



**DENVER**  
THE MILE HIGH CITY

# Denver Traffic Management Center - Using Technology to Increase Operational Capabilities

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Western ITE and Texas ITE Joint Conference  
June 26, 2018

FOR CITY SERVICES VISIT | CALL  
**DenverGov.org** | **311**

- Traffic congestion in the City of Denver and throughout the metropolitan area continues to increase
  - In a 2017 report release by INRIX, Denver is ranked as the **21<sup>st</sup> most congested city in the United States**
- The population in the Metro Denver area has continued to increase
  - Based upon information from the Metro Denver Economic Development Corporation, the Metro Denver area has experienced an average **1.6% annual population growth** since 2010 and the population for the metro area is expected to continue to increase with a projected population of **4,000,000 by 2035**
- Although many initiatives and programs have increased the usage of public transit and other forms of transportation it is expected the transportation network's **vehicle hours of delay will continue to rise**

- Addressing the current and future congestion requires the combined efforts of multiple programs and initiatives which include **operations** and the **application of technology**
- Operations involves managing the transportation network with a focus upon the **network's performance which includes mobility and reliability**
- Technology has been integrated into transportation agencies for decades but now there has been significant increase in new and emerging technologies
- The City of Denver has a **Smart Systems group within the Transportation Division that combines operations and technology**

- The City of Denver's **Smart Systems Program** works to improve conditions on the roadway network through operational and technological perspectives
- Functional groups of the program include:
  - **Fiber optic network**
  - **ITS devices**
  - **Systems**
  - **Traffic signal infrastructure**
  - **Denver Traffic Management Center**
- Managing and participating in the City's transportation technology initiatives
  - **Advanced Transportation and Congestion Management Technologies Deployment Program**
  - **Smart Cities initiatives**
  - **Enterprise Data Management**

- The Denver TMC is responsible for real-time monitoring and management of the City's transportation network
  - Daily operations
  - Unplanned incidents
  - Special events
  - Road work
- Since its creation in the 1990's the Denver TMC had been an operation with a heavy focus upon traffic signal operations
  - This included managing special events and traffic associated with professional sport teams
- To address current and future traffic issues the City is looking to **enhance the operations** of the Denver TMC to **increase active management** of the transportation network

- To create a vision for the next generation Denver TMC, it was necessary to develop a Strategic Plan
- The key objectives of this plan are:
  - **Development of Denver TMC core functions**
  - **Identifying opportunities for increased operational capabilities**
  - **Development of a readiness for the absorption of new technologies**

## Core Functions of the Denver TMC

- Operational Readiness
- Situational Awareness
- Information Dissemination
- Data Analysis
- Deployment of Operational Strategies
- Traffic Signal Operations
- Identification of Operational Issues

## Increased Operational Capabilities

- The Denver TMC is expected to support and move forward the goal of providing safe, efficient and reliable travel
- There is a need to increase the operational capabilities to support the delivery of the core functions that would support the City's transportation vision
- Currently staff is developing a list of functional requirements



## Implementing New Technologies

- There has been a drastic increase in the availability of new technology that can be leveraged in monitoring and managing the roadway network
- Recent technological initiatives within the City
  - Smart Cities
  - Advanced Transportation and Congestion Management Technologies Deployment Program
  - Enterprise Data Management
- Denver TMC staff participate as part of the City's project team for implementing technology related to transportation
  - This allows for **operational perspectives to be included in the design stages**

