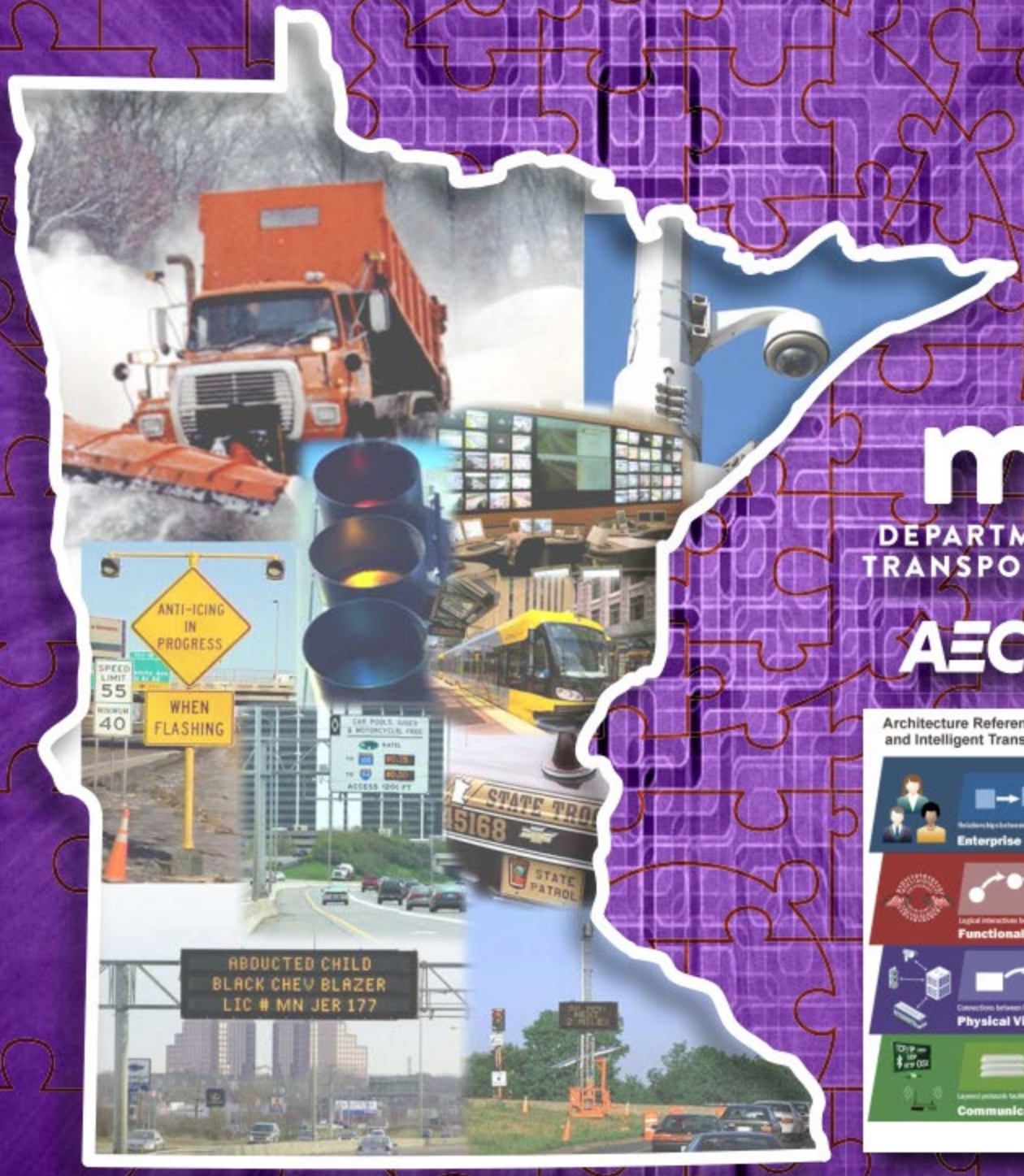
Minnesota Statewide Regional ITS Architecture

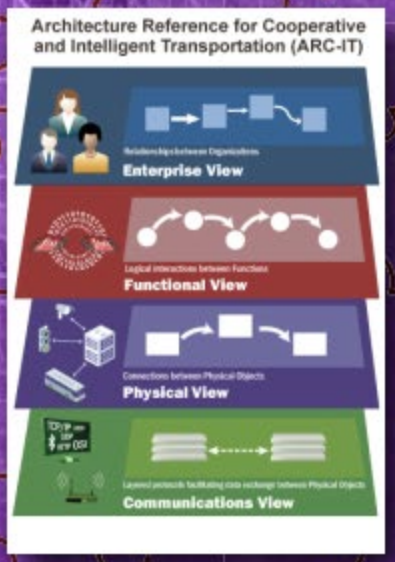
Version 2018

Volume 13:
RAD-IT Outputs of the Regional ITS Architecture



DEPARTMENT OF TRANSPORTATION

AECOM



Minnesota Statewide Regional ITS Architecture Version 2018

Volume 13: RAD-IT Outputs of the Regional ITS Architecture

December 2018

Table of Contents

1 Introduction

The Minnesota Statewide Regional Intelligent Transportation Systems (ITS) Architecture Version 2018 is an update of the previous version that was developed in 2014. It conforms with the National ITS Architecture and the Federal Highway Administration (FHWA) Final Rule 940 and Federal Transit Administration (FTA) Final Policy on ITS Architecture and Standards. The Final Rule and the Final Policy ensure that ITS projects carried out using funds from the Highway Trust Fund including the Mass Transit Account conform to the National ITS Architecture and applicable ITS standards.

The Minnesota Statewide Regional ITS Architecture represents a shared vision of how each agency's systems work together by sharing information and resources to enhance transportation safety, efficiency, capacity, mobility and security. The information exchange among the many transportation stakeholders helps illustrate various integration options, gain consensus on cost-effective ITS technologies and systems to be considered prior to investing in design, development and deployment of ITS.

The Regional ITS Architecture is a living document and will evolve as needs, technology, stakeholders and funding change. The National ITS Architecture is a resource to the Minnesota Statewide Regional Architecture providing framework for planning, defining and integrating ITS.

The Minnesota Statewide Regional ITS Architecture is organized into to a total of fifteen (15) volumes as summarized below:

- **Overview Volume** provides a summary overview of the Minnesota Statewide Regional ITS Architecture. This volume identifies the purpose/need, a general description of the region, development objectives, and performance measures for the Minnesota Statewide Regional ITS Architecture.

- **Implementation Volume – ITS Initiatives and Project Concepts for Implementation** describes processes for developing an ITS program and projects, identifies a list of future ITS projects, and develops concept and details for each project. The project detail includes a project description, dependencies, time frame, project champion and any agency agreements required. The Implementation Volume serves as long-range guidance to help affected agencies and stakeholders systematically and cost-effectively implement ITS projects for the next 15 to 20 years in Minnesota based on funding availability. The Implementation Volume also identifies an approach for mainstreaming ITS into the Minnesota Transportation Investment Process, which is the SAFETEA-LU required transportation planning and project development process and recommends the sequence and strategy for future project implementation.

- **Volumes 1 through 12 – Service Package Areas** provide detailed documentation of the following ARC-IT Service Package Areas:

- Volume 1 – Data Management (DM)
- Volume 2 – Traveler Information (TI)
- Volume 3 – Traffic Management (TM)
- Volume 4 – Public Transportation (PT)
- Volume 5 – Commercial Vehicle Operations (CVO)
- Volume 6 – Public Safety (PS)
- Volume 7 – Maintenance and Construction (MC)
- Volume 8 – Vehicle Safety (VS)
- Volume 9 – Parking Management (PM)
- Volume 10 – Weather (WX)
- Volume 11 – Support (SU)
- Volume 12 – Sustainable Travel (ST)

- **Volumes 13 – RAD-IT Outputs of the Regional ITS Architecture:** Volume 13 consists of a RAD-IT generated report for the Minnesota Statewide Regional ITS Architecture.

Development of Volume 13 entailed the entry of all existing and planned ITS elements identified in Appendix A for Volumes 1 through 12 into RAD-IT Software Version 8.2. This information included the ITS element names, descriptions, appropriate stakeholders, existing/planned status, and relevant service packages in which the ITS elements can be categorized. Additional inputs into RAD-IT not included in Volumes 1 through 12 consist of Operational Concepts, in which all ITS stakeholders are assigned roles and responsibilities for operating and maintaining ITS elements.

Given the ITS elements in Appendix A of Volumes 1 through 12, RAD-IT identifies all potential flows of communication between ITS elements. These flows are based on the categorization of ITS elements into the Service Packages identified in Appendix A and the assignment of ITS elements as physical objects (i.e. subsystems or terminators).

The reports generated by RAD-IT are designed to meet FHWA Rule 940 which requires agencies to develop a regional ITS architecture based on the Architecture Reference for Cooperative Intelligent Transportation (ARC-IT) Version 8.2 that reflects the local needs, issues, and objectives for ITS implementation and is consistent with the transportation planning process for statewide, metropolitan and local planning practice. ITS projects receiving federal-aid funding are required to have developed a regional ITS architecture for the projects, systems integration, and future implementation.

This section should include background on the architecture and the effort used to develop and maintain it. It is also a good idea to include a table that identifies how the content in the document complies with the FHWA Rule/FTA Policy. This is the only section in the document that does not include any automated content.

2 Architecture Scope

The Minnesota Statewide Regional ITS Architecture is a roadmap for transportation systems integration. The architecture was developed through a cooperative effort by Minnesota transportation agencies, covering all modes and all roads in the region. It represents a shared vision of how each agency's systems will work together in the future, sharing information and resources to provide a safer, more efficient, and more effective transportation system for travelers in Minnesota.

The architecture provides an overarching framework that spans all of Minnesota's transportation organizations and individual transportation projects. Using the architecture, each transportation project can be viewed as an element of the overall transportation system, providing visibility into the relationship between individual transportation projects and ways to cost-effectively build an integrated transportation system over time. This chapter establishes the scope of the architecture in terms of its geographic breadth, the scope of services that are covered, and the time horizon that is addressed.

Description

The Minnesota Statewide Regional ITS Architecture represents a shared vision of how each agency's system works together by sharing information and resources to enhance transportation safety, efficiency, capacity, mobility, and security. The information exchange among the many transportation stakeholders helps illustrate various integration options, gain consensus on cost-effective ITS technologies and systems to be considered prior to investing in the design, development and deployment of ITS.

Timeframe

2019 - 2034

Geographic Scope

Entire State of Minnesota

Service Scope

Data Management, Public Transportation, Traveler Information, Traffic Management, Vehicle Safety, Commercial Vehicle Operations, Emergency Management, Maintenance and Construction Management, Services Supporting Sustainable Travel

3 Relationship to Planning

The Minnesota Statewide Regional ITS Architecture is an integral part of planning for the operations and maintenance strategies that are addressed by the regional transportation planning process. The architecture provides a framework that connects operations and maintenance objectives and strategies with the integrated transportation system improvements that are implemented as a progressive series of ITS projects. The architecture also is used to define the data needs associated with performance monitoring that supports an informed planning process. This chapter identifies the planning objectives, strategies, and associated performance measures from the regional plan. The planning objectives, strategies, and associated performance measures from the regional plan are detailed in the **Overview Volume** as well as summarized in Table 1 on the next page. The high-level Minnesota ITS Development Objectives are categorized in eight areas as shown in Table 1. These planning elements are connected with ITS services in the Minnesota Statewide Regional ITS Architecture.

Table 1 – Relationship to Planning

Number	Type	Name	Supports	Performance Measure
A	**Goal**	**Improve the Safety of the State Transportation System**		
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes at intersections due to inappropriate crossing
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes at railroad crossings
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes at signalized intersections
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes at un-signalized intersections
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes due to commercial vehicle safety violations
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes involving large trucks and buses
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes involving pedestrians and non-motorized vehicles
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes involving younger drivers (under 21)
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes related to driver inattention and distraction
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes related to driving while intoxicated
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes related to excessive speeding
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes related to inappropriate lane departure, crossing, or merging
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes related to red-light running
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes related to road weather conditions
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes related to roadway/geometric restrictions
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of crashes related to unexpected congestion
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of secondary crashes

Number	Type	Name	Supports	Performance Measure
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of vehicle crashes in Minnesota
A-1	Objective	Reduce crash frequency	Improve the Safety of the State Transportation System	Number of vehicle crashes per VMT
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities at intersections due to inappropriate crossing
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities at railroad crossings
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities at signalized intersections
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities at un-signalized intersections
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities due to commercial vehicle safety violations
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities involving large trucks and buses
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities involving pedestrians and non-motorized vehicles
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities involving unbelted vehicle occupant
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities involving younger drivers (under 21)
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities related to driver inattention and distraction
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities related to driving while intoxicated
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities related to excessive speeding
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities related to inappropriate lane departure, crossing, or merging
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities related to red-light running
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities related to road weather conditions
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities related to roadway/geometric restrictions
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of fatalities related to unexpected congestion

Number	Type	Name	Supports	Performance Measure
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of hazardous materials transportation incidents involving fatalities
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of hazardous materials transportation incidents involving injuries
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries at intersections due to inappropriate crossing
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries at railroad crossings
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries at signalized intersections
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries at un-signalized intersections
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries due to commercial vehicle safety violations
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries involving large trucks and buses
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries involving pedestrians and non-motorized vehicles
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries involving unbelted vehicle occupant
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries involving younger drivers (under 21)
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries related to driver inattention and distraction
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries related to driving while intoxicated
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries related to excessive speeding
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries related to inappropriate lane departure, crossing, or merging
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries related to red-light running
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries related to road weather conditions
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries related to roadway/geometric restrictions
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of injuries related to unexpected congestion

Number	Type	Name	Supports	Performance Measure
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of roadway fatalities in Minnesota
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of roadway fatalities per VMT
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of roadway injuries in Minnesota
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of roadway injuries per VMT
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of speed violations
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of traffic law violations
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of transit fatalities
A-2	Objective	Reduce fatalities and life changing injuries	Improve the Safety of the State Transportation System	Number of transit injuries
A-3	Objective	Reduce crashes in work zones	Improve the Safety of the State Transportation System	Number of crashes in work zones
A-3	Objective	Reduce crashes in work zones	Improve the Safety of the State Transportation System	Number of fatalities in work zones
A-3	Objective	Reduce crashes in work zones	Improve the Safety of the State Transportation System	Number of motorist injuries in work zones
A-3	Objective	Reduce crashes in work zones	Improve the Safety of the State Transportation System	Number of workers injured by vehicles in work zones
B	**Goal**	**Increase Operational Efficiency and Reliability of the Transportation System**		
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	95th or 90th percentile travel times for selected routes
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Average commute trip travel time (minutes)
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Average travel time during peak periods (minutes)
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Hours of delay per capita

Number	Type	Name	Supports	Performance Measure
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Hours of delay per driver
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Hours per day at LOS F or V/C > 1.0 (or other threshold)
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Mean incident clearance time
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Mean incident clearance time for Twin Cities urban freeway incidents
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Mean incident notification time
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Mean incident response time
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Percent of intersections operating at LOS F or V/C > 1.0 and population growth rate
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Percent of lane-miles operating at LOS F or V/C > 1.0
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Percent of Twin Cities freeway miles congested (below 45 mph) in weekday peak periods - 5 AM to 10 AM and 2 PM to 7 PM
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Rate of increase in facility miles operating at LOS F or V/C > 1.0
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Travel time index
B-1	Objective	Reduce overall delay associated with congestion	Increase Operational Efficiency and Reliability of the Transportation System	Variance of travel time on specified routes during peak and off-peak periods
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	AM/PM peak hour person throughput on specified routes

Number	Type	Name	Supports	Performance Measure
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	AM/PM peak hour vehicle throughput on specified routes
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Annual commuter rail ridership
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Annual express bus ridership
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Annual light rail ridership
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Annual transit ridership across the state
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Availability of carpool/vanpool matching and ridesharing information services
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Commuter vehicle miles traveled (VMT) per regional employee
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Miles of bus-only shoulder lanes available for transit use in the metro area
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Number of agencies create and implement transportation access guides
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Number of employers with access to regional carpool/vanpool database
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Number of trips in region
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	On-time performance of transit
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Percent of fares collected using automated fare collection

Number	Type	Name	Supports	Performance Measure
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Percent of major employers with active TDM programs
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Percent of total transfers performed with automated fare cards
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Share of household trips by each mode of travel
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Single occupancy vehicle commute trips per capita
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Transit Availability (hours (span) of service and frequency)
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Transit Cost effectiveness (cost/service hour, cost/passenger trip, and revenue recovery percentage)
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Transit Cost efficiency (cost/mile and miles/vehicle)
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Transit passengers per capita rate
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Transit rider per hour of transit service by transit system
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Transit Service effectiveness (passengers/service hour and passengers/mile)
B-2	Objective	Increase average passenger occupancy and facility throughput	Increase Operational Efficiency and Reliability of the Transportation System	Vehicle throughput on specified routes
B-3	Objective	Reduce delays due to work zones	Increase Operational Efficiency and Reliability of the Transportation System	Average duration in minutes of queue length greater than a pre-defined threshold (e.g. 0.5 mile)
B-3	Objective	Reduce delays due to work zones	Increase Operational Efficiency and Reliability of the Transportation System	Length of average and maximum queues in work zones

Number	Type	Name	Supports	Performance Measure
B-3	Objective	Reduce delays due to work zones	Increase Operational Efficiency and Reliability of the Transportation System	Percentage of vehicles experiencing queuing in work zones
B-3	Objective	Reduce delays due to work zones	Increase Operational Efficiency and Reliability of the Transportation System	Variance of travel time in work zones
B-3	Objective	Reduce delays due to work zones	Increase Operational Efficiency and Reliability of the Transportation System	Vehicle hours of delay associated with work zones
B-4	Objective	Reduce traffic delays during evacuation from homeland security and Hazmat incidents	Increase Operational Efficiency and Reliability of the Transportation System	Total vehicle hours of delay per capita during evacuation from homeland security and Hazmat incidents
C	**Goal**	**Enhance Mobility, Convenience, and Comfort for Transportation System Users**		
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	95th or 90th percentile travel times for selected routes
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Average commute trip travel time (minutes)
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Average travel time during peak periods (minutes)
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Hours of delay per capita
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Hours of delay per driver
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Hours per day at LOS F or V/C > 1.0 (or other threshold)
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Mean incident clearance time
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Mean incident clearance time for Twin Cities urban freeway incidents

Number	Type	Name	Supports	Performance Measure
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Mean incident notification time
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Mean incident response time
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of agencies in the region with interoperable voice communications
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of joint training exercises conducted among operators and emergency responders
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of participating agencies in a regional coordinated incident response team
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of regional roadway miles covered by ITS-related assets in use for incident detection
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of TIM corridors in the region covered by regional coordinated incident response teams
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of traffic signals equipped with emergency vehicle preemption
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of intersections operating at LOS F or V/C > 1.0 and population growth rate
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of lane-miles operating at LOS F or V/C > 1.0
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of staff having completed NIMS training and percent of transportation responders familiar with ICS
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of transportation operating agencies that have a plan in place for a representative to be at the local (city or county) EOC or State EOC to coordinate strategic activities and response planning for transportation during emergencies
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of Twin Cities freeway miles congested (below 45 mph) in weekday peak periods - 5 AM to 10 AM and 2 PM to 7 PM

Number	Type	Name	Supports	Performance Measure
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percentage of incident management agencies in region participating in multi-modal information exchange network
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Rate of increase in facility miles operating at LOS F or V/C > 1.0
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Travel time index
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Variance of travel time on specified routes during peak and off-peak periods
C-1	Objective	Reduce congestion and incident-related delay for travelers	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Vehicle hours of delay associated with traffic incidents in peak and off-peak periods
C-2	Objective	Improve travel time reliability	Enhance Mobility, Convenience, and Comfort for Transportation System Users	95th or 90th percentile travel times for selected routes
C-2	Objective	Improve travel time reliability	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Buffer index or buffer time
C-2	Objective	Improve travel time reliability	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Miles of bus-only shoulder lanes available for transit use in the metro area
C-2	Objective	Improve travel time reliability	Enhance Mobility, Convenience, and Comfort for Transportation System Users	On-time performance of transit
C-2	Objective	Improve travel time reliability	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of fares collected using automated fare collection
C-2	Objective	Improve travel time reliability	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of total transfers performed with automated fare cards
C-2	Objective	Improve travel time reliability	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Planning time index
C-2	Objective	Improve travel time reliability	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Travel time index

Number	Type	Name	Supports	Performance Measure
C-2	Objective	Improve travel time reliability	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Variance of travel time on specified routes during peak and off-peak periods
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Annual transit ridership across the state
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Commuter vehicle miles traveled (VMT) per regional employee
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of 511 calls per year
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of agencies create and implement transportation access guides
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of riders on transit units per trip
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of specifically tailored traveler information messages provided
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of transit passenger miles traveled per capita
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of transit routes with information being provided by ATIS
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of users of notifications for traveler information (e.g., e-mail, text message) per year
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of visitors to traveler information website per year
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of all peak-period trips made by transit
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of all trips made by transit

Number	Type	Name	Supports	Performance Measure
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of all trips made using alternative modes in transit station communities
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of major employers with active TDM programs
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of the transportation system in which travel conditions can be detected remotely via video monitoring cameras, speed detectors, etc.
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of transportation facilities whose owners share their traveler information with other agencies in the region
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Ridership reported by rural area transit providers
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Ridership reported by urbanized area transit providers
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Share of employees walking, biking, telecommuting, carpooling/vanpooling, riding transit, driving alone
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Share of trips by each mode of travel
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Single occupancy vehicle commute trips per capita
C-3	Objective	Increase choice of travel modes	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Transit to auto travel time differential for a given period on a given portion of the system
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	95th or 90th percentile travel times for selected routes
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Average commute trip travel time (minutes)
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Average travel time during peak periods (minutes)

Number	Type	Name	Supports	Performance Measure
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Hours of delay per capita
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Hours of delay per driver
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Hours per day at LOS F or V/C > 1.0 (or other threshold)
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Mean incident notification time
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Mean incident response time
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of 511 calls per year
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of parking facilities with advanced parking information to customers
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of parking facilities with automated occupancy counting and space management
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of parking facilities with coordinated availability information
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of parking facilities with coordinated electronic payment systems
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of specifically tailored traveler information messages provided
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of speed violations
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of traffic law violations

Number	Type	Name	Supports	Performance Measure
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of transit routes with information being provided by ATIS
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of users aware of park-and-ride lots in their region
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of users of notifications for traveler information (e.g., e-mail, text message) per year
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number of visitors to traveler information website per year
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Number parking facilities with electronic fee collection
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of intersections operating at LOS F or V/C > 1.0 and population growth rate
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of lane-miles operating at LOS F or V/C > 1.0
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Percent of Twin Cities freeway miles congested (below 45 mph) in weekday peak periods - 5 AM to 10 AM and 2 PM to 7 PM
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Rate of increase in facility miles operating at LOS F or V/C > 1.0
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Speed differential between lanes of traffic on multi-lane highways
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Travel time index
C-4	Objective	Reduce stress caused by transportation	Enhance Mobility, Convenience, and Comfort for Transportation System Users	Variance of travel time on specified routes during peak and off-peak periods
D	**Goal**	**Improve the Security of the Transportation System**		
D-1	Objective	Enhance traveler security	Improve the Security of the Transportation System	Number of video monitoring cameras on platforms, park-n-ride lots, vehicles, and other transit facilities

Number	Type	Name	Supports	Performance Measure
D-1	Objective	Enhance traveler security	Improve the Security of the Transportation System	Number of critical sites with hardened security enhancements
D-1	Objective	Enhance traveler security	Improve the Security of the Transportation System	Number of critical sites with security monitoring
D-1	Objective	Enhance traveler security	Improve the Security of the Transportation System	Number of reported personal safety incidents
D-1	Objective	Enhance traveler security	Improve the Security of the Transportation System	Number of security incidents on roadways
D-1	Objective	Enhance traveler security	Improve the Security of the Transportation System	Number of security incidents on transportation infrastructure
D-1	Objective	Enhance traveler security	Improve the Security of the Transportation System	Percent of major and minor arterials equipped and operating with video monitoring cameras
D-1	Objective	Enhance traveler security	Improve the Security of the Transportation System	Percent of the transportation system in which travel conditions can be detected remotely via video monitoring cameras, speed detectors, etc.
D-1	Objective	Enhance traveler security	Improve the Security of the Transportation System	Personal safety and customer service ratings
D-1	Objective	Enhance traveler security	Improve the Security of the Transportation System	Transit user complaint rate
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Hazmat incident response time
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Homeland security incident response time
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Mean incident response time
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Number of video monitoring cameras on platforms, park-n-ride lots, vehicles, and other transit facilities
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Number of critical sites with hardened security enhancements
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Number of critical sites with security monitoring
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Number of Hazmat incidents

Number	Type	Name	Supports	Performance Measure
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Number of Hazmat shipments tracked in real-time
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Number of homeland security incidents
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Number of reported personal safety incidents
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Number of security incidents on roadways
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Number of security incidents on transportation infrastructure
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Number of travelers routed around Hazmat incidents
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Number of travelers routed around homeland security incidents
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Percent of major and minor arterials equipped and operating with video monitoring cameras
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Percent of the transportation system in which travel conditions can be detected remotely via video monitoring cameras, speed detectors, etc.
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Personal safety and customer service ratings
D-2	Objective	Safeguard the motoring public from homeland security and/or Hazmat incidents	Improve the Security of the Transportation System	Transit user complaint rate
E	**Goal**	**Support Regional Economic Productivity and Development**		
E-1	Objective	Reduce travel time for freight, transit and businesses	Support Regional Economic Productivity and Development	Hours of delay per 1,000 vehicle miles on selected freight-significant highways
E-1	Objective	Reduce travel time for freight, transit and businesses	Support Regional Economic Productivity and Development	Miles of bus-only shoulder lanes available for transit use in the metro area

Number	Type	Name	Supports	Performance Measure
E-1	Objective	Reduce travel time for freight, transit and businesses	Support Regional Economic Productivity and Development	On-time performance of transit
E-1	Objective	Reduce travel time for freight, transit and businesses	Support Regional Economic Productivity and Development	Percent of fares collected using automated fare collection
E-1	Objective	Reduce travel time for freight, transit and businesses	Support Regional Economic Productivity and Development	Percent of total transfers performed with automated fare cards
E-1	Objective	Reduce travel time for freight, transit and businesses	Support Regional Economic Productivity and Development	Point-to-point travel times on selected freight-significant highways
E-1	Objective	Reduce travel time for freight, transit and businesses	Support Regional Economic Productivity and Development	Transit to auto travel time differential for a given period on a given portion of the system
E-1	Objective	Reduce travel time for freight, transit and businesses	Support Regional Economic Productivity and Development	Travel time index on selected freight-significant highways
E-1	Objective	Reduce travel time for freight, transit and businesses	Support Regional Economic Productivity and Development	Variance of travel time on specified routes during peak and off-peak periods
E-2	Objective	Improve the efficiency of freight movement, permitting and credentials process	Support Regional Economic Productivity and Development	Average duration of delays per month at intermodal facilities
E-2	Objective	Improve the efficiency of freight movement, permitting and credentials process	Support Regional Economic Productivity and Development	Frequency of delays per month at intermodal facilities
E-2	Objective	Improve the efficiency of freight movement, permitting and credentials process	Support Regional Economic Productivity and Development	Number of automated permits/credentials issued
E-2	Objective	Improve the efficiency of freight movement, permitting and credentials process	Support Regional Economic Productivity and Development	Percent (or number) of commercial vehicles tracked by trucking companies
E-2	Objective	Improve the efficiency of freight movement, permitting and credentials process	Support Regional Economic Productivity and Development	Percent (or number) of freight shipment tracked
E-2	Objective	Improve the efficiency of freight movement, permitting and credentials process	Support Regional Economic Productivity and Development	Percent of agencies involved in CVO inspection, administration, enforcement, and emergency management in the region with interoperable communications
E-2	Objective	Improve the efficiency of freight movement, permitting and credentials process	Support Regional Economic Productivity and Development	Percent of weigh stations use electronic credentialing
E-3	Objective	Improve travel time reliability for freight, transit and businesses	Support Regional Economic Productivity and Development	Average border crossing time for freight at international borders per year
E-3	Objective	Improve travel time reliability for freight, transit and businesses	Support Regional Economic Productivity and Development	Miles of bus-only shoulder lanes available for transit use in the metro area

