Traffic Management Strategies

What is it?
Traffic management strategies involve operational approaches to improve traffic flows on freeways and arterials in locations with high levels of congestion. System efficiency strategies are designed to improve the operations of the existing transportation system, make better use of existing capacity, and encourage more fuel-efficient travel speeds. Example strategies include:

- **Freeway Management/Arterial Management**: The use of techniques such as ramp metering and traffic signal coordination to reduce congestion and improve traffic flow.

- **Integrated Corridor Management**: The strategic use of all possible capacity in a transportation system to help provide optimal traffic flow throughout a network.

- **Transportation Management Center (TMC)**: A facility that collects real-time traffic data and provides coordinated transportation management on roadways. TMCs are integral to a variety of management and operations strategies.

- **Road Weather Management**: Real-time monitoring of roadway conditions (including traffic cameras) during inclement weather to provide advance warning to motorists or provide restrictions on travel (such as requiring chains or snow tires on mountain passes). This strategy also includes mobilizing snow plows during threats of extreme weather to ensure prompt snow removal.

- **Traveler Information Systems**: These systems can provide information about travel conditions on roadways (accidents, weather, congestion, and delay) and travel options to allow travelers to make efficient decisions about route and mode choice. This helps reduce travel time and optimizes the use of the transportation network.

- **Active Traffic Management**: The use of automatic systems and human intervention to manage traffic flow, reduce accidents, and reduce congestion using managed lanes or smart lanes. Sensor loops are placed in roadways to monitor roadway activity and observe real-time traffic, while computer systems, linked with variable message signs, are used to re-set speed limits on the system in advance of accidents and bottleneck locations.
What are the benefits?

- **Mobility**: Improves travel time and travel time reliability; reduces congestion and delay.

- **Economic Vitality**: Provides positive economic impacts in the form of improved freight travel time and reliability while also improving access to industrial and employment centers.

- **Environmental**: Reduces the emission of criteria air pollutants and greenhouse gases (GHGs) that are harmful to the environment and human health by encouraging more fuel-efficient travel speeds.

- **Safety and Security**: Reduces crash rates through smoothed traffic flow and road weather management and provides a more resilient transportation network through optimization of the system capacity.

Where is it being used?

Traffic management strategies are employed throughout the U.S. Relevant west coast examples include:

- **TripCheck**, Oregon Department of Transportation
- **Active Transportation Management Signs**, Washington Department of Transportation
- **Quickmap**, California Department of Transportation

How effective is it?

This section describes what is known related to the effectiveness of traffic management strategies. However, the reader should note that impacts in specific locations will be highly contextual and accurate evaluation will likely require more detailed analysis using various traffic modeling tools, in addition to transportation demand models.

Traffic management and operations strategies can save travelers time and money by reducing congestion. By one measure, operational improvements nationwide resulted in a savings of 308 million annual hours of delay, with a value of $6.5 billion, in 2007. Findings related to the effectiveness of traffic management and operation strategies are below:

---

1. [https://www.tripcheck.com/Pages/Road-Conditions?curRegion=0&amp;mainNav=RoadConditions](https://www.tripcheck.com/Pages/Road-Conditions?curRegion=0&amp;mainNav=RoadConditions)
2. [https://www.wsdot.wa.gov/](https://www.wsdot.wa.gov/)
4. In this summary, the best available data on program effectiveness is used. Whenever possible, information is provided for the referenced examples; however, that information was not always available.
According to the OSTI Greenhouse Gas Toolkit, traffic management strategies could result in a 0.07% to 1.3% reduction in total transportation sector baseline GHG emissions in 2030.\(^6\)

A traffic management system in Espanola, New Mexico, developed in June 2006 integrated the operations of eight signalized intersections through connections to a traffic operations center. The project resulted in a 27.5% reduction in total crashes compared with previous years, and a reduction in vehicle delay of 87.5%.\(^7\)

The installation of an advanced traffic management system in Fort Collins, Colorado, reduced travel times up to 36%, while in Virginia, coordinated signal systems resulted in a 30% reduction in corridor travel times versus isolated systems.\(^8\)\(^9\)

