Thank you for completing this **Arterial Management** survey, administered on behalf of the U.S. Department of Transportation (DOT), Intelligent Transportation Systems (ITS) Joint Program Office (JPO). Please review the survey questions and consult with colleagues, as needed, to gather the requested information before completing the online survey.

ARTERIAL AGENCY CHARACTERISTICS

1. **What is the total number of arterial centerline miles operated by your agency?**

   If none, please enter '0.'

   Number of miles: _____

2. **What is the total number of signalized intersections operated by your agency?**

   If none, please enter '0.'

   Number of intersections: _____

ARTERIAL REAL TIME TRAFFIC DATA COLLECTION

3. **What is the total number of arterial centerline miles covered by any real-time traffic data collection technologies (see definition below)?** *Do not include Closed Circuit Television cameras used only for visual verification, such as for incident management.*

   If none, please enter '0.'

   Number of miles: _____ [NUMBER OF MILES SHOULD NOT EXCEED Q. 1]

DEFINITION: Real-time data collection technologies include **roadside infrastructure** such as inductive loops, radar detectors, video imaging detection, or magnetometers, as well as **vehicle probe readers** such as toll tag, license plate, Bluetooth, GPS, etc.

4. **What is the total number of arterial centerline miles where real-time traffic data (e.g., volumes and speeds) are collected using roadside infrastructure such as inductive loops, radar/microwave detection, or video imaging detection?**

   If none, please enter '0.'

   Number of miles: _____ [NUMBER OF MILES SHOULD NOT EXCEED Q. 3]

5a. **What is the total number of arterial centerline miles where real-time traffic data are collected by vehicle probe readers, using technology such as Bluetooth readers, toll tag readers, cell phone readers, etc.?**

   If none, please enter '0'.

   Number of miles: _____ [NUMBER OF MILES SHOULD NOT EXCEED Q. 3]

5b. **Which type(s) of vehicle probe readers does your agency use to collect real-time traffic data on arterials?** *Please select all that apply.*

- ❑ Toll tag readers
- ❑ License plate readers
- ❑ Bluetooth readers
- ❑ Cellular/mobile phone readers
- ❑ In-vehicle GPS readers
- ❑ Other readers (please specify): _____
- ❑ None

6. **Which of the following sources of arterial traffic data collected outside your agency (e.g., data gathered through crowdsourcing or other means), does your agency use, if any?** *Please select all that apply.*

- ❑ My agency uses notifications from the public (e.g., emails, texts, phone calls)
- ❑ My agency uses mapping and traffic information applications that are publicly available (e.g., Waze, Google Maps)
- ❑ My agency uses third-party commercial provider data (e.g., Inrix, HERE, Waze)
- ❑ Other (please specify): _____
- ❑ My agency does not use arterial traffic data collected from outside sources
- ❑ Don't know

HARDWARE CHARACTERISTICS OF SIGNALIZED INTERSECTIONS

7. **Does your agency deploy any of the following detection technologies at signalized intersections?** *Please select all that apply.*

   - ❑ Inductive Loop
   - ❑ Video imaging detection
   - ❑ Radar/microwave detection
   - ❑ Magnetometers
   - ❑ Other (please specify): _____
   - ❑ No detection technologies deployed at signalized intersections

8. **Does your agency equip signalized intersections with Closed Circuit Television (CCTV) cameras for the purpose of monitoring traffic flow?** *Please select one.*

   - o Yes
   - o No

TRAFFIC SIGNAL CONTROL OPERATION STRATEGIES

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

   - o Yes
   - o No [SKIP TO Q. 10]

9a. What is the total number of signalized intersections under adaptive signal control technology (ASCT)?

