

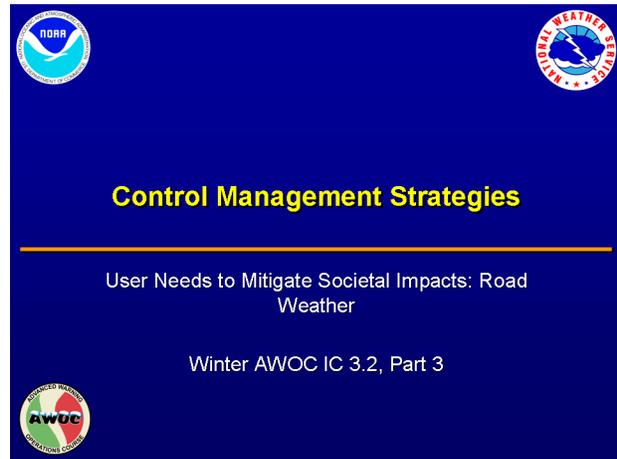
---

---

# 1. Control Management Strategies

**Instructor Notes:** This module is the third part of a lesson that will discuss Road Weather Impacts and Management Strategies. This presentation describes the control management strategies utilized by the transportation community. This presentation should take approximately 10 minutes.

**Student Notes:**



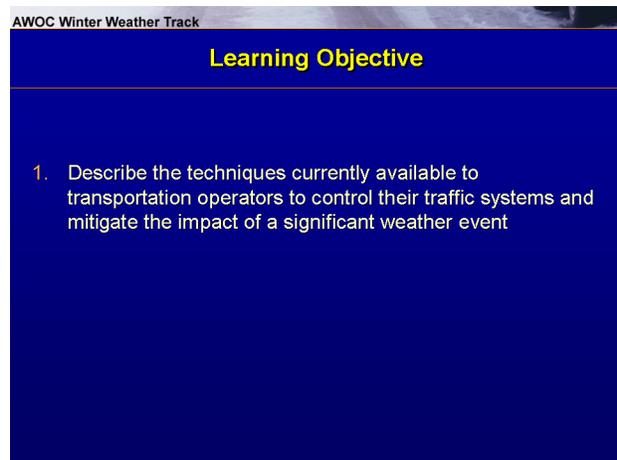
---

---

# 2. Learning Objective

**Instructor Notes:** There is one learning objective for this lesson: 1. Describe the techniques currently available to transportation operators to control their traffic systems and mitigate the impact of a significant weather event..

**Student Notes:**



---

---

### 3. Description of Control Strategies

**Instructor Notes:** Another way that transportation managers can mitigate the impacts of adverse weather is to use techniques to control traffic access, capacity, speed, and behavior during events. [CLICK] These techniques, usually implemented by Transportation Management or Operations Centers, are called Control Management Strategies. Control Management Strategies, when implemented properly, can result in improving mobility, increasing public safety, and making maintenance operations safer. [CLICK] Most control management strategies involve restricting or pacing traffic flow in order to regulate capacity. The goal of control management strategies is to physically control roadway access so that the public can travel as safely as possible. [CLICK] Control strategy techniques often involve methods or devices for restricting access to a road segment. These strategies can also call for opening up additional lanes of traffic to increase volume under specific conditions. Control management strategies may rely on automated systems or be manually implemented by transportation operations, public safety, or maintenance personnel.

**Student Notes:**

AWOC Winter Weather Track

#### Description of Control Management Strategies



- Implementation: TMCs, TOCs, and public safety personnel
- Goal: Physically control roadway access to keep the travelling public safe
- These techniques can be automated, require remote control, or be manually implemented

---

---

### 4. Advanced Traffic Control Systems

**Instructor Notes:** Many highly urbanized areas employ advanced traffic control systems (ATCS). These systems allow TMC/TOC personnel to have greater control over traffic signals, implement remote management of traffic speeds on roadways, and change message signs and highway advisory radio messages from a remote location. [CLICK] The New Jersey Turnpike Authority (NJTA) operates an advanced traffic management system (ATMS) to control almost 150 miles of its turnpike system. The ATMS helps personnel monitor road and weather conditions, manage traffic speeds, and notify motorists of hazardous conditions. The ATMS allows NJTA to implement speed management and traveler information techniques to help improve roadway safety when fog, snow, and ice are present (Pisano and Goodwin, 2004).

