

# 2013 Arterial Management Survey

## AGENCY CHARACTERISTICS

1. **Centerline arterial miles operated by your agency:**
2. **Signalized intersections operated by your agency:**
3. **Indicate the number of staffs performing traffic signal management, operations and maintenance in the following categories:**
  - In-house management and operations:
  - Outsourced management and operations:
  - In-house maintenance:
  - Outsourced maintenance:
4. **What types of training do you provide and/or require for in-house staff? (Check all that apply)**
  - Provide funding and encouragement for personnel to attend training
  - Provide training program
  - Require formal training leading to certification
5. **What types of training do you provide and/or require for out-sourced staff? (Check all that apply)**
  - Provide funding and encouragement for personnel to attend training
  - Provide training program
  - Require formal training leading to certification

## SURVEILLANCE

6. **Total number of arterial centerline miles with real-time traffic data collection technologies (does not include Closed Circuit TV or CCTV):**
  - 6a. Number of these miles where real-time traffic data are collected using roadside infrastructure such as loops, radar detectors, or video imaging detector systems:
  
  - 6b. Number of these miles where real-time traffic data are collected by vehicle probes, using technology such as toll tag readers, cell phones, etc.:
7. **What type of vehicle probe readers are used to obtain traffic information? (Check all that apply)**
  - Toll tag readers
  - Blue tooth readers
  - Cellular phone readers
  - GPS readers
  - License plate recognition
  - Do not collect vehicle probe data
  - Other readers (please specify):

## HARDWARE CHARACTERISTICS OF SIGNALIZED INTERSECTIONS

8. For each signal controller type in your system, please provide the number deployed and the average age (to the nearest year): (Please indicate 0 if a specific type of controller is not deployed)

	Number Deployed	Average Age (years)
NEMA:		
Model 170:		
Model 2070:		
ATC:		

9. How would you characterize the agency's primary motivation for upgrading traffic signal controllers? (Check all that apply)

Lack of vendor or manufacturer support

New Operations/maintenance features are desired that are not available on current controller

Current controller is not compatible with central traffic signal management system

Advanced strategies like adaptive control or transit signal priority are not supported by current controller

A single controller platform is desired for the entire agency

Other (please specify):

10. Indicate: 1) the number signalized intersections where the following detection technologies are deployed and 2) the estimated % time detection technologies are operational (reliably operating as intended):

	Number Signalized Intersections	% Time Operational
Loop detectors:		
Video imaging detector systems: Radar:		
Other (please specify):		
Loop detectors:		
Video imaging detector systems: Radar:		

11. Number of pre-timed signalized intersections:

12. Number of semi-actuated signalized intersections:

13. Number of fully-actuated signalized intersections:

14. Number of signalized intersections equipped with Closed Circuit Television (CCTV) Cameras for the purpose of monitoring traffic flow:

## TRAFFIC SIGNAL CONTROL OPERATION STRATEGIES

**15. Does your agency have a documented plan (e.g., agency memo, Concept of Operations, MOU, agreement) inclusive of objectives and performance measures, to guide the management, operation and maintenance of traffic signals?**

Yes

Which of the following areas are included in the plan? (Check all that apply)

Management and operations

Maintenance

No

**16. Does your agency use adaptive signal control technology (ASCT) as an operational strategy to improve coordinated signal timing?**

No

What does your agency consider the most significant barrier to implementing adaptive control?

(Select one)

Cost to deploy

Cost to operate and maintain

Complexity to operate and maintain

Uncertainty about benefits

Incompatibility with existing system

Other (please specify):

Yes (Provide number of intersections below)

Number of signalized intersections under ASCT:

**17. Does your agency participate in a regional program managed by the State DOT, MPO or other regional authority that actively coordinates traffic signals on arterials of regional significance across jurisdictional boundaries?**

Yes

How often are the plans updated?