A variable speed limit system installed in St. Louis, Missouri, reduced the crash rate by 4.5% to 8% as a result of a reduction in speed differentials during stop-and-go congestion.\(^10\)

Additionally, providing pre-trip traveler information via the internet, wireless-enabled devices, television, radio, and other services allows users to make more informed decisions for trip departure, route choice, and mode of travel, which can lead to mode shift and vehicle miles traveled (VMT) reduction. Example applications are below:\(^11\)

- In the San Francisco Bay Area, variable message signs provide integrated transit information to allow motorists to compare the travel time between remaining on a highway versus taking a train from a nearby transit station. This led to a modal shift to transit of 4% for travelers.
- In Japan, a personalized travel planning system provided commuters with geographic positioning system- (GPS) equipped cell phones and internet access to help them analyze their daily travel behavior and choose more environmentally friendly routes and modes. Survey data show shifts in users’ travel behavior (primarily mode selection) reduced carbon dioxide emissions 20% during their daily commutes.

### How much does it cost to implement?

Costs for transportation management and operations strategies vary depending on the type of strategy employed and the extent of implementation. Examples of capital and operating costs for various strategy applications are provided below:

**Traffic Management Centers (TMCs):** The cost of TMCs can vary greatly due to the size of the facility, the number of agencies present, and the number of functions performed by the facility. Capital costs range from $1.8 million to $11 million per facility, while operations and maintenance costs range from $50,000 up to $1.8 million per year.\(^12\)

---


\(^7\) FHWA. NM 68, Riverside Drive City of Espanola, New Mexico ITS Project Final Evaluation Report. 2008.


Freeway/Arterial Management: Optimizing signal timing is considered a low cost, effective approach for reducing congestion. Based on data from numerous studies, average costs per signal update are around $3,000. The cost of the traffic management system in Espanola, New Mexico, (which included video detection equipment, a fiber optic communication system, a wireless communication system, and traffic management system hardware and software) was $862,279 for full deployment.\(^\text{13}\)

In Allegheny County, Pennsylvania, an optimized traffic signal timing project resulted in a benefit-cost ratio of 57:1 along a corridor.\(^\text{14}\)

Traveler Information Systems: The cost to implement a traveler information system depends on the strategies used. For example, the average costs to design, implement, and operate a 511 system for the first year can range from $1.8 million for a metropolitan system to $2.5 million for a statewide system. This is much higher than the cost of using an internet website to disseminate traveler information, which can range from $12,000 for a rural transit traveler information site to more than $250,000 for a site that integrates TMC data and includes multimodal data for a regional or metropolitan area.\(^\text{15}\)

In Vancouver, Washington, a traveler information system was implemented at a cost of $511,300. The system consisted of three variable message signs, two highway advisory radio stations, and one road weather information system. Road weather information was also made available on the Washington State Department of Transportation website.\(^\text{16}\)

Integrated Corridor Management: Integrated corridor management (ICM) strategies on I-15 in San Diego, California, were estimated to have a benefit-cost ratio of 9.7:1 over a 10-year lifecycle. Improvements in arterial and overall system performance were forecast to result in a reduction in travel delay, vehicle-hours of travel, fuel consumption, and vehicular emissions.\(^\text{17}\)

Road Weather Management: Studies of road weather management systems have resulted in positive benefit-cost ratios. In Michigan, an analysis before deployment of the system estimated benefit-cost ratios ranging from 2.8 to 7 due to reduced travel times, reduced crash rates, and lower operating costs. Moreover, the use of weather information in Iowa, Nevada, and Michigan has reduced winter maintenance costs by $272,000 to $814,000, resulting in benefit-cost ratios of 1.8 to 36.7.\(^\text{18}\)

Implementation resources

The following resources may be helpful for jurisdictions wishing to implement traffic management strategies:

- Freeway Operations and Traffic Management, Federal Highway Administration
- Traffic Incident Management, Federal Highway Administration
- Traffic Signal System Management, Federal Highway Administration
- Corridor Traffic Management, Federal Highway Administration
- Operations and Management: Managing Existing Road Systems for Efficiency and Economy, Victoria Transport Policy Institute