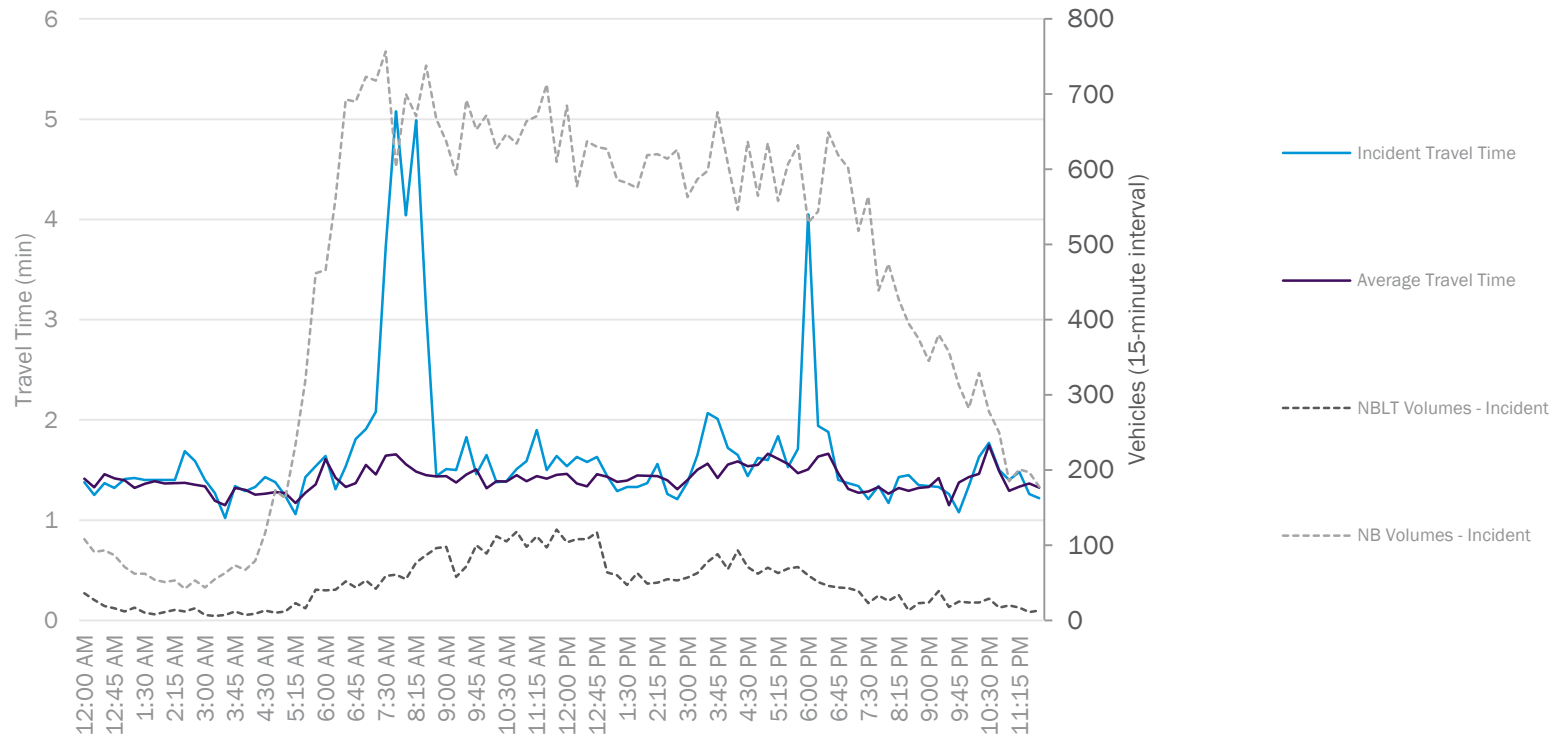
- As Denver TMC continues to work on long-range planning there are efforts to quickly implement operational enhancements **whose levels of effort are relatively small**
- There are some core functions whose existence is critical as they provide a **foundation** for the others
  - Operational readiness
  - Situational awareness
- Much of the current work is centered around the foundational functions
  - However, opportunities to implement in the other core functions are considered