**Student Notes:**



## 5. Modified Traffic Signal Timing

**Instructor Notes:** With the implementation of ATCS, traffic signal timing patterns for adverse weather conditions are now possible. Recent studies (Goodwin and Pisano, 2003; Bernardin Lochmueller and Associates, 1995; Maki, 1999; Perrin et al., 2002; Lieu and Lin, 2004) show that these timing patterns can produce significant improvements to traffic operations efficiency by reducing accidents, stoppage time, and, hence, travel delays. [CLICK] Depending on the type of weather, [CLICK] the signal timing changes can include: - increasing the amount of all red time (to allow drivers to clear intersections), - increasing the length of amber times (to allow drivers more time to slow down at intersections), or - increasing cycle length (to allow slower moving traffic on capacity-reduced roads to stop less frequently). These weather-related timing patterns are pre-programmed, can be easily implemented at the onset of adverse weather conditions and then changed back when conditions improve (Pisano and Goodwin, 2002). For instance, the Charlotte, NC DOT can implement a weather-related signal timing pattern at approximately 150 traffic signals this way from a central location (Pisano and Goodwin, 2004).

**Student Notes:**

AWOC Winter Weather Track

### Examples of Control Strategies: Modified Traffic Signal Timing

Weather-specific timing patterns can improve traffic operations

Change green times on signals here

To ease congestion during t-storms here

Photo from Google Earth

Traffic managers implement signal timing changes by downloading preset patterns at the onset of adverse weather & changing back as conditions improve

## 6. Speed Limit Reductions

**Instructor Notes:** During adverse weather conditions, speed limit modifications are sometimes necessary to increase public safety. In areas with a recurring need, Variable Speed Limit (VSL) signs are installed and display the current speed limit for a prescribed area. These signs are most common on large bridges, but may be installed on other road segments in highly urbanized areas. When VSL signs are not installed, then speed limit reductions are applied using other techniques. These other techniques include DMS notifications or public safety officers escorting traffic and physically restricting speeds. [CLICK] The Utah DOT (UDOT) implemented a speed limit reduction system along a short segment of I-215 due to problems with recurring fog events. They utilized VSL signs and DMS to inform the public when speed limit reductions were in effect (because visibilities had dropped below 1/4 mile). A benefit of this system was that seemingly cautious drivers tended to drive faster when they were notified of lower speed limits. This change resulted in a drop in speed variance of almost 25% (Goodwin, 2003). In other words, when slower drivers know what a “safe speed” is, they tend to speed up and traffic moves along at a more uniform rate. [CLICK] A similar system was implemented in the early 1990s in southeastern Tennessee along a fog-prone, three-mile stretch of I-75. Between 1973 and 1994, there were over 200 fog-related crashes with 130 injuries and 18 fatalities there. Between 1994 and 2000, after implementation, there were no fog-related crashes in that area (Goodwin and Pisano, 2003).

**Student Notes:**

AWOC Winter Weather Track

**Examples of Control Strategies:  
Speed Limit Reductions**

Photo from DoT/FRWA

Photo from TN DOT

Most common on bridges & other areas prone to low visibilities

Utah DOT Low Visibility Warning System Messages

Visibility Conditions	Displayed Messages
656-820 ft (200-250 m)	"FOG AHEAD"
492-656 ft (150-200 m)	"DENSE FOG" "ADVISE 50 MPH"
328-492 ft (100-150 m)	"DENSE FOG" "ADVISE 40 MPH"
197-328 ft (60-100 m)	"DENSE FOG" "ADVISE 30 MPH"
<197 ft (60 m)	"DENSE FOG" "ADVISE 20 MPH"

Example from SE Tennessee (I-75):

