the other incidents.

Between 2013 & 2014, Accident Clearance Time DECREASED by over 2 hours

December has the longest average clearance time. May has the shortest average clearance time.
The average incident clearance time for Wichita in 2014 was 48 minutes, down almost two hours since 2013’s average of two hours and 30 minutes. Wichita’s average clearance time excludes stalled vehicles, tow and construction incidents. Kansas law (K.S.A. 8-1102) allows motorists 48 hours to remove an abandoned vehicle before it will be towed, unless it creates a traffic hazard.

KC Scout’s 1 36-minute clearance time is the average time it takes to clear lanes for lane-blocking incidents. Incident clearance time as reported by WICHway includes the time all emergency personal, equipment, and vehicles have left the scene.

Houston TranStar’s 2 31.2-minute clearance time did not specifically mention which incidents are included and whether or not the time was for complete removal from the roadway or only for lane-blocking incidents.

Sources


**CRASH SUMMARY**

**Introduction**

Unlike incidents which include all events occurring on the highway, crashes involve the collision of a vehicle with another vehicle, animal, pedestrian or debris. Crashes are typically broken down into two separate categories, property damage only (PDO) and injury or fatality crashes. The longer a crash remains on the roadway, the larger the effect on traffic. Reducing the time it takes to safely remove the crash from the roadway is a goal for the Wichita area.

Identifying high incident areas is important when determining the need for safety improvements. These maps illustrate locations of logged crashes. Areas with a low number of incidents are blank or green. As the number of incidents in a location increase, the thematic map changes in color from green to yellow to red. From the data below, the interchange areas of: I-135 and US-54; I-235 and US-54; and K-96/K-254/I-235 and I-135 have the highest number of incidents. Highway interchange locations typically have a higher number of incidents than that of open roadways due to more complex driving maneuvers associated with interchange areas, such as lane changes, merging and traffic traveling at different speeds. Additionally, the higher the volume of traffic in a location the more chances there are for a crash to occur.
Crash Clearance Times

Crash clearance time is another important factor to consider in traffic management and an improvement goal for the Wichita area. This graph illustrates how much time it takes to clear a percentage of all crashes. In 2014, 69% of all recorded crashes were cleared in less than 60 minutes! In two hours, 96% of crashes are cleared, that is 7% better than 2013 two-hour clearance time of 89%. This graph includes both injury and non-injury crashes clearance times logged by TMC operators.

Cumulative Distribution of Crash Clearance Time

In 2014, 69 percent of crashes were cleared in less than 60 minutes.
### 2014 Total Crashes by Highway

<table>
<thead>
<tr>
<th>Highway</th>
<th>ACCIDENT-PDO</th>
<th>ACCIDENT-INJ/FAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>US-54</td>
<td>199</td>
<td>72</td>
</tr>
<tr>
<td>K-96</td>
<td>55</td>
<td>13</td>
</tr>
<tr>
<td>I-235</td>
<td>90</td>
<td>29</td>
</tr>
<tr>
<td>I-135</td>
<td>134</td>
<td>65</td>
</tr>
</tbody>
</table>

#### Total Crashes

- **I-135**: 134
- **US-54**: 199
- **K-96**: 55
- **I-235**: 29

### 2014 Crash Clearance Time

<table>
<thead>
<tr>
<th>Highway</th>
<th>ACCIDENT-PDO</th>
<th>ACCIDENT-INJ/FAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>US-54</td>
<td>0:57</td>
<td>1:19</td>
</tr>
<tr>
<td>K-96</td>
<td>0:55</td>
<td></td>
</tr>
<tr>
<td>I-235</td>
<td>0:43</td>
<td></td>
</tr>
<tr>
<td>I-135</td>
<td>0:49</td>
<td>1:00</td>
</tr>
</tbody>
</table>

#### Average Time (hour:min)

- **I-135**: 1:00
- **US-54**: 1:19
- **K-96**: 0:57
- **I-235**: 0:43

---

11
Crashes by Severity

The duration of an accident is used as a performance measure of how crashes affect the roadway. The crash duration is an appropriate metric for severity because the duration affects the number and type of responders that respond to the crash, the amount of congestion that occurs because of the crash, increased delay to the traveler and the amount of traffic control needed to provide a safe crash scene. According to the Manual on Uniform Traffic Control Devices (MUTCD)\(^3\), a federal document for minimum traffic standards, crash severity can be separated into three levels:

- **Minor** - duration under 30 minutes
- **Intermediate** - duration of 30 minutes to 2 hours
- **Major** - duration greater than 2 hours

The crashes shown in this report include confirmed injury and non-injury accidents logged by TMC operators on highways only. The reduction in major events by 11% is the key area that was improved from 2013.