No

## TRAFFIC SIGNAL PREEMPTION AND PRIORITY

**18. Number of signalized intersections that allow for signal preemption for emergency vehicles:**

**19. Number of signalized intersections that allow for signal priority for transit vehicles:**

**20. Number of signalized intersections near a highway-rail intersection that utilize traffic signal preemption to flush a vehicle queue spilled back across an active highway-rail grade crossing:**

## PARKING MANAGEMENT CAPABILITIES

**21. Does your agency deploy parking management systems that monitor the availability of parking?**

Yes

Indicate which parking modes are monitored: (Check all that apply)

On-street parking

Parking lots and/or garages

Other (please specify):

No

**22. Does your agency disseminate parking availability information to drivers?**

Yes

No

**23. Does your agency use a parking pricing strategy (e.g., peak period surcharges) to manage congestion?**

Yes

No

## TRANSPORTATION MANAGEMENT CENTER (TMC)

**24. Does your agency operate an Arterial Management Transportation Management Center (TMC)?**

Yes

TMC Name:

TMC Coverage:

No

## MANAGED LANES

**25. Screening question: Operate managed lanes?**

Yes

No

**25. a. Total number of arterial centerline miles featuring managed lanes:**

**25. b. Please provide the estimated number of arterial centerline miles for each type of managed lane strategy:**

Occupancy control (HOV):

Reversible flow:

Lane open/closed (traffic incidents, roadway maintenance, etc.):

Truck only:

Variable speed limit:

Other congestion pricing strategies:

Other managed lane strategy (please specify):

## MODELING AND DECISION SUPPORT

**26. Does your agency use any Analysis, Modeling and Simulation (AMS) tools to optimize/model the arterial system?**

Yes

Please specify:

No

**27. Has your agency deployed a decision support system to assist in operations of the following? (Check all that apply)**

Road weather management

Incident management

Emergency management

Evacuation

Maintenance

No decision support system deployed

Other (please specify):

## AUTOMATED ENFORCEMENT

**28. a. What types of automated enforcement does your agency use? (Check all that apply)**

Speeding

Red-light running (answer part b below)

Do not use automated enforcement

Other (please specify):

**28. b. Number of signalized intersections with automated red-light running enforcement :**

## SAFETY AND ROAD WEATHER MANAGEMENT

**29. Has your agency deployed any of the following safety systems? (Check all that apply)**

Pedestrian warning system

Bicyclist warning system

Over-height warning system

Reference Location Signs

Dynamic Curve Warning System

None of the above

**30. What are your agency's sources of weather and road weather information? (Check all that apply)**

National Weather Service products

FAA (ASOS, AWOS, etc.)

USGS earthquake alerts

Agency field personnel

Agency field sensors (RWIS/ESS, probes, etc.)

National sensor data sources (Clarus/MADIS)

Private providers

Other (please specify):

**31. Does your agency employ safety warning systems related to road weather events?**

Yes

What hazards are covered? (Check all that apply)

High wind

Icy roads

Fog

Dust

Other

No

**32. Has your agency deployed any Environmental Sensor Stations (ESS)?**

Yes

How many?

What data are collected by ESS and in-pavement sensors? (Check all that apply)

Pavement temperature

Pavement surface condition

Pavement precipitation

Temperature

Humidity

Wind speed

Precipitation (rain)

Precipitation (snow)

Other (please specify):

No

**33. Is your agency using or planning to use a Maintenance Decision Support System (MDSS) for winter maintenance? (MDSS includes software systems that provide strategic and tactical weather forecasts, support treatment decision making and provide summary.)**

Yes, agency uses an MDSS statewide

Yes, considering (pilot project, used partially, used in one district)

No, agency needs an MDSS, but does not have a system

No, agency does not need an MDSS

**34. Does your agency adjust traffic signal timing in response to inclement weather or road weather conditions?**

Yes

No

**35. Does your agency deploy variable speed limit systems?**

Yes

What event triggers the deployment? (Check all that apply)

Weather

Traffic volume

Incidents

Other (please specify):

No

## INCIDENT MANAGEMENT/WORK ZONE MANAGEMENT

**36. Number of arterial centerline miles patrolled by service patrol:**

**37. Number of arterial centerline miles covered by the following incident detection/verification methods:**

- Computer algorithms:
- Closed Circuit Television (CCTV):
- Other (please specify):

**38. Does your agency deploy ITS technology at work zones?**

Yes

What ITS technologies does your agency deploy at work zones? (Check all that apply)

- Intrusion alarm
- Dynamic lane merge system
- Queue detection and alert system
- Variable speed limit
- Travel time system
- Route guidance around work zones Portable
- CCTV
- Other (please specify):