Number	Type	Name	Supports	Performance Measure
E-3	Objective	Improve travel time reliability for freight, transit and businesses	Support Regional Economic Productivity and Development	Number of users of notifications for traveler information (e.g., e-mail, text message) per year
E-3	Objective	Improve travel time reliability for freight, transit and businesses	Support Regional Economic Productivity and Development	On-time performance of transit
E-3	Objective	Improve travel time reliability for freight, transit and businesses	Support Regional Economic Productivity and Development	Percent of fares collected using automated fare collection
E-3	Objective	Improve travel time reliability for freight, transit and businesses	Support Regional Economic Productivity and Development	Percent of the transportation system in which travel conditions can be detected remotely via video monitoring cameras, speed detectors, etc.
E-3	Objective	Improve travel time reliability for freight, transit and businesses	Support Regional Economic Productivity and Development	Percent of total transfers performed with automated fare cards
E-3	Objective	Improve travel time reliability for freight, transit and businesses	Support Regional Economic Productivity and Development	Percent of transportation facilities whose owners share their traveler information with other agencies in the region
E-3	Objective	Improve travel time reliability for freight, transit and businesses	Support Regional Economic Productivity and Development	Percent of weigh stations use electronic credentialing
E-3	Objective	Improve travel time reliability for freight, transit and businesses	Support Regional Economic Productivity and Development	Percentage of incident management agencies in region participating in multi-modal information exchange network
E-3	Objective	Improve travel time reliability for freight, transit and businesses	Support Regional Economic Productivity and Development	Travel time index on selected freight-significant highways
E-3	Objective	Improve travel time reliability for freight, transit and businesses	Support Regional Economic Productivity and Development	Variance of travel time on specified routes during peak and off-peak periods
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	Miles of bus-only shoulder lanes available for transit use in the metro area
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	Number of enforcement personnel assigned to enforcing truck weight limit violations
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	Number of fleet vehicles with maintenance diagnostic equipment
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	Number of ITS-related assets tracked
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	Number of vehicles operating under CAD
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	On-time performance of transit
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	Percent (or number) of commercial vehicles tracked by trucking companies
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	Percent of agencies involved in CVO inspection, administration, enforcement, and emergency management in the region with interoperable communications
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	Percent of construction projects completed on-time according to established schedule

Number	Type	Name	Supports	Performance Measure
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	Percent of fares collected using automated fare collection
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	Percent of total transfers performed with automated fare cards
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	Percentage of fleet/equipment within lifecycle
E-4	Objective	Increase agency efficiency	Support Regional Economic Productivity and Development	Rate at which fleet/equipment is utilized
E-5	Objective	Reduce vehicle operating costs	Support Regional Economic Productivity and Development	95th or 90th percentile travel times for selected routes
E-5	Objective	Reduce vehicle operating costs	Support Regional Economic Productivity and Development	Average commute trip travel time (minutes)
E-5	Objective	Reduce vehicle operating costs	Support Regional Economic Productivity and Development	Average travel time during peak periods (minutes)
E-5	Objective	Reduce vehicle operating costs	Support Regional Economic Productivity and Development	Hours of delay per capita
E-5	Objective	Reduce vehicle operating costs	Support Regional Economic Productivity and Development	Hours of delay per driver
E-5	Objective	Reduce vehicle operating costs	Support Regional Economic Productivity and Development	Hours per day at LOS F or V/C > 1.0 (or other threshold)
E-5	Objective	Reduce vehicle operating costs	Support Regional Economic Productivity and Development	Percent of intersections operating at LOS F or V/C > 1.0 and population growth rate
E-5	Objective	Reduce vehicle operating costs	Support Regional Economic Productivity and Development	Percent of lane-miles operating at LOS F or V/C > 1.0
E-5	Objective	Reduce vehicle operating costs	Support Regional Economic Productivity and Development	Percent of Twin Cities freeway miles congested (below 45 mph) in weekday peak periods - 5 AM to 10 AM and 2 PM to 7 PM
E-5	Objective	Reduce vehicle operating costs	Support Regional Economic Productivity and Development	Rate of increase in facility miles operating at LOS F or V/C > 1.0
E-5	Objective	Reduce vehicle operating costs	Support Regional Economic Productivity and Development	Travel time index
E-5	Objective	Reduce vehicle operating costs	Support Regional Economic Productivity and Development	Variance of travel time on specified routes during peak and off-peak periods
E-6	Objective	Enhance efficiency at borders	Support Regional Economic Productivity and Development	Average border crossing time for freight at international borders per year
E-6	Objective	Enhance efficiency at borders	Support Regional Economic Productivity and Development	Percent of weigh stations use electronic credentialing
F	**Goal**	**Preserve the Transportation System**		

Number	Type	Name	Supports	Performance Measure
F-1	Objective	Safeguard existing infrastructure	Preserve the Transportation System	Number of critical sites with hardened security enhancements
F-1	Objective	Safeguard existing infrastructure	Preserve the Transportation System	Number of critical sites with security monitoring
F-1	Objective	Safeguard existing infrastructure	Preserve the Transportation System	Number of pavement miles damaged by commercial vehicles
F-1	Objective	Safeguard existing infrastructure	Preserve the Transportation System	Number of security incidents on transportation infrastructure
F-1	Objective	Safeguard existing infrastructure	Preserve the Transportation System	Number of size and weight violations
F-1	Objective	Safeguard existing infrastructure	Preserve the Transportation System	Percent of agencies involved in CVO inspection, administration, enforcement, and emergency management in the region with interoperable communications
F-1	Objective	Safeguard existing infrastructure	Preserve the Transportation System	Percent of construction projects completed on-time according to established schedule
F-1	Objective	Safeguard existing infrastructure	Preserve the Transportation System	Percent of major and minor arterials equipped and operating with video monitoring cameras
F-1	Objective	Safeguard existing infrastructure	Preserve the Transportation System	Percent of the transportation system in which travel conditions can be detected remotely via video monitoring cameras, speed detectors, etc.
G	**Goal**	**Enhance the Integration and Connectivity of the Transportation System**		
G-1	Objective	Aid in transportation infrastructure and operations planning	Enhance the Integration and Connectivity of the Transportation System	Administrative support rate (as part of overall project budget)
G-1	Objective	Aid in transportation infrastructure and operations planning	Enhance the Integration and Connectivity of the Transportation System	Amount of data gathered from ITS used in infrastructure and operations planning
G-1	Objective	Aid in transportation infrastructure and operations planning	Enhance the Integration and Connectivity of the Transportation System	Number of planning activities using data from ITS systems
G-1	Objective	Aid in transportation infrastructure and operations planning	Enhance the Integration and Connectivity of the Transportation System	Operations cost deviation
G-1	Objective	Aid in transportation infrastructure and operations planning	Enhance the Integration and Connectivity of the Transportation System	Project cost deviation
G-1	Objective	Aid in transportation infrastructure and operations planning	Enhance the Integration and Connectivity of the Transportation System	Project schedule deviation

Number	Type	Name	Supports	Performance Measure
G-1	Objective	Aid in transportation infrastructure and operations planning	Enhance the Integration and Connectivity of the Transportation System	Years of data in database that is easily searchable and extractable
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	95th or 90th percentile travel times for selected routes
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Average border crossing time for freight at international borders per year
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Average commute trip travel time (minutes)
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Average travel time during peak periods (minutes)
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Hours of delay per capita
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Hours of delay per driver
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Hours per day at LOS F or V/C > 1.0 (or other threshold)
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Number of automated permits/credentials issued
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Percent of intersections operating at LOS F or V/C > 1.0 and population growth rate
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Percent of lane-miles operating at LOS F or V/C > 1.0
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Percent of Twin Cities freeway miles congested (below 45 mph) in weekday peak periods - 5 AM to 10 AM and 2 PM to 7 PM
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Percent of weigh stations use electronic credentialing

Number	Type	Name	Supports	Performance Measure
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Rate of increase in facility miles operating at LOS F or V/C > 1.0
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Travel time index
G-2	Objective	Reduce need for new facilities	Enhance the Integration and Connectivity of the Transportation System	Variance of travel time on specified routes during peak and off-peak periods
H	**Goal**	**Reduce Environmental Impacts**		
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	95th or 90th percentile travel times for selected routes
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Average commute trip travel time (minutes)
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Average travel time during peak periods (minutes)
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Carbon dioxide emissions
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Excess fuel consumed (due to congestion) (total or per capita)
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Hours of delay per capita
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Hours of delay per driver
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Hours per day at LOS F or V/C > 1.0 (or other threshold)
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Measurements of emissions within the state of Minnesota
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Minnesota vehicle miles traveled
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	MnDOT fleet diesel use
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	MnDOT fleet gasoline use
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Percent of intersections operating at LOS F or V/C > 1.0 and population growth rate
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Percent of lane-miles operating at LOS F or V/C > 1.0

Number	Type	Name	Supports	Performance Measure
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Percent of Twin Cities freeway miles congested (below 45 mph) in weekday peak periods - 5 AM to 10 AM and 2 PM to 7 PM
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Rate of increase in facility miles operating at LOS F or V/C > 1.0
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Total fuel consumed per capita for transportation
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Travel time index
H-1	Objective	Reduce emissions/energy impacts and use associated with congestion	Reduce Environmental Impacts	Variance of travel time on specified routes during peak and off-peak periods
H-2	Objective	Reduce negative impacts of the transportation system on communities	Reduce Environmental Impacts	Amount of environmentally friendly de-icing material used
H-2	Objective	Reduce negative impacts of the transportation system on communities	Reduce Environmental Impacts	Annual transit ridership across the state
H-2	Objective	Reduce negative impacts of the transportation system on communities	Reduce Environmental Impacts	Availability of carpool/vanpool matching and ridesharing information services
H-2	Objective	Reduce negative impacts of the transportation system on communities	Reduce Environmental Impacts	Commuter vehicle miles traveled (VMT) per regional employee
H-2	Objective	Reduce negative impacts of the transportation system on communities	Reduce Environmental Impacts	Number of agencies create and implement transportation access guides
H-2	Objective	Reduce negative impacts of the transportation system on communities	Reduce Environmental Impacts	Number of employers with access to regional carpool/vanpool database
H-2	Objective	Reduce negative impacts of the transportation system on communities	Reduce Environmental Impacts	Number of traffic law violations
H-2	Objective	Reduce negative impacts of the transportation system on communities	Reduce Environmental Impacts	Number of trips in region
H-2	Objective	Reduce negative impacts of the transportation system on communities	Reduce Environmental Impacts	Percent of major employers with active TDM programs
H-2	Objective	Reduce negative impacts of the transportation system on communities	Reduce Environmental Impacts	Share of household trips by each mode of travel

Number	Type	Name	Supports	Performance Measure
H-2	Objective	Reduce negative impacts of the transportation system on communities	Reduce Environmental Impacts	Vehicle volume and persons per hour per lane

4 ITS Stakeholders

Identifying stakeholders is an important task in ITS architecture development since effective ITS involves the integration of multiple stakeholders and their transportation systems. This section describes the stakeholders who either participated in the creation of the Minnesota Statewide Regional ITS Architecture or whom the participating stakeholders felt were needed to be included in the architecture. Some stakeholders have been grouped in order to better reflect mutual participation or involvement in transportation services and elements. Every stakeholder in this section is related to one or more of the transportation inventory elements described in the next chapter, either as an individual stakeholder or as a member of a stakeholder group.

Table 2 – ITS Stakeholders

Stakeholder Name	Stakeholder Description
Account Management Providers	Provide invoicing and payment tracking services for private companies or public agencies. Examples of the Account Management Provider include: Service Billing Companies and Credit Card Companies.
Airports	Represents airports throughout the state of Minnesota. Airports receive important traveler, weather, and construction information from other agencies, and coordinate with emergency management.
City of Minneapolis	City of Minneapolis is a part of the Minneapolis-St. Paul MPO. City operates a traffic management center through which video monitoring cameras and traffic signal timings are controlled and traffic flows are monitored. City also participates in Integrated Corridor Traffic Management (ICTM) program. City operates a parking management system and uses dynamic message signs to notify drivers of parking space availability.
Event Promoters	Special Event Sponsors that have knowledge of events that may impact travel on roadways or other modal means.
FHWA	This represents the Federal Highway Administration (FHWA). This agency leads the Clarus Initiative, which is an initiative to develop and demonstrate an integrated surface transportation weather observing, forecasting and data management system.
FMCSA	Federal Motor Carrier Safety Administration (FMCSA). is a federal agency responsible for the administration of safety-related initiatives and programs for the motor carrier industry.
IFTA, Inc.	The IFTA, Inc. (International Fuel Tax Association) administers the International Fuel Tax Agreement.
Intercity Transit Providers	This stakeholder represents Northstar Commuter Coach traveling between Elk River and Minneapolis and Greyhound and Jefferson Lines buses traveling throughout the state.
IRP, Inc.	The IRP (International Registration Plan), Inc. administers International Registration Plan. For motor carriers operating under the International Registration Plan, registering a fleet of inter-jurisdictional vehicles becomes a one-stop process for motor
Local Agencies	This represents Minnesota county-level and city-level agencies.
Local Media	Represents all local media outlets.
Local Transit Providers	This stakeholder group includes the St. Cloud Metropolitan Transit Commission (MTC), Duluth Transit Authority (DTA), City of Rochester Public Transit, Metro Area Transit (MAT -- serving Moorhead), Cities Area Transit (CAT -- serving East Grand Forks), and various county and city-level transit operations centers.
MAASTO	Mid America Association of State Transportation Officials
Major Employers	This represents major employers in large and small urban areas of Minnesota.
Map Update Providers	Agencies that provide information to, or receive information from, Minnesota public agencies and private companies providing ITS services.
Metro Area Transit Providers	This stakeholder group includes Metro Transit and Suburban Transit Providers, independent of Metro Transit that connect outer-ring metro-area suburbs with Minneapolis and St. Paul metro areas.

Stakeholder Name	Stakeholder Description
Metro Transit	Provides fixed-route and demand response public transit service for the Minneapolis-St. Paul metro area. This is a service of the Metropolitan Council of the Twin Cities.
Metropolitan Council	The Metropolitan Council is the regional planning agency serving the Twin Cities seven-county metropolitan area and providing essential services to the region, such as public transportation (Metro Transit), wastewater collection and treatment, and planning for housing and community development.
Minnesota Ambulance Association	Minnesota Ambulance Association
Minnesota Chiefs of Police Association	Minnesota Chiefs of Police Association
Minnesota DPS	The Minnesota Department of Public Safety (DPS) is comprised of several divisions and services, including the Minnesota State Patrol, Driver and Vehicle Services, and Homeland Security and Emergency Management.
Minnesota DVS	This stakeholder represents the Driver and Vehicle Services Division of the Minnesota Department of Public Safety, which sends commercial vehicle operations credentials information to the Truck Center.
Minnesota EMSRB	The Minnesota Emergency Medical Services Regulatory Board (EMSRB) is the state agency responsible for licensing ambulance services, certifying emergency medical personnel, approving emergency medical services training programs, designating and funding eight regional EMS organizations that support emergency medical services, funding the Comprehensive Advanced Life Support (CALS) Program for training rural emergency room teams, and administering the volunteer ambulance training grant program, the longevity program for volunteer ambulance personnel and the EMS for Children (EMSC) grant program.
Minnesota Homeland Security and Emergency Management	This agency is responsible for operating the Minnesota AMBER Alert System and the Minnesota State Emergency Operations Center (SEOC).
Minnesota State Fire Chiefs Association	Minnesota State Fire Chiefs Association
Minnesota State Patrol	Represents the 12 State Patrol districts that manage resources and communicate incident data and resource requests to other public and private agencies.
MnDOT	Department of Transportation for the State of Minnesota. MnDOT manages, operates and maintains a wide range of ITS systems covering multiple functional areas throughout the State.
MnDOT OFCVO	MnDOT Office of Freight and Commercial Vehicles (OFCVO).
MnDOT Office of Aeronautics	MnDOT Office of Aeronautics Navigation Systems Section has installed Automated Weather Observation Systems (AWOS) and Automated Surface Observation Systems (ASOS) throughout the state. The equipment, installation, and maintenance of these systems is funded entirely by this office.
MnDOT Office of Maintenance	MnDOT Office of Maintenance coordinates roadway maintenance and construction activity throughout Minnesota.
MnDOT OTDS	MnDOT Office of Transportation Data and Analysis is responsible for the collection, creation, storage, maintenance, and dissemination of transportation-related data to the general public through various means.
Neighboring States	This group includes agencies representing the states of Iowa, Wisconsin, North Dakota and South Dakota. Agencies coordinate traffic management, emergency management, and roadway information systems with MnDOT and Minnesota State Patrol.
NOAA	The National Weather Service, a branch of the National Oceanic and Atmospheric Administration (NOAA), provides weather forecast and issues warnings related to adverse weather conditions.
North/West Passage Corridor Members	The North/West Passage Corridor encompasses the states along I-90/I-94 from Wisconsin to Washington. The eight states are: Wisconsin, Minnesota, North Dakota, South Dakota, Montana, Idaho, Wyoming, and Washington.
Northstar Corridor Development Authority	This stakeholder represents the agency primarily responsible for commuter rail operations extending northwest from downtown Minneapolis to Big Lake.
Private Information Service Providers	Private Information Service Providers that provide value-added information, such as Rideshare Matching Services.

Stakeholder Name	Stakeholder Description
Private Mayday Service Providers	This stakeholder represents private mayday service providers, such as the OnStar system.
Private Parking Operators	Operate Parking Management Systems for public or private parking facilities, including park-and-ride facilities.
Private Trucking Companies	Private trucking companies represent those companies that own and manage their own commercial fleets of vehicles traveling through the state of Minnesota.
Private Weather Service Providers	This stakeholder represents private weather service providers.
Railroad Companies	Railroad Companies include the Twin Cities and Western Railroad (TCW). Companies operate and maintain railroad wayside equipment at highway-railroad intersections.
Traveler Information Kiosks Operators	This stakeholder group represents agencies and municipalities that provide traveler information services to the traveling public. This group includes MnDOT, Explore Minnesota Tourism, North/West Passage Corridor Members, private information service providers, and counties and cities throughout Minnesota.
Travelers	Travelers on Minnesota roads and highways.
University of Minnesota CTS ITS Institute	University of Minnesota Center for Transportation Studies (CTS) ITS Institute operates the Research Lab Network Monitoring Archive and Research Lab Network Monitoring Roadside Equipment.
University of Minnesota Duluth	University of Minnesota Duluth houses the Transportation Data Research Laboratory (TDRL).
US Customs and Border Protection	US Customs and Border Protection

5 ITS Inventory

An inventory of existing and planned transportation systems is the basis for the Minnesota Statewide Regional ITS Architecture. The transportation system inventory was developed based on input from stakeholders throughout Minnesota. The inventory includes a list of ITS elements and the associated stakeholder responsible for system operation.

This section describes every surface transportation inventory element for Minnesota. A transportation element can be either a center, support, vehicle, traveler or field equipment. Each transportation element listed below has one or more stakeholders associated with it. In order to reduce the complexity of the architecture, some transportation elements with like functionality have been grouped together. Each transportation inventory element is mapped to at least one ARC-IT physical object.

Table 3 – ITS Inventory

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
511 Telephone Information Service	Minnesota launched its 511 telephone information service in July 2002. Callers can obtain the following information for all state maintained roadways: road conditions, construction, incidents, and urban area congestion among other information.	MnDOT	Existing	Transportation	Transportation Information Center Traveler Information Voice System Transportation Information Center
911 Dispatch Center	This element represents the dispatch centers that receives 911 calls and dispatch the appropriate sheriff, police, fire and EMS for traffic incidents. Some centers are equipped with computer aided dispatch (CAD) systems. Dispatch centers coordinate traffic incident responses and exchange mutual aid and incident information with agencies as necessary. Future coordination with Minnesota CARS is planned.	Minnesota State Patrol	Existing	Transportation	Center Emergency Management Center
Account Management Providers	Provide invoicing and payment tracking services for private companies or public agencies. Examples of the Account Management Provider include: Service Billing Companies and Credit Card Companies	Account Management Providers	Existing	Transportation	Financial Center
Advance Warning Flasher Roadside Equipment	Advance Warning Flasher Roadside Equipment is located upstream from traffic signal roadside equipment on high-speed approaches to warn drivers of changes in signal phases from green to red.	MnDOT	Existing	Transportation	Other ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Advanced Pavement Condition and Visibility Warning System Roadside Equipment	This element represents the roadside equipment of the proposed automated warning system. The roadside equipment would consist of pavement sensors, visibility sensors, and either changeable message signs or static warning signs with flashing beacons located upstream from the problem area. MnDOT SRCC personnel and the State Patrol would have remote access and capability to override the messages being sent.	MnDOT	Planned	Transportation	ITS Roadway Equipment
Airport	Located throughout the state, Minnesota Airports receive important traveler, weather, and construction information from other agencies, and coordinate with emergency management.	Airports	Existing	Transportation	Emergency Management Center
Animal Crossing Warning Roadside Equipment	This represents roadside equipment that includes laser/light emitters along the roadway, along with a series of static deer warning signs with light flashers. When an animal breaks the beam, the flashers on the three signs nearest the deer are activated, providing additional warning to motorists. Equipment is installed near Camden State Park in MnDOT District 8 along TH 23.	MnDOT	Existing	Transportation	ITS Roadway Equipment
Arrow Board Reporting System	The Arrow Board Reporting System consists of the arrow board devices and the arrow board server. The arrow board devices are equipped with automated reporting functionality. Upon activation, the Arrow Board System will assemble an initial message that includes the arrow board device ID, latitude/longitude, display status, device status, and orientation to the arrow board server. The server will poll the system every two minutes for new data. MnDOT RTMC via IRIS will access the data from the system server and will make arrow board-related lane closure incident event data available for CARS.	MnDOT	Planned	Transportation	ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Automated Crash Notification System	This system provides immediate notification of crashes to responders and provides access to driver, passenger, and vehicle information. This would assist emergency responders in quickly and efficiently locating crash or other road safety related incidents.	MnDOT	Planned	Transportation	Emergency Management Center
Automated Permit Routing System (RouteBuilder)	This element represents MnDOT's oversize/overweight (OS/OW) permitting system with a routing component. This system offers many of the features and functions of the typical OS/OW permitting system. Customers can apply for permits, copy previous permits, make one-time revisions, manage their company profiles, manage the vehicle template, view previous permits and pay for permits without MnDOT staff intervention. Law enforcement personnel have access to RouteBuilder through a portal that can be used to validate permits. The current system issues permits for only the state highway system.	MnDOT OFCVO	Existing	Transportation	Commercial Vehicle Administration Center Transportation Information Center
AWOS Central Control System	MnDOT Office of Aeronautics has installed and currently maintains Automated Weather Observation Systems (AWOS) throughout the state. AWOS data is gathered and re-distributed over the Federal Aviation Administration (FAA) National Airspace Data Interchange Network (NADIN), allowing these reports to become available through computer weather systems. Current weather information can be obtained by telephoning the AWOS site, where a computer generated voice relays up-to-the-minute observations. The AWOS data is visually displayed on a remote computer monitor at local airports, and is simultaneously broadcast over the local radio navigation aid or a VHF transmitter for in-flight use.	MnDOT Office of Aeronautics	Existing	Transportation	Maint and Constr Management Center Transportation Information Center
AWOS Roadside Equipment	This element represents the roadside equipment of AWOS.	MnDOT Office of Aeronautics	Existing	Transportation	ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Basic Vehicle	This represents the basic vehicle platform that interfaces with and hosts ITS electronics. It provides an interface to the drive train, driver convenience and entertainment systems, and other non-ITS electronics on-board the vehicle. This interface allows general vehicle systems (e.g., the stereo speaker system) to be shared by ITS and non-ITS systems. It also allows monitoring and control of the vehicle platform for advanced vehicle control system applications.	Travelers	Existing	Transportation	Basic Vehicle
Bridge Inspection / Structural Monitoring Roadside Equipment	This element represents roadside cameras and sensors that are planned to be utilized for maintenance inspections of key bridges in Minnesota. Roadside equipment is planned to be controlled by MnDOT RTMC, SRCC, and Maintenance and Construction Management Centers for maintenance inspections. Initial testing on I-35W bridge in Minneapolis will test sensors such as linear potentiometers to measure bridge movements, accelerometers to monitor bridge deflections under loads, and acoustical sensors to detect unusual sounds of a specific frequency. Data on inspection activity can be archived to indicate dates of inspection and exactly what was inspected.	MnDOT	Planned	Transportation	Connected Vehicle Roadside Equipment ITS Roadway Equipment
Video Monitoring Roadside Equipment	This element represents video monitoring cameras deployed along the roadside by various agencies and municipalities throughout Minnesota. Cameras are controlled and monitored by TMCs.	MnDOT	Existing	Transportation	ITS Roadway Equipment
Clarus Weather System	The Clarus Weather System is an FHWA-led initiative that plans to collect atmospheric and surface weather data from environmental sensor stations throughout the US and Canada and share the data with the general public and private information service providers. Eight U.S. states, including Minnesota and three Canadian territories, currently upload information to a map interface on the Clarus Initiative project website.	FHWA	Existing	Transportation	Weather Service System