### 2013 vs 2014 Crashes

<table>
<thead>
<tr>
<th>Type</th>
<th>2013</th>
<th>2014</th>
<th>Avg. Duration (hh:mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor</td>
<td>66</td>
<td>196</td>
<td>0:16</td>
</tr>
<tr>
<td>Intermediate</td>
<td>176</td>
<td>432</td>
<td>0:59</td>
</tr>
<tr>
<td>Major</td>
<td>43</td>
<td>29</td>
<td>15:09</td>
</tr>
<tr>
<td>Grand Total</td>
<td>285</td>
<td>657</td>
<td>2:57</td>
</tr>
</tbody>
</table>

**Source**


*The 2013 report data covered 6 months, July 1, 2013 to December 31, 2013*
**2014 Injury/Fatality Crashes by Severity**

<table>
<thead>
<tr>
<th>Severity</th>
<th>Total Crashes</th>
<th>Avg. Duration (hh:mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor</td>
<td>30</td>
<td>0:17</td>
</tr>
<tr>
<td>Intermediate</td>
<td>139</td>
<td>1:02</td>
</tr>
<tr>
<td>Major</td>
<td>10</td>
<td>3:05</td>
</tr>
<tr>
<td>Grand Total</td>
<td>179</td>
<td>1:01</td>
</tr>
</tbody>
</table>

**2014 Non-Injury Crashes by Severity**

<table>
<thead>
<tr>
<th>Severity</th>
<th>Total Crashes</th>
<th>Avg. Duration (hh:mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor</td>
<td>166</td>
<td>0:13</td>
</tr>
<tr>
<td>Intermediate</td>
<td>293</td>
<td>0:57</td>
</tr>
<tr>
<td>Major</td>
<td>19</td>
<td>3:28</td>
</tr>
<tr>
<td>Grand Total</td>
<td>478</td>
<td>0:48</td>
</tr>
</tbody>
</table>

**Incident vs. Crash**

**Incident** - an event occurring on the highway that affects the safety or capacity of the highway.

**Crash** - the collision of a vehicle with another vehicle, animal, pedestrian, debris or stationary object.

**Severity Levels**

**Minor** - duration under 30 min.

**Intermediate** - duration of 30 min. to 2 hrs.

**Major** – duration greater than 2 hrs.
A Smart Work Zone (SWZ) utilizes technologies to give drivers real-time traffic information so they can make informed driving decisions and potentially increase the safety for both motorists and highway workers. The Kansas Department of Transportation (KDOT) has implemented the first Smart Work Zone (SWZ) in Kansas on the I-135 rehabilitation project from North 37th Street to 85th Street. The Wichita SWZ project includes 7 portable message boards, 5 cameras, 6 traffic detectors and 2 Bluetooth readers interconnecting with the existing TMC devices to provide real-time information to motorists. The message boards displaying travel times through the construction zone were placed on major routes connecting Valley Center and Park City to I-135. When travel times increased, daily commuters could choose to divert to alternative routes, avoiding the construction delays.

**WHY USE A SMART WORK ZONE?**

- **Saves Lives**
  - Reducing accidents and informs motorists of current driving conditions
- **Saves Time**
  - Encourage drivers to use alternative routes during heavy congestion
- **Saves Money**
  - Less time in traffic means less congestion and decrease in delays
MOTORIST ASSISTANCE PROGRAM

The Motorist Assistance Program (MAP) is a partnership between the Kansas Department of Transportation and the Kansas Highway Patrol. Wichita’s Motorist Assistance Program operates Monday through Friday, 5 am to Midnight, and 7 am to 11 pm on weekends. MAP has outlined four primary goals:

1. To protect and assist stranded motorists; thereby reducing the safety risk that stranded motorists create for themselves and other drivers.
2. To reduce congestion in the metro areas, particularly during rush hours and on holidays through the removal of disabled vehicles from traffic lanes.
3. To assist the Kansas Department of Transportation and local law enforcement agencies in the prevention of incidents that endanger motorists and disrupt normal traffic flow.
4. To free road patrol troopers to perform duties requiring law enforcement powers through the cost-effective employment of Motorist Assistance Technicians.

