

Thank you for completing the **Freeway 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.

FREEWAY AGENCY CHARACTERISTICS

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

Number of miles: _____

FREEWAY REAL-TIME TRAFFIC DATA COLLECTION

2. What is the total number of freeway 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.

3a. What is the total number of freeway 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. 2]**

3b. Which of the following roadside infrastructure technologies does your agency deploy to collect real-time traffic data on freeways? Please select all that apply.

- Inductive Loop
- Radar/microwave detection
- Video imaging detection
- Magnetometers
- Other (please specify): _____
- None

4a. What is the total number of freeway 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. 2]**

4b. Which type(s) of vehicle probe readers does your agency use to collect real-time traffic data on freeways? 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

5. Which of the following sources of freeway 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 freeway traffic data collected from outside sources
- Don't know

RAMP CONTROL

6. What is the total number of freeway entrance ramps operated by your agency? *If none, please enter '0.'*

Number of ramps: _____ [IF Q6 =0 SKIP TO Q. 8]

7a. Does your agency have freeway entrance ramp metering? *Please select one.*

- Yes
- No [SKIP TO Q. 8]

7b. What is the total number of freeway entrance ramps equipped with ramp metering? *If none, please enter '0.'*

Number of ramps: _____ [NUMBER OF RAMPS SHOULD NOT EXCEED Q. 6]

MANAGED LANES

8. Does your agency and/or another entity (e.g., public/private partnership) operate managed lanes (see definition below) on freeways? Please select one.

- Yes, my agency operates managed lanes
- Yes, other entity (e.g., public/private partnership) operates managed lanes
- Yes, both my agency and another entity operate managed lanes
- No, my agency does not operate managed lanes **[SKIP TO Q. 10]**

DEFINITION: Managed lane concept is typically a "freeway-within-a-freeway" where a set of lanes within the freeway cross section is separated from the general-purpose lanes. The operation of and demand on the facility is managed using a combination of tools and techniques (e.g., pricing, vehicle eligibility, and access control) in order to continuously achieve an optimal condition, such as free-flow speeds.

9. What is the estimated number of freeway centerline miles covered by each of the following types of managed lane strategies? If none for a strategy, please enter '0' for that response.

- | | |
|---|-------|
| High Occupancy Vehicle (HOV) | _____ |
| Reversible flow | _____ |
| Lane use control (open/closed/direction arrow or chevron) | _____ |
| Truck only | _____ |
| Transit only | _____ |
| High Occupancy Toll (HOT) | _____ |
| Variable speed limits | _____ |
| Hard shoulder running | _____ |
| Other congestion pricing strategy | _____ |
| Other managed lane strategy (Please specify): | _____ |

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

AUTOMATED ENFORCEMENT

10. Does your agency deploy automated enforcement on freeways? *Please select one.*

- Yes
- No **[SKIP TO Q. 12]**

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

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

SAFETY AND ROAD WEATHER MANAGEMENT

12. Has your agency deployed any of the following ITS safety systems? *Please select all that apply.*

- Over-height warning system (e.g., bridge, tunnel, gantries)
- Lane use control on general purpose lanes
- Automated and/or manual freeway ramp gates
- Reference location signs
- Dynamic curve warning system
- Downhill truck speed warning
- Dynamic speed limits
- Queue warning system
- Wrong way driving detection system
- Wireless truck roadside inspection
- Other (Please specify): _____
- No ITS safety systems have been deployed

13. Does your agency use any of the following ITS to collect weather and road condition information on freeways? 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

14. Is your agency using or planning to use a Maintenance Decision Support System (MDSS) for winter maintenance (see examples below)? Please select one.

- Yes, my agency uses an MDSS
- Yes, my agency is considering an MDSS
- No, my agency does not have an MDSS, but needs one
- No, my agency does not need an MDSS

Examples of MDSS include software systems that provide strategic and tactical weather forecasts, support treatment decision-making, and provide summaries, etc.

INCIDENT MANAGEMENT/WORK ZONE MANAGEMENT

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

Freeway centerline miles: _____ **[NUMBER OF MILES SHOULD NOT EXCEED Q. 1]**

16. What is the total number of freeway centerline miles covered by each of the following incident detection/verification methods? If none for a particular method, please enter '0' for that response.