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Commercial Vehicle Administration Center	This center accepts and investigates all complaints made against carriers and service providers under its jurisdiction. The center reviews and issues transportation permits for oversize and/or overweight load movements which meet appropriate requirements and restrictions for travel on MN Trunk Highways.	MnDOT OFCVO	Existing	Transportation	Commercial Vehicle Administration Center
Commercial Vehicles	This ITS element represents commercial vehicles equipped with the sensory, processing, storage, and communications functions to promote the safe and efficient operation of commercial vehicles in the state of Minnesota. These vehicles may be equipped with two-way communications allowing commercial vehicle drivers to communicate with their fleet managers, and roadside officials. The vehicle may also have the capability to collect and process vehicle, cargo information from the attached freight equipment, and driver safety data and status and alert the driver whenever there is a potential safety or security problem. Basic identification, security and safety status data may be supplied to inspection facilities at mainline speeds.	Private Trucking Companies	Existing	Transportation	Commercial Vehicle OBE
Commuter Rail Operations Center	This element represents the Northstar Commuter Rail operations center that will operate and maintain commuter rail vehicles between downtown Minneapolis and Big Lake beginning in 2009. Commuter rail vehicle maintenance facility will be located in Big Lake. Stations are planned in Minneapolis, Fridley, Coon Rapids, Anoka, Elk River, and Big Lake. Future plans are to expand the commuter rail line northwest to downtown Saint Cloud and the VA Medical Center.	Northstar Corridor Development Authority	Planned	Transportation	Transit Management Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Condition Acquisition and Reporting System (CARS)	This system represents a central source of roadway event information for both the management and dissemination of traffic-related information to the traveling public. The system is maintained by MnDOT and data is input throughout MnDOT at District Offices, RTMC and SRCC. Minnesota State Patrol users also enter information to CARS on road conditions and incidents each day. CARS also manages automated data entry for congestion in the Twin Cities metro area based on information from loop detector roadside equipment. Data entered into CARS is available to the public to use for traveler information services through an XML feed. In MnDOT District 7, data entry occurs via web-enabled cellular telephones with approximately 75 users, primarily snow plow operators. Similar deployment is planned for MnDOT District 6. Integration of CARS with 911 Computer Aided Dispatch System is planned.	MnDOT Office of Maintenance	Existing	Transportation	Transportation Information Center
County Emergency Operations Centers	Each Minnesota county and various Minnesota cities have an emergency operations center (EOC). These EOCs range from minimally equipped, stand-by facilities to centers that operate on a daily basis. The EOCs operate for emergency operations and homeland security practices during emergencies and disasters.	Local Agencies	Existing	Transportation	Emergency Management Center
County Sheriff and City Police Offices	This element represents local law enforcement agencies throughout the state of Minnesota at the county and city level.	Local Agencies	Existing	Transportation	Emergency Management Center Enforcement Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
CV Roadside Equipment	This element represents the Connected Vehicle roadside devices that are used to send messages to, and receive messages from, nearby vehicles using Dedicated Short Range Communications (DSRC) or other alternative wireless communications technologies. Communications with adjacent field equipment and back office centers that monitor and control the RSE are also supported. This device operates from a fixed position and may be permanently deployed or a portable device that is located temporarily in the vicinity of a traffic incident, road construction, or a special event. It includes a processor, data storage, and communications capabilities that support secure communications with passing vehicles, other field equipment, and centers.	MnDOT	Planned	Transportation	Connected Vehicle Roadside Equipment
CVO Information Requestor	This terminator represents any organization requesting information from the Minnesota CVIEW. It typically represents insurance companies requesting safety information on carriers etc.	Private Trucking Companies	Existing	Transportation	CVO Information Requestor Center
Driver	Drivers along Minnesota roads and highways.	Travelers	Existing	Transportation	Driver
Dynamic Late Merge Central Control System	This system is placed in advance of lane closures due to roadway maintenance and construction and consists of three portable Dynamic Message Signs (DMS) and a Remote Traffic Microwave Sensor (RTMS) detector. As traffic congestion begins to form, the DMS are activated to provide lane use instructions to drivers. System is self-contained with the possibility of remote operator override from the RTMC/ SRCC.	MnDOT	Existing	Transportation	Maint and Constr Management Center
Dynamic Late Merge Roadside Equipment	This roadside equipment consists of three portable Dynamic Message Signs (DMS) and a Remote Traffic Microwave Sensor (RTMS) detector.	MnDOT	Existing	Transportation	ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Dynamic Message Sign Roadside Equipment	This element represents portable and permanent Dynamic Message Signs (DMS) operated throughout the state used to convey driver information on special events, maintenance and construction activity, incident management, AMBER Alerts, and transportation and national emergencies. Permanent signs include existing signs managed by the MnDOT RTMC.	MnDOT	Existing	Transportation	ITS Roadway Equipment
Emergency Vehicle Equipment	This element represents vehicle equipment on emergency vehicles that communicates with 911 centers (e.g. AVL, MDT, voice/video/data communications, transponder/transmitter for signal pre-emption). Agencies operating emergency vehicles include Minnesota State Patrol, and various counties and cities throughout Minnesota.	Minnesota State Patrol	Existing	Transportation	Emergency Vehicle OBE
Event Promoters	Special Event Sponsors that have knowledge of events that may impact travel on roadways or other modal means.	Event Promoters	Existing	Transportation	Event Promoter System
FAST Compliance Management System	FAST (Free and Secure Trade) supports moving pre-approved eligible goods across the border quickly and verifying trade compliance away from the border. FAST Location exists at the Fort Frances Bridge in International Falls, MN. FAST is a commercial process offered to pre-approved importers, carriers, and registered drivers. Shipments for approved companies, transported by approved carriers using registered drivers, will be cleared into either country with greater speed and certainty, and at a reduced cost of compliance. This is achieved through electronic data transmissions and transponder technology within Commercial Vehicles.	US Customs and Border Protection	Existing	Transportation	Commercial Vehicle Check Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
FIRST Emergency Vehicles	The Freeway Incident Response Safety Team (FIRST) is an incident management measure designed to assist disabled vehicles along congested freeway segments and relieve peak period non-recurrent congestion through quick detection, verification, and removal of freeway incidents. The primary purpose of the FIRST Program is to alleviate congestion and to prevent secondary crashes. Each FIRST truck is equipped with a changeable message sign and AVL system. The FIRST Dispatch Center is located at the RTMC.	MnDOT	Existing	Transportation	Emergency Vehicle OBE
Highway Advisory Radio Roadside Equipment	This element represents roadside equipment that facilitates the operation of highway advisory radio (HAR) throughout Minnesota. HAR is controlled by MnDOT District Offices throughout the state.	MnDOT	Existing	Transportation	ITS Roadway Equipment
IFTA Clearinghouse	The IFTA Clearinghouse supports the IFTA base state agreement electronically. The IFTA Clearinghouse coordinates IFTA carrier information and transmittal records between participated jurisdictions.	IFTA, Inc.	Existing	Transportation	Other CV Administration Centers
In Vehicle Signing Roadside Equipment	This represents roadside equipment that emits a radio signal to In-Vehicle Signing Vehicle Equipment equipped with the proper receivers at railroad crossings and other intersections.	Railroad Companies	Existing	Transportation	Connected Vehicle Roadside Equipment ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
In Vehicle Signing Vehicle Equipment	This represents an in-vehicle signing system that was installed in 29 school buses in the City of Glencoe. The system is activated when a receiver on the school bus traveling toward the crossing comes within range of a radio signal emitted at the crossing. The system operates by providing the school bus driver with two types of information on rail crossings: the bus's proximity to an at-grade railroad crossing (crossing alert) and whether or not a train is present at or near the crossing (train warning). Both visual and variable audio signals are given. The system was operational for the 1997/1998 school year. The system was initially installed at signalized railroad crossings but the test was later expanded to evaluate the technology for use at unsignalized or passive crossings.	MnDOT	Existing	Transportation	Vehicle OBE
Infrastructure GIS Database Systems	This represents GIS mapping systems utilized by MnDOT and local agencies. It is planned to enhance these systems by adding infrastructure data. The enhanced systems will keep up-to-date records and allow agencies and contractors to use the data to target and record replacement and repair of infrastructure.	MnDOT	Planned	Transportation	Asset Management System
Intelligent Work Zone System Roadside Equipment	This element represents an automated system of devices that provides motorists and/or workers real-time information for improved safety and mobility through a work zone. The information is categorized into 3 levels: (1) Conflict Warning - high priority information to warn motorists of eminent traffic and roadway hazards; (2) Traffic Control - provides important driving information such as advisory speeds, merging instructions, and lane control directions; and (3) Travel Information - provides information which the motorist may use to make route decisions, such as travel times, alternate route info, incident warnings and work zone staging information.	MnDOT	Existing	Transportation	Connected Vehicle Roadside Equipment ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Intercity Transit Management Centers	This element represents transit management centers that operate intercity fixed routes traveling long distances. These centers include Greyhound and Jefferson Lines buses traveling throughout the state.	Intercity Transit Providers	Existing	Transportation	Emergency Management Center Transit Management Center
Intermodal Freight Depots	This represents a depot operated either by a depot manager or an alternate mode freight shipper which represents the point of exchange where freight is moved from one mode to another. The depot has knowledge about activities that may impact travel on roadways such as large groups of trucks entering the highway after unloading a ship or freight train. The depot coordinates freight movement with Fleet-Freight Managers, gathers information on traffic conditions affecting the depot, and provides information on intermodal freight activities that is pertinent to traffic movement in the surrounding area.	Private Trucking Companies	Planned	Transportation	Intermodal Terminal
Intersection Collision Warning Roadside Equipment	This represents roadside equipment that provides drivers on rural roadways with advance warning information, indicating when entry into an intersection is not safe. Roadside equipment will be designed to detect vehicles within a specified zone and send messages to other roadside equipment located upstream of the detection zone, which will alert oncoming motorists of vehicle presence that cannot be seen by the driver on the roadway.	MnDOT	Planned	Transportation	Connected Vehicle Roadside Equipment ITS Roadway Equipment
IRP Clearinghouse	The IRP Clearinghouse supports the IRP base state agreement electronically. The Clearinghouse supports exchange of motor carrier and financial information between participating jurisdictions.	IRP, Inc.	Existing	Transportation	Other CV Administration Centers
Lane Control Roadside Equipment	This element represents roadside equipment that warns drivers with electronic displays about the open or closed status of traffic lanes along the roadway.	MnDOT	Existing	Transportation	ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Lane/Ramp Access Control Roadside Equipment	This represents existing and planned automated gate closure systems along interstate highways. Existing system located on I-90 in Jackson, MN is activated during severe weather events and other severe incidents requiring freeway closures for winter roadway maintenance and snow plowing. The system includes automated gates, video monitoring cameras that monitor each direction of travel at the intersection, and automated signs that warn drivers that the road ahead is closed. All components of this system are monitored and controlled by the MnDOT District 7B Office in Windom, MN. A planned gate system will be installed along I-35W at 46th St. S. in Minneapolis for a Bus Rapid Transit station. Buses will be able to activate the system with on-board equipment for automated entry and exit into and out of the station.	MnDOT	Existing	Transportation	ITS Roadway Equipment
Lift Bridge Traffic Control Central System	This represents the control center used to operate the Stillwater Lift Bridge. The bridge carries Minnesota Trunk Highway Route 36 and Wisconsin Highway 64 over the St. Croix River at the City of Stillwater, MN. An operator uses a portable traffic control station to operate the traffic gates while standing outside the control house. Indicator lights are used to display alarms and the positions and status of devices on the bridge.	MnDOT	Existing	Transportation	Traffic Management Center
Lift Bridge Traffic Control Roadside Equipment	This represents roadside equipment controlled by an operator at the Lift Bridge Traffic Control Central System in Stillwater.	MnDOT	Existing	Transportation	ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Light Rail Operations Center	This element represents the Metro Transit light rail transit operations center. This center dispatches and maintains all light rail transit vehicles running between downtown Minneapolis and the Mall of America in Bloomington and between Minneapolis and Saint Paul. Other light rail transit lines connecting suburbs with Minneapolis and Saint Paul are in early planning stages.	Metro Transit	Existing	Transportation	Emergency Management Center Transit Management Center
Local Agency Traveler Information Website	This element represents websites that broadcast information on traveler services to the general public. This includes various county and city websites.	Local Agencies	Existing	Transportation	Transportation Information Center
Local TMCs	This element represents local centers that facilitate traffic management on a roadway network from a central location that provides roadway monitoring, signal system control, remote equipment control, and communications with field personnel and other agencies.	Local Agencies	Existing	Transportation	Archived Data User System Traffic Management Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Local Transit Management Centers	This element represents local transit management centers operating outside of the Twin Cities metropolitan area that operate fixed route and demand responsive public transit services. These centers include the St. Cloud Metropolitan Transit Commission (MTC), Duluth Transit Authority (DTA), City of Rochester Public Transit, Metro Area Transit (MAT -- serving Moorhead), Cities Area Transit (CAT -- serving East Grand Forks), and various county and city-level transit operations centers. St. Cloud MTC operates Transit Signal Priority (TSP), electronic fare collection, and on-board surveillance systems. DTA disseminates real-time bus arrival information at bus stops, via the internet, and via on-board enunciators. DTA manages electronic fare collection with smart "touch" cards that are integrated with U of M student ID cards. DTA also operates surveillance systems on-board all buses and at transit centers/ garages. City of Rochester manages electronic fare collection and plans to operate TSP at all signalized intersections that serve emergency vehicles with traffic signal preemption within the City. MAT currently operates electronic fare collection and plans to operate TSP on Traffic Signal System Roadside Equipment operated by MnDOT. CAT currently operate TSP on Traffic Signal System Roadside Equipment operated by MnDOT. Rural transit agencies within MnDOT District 6 plan to implement a shared CAD/AVL system. Rural transit agencies within MnDOT District 7 plan to implement an automated transit vehicle maintenance monitoring program.	Local Transit Providers	Existing	Transportation	Archived Data User System Emergency Management Center Transit Management Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Maintenance and Construction Field Personnel	Represents the MnDOT field personnel that perform maintenance and construction field activities including vehicle and equipment operators, field supervisory personnel, field crews, and work zone safety personnel. In MnDOT District 7, field personnel, primarily snow plow operators, perform data entry via web-enabled cellular telephones as a part of the MDARS (Mobile Data Acquisition Reporting System) project.		Existing	Transportation	Maint and Constr Field Personnel
Maintenance and Construction Management Center	This element represents maintenance office, truck stations and garages of transportation agencies that perform the maintenance and construction activity including planned activities (road maintenance, snow plowing, etc.) and unplanned incidents within the jurisdiction area, and communicate maintenance and construction schedules and other related information to other agencies.	MnDOT	Existing	Transportation	Archived Data User System Maint and Constr Management Center Traffic Management Center Vehicle Service Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Maintenance and Construction Vehicle Equipment	This element represents maintenance vehicles that are utilized by the MnDOT and City and County Public Works/Highway Departments to support road maintenance. Automatic Vehicle Location (AVL) systems deployed on snow removal/highway maintenance vehicles within the metro area and several MnDOT Districts assist in overall snow fighting techniques, decision support systems, and area-wide highway maintenance issues for winter and summer operations. It is planned to expand the deployment of AVL systems statewide. Pilot projects conducted by MnDOT Office of Maintenance include vehicle-mounted electro-luminescence signs (Metro Area), full-matrix LED vehicle-mounted DMS (District 1/Virginia), Mold Board Lights (District 2/Crookston), and Guidance Lasers (District 7/Mankato). Other municipalities utilize vehicle ITS equipment to varying extents that provides the processing, sensory, storage, and communications functions necessary to support road maintenance and construction.	MnDOT	Existing	Transportation	Maint and Constr Vehicle OBE Vehicle OBE
Maintenance Decision Support System	Maintenance Decision Support System (MDSS) is a server- and Client-side hardware and software package that provides winter maintenance support. MDSS offers visualizations of the real time maintenance data integrated from many sources and reports actual road conditions to establish appropriate maintenance treatments. It enables weather and roadway conditions predictions and identifies an optimal maintenance plan given user-configurable resources. Road and weather conditions, location of snowplows, and recommended chemical type and application rate are available to supervisors and dispatchers on desk-top computers. The same information is available to snow plow operators via on-board equipment.	MnDOT	Existing	Transportation	Maint and Constr Management Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Mayday System	Mayday System can provide data to the State Patrol and emergency hospitals in the Twin Cities and Greater Minnesota.	Private Mayday Service Providers	Existing	Transportation	Emergency Management Center
Mayday System Vehicle Equipment	These are vehicles equipped with Mayday systems.	Travelers	Existing	Transportation	Vehicle OBE
MCMIS	Motor Carrier Management Information System (MCMIS) is a national system to consolidate and process motor carrier safety data from sources throughout the US. MCMIS contains safety records of active intrastate and interstate motor carriers, safety and compliance reviews, and roadside inspection records and crash records. MCMIS also carries a Safety Fitness Rating based on algorithms that evaluate all of a carrier's safety data. It supplies carrier ID and safety data history for each interstate carrier via the SAFER system to the Aspen ISS.	FMCSA	Existing	Transportation	Other CV Administration Centers
Media Information Release System	This system has been created to keep the media and the public more up to date in case of serious and fatal accidents that happen within the state of Minnesota. This system contains only those accidents in which the Minnesota State Patrol is the primary reporting law enforcement agency. Records displayed here are as current as the last time State Patrol Personnel edited data. However due to extenuating circumstances such as heavy-accident periods like ice and snow storms, data entry may get back-logged and may not be up to the minute.	Minnesota State Patrol	Existing	Transportation	Archived Data System
Media Outlets	Represents the information systems that provide traffic reports, travel conditions, and other transportation-related news services to the traveling public through radio, TV, and other media.	Local Media	Existing	Transportation	Media

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Metro Area Transit Management Centers	This element represents transit management centers operating within the Twin Cities metropolitan area that operate fixed route and demand responsive public transit services. This includes the Metro Transit Control Center and Suburban Transit Provider Operations Centers, independent of Metro Transit, that connect outer-ring metro-area suburbs with Minneapolis and St. Paul metro areas. Metro Transit Control Center utilizes Global Position System (GPS) technology to identify the location of all transit vehicles and also uses an 800-megahertz regional radio system, which allows Metro Transit to interact with police and fire departments and emergency response teams. Within the metro area, door-to-door demand response transit service is provided by Metro Mobility (serving Minneapolis, St. Paul and many surrounding suburbs), Anoka County Traveler (serving Anoka County), DARTS (serving Dakota County), Scott County (Scott County) and H.S.I. (serving Washington County). Transit fare coordination exists between Metro Transit and all Suburban Transit Providers. As a suburban transit provider, Minnesota Valley Transit Authority implemented Bus Rapid Transit components, such as transit signal priority and transit kiosks at transit stations along the Cedar Avenue / I-35W Corridor. Other Suburban Transit Providers include Maple Grove Transit, Southwest Metro Transit Commission, Prior Lake Laker Lines, Plymouth Transit, and Scott County Transit.	Metro Area Transit Providers	Existing	Transportation	Archived Data User System Emergency Management Center Transit Management Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Minneapolis TMC	The City of Minneapolis operates a Traffic Management Center that provides traffic-responsive and time-of-day operation and an extensive selection of on-line database operations. City of Minneapolis plans to upgrade signal controllers throughout the City, implement an adaptive signal timing plan generation algorithm for the existing traffic control system in Minneapolis, and allow for video sharing between key stakeholders.	City of Minneapolis	Existing	Transportation	Archived Data User System Traffic Management Center
Minnesota Emergency Alert System	Information system to alert the public in emergency situations such as child abductions. The alert includes information and instructions for transportation system operators and the traveling public, improving public safety and enlisting the public's help in some scenarios. Minnesota Homeland Security and Emergency Management and Minnesota Bureau of Criminal Apprehension are key stakeholders of this system.	Minnesota Homeland Security and Emergency Management	Planned	Transportation	Alerting and Advisory System
Minnesota Emergency Responder Database	This element represents an online database to route on-the-scene incident data, road condition, or other data through a single dispatch center or system for processing. The project area would include the seven-county metro area and 10 counties in Greater Minnesota.	Minnesota EMSRB	Existing	Transportation	Archived Data System
Minnesota State Emergency Operations Center (SEOC)	Through the Minnesota DPS Office of Homeland Security and Emergency Management, the state EOC coordinates notifications to the public with county EOCs through the Emergency Alert System (EAS). Personnel from state agencies report to the SEOC to be a liaison between the EOC and their agency and to aid in any decisions. County EOCs coordinate with the SEOC and the nuclear power plants to perform actions needed to ensure public safety. Local police, fire, and other public agencies may be called upon. A county EOC may request assistance from the state.	Minnesota Homeland Security and Emergency Management	Existing	Transportation	Emergency Management Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Minnesota State Patrol Databases	This represents Minnesota State Patrol databases that contains information on crash and dispatching. An Automated Field Reporting (AFR) System is planned to interface with the Records Management System (RMS). With the implementation of the AFR System, four documents that are currently manually filled out and submitted by the Troopers will be electronically transferred from Troopers' laptop computers (called Mobile Data Computers or MDC's) to a central repository.	Minnesota State Patrol	Existing	Transportation	Archived Data System
Minnesota State Patrol District Office	This element represents the 12 State Patrol district offices that manage resources and communicate incident data and resource requests to other public and private agencies. Emergency vehicle components are connected to and operated by the State Patrol Dispatch Center. Central office in St. Paul coordinates alert notifications and emergency plans with the NDDES SOC and also coordinates incident response and threat information with the North Dakota State Radio. It is planned to monitor information received from the Minnesota State Patrol Computer Aided Dispatching (CAD) System and process the transmission of this information to the MnDOT 511 Telephone Information Service and Traveler Information Website (511mn.org). Integration of State Patrol CAD system with MnDOT CARS is planned.	Minnesota State Patrol	Existing	Transportation	Center Emergency Management Center Enforcement Center Traffic Management Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
MnPASS Roadside Equipment	Roadside equipment includes variable message signs to display toll amounts that vary by time of day and/or levels of traffic congestion on toll facility and flashing roadside beacons to indicate that proper toll amounts have been paid for use of the HOT (High-Occupancy Toll) Lane facility. Equipment also includes ramp access controls to prevent drivers from entering the HOT Lane facility. MnPASS is designed to improve roadway efficiency by increasing person and vehicle-carrying capabilities in the MnPASS lanes. HOT lane tolls are priced dynamically based on the level of demand for the HOT lanes.	MnDOT	Existing	Transportation	ITS Roadway Payment Equipment Other ITS Roadway Equipment
MnPASS Service Center	This element represents the center that performs administrative functions relating to MnPASS operations.	MnDOT	Existing	Transportation	Payment Administration Center
MnPASS Vehicle Equipment	This element represents the transponder that supports automated payment of tolls along the MnPASS Lanes.	Travelers	Existing	Transportation	Vehicle OBE

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Motor Carrier Information System	Minnesota Motor Carrier Information System (MCIS) processes and tracks motor carrier credentials, operating authority and associated transactions. MCIS also tracks enforcement cases and hazardous materials incidents. Developed in-house in 1993, MCIS uses client/server architecture, an Oracle database and Oracle Forms. The system has been modified since its initial launch, with the last update in 2008. No credentials can be issued automatically through MCIS without MnDOT staff intervention. Unlike other online credentialing systems, MCIS is not available to the public via the Web. The online component of MCIS is only available to MnDOT credentialing staff members using in-house workstations. These staff members use MCIS to process credentialing applications submitted by customers and enter payments; MnDOT's finance office manually processes these payments. Law enforcement personnel do not have access to MCIS, although MnDOT does maintain a collaborative working relationship with Minnesota State Patrol.	MnDOT OFCVO	Existing	Transportation	Commercial Vehicle Administration Center
Motor Carrier Registration System	This system is responsible for the administration of Minnesota 's driver's license and vehicle registration programs. Its primary functions include driver's license testing and issuance, driver safety compliance, motor vehicle title and registration, commercial vehicle registration, and auto dealer licensing and regulation. The Motor Carrier Registration System sends commercial vehicle operations credentials information to Truck Center.	Minnesota DVS	Existing	Transportation	DMV Other CV Administration Centers
National Weather Service	The National Oceanic and Atmospheric Administration's (NOAA) National Weather Service provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas.	NOAA	Existing	Transportation	Weather Service System

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Neighboring State CARS / Roadway Information Systems	This element represents an existing Conditions Acquisition and Reporting System (CARS) for the state of Iowa and a planned CARS for the state of Wisconsin. This also represents roadway information systems for North Dakota and South Dakota. ISP coordination with the MnDOT CARS is planned.	Neighboring States	Existing	Transportation	Other Transportation Information Centers
Neighboring State Emergency Management Agencies	This element represents neighboring state agencies that coordinate alert notifications, emergency plans, evacuation plans, incident response, resources, and incident command information with Minnesota State Patrol and MnDOT RTMC, SRCC and District Offices. These agencies include: Iowa State Patrol, Wisconsin State Patrol, North Dakota State Operations Center, Northwest Wisconsin Emergency Service Providers, and US Coast Guard.	Neighboring States	Existing	Transportation	Other Emergency Management Centers
Neighboring State Traffic Management Centers	This element represents traffic management centers located outside the state of Minnesota that plan to coordinate traffic control and information in border areas. This includes the North Dakota DOT Traffic Operations Center, the North Dakota DOT Maintenance Office, the Fargo Traffic Operations Center, the Wisconsin DOT Traffic Operations Center in Superior, and the Iowa DOT.	Neighboring States	Existing	Transportation	Traffic Management Center
Neighboring State Traffic Management Centers Roadside Equipment	This element represents roadside equipment whose control plans to be shared between Minnesota Traffic Management Centers and Neighboring State Traffic Management Centers. This includes signal system roadside equipment in Fargo, ND and additional roadside equipment operated by the North Dakota and Wisconsin DOT's.	Neighboring States	Planned	Transportation	ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
North/West Passage Corridor Traveler Information Website	As a project included in the North/West Passage Corridor Phase 3 Work Plan, the initial information presented for the website would focus on Major Event Descriptions (also a project defined in the Phase 3 Work Plan) affecting travel along the Corridor. The website would be linked to/from each of the individual state 511 (or related state-wide traveler information) web sites to encourage use. The site could also be developed to serve as a foundation for providing similar information at kiosks in rest areas, restaurants or other venues along the corridor. The North/West Passage Corridor encompasses eight states along the I-90/I-94 Corridor (WI, MN, ND, SD, MT, WY, ID, WA).	North/West Passage Corridor Members	Planned	Transportation	Transportation Information Center
Other States TPIMS	Truck parking information management systems in other MAASTO states.	MAASTO	Existing	Transportation	Parking Management System
Oversize Warning Roadside Equipment	This represents roadside detectors and electronic warning signs that warn drivers of vehicles that are too tall or too wide to pass under bridges or through tunnels. Operated by MnDOT District 7.	MnDOT	Existing	Transportation	ITS Roadway Equipment
Park-and-Ride Parking Information System Roadside Equipment	Real-time information on availability of parking spaces at Metro Transit Park-and-Rides will be displayed to drivers via electronic message signs at various Metro Transit park-and-ride stations.	Metro Transit	Existing	Transportation	Parking Management System
Parking Management Roadside Equipment	This represents roadside equipment that detects vehicle traffic in parking facilities and informs motorists of parking space availability. Roadside equipment is controlled by Parking Management Systems.	MnDOT	Planned	Transportation	Parking Management System
Parking Management System	This represents the central control system of the parking management system. This system monitors parking operations and controls electronic display signs to notify drivers of parking availability.	MnDOT	Existing	Transportation	Traffic Management Center
Parking Operator	Parking Operator that controls electronic display signs to notify drivers of parking availability.	Private Parking Operators	Existing	Transportation	Parking Operator