### Motorist Assist Summary

<table>
<thead>
<tr>
<th>Activity</th>
<th>Annual Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2013</td>
</tr>
<tr>
<td>Public Contacts*</td>
<td>7,375</td>
</tr>
<tr>
<td>Service Rendered</td>
<td>4,918</td>
</tr>
<tr>
<td>Unattended Vehicles**</td>
<td>1,808</td>
</tr>
<tr>
<td>Total Days Worked</td>
<td>1,108</td>
</tr>
<tr>
<td>Total Hours Worked</td>
<td>9,968</td>
</tr>
<tr>
<td>Total Miles Driven</td>
<td>213,381</td>
</tr>
</tbody>
</table>

*Contact with at least one person. Multiple persons in an encounter are not counted individually

**Red tag placed on the vehicle found abandoned between the fences along a highway. Recovered stolen vehicles are excluded.

MISSION

To improve traffic safety through timely, courteous, and cost-effective assistance to motorists whose vehicles are stranded or disabled along the roadway.
TRAFFIC INCIDENT MANAGEMENT TRAINING

Traffic Incident Management (TIM) is a comprehensive initiative focused on improving safety, capacity and reliability of a roadway. TIM consists of planned and coordinated efforts to identify and restore roadway capacity as safely and quickly as possible. Strong traffic management practices help to improve the safety of responders and the public, as well as improve route reliability. Since beginning in the Wichita area in 2013, over 550 traffic incident responders from multiple disciplines have been trained. Responders completed a 4-hour training course developed by the Federal Highway Administration (FHWA) through the Strategic Highway Research Program (SHRP2). The course develops a common set of practices and advance standards for all emergency responders and those who support traffic incident management (TIM). Between 2013 and 2014, the average incident clearance time in Wichita decreased by almost 2 hours. TIM training and the cooperative work of area first responders are primarily responsible for the sharp decrease in average clearance time.

<table>
<thead>
<tr>
<th>Responders</th>
<th>Total Trained</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2013</td>
</tr>
<tr>
<td>Law Enforcement</td>
<td>49</td>
</tr>
<tr>
<td>Fire/Rescue</td>
<td>379</td>
</tr>
<tr>
<td>Towing and Recovery</td>
<td>0</td>
</tr>
<tr>
<td>EMS</td>
<td>3</td>
</tr>
<tr>
<td>DOT/ Transportation</td>
<td>24</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>456</strong></td>
</tr>
</tbody>
</table>

Since starting in 2013, over 550 traffic incident responders from multiple disciplines have completed a 4-hour TIM training course.

Saves Lives
- Faster incident response and clearance times result in fewer secondary crashes.
- Training results in less exposure of responder team to moving traffic during recovery.

Saves Money
- Less congestion leads to few freight and traveler delays and backups.
- Fewer secondary crashes saves on insurance claims.
- Faster cleanups lead to cost savings for incident personnel.

Saves Time
- Smarter response techniques cut congestion clearance time and decrease delays.
CONGESTION INDEX REPORTS

Introduction

Traffic congestion affects our daily lives as we travel along the roadways. Morning and evening commuters generally have a similar schedule day to day, which causes peak periods of congestion. Commuters are familiar with regular congestion on their routes and will plan accordingly. Roadway users want travel time reliability with consistent and reliable travel times on their route. Starting in 2014, WICHway began displaying travel times on Dynamic Message Signs (DMS’s). The travel times give commuters real-time travel time to their destinations. Travel times offer daily drivers a method to quickly determine whether traffic is flowing normally or if there is congestion and an alternative route should be considered.