	Number of Freeway centerline miles
Closed Circuit Television (CCTV)	_____
Call boxes	_____
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]

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

- Yes
- No **[SKIP TO Q. 19]**

18. Which of the following ITS technologies does your agency deploy at work zones (on freeways)? Please select 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 traffic monitoring devices
- Portable CCTV
- Temporary ramp metering
- Other (please specify): _____

TRAVELER INFORMATION

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

Number of permanent DMS _____

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

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

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

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

STATE PERFORMANCE MEASUREMENT

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

Mobility

- Average speed
- Average delay per vehicle
- Delay per incident
- Frequency of severe congestion
- Volume on HOV facilities
- Average speed on HOV facilities
- Truck volume
- Travel time
- Travel time reliability
- Traffic density (e.g., vehicles per lane per mile)
- Traffic flow (e.g., vehicles per lane per hour, passenger cars per lane per hour)
- Person throughput (e.g., per lane per hour or per hour)

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 CO₂ emissions

Other

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

INTEGRATED CORRIDOR MANAGEMENT

This 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>

23. 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.

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

AGENCY COORDINATION

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

- Yes
- No

25. 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	<input type="radio"/>	<input type="radio"/>
Incident severity and type	<input type="radio"/>	<input type="radio"/>

26. Does your agency provide real-time incident information (e.g., type, severity) to the following types of agencies? Please select one response for each agency type.

	Incident Information	
	Yes	No
Freeway management agencies	<input type="radio"/>	<input type="radio"/>
Arterial management agencies	<input type="radio"/>	<input type="radio"/>
Public transit agencies	<input type="radio"/>	<input type="radio"/>
Law enforcement public safety agencies	<input type="radio"/>	<input type="radio"/>
Fire rescue public safety agencies	<input type="radio"/>	<input type="radio"/>
Other agencies	<input type="radio"/>	<input type="radio"/>

27. Does your agency provide real-time freeway traffic information (e.g., travel times, speed and condition) to the following types of agencies? Please select one response for each agency type.

	Freeway traffic information	
	Yes	No
Freeway management agencies	<input type="radio"/>	<input type="radio"/>
Arterial management agencies	<input type="radio"/>	<input type="radio"/>
Public transit agencies	<input type="radio"/>	<input type="radio"/>
Law enforcement public safety agencies	<input type="radio"/>	<input type="radio"/>
Fire rescue public safety agencies	<input type="radio"/>	<input type="radio"/>
Other agencies	<input type="radio"/>	<input type="radio"/>

TELECOMMUNICATIONS

28. What type(s) 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

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

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

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

- Yes
- No
- Don't know

31. 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.

- Yes
- No
- Don't know

[ASK Q. 32 IF: (Q.29=HAS OR IS DEVELOPING POLICY) AND (Q. 30 AND/OR Q. 31=YES)]

32. Has your agency's policy on cybersecurity (specific to ITS equipment) 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 FREEWAY ITS DEVICES

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

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

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

- Agency staff [ANSWER Q. 35a]
- Contractor(s) [ANSWER Q. 35b]
- Other (please specify) _____

35a. 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)? Select all that apply.

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

35b. Approximately what percentage of all ITS field equipment work (i.e., installation, inspection, maintenance, and repair) is contracted out? Please select one.

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

FUTURE DEPLOYMENT PLANNING

36. Does your agency plan to expand or upgrade current ITS during the next three years (2021 through 2023)? Please select one.

- Yes
- No
- Don't know

37. Does your agency plan to invest in new or emerging ITS during the next three years (2021 through 2023)? Please select one.

- Yes
- No [SKIP TO Q. 38]
- Don't know [SKIP TO Q. 38]

37a. Please describe new or emerging ITS technologies:

ADDITIONAL COMMENTS

38. 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.

39a. Can we contact you if we have any follow-up questions about your agency's experience deploying ITS? Please select one.

- Yes
- No [SKIP TO Q. 40]

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

39b. Your preferred phone number. If this is not your preferred phone number, please type in your preferred phone number:

39c. Your preferred email address. If this is not your preferred email, please type in your preferred email address:

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

- 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).
- 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).