- '73-'94: 200 crashes
- '94-2000: 0 crashes

## 7. Roadway Access Restrictions

**Instructor Notes:** Another control strategy that is available is roadway access restrictions. This strategy covers several possibilities, including physically restricting access to a roadway (e.g., closing exit ramp gates), limiting access to certain classes of vehicles (e.g., high profile vehicles during strong cross winds, employing weight limits during significant freeze/thaw periods), or closing one or more lanes of traffic to make snow removal quicker, safer, and more effective (e.g., when avalanche conditions have been detected or after one has occurred). [CLICK] Roadway access restriction techniques,

because they cover many situations, rely on a variety of tools and technologies to implement. For instance, exit ramp gates can be connected to automated systems or require personnel to manually close them. Other techniques may require specific technology (i.e., avalanche detection) or require more old fashioned methods (i.e., ticketing offenders in vehicle restriction areas) to implement effectively (Pisano et al., 2002). While many tools exist for transportation departments to install in areas with recurring weather problems, access restrictions may be needed anywhere. [CLICK] In these situations, it's done the old fashion way - state or local police restrict access. This technique is used along I-80 in central Pennsylvania during high-impact, sub-advisory winter weather events. The Pennsylvania state police position themselves with their lights on in areas where road conditions have deteriorated to slow down traffic (DeVoor, 2008).

**Student Notes:**

AWOC Winter Weather Track

**Examples of Control Strategies:  
Roadway Access Restrictions**



Photo from Tennessee DOT

Photo from Nevada DOT

This strategy includes physically restricting access, limiting access to certain classes of vehicles or closing lanes of traffic

---

---

## 8. Contraflow & Shoulder Traffic Operations

**Instructor Notes:** During evacuations of large populations due to adverse weather (e.g., hurricanes and tropical storms), contraflow traffic operations are often implemented. This procedure opens up the opposite lanes of traffic (or shoulder traffic) on bridges, highways, and arterials to allow travelers to exit quickly and ease traffic congestion.

Student Notes:

AWOC Winter Weather Track

**Examples of Control Strategies:  
Contraflow & Shoulder Traffic Operations**

Photo from South Carolina DOT



When large scale evacuations are necessary, contraflow (i.e., opposite direction) and shoulder lanes of traffic can be opened to ease traffic congestion

---

## 9. Advisory & Control Strategies Relationship

**Instructor Notes:** Implementing control management strategies can cause serious headaches for unaware travelers. [CLICK] When significant restrictions are put into place, advisory strategy techniques (e.g., DMS, transportation web sites, HAR, and flashing beacons) will often be used in conjunction with the control strategies to inform the public of the changes. [CLICK] For larger scale events, local and national media are used to inform the public about avoiding impacted areas.

Student Notes:

AWOC Winter Weather Track

**The Relationship between Advisory and Control Management Strategies**

Advisory Strategies                      Control Strategies

TRAVEL ADVISORY  
TUNE TO 750 AM



Photo from Operations Dept., NJTA

ROAD CLOSED  
DUE TO FOG



Photo from Tennessee DOT

- When control strategies are implemented, advisory strategies are used to inform the public of the changes
- For larger scale events, local and national media are also used to help disseminate info on impacted areas

---

## 10. Summary

**Instructor Notes:** Control management strategies involve various techniques used to physically control traffic access, capacity, speed, and driver behavior during events. [CLICK] Several examples of control management strategies were presented, including advanced traffic control systems, adverse weather signal timing patterns, speed limit reductions, and roadway access restrictions. [CLICK] While some of these strategies may require newer technologies to implement, many can and are implemented using more old-fashioned techniques. [CLICK] It's important that control strategies do not

operate in a vacuum. These techniques are often implemented in conjunction with advisory strategies so that the traveling public is aware of any closures or restrictions in place for a specific roadway segment. [CLICK] To proceed to the next section of this lesson, click on the link at the bottom of the slide, or use the navigation in the NWS Learning Center.

**Student Notes:**

AWOC Winter Weather Track

### Summary of "Control Management Strategies" Module

- Control management strategies involve physically controlling the travelling public's access to roadways to keep them safe
- Examples include adverse weather signal timing patterns, speed limit reductions, & roadway restrictions
- Implementation can depend on newer technologies (i.e., ATCS) or on more old-fashioned techniques
- Control strategies are often implemented with advisory strategies so drivers are aware of closures or restrictions in a give area

[Proceed to next module in this lesson](#)