No

## TRAVELER INFORMATION

**39. Number of arterial centerline miles covered by Highway Advisory Radio (HAR):**

**40. Total number of permanent Dynamic Message Signs (DMS) deployed on arterials:**

**41. Does your agency use the DMS in the absence of incidents or special events?**

Yes

Please describe:

No

**42. Does your agency have an agreement with a private vendor to push mobile alerts regarding incidents, roadway conditions, etc. to mobile media?**

Yes

No

**43. What methods are used to disseminate traveler information on arterials? (Check all that apply)**

- 511
- Other (non-511) telephone systems
- Email or alert
- Twitter
- Facebook
- App for mobile device such as tablet or smart phone
- Dynamic Message Signs
- Website
- Highway Advisory Radio
- Other (please specify):

**44. Please indicate whether your agency reports any of the following information to the public. (Check all that apply)**

- Roadway or lane blocking incidents and events on arterials
- Work zone location and duration on arterials
- Roadway weather observations on arterials
- Freeway blocked or with other travel restrictions
- None of the above

**45. Do you report arterial travel time data?**

Yes

What arterial travel time data are reported? (Check all that apply)

- Travel time by segment
- Travel time over selected route
- Other (please specify):

No

## SYSTEM PERFORMANCE MANAGEMENT

**46. Does your agency collect operations data to track arterial network system performance?**

Yes

No

**47. Does your agency have clearly stated and documented operational objectives and performance measures for the arterial system?**

Yes

Has your agency established targets for the performance measures?

Yes

No

No

**48. Does your agency use archived operations data to track arterial system performance?**

Yes

What are the archived operations data used for? (Check all that apply)

- Real-time Operations (e.g., used in real-time to adjust system operations)
- Capital planning/analysis
- Operations planning/analysis
- Dissemination to the public
- Planning/analysis of work zone design
- Other (please specify):

No



**49. Which of the following measures are used to report on the performance of the arterial system? (Check all that apply)**

- Travel time
- Travel time reliability
- Vehicles per lane per mile
- Vehicles per hour
- Person throughput per lane per hour
- Person throughput per hour
- Average auto occupancy
- Average queue length
- Performance measures are not used
- Other (please specify):

## MAINTENANCE OF ARTERIAL MANAGEMENT ITS TECHNOLOGY

**50. Does your agency utilize an asset management system to track infrastructure inventory and related maintenance and operations activity?**

- Yes
- No

**51. Does your agency have a preventive maintenance program for ITS devices?**

Yes

How often are your ITS devices inspected and re-calibrated?

- a. Loop detectors
  - Less than once annually
  - Once annually
  - More than once annually
  - Not regularly inspected and recalibrated
  - Not Applicable
- b. Other Types of Detectors (radar, microwave, toll tag readers)
  - Less than once annually
  - Once annually
  - More than once annually
  - Not regularly inspected and recalibrated
  - Not Applicable
- c. CCTV Cameras
  - Less than once annually
  - Once annually
  - More than once annually
  - Not regularly inspected and recalibrated
  - Not Applicable
- d. Other (please specify):
  - Less than once annually
  - Once annually
  - More than once annually

No

**52. How are decisions for maintenance, repairs, and replacement of ITS devices made? (Check all that apply)**

- Reaction to failure in component or device
- Planned program of routine and preventive maintenance
- Results of inspection and monitoring of conditions
- Cost/ benefit analysis
- Estimated service life
- Obsolescence (e.g. device becomes obsolete/out-of-date)
- Other (please specify):

**53. Does your agency collect data on the overall health and maintenance of ITS devices and equipment?**

Yes

What sources of data are used?

- Inspections
- Complaint calls
- Real-time monitoring
- Other (please specify):

For which of the following purposes does your agency use the data on equipment health and maintenance? (Check all that apply)

- To make investment decisions
- To monitor specified performance metrics
- To monitor specified performance trends
- To conduct benefit-cost analysis
- To communicate to decision makers
- To communicate to public
- Other (please specify):

No

**54. Does your agency regularly measure the performance of traffic signals?**

Yes

Please indicate the methods used to gather data: (check all that apply)

- Manual methods are used primarily (citizen complaints)
- Automated methods are used (travel time, cycle failure, queue length, speed)
- Percentage of the total number of signalized intersections that are monitored for operational performance:

No

## DEDICATED SHORT RANGE COMMUNICATIONS (DSRC) STANDARD

**55. Is your agency familiar with Dedicated Short-Range Communications (DSRC) technology?**

Yes

No (go to Next Section)

**56. Does your agency currently use or have plans to use dedicated short range communications (DSRC) in operating any of its ITS infrastructure?**

- Currently use DSRC
- Plan to use DSRC
- No plans to use DSRC (go to Next Section)

57. Is your agency using or does it plan to use any DSRC-enabled technologies to support the deployment of the following?

	Currently Using	Plan to Use	No Plans to Use
Safety applications (e.g. intersection collision avoidance)			
Mobility applications			
Tolling operations			
Commercial Vehicle			
Operations and regulation			

## INTEGRATED CORRIDOR MANAGEMENT

58. Have you identified corridor(s) for the purpose of integrating operations across multiple transportation facilities (including freeways, major arterials, and public transit networks) in order to actively manage travel demand and capacity in the corridor as a whole?

Yes

How many corridors have been identified for integrated transportation operations?

- 1 corridor identified
- 2 corridors identified
- 3 or more corridors identified

No (go to Next Section)

59. The next set of questions all pertain specifically to the corridor you identified above. If you identified more than one corridor, please tell us about the corridor where the greatest level of coordination is taking place. In your responses, please do NOT include coordination efforts that are occurring outside the specific corridor you have identified.

Please name the key facilities that comprise the corridor (please be as specific as possible):

- a. Freeway(s) (e.g., US-75):
- b. Key Arterial(s) (e.g., Greenville Avenue, US-75 Frontage Roads):
- c. Public Transit Services (e.g., DART Red/Orange Light Rail Line, MTS Express Bus):
- d. Other (e.g., freight, rail, bicycle, pedestrian):

60. Approximately how long is the corridor?

- Less than 10 miles
- 11-20 miles
- 21-30 miles
- 31-50 miles
- More than 50 miles

61. For each agency type listed below, please indicate whether you are currently coordinating or plan to coordinate integrated transportation operations in the corridor specified above. If yes, please provide the name of the agencies in the corridor with which your agency is coordinating (referred to as the "coordinating agencies" in this survey). Please do NOT include coordination efforts that are occurring outside the corridor. For each agency type, a-d, select only one response.

	Currently Coordinate in Corridor	Plan to Coordinate in Corridor	No Plans to Coordinate in Corridor	Not Applicable	Agency Names
Freeway agencies:					
Arterial agencies:					
Transit agencies:					
Other agencies (e.g., MPOs, Toll Authorities, Port Operators):					

62. Has your agency signed any formal multi-jurisdictional or multi-agency Agreements, Memorandums of Understanding (MOUs), or other instruments with these coordinating agencies regarding the integrated operations of the corridor?

- Yes, already signed
  - One instrument signed
  - Multiple instruments signed
- Agreements, MOUs, or instruments are being developed (plan to sign)
- No, there is no plan to develop or sign Agreements, MOUs, or other instruments
- Do not know

IF SIGNED OR PLAN TO SIGN: Please describe what is covered by the Agreements, MOUs, or instruments:

63. How are data about conditions in the corridor shared among the coordinating agencies? (Check all that apply)

- Manual data sharing: Corridor stakeholders call, radio, fax or email relevant corridor data to one another
- Automated sharing of real-time video data (video servers/switcher communicate directly to one another in real time to share video images through video protocols)
- Automated sharing of real-time data (computers, database servers communicate directly to one another to transmit data automatically (in real time) via center-to-center protocols)
  - In general is this sharing of real-time data active or passive? (select one)
    - Active (your agency receives alerts; data is pushed to your agency)
    - Passive (your agency must access the data; no alerts are received)
- Information Clearing House/Information Exchange Network (IEN) between corridor networks/agencies (a software system that collects, aggregates, warehouses and distributes traffic flow/transit performance data and incident/construction data for the corridor. All corridor agencies can access the agency/network information)
  - In general is this sharing of data active or passive? (select one)
    - Active (your agency receives alerts; data is pushed to your agency)
    - Passive (your agency must access the data; no alerts are received)
- Other (please specify):

**64. We want to understand if data is sent and/or received among the coordination agencies in the corridor.**

- a. For each type of data below, please indicate if your agency receives this data from the other coordinating agencies in the corridor, collects and sends this data to the other coordinating agencies, collects but does not send this data to the other coordinating agencies, or does not collect this data. For each item, a-i, check all that apply.