The congestion index report informs commuters of travel time reliability on Wichita highways. Although Wichita does not currently have significant congestion compared to other larger cities, congestion continues to increase as the city grows. Travel time reliability is measured by comparing travel times during little or no congestion to peak-hour travel times. The Federal Highway Administration (FHWA) has outlined three methods on measuring travel time reliability:

- Travel Time Index (TTI)
- Planning Time Index (PTI)
- Buffer Time Index (BTI)

The methods used to calculate these metrics are shown in the appendices. The data contained in this report is based on unprocessed, raw data collected from traffic sensors within WICHway’s intelligent transportation system. Prior to analyzing the data found in this report, erroneous data from possible malfunctioning detectors or erroneous data was eliminated. No other attempts were made to alter data or interpolate missing data in any way.

The results outlined in this report are intended to help inform travelers of current congestion areas and help stakeholders make informed decisions on areas of the highway system that need improvement. As data continues to be developed, historic and current traffic trends can be used to derive comparisons; thereby helping make informed decisions on areas of improvement to Wichita’s transportation system.

<table>
<thead>
<tr>
<th>Travel Reliability Index Average Snapshot</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TTI</strong></td>
</tr>
<tr>
<td>AM</td>
</tr>
<tr>
<td>WICHway 2013</td>
</tr>
<tr>
<td>WICHway 2014</td>
</tr>
</tbody>
</table>
**WICHway Sensor Framework**

Wichita’s Intelligent Transportation System (ITS) currently has 52 traffic sensors in the network. Traffic sensors detect vehicle speeds, volume, lane occupancy and direction in 15-minute intervals, all of which is stored on local TMC data servers.

When a peak period is referenced, the peak periods correspond to 7:15 to 8:15 am and 4:30 to 5:30 pm. The peak periods in this report were determined using data collected over the 12-month time period.

The congestion indices used in this report are:

- Travel Time Index (TTI)
- Planning Time Index (PTI)
- Buffer Time Index (BTI)

All three travel time reliability indices are calculated standards used by the Federal Highway Administration (FHWA). For comparison purposes the FHWA publishes an Urban Congestion report located at:

http://www.ops.fhwa.dot.gov/perf_measurement/ucr/index.htm

This FHWA report has indices for many other cities in the United States.

The indices averages shown in this report separated by several roadway segments and time periods. The travel time index equations (TTI, PTI and BTI) can be found in the appendix.
Average Annual Daily Traffic (AADT) by Route

AADT is a measure of the average annual number of vehicles that cross a point (in both directions) on a roadway segment during a day. Based on typical peaking characteristics, the capacity of a freeway lane is 20,000 vehicles per day per lane.

I-135 runs north and south through Wichita and is a major interstate route for travelers and commuter traffic.

I-135 AADT in 2014
K-96 is a bypass route connecting East US-54 (Kellogg) with North I-135 then continues west to Hutchinson, Kansas.

US-54 runs east and west through the heart of Wichita and has the highest Average Annual Daily Traffic (AADT) in Wichita.
Average Travel Speed by Segment

The chart below shows the average travel speed by highway segment during peak hours of 7:15-8:15 am and 4:30-5:30 pm in comparison to the posted speed limits. The green segment represents the posted speed limit +/- 5 m.p.h. Areas where the line extends below the lower green area threshold signify the average flow of traffic is below the posted speed limit and is an indication of where congestion is routinely present. Note the drop in speed near US-54 and Eastern is due to the end of the freeway section of US-54 (Kellogg).

Northbound I-135 traffic at North 37th Street experiences an average speed of 52 mph in the evening, 8 mph below the posted speed limit.
Travel Time Index (TTI)

**Travel Time Index (TTI)** represents the average additional time required during peak times compared to time with no congestion.

If it typically takes a driver 1 minute to drive between two points with no congestion, a TTI of 1.5 means on average, it will take the same driver 1 minute 30 seconds (1 minute x 1.5 = 1.5 minutes) to travel between the same two points during the peak periods.