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
PRISM	Links to interstate commercial motor vehicle registration to safety and safety fitness of motor carriers. Identifies motor carriers and improves safety through a comprehensive system of education, awareness, performance monitoring, and treatment.	FMCSA	Existing	Transportation	Other CV Administration Centers
Private Fleet and Freight Management Center	Private trucking companies represent those companies that own and manage their own commercial fleets of vehicles traveling through the state of Minnesota. They provide route plans for oversized and overweight vehicles based on information received from the CARS database.	Private Trucking Companies	Existing	Transportation	Fleet and Freight Management Center
Private Information Service Providers	This element represents private information service providers that provide specific directions to travelers by receiving origin and destination requests from travelers, generate route plans, and return the calculated plans to travelers.	Private Information Service Providers	Existing	Transportation	Transportation Information Center
Queue Detection Roadside Equipment	This element represents roadside equipment that detects lengthy queues of traffic downstream of Ramp Meter Roadside Equipment, incident locations, and work zones.	MnDOT	Existing	Transportation	ITS Roadway Equipment
Railroad Active Warning Roadside Equipment	This element represents roadside equipment that alerts motorists of railroad crossings at at-grade intersections. Gates are activated and de-activated as trains are detected approaching and clearing the intersection.	MnDOT	Existing	Transportation	ITS Roadway Equipment
Railroad Wayside Equipment	This element represents wayside equipment at various highway-railroad crossing systems.	Railroad Companies	Existing	Transportation	Wayside Equipment
Ramp Meter Roadside Equipment	This element represents the system of ramp meters used by the RTMC to increase freeway volumes, trip reliability, and freeway speeds, while decreasing travel time and crashes. Ramp meters have the potential to operate during the morning and evening peak traffic periods. Timing and operation of ramp meters is controlled by Intelligent Roadway Information System at the MnDOT RTMC.	MnDOT	Existing	Transportation	ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Real-Time Bus Arrival Time Display Roadside Equipment	Real-time information on bus and light rail arrival/departure times is displayed to passengers via electronic message signs at Metro Transit bus stops and light rail stations. Signs are also installed at key decision points for drivers along arterial roads and freeways prior to entrances to park-and-ride facilities. Commuter rail arrival/departure times could also be displayed to travelers in the future.	Metro Transit	Existing	Transportation	Traveler Support Equipment
Real-Time Transit Travel Time Display Roadside Equipment	Real-time information on transit travel times as compared passenger-vehicle travel times is displayed to passengers via dynamic message signs prior to arriving at select Metro Transit park-and-ride locations.	Metro Transit	Planned	Transportation	ITS Roadway Equipment
Red Light Monitoring/Enforcement Roadside Equipment	This element represents portable or permanent photo/monitoring systems located at intersections with high crash rates. Purpose is to inform and educate the traveling public of the dangers of running red lights. Planned for MnDOT District 6.	MnDOT	Existing	Transportation	ITS Roadway Equipment
Research Lab Network Monitoring Archive	This represents the data archive maintained by Minnesota Traffic Observatory (MTO). The archive stores data on freeway traffic flows through a fully independent network of video detectors covering the I-35W/I-94 Commons freeway area in Minneapolis. Portable monitoring stations deployed on the roofs of several high-rise buildings overlooking the freeway transmit data back to the MTO.	University of Minnesota CTS ITS Institute	Existing	Transportation	Archived Data System
Research Lab Network Monitoring Roadside Equipment	This element represents the network of video detectors providing space- and time-continuous coverage of the I-35W/I-94 Commons freeway area in Minneapolis (the Beholder system). Portable monitoring stations deployed on the roofs of several high-rise buildings overlooking the freeway transmit data back to the MTO via a high-speed IEEE 802.16 wireless network.	University of Minnesota CTS ITS Institute	Existing	Transportation	ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Research Lab New Monitoring Control System	This represents the Minnesota Traffic Observatory (MTO) - a transportation laboratory that gathers data on freeway traffic flows through a fully independent network of video detectors providing space- and time-continuous coverage of the I-35W/I-94 Commons freeway area in Minneapolis. Portable monitoring stations deployed on the roofs of several high-rise buildings overlooking the freeway transmit data back to the MTO via a high-speed IEEE 802.16 wireless network. MnDOT supplies eight switchable compressed/streamed Internet video feeds to the MTO. Researchers have the ability to switch between any of the Mn/DOT video cameras monitoring the metropolitan freeway network.	University of Minnesota CTS ITS Institute	Planned	Transportation	Traffic Management Center
Rest Area WiFi	RASAWI (Rest Area Sponsorship, Advertising, and Wireless Internet) Program aims to deploy wireless internet access at a number of rest areas throughout the state of Minnesota.	MnDOT	Existing	Transportation	Transportation Information Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Roadway Automated Treatment System	Automated treatment systems remotely apply roadway chemicals due to ice conditions that may form on bridges, bridge approaches, or curves. Systems can also be controlled and operated by a system operator at either the RTMC or SRCC throughout the state. Treatment systems exist in the metro area and MnDOT Districts 1 (Duluth), 6, (Rochester and Winona) and 7 (Worthington and Beaver Creek). Similar systems are planned for MnDOT Districts 2 and 4. Treatment systems in the metro area are connected to Advanced Warning Flashers to alert drivers of system operation. Further deployment is planned in District 6 on I-35 on the Albert Lea Lake Bridge. Mobile anti-icing systems are being tested in the metro area. Hennepin County and City of Duluth currently operate roadway automated treatment systems. Cities of Moorhead and East Grand Forks plan to operate roadway automated treatment systems.	MnDOT	Existing	Transportation	ITS Roadway Equipment
Roadway Flooding Warning Roadside Equipment	This element represents roadside equipment on TH 59 and TH 60 near Worthington that automatically detects a rise in water level and issues an alert based on commands from the Mankato Signal Center in District 7. It also represents planned roadside equipment in Mower County that would alert the Mower County dispatch center and trigger advanced warning signs (static signs with flashing beacons) to alert approaching vehicles. The proposed equipment includes sensors in the field which report to a central receiver/decoder located which would likely be located at the Mower County dispatch center. The system would also include communication and utilities at both the flood-warning sensor and the static warning signs with flashing beacons.	Local Agencies	Planned	Transportation	ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Roadway Lighting Management Central Monitoring Equipment	This element represents the central location at which Roadway Lighting Management Roadside Equipment is monitored.	City of Minneapolis	Planned	Transportation	Traffic Management Center
Roadway Lighting Management Roadside Equipment	This represents roadside equipment that will apply an optimal amount of roadway lighting based on current road and weather conditions. System is planned in the City of Minneapolis, which will allow operational control of the City's street lighting system from a central location, delivering light intelligently based upon real-time conditions. Through a wireless network and existing power and cable lines, the user can efficiently and effectively control the operation of all street lights maintained by the City of Minneapolis from one central location, mobile or stationary.	City of Minneapolis	Existing	Transportation	ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
RTMC	The Traffic Operations unit is responsible for managing traffic on the Twin Cities metro freeways with the use of ramp meters, variable message signs, lane control signals and loop detectors. Additional RTMC components include the HOV system, MnPASS, and airborne monitoring systems. They monitor traffic conditions, assist in incident management and provide traveler information. Traffic Operations staff also continually perform systems analysis of field equipment, the ramp meter algorithm and Operations Center equipment. They also analyze and research traffic flow trends, new technologies and other issues that affect congestion. RTMC Maintenance Dispatch provides maintenance communications for the Metro District. Staff handles phone calls and monitor electronic communications and bridge anti-icing systems, roadway surface and sub-surface systems. RTMC Maintenance dispatches appropriate personnel for road emergencies such as snow and ice, potholes and incidents that may affect traffic flow. Maintenance Dispatch coordinates and initiates traffic management systems with the RTMC, traffic management personnel and the State Patrol. The RTMC integrates MnDOT's Metro District Maintenance Dispatch and MnDOT's Office of Traffic, Security and Operations with the Minnesota State Patrol Dispatch into a unified communications center. The integration provides the communications and computer infrastructure necessary for coordinated transportation management on metro freeways during normal commuting periods, as well as during special events and major incidents. In addition, the RTMC houses the FIRST Dispatch Center. The RTMC is also designated as the primary EOC for the Metro area.	MnDOT	Existing	Transportation	Archived Data User System Center Emergency Management Center Maint and Constr Management Center Other Archived Data Systems Traffic Management Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
RWIS Central Control System	The RWIS Central Control System collects, verifies, processes, and formats environmental and road pavement surface condition data. Data is then made available to maintenance personnel, law enforcement, vendors providing value-added services, and the general public via the 511 information system. It is planned to send RWIS data to the MnCARS database.	MnDOT Office of Maintenance	Existing	Transportation	Authorizing Center
RWIS Central Control System	The RWIS Central Control System collects, verifies, processes, and formats environmental and road pavement surface condition data. Data is then made available to maintenance personnel, law enforcement, vendors providing value-added services, and the general public via the 511 information system. It is planned to send RWIS data to the MnCARS database.	MnDOT Office of Maintenance	Existing	Transportation	Maint and Constr Management Center
RWIS Central Control System	The RWIS Central Control System collects, verifies, processes, and formats environmental and road pavement surface condition data. Data is then made available to maintenance personnel, law enforcement, vendors providing value-added services, and the general public via the 511 information system. It is planned to send RWIS data to the MnCARS database.	MnDOT Office of Maintenance	Existing	Transportation	Other Archived Data Systems
RWIS Central Control System	The RWIS Central Control System collects, verifies, processes, and formats environmental and road pavement surface condition data. Data is then made available to maintenance personnel, law enforcement, vendors providing value-added services, and the general public via the 511 information system. It is planned to send RWIS data to the MnCARS database.	MnDOT Office of Maintenance	Existing	Transportation	Transportation Information Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
RWIS Central Control System	The RWIS Central Control System collects, verifies, processes, and formats environmental and road pavement surface condition data. Data is then made available to maintenance personnel, law enforcement, vendors providing value-added services, and the general public via the 511 information system. It is planned to send RWIS data to the MnCARS database.	MnDOT Office of Maintenance	Existing	Transportation	Weather Service System
RWIS Stations	MnDOT's RWIS Stations include 96 environmental sensor sites, designed to measure environmental conditions and road pavement surface conditions, and over 50 airport sites, designed just to measure environmental conditions, connected via statewide network. Environmental sensors are planned to be equipped with pan/tilt cameras to provide maintenance crews with additional road condition data. All data is communicated to the MnDOT RWIS Central Control System for verification, processing, and formatting. Camera images from RWIS stations are posted on the MnDOT 511 Traveler Information Website (www.511mn.org).	MnDOT Office of Maintenance	Existing	Transportation	ITS Roadway Equipment
SAFER	The FMCSA Safety and Fitness Electronic Records (SAFER) System offers company safety data and related services to industry and the public over the Internet. Users can search FMCSA databases, register for a USDOT number, pay fines online, order company safety profiles, challenge FMCSA data using the DataQs system, access the Hazardous Material Route registry, obtain National Crash and Out of Service rates for Hazmat Permit Registration, get printable registration forms and find information about other FMCSA Information Systems.	FMCSA	Existing	Transportation	Other CV Administration Centers

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Security Monitoring Roadside Equipment	This element represents threat detection, video monitoring, and emergency alert systems at critical infrastructure areas (bridges, ports, tunnels, etc.) throughout the state. Video cameras and threat sensors will monitor critical facilities and when suspicious activity or objects in restricted areas detected an alert will automatically be sent to RTMC and emergency management personnel. The Tunnel Alarm Monitoring System is currently operated by MnDOT District 1 and the State Patrol dispatchers is listed separately.	MnDOT	Planned	Transportation	Security Monitoring Equipment
Speed Monitoring Roadside Equipment	This system will provide photo enforcement for speeding at locations where there is a history of crashes with excessive speed as a contributing factor or in work zones.	Minnesota State Patrol	Existing	Transportation	ITS Roadway Equipment
SRCC	MnDOT Southern Regional Communication Center (SRCC) is a regional center in the Rochester area for 24-hour incident and emergency response, multi-agency dispatching and fleet management, interagency communications, and collection and dissemination of road conditions.	MnDOT	Existing	Transportation	Archived Data User System Emergency Management Center Emissions Management Center Maint and Constr Management Center Other Archived Data Systems Traffic Management Center
Surface Transportation Weather Service Providers	Providers of value-added sector specific meteorological services. These providers utilize National Weather Service data and predictions, road condition information and local environmental data to provide weather observations and forecasts. Examples include the Data Transmission Network (DTN).	Private Weather Service Providers	Planned	Transportation	Surface Transportation Weather Service
TPIMS Central Data Repository	Central data repository for the multi-state truck parking information management systems.	MAASTO	Existing	Transportation	Archived Data System

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Traffic Data and Video Archive	This element represents the database in which Automated Traffic Recorder (ATR) data is stored. The ATR data is compiled from several sources into a single accessible database managed by the MnDOT Office of Transportation Data Analysis to answer data requests and provide reports to others. This element also represents the database in which monitoring video is stored.	MnDOT	Existing	Transportation	Archived Data System
Traffic Detector Roadside Equipment	This element represents roadside equipment that collects data on traffic patterns and volumes. Data is communicated back to the Automated Traffic Recorder (ATR) central systems reside in TMCs (i.e. RTMC, SRCC, and local TMCs). Data is also collected, processed, and archived by TMCs.	MnDOT	Existing	Transportation	ITS Roadway Equipment
Traffic Signal Roadside Equipment	This element represents traffic signals in Minnesota that are controlled by traffic management centers - RTMC, SRCC, Minneapolis TMC, and Local TMCs. This element supports surface street control and arterial traffic management. It represents traffic signal systems ranging from fixed-schedule control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests.	MnDOT	Existing	Transportation	ITS Roadway Equipment
Transit Center and Station Surveillance System Roadside Equipment	These systems represent surveillance and security monitoring at transit centers, garages, stations, and park and ride lots. The systems have been implemented at centers and garages for the Saint Cloud Metropolitan Transit Commission, Duluth Transit Authority, and Metro Transit. Park and ride surveillance system and BRT/light rail boarding area surveillance systems are deployed by Metro Transit.	Metro Area Transit Providers	Planned	Transportation	Traveler Support Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Transit Data Archives	Transit data archives will store automated data generated by metro area transit providers, as well as local transit providers. It is planned to upgrade existing or install new scheduling software systems as determined by transit agencies. The automated archiving system will provide the capability to automate real time, interactive and/or batch scheduling functions and increase the efficiency of service. The basic program features will include vehicle management, driver management, trip reservations, automated scheduling and routing, coordination, dispatching, reporting, geo-coding, and mapping.	Metro Area Transit Providers	Existing	Transportation	Archived Data System
Transit Information Telephone Systems	This elelment represents telephone systems that allow users to utilize a touchtone phone to access transit schedule information. Metro Transit currently operates a phone system that gives transit related information such as routes, schedule, State Fair transit information, and Snow Reroute information when applicable. It provides real-time information for trips departing in the next 20 minutes. It also provides visually impaired customers with equal access to schedules.	Metro Area Transit Providers	Existing	Transportation	Personal Information Device Transit Management Center
Transit Information Websites	This element represents websites that provide general route and schedule information to travelers. Metro Transit, Duluth Transit Authority, and Cities Area Transit websites support transit trip planner functions. Metro Transit website also supports trip planning and dynamic ridesharing functions. DARTS has an on-line ride reservation request system.	Metro Area Transit Providers	Existing	Transportation	Transportation Information Center

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Transit Kiosks	This element represents existing and planned transit kiosks that manage electronic fare payment and provide real-time stop arrival notifications. Kiosks are currently in operation along the Metro Transit Hiawatha Light Rail line. Kiosks are planned as part of the Minnesota Valley Transit Authority Bus Rapid Transit project along Cedar Avenue and I-35W. This also represents existing and planned kiosks for Metro Area Transit and City of Rochester Transit that provide transit information to passengers at transit stops and stations.	Metro Area Transit Providers	Existing	Transportation	Traveler Support Equipment
Transit Vehicle Equipment	This element represents all transit vehicles operated by transit service providers. This element also represents ITS equipment on board of transit vehicles, including AVL, MDT, radio communications, TSP, passenger counter, electronic fare collection equipment, surveillance and security monitoring devices, and traveler information annunciation. Transit Signal Priority (TSP) exists on vehicles serving St. Cloud and East Grand Forks. TSP is planned for vehicles serving Minneapolis, Rochester, Duluth, and Moorhead. Transit vehicles for Metro Transit, MTC, and DTA support on-board surveillance cameras. Transit vehicles for Metro Transit, MTC, and DTA support on-board Automated Vehicle Location (AVL) devices. Transit vehicles for Metro Transit, MTC, DTA, MAT, CAT, and Rochester support electronic fare collection devices. Transit vehicles for Metro Transit and DTA support automated passenger counting. Light Rail transit vehicles support automated next stop annunciation. Metro Transit plans to deploy transit vehicle lateral and longitudinal vehicle safety warning systems for shoulder-running buses to improve transit travel safety.	Metro Area Transit Providers	Existing	Transportation	Transit Vehicle OBE Vehicle OBE
Transit Vehicle Operator	This element represents operators of transit vehicles.	Metro Area Transit Providers	Existing	Transportation	Transit Vehicle Operator

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Transportation Information System (TIS)	MnDOT Office of Transportation Data Analysis (OTDS) is responsible for the collection, creation, storage, maintenance, and dissemination of transportation-related data to the general public through various means. Interconnects with MnDOT RTMC and SRCC, RWIS Central Server, and MnCARS. Archive coordination exists with the RTMC, SRCC, and RWIS.	MnDOT OTDS	Existing	Transportation	Archived Data System
Traveler	Travelers along Minnesota roads and highways.	Travelers	Existing	Transportation	Traveler
Traveler Cards	This element represents traveler cards that facilitate electronic payment of transit fares on board Transit Vehicles. Traveler cards are also used in the electronic payment of parking fees at parking ramps.	Travelers	Planned	Transportation	Payment Device Traveler Card
Traveler Information and Parking Kiosks	MnDOT Traveler Information Kiosks at major parking ramps.	MnDOT	Existing	Transportation	Traveler Support Equipment
Truck Center	Collects and distributes planned event information (i.e., road maintenance) and unplanned event information (i.e., road surface conditions). It is also responsible for granting trucking permits for oversized and overweight vehicles and provides route plans for oversized and overweight vehicles based on information it receives from CARS. Examples of the Truck Center include: MnDOT Metro Region Truck Center) and Other Regional Truck Centers.	MnDOT OFCVO	Existing	Transportation	Commercial Vehicle Administration Center Transportation Information Center
Tunnel Emissions Roadside Equipment	This represents the Tunnel Alarm Monitoring System is currently operated by Mn/DOT District 1 and the State Patrol dispatchers and includes the monitoring of the Lief Erickson Tunnel within Segment 10 and the Silver Creek and Lafayette Bluff tunnels along Highway 61 north of Duluth (along the North Shore). Roadside equipment monitors for carbon monoxide (CO) levels, fire, fan and generator operation and communications and power.	MnDOT	Existing	Transportation	ITS Roadway Equipment Security Monitoring Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
UMD Transportation Data Research Laboratory (TDRL)	Transportation Data Research Laboratory (TDRL) server located at the University of Minnesota-Duluth (UMD) campus downloads data from the MnDOT RWIS Central Server. The TDRL server daily archives this RWIS data using the Unified Transportation Sensor Data Format (UTSDF) and makes them available to the public through Internet. This archived historic data is presently only available through TDRL.	University of Minnesota Duluth	Existing	Transportation	Archived Data System Transportation Information Center
User Personal Portable and Computing Devices	This element represents personal computers and other personal devices (such as PDA's and cell phones) used by travelers to obtain travel-related information. It is planned to obtain traffic data from cell phone usage on roads and highways.	Travelers	Existing	Transportation	Archived Data User System Personal Information Device
Variable Speed Limit Roadside Equipment	This element represents Variable Speed Limit (VSL) systems that will provide real-time information on appropriate speed for current conditions based on traffic flow, traffic speed, weather and other inputs and integration with law enforcement. Can be used to manage traffic under a number of variable conditions. MnDOT will select a corridor for deployment of VSL system in conjunction with a dynamic lane control system based on traffic data analysis.	MnDOT	Existing	Transportation	ITS Roadway Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Vehicle	In-vehicle systems may record vehicle operating information, including speed, seat belt use, brake use, impact, etc. Operational Test is being conducted by MnDOT to utilize vehicles as traffic sensors to gather travel time estimations. It is planned to develop in-vehicle safety systems as part of the Minnesota ITS Safety Plan over the coming years. These systems include ignition interlocks with seat belt systems, BAC (Blood-Alcohol Content) measurements for repeat offender drunk drivers, and driver distraction detection systems. The area along the I-94 corridor between Saint Cloud, MN and Maple Grove, MN is being considered as a test bed for Vehicle-Infrastructure Integration projects involving vehicle to roadside communications. High-speed, Dedicated Short-Range Communications (DSRC) systems needed for vehicle-roadside safety-critical communications will require substantial network speed.	Travelers	Planned	Transportation	Vehicle OBE
Vehicle Occupancy Monitoring/Enforcement Roadside Equipment	This element represents roadside equipment that is planned to monitor vehicle occupancies along designated HOV/MnPASS lanes and signal for enforcement when violations are detected.	MnDOT	Existing	Transportation	ITS Roadway Equipment
Virtual Weigh Stations	Virtual Weigh-in-Motion (WIM) Stations will allow for real-time identification of trucks violating weight restrictions using a weigh-in-motion (WIM) scale and other enhancements. Virtual WIM sites will flag potential violators for enforcement officers to perform further checks. Virtual WIM sites can either act as standalone WIM sites or be connected to a central operating network. Virtual WIM Stations will also investigate the use of a dynamic feedback system that will present a weight compliance message to vehicles immediately after they have passed over a WIM scale.	MnDOT OFCVO	Existing	Transportation	Commercial Vehicle Check Equipment

Element Name	Element Description	Stakeholder	Element Status	Element Domain	Associated Physical Objects
Weigh In Motion (WIM) Stations	This element represents scales that weigh trucks while they are moving so they do not have to be pulled off the road.	MnDOT OFCVO	Existing	Transportation	Commercial Vehicle Check Equipment
Weigh Station Roadside Equipment	This element represents roadside equipment operated by the Minnesota State Patrol that ensures commercial vehicles comply with weight restrictions along Minnesota roads and highways. These stations do not have the functionality of Weigh-in-Motion (WIM) Stations deployed elsewhere in Minnesota.	Minnesota State Patrol			Commercial Vehicle Check Equipment

6 Service Packages

ITS services, or service packages, describe what can be done to improve the efficiency, safety, and convenience of the regional transportation system through better information, advanced systems and new technologies. Some services are specific to one primary stakeholder while others require broad stakeholder participation. This section describes the ITS services that meet the transportation needs in Minnesota.

Table 4 – Service Packages

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
CVO01	Carrier Operations and Fleet Management	Existing	No	511 Traveler Information Website
CVO01	Carrier Operations and Fleet Management	Existing	No	Automated Permit Routing System (RouteBuilder)
CVO01	Carrier Operations and Fleet Management	Existing	No	Commercial Vehicle Administration Center
CVO01	Carrier Operations and Fleet Management	Existing	No	Commercial Vehicles
CVO01	Carrier Operations and Fleet Management	Existing	No	Condition Acquisition and Reporting System (CARS)
CVO01	Carrier Operations and Fleet Management	Existing	No	Private Fleet and Freight Management Center
CVO01	Carrier Operations and Fleet Management	Existing	No	Truck Center
CVO02	Freight Administration	Planned	No	Commercial Vehicles
CVO02	Freight Administration	Planned	No	Intermodal Freight Depots
CVO02	Freight Administration	Planned	No	Private Fleet and Freight Management Center
CVO03	Electronic Clearance	Existing	No	Commercial Vehicle Administration Center
CVO03	Electronic Clearance	Existing	No	Commercial Vehicles
CVO03	Electronic Clearance	Existing	No	IFTA Clearinghouse
CVO03	Electronic Clearance	Existing	No	IRP Clearinghouse
CVO03	Electronic Clearance	Existing	No	MCMIS
CVO03	Electronic Clearance	Existing	No	Private Fleet and Freight Management Center
CVO03	Electronic Clearance	Existing	No	SAFER
CVO03	Electronic Clearance	Existing	No	Virtual Weigh Stations
CVO03	Electronic Clearance	Existing	No	Weigh In Motion (WIM) Stations
CVO03	Electronic Clearance	Existing	No	Weigh Station Roadside Equipment
CVO04	CV Administrative Processes	Existing	No	Account Management Providers
CVO04	CV Administrative Processes	Existing	No	Automated Permit Routing System (RouteBuilder)
CVO04	CV Administrative Processes	Existing	No	CVO Information Requestor
CVO04	CV Administrative Processes	Existing	No	IFTA Clearinghouse
CVO04	CV Administrative Processes	Existing	No	IRP Clearinghouse
CVO04	CV Administrative Processes	Existing	No	MCMIS

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
CVO04	CV Administrative Processes	Existing	No	Motor Carrier Information System
CVO04	CV Administrative Processes	Existing	No	Motor Carrier Registration System
CVO04	CV Administrative Processes	Existing	No	PRISM
CVO04	CV Administrative Processes	Existing	No	Private Fleet and Freight Management Center
CVO04	CV Administrative Processes	Existing	No	SAFER
CVO04	CV Administrative Processes	Existing	No	Truck Center
CVO05	International Border Electronic Clearance	Existing	No	Commercial Vehicle Administration Center
CVO05	International Border Electronic Clearance	Existing	No	Commercial Vehicles
CVO05	International Border Electronic Clearance	Existing	No	FAST Compliance Management System
CVO07	Roadside CVO Safety	Existing	No	Commercial Vehicles
CVO07	Roadside CVO Safety	Existing	No	Minnesota State Patrol District Office
CVO07	Roadside CVO Safety	Existing	No	Private Fleet and Freight Management Center
CVO07	Roadside CVO Safety	Existing	No	SAFER
CVO07	Roadside CVO Safety	Existing	No	Virtual Weigh Stations
CVO07	Roadside CVO Safety	Existing	No	Weigh In Motion (WIM) Stations
CVO07	Roadside CVO Safety	Existing	No	Weigh Station Roadside Equipment
CVO08	Smart Roadside and Virtual WIM	Planned	No	Commercial Vehicle Administration Center
CVO08	Smart Roadside and Virtual WIM	Planned	No	Commercial Vehicles
CVO08	Smart Roadside and Virtual WIM	Planned	No	Minnesota State Patrol District Office
CVO08	Smart Roadside and Virtual WIM	Planned	No	Private Fleet and Freight Management Center
CVO08	Smart Roadside and Virtual WIM	Planned	No	SAFER
CVO08	Smart Roadside and Virtual WIM	Planned	No	Virtual Weigh Stations
CVO08	Smart Roadside and Virtual WIM	Planned	No	Weigh In Motion (WIM) Stations
CVO08	Smart Roadside and Virtual WIM (S31)	Planned	Yes	Commercial Vehicles
CVO08	Smart Roadside and Virtual WIM (S31)	Planned	Yes	Minnesota State Patrol District Office
CVO08	Smart Roadside and Virtual WIM (S31)	Planned	Yes	Motor Carrier Information System
CVO08	Smart Roadside and Virtual WIM (S31)	Planned	Yes	Weigh In Motion (WIM) Stations
CVO08	Smart Roadside and Virtual WIM (S32)	Planned	Yes	Commercial Vehicles
CVO08	Smart Roadside and Virtual WIM (S32)	Planned	Yes	Motor Carrier Information System
CVO08	Smart Roadside and Virtual WIM (S32)	Planned	Yes	Virtual Weigh Stations
CVO09	Freight-Specific Dynamic Travel Planning	Planned	No	511 Traveler Information Website

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
CVO09	Freight-Specific Dynamic Travel Planning	Planned	No	Commercial Vehicles
CVO09	Freight-Specific Dynamic Travel Planning	Planned	No	Parking Management Roadside Equipment
CVO09	Freight-Specific Dynamic Travel Planning	Planned	No	Private Fleet and Freight Management Center
CVO10	Road Weather Information for Freight Carriers	Existing	No	511 Traveler Information Website
CVO10	Road Weather Information for Freight Carriers	Existing	No	Condition Acquisition and Reporting System (CARS)
CVO10	Road Weather Information for Freight Carriers	Existing	No	Private Fleet and Freight Management Center
CVO12	HAZMAT Management	Existing	No	Commercial Vehicles
CVO12	HAZMAT Management	Existing	No	County Emergency Operations Centers
CVO12	HAZMAT Management	Existing	No	Minnesota State Emergency Operations Center (SEOC)
CVO12	HAZMAT Management	Existing	No	Minnesota State Patrol District Office
CVO12	HAZMAT Management	Existing	No	Private Fleet and Freight Management Center
DM01	ITS Data Warehouse	Existing	No	911 Dispatch Center
DM01	ITS Data Warehouse	Existing	No	Condition Acquisition and Reporting System (CARS)
DM01	ITS Data Warehouse	Existing	No	Intercity Transit Management Centers
DM01	ITS Data Warehouse	Existing	No	Local TMCs
DM01	ITS Data Warehouse	Existing	No	Local Transit Management Centers
DM01	ITS Data Warehouse	Existing	No	Maintenance and Construction Management Center
DM01	ITS Data Warehouse	Existing	No	Media Information Release System
DM01	ITS Data Warehouse	Existing	No	Metro Area Transit Management Centers
DM01	ITS Data Warehouse	Existing	No	Minnesota Emergency Responder Database
DM01	ITS Data Warehouse	Existing	No	Minnesota State Emergency Operations Center (SEOC)
DM01	ITS Data Warehouse	Existing	No	Minnesota State Patrol Databases
DM01	ITS Data Warehouse	Existing	No	Minnesota State Patrol District Office
DM01	ITS Data Warehouse	Existing	No	Research Lab Network Monitoring Archive
DM01	ITS Data Warehouse	Existing	No	Research Lab New Monitoring Control System
DM01	ITS Data Warehouse	Existing	No	RTMC
DM01	ITS Data Warehouse	Existing	No	RWIS Central Control System
DM01	ITS Data Warehouse	Existing	No	SRCC
DM01	ITS Data Warehouse	Existing	No	Traffic Data and Video Archive
DM01	ITS Data Warehouse	Existing	No	Transit Data Archives
DM01	ITS Data Warehouse	Existing	No	Transportation Information System (TIS)
DM01	ITS Data Warehouse	Existing	No	UMD Transportation Data Research Laboratory (TDRL)
DM01	ITS Data Warehouse (S06)	Planned	Yes	Other States TPIMS
DM01	ITS Data Warehouse (S06)	Planned	Yes	Parking Management Roadside Equipment