Number of signalized intersections under ASCT: _____

[NUMBER OF SIGNALIZED INTERSECTIONS SHOULD NOT EXCEED Q. 2]

10. **Does your agency participate in a regional program managed by the State Department of Transportation, Metropolitan Planning Organization (MPO), or other regional authority that actively coordinates traffic signals on arterials across jurisdictional boundaries?** *Please select one.*

    - o Yes
    - o No

TRAFFIC SIGNAL PREEMPTION AND PRIORITY

11. **Does your agency deploy any of the following technologies at signalized intersections?** *Please select all that apply.*

    - ❑ Emergency vehicle signal preemption
    - ❑ Transit signal priority
    - ❑ Truck signal priority
    - ❑ Signal preemption near a rail grade crossing
    - ❑ None of the above

PARKING MANAGEMENT CAPABILITIES

12. **Does your agency monitor the availability of parking (including on-street spaces or off-street lots or garages)?** *Please select one.*

    - o Yes, my agency and/or agency contractor(s) monitor
    - o No
    - o Don’t know

13. **Does your agency do any of the following?** *Please select all that apply.*

    - ❑ Disseminate parking availability information to drivers
    - ❑ Use a parking pricing strategy (e.g., peak period surcharges) to manage congestion
    - ❑ Allow drivers to reserve a parking space at a destination facility on demand to ensure availability
    - ❑ None of the above

AUTOMATED ENFORCEMENT

14. Does your agency deploy automated enforcement on arterials (e.g., speed, red light running, school zones, work zones, bus-use only, etc.)? Please select one.

- o Yes
- o No [SKIP TO Q. 17a]

15. What automated enforcement technologies does your agency use on arterials? Please select all that apply.

- ❑ License plate recognition
- ❑ Cameras
- ❑ Toll tag readers
- ❑ Radar
- ❑ Other (please specify): _____

16. What types of automated enforcement are covered on arterials? Please select all that apply.

- ❑ Speeding
- ❑ Red light running
- ❑ School zone
- ❑ Work zone
- ❑ Bus-use only
- ❑ Railroad crossing
- ❑ Other (please specify): _____

SAFETY AND ROAD WEATHER MANAGEMENT

17a. Has your agency deployed any of the following ITS safety systems on arterials? *Please select all that apply.*

- ❑ Pedestrian warning system (e.g., Pedestrian Hybrid beacon, passive pedestrian sensors at signalized intersections) [ANSWER Q. 17b]
- ❑ Bicyclist warning system
- ❑ Over-height warning system (e.g., bridge, tunnel, gantries)
- ❑ Queue warning system
- ❑ Wrong way driving detection system
- ❑ Dynamic curve warning system
- ❑ Dynamic speed limits
- ❑ Other (please specify): _____
- ❑ No ITS safety systems deployed

17b. What is the total number of signalized intersections equipped with ITS pedestrian crossing technology? *If none, please enter '0.'*

Number of signalized intersections: _____

[NUMBER OF SIGNALIZED INTERSECTIONS SHOULD NOT EXCEED Q. 2]

18. Does your agency use any of the following ITS to collect weather and road condition information on arterials? *Please select all that apply.*

- ❑ Mobile or remote sensors
- ❑ Environmental sensor stations
- ❑ Other (Please specify): _____
- ❑ ITS are not used to collect weather and road condition information

19. Does your agency adjust traffic signal timing in response to inclement weather or road weather conditions? *Please select one.*

- o Yes
- o No

INCIDENT MANAGEMENT/WORK ZONE MANAGEMENT

20. What is the total number of arterial centerline miles covered by service patrols? *If none, please enter '0.'*

Number of miles: _____ [NUMBER OF MILES SHOULD NOT EXCEED Q. 1]

21. What is the total number of arterial centerline miles covered by each of the following real-time incident detection/verification methods? *If none for a particular method, please enter '0.'*

	Number of Arterial Centerline Miles
Closed Circuit Television (CCTV)	_____
Computer algorithms to detect incidents	_____
External data (e.g., data provided by crowdsourcing, commercial providers, or citizen-reported)	_____
Other (Please specify): _____	_____

[FOR EACH RESPONSE, NUMBER OF MILES SHOULD NOT EXCEED Q. 1]

22. Does your agency deploy ITS technology at work zones? *Please select one.*

- o Yes
- o No [SKIP TO Q. 24]

23. Which of the following ITS technologies does your agency deploy at work zones (on arterials)? *Please select all that apply.*

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

TRAVELER INFORMATION

24. What is the total number of permanent Dynamic Message Signs (DMS) deployed on arterials? *If none, please enter '0.'*

Total Number of DMS: _____

25. What methods does your agency use to disseminate real-time traveler information about arterials? *Please select all that apply.*