The Travel Time Index (TTI) represents the *average* additional time needed during peak hours. The TTI is the average travel times divided by the free-flow travel time.

\[
TTI = \frac{Average \ Travel \ Time}{Freeflow \ Travel \ Time}
\]

The TTI for Wichita is computed for specific highway segments with the average travel time computed during peak morning and afternoon periods (7:15 am to 8:15 am, 4:30 pm to 5:30 pm). Peak period TTI was chosen because for the Wichita area, this is generally the time that is associated with congestion. The TTI ratio can be explained by considering the values as percentages. A TTI of 1 means the average travel time is equal to the free-flow speed, indicating no delay or congestion during peak periods. If the value is greater than 1, such as 1.3, the average peak travel time is 30% longer than if no congestion was present. For example, if it typically takes a driver 1 minute to drive between two points with no congestion, a TTI of 1.3 means it will take the same driver 1 minute 18 seconds to travel between the same two points during the peak period. If the value is less than 1, then the speed of vehicles during the peak time is greater than off-peak times.
Travel Time Index (TTI) represents the average additional time required during peak times compared to time with no congestion.

*The K-96 and Greenwich interchange was under construction during most of 2014 as illustrated in red on the above map.*

**Travel Time Index Legend**
- **Green**: 1.0–1.05
- **Yellow**: 1.06–1.10
- **Red**: 1.11+

**2014 Morning Peak**
- 0% (1.00 min)

In 2013: 1.02 minutes

**2014 Evening Peak**
- -1% (1.01 min)

In 2013: 1.02 minutes
Planning Time Index (PTI)

Planning Time Index (PTI) represents the total travel time required to maintain arrival time 95% of the time. 95% arrival is similar to saying 19 days out of 20 work days you would arrive on time.

If travel during times of light traffic with little congestion takes 2 minutes, a PTI of 1.5 means the same trip will take a total of 3 minutes (1.5 minutes x 2 = 3 minutes), or 1.5 times longer.

The Planning Time Index (PTI) represents total travel time a commuter should plan for in order to maintain arrival time 95% of the time. The higher the PTI, the more likely the driver is to experience travel delay for the road segment. The PTI is the 95th percentile travel time divided by the free-flow travel time.

\[
PTI = \frac{95\text{th Percentile Travel Time}}{\text{Freeflow Travel Time}}
\]

The PTI for Wichita is computed for specific highway segments with the average travel time computed during peak morning and afternoon periods (7:15 am to 8:15 am, 4:30 pm to 5:30 pm). The PTI ratio can be explained by considering the values as percentages. A PTI of 1 means no additional planning time is needed 95% of the time. A value greater than 1, such as 2.0, indicates the driver should plan the travel time to take 200% longer, or twice as long, than times with no congestion. For example, if it typically takes a driver one minute to drive between two points with no congestion, a PTI of 2.0 means it will take the same driver two minutes to travel between the same two points during a peak period. If the value is less than 1, then the speed of vehicles during the peak time is greater than off-peak times.
Planning Time Index (PTI) represents the total travel time required to maintain arrival time 95% of the time.

**Planning Time Index Legend**
- 1.0 – 1.30
- 1.31-1.60
- 1.61+

**2014**
- **Morning Peak**: +2.6% (1.18 min)
- **Evening Peak**: +2.5% (1.25 min)

In 2013:
- **Morning Peak**: 1.15 minutes
- **Evening Peak**: 1.22 minutes
Buffer Time Index (BTI)

Buffer Time Index (BTI) represents the additional time or “buffer” necessary above the average peak travel time.

The Buffer Time Index (BTI) represents the additional time, or buffer, commuters need to add above their average travel time in order to maintain their planned arrival time. The higher the BTI, the more time the driver should add to account for unexpected delay. The BTI is given as a percentage and its value increases as congestion worsens. The BTI is the 95th percentile travel time minus the average travel time divided by the average travel time.

\[
BTI \text{ (%) } = \frac{95\text{th Percentile Travel Time} - \text{Average Travel Time}}{\text{Average Travel Time}}
\]

The BTI for Wichita is computed for specific highway segments with the travel times computed during peak morning and afternoon periods (7:15 am to 8:15 am, 4:30 pm to 5:30 pm). A BTI of 0% means no extra time is needed during peak-hours verses free-flow traffic. A percentage such as 20% indicates the driver should plan the travel time to be 20% longer than times with no congestion. For example, if travel during times of light traffic with little congestion takes five minutes, a BTI of 40% means the traveler should plan the an additional two minutes (5 minutes x 40% = 2 minutes) to make their destination on time.
Buffer Time Index (BTI) represents the additional time or “buffer” necessary above the average peak travel time.
WEBSITE – WICHWAY.ORG

In late 2013 Wichita’s internet gateway to the Traffic Management Center, WICHway.org, was redesigned and rebuilt from the ground up and became live on December 11, 2013. The website provides users, the public, media and first responders with real-time information such as active incidents, camera views, posted message boards, live travel speeds and road conditions. In 2014, WICHway had 68,036 new users accessing through both mobile and desktop devices. Users can also find past reports, contact information and links to additional websites.