	My agency Receives	My agency Collects and Sends	My agency Collects but does not send	My agency does not collect	Not Applicable
a-Freeway incident data					
b-Freeway traffic volumes, speeds, or travel times					
c-Arterial incident data					
d-Arterial traffic volumes, speeds, or travel times					
e-Transit incident data					
f-Transit vehicle location data (AVL)					
g-Transit schedule adherence data					
h-Transit passenger count data					
i-Other data (please describe below):					

- b. For each type of data that is sent or received among coordinating agencies (as indicated in part a above), please indicate with what level of frequency the data is shared. For each item, a-i, select only one response.

	0-5 Minutes	6-15 Minutes	16-59 Minutes	60+ Minutes
a-Freeway incident data				
b-Freeway traffic volumes, speeds, or travel times				
c-Arterial incident data				
d-Arterial traffic volumes, speeds, or travel times				
e-Transit incident data				
f-Transit vehicle location data (AVL)				
g-Transit schedule adherence data				
h-Transit passenger count data				
i-Other data (please described in part a):				

65. For each of the following types of operations strategies please indicate whether your agency is currently coordinating or plans to coordinate operations with other corridor agencies across transportation facilities (i.e., freeway, arterial and transit) in order to achieve shared operations objectives. For each item, a-n, select only one response.

For example, if traffic signal timing is coordinated across facilities, then signal timing on arterials is adjusted based on information about both freeway and arterial conditions.

	Currently Coordinate Across Facilities	Plan to Coordinate Across Facilities	No Plans to Coordinate	Not Applicable
a-Traffic incident management				
b-Freeway ramp metering				
c-Emergency management (e.g., evacuations)				
d-Cross jurisdictional traffic signal coordination				
e-Traffic responsive signal timing/coordination				
f-Transit signal priority				
g-Physical bus priority (e.g. bus-on-shoulder)				
h-Demand-sensitive transit capacity increases (e.g., add cars/routes)				
i-Real-time parking availability information (e.g., at transit stations)				
j-Road weather management				
k-Planned special events				
l-Real-time traveler information delivered pre-trip				
m-Real-time information delivered en-route (e.g., Dynamic Message Signs)				
n-Electronic multimodal payment systems				
o-Other (please specify below):				

66. How would you describe the institutional coordination among the corridor stakeholders? Please select one response from the following scale, which ranges from less formal institutional coordination (1) to more formal institutional coordination (5).

- 1 - (Less Formal) - Ad hoc coordination; no regular meetings; corridor stakeholders address near-term issues only
- 2 - Informal working groups; regular meetings among corridor stakeholders
- 3 - Formally established working groups; assigned responsibilities for Integrated Corridor Management
- 4 - Funded staff person(s) and well-defined responsibilities for Integrated Corridor Management
- 5 - (More Formal) - Legal entity with dedicated resources and a governing board

**67. Have the coordinating agencies in the corridor developed any of the following Integrated Corridor Management (ICM) documents for the corridor? For each item, a-d, select only one response.**

	Document Completed	Currently Developing	Plan to Develop Next 2-3 Years	No Immediate Plans to Develop	Do Not Know
a-ICM Concept of Operations (ConOps)					
b-ICM System Requirements Specifications (SyRS)					
c-ICM Analysis Modeling and Simulation (AMS) Plan					
d-ICM Implementation Plan					

**68. Have the coordinating agencies in the corridor developed a documented set of response plans or strategies, in any level of detail, that are based on shared operational objectives and that are designed to optimize performance in the corridor as a whole (e.g., across transportation facilities/modes) during conditions of both recurring and non-recurring congestion? In your response, please do not include response plans developed for emergency situations, such as evacuations.**

- Response plans or strategies have been developed for day-to-day operations during conditions of both recurring and non-recurring congestion
- Response plans or strategies are currently being developed
- There are plans to develop response plans or strategies
- There are no plans to develop response plans or strategies (skip to last question for additional comments)
- Do not know

**69. Has your agency deployed or does it plan to deploy a Decision Support System (DSS) to assist in the integrated operations of the Corridor?**

*NOTE: A DSS is a subsystem that utilizes measurements of real-time corridor conditions to recommend coordinated response plans to all corridor agencies. The DSS continues to update its recommendation based on corridor measurements showing changing corridor conditions.*

- Yes, deployed
- Plan to deploy
- No (no plans to deploy)
- Do not know

**70. Have the coordinating agencies identified corridor-level/multimodal performance measures (e.g., person throughput, average travel time, average travel speed, etc.) that will be used to measure the effectiveness of the strategies and response plans that are implemented in the corridor?**

- Yes, corridor-level/multimodal performance measures identified
- Agency plans to identify corridor-level/multimodal performance measures
- No plans to identify corridor-level/multimodal performance measures
- Do not know

**71. Additional comments about the integration and coordination of operations in the corridor:**

## ITS FUNDING

### 72. Screening question: Do you have a separate budget for ITS?

a. Please indicate whether you track the budget separately for each of the following categories:

ITS Planning and Systems Engineering

Device Installation

ITS Operations

ITS Maintenance and Inspection

Repair of ITS Technologies

Do not track categories separately (go to next section)

Other (please specify):

b. Please indicate the percentage of budget allocated to each category that is separately tracked:

ITS Planning and Systems Engineering

Device Installation

ITS Operations

ITS Maintenance and Inspection

Repair of ITS Technologies

Other (specified above)

## ITS PURCHASE DECISION-MAKING

73. Please rate the importance of each of the following factors to your agency's decision to purchase ITS technologies: (1 = Not at All Important; 2 = Not Very Important; 3 = Neutral; 4 = Somewhat Important; 5 = Very Important) Please check only one rating box per row.

	Not at All Important	Not Very Important	Neutral	Somewhat Important	Very Important
Cost of initial deployment					
Cost to maintain and repair					
Public/constituent involvement					
Funding/grant availability					
Mobility benefits (e.g., to address congestion)					
Safety benefits					
Environmental benefits					
Integration with other agencies					
Integration with your current technologies					
Already used by other agencies					
Other (please specify below):					



**74. Does your agency have any plans to invest in new ITS technology or to expand current ITS coverage in 2014 through 2016?**

Yes

Check all that apply:

Invest in new ITS

Expand current ITS coverage

No

Please describe new ITS (if applicable):

## BENEFITS OF ARTERIAL MANAGEMENT TECHNOLOGIES

**75. Based on your agency experience, please rate the benefits of the following ITS technologies. Select a rating from 1 (No Benefit) to 5 (Significant Benefit) or No Experience in each row. Please check only one rating box per row.**

	No Benefit (1)	(2)	Moderate Benefit (3)	(4)	Significant Benefit (5)	No Experience
Traffic Sensors						
Vehicle Probes						
Adaptive Traffic Signal Control						
Cameras						
Lane Management						
Traveler Information						
Automated Enforcement						
Archived Data						
Environmental Sensor Stations						

## PLANNING FOR OPERATIONS

**76. Is there a long range ITS plan to guide project/program selection?**

Yes

No

**77. Does your agency routinely utilize systems engineering to identify agency needs and requirements when implementing/procuring ITS?**

Yes

No

**78. Does your agency rely on sample or model procurement documents provided by FHWA (e.g., for ASCT)?**

Yes

No

**79. Is your agency part of the Regional ITS Architecture used to support regional transportation planning?**

Yes

No

**80. Is your agency included in a Regional Concept for Transportation Operations?**

Yes

No

**81. Does your agency provide arterial travel time, speed and condition information in real-time (as these events occur) to the following types of agencies? (Check all that apply)**

Agencies involved in incident management

Freeway Management agencies

Arterial Management agencies

Public Transit agencies

**82. Select all that apply concerning your agency's participation in regional coordination activities:**

No regular interagency meetings

Regular meetings with other agencies to coordinate planning

Regular meetings to coordinate operations

Formal agreement on coordination and data sharing with other agencies

Formal agreement to integrate operations with other agencies

## ADDITIONAL COMMENTS

**83. Please use the space below to provide any additional comments regarding your agency's deployment, operations or maintenance of ITS. (Please be as specific as possible when commenting on particular ITS technologies.)**