- o 511
- o Social media (e.g., Twitter, Facebook)
- o Email or text/SMS alert
- o Mobile app custom-built for agency
- o Third party mobile app (e.g., Google Maps, Waze)
- o Dynamic Message Signs
- o Website
- o Highway Advisory Radio
- o Other (please specify): _____
- o Agency does not disseminate real-time traveler information about arterials

26. Does your agency provide an open data feed (e.g., to app developers, information service providers, or the public)? *Please select one.*

- o Yes
- o No, but my agency is working on this
- o No current plans for an open data feed

SYSTEM PERFORMANCE MEASUREMENT

27. Which of the following measures does your agency use to report on the performance of the arterial system? *Please select all that apply.*

Mobility

- ❑ Average speed
- ❑ Average delay per vehicle
- ❑ Delay per incident
- ❑ Frequency of severe congestion
- ❑ Travel time
- ❑ Travel time reliability
- ❑ Traffic density (e.g., vehicles per lane per mile)
- ❑ Traffic flow (e.g., vehicles per lane per hour; passenger car per lane per hour)
- ❑ Person throughput (e.g., per lane per hour or per hour)
- ❑ Average auto occupancy
- ❑ Average queue length

Safety

- ❑ Number of crashes
- ❑ Crash severity (e.g., property damage only, fatality)
- ❑ Fatality rate (e.g., per 100 Million VMT)
- ❑ Number of fatalities
- ❑ Serious injury rate (e.g., per 100 Million VMT)
- ❑ Number of serious injuries
- ❑ Number of non-motorized fatalities and serious injuries

Environment

- ❑ Emissions for applicable criteria pollutants
- ❑ Tailpipe CO_2 emissions

Other

- ❑ Other performance measure(s) used by your agency (Please specify): _____
- ❑ **No performance measures used**

INTEGRATED CORRIDOR MANAGEMENT

This next question focuses on Integrated Corridor Management (ICM). ICM is an approach that manages a transportation corridor as a multimodal system (**freeway**, **arterial**, and **public transit**), integrating operations such as traffic incident management, work zone management, traffic signal timing, managed lanes, real-time traveler information, and active traffic management to maximize the capacity of all facilities and modes across the corridor.

For the purposes of this survey, a corridor is defined as: a largely linear geographic band and a bounded travel shed of (mostly) commute and daily trips. The corridor must include **freeway**, **arterial**, and **public transit facilities**, with cross-facility connections.

You can find more information about ICM at https://rosap.ntl.bts.gov/view/dot/38816

28. Has your agency deployed Integrated Corridor Management (ICM) in one or more corridors (i.e., integrating operations across freeway, arterial, and public transit networks) to actively manage travel demand and capacity in the corridor as a whole)? *Please select one*.

- o Yes, my agency has deployed ICM
- o No, but my agency plans to deploy ICM
- o No, my agency has no plans to deploy ICM

AGENCY COORDINATION

29. Does your agency have a Transportation Systems Management and Operations (TSMO) Plan? *Please select one.*

- o Yes
- o No

30. Does your agency receive the following incident information in real-time from any public safety agency? *Please select one response for each item.*

	Yes	*No*
Incident clearance	*o*	*o*
Incident severity and type	*o*	*o*

31. Does your agency <u>provide</u> real-time arterial traffic information (e.g., travel time, speed, and condition) to the following types of agencies? *Please select one response for each agency type.*

	Incident Information	
	Yes	*No*
Agencies involved in incident management	*o*	*o*
Freeway management agencies	*o*	*o*
Arterial management agencies	*o*	*o*
Public transit agencies	*o*	*o*

TELECOMMUNICATIONS

32. What type of telecommunications does your agency use to communicate between any ITS devices, and/or between ITS roadside devices and a central processing location? *Please select all that apply.*

Wired:

- ❑ Coaxial
- ❑ Fiber optic cable
- ❑ Twisted copper pair/Twisted wire pair
- ❑ Digital subscriber line (DSL)
- ❑ Data cable over modem

Wireless:

- ❑ 5G New Radio and Small cell infrastructure
- ❑ Cellular (LTE-4G)
- ❑ Cellular (GPRS – 2G or 3G)
- ❑ LTE-Cellular V2X (LTE-CV2X)
- ❑ Wi-Fi
- ❑ Dedicated short range communications (DSRC)
- ❑ Mobile or Fixed service satellite (FSS)
- ❑ Ultra wideband (UWB)
- ❑ Microwave
- ❑ Other telecommunications (wired and/or wireless) (please specify): _____

CYBERSECURITY

33. Does your agency have a documented cybersecurity policy specific to ITS equipment? *Please select one.*

- o Yes, my agency has a policy
- o No, but my agency is developing a policy
- o No, my agency does not have/is not developing a policy
- o Don't know

34. Has your agency had any cybersecurity events (e.g., ransomware, data breach, etc.) affecting IT systems in the last three years? *Please select one.*

- o Yes
- o No
- o Don't know

35. Has your agency had any cybersecurity events (e.g., ransomware, data breach, tampering of field devices, etc.) affecting transportation operations in the last three years? *Please select one.*

- o Yes
- o No
- o Don't know

[ASK Q. 36 IF: (Q. 33=HAS OR IS DEVELOPING POLICY) AND (Q. 34 AND/OR Q. 31=YES)]

36. Has your agency's policy on cybersecurity changed since the cybersecurity event(s) took place? *Please select all that apply.*

- ❑ Yes, policy was developed or is being developed as a result of the event(s)
- ❑ Yes, policy has been updated as a result of the event(s)
- ❑ No, event(s) did not have an impact on policy
- ❑ Don't know

MAINTENANCE OF ARTERIAL ITS TECHNOLOGY

37. Does your agency utilize an asset management system to track ITS inventory and/or related maintenance and operations activity? *Please select one.*

- o Yes, system tracks only ITS inventory
- o Yes, system tracks only ITS maintenance and operations activity
- o Yes, system tracks both
- o No, my agency does not have an ITS asset management system

38. Who installs, inspects, maintains, and repairs your agency's ITS equipment in the field? *Please select all that apply.*

- ❑ Agency staff [ANSWER Q. 38a]
- ❑ Contractor(s) [ANSWER Q. 38b]
- ❑ Other (please specify): _____

38a. Which job titles best describe the agency staff that perform this work (i.e., install, inspect, maintain, and repair your agency's ITS equipment in the field)? *Please select all that apply.*

- ❑ Engineer
- ❑ Electrician
- ❑ IT Specialist
- ❑ Software Engineer
- ❑ Traffic Signals Technician
- ❑ GIS Specialist
- ❑ Field Technician
- ❑ Planner
- ❑ Other (please specify):_____
- ❑ Don't know

38b. Approximately what percentage of all ITS field equipment work (i.e., installation, inspection, maintenance, and repair) is contracted out? *Please select one.*

- o 0% to 25%
- o 26% to 50%
- o 51% to 75%
- o 76% to 100%
- o Don't know

FUTURE DEPLOYMENT PLANNING

39. Does your agency plan to <u>expand or upgrade current ITS</u> during the next three years (2021 through 2023)? *Please select one.*

- o Yes
- o No
- o Don't know

40. Does your agency plan to <u>invest in new or emerging ITS</u> during the next three years (2021 through 2023)? *Please select one.*

- o Yes
- o No [SKIP TO Q. 41]
- o Don't know [SKIP TO Q. 41]

40a. Please describe new or emerging ITS technologies:

ADDITIONAL COMMENTS

41. 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.

42a. Can we contact you if we have any follow-up questions about your agency's experience deploying ITS? *Please select one.*

- o Yes
- o No [SKIP TO Q. 43]

Thank you. How can we best reach you if we have follow-up questions about your agency's experience deploying ITS?

42b. Your preferred phone number. If this is not your preferred email, please type in your preferred email address:

42c. Your preferred email address. If this is not your preferred email, please type in your preferred email address:

43. Please confirm if you are ready to submit your responses. *Please select one.*

- o Yes, I have completed the survey and I would like to submit my final responses (Note: if you click this button, you will not be able to return to the survey).
- o No, I am still working on the survey and will complete it later.

Thank you for your time and effort in completing this survey! The ITS JPO and the U.S. DOT Volpe Center greatly appreciate your participation.

If you have questions about the survey, please contact
Margaret Petrella at 2020_DTS@dot.gov or 617-494-3582).