WICHway had 68,036 new users accessing through both mobile and desktop devices
WICHWAY TOOLS AND EQUIPMENT

WICHway utilizes an array of tools to monitor traffic, reduce congestion, assist responders to incidents and improve travel in Wichita. Many of these tools are available through the website, WICHway.org.

**WICHway Website**
Alerts and real-time information about traffic conditions and incidents available on desktop, tablets, and mobile devices.

**Traffic Management Center**
Control center for WICHway, Wichita’s Intelligent Transportation System.

**Live Traffic Monitoring**
Operators view live traffic conditions and update devices with current information.

**Closed-Circuit Cameras**
View live traffic and monitor incidents.

**Traffic Detectors**
Record live traffic data including speed, volume, lane occupancy and direction.

**Dynamic Message Sign (DMS)**
Alerts road users of current traffic conditions.
# APPENDICES

## Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADT</td>
<td>Average Daily Traffic</td>
</tr>
<tr>
<td>AADT</td>
<td>Average Annual Daily Traffic</td>
</tr>
<tr>
<td>BTI</td>
<td>Buffer Time Index</td>
</tr>
<tr>
<td>CCTV</td>
<td>Closed-Circuit Television</td>
</tr>
<tr>
<td>DMS</td>
<td>Dynamic Message Sign</td>
</tr>
<tr>
<td>FHWA</td>
<td>Federal Highway Administration</td>
</tr>
<tr>
<td>ITS</td>
<td>Intelligent Transportation System</td>
</tr>
<tr>
<td>KDOT</td>
<td>Kansas Department of Transportation</td>
</tr>
<tr>
<td>KHP</td>
<td>Kansas Highway Patrol</td>
</tr>
<tr>
<td>MAP</td>
<td>Motorist Assistance Program</td>
</tr>
<tr>
<td>MAV</td>
<td>Motorist Assist Vehicle</td>
</tr>
<tr>
<td>MIST</td>
<td>Management Information System for Transportation</td>
</tr>
<tr>
<td>MUTCD</td>
<td>Manual on Uniform Traffic Control Devices</td>
</tr>
<tr>
<td>PDO</td>
<td>Property Damage Only</td>
</tr>
<tr>
<td>PTI</td>
<td>Planning Time Index</td>
</tr>
<tr>
<td>SHRP2</td>
<td>Strategic Highway Research Program</td>
</tr>
<tr>
<td>SWZ</td>
<td>Smart Work Zone</td>
</tr>
<tr>
<td>TIM</td>
<td>Traffic Incident Management</td>
</tr>
<tr>
<td>TMC</td>
<td>Traffic Management Center</td>
</tr>
<tr>
<td>TTI</td>
<td>Travel Time Index</td>
</tr>
<tr>
<td>VMT</td>
<td>Vehicle Miles Traveled</td>
</tr>
</tbody>
</table>

## Sources

Travel Time Index Equations

Travel Time Index (TTI)

\[ TTI = \frac{Average \ Travel \ Time}{Freeflow \ Travel \ Time} \]

Planning Time Index (PTI)

\[ PTI = \frac{95th \ Percentile \ Travel \ Time}{Freeflow \ Travel \ Time} \]

Buffer Time Index (BTI)

\[ BTI (\%) = \frac{95th \ Percentile \ Travel \ Time - Average \ Travel \ Time}{Average \ Travel \ Time} \]

Vehicle Miles Traveled (VMT)

\[ VMT = ADT \times Segment \ Length \ (Miles) \]

Average Index Value

To calculate and indices weighted average for several roadway segments and time periods

\[ Average \ Index \ Value = \frac{\sum_{i=1}^{n} (Index \ Value_n \times VMT_n)_{each \ segment \ and \ time \ period}}{\sum_{i=1}^{n} (VMT_n)_{each \ segment \ and \ time \ period}} \]