# Case Study of Denver Traffic Management Center Actions

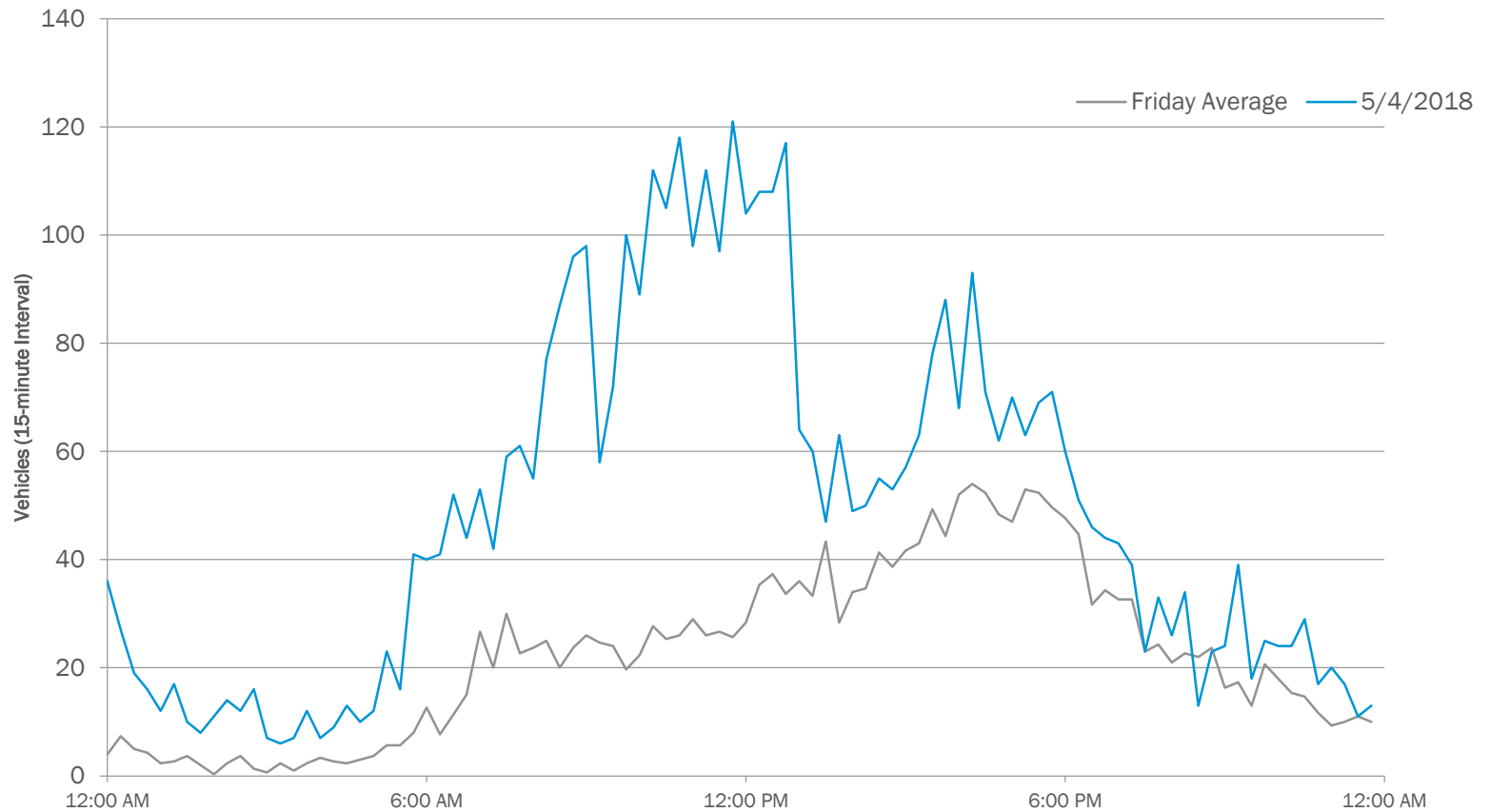
- Integration of technology allows the Denver TMC to increase its operational capabilities and to conduct active traffic management
- As an example the Denver TMC is **responding to incidents on the transportation network** by monitoring and actively managing the disrupted traffic flow
  - This includes incidents on CDOT roadways with impacts to the Denver network
- On Friday, May 4<sup>th</sup> an incident that involved a full closure of a major arterial was detected
  - Efforts were taken to determine the de facto diversion routes
  - The active management included making changes to the traffic signal timing to accommodate the change in volume seen on the diversion route
- Changes to traffic signal timing were made in an **iterative process by continuing to actively monitor and manage the network**

- The Denver TMC was able to **visually notice improvements** to the roadway once traffic signal timing changes were implemented
- To further understand the system performance and to quantify benefits an effort was made to analyze traffic data
  - Initial efforts included collecting travel time data from the incident day and making comparisons to “average conditions”
  - **Significant improvement in travel times** were seen once the Denver TMC began adjusting traffic signal timing
- Traffic volumes were also analyzed
  - Comparisons were made to “average conditions”
  - There were no significant decreases in volumes
- This is a case where technology allowed staff to **increase situational awareness, take action and then analyze afterwards**

NB Santa Fe Travel Times  
Evans to Florida



NBLT Santa Fe at Florida - Incident Comparison



## After Action Review – Strengths

- **Operational Readiness**

- Traffic signals in the area are connected as part of the City’s communication infrastructure and can be monitored and managed from the Denver TMC
  - 1206 out of the City’s 1294 traffic signals (93%) are connected to the Denver TMC
- Traffic cameras were available to monitor the affected intersections
  - 506 cameras maintained and operated by the Denver TMC

- **Deployment of Operational Strategies**

- Changes were made to the traffic signal timing which accommodated the change in traffic trends related to the diversion of vehicles



## After Action Review – Improvements

- **Operational Readiness**

- Under normal operations the Denver TMC is open from 0600 to 1900 hours on weekdays only

- **Situational Awareness**

- If the Denver TMC would have been aware of the closure the changes to signal timing could have been made earlier
- Devices and data analytics could provide alerts to a “changed” condition on the roadway related to travel times or volumes
- Establish communications between internal and external partners and stakeholders

- **Information Dissemination**

- There are opportunities for the Denver TMC to push information to the traveling public using technology applications developed and managed by third parties



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Thank You

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