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
DM01	ITS Data Warehouse (S06)	Planned	Yes	Parking Management System
DM01	ITS Data Warehouse (S06)	Planned	Yes	TPIMS Central Data Repository
MC01	Maintenance and Construction Vehicle and Equipment Tracking	Existing	No	Maintenance and Construction Management Center
MC01	Maintenance and Construction Vehicle and Equipment Tracking	Existing	No	Maintenance and Construction Vehicle Equipment
MC01	Maintenance and Construction Vehicle and Equipment Tracking	Existing	No	RTMC
MC02	Maintenance and Construction Vehicle Maintenance	Existing	No	Maintenance and Construction Management Center
MC02	Maintenance and Construction Vehicle Maintenance	Existing	No	Maintenance and Construction Vehicle Equipment
MC03	Roadway Automated Treatment	Existing	No	Driver
MC03	Roadway Automated Treatment	Existing	No	Maintenance and Construction Management Center
MC03	Roadway Automated Treatment	Existing	No	Roadway Automated Treatment System
MC03	Roadway Automated Treatment	Existing	No	RTMC
MC04	Winter Maintenance	Existing	No	Condition Acquisition and Reporting System (CARS)
MC04	Winter Maintenance	Existing	No	Maintenance and Construction Management Center
MC04	Winter Maintenance	Existing	No	Maintenance and Construction Vehicle Equipment
MC04	Winter Maintenance	Existing	No	Maintenance Decision Support System
MC04	Winter Maintenance	Existing	No	RTMC
MC04	Winter Maintenance	Existing	No	SRCC
MC05	Roadway Maintenance and Construction	Existing	No	Dynamic Late Merge Central Control System
MC05	Roadway Maintenance and Construction	Existing	No	Dynamic Late Merge Roadside Equipment
MC05	Roadway Maintenance and Construction	Existing	No	Infrastructure GIS Database Systems
MC05	Roadway Maintenance and Construction	Existing	No	Intelligent Work Zone System Roadside Equipment
MC05	Roadway Maintenance and Construction	Existing	No	Maintenance and Construction Management Center
MC05	Roadway Maintenance and Construction	Existing	No	Maintenance and Construction Vehicle Equipment
MC05	Roadway Maintenance and Construction	Existing	No	RTMC
MC05	Roadway Maintenance and Construction	Existing	No	SRCC
MC06	Work Zone Management	Existing	No	Arrow Board Reporting System
MC06	Work Zone Management	Existing	No	VIDEO MONITORING Roadside Equipment

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
MC06	Work Zone Management	Existing	No	Condition Acquisition and Reporting System (CARS)
MC06	Work Zone Management	Existing	No	Driver
MC06	Work Zone Management	Existing	No	Dynamic Late Merge Central Control System
MC06	Work Zone Management	Existing	No	Dynamic Late Merge Roadside Equipment
MC06	Work Zone Management	Existing	No	Dynamic Message Sign Roadside Equipment
MC06	Work Zone Management	Existing	No	Intelligent Work Zone System Roadside Equipment
MC06	Work Zone Management	Existing	No	Lane/Ramp Access Control Roadside Equipment
MC06	Work Zone Management	Existing	No	Maintenance and Construction Management Center
MC06	Work Zone Management	Existing	No	Maintenance and Construction Vehicle Equipment
MC06	Work Zone Management	Existing	No	RTMC
MC06	Work Zone Management	Existing	No	SRCC
MC06	Work Zone Management	Existing	No	Variable Speed Limit Roadside Equipment
MC06	Work Zone Management (S01)	Planned	Yes	511 Traveler Information Website
MC06	Work Zone Management (S01)	Planned	Yes	Arrow Board Reporting System
MC06	Work Zone Management (S01)	Planned	Yes	Condition Acquisition and Reporting System (CARS)
MC06	Work Zone Management (S01)	Planned	Yes	RTMC
MC07	Work Zone Safety Monitoring	Existing	No	Driver
MC07	Work Zone Safety Monitoring	Existing	No	Intelligent Work Zone System Roadside Equipment
MC07	Work Zone Safety Monitoring	Existing	No	Maintenance and Construction Field Personnel
MC07	Work Zone Safety Monitoring	Existing	No	Maintenance and Construction Management Center
MC07	Work Zone Safety Monitoring	Existing	No	Maintenance and Construction Vehicle Equipment
MC07	Work Zone Safety Monitoring	Existing	No	RTMC
MC08	Maintenance and Construction Activity Coordination	Existing	No	Maintenance and Construction Management Center
MC08	Maintenance and Construction Activity Coordination	Existing	No	Media Outlets
MC08	Maintenance and Construction Activity Coordination	Existing	No	RTMC
MC08	Maintenance and Construction Activity Coordination	Existing	No	SRCC
MC09	Infrastructure Monitoring	Planned	No	Bridge Inspection / Structural Monitoring Roadside Equipment

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
MC09	Infrastructure Monitoring	Planned	No	Maintenance and Construction Management Center
MC09	Infrastructure Monitoring	Planned	No	RTMC
PM01	Parking Space Management	Existing	No	Driver
PM01	Parking Space Management	Existing	No	Park-and-Ride Parking Information System Roadside Equipment
PM01	Parking Space Management	Existing	No	Parking Management Roadside Equipment
PM01	Parking Space Management	Existing	No	Parking Management System
PM01	Parking Space Management	Existing	No	Parking Operator
PM01	Parking Space Management	Existing	No	Vehicle
PM01	Parking Space Management (S06)	Existing	Yes	Driver
PM01	Parking Space Management (S06)	Existing	Yes	Parking Management Roadside Equipment
PM01	Parking Space Management (S06)	Existing	Yes	Parking Management System
PM02	Smart Park and Ride System	Existing	No	Driver
PM02	Smart Park and Ride System	Existing	No	Metro Area Transit Management Centers
PM02	Smart Park and Ride System	Existing	No	Park-and-Ride Parking Information System Roadside Equipment
PM03	Parking Electronic Payment	Existing	No	Account Management Providers
PM03	Parking Electronic Payment	Existing	No	Driver
PM03	Parking Electronic Payment	Existing	No	Park-and-Ride Parking Information System Roadside Equipment
PM03	Parking Electronic Payment	Existing	No	Parking Management Roadside Equipment
PM03	Parking Electronic Payment	Existing	No	Parking Operator
PM03	Parking Electronic Payment	Existing	No	Traveler Cards
PM03	Parking Electronic Payment	Existing	No	Vehicle
PM04	Regional Parking Management	Planned	No	511 Telephone Information Service
PM04	Regional Parking Management	Planned	No	511 Traveler Information Website
PM04	Regional Parking Management	Planned	No	Dynamic Message Sign Roadside Equipment
PM04	Regional Parking Management	Planned	No	Parking Management Roadside Equipment
PM04	Regional Parking Management	Planned	No	Parking Management System
PM04	Regional Parking Management	Planned	No	Parking Operator
PM04	Regional Parking Management (S06)	Planned	Yes	511 Telephone Information Service
PM04	Regional Parking Management (S06)	Planned	Yes	511 Traveler Information Website
PM04	Regional Parking Management (S06)	Planned	Yes	Dynamic Message Sign Roadside Equipment
PM04	Regional Parking Management (S06)	Planned	Yes	Other States TPIMS

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
PM04	Regional Parking Management (S06)	Planned	Yes	Parking Management Roadside Equipment
PM04	Regional Parking Management (S06)	Planned	Yes	Parking Management System
PM04	Regional Parking Management (S06)	Planned	Yes	Parking Operator
PS01	Emergency Call-Taking and Dispatch	Existing	No	911 Dispatch Center
PS01	Emergency Call-Taking and Dispatch	Existing	No	County Emergency Operations Centers
PS01	Emergency Call-Taking and Dispatch	Existing	No	Emergency Vehicle Equipment
PS01	Emergency Call-Taking and Dispatch	Existing	No	FIRST Emergency Vehicles
PS01	Emergency Call-Taking and Dispatch	Existing	No	Minnesota State Patrol District Office
PS01	Emergency Call-Taking and Dispatch	Existing	No	RTMC
PS01	Emergency Call-Taking and Dispatch	Existing	No	SRCC
PS02	Routing Support for Emergency Responders	Existing	No	911 Dispatch Center
PS02	Routing Support for Emergency Responders	Existing	No	Emergency Vehicle Equipment
PS02	Routing Support for Emergency Responders	Existing	No	Minneapolis TMC
PS02	Routing Support for Emergency Responders	Existing	No	RTMC
PS02	Routing Support for Emergency Responders	Existing	No	SRCC
PS03	Emergency Vehicle Preemption	Existing	No	911 Dispatch Center
PS03	Emergency Vehicle Preemption	Existing	No	Emergency Vehicle Equipment
PS03	Emergency Vehicle Preemption	Existing	No	Minneapolis TMC
PS03	Emergency Vehicle Preemption	Existing	No	RTMC
PS03	Emergency Vehicle Preemption	Existing	No	SRCC
PS03	Emergency Vehicle Preemption	Existing	No	Traffic Signal Roadside Equipment
PS04	Mayday Notification	Existing	No	911 Dispatch Center
PS04	Mayday Notification	Existing	No	Automated Crash Notification System
PS04	Mayday Notification	Existing	No	Driver
PS04	Mayday Notification	Existing	No	Mayday System
PS04	Mayday Notification	Existing	No	Mayday System Vehicle Equipment
PS04	Mayday Notification	Existing	No	Vehicle
PS08	Roadway Service Patrols	Existing	No	FIRST Emergency Vehicles
PS08	Roadway Service Patrols	Existing	No	RTMC
PS09	Transportation Infrastructure Protection	Existing	No	911 Dispatch Center

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
PS09	Transportation Infrastructure Protection	Existing	No	RTMC
PS09	Transportation Infrastructure Protection	Existing	No	Security Monitoring Roadside Equipment
PS09	Transportation Infrastructure Protection	Existing	No	SRCC
PS09	Transportation Infrastructure Protection	Existing	No	Tunnel Emissions Roadside Equipment
PS09	Transportation Infrastructure Protection (S23)	Existing	Yes	911 Dispatch Center
PS09	Transportation Infrastructure Protection (S23)	Existing	Yes	Dynamic Message Sign Roadside Equipment
PS09	Transportation Infrastructure Protection (S23)	Existing	Yes	Oversize Warning Roadside Equipment
PS09	Transportation Infrastructure Protection (S23)	Existing	Yes	RTMC
PS09	Transportation Infrastructure Protection (S23)	Existing	Yes	SRCC
PS10	Wide-Area Alert	Existing	No	511 Telephone Information Service
PS10	Wide-Area Alert	Existing	No	511 Traveler Information Website
PS10	Wide-Area Alert	Existing	No	911 Dispatch Center
PS10	Wide-Area Alert	Existing	No	Airport
PS10	Wide-Area Alert	Existing	No	Condition Acquisition and Reporting System (CARS)
PS10	Wide-Area Alert	Existing	No	County Emergency Operations Centers
PS10	Wide-Area Alert	Existing	No	County Sheriff and City Police Offices
PS10	Wide-Area Alert	Existing	No	Dynamic Message Sign Roadside Equipment
PS10	Wide-Area Alert	Existing	No	Highway Advisory Radio Roadside Equipment
PS10	Wide-Area Alert	Existing	No	Local TMCs
PS10	Wide-Area Alert	Existing	No	Maintenance and Construction Management Center
PS10	Wide-Area Alert	Existing	No	Metro Area Transit Management Centers
PS10	Wide-Area Alert	Existing	No	Minnesota Emergency Alert System
PS10	Wide-Area Alert	Existing	No	Minnesota State Emergency Operations Center (SEOC)
PS10	Wide-Area Alert	Existing	No	Minnesota State Patrol District Office
PS10	Wide-Area Alert	Existing	No	Neighboring State Emergency Management Agencies
PS10	Wide-Area Alert	Existing	No	RTMC
PS10	Wide-Area Alert	Existing	No	SRCC
PS10	Wide-Area Alert	Existing	No	User Personal Portable and Computing Devices
PS11	Early Warning System	Existing	No	911 Dispatch Center
PS11	Early Warning System	Existing	No	Airport
PS11	Early Warning System	Existing	No	County Emergency Operations Centers
PS11	Early Warning System	Existing	No	County Sheriff and City Police Offices
PS11	Early Warning System	Existing	No	Maintenance and Construction Management Center

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
PS11	Early Warning System	Existing	No	Metro Area Transit Management Centers
PS11	Early Warning System	Existing	No	Minnesota Emergency Alert System
PS11	Early Warning System	Existing	No	Minnesota State Emergency Operations Center (SEOC)
PS11	Early Warning System	Existing	No	Minnesota State Patrol District Office
PS11	Early Warning System	Existing	No	National Weather Service
PS11	Early Warning System	Existing	No	RTMC
PS11	Early Warning System	Existing	No	Security Monitoring Roadside Equipment
PS11	Early Warning System	Existing	No	SRCC
PS12	Disaster Response and Recovery	Existing	No	County Emergency Operations Centers
PS12	Disaster Response and Recovery	Existing	No	County Sheriff and City Police Offices
PS12	Disaster Response and Recovery	Existing	No	Maintenance and Construction Management Center
PS12	Disaster Response and Recovery	Existing	No	Minnesota State Emergency Operations Center (SEOC)
PS12	Disaster Response and Recovery	Existing	No	Neighboring State Emergency Management Agencies
PS12	Disaster Response and Recovery	Existing	No	RTMC
PS13	Evacuation and Reentry Management	Existing	No	County Emergency Operations Centers
PS13	Evacuation and Reentry Management	Existing	No	County Sheriff and City Police Offices
PS13	Evacuation and Reentry Management	Existing	No	Maintenance and Construction Management Center
PS13	Evacuation and Reentry Management	Existing	No	Minnesota State Emergency Operations Center (SEOC)
PS13	Evacuation and Reentry Management	Existing	No	Minnesota State Patrol District Office
PS13	Evacuation and Reentry Management	Existing	No	Neighboring State Emergency Management Agencies
PS13	Evacuation and Reentry Management	Existing	No	RTMC
PS13	Evacuation and Reentry Management	Existing	No	SRCC
PS14	Disaster Traveler Information	Existing	No	511 Telephone Information Service
PS14	Disaster Traveler Information	Existing	No	511 Traveler Information Website
PS14	Disaster Traveler Information	Existing	No	Condition Acquisition and Reporting System (CARS)
PS14	Disaster Traveler Information	Existing	No	County Emergency Operations Centers
PS14	Disaster Traveler Information	Existing	No	County Sheriff and City Police Offices
PS14	Disaster Traveler Information	Existing	No	Maintenance and Construction Management Center
PS14	Disaster Traveler Information	Existing	No	Media Outlets
PS14	Disaster Traveler Information	Existing	No	Minnesota State Emergency Operations Center (SEOC)
PS14	Disaster Traveler Information	Existing	No	National Weather Service
PS14	Disaster Traveler Information	Existing	No	Rest Area WiFi
PS14	Disaster Traveler Information	Existing	No	RTMC

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
PS14	Disaster Traveler Information	Existing	No	SRCC
PS14	Disaster Traveler Information	Existing	No	User Personal Portable and Computing Devices
PT01	Transit Vehicle Tracking	Existing	No	Local Transit Management Centers
PT01	Transit Vehicle Tracking	Existing	No	Metro Area Transit Management Centers
PT01	Transit Vehicle Tracking	Existing	No	Transit Vehicle Equipment
PT02	Transit Fixed-Route Operations	Existing	No	Commuter Rail Operations Center
PT02	Transit Fixed-Route Operations	Existing	No	Intercity Transit Management Centers
PT02	Transit Fixed-Route Operations	Existing	No	Light Rail Operations Center
PT02	Transit Fixed-Route Operations	Existing	No	Local Transit Management Centers
PT02	Transit Fixed-Route Operations	Existing	No	Maintenance and Construction Management Center
PT02	Transit Fixed-Route Operations	Existing	No	Metro Area Transit Management Centers
PT02	Transit Fixed-Route Operations	Existing	No	Transit Vehicle Equipment
PT02	Transit Fixed-Route Operations	Existing	No	Transit Vehicle Operator
PT03	Dynamic Transit Operations	Existing	No	Local Transit Management Centers
PT03	Dynamic Transit Operations	Existing	No	Maintenance and Construction Management Center
PT03	Dynamic Transit Operations	Existing	No	Metro Area Transit Management Centers
PT03	Dynamic Transit Operations	Existing	No	Transit Information Websites
PT03	Dynamic Transit Operations	Existing	No	Transit Vehicle Equipment
PT04	Transit Fare Collection Management	Existing	No	Account Management Providers
PT04	Transit Fare Collection Management	Existing	No	Commuter Rail Operations Center
PT04	Transit Fare Collection Management	Existing	No	Intercity Transit Management Centers
PT04	Transit Fare Collection Management	Existing	No	Local Transit Management Centers
PT04	Transit Fare Collection Management	Existing	No	Metro Area Transit Management Centers
PT04	Transit Fare Collection Management	Existing	No	Transit Kiosks
PT04	Transit Fare Collection Management	Existing	No	Transit Vehicle Equipment
PT04	Transit Fare Collection Management	Existing	No	Traveler
PT04	Transit Fare Collection Management	Existing	No	Traveler Cards
PT05	Transit Security	Existing	No	County Emergency Operations Centers
PT05	Transit Security	Existing	No	County Sheriff and City Police Offices
PT05	Transit Security	Existing	No	Intercity Transit Management Centers
PT05	Transit Security	Existing	No	Light Rail Operations Center
PT05	Transit Security	Existing	No	Local Transit Management Centers

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
PT05	Transit Security	Existing	No	Metro Area Transit Management Centers
PT05	Transit Security	Existing	No	Transit Center and Station Surveillance System Roadside Equipment
PT05	Transit Security	Existing	No	Transit Vehicle Equipment
PT06	Transit Fleet Management	Existing	No	Commuter Rail Operations Center
PT06	Transit Fleet Management	Existing	No	Light Rail Operations Center
PT06	Transit Fleet Management	Existing	No	Local Transit Management Centers
PT06	Transit Fleet Management	Existing	No	Metro Area Transit Management Centers
PT06	Transit Fleet Management	Existing	No	Transit Vehicle Equipment
PT07	Transit Passenger Counting	Existing	No	Local Transit Management Centers
PT07	Transit Passenger Counting	Existing	No	Metro Area Transit Management Centers
PT07	Transit Passenger Counting	Existing	No	Transit Vehicle Equipment
PT08	Transit Traveler Information	Existing	No	Intercity Transit Management Centers
PT08	Transit Traveler Information	Existing	No	Local Transit Management Centers
PT08	Transit Traveler Information	Existing	No	Media Outlets
PT08	Transit Traveler Information	Existing	No	Metro Area Transit Management Centers
PT08	Transit Traveler Information	Existing	No	Real-Time Bus Arrival Time Display Roadside Equipment
PT08	Transit Traveler Information	Existing	No	Transit Information Telephone Systems
PT08	Transit Traveler Information	Existing	No	Transit Information Websites
PT08	Transit Traveler Information	Existing	No	Transit Kiosks
PT08	Transit Traveler Information	Existing	No	Transit Vehicle Equipment
PT08	Transit Traveler Information	Existing	No	Traveler
PT08	Transit Traveler Information	Existing	No	User Personal Portable and Computing Devices
PT09	Transit Signal Priority	Existing	No	Local TMCs
PT09	Transit Signal Priority	Existing	No	Local Transit Management Centers
PT09	Transit Signal Priority	Existing	No	Metro Area Transit Management Centers
PT09	Transit Signal Priority	Existing	No	Minneapolis TMC
PT09	Transit Signal Priority	Existing	No	RTMC
PT09	Transit Signal Priority	Existing	No	Traffic Signal Roadside Equipment
PT09	Transit Signal Priority	Existing	No	Transit Vehicle Equipment
PT11	Transit Pedestrian Indication	Planned	No	Transit Vehicle Equipment
PT11	Transit Pedestrian Indication	Planned	No	Transit Vehicle Operator
PT11	Transit Pedestrian Indication	Planned	No	Traveler
PT11	Transit Pedestrian Indication	Planned	No	User Personal Portable and Computing Devices
PT12	Transit Vehicle at Station/Stop Warnings	Planned	No	Metro Area Transit Management Centers
PT12	Transit Vehicle at Station/Stop Warnings	Planned	No	Transit Vehicle Equipment
PT12	Transit Vehicle at Station/Stop Warnings	Planned	No	Transit Vehicle Operator
PT12	Transit Vehicle at Station/Stop Warnings	Planned	No	Traveler
PT12	Transit Vehicle at Station/Stop Warnings	Planned	No	User Personal Portable and Computing Devices

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
PT13	Vehicle Turning Right in Front of a Transit Vehicle	Planned	No	Transit Vehicle Equipment
PT13	Vehicle Turning Right in Front of a Transit Vehicle	Planned	No	Transit Vehicle Operator
PT14	Multi-modal Coordination	Planned	No	Commuter Rail Operations Center
PT14	Multi-modal Coordination	Planned	No	Intercity Transit Management Centers
PT14	Multi-modal Coordination	Planned	No	Local Transit Management Centers
PT14	Multi-modal Coordination	Planned	No	Metro Area Transit Management Centers
PT17	Transit Connection Protection	Planned	No	Intercity Transit Management Centers
PT17	Transit Connection Protection	Planned	No	Light Rail Operations Center
PT17	Transit Connection Protection	Planned	No	Local Transit Management Centers
PT17	Transit Connection Protection	Planned	No	Metro Area Transit Management Centers
ST01	Emissions Monitoring	Existing	No	SRCC
ST01	Emissions Monitoring	Existing	No	Tunnel Emissions Roadside Equipment
ST04	Roadside Lighting	Planned	No	Roadway Lighting Management Central Monitoring Equipment
ST04	Roadside Lighting	Planned	No	Roadway Lighting Management Roadside Equipment
ST06	HOV/HOT Lane Management	Planned	No	Minnesota State Patrol District Office
ST06	HOV/HOT Lane Management	Planned	No	RTMC
ST06	HOV/HOT Lane Management	Planned	No	Vehicle Occupancy Monitoring/Enforcement Roadside Equipment
SU01	Connected Vehicle System Monitoring and Management	Planned	No	CV Roadside Equipment
SU01	Connected Vehicle System Monitoring and Management	Planned	No	Maintenance and Construction Vehicle Equipment
SU01	Connected Vehicle System Monitoring and Management	Planned	No	RTMC
SU01	Connected Vehicle System Monitoring and Management	Planned	No	Transit Vehicle Equipment
SU02	Core Authorization	Planned	No	CV Roadside Equipment
SU02	Core Authorization	Planned	No	Maintenance and Construction Vehicle Equipment
SU02	Core Authorization	Planned	No	Ramp Meter Roadside Equipment
SU02	Core Authorization	Planned	No	RTMC
SU02	Core Authorization	Planned	No	Traffic Signal Roadside Equipment
SU03	Data Distribution	Existing	No	911 Dispatch Center
SU03	Data Distribution	Existing	No	Minnesota State Patrol District Office
SU03	Data Distribution	Existing	No	RTMC
SU04	Map Management	Planned	No	<None>
SU05	Location and Time	Planned	No	<None>
SU08	Security and Credentials Management	Planned	No	CV Roadside Equipment

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
SU08	Security and Credentials Management	Planned	No	Maintenance and Construction Vehicle Equipment
SU08	Security and Credentials Management	Planned	No	RTMC
SU08	Security and Credentials Management	Planned	No	Transit Vehicle Equipment
SU11	Vehicle Maintenance	Existing	No	Maintenance and Construction Management Center
SU11	Vehicle Maintenance	Existing	No	Maintenance and Construction Vehicle Equipment
SU11	Vehicle Maintenance	Existing	No	Transit Vehicle Equipment
TI01	Broadcast Traveler Information	Existing	No	511 Telephone Information Service
TI01	Broadcast Traveler Information	Existing	No	511 Traveler Information Website
TI01	Broadcast Traveler Information	Existing	No	AWOS Central Control System
TI01	Broadcast Traveler Information	Existing	No	Condition Acquisition and Reporting System (CARS)
TI01	Broadcast Traveler Information	Existing	No	Local Agency Traveler Information Website
TI01	Broadcast Traveler Information	Existing	No	Local TMCs
TI01	Broadcast Traveler Information	Existing	No	Maintenance and Construction Management Center
TI01	Broadcast Traveler Information	Existing	No	Media Outlets
TI01	Broadcast Traveler Information	Existing	No	Minnesota State Emergency Operations Center (SEOC)
TI01	Broadcast Traveler Information	Existing	No	MnPASS Service Center
TI01	Broadcast Traveler Information	Existing	No	National Weather Service
TI01	Broadcast Traveler Information	Existing	No	North/West Passage Corridor Traveler Information Website
TI01	Broadcast Traveler Information	Existing	No	Rest Area WiFi
TI01	Broadcast Traveler Information	Existing	No	RTMC
TI01	Broadcast Traveler Information	Existing	No	Surface Transportation Weather Service Providers
TI01	Broadcast Traveler Information	Existing	No	Transit Information Websites
TI01	Broadcast Traveler Information	Existing	No	User Personal Portable and Computing Devices
TI01	Broadcast Traveler Information (S01)	Existing	Yes	511 Traveler Information Website
TI01	Broadcast Traveler Information (S01)	Existing	Yes	Condition Acquisition and Reporting System (CARS)
TI01	Broadcast Traveler Information (S01)	Existing	Yes	Driver
TI01	Broadcast Traveler Information (S01)	Existing	Yes	RTMC

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
TI01	Broadcast Traveler Information (S01)	Existing	Yes	User Personal Portable and Computing Devices
TI01	Broadcast Traveler Information (S06)	Planned	Yes	511 Telephone Information Service
TI01	Broadcast Traveler Information (S06)	Planned	Yes	511 Traveler Information Website
TI01	Broadcast Traveler Information (S06)	Planned	Yes	Parking Management System
TI01	Broadcast Traveler Information (S08)	Planned	Yes	511 Telephone Information Service
TI01	Broadcast Traveler Information (S08)	Planned	Yes	511 Traveler Information Website
TI01	Broadcast Traveler Information (S08)	Planned	Yes	Condition Acquisition and Reporting System (CARS)
TI01	Broadcast Traveler Information (S08)	Planned	Yes	Private Information Service Providers
TI01	Broadcast Traveler Information (S08)	Planned	Yes	RTMC
TI01	Broadcast Traveler Information (S35)	Existing	Yes	511 Traveler Information Website
TI01	Broadcast Traveler Information (S35)	Existing	Yes	Condition Acquisition and Reporting System (CARS)
TI02	Personalized Traveler Information	Existing	No	511 Telephone Information Service
TI02	Personalized Traveler Information	Existing	No	511 Traveler Information Website
TI02	Personalized Traveler Information	Existing	No	Condition Acquisition and Reporting System (CARS)
TI02	Personalized Traveler Information	Existing	No	Media Outlets
TI02	Personalized Traveler Information	Existing	No	National Weather Service
TI02	Personalized Traveler Information	Existing	No	Transit Information Websites
TI02	Personalized Traveler Information	Existing	No	Traveler
TI02	Personalized Traveler Information	Existing	No	Traveler Information and Parking Kiosks
TI02	Personalized Traveler Information	Existing	No	User Personal Portable and Computing Devices
TI04	Infrastructure-Provided Trip Planning and Route Guidance	Existing	No	511 Traveler Information Website
TI04	Infrastructure-Provided Trip Planning and Route Guidance	Existing	No	Private Information Service Providers
TI04	Infrastructure-Provided Trip Planning and Route Guidance	Existing	No	User Personal Portable and Computing Devices
TI04	Infrastructure-Provided Trip Planning and Route Guidance	Existing	No	Vehicle
TI06	Dynamic Ridesharing and Shared Use Transportation	Existing	No	Transit Information Websites

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
TI06	Dynamic Ridesharing and Shared Use Transportation	Existing	No	Traveler
TI06	Dynamic Ridesharing and Shared Use Transportation	Existing	No	User Personal Portable and Computing Devices
TI07	In-Vehicle Signage	Existing	No	Driver
TI07	In-Vehicle Signage	Existing	No	In Vehicle Signing Roadside Equipment
TI07	In-Vehicle Signage	Existing	No	In Vehicle Signing Vehicle Equipment
TM01	Infrastructure-Based Traffic Surveillance	Existing	No	Animal Crossing Warning Roadside Equipment
TM01	Infrastructure-Based Traffic Surveillance	Existing	No	VIDEO MONITORING Roadside Equipment
TM01	Infrastructure-Based Traffic Surveillance	Existing	No	Local TMCs
TM01	Infrastructure-Based Traffic Surveillance	Existing	No	Minneapolis TMC
TM01	Infrastructure-Based Traffic Surveillance	Existing	No	Neighboring State Traffic Management Centers Roadside Equipment
TM01	Infrastructure-Based Traffic Surveillance	Existing	No	Research Lab Network Monitoring Roadside Equipment
TM01	Infrastructure-Based Traffic Surveillance	Existing	No	Research Lab New Monitoring Control System
TM01	Infrastructure-Based Traffic Surveillance	Existing	No	RTMC
TM01	Infrastructure-Based Traffic Surveillance	Existing	No	SRCC
TM01	Infrastructure-Based Traffic Surveillance	Existing	No	Traffic Detector Roadside Equipment
TM01	Infrastructure-Based Traffic Surveillance (S08)	Existing	Yes	RTMC
TM01	Infrastructure-Based Traffic Surveillance (S08)	Existing	Yes	Traffic Detector Roadside Equipment
TM03	Traffic Signal Control	Existing	No	Advance Warning Flasher Roadside Equipment
TM03	Traffic Signal Control	Existing	No	Local TMCs
TM03	Traffic Signal Control	Existing	No	Minneapolis TMC
TM03	Traffic Signal Control	Existing	No	RTMC
TM03	Traffic Signal Control	Existing	No	Traffic Signal Roadside Equipment
TM03	Traffic Signal Control (S07)	Existing	Yes	Local TMCs
TM03	Traffic Signal Control (S07)	Existing	Yes	Minneapolis TMC
TM03	Traffic Signal Control (S07)	Existing	Yes	RTMC
TM03	Traffic Signal Control (S07)	Existing	Yes	Traffic Signal Roadside Equipment
TM04	Connected Vehicle Traffic Signal System	Planned	No	CV Roadside Equipment
TM04	Connected Vehicle Traffic Signal System	Planned	No	Maintenance and Construction Vehicle Equipment
TM04	Connected Vehicle Traffic Signal System	Planned	No	Ramp Meter Roadside Equipment
TM04	Connected Vehicle Traffic Signal System	Planned	No	RTMC
TM04	Connected Vehicle Traffic Signal System	Planned	No	Traffic Signal Roadside Equipment

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
TM05	Traffic Metering	Existing	No	Driver
TM05	Traffic Metering	Existing	No	Ramp Meter Roadside Equipment
TM05	Traffic Metering	Existing	No	RTMC
TM06	Traffic Information Dissemination	Existing	No	Advanced Pavement Condition and Visibility Warning System Roadside Equipment
TM06	Traffic Information Dissemination	Existing	No	Animal Crossing Warning Roadside Equipment
TM06	Traffic Information Dissemination	Existing	No	Arrow Board Reporting System
TM06	Traffic Information Dissemination	Existing	No	Condition Acquisition and Reporting System (CARS)
TM06	Traffic Information Dissemination	Existing	No	Driver
TM06	Traffic Information Dissemination	Existing	No	Dynamic Message Sign Roadside Equipment
TM06	Traffic Information Dissemination	Existing	No	Highway Advisory Radio Roadside Equipment
TM06	Traffic Information Dissemination	Existing	No	Local TMCs
TM06	Traffic Information Dissemination	Existing	No	Media Outlets
TM06	Traffic Information Dissemination	Existing	No	Metro Area Transit Management Centers
TM06	Traffic Information Dissemination	Existing	No	Minneapolis TMC
TM06	Traffic Information Dissemination	Existing	No	Neighboring State Traffic Management Centers Roadside Equipment
TM06	Traffic Information Dissemination	Existing	No	Real-Time Transit Travel Time Display Roadside Equipment
TM06	Traffic Information Dissemination	Existing	No	RTMC
TM06	Traffic Information Dissemination	Existing	No	SRCC
TM06	Traffic Information Dissemination (S01)	Planned	Yes	Arrow Board Reporting System
TM06	Traffic Information Dissemination (S01)	Planned	Yes	Driver
TM06	Traffic Information Dissemination (S01)	Planned	Yes	RTMC
TM07	Regional Traffic Management	Existing	No	Local TMCs
TM07	Regional Traffic Management	Existing	No	Minneapolis TMC
TM07	Regional Traffic Management	Existing	No	Neighboring State Traffic Management Centers
TM07	Regional Traffic Management	Existing	No	RTMC
TM07	Regional Traffic Management	Existing	No	SRCC
TM08	Traffic Incident Management System	Existing	No	911 Dispatch Center
TM08	Traffic Incident Management System	Existing	No	VIDEO MONITORING Roadside Equipment
TM08	Traffic Incident Management System	Existing	No	County Emergency Operations Centers

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
TM08	Traffic Incident Management System	Existing	No	County Sheriff and City Police Offices
TM08	Traffic Incident Management System	Existing	No	Emergency Vehicle Equipment
TM08	Traffic Incident Management System	Existing	No	Event Promoters
TM08	Traffic Incident Management System	Existing	No	Local TMCs
TM08	Traffic Incident Management System	Existing	No	Metro Area Transit Management Centers
TM08	Traffic Incident Management System	Existing	No	Minneapolis TMC
TM08	Traffic Incident Management System	Existing	No	Minnesota State Patrol District Office
TM08	Traffic Incident Management System	Existing	No	Neighboring State Traffic Management Centers
TM08	Traffic Incident Management System	Existing	No	Neighboring State Traffic Management Centers Roadside Equipment
TM08	Traffic Incident Management System	Existing	No	Roadway Flooding Warning Roadside Equipment
TM08	Traffic Incident Management System	Existing	No	RTMC
TM08	Traffic Incident Management System	Existing	No	SRCC
TM08	Traffic Incident Management System (S01)	Planned	Yes	511 Traveler Information Website
TM08	Traffic Incident Management System (S01)	Planned	Yes	Arrow Board Reporting System
TM08	Traffic Incident Management System (S01)	Planned	Yes	Condition Acquisition and Reporting System (CARS)
TM08	Traffic Incident Management System (S01)	Planned	Yes	RTMC
TM10	Electronic Toll Collection	Existing	No	Account Management Providers
TM10	Electronic Toll Collection	Existing	No	MnPASS Roadside Equipment
TM10	Electronic Toll Collection	Existing	No	MnPASS Service Center
TM10	Electronic Toll Collection	Existing	No	MnPASS Vehicle Equipment
TM12	Dynamic Roadway Warning	Existing	No	Advance Warning Flasher Roadside Equipment
TM12	Dynamic Roadway Warning	Existing	No	Advanced Pavement Condition and Visibility Warning System Roadside Equipment
TM12	Dynamic Roadway Warning	Existing	No	Animal Crossing Warning Roadside Equipment
TM12	Dynamic Roadway Warning	Existing	No	VIDEO MONITORING Roadside Equipment
TM12	Dynamic Roadway Warning	Existing	No	Driver
TM12	Dynamic Roadway Warning	Existing	No	Oversize Warning Roadside Equipment
TM12	Dynamic Roadway Warning	Existing	No	Queue Detection Roadside Equipment
TM12	Dynamic Roadway Warning	Existing	No	Roadway Flooding Warning Roadside Equipment
TM12	Dynamic Roadway Warning	Existing	No	RTMC
TM12	Dynamic Roadway Warning	Existing	No	SRCC

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
TM12	Dynamic Roadway Warning	Existing	No	Traffic Detector Roadside Equipment
TM12	Dynamic Roadway Warning (S23)	Existing	Yes	Advance Warning Flasher Roadside Equipment
TM12	Dynamic Roadway Warning (S23)	Existing	Yes	Dynamic Message Sign Roadside Equipment
TM12	Dynamic Roadway Warning (S23)	Existing	Yes	Oversize Warning Roadside Equipment
TM12	Dynamic Roadway Warning (S23)	Existing	Yes	RTMC
TM12	Dynamic Roadway Warning (S23)	Existing	Yes	SRCC
TM13	Standard Railroad Grade Crossing	Existing	No	Driver
TM13	Standard Railroad Grade Crossing	Existing	No	Railroad Active Warning Roadside Equipment
TM13	Standard Railroad Grade Crossing	Existing	No	Railroad Wayside Equipment
TM16	Reversible Lane Management	Existing	No	Lane/Ramp Access Control Roadside Equipment
TM16	Reversible Lane Management	Existing	No	RTMC
TM17	Speed Warning and Enforcement	Existing	No	Driver
TM17	Speed Warning and Enforcement	Existing	No	Dynamic Message Sign Roadside Equipment
TM17	Speed Warning and Enforcement	Existing	No	Maintenance and Construction Management Center
TM17	Speed Warning and Enforcement	Existing	No	Minneapolis TMC
TM17	Speed Warning and Enforcement	Existing	No	Minnesota State Patrol District Office
TM17	Speed Warning and Enforcement	Existing	No	Oversize Warning Roadside Equipment
TM17	Speed Warning and Enforcement	Existing	No	Red Light Monitoring/Enforcement Roadside Equipment
TM17	Speed Warning and Enforcement	Existing	No	RTMC
TM17	Speed Warning and Enforcement	Existing	No	Speed Monitoring Roadside Equipment
TM17	Speed Warning and Enforcement	Existing	No	SRCC
TM17	Speed Warning and Enforcement	Existing	No	Vehicle
TM18	Drawbridge Management	Existing	No	Driver
TM18	Drawbridge Management	Existing	No	Lift Bridge Traffic Control Central System
TM18	Drawbridge Management	Existing	No	Lift Bridge Traffic Control Roadside Equipment
TM19	Roadway Closure Management	Existing	No	Driver
TM19	Roadway Closure Management	Existing	No	Lane/Ramp Access Control Roadside Equipment
TM19	Roadway Closure Management	Existing	No	SRCC

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
TM20	Variable Speed Limits	Existing	No	RTMC
TM20	Variable Speed Limits	Existing	No	SRCC
TM20	Variable Speed Limits	Existing	No	Variable Speed Limit Roadside Equipment
TM22	Dynamic Lane Management and Shoulder Use	Existing	No	Driver
TM22	Dynamic Lane Management and Shoulder Use	Existing	No	Lane Control Roadside Equipment
TM22	Dynamic Lane Management and Shoulder Use	Existing	No	MnPASS Roadside Equipment
TM22	Dynamic Lane Management and Shoulder Use	Existing	No	RTMC
TM22	Dynamic Lane Management and Shoulder Use	Existing	No	Vehicle
VS01	Autonomous Vehicle Safety Systems	Planned	No	Basic Vehicle
VS01	Autonomous Vehicle Safety Systems	Planned	No	Driver
VS01	Autonomous Vehicle Safety Systems	Planned	No	Transit Vehicle Equipment
VS01	Autonomous Vehicle Safety Systems	Planned	No	Vehicle
VS01	Autonomous Vehicle Safety Systems (S63)	Planned	Yes	Basic Vehicle
VS01	Autonomous Vehicle Safety Systems (S63)	Planned	Yes	Maintenance and Construction Vehicle Equipment
VS01	Autonomous Vehicle Safety Systems (S63)	Planned	Yes	Vehicle
VS02	V2V Basic Safety	Planned	No	Maintenance and Construction Vehicle Equipment
VS02	V2V Basic Safety	Planned	No	Vehicle
VS04	V2V Special Vehicle Alert	Planned	No	Maintenance and Construction Vehicle Equipment
VS04	V2V Special Vehicle Alert	Planned	No	Vehicle
VS05	Curve Speed Warning	Planned	No	Advanced Pavement Condition and Visibility Warning System Roadside Equipment
VS05	Curve Speed Warning	Planned	No	Driver
VS09	Reduced Speed Zone Warning / Lane Closure	Existing	No	Dynamic Message Sign Roadside Equipment
VS09	Reduced Speed Zone Warning / Lane Closure	Existing	No	Maintenance and Construction Vehicle Equipment
VS09	Reduced Speed Zone Warning / Lane Closure	Existing	No	RTMC
VS11	Oversize Vehicle Warning	Existing	No	Commercial Vehicles
VS11	Oversize Vehicle Warning	Existing	No	Oversize Warning Roadside Equipment
VS13	Intersection Safety Warning and Collision Avoidance	Planned	No	Driver
VS13	Intersection Safety Warning and Collision Avoidance	Planned	No	Intersection Collision Warning Roadside Equipment

Service Package	Service Package Name	Service Package Status	Service Package Instance	Included Elements
WX01	Weather Data Collection	Existing	No	Advanced Pavement Condition and Visibility Warning System Roadside Equipment
WX01	Weather Data Collection	Existing	No	AWOS Central Control System
WX01	Weather Data Collection	Existing	No	AWOS Roadside Equipment
WX01	Weather Data Collection	Existing	No	Clarus Weather System
WX01	Weather Data Collection	Existing	No	Maintenance and Construction Vehicle Equipment
WX01	Weather Data Collection	Existing	No	RWIS Central Control System
WX01	Weather Data Collection	Existing	No	RWIS Stations
WX01	Weather Data Collection	Existing	No	SRCC
WX02	Weather Information Processing and Distribution	Existing	No	AWOS Central Control System
WX02	Weather Information Processing and Distribution	Existing	No	Clarus Weather System
WX02	Weather Information Processing and Distribution	Existing	No	Condition Acquisition and Reporting System (CARS)
WX02	Weather Information Processing and Distribution	Existing	No	Maintenance and Construction Management Center
WX02	Weather Information Processing and Distribution	Existing	No	Media Outlets
WX02	Weather Information Processing and Distribution	Existing	No	National Weather Service
WX02	Weather Information Processing and Distribution	Existing	No	RTMC
WX02	Weather Information Processing and Distribution	Existing	No	RWIS Central Control System
WX02	Weather Information Processing and Distribution	Existing	No	SRCC
WX02	Weather Information Processing and Distribution	Existing	No	Surface Transportation Weather Service Providers

7 Operational Concept

The Operational Concept lists the roles and responsibilities that each participating agency must take on to provide the ITS services included in the ITS Architecture. Changing needs may arise that will require an agreement to be formed between all affected parties that defines new or additional roles. Defining the roles and responsibilities of the participating stakeholders in the region and the willingness of agencies to accept their roles and responsibilities is an important step in realizing the common goal of an interoperable ITS system throughout Minnesota.

Table 5 – Operational Concept

RR Area Name	Stakeholder	RR Description	RR Status
Archived Data Systems for Minnesota Regional ITS Architecture	City of Minneapolis	Store and manage transportation related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	Local Agencies	Store and manage transportation related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	Local EM Agencies	Store and manage transportation related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	Local Transit Providers	Store and manage transportation related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Store and manage transportation related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	Metro Transit	Store and manage transportation related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	Minnesota Homeland Security and Emergency Management	Store and manage transportation related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	Minnesota State Patrol	Store and manage transportation related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	MnDOT	Store and manage transportation related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	MnDOT OFCVO	Store and manage transportation related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	MnDOT Office of Aeronautics	Store and manage transportation related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	MnDOT Office of Maintenance	Store and manage transportation related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	Neighboring States	Store and manage transportation related data	Existing

RR Area Name	Stakeholder	RR Description	RR Status
Archived Data Systems for Minnesota Regional ITS Architecture	NOAA	Store and manage weather related data	Existing
Archived Data Systems for Minnesota Regional ITS Architecture	North/West Passage Corridor Members	Store and manage transportation related data	Existing
Commercial Vehicle Operations for Minnesota Regional ITS Architecture	Local Agencies	Provide road restriction information	Existing
Commercial Vehicle Operations for Minnesota Regional ITS Architecture	Minnesota DVS	Manage motor carrier registration	Existing
Commercial Vehicle Operations for Minnesota Regional ITS Architecture	Minnesota State Patrol	Perform CVO safety inspection and enforcement	Existing
Commercial Vehicle Operations for Minnesota Regional ITS Architecture	MnDOT	Provide road conditions and restriction information	Existing
Commercial Vehicle Operations for Minnesota Regional ITS Architecture	MnDOT OFCVO	Manage CVO activies and issue permits	Existing
Electronic Toll Collection for Minnesota Regional ITS Architecture	Minnesota State Patrol	Operate MnPASS HOT lanes	Existing
Electronic Toll Collection for Minnesota Regional ITS Architecture	MnDOT	Operate MnPASS HOT lanes	Existing
Electronic Toll Collection for Minnesota Regional ITS Architecture	MnDOT	Operate dynamic shoulders	Planned
Electronic Toll Collection for Minnesota Regional ITS Architecture	MnDOT	Provide simple and integrated parking fee payment systems	Planned
Emergency Management for Minnesota Regional ITS Architecture	Local Agencies	Provide mobile data computers in emergency vehicles to provide real-time information	Existing
Emergency Management for Minnesota Regional ITS Architecture	Local Agencies	Provide emergency/ evacuation and reentry information	Existing
Emergency Management for Minnesota Regional ITS Architecture	Local Agencies	Operate and enhance CAD systems	Existing
Emergency Management for Minnesota Regional ITS Architecture	Local Agencies	Provide AVL to emergency vehicles	Existing
Emergency Management for Minnesota Regional ITS Architecture	Local Agencies	Provide wireless digital feed from patrol cars to dispatch centers	Planned
Emergency Management for Minnesota Regional ITS Architecture	Local Agencies	Provide dynamic routing of emergency vehicles	Planned
Emergency Management for Minnesota Regional ITS Architecture	Local Agencies	Provide enhanced Mayday services	Planned
Emergency Management for Minnesota Regional ITS Architecture	Local Agencies	Provide OnStar or third party information directly to MSP or other PSAP's CAD systems	Planned

RR Area Name	Stakeholder	RR Description	RR Status
Emergency Management for Minnesota Regional ITS Architecture	Local Agencies	Provide surveillance to monitor transportation infrastructure	Planned
Emergency Management for Minnesota Regional ITS Architecture	Local Agencies	Provide CAD to CAD integration for multi-agency coordination at major incidents	Planned
Emergency Management for Minnesota Regional ITS Architecture	Minnesota Homeland Security and Emergency Management	Provide surveillance to monitor transportation infrastructure	Existing
Emergency Management for Minnesota Regional ITS Architecture	Minnesota Homeland Security and Emergency Management	Provide emergency/ evacuation and reentry information	Existing
Emergency Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Provide AVL to emergency vehicles	Existing
Emergency Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Enhance GIS capabilities	Existing
Emergency Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Provide mobile data computers in emergency vehicles to provide real-time information	Existing
Emergency Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Operate and enhance CAD systems	Existing
Emergency Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Provide wireless digital feed from patrol cars to dispatch centers	Planned
Emergency Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Provide dynamic routing of emergency vehicles	Planned
Emergency Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Provide real-time digital video recordings (DVR)	Planned
Emergency Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Provide enhanced Mayday services	Planned
Emergency Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Provide OnStar or third party information directly to MSP or other PSAP's CAD systems	Planned
Emergency Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Provide ability to remotely post AMBER alert information on DMS	Planned
Emergency Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Provide CAD to CAD integration for multi-agency coordination at major incidents	Planned
Emergency Management for Minnesota Regional ITS Architecture	MnDOT	Provide dynamic routing of emergency vehicles	Existing
Emergency Management for Minnesota Regional ITS Architecture	MnDOT	Enhance GIS capabilities	Existing
Emergency Management for Minnesota Regional ITS Architecture	MnDOT	Provide surveillance to monitor transportation infrastructure)	Existing
Emergency Management for Minnesota Regional ITS Architecture	MnDOT	Provide ability to remotely post AMBER alert information on DMS	Existing

RR Area Name	Stakeholder	RR Description	RR Status
Emergency Management for Minnesota Regional ITS Architecture	MnDOT	Provide emergency/ evacuation and reentry information	Existing
Emergency Management for Minnesota Regional ITS Architecture	MnDOT	Provide AVL to emergency vehicles	Existing
Emergency Management for Minnesota Regional ITS Architecture	MnDOT	Provide wireless digital feed from patrol cars to dispatch centers	Planned
Emergency Management for Minnesota Regional ITS Architecture	MnDOT	Provide real-time digital video recordings (DVR)	Planned
Emergency Management for Minnesota Regional ITS Architecture	Private Mayday Service Providers	Provide enhanced Mayday services	Planned
Emergency Management for Minnesota Regional ITS Architecture	Private Mayday Service Providers	Provide OnStar or third party information directly to MSP or other PSAP's CAD systems	Planned
Freeway Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Assist with traffic control due to incidents and work zones	Existing
Freeway Management for Minnesota Regional ITS Architecture	MnDOT	Provide congestion information to travelers	Existing
Freeway Management for Minnesota Regional ITS Architecture	MnDOT	Provide work zone information to travelers	Existing
Incident Management for Minnesota Regional ITS Architecture	Local Agencies	Coordinate incident responses	Existing
Incident Management for Minnesota Regional ITS Architecture	Local EM Agencies	Coordinate incident responses	Existing
Incident Management for Minnesota Regional ITS Architecture	Local Media	Provide incident information to travelers	Existing
Incident Management for Minnesota Regional ITS Architecture	Minnesota State Patrol	Coordinate incident responses	Existing
Incident Management for Minnesota Regional ITS Architecture	MnDOT	Monitor queue length at ramps, incident scenes and work zones	Existing
Maintenance and Construction for Minnesota Regional ITS Architecture	City of Minneapolis	Provide work zone information to travelers	Existing
Maintenance and Construction for Minnesota Regional ITS Architecture	Local Agencies	Provide work zone information to travelers	Existing
Maintenance and Construction for Minnesota Regional ITS Architecture	Minnesota State Patrol	Enforcement work zone speed limits	Existing
Maintenance and Construction for Minnesota Regional ITS Architecture	MnDOT	Provide work zone information to travelers	Existing
Maintenance and Construction for Minnesota Regional ITS Architecture	MnDOT	Coordinate construction and maintenance project schedules	Existing
Maintenance and Construction for Minnesota Regional ITS Architecture	MnDOT Office of Maintenance	Provide work zone information to travelers	Existing

RR Area Name	Stakeholder	RR Description	RR Status
Maintenance and Construction for Minnesota Regional ITS Architecture	MnDOT Office of Maintenance	Coordinate construction and maintenance project schedules	Existing
Parking Management for Minnesota Regional ITS Architecture	City of Minneapolis	Provide information on parking availability	Existing
Parking Management for Minnesota Regional ITS Architecture	City of Minneapolis	Provide simple and integrated parking fee payment systems	Planned
Parking Management for Minnesota Regional ITS Architecture	Local Agencies	Provide information on parking availability	Existing
Parking Management for Minnesota Regional ITS Architecture	Private Parking Operators	Provide information on parking availability	Existing
Security for Minnesota Statewide Regional ITS Architecture	Metro Area Transit Providers	Provide security monitoring on transit vehicle, stops and facilities	Existing
Security for Minnesota Statewide Regional ITS Architecture	Metro Transit	Provide security monitoring on transit vehicle, stops and facilities	Existing
Security for Minnesota Statewide Regional ITS Architecture	Minnesota State Patrol	Monitor public space security and safety	Existing
Security for Minnesota Statewide Regional ITS Architecture	MnDOT	Monitor roadway infrastructure security and safety	Existing
Support for Minnesota Statewide Regional ITS Architecture	City of Minneapolis	Provide support to CAV technology implementation	Planned
Support for Minnesota Statewide Regional ITS Architecture	Local Agencies	Provide support to CAV technology implementation	Planned
Support for Minnesota Statewide Regional ITS Architecture	Metro Area Transit Providers	Provide support to CAV technology implementation	Planned
Support for Minnesota Statewide Regional ITS Architecture	Metro Transit	Provide support to CAV technology implementation	Planned
Support for Minnesota Statewide Regional ITS Architecture	Minnesota State Patrol	Provide support to CAV technology implementation	Planned
Support for Minnesota Statewide Regional ITS Architecture	MnDOT	Provide support to CAV technology implementation	Existing
Support for Minnesota Statewide Regional ITS Architecture	MnDOT OFCVO	Provide support to CAV technology implementation	Planned
Support for Minnesota Statewide Regional ITS Architecture	MnDOT Office of Maintenance	Provide support to CAV technology implementation	Planned
Support for Minnesota Statewide Regional ITS Architecture	University of Minnesota CTS ITS Institute	Provide support to CAV technology implementation	Planned
Surface Street Management for Minnesota Statewide Regional ITS Architecture	City of Minneapolis	Manage traffic on surface streets	Existing
Surface Street Management for Minnesota Statewide Regional ITS Architecture	Local Agencies	Manage traffic on surface streets	Existing
Surface Street Management for Minnesota Statewide Regional ITS Architecture	Local Transit Providers	Coordinate with traffic agency in TSP implementation and operations	Planned
Surface Street Management for Minnesota Statewide Regional ITS Architecture	Metro Area Transit Providers	Coordinate with traffic agency in TSP implementation and operations	Existing
Surface Street Management for Minnesota Statewide Regional ITS Architecture	Metro Transit	Coordinate with traffic agency in TSP implementation and operations	Existing
Surface Street Management for Minnesota Statewide Regional ITS Architecture	MnDOT	Manage traffic on surface streets	Existing

RR Area Name	Stakeholder	RR Description	RR Status
Sustainable Travel for Minnesota Statewide Regional ITS Architecture	MnDOT	Operate MnPASS lanes	Existing
Transit Services for Minnesota Regional ITS Architecture	City of Minneapolis	Coordinate transit vehicle movements with traffic control devices	Planned
Transit Services for Minnesota Regional ITS Architecture	Local Agencies	Coordinate transit vehicle movements with traffic control devices	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Agencies	Provide queue jumping	Planned
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Track fleet and personnel operations	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Measure historical transit route performance	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Optimize schedule efficiency	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Provide simple fare payment systems	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Provide surveillance and enforcement on transit vehicles and transit facilities	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Provide park and ride vehicle security	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Support vehicle diagnostics and maintenance	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Coordinate timed transfers between route segments, providers & modes	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Provide transit route and schedule information	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Provide information to the ADA community	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Provide information on ridesharing opportunities	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Coordinate transit vehicle movements with traffic control devices	Existing
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Provide real-time transit vehicle arrival information	Planned
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Provide on-line reservation system for demand-responsive transit	Planned
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Provide electronic fare payment card	Planned
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Upgrade analog cameras to digital cameras	Planned
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Optimize garage operations	Planned
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Provide on-board automated enunciators	Planned
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Provide real-time transfer information to travelers	Planned
Transit Services for Minnesota Regional ITS Architecture	Local Transit Providers	Provide queue jumping	Planned
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Track fleet and personnel operations	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Measure historical transit route performance	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Optimize schedule efficiency	Existing

RR Area Name	Stakeholder	RR Description	RR Status
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide on-line reservation system for demand-responsive transit	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide simple fare payment systems	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide electronic fare payment card	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide surveillance and enforcement on transit vehicles and transit facilities	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide park and ride vehicle security	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Coordinate timed transfers between route segments, providers & modes	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide transit route and schedule information	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide information to the ADA community	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide information on ridesharing opportunities	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide real-time transit vehicle arrival information	Planned
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Upgrade analog cameras to digital cameras	Planned
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Support vehicle diagnostics and maintenance	Planned
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Optimize garage operations	Planned
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide on-board automated enunciators	Planned
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide real-time transfer information to travelers	Planned
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Coordinate transit vehicle movements with traffic control devices	Planned
Transit Services for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide queue jumping	Planned
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Provide real-time transit vehicle arrival information	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Track fleet and personnel operations	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Measure historical transit route performance	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Optimize schedule efficiency	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Provide on-line reservation system for demand-responsive transit	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Provide simple fare payment systems	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Provide electronic fare payment card	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Provide surveillance and enforcement on transit vehicles and transit facilities	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Provide park and ride vehicle security	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Support vehicle diagnostics and maintenance	Existing

RR Area Name	Stakeholder	RR Description	RR Status
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Coordinate timed transfers between route segments, providers & modes	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Provide transit route and schedule information	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Provide on-board automated enunciators	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Provide information to the ADA community	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Provide information on ridesharing opportunities	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Provide real-time transfer information to travelers	Existing
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Upgrade analog cameras to digital cameras	Planned
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Optimize garage operations	Planned
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Coordinate transit vehicle movements with traffic control devices	Planned
Transit Services for Minnesota Regional ITS Architecture	Metro Transit	Provide queue jumping	Planned
Transit Services for Minnesota Regional ITS Architecture	MnDOT	Coordinate transit vehicle movements with traffic control devices	Planned
Transit Services for Minnesota Regional ITS Architecture	MnDOT	Provide queue jumping	Planned
Traveler Information for Minnesota Regional ITS Architecture	Airports	Provider traveler information	Existing
Traveler Information for Minnesota Regional ITS Architecture	City of Minneapolis	Provide congestion, work zone and road conditions information to travelers	Existing
Traveler Information for Minnesota Regional ITS Architecture	Intercity Transit Providers	Provide transit information to travelers	Existing
Traveler Information for Minnesota Regional ITS Architecture	Local Agencies	Provide congestion, work zone and road conditions information to travelers	Existing
Traveler Information for Minnesota Regional ITS Architecture	Local EM Agencies	Provide incident and emergency information	Existing
Traveler Information for Minnesota Regional ITS Architecture	Local Media	Provide congestion, work zone and road conditions information to travelers	Existing
Traveler Information for Minnesota Regional ITS Architecture	Local Transit Providers	Provide transit information to travelers	Existing
Traveler Information for Minnesota Regional ITS Architecture	Metro Area Transit Providers	Provide transit information to travelers	Existing
Traveler Information for Minnesota Regional ITS Architecture	Metro Transit	Provide transit information to travelers	Existing
Traveler Information for Minnesota Regional ITS Architecture	Minnesota Homeland Security and Emergency Management	Provide emergency information	Existing
Traveler Information for Minnesota Regional ITS Architecture	Minnesota State Patrol	Provide incident and emergency information	Existing
Traveler Information for Minnesota Regional ITS Architecture	MnDOT	Provide congestion, work zone and road conditions information to travelers	Existing
Traveler Information for Minnesota Regional ITS Architecture	MnDOT Office of Maintenance	Provide work zone and road conditions information	Existing
Traveler Information for Minnesota Regional ITS Architecture	NOAA	Provide weather information	Existing

RR Area Name	Stakeholder	RR Description	RR Status
Traveler Information for Minnesota Regional ITS Architecture	Private Information Service Providers	Provide congestion, work zone and road conditions information to travelers	Existing

8 Functional Requirements

Each ITS system operated by the stakeholders must perform certain functions to effectively deliver the envisioned project capabilities. The primary functions that each system needs to perform are broadly defined in the Minnesota Statewide Regional ITS Architecture architecture as a set of Functional Objects that make up the physical elements of the architecture.

Table 6 – Functional Requirements

Element Name	Physical Object	Functional Object	Functional Object Description
511 Telephone Information Service	Transportation Information Center	TIC Data Collection	'TIC Data Collection' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers.
511 Telephone Information Service	Transportation Information Center	TIC Emergency Traveler Information	'TIC Emergency Traveler Information' provides emergency information to the public, including wide-area alerts and evacuation information. It provides emergency alerts, information on evacuation zones and evacuation requirements, evacuation destinations and shelter information, available transportation modes, and traffic and road conditions at the origin, destination, and along the evacuation routes. In addition to general evacuation information, personalized information including tailored evacuation routes, service information, and estimated travel times is also provided based on traveler specified origin, destination, and route parameters. Updated information is provided throughout the evacuation and subsequent reentry as status changes and plans are adapted.
511 Telephone Information Service	Transportation Information Center	TIC Interactive Traveler Information	'TIC Interactive Traveler Information' disseminates personalized traveler information including traffic and road conditions, transit information, parking information, maintenance and construction information, multimodal information, event information, and weather information. Tailored information is provided based on the traveler's request in this interactive service.
511 Telephone Information Service	Transportation Information Center	TIC Traveler Information Broadcast	'TIC Traveler Information Broadcast' disseminates traveler information including traffic and road conditions, incident information, maintenance and construction information, event information, transit information, parking information, and weather information. The same information is broadcast to all equipped traveler interface systems and vehicles.

Element Name	Physical Object	Functional Object	Functional Object Description
511 Telephone Information Service	Transportation Information Center	TIC Traveler Telephone Information	'TIC Traveler Telephone Information' services voice-based traveler requests for information that supports traveler telephone information systems like 511. It takes requests for traveler information, which could be voice-formatted traveler requests, dual-tone multi-frequency (DTMF)-based requests, or a simple traveler information request, and returns the requested traveler information in the proper format. In addition to servicing requests for traveler information, it also collects and forwards alerts and advisories to traveler telephone information systems.
511 Traveler Information Website	Transportation Information Center	TIC Data Collection	'TIC Data Collection' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers.
511 Traveler Information Website	Transportation Information Center	TIC Emergency Traveler Information	'TIC Emergency Traveler Information' provides emergency information to the public, including wide-area alerts and evacuation information. It provides emergency alerts, information on evacuation zones and evacuation requirements, evacuation destinations and shelter information, available transportation modes, and traffic and road conditions at the origin, destination, and along the evacuation routes. In addition to general evacuation information, personalized information including tailored evacuation routes, service information, and estimated travel times is also provided based on traveler specified origin, destination, and route parameters. Updated information is provided throughout the evacuation and subsequent reentry as status changes and plans are adapted.
511 Traveler Information Website	Transportation Information Center	TIC Interactive Traveler Information	'TIC Interactive Traveler Information' disseminates personalized traveler information including traffic and road conditions, transit information, parking information, maintenance and construction information, multimodal information, event information, and weather information. Tailored information is provided based on the traveler's request in this interactive service.
511 Traveler Information Website	Transportation Information Center	TIC Traveler Information Broadcast	'TIC Traveler Information Broadcast' disseminates traveler information including traffic and road conditions, incident information, maintenance and construction information, event information, transit information, parking information, and weather information. The same information is broadcast to all equipped traveler interface systems and vehicles.

Element Name	Physical Object	Functional Object	Functional Object Description
511 Traveler Information Website	Transportation Information Center	TIC Traveler Telephone Information	'TIC Traveler Telephone Information' services voice-based traveler requests for information that supports traveler telephone information systems like 511. It takes requests for traveler information, which could be voice-formatted traveler requests, dual-tone multi-frequency (DTMF)-based requests, or a simple traveler information request, and returns the requested traveler information in the proper format. In addition to servicing requests for traveler information, it also collects and forwards alerts and advisories to traveler telephone information systems.
511 Traveler Information Website	Transportation Information Center	TIC Trip Planning	'TIC Trip Planning' provides pre-trip and en-route trip planning services for travelers. It receives origin, destination, constraints, and preferences and returns trip plan(s) that meet the supplied criteria. Trip plans may be based on current traffic and road conditions, transit schedule information, and other real-time traveler information. Candidate trip plans are multimodal and may include vehicle, transit, and alternate mode segments (e.g., rail, ferry, bicycle routes, and walkways) based on traveler preferences. It also confirms the trip plan for the traveler and supports reservations and advanced payment for portions of the trip. The trip plan includes specific routing information and instructions for each segment of the trip and may also include information and reservations for additional services (e.g., parking) along the route.
911 Dispatch Center	Center	Center Data Collection	'Center Data Collection' collects and stores information that is created in the course of center operations. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
911 Dispatch Center	Center	Center Data Subscription Management	'Center Data Subscription Management' manages data subscriptions for an end user. It provides access to a catalog of available data, manages the necessary user information and rules that govern the data subscriptions, supports communications with data providers to collect data per the subscription rules, and makes the data available to the end user. It provides the local user interface through which a user can specify and manage subscriptions. It supports different mechansims for collecting subscribed data for the end-user including one-time query-response as well as publish-subscribe services.
911 Dispatch Center	Emergency Management Center	Emergency Call-Taking	'Emergency Call-Taking' supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other objects that formulate and manage the emergency response. It receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.

Element Name	Physical Object	Functional Object	Functional Object Description
911 Dispatch Center	Emergency Management Center	Emergency Data Collection	'Emergency Data Collection' collects and stores emergency information that is collected in the course of operations by the Emergency Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
911 Dispatch Center	Emergency Management Center	Emergency Dispatch	'Emergency Dispatch' tracks the location and status of emergency vehicles and dispatches these vehicles to incidents. Pertinent incident information is gathered from the public and other public safety agencies and relayed to the responding units. Incident status and the status of the responding units is tracked so that additional units can be dispatched and/or unit status can be returned to available when the incident is cleared and closed.
911 Dispatch Center	Emergency Management Center	Emergency Early Warning System	'Emergency Early Warning System' monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies and uses this information to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to initiate the emergency response, including public notification using ITS traveler information systems, where appropriate.
911 Dispatch Center	Emergency Management Center	Emergency Environmental Monitoring	'Emergency Environmental Monitoring' collects current and forecast road conditions and surface weather information from a variety of sources. The collected environmental information is monitored and presented to the operator and used to more effectively manage incidents.
911 Dispatch Center	Emergency Management Center	Emergency Incident Command	'Emergency Incident Command' provides tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident. It supports communications with public safety, emergency management, transportation, and other allied response agency centers, tracks and maintains resource information, action plans, and the incident command organization itself. Information is shared with agency centers including resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response. It supports the functions and interfaces commonly supported by a mobile command center.

Element Name	Physical Object	Functional Object	Functional Object Description
911 Dispatch Center	Emergency Management Center	Emergency Notification Support	'Emergency Notification Support' receives emergency notification messages from vehicles or personal handheld devices, determines an appropriate response, and either uses internal resources or contacts a local agency to provide that response. The nature of the emergency is determined based on the information in the received message as well as other inputs. This object effectively serves as an interface between automated collision notification systems and the local public safety answering point for messages that require a public safety response. This capability depends on an up-to-date registry of public safety answering points/response agencies by coverage area, the type of emergency, and hours of service.
911 Dispatch Center	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.
911 Dispatch Center	Emergency Management Center	Emergency Routing	'Emergency Routing' supports routing of emergency vehicles and enlists support from the Traffic Management Center to facilitate travel along these routes. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by the Traffic Management Center on request. Vehicles are tracked and routes are based on current vehicle location. It may coordinate with the Traffic Management Center to provide preemption or otherwise adapt the traffic control strategy along the selected route.

Element Name	Physical Object	Functional Object	Functional Object Description
911 Dispatch Center	Emergency Management Center	Emergency Secure Area Alarm Support	'Emergency Secure Area Alarm Support' receives traveler or transit vehicle operator alarm messages, notifies the system operator, and provides acknowledgement of alarm receipt back to the originator of the alarm. The alarms received can be generated by silent or audible alarm systems and may originate from public areas (e.g. transit stops, park and ride lots, transit stations, rest areas) or transit vehicles. The nature of the emergency may be determined based on the information in the alarm message as well as other inputs.
911 Dispatch Center	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.
911 Dispatch Center	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.
Advance Warning Flasher Roadside Equipment	Other ITS Roadway Equipment	Roadway Traffic Information Dissemination	'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios.
Advance Warning Flasher Roadside Equipment	Other ITS Roadway Equipment	Roadway Work Zone Traffic Control	'Roadway Work Zone Traffic Control' controls traffic in areas of the roadway where maintenance and construction activities are underway, monitoring and controlling traffic using field equipment such as video monitoring cameras, dynamic messages signs, and gates/barriers. Work zone speeds and delays are provided to the motorist prior to the work zones.
Advanced Pavement Condition and Visibility Warning System Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.

Element Name	Physical Object	Functional Object	Functional Object Description
Advanced Pavement Condition and Visibility Warning System Roadside Equipment	ITS Roadway Equipment	Roadway Environmental Monitoring	'Roadway Environmental Monitoring' measures environmental conditions and communicates the collected information back to a center where it can be monitored and analyzed or to other field devices to support communications to vehicles. A broad array of general weather and road surface information may be collected. Weather conditions that may be measured include temperature, wind, humidity, precipitation, and visibility. Surface and sub-surface sensors can measure road surface temperature, moisture, icing, salinity, and other measures.
Advanced Pavement Condition and Visibility Warning System Roadside Equipment	ITS Roadway Equipment	Roadway Traffic Information Dissemination	'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios.
Advanced Pavement Condition and Visibility Warning System Roadside Equipment	ITS Roadway Equipment	Roadway Warning	'Roadway Warning' includes the field equipment used to warn drivers approaching hazards on a roadway. Warnings may be generated in response to roadway weather conditions, road surface conditions, traffic conditions including queues, obstacles or animals in the roadway, and any other transient events that can be sensed. The equipment monitors traffic and roadway conditions and may send data to a Traffic Management Center for processing or may process it to determine when a warning should be issued. When it is determined that a warning should be issued, the equipment is used to alert approaching drivers via dynamic warning signs, flashing lights, in-vehicle messages, etc.
Airport	Emergency Management Center	Emergency Early Warning System	'Emergency Early Warning System' monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies and uses this information to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to initiate the emergency response, including public notification using ITS traveler information systems, where appropriate.
Airport	Emergency Management Center	Emergency Environmental Monitoring	'Emergency Environmental Monitoring' collects current and forecast road conditions and surface weather information from a variety of sources. The collected environmental information is monitored and presented to the operator and used to more effectively manage incidents.

Element Name	Physical Object	Functional Object	Functional Object Description
Airport	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.
Airport	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.
Animal Crossing Warning Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.
Animal Crossing Warning Roadside Equipment	ITS Roadway Equipment	Roadway Traffic Information Dissemination	'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios.
Animal Crossing Warning Roadside Equipment	ITS Roadway Equipment	Roadway Warning	'Roadway Warning' includes the field equipment used to warn drivers approaching hazards on a roadway. Warnings may be generated in response to roadway weather conditions, road surface conditions, traffic conditions including queues, obstacles or animals in the roadway, and any other transient events that can be sensed. The equipment monitors traffic and roadway conditions and may send data to a Traffic Management Center for processing or may process it to determine when a warning should be issued. When it is determined that a warning should be issued, the equipment is used to alert approaching drivers via dynamic warning signs, flashing lights, in-vehicle messages, etc.

Element Name	Physical Object	Functional Object	Functional Object Description
Arrow Board Reporting System	ITS Roadway Equipment	Roadway Work Zone Traffic Control	'Roadway Work Zone Traffic Control' controls traffic in areas of the roadway where maintenance and construction activities are underway, monitoring and controlling traffic using field equipment such as video monitoring cameras, dynamic messages signs, and gates/barriers. Work zone speeds and delays are provided to the motorist prior to the work zones.
Automated Crash Notification System	Emergency Management Center	Emergency Notification Support	'Emergency Notification Support' receives emergency notification messages from vehicles or personal handheld devices, determines an appropriate response, and either uses internal resources or contacts a local agency to provide that response. The nature of the emergency is determined based on the information in the received message as well as other inputs. This object effectively serves as an interface between automated collision notification systems and the local public safety answering point for messages that require a public safety response. This capability depends on an up-to-date registry of public safety answering points/response agencies by coverage area, the type of emergency, and hours of service.
Automated Crash Notification System	Emergency Management Center	Emergency Secure Area Alarm Support	'Emergency Secure Area Alarm Support' receives traveler or transit vehicle operator alarm messages, notifies the system operator, and provides acknowledgement of alarm receipt back to the originator of the alarm. The alarms received can be generated by silent or audible alarm systems and may originate from public areas (e.g. transit stops, park and ride lots, transit stations, rest areas) or transit vehicles. The nature of the emergency may be determined based on the information in the alarm message as well as other inputs.
Automated Crash Notification System	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.

Element Name	Physical Object	Functional Object	Functional Object Description
Automated Permit Routing System (RouteBuilder)	Commerical Vehicle Administration Center	CVAC Credentials and Taxes Administration	'CVAC Credentials and Taxes Administration' issues credentials, collects fees and taxes, and supports enforcement of credential requirements. It manages driver licensing and enrolls carriers in additional CVO programs such as wireless roadside inspection programs. It communicates with the Fleet and Freight Management Centers associated with the motor carriers to process applications and collect fuel taxes, weight/distance taxes, and other taxes and fees associated with commercial vehicle operations. It also receives applications for, and issues special Oversize/Overweight and HAZMAT permits in coordination with other cognizant authorities. It supports user account management and receives and processes requests for review of carrier and driver status. It communicates with peer functional objects in other jurisdictions to exchange credentials database information.
Automated Permit Routing System (RouteBuilder)	Transportation Information Center	CVAC Information Exchange	'CVAC Information Exchange' supports the exchange of safety, credentials, permit data, and other data concerning the operation of commercial vehicles among jurisdictions. The object also supports the exchange of safety, credentials, permit, and operations data between systems (for example, an administrative center and the roadside check facilities) within a single jurisdiction. Data are collected from multiple authoritative sources and packaged into snapshots (top-level summary and critical status information) and profiles (detailed and historical data). Data is made available to fleet operators and other information requestors on request or based on subscriptions established by the requestor.
AWOS Central Control System	Maint and Constr Management Center	MCM Environmental Information Collection	'MCM Environmental Information Collection' collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. In addition to fixed sensor stations at the roadside, this functional object also collects environmental information from sensor systems located on Maintenance and Construction Vehicles. It also collects current and forecast environmental conditions information that is made available by other systems. The functional object aggregates the sensor system data and provides it, along with data attributes to other applications.
AWOS Central Control System	Maint and Constr Management Center	MCM Environmental Information Processing	'MCM Environmental Information Processing' processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. The processed environmental information products are presented to center personnel and disseminated to other centers.

Element Name	Physical Object	Functional Object	Functional Object Description
AWOS Central Control System	Transportation Information Center	TIC Data Collection	'TIC Data Collection' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers.
AWOS Central Control System	Transportation Information Center	TIC Traveler Information Broadcast	'TIC Traveler Information Broadcast' disseminates traveler information including traffic and road conditions, incident information, maintenance and construction information, event information, transit information, parking information, and weather information. The same information is broadcast to all equipped traveler interface systems and vehicles.
AWOS Roadside Equipment	ITS Roadway Equipment	Roadway Environmental Monitoring	'Roadway Environmental Monitoring' measures environmental conditions and communicates the collected information back to a center where it can be monitored and analyzed or to other field devices to support communications to vehicles. A broad array of general weather and road surface information may be collected. Weather conditions that may be measured include temperature, wind, humidity, precipitation, and visibility. Surface and sub-surface sensors can measure road surface temperature, moisture, icing, salinity, and other measures.
Bridge Inspection / Structural Monitoring Roadside Equipment	Connected Vehicle Roadside Equipment	RSE Situation Monitoring	'RSE Situation Monitoring' is a general functional object that supports collection of traffic, environmental, and emissions data from passing vehicles. The data is collected, filtered, and forwarded based on parameters provided by the back office. Parameters are provided to passing vehicles that are equipped to collect and send situation data to the infrastructure in snapshots. In addition, this object collects current status information from local field devices including intersection status, sensor data, and signage data, providing complete, configurable monitoring of the situation for the local transportation system in the vicinity of the RSE.
Bridge Inspection / Structural Monitoring Roadside Equipment	Connected Vehicle Roadside Equipment	RSE Traffic Monitoring	'RSE Traffic Monitoring' monitors the basic safety messages that are shared between connected vehicles and distills this data into traffic flow measures that can be used to manage the network in combination with or in lieu of traffic data collected by infrastructure-based sensors. As connected vehicle penetration rates increase, the measures provided by this application can expand beyond vehicle speeds that are directly reported by vehicles to include estimated volume, occupancy, and other measures. This object also supports incident detection by monitoring for changes in speed and vehicle control events that indicate a potential incident.

Element Name	Physical Object	Functional Object	Functional Object Description
Bridge Inspection / Structural Monitoring Roadside Equipment	ITS Roadway Equipment	Roadway Infrastructure Monitoring	'Roadway Infrastructure Monitoring' monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It includes sensors that monitor the infrastructure and the communications necessary to report this data to a center or vehicle-based maintenance system.
Bridge Inspection / Structural Monitoring Roadside Equipment	ITS Roadway Equipment	Roadway Passive Monitoring	'Roadway Passive Monitoring' monitors passing vehicles for a signature that can be used to recognize the same vehicle at different points in the network and measure travel times. Depending on the implementation and the penetration rate of the technology that is monitored, other point traffic measures may also be inferred by monitoring the number of vehicles within range over time. Today this approach is implemented most commonly using a Bluetooth receiver that passively monitors Bluetooth devices on-board passing vehicles and license plate readers that record the vehicle license plate number, but any widely deployed vehicle communications technology or feature that can be passively monitored to uniquely identify a vehicle could be used.
Video Monitoring Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.
Video Monitoring Roadside Equipment	ITS Roadway Equipment	Roadway Incident Detection	'Roadway Incident Detection' provides incident detection using traffic detectors and surveillance equipment. It monitors for unusual traffic conditions that may indicate an incident or processes surveillance images, watching for potential incidents. It provides potential incident information as well as traffic flow and images to the center for processing and presentation to traffic operations personnel.
Video Monitoring Roadside Equipment	ITS Roadway Equipment	Roadway Warning	'Roadway Warning' includes the field equipment used to warn drivers approaching hazards on a roadway. Warnings may be generated in response to roadway weather conditions, road surface conditions, traffic conditions including queues, obstacles or animals in the roadway, and any other transient events that can be sensed. The equipment monitors traffic and roadway conditions and may send data to a Traffic Management Center for processing or may process it to determine when a warning should be issued. When it is determined that a warning should be issued, the equipment is used to alert approaching drivers via dynamic warning signs, flashing lights, in-vehicle messages, etc.
Video Monitoring Roadside Equipment	ITS Roadway Equipment	Roadway Work Zone Traffic Control	'Roadway Work Zone Traffic Control' controls traffic in areas of the roadway where maintenance and construction activities are underway, monitoring and controlling traffic using field equipment such as video monitoring cameras, dynamic messages signs, and gates/barriers. Work zone speeds and delays are provided to the motorist prior to the work zones.

Element Name	Physical Object	Functional Object	Functional Object Description
Commercial Vehicle Administration Center	Commercial Vehicle Administration Center	CVAC Information Exchange	'CVAC Information Exchange' supports the exchange of safety, credentials, permit data, and other data concerning the operation of commercial vehicles among jurisdictions. The object also supports the exchange of safety, credentials, permit, and operations data between systems (for example, an administrative center and the roadside check facilities) within a single jurisdiction. Data are collected from multiple authoritative sources and packaged into snapshots (top-level summary and critical status information) and profiles (detailed and historical data). Data is made available to fleet operators and other information requestors on request or based on subscriptions established by the requestor.
Commercial Vehicle Administration Center	Commercial Vehicle Administration Center	CVAC International Administration	'CVAC International Administration' generates and processes the entry documentation necessary to obtain release of vehicle, cargo, and driver across an international border, report the results of the crossing event, and handle duty fee processing. It interfaces with the systems used by customs and border protection, immigration, carriers, and service providers (e.g., brokers) to generate, process, and store entry documentation.
Commercial Vehicle Administration Center	Commercial Vehicle Administration Center	CVAC Safety and Security Administration	'CVAC Safety and Security Administration' provides commercial vehicle safety and security criteria to roadside check facilities, collects and reviews safety and security data from the field and distributes safety and security information to other centers, carriers, and enforcement agencies. It also supports wireless roadside inspections, including carrier enrollment, managing and distributing information about trigger areas where wireless inspections may occur, and monitoring the condition of the commercial vehicle and driver using wireless communications at identified trigger areas. It supports the collection and review of carrier and driver safety and security data and supports determination of the carrier and driver safety and security ratings. It clears the out-of-service status when the responsible carrier or driver reports that deficiencies flagged during inspections have been corrected.
Commercial Vehicles	Commercial Vehicle OBE	CV On-Board Cargo Monitoring	'CV On-Board Cargo Monitoring' monitors the location and status of the commercial vehicle and its cargo. It sends the collected data to appropriate centers and roadside facilities, including emergency management in the case of HAZMAT incidents. Depending on the nature of the cargo, it may include sensors that measure temperature, pressure, load leveling, acceleration, and other attributes of the cargo.

Element Name	Physical Object	Functional Object	Functional Object Description
Commercial Vehicles	Commercial Vehicle OBE	CV On-Board Electronic Screening Support	'CV On-Board Electronic Screening Support' exchanges information with roadside facilities, providing information such as driver, vehicle, and carrier identification to roadside facilities that can be used to support electronic screening. Pass/pull-in messages are received and presented to the commercial vehicle driver and screening events are recorded. Additional information, including trip records (e.g., border clearance information), safety inspection records, cargo information, and driver status information may also be collected, stored, and made available to the roadside facility.
Commercial Vehicles	Commercial Vehicle OBE	CV On-Board Safety and Security	'CV On-Board Safety and Security' collects and processes vehicle and driver safety and security information and provides safety and security information to the Fleet and Freight Management Center. It also supplies this information to the roadside facilities both at mainline speeds and while stopped for inspections. Safety information may also be provided at predetermined trigger areas using wireless communications. The capability to alert the commercial vehicle driver whenever there is a critical safety or security problem or potential emergency is also provided. It also supports on-board driver safety log maintenance and checking.
Commercial Vehicles	Commercial Vehicle OBE	CV On-Board Trip Monitoring	'CV On-Board Trip Monitoring' provides the capabilities to support fleet management with automatic vehicle location and automated mileage and fuel reporting and auditing. In addition, this equipment is used to monitor the planned route and notify the Fleet and Freight Management Center of any deviations. Freight-specific traveler information and restrictions are also collected and reported to the driver to support the trip.
Commuter Rail Operations Center	Transit Management Center	Transit Center Fare Management	'Transit Center Fare Management' manages fare collection and passenger load management at the transit center. It provides the back office functions that support transit fare collection, supporting payment reconciliation with links to financial institutions and enforcement agencies for fare violations. It collects data required to determine accurate ridership levels, establish fares, and distribute fare information. It loads fare data into the vehicle prior to the beginning of normal operations and unloads fare collection data from the vehicle at the close out of normal operations.
Commuter Rail Operations Center	Transit Management Center	Transit Center Fixed-Route Operations	'Transit Center Fixed-Route Operations' manages fixed route transit operations. It supports creation of schedules, blocks and runs for fixed and flexible route transit services. It allows fixed-route and flexible-route transit services to disseminate schedules and automatically updates customer service operator systems with the most current schedule information. It also supports automated dispatch of transit vehicles. Current vehicle schedule adherence and optimum scenarios for schedule adjustment are also provided. It also receives and processes transit vehicle loading data.

Element Name	Physical Object	Functional Object	Functional Object Description
Commuter Rail Operations Center	Transit Management Center	Transit Center Multi-Modal Coordination	'Transit Center Multi-Modal Coordination' supports transit service coordination between transit properties and coordinates with other surface and air transportation modes. As part of service coordination, it shares schedule and trip information, as well as transit transfer cluster (a collection of stop points, stations, or terminals where transfers can be made conveniently) and transfer point information between Multimodal Transportation Service Providers, Transit Agencies, and ISPs. An interface to Traffic Management also supports demand management strategies.
Commuter Rail Operations Center	Transit Management Center	Transit Center Vehicle Assignment	'Transit Center Vehicle Assignment' assigns individual transit vehicles to vehicle blocks and downloads this information to the transit vehicle. It also provides an exception handling process for the vehicle assignment function to generate new, supplemental vehicle assignments when required by changes during the operating day. It provides an inventory management function for the transit facility which stores functional attributes about each of the vehicles owned by the transit operator. These attributes permit the planning and assignment functions to match vehicles with routes based on suitability for the types of service required by the particular routes.
Commuter Rail Operations Center	Transit Management Center	Transit Garage Maintenance	'Transit Garage Maintenance' provides advanced maintenance functions for the transit property. It collects operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors operators and vehicles. It collects vehicle mileage data and uses it to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data. In addition, it provides information to service personnel to support maintenance activities and records and verifies that maintenance work was performed.
Condition Acquisition and Reporting System (CARS)	Archived Data System	Archive Data Repository	'Archive Data Repository' collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. It includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. It supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region. Repositories may be established to support operations planning, performance monitoring and management, and policy and investment decisions.
Condition Acquisition and Reporting System (CARS)	Archived Data System	Archive Government Reporting	'Archive Government Reporting' selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements. It provides transportation system statistics and performance measures in required formats to support investment and policy decisions.

Element Name	Physical Object	Functional Object	Functional Object Description
Condition Acquisition and Reporting System (CARS)	Archived Data System	Archive On-Line Analysis and Mining	'Archive On-Line Analysis and Mining' provides advanced data analysis, summarization, and mining features that facilitate discovery of information, patterns, and correlations in large data sets. Multidimensional analysis, selective summarization and expansion of data details, and many other advanced analysis services may be offered. Complex performance measures that are derived from multiple data sources may also be produced.
Condition Acquisition and Reporting System (CARS)	Archived Data System	Archive Situation Data Archival	'Archive Situation Data Archival' collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. It controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes, rather than for traffic management. It also collects situation data from connected vehicles. The data collected, quality checks performed, and aggregation strategies are defined to support transportation system performance monitoring and management.
Condition Acquisition and Reporting System (CARS)	Data Distribution System	DDS Data Access Management	'DDS Data Access Management' defines the access mechanisms, structures and restrictions for inbound (from providers) and outbound (to consumers) data.
Condition Acquisition and Reporting System (CARS)	Data Distribution System	DDS Data Collection and Aggregation	'DDS Data Collection and Aggregation' collects data 'deposits' from producers including meta data such as the generation location and time. It authenticates and validates the data deposits and logs all associated meta data. Authenticated, valid data is bundled based on information type and location and made available as data products to consumers who are interested in the data. It establishes delivery parameters for data consumers that subscribe based on parameters including content type and geographic region of interest and delivers data to consumers based on these parameters.
Condition Acquisition and Reporting System (CARS)	Transportation Information Center	TIC Data Collection	'TIC Data Collection' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers.

Element Name	Physical Object	Functional Object	Functional Object Description
Condition Acquisition and Reporting System (CARS)	Transportation Information Center	TIC Emergency Traveler Information	'TIC Emergency Traveler Information' provides emergency information to the public, including wide-area alerts and evacuation information. It provides emergency alerts, information on evacuation zones and evacuation requirements, evacuation destinations and shelter information, available transportation modes, and traffic and road conditions at the origin, destination, and along the evacuation routes. In addition to general evacuation information, personalized information including tailored evacuation routes, service information, and estimated travel times is also provided based on traveler specified origin, destination, and route parameters. Updated information is provided throughout the evacuation and subsequent reentry as status changes and plans are adapted.
Condition Acquisition and Reporting System (CARS)	Transportation Information Center	TIC Interactive Traveler Information	'TIC Interactive Traveler Information' disseminates personalized traveler information including traffic and road conditions, transit information, parking information, maintenance and construction information, multimodal information, event information, and weather information. Tailored information is provided based on the traveler's request in this interactive service.
Condition Acquisition and Reporting System (CARS)	Transportation Information Center	TIC Operations Data Collection	'TIC Operations Data Collection' collects and stores information that is collected about the transportation information service including data on the number of clients serviced and the services that were provided. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Condition Acquisition and Reporting System (CARS)	Transportation Information Center	TIC Traveler Information Broadcast	'TIC Traveler Information Broadcast' disseminates traveler information including traffic and road conditions, incident information, maintenance and construction information, event information, transit information, parking information, and weather information. The same information is broadcast to all equipped traveler interface systems and vehicles.
Condition Acquisition and Reporting System (CARS)	Transportation Information Center	TIC Traveler Telephone Information	'TIC Traveler Telephone Information' services voice-based traveler requests for information that supports traveler telephone information systems like 511. It takes requests for traveler information, which could be voice-formatted traveler requests, dual-tone multi-frequency (DTMF)-based requests, or a simple traveler information request, and returns the requested traveler information in the proper format. In addition to servicing requests for traveler information, it also collects and forwards alerts and advisories to traveler telephone information systems.
County Emergency Operations Centers	Emergency Management Center	Emergency Call-Taking	'Emergency Call-Taking' supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other objects that formulate and manage the emergency response. It receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.

Element Name	Physical Object	Functional Object	Functional Object Description
County Emergency Operations Centers	Emergency Management Center	Emergency Commercial Vehicle Response	'Emergency Commercial Vehicle Response' identifies and initiates a response to commercial vehicle and freight equipment related emergencies. These emergencies may include incidents involving hazardous materials as well as the detection of non-permitted transport of security sensitive hazmat. It identifies the location of the vehicle, the nature of the incident, the route information, and information concerning the freight itself. The information supports the determination of the response and identifies the responding agencies to notify.
County Emergency Operations Centers	Emergency Management Center	Emergency Dispatch	'Emergency Dispatch' tracks the location and status of emergency vehicles and dispatches these vehicles to incidents. Pertinent incident information is gathered from the public and other public safety agencies and relayed to the responding units. Incident status and the status of the responding units is tracked so that additional units can be dispatched and/or unit status can be returned to available when the incident is cleared and closed.
County Emergency Operations Centers	Emergency Management Center	Emergency Early Warning System	'Emergency Early Warning System' monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies and uses this information to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to initiate the emergency response, including public notification using ITS traveler information systems, where appropriate.
County Emergency Operations Centers	Emergency Management Center	Emergency Environmental Monitoring	'Emergency Environmental Monitoring' collects current and forecast road conditions and surface weather information from a variety of sources. The collected environmental information is monitored and presented to the operator and used to more effectively manage incidents.

Element Name	Physical Object	Functional Object	Functional Object Description
County Emergency Operations Centers	Emergency Management Center	Emergency Evacuation Support	'Emergency Evacuation Support' coordinates evacuation plans among allied agencies and manages evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety. Where appropriate, the affected population is evacuated in shifts, using more than one evacuation route, and including several evacuation destinations to spread demand and thereby expedite the evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. The public is provided with real-time evacuation guidance including basic information to assist potential evacuees in determining whether evacuation is necessary. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. The evacuation and reentry status are monitored and used to refine the plan and resource allocations during the evacuation and subsequent reentry. It communicates with public health systems to develop evacuation plans and recommended strategies for disasters and evacuation scenarios involving biological or other medical hazards.
County Emergency Operations Centers	Emergency Management Center	Emergency Incident Command	'Emergency Incident Command' provides tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident. It supports communications with public safety, emergency management, transportation, and other allied response agency centers, tracks and maintains resource information, action plans, and the incident command organization itself. Information is shared with agency centers including resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response. It supports the functions and interfaces commonly supported by a mobile command center.
County Emergency Operations Centers	Emergency Management Center	Emergency Notification Support	'Emergency Notification Support' receives emergency notification messages from vehicles or personal handheld devices, determines an appropriate response, and either uses internal resources or contacts a local agency to provide that response. The nature of the emergency is determined based on the information in the received message as well as other inputs. This object effectively serves as an interface between automated collision notification systems and the local public safety answering point for messages that require a public safety response. This capability depends on an up-to-date registry of public safety answering points/response agencies by coverage area, the type of emergency, and hours of service.

Element Name	Physical Object	Functional Object	Functional Object Description
County Emergency Operations Centers	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.
County Emergency Operations Centers	Emergency Management Center	Emergency Secure Area Alarm Support	'Emergency Secure Area Alarm Support' receives traveler or transit vehicle operator alarm messages, notifies the system operator, and provides acknowledgement of alarm receipt back to the originator of the alarm. The alarms received can be generated by silent or audible alarm systems and may originate from public areas (e.g. transit stops, park and ride lots, transit stations, rest areas) or transit vehicles. The nature of the emergency may be determined based on the information in the alarm message as well as other inputs.
County Emergency Operations Centers	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.

Element Name	Physical Object	Functional Object	Functional Object Description
County Emergency Operations Centers	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.
County Sheriff and City Police Offices	Emergency Management Center	Emergency Early Warning System	'Emergency Early Warning System' monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies and uses this information to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to initiate the emergency response, including public notification using ITS traveler information systems, where appropriate.
County Sheriff and City Police Offices	Emergency Management Center	Emergency Environmental Monitoring	'Emergency Environmental Monitoring' collects current and forecast road conditions and surface weather information from a variety of sources. The collected environmental information is monitored and presented to the operator and used to more effectively manage incidents.
County Sheriff and City Police Offices	Emergency Management Center	Emergency Evacuation Support	'Emergency Evacuation Support' coordinates evacuation plans among allied agencies and manages evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety. Where appropriate, the affected population is evacuated in shifts, using more than one evacuation route, and including several evacuation destinations to spread demand and thereby expedite the evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. The public is provided with real-time evacuation guidance including basic information to assist potential evacuees in determining whether evacuation is necessary. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. The evacuation and reentry status are monitored and used to refine the plan and resource allocations during the evacuation and subsequent reentry. It communicates with public health systems to develop evacuation plans and recommended strategies for disasters and evacuation scenarios involving biological or other medical hazards.

Element Name	Physical Object	Functional Object	Functional Object Description
County Sheriff and City Police Offices	Emergency Management Center	Emergency Incident Command	'Emergency Incident Command' provides tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident. It supports communications with public safety, emergency management, transportation, and other allied response agency centers, tracks and maintains resource information, action plans, and the incident command organization itself. Information is shared with agency centers including resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response. It supports the functions and interfaces commonly supported by a mobile command center.
County Sheriff and City Police Offices	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.
County Sheriff and City Police Offices	Emergency Management Center	Emergency Secure Area Alarm Support	'Emergency Secure Area Alarm Support' receives traveler or transit vehicle operator alarm messages, notifies the system operator, and provides acknowledgement of alarm receipt back to the originator of the alarm. The alarms received can be generated by silent or audible alarm systems and may originate from public areas (e.g. transit stops, park and ride lots, transit stations, rest areas) or transit vehicles. The nature of the emergency may be determined based on the information in the alarm message as well as other inputs.

Element Name	Physical Object	Functional Object	Functional Object Description
County Sheriff and City Police Offices	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.
County Sheriff and City Police Offices	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.
CV Roadside Equipment	Connected Vehicle Roadside Equipment	RSE Communications Support	'RSE Communications Support' supports secure, reliable communications with other connected devices. It provides the communications functions that add a timestamp, the message origin, and a digital signature in outbound messages and processes, verifies, and authenticates the same fields in inbound messages. It also encrypts (outbound) and decrypts (inbound) sensitive data.
CV Roadside Equipment	Connected Vehicle Roadside Equipment	RSE Device Management	'RSE Device Management' provides executive control and monitoring of the RSE hardware and installed software applications. It monitors the operational status of the hardware and other attached field devices and detects and reports fault conditions. A back office interface supports application installation, upgrade, and configuration as well as remote control of the operating mode and hardware configuration settings and initiation of remote diagnostics. A local interface is provided to field personnel for local monitoring and diagnostics, supporting field maintenance, repair, and replacement.

Element Name	Physical Object	Functional Object	Functional Object Description
CV Roadside Equipment	Connected Vehicle Roadside Equipment	RSE Intersection Management	'RSE Intersection Management' uses short range communications to support connected vehicle applications that manage signalized intersections. It communicates with approaching vehicles and ITS infrastructure (e.g., the traffic signal controller) to enhance traffic signal operations. Coordination with the ITS infrastructure also supports conflict monitoring to ensure the RSE output and traffic signal control output are consistent and degrade in a fail safe manner.
CV Roadside Equipment	Connected Vehicle Roadside Equipment	RSE Situation Monitoring	'RSE Situation Monitoring' is a general functional object that supports collection of traffic, environmental, and emissions data from passing vehicles. The data is collected, filtered, and forwarded based on parameters provided by the back office. Parameters are provided to passing vehicles that are equipped to collect and send situation data to the infrastructure in snapshots. In addition, this object collects current status information from local field devices including intersection status, sensor data, and signage data, providing complete, configurable monitoring of the situation for the local transportation system in the vicinity of the RSE.
CV Roadside Equipment	Connected Vehicle Roadside Equipment	RSE Support Services	'RSE Support Services' provides foundational functions that supports data collection, management, and distribution. It coordinates with Object Registration and Discovery to maintain its registration with respect to location/geographic scope and credentialing information. It maintains the necessary security credentials, authorizations, and associated keys to support communications in the connected vehicle environment. It maintains precise location and time information to support other services.
CV Roadside Equipment	Connected Vehicle Roadside Equipment	RSE Traffic Monitoring	'RSE Traffic Monitoring' monitors the basic safety messages that are shared between connected vehicles and distills this data into traffic flow measures that can be used to manage the network in combination with or in lieu of traffic data collected by infrastructure-based sensors. As connected vehicle penetration rates increase, the measures provided by this application can expand beyond vehicle speeds that are directly reported by vehicles to include estimated volume, occupancy, and other measures. This object also supports incident detection by monitoring for changes in speed and vehicle control events that indicate a potential incident.
CV Roadside Equipment	Connected Vehicle Roadside Equipment	RSE Trust Management	'RSE Trust Management' manages the certificates and associated keys that are used to sign, encrypt, decrypt, and authenticate messages. It communicates with the Security and Credentials Management System to maintain a current, valid set of security certificates and keys and identifies, logs, and reports events that may indicate a threat to Connected Vehicle Environment security.

Element Name	Physical Object	Functional Object	Functional Object Description
Dynamic Late Merge Central Control System	Maint and Constr Management Center	MCM Maintenance Decision Support	'MCM Maintenance Decision Support' recommends maintenance courses of action based on current and forecast environmental and road conditions and additional application specific information. Decisions are supported through understandable presentation of filtered and fused environmental and road condition information for specific time horizons as well as specific maintenance recommendations that are generated by the system based on this integrated information. The recommended courses of action are supported by information on the anticipated consequences of action or inaction, when available.
Dynamic Late Merge Central Control System	Maint and Constr Management Center	MCM Roadway Maintenance	'MCM Roadway Maintenance' provides overall management and support for routine maintenance on a roadway system or right-of-way. Services managed include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of non-ITS equipment on the roadway (e.g., signs, gantries, cabinets, guard rails, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling routine maintenance activities. See also MCM Field Equipment Maintenance for maintenance of ITS field equipment.
Dynamic Late Merge Central Control System	Maint and Constr Management Center	MCM Work Zone Management	'MCM Work Zone Management' remotely monitors and supports work zone activities, controlling traffic through dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers, and informing other groups of activity (e.g., traveler information, traffic management, other maintenance and construction centers) for better coordination management. Work zone speeds, and delays, and closures are provided to the motorist prior to the work zones. This application provides control of field equipment in all maintenance areas, including fixed and portable field equipment supporting both stationary and mobile work zones.
Dynamic Late Merge Roadside Equipment	ITS Roadway Equipment	Roadway Field Device Support	'Roadway Field Device Support' monitors the operational status of field devices and detects and reports fault conditions. Consolidated operational status (device status, configuration, and fault information) are reported for resolution and repair. A local interface is provided to field personnel for local monitoring and diagnostics, supporting field maintenance, upgrade, repair, and replacement of field devices.
Dynamic Late Merge Roadside Equipment	ITS Roadway Equipment	Roadway Work Zone Traffic Control	'Roadway Work Zone Traffic Control' controls traffic in areas of the roadway where maintenance and construction activities are underway, monitoring and controlling traffic using field equipment such as video monitoring cameras, dynamic messages signs, and gates/barriers. Work zone speeds and delays are provided to the motorist prior to the work zones.

Element Name	Physical Object	Functional Object	Functional Object Description
Dynamic Message Sign Roadside Equipment	ITS Roadway Equipment	Roadway Speed Monitoring and Warning	'Roadway Speed Monitoring and Warning' includes the field elements that monitor vehicle speeds. If the speed is determined to be excessive, an advisory or warning is displayed. Current environmental conditions and other factors that may reduce safe operating speeds may also be taken into account. The operational status (state of the device, configuration, and fault data) is provided to the center. This application can also provide an enforcement function, reporting speed violations to an enforcement agency.
Dynamic Message Sign Roadside Equipment	ITS Roadway Equipment	Roadway Traffic Information Dissemination	'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios.
Dynamic Message Sign Roadside Equipment	ITS Roadway Equipment	Roadway Work Zone Traffic Control	'Roadway Work Zone Traffic Control' controls traffic in areas of the roadway where maintenance and construction activities are underway, monitoring and controlling traffic using field equipment such as video monitoring cameras, dynamic messages signs, and gates/barriers. Work zone speeds and delays are provided to the motorist prior to the work zones.
Dynamic Message Sign Roadside Equipment	Traveler Support Equipment	Transit Stop Information Services	'Transit Stop Information Services' furnishes transit users with real-time travel-related information at transit stops, multi-modal transfer points, and other public transportation areas. It provides transit users with information on transit routes, schedules, transfer options, available services, fares, and real-time schedule adherence. In addition to tailored information for individual transit users, it supports general annunciation and/or display of imminent arrival information and other information of general interest to transit users.
Dynamic Message Sign Roadside Equipment	Traveler Support Equipment	Traveler Information Reception	'Traveler Information Reception' receives formatted traffic advisories, road conditions, transit information, broadcast alerts, and other general traveler information broadcasts and presents the information to the traveler with a public traveler interface. It includes the receiver and public display device such as a large display monitor or other public display.
Emergency Vehicle Equipment	Emergency Vehicle OBE	EV On-Board En Route Support	'EV On-Board En Route Support' provides communications functions to responding emergency vehicles that reduce response times and improve safety of responding public safety personnel and the general public. It supports traffic signal preemption via short range communication directly with signal control equipment and sends alert messages to surrounding vehicles.

Element Name	Physical Object	Functional Object	Functional Object Description
Emergency Vehicle Equipment	Emergency Vehicle OBE	EV On-Board Incident Management Communication	'EV On-board Incident Management Communication' provides communications support to first responders. Information about the incident, information on dispatched resources, and ancillary information such as road and weather conditions are provided to emergency personnel. Emergency personnel transmit information about the incident such as identification of vehicles and people involved, the extent of injuries, hazardous material, resources on site, site management strategies in effect, and current clearance status. Emergency personnel may also send in-vehicle signing messages to approaching traffic using short range communications.
Emergency Vehicle Equipment	Emergency Vehicle OBE	EV Service Patrol Vehicle Operations	'EV Service Patrol Vehicle Operations' provides on-board processing and communications to service patrol vehicles that reduce response times and improve safety of responding personnel. It supports service patrol vehicle dispatch and provides incident information back to the dispatching center.
FAST Compliance Management System	Commercial Vehicle Check Equipment	CVCE Electronic Screening	'CVCE Electronic Screening' supports electronic credentials and safety screening of commercial vehicles at mainline speeds. It processes the data from the commercial vehicles along with accessed database information to determine whether a pull-in message is needed. It may also generate random pull-in messages with provisions for facility operators and enforcement officials to have manual override capabilities.
FAST Compliance Management System	Commercial Vehicle Check Equipment	CVCE International Border Crossing	'CVCE International Border Crossing' checks compliance with import/export and immigration regulations to manage release of commercial vehicle, cargo, and driver across an international border. It includes interfaces to the equipment at international border crossings operated by government agencies such as Customs and Border Protection.
FIRST Emergency Vehicles	Emergency Vehicle OBE	EV On-Board En Route Support	'EV On-Board En Route Support' provides communications functions to responding emergency vehicles that reduce response times and improve safety of responding public safety personnel and the general public. It supports traffic signal preemption via short range communication directly with signal control equipment and sends alert messages to surrounding vehicles.
FIRST Emergency Vehicles	Emergency Vehicle OBE	EV On-Board Incident Management Communication	'EV On-board Incident Management Communication' provides communications support to first responders. Information about the incident, information on dispatched resources, and ancillary information such as road and weather conditions are provided to emergency personnel. Emergency personnel transmit information about the incident such as identification of vehicles and people involved, the extent of injuries, hazardous material, resources on site, site management strategies in effect, and current clearance status. Emergency personnel may also send in-vehicle signing messages to approaching traffic using short range communications.

Element Name	Physical Object	Functional Object	Functional Object Description
FIRST Emergency Vehicles	Emergency Vehicle OBE	EV Service Patrol Vehicle Operations	'EV Service Patrol Vehicle Operations' provides on-board processing and communications to service patrol vehicles that reduce response times and improve safety of responding personnel. It supports service patrol vehicle dispatch and provides incident information back to the dispatching center.
Highway Advisory Radio Roadside Equipment	ITS Roadway Equipment	Roadway Traffic Information Dissemination	'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios.
In Vehicle Signing Roadside Equipment	Connected Vehicle Roadside Equipment	RSE Traveler Information Communications	'RSE Traveler Information Communications' includes field elements that distribute information to vehicles for in-vehicle display. The information may be provided by a center (e.g., variable information on traffic and road conditions in the vicinity of the field equipment) or it may be determined and output locally (e.g., static sign information and signal phase and timing information). This includes the interface to the center or field equipment that controls the information distribution and the short range communications equipment that provides information to passing vehicles.
In Vehicle Signing Vehicle Equipment	Vehicle OBE	Vehicle Roadside Information Reception	'Vehicle Roadside Information Reception' receives advisories, vehicle signage data, and other driver information and presents this information to the driver using in-vehicle equipment. Information presented may include fixed sign information, traffic control device status (e.g., signal phase and timing data), advisory and detour information, warnings of adverse road and weather conditions, travel times, and other driver information.
Intelligent Work Zone System Roadside Equipment	ITS Roadway Equipment	Roadway Field Device Support	'Roadway Field Device Support' monitors the operational status of field devices and detects and reports fault conditions. Consolidated operational status (device status, configuration, and fault information) are reported for resolution and repair. A local interface is provided to field personnel for local monitoring and diagnostics, supporting field maintenance, upgrade, repair, and replacement of field devices.
Intelligent Work Zone System Roadside Equipment	ITS Roadway Equipment	Roadway Work Zone Safety	'Roadway Work Zone Safety' includes field elements that detect vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone.
Intelligent Work Zone System Roadside Equipment	ITS Roadway Equipment	Roadway Work Zone Traffic Control	'Roadway Work Zone Traffic Control' controls traffic in areas of the roadway where maintenance and construction activities are underway, monitoring and controlling traffic using field equipment such as video monitoring cameras, dynamic messages signs, and gates/barriers. Work zone speeds and delays are provided to the motorist prior to the work zones.

Element Name	Physical Object	Functional Object	Functional Object Description
Intercity Transit Management Centers	Emergency Management Center	Emergency Data Collection	'Emergency Data Collection' collects and stores emergency information that is collected in the course of operations by the Emergency Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Intercity Transit Management Centers	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.
Intercity Transit Management Centers	Emergency Management Center	Emergency Secure Area Alarm Support	'Emergency Secure Area Alarm Support' receives traveler or transit vehicle operator alarm messages, notifies the system operator, and provides acknowledgement of alarm receipt back to the originator of the alarm. The alarms received can be generated by silent or audible alarm systems and may originate from public areas (e.g. transit stops, park and ride lots, transit stations, rest areas) or transit vehicles. The nature of the emergency may be determined based on the information in the alarm message as well as other inputs.

Element Name	Physical Object	Functional Object	Functional Object Description
Intercity Transit Management Centers	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.
Intercity Transit Management Centers	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.
Intercity Transit Management Centers	Transit Management Center	Transit Center Connection Protection	'Transit Center Connection Protection' manages the coordination of transit transfers between routes within a single transit agency, between routes of different transit agencies, or between different modes (e.g. a bus transit route and a ferry route). This functional object also supports the capability for an individual traveler to obtain connection protection throughout a specific transit trip. This application may be implemented through peer-to-peer sharing between agencies control systems or as a central transit transfer request brokerage that facilitates the management and coordination of transfers across multiple agencies and control systems.
Intercity Transit Management Centers	Transit Management Center	Transit Center Data Collection	'Transit Center Data Collection' collects and stores transit information that is collected in the course of transit operations performed by the Transit Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.

Element Name	Physical Object	Functional Object	Functional Object Description
Intercity Transit Management Centers	Transit Management Center	Transit Center Fare Management	'Transit Center Fare Management' manages fare collection and passenger load management at the transit center. It provides the back office functions that support transit fare collection, supporting payment reconciliation with links to financial institutions and enforcement agencies for fare violations. It collects data required to determine accurate ridership levels, establish fares, and distribute fare information. It loads fare data into the vehicle prior to the beginning of normal operations and unloads fare collection data from the vehicle at the close out of normal operations.
Intercity Transit Management Centers	Transit Management Center	Transit Center Fixed-Route Operations	'Transit Center Fixed-Route Operations' manages fixed route transit operations. It supports creation of schedules, blocks and runs for fixed and flexible route transit services. It allows fixed-route and flexible-route transit services to disseminate schedules and automatically updates customer service operator systems with the most current schedule information. It also supports automated dispatch of transit vehicles. Current vehicle schedule adherence and optimum scenarios for schedule adjustment are also provided. It also receives and processes transit vehicle loading data.
Intercity Transit Management Centers	Transit Management Center	Transit Center Information Services	'Transit Center Information Services' collects the latest available information for a transit service and makes it available to transit customers and to Transportation Information Centers for further distribution. Customers are provided information at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute. Information provided can include the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events. In addition to general service information, tailored information (e.g., itineraries) are provided to individual transit users.
Intercity Transit Management Centers	Transit Management Center	Transit Center Multi-Modal Coordination	'Transit Center Multi-Modal Coordination' supports transit service coordination between transit properties and coordinates with other surface and air transportation modes. As part of service coordination, it shares schedule and trip information, as well as transit transfer cluster (a collection of stop points, stations, or terminals where transfers can be made conveniently) and transfer point information between Multimodal Transportation Service Providers, Transit Agencies, and ISPs. An interface to Traffic Management also supports demand management strategies.
Intercity Transit Management Centers	Transit Management Center	Transit Center Security	'Transit Center Security' monitors transit vehicle operator or traveler activated alarms received from on-board a transit vehicle. It supports transit vehicle operator authentication and provides the capability to remotely disable a transit vehicle. It also includes the capability to alert operators and police to potential incidents identified by these security features.

Element Name	Physical Object	Functional Object	Functional Object Description
Intersection Collision Warning Roadside Equipment	Connected Vehicle Roadside Equipment	RSE Intersection Safety	'RSE Intersection Safety' uses short range communications to support connected vehicle applications that improve intersection safety. It communicates with approaching vehicles and ITS infrastructure to alert and warn drivers of potential stop sign, red light, and non-motorized user crossing conflicts or violations.
Intersection Collision Warning Roadside Equipment	ITS Roadway Equipment	Roadway Signal Control	'Roadway Signal Control' includes the field elements that monitor and control signalized intersections. It includes the traffic signal controllers, detectors, conflict monitors, signal heads, and other ancillary equipment that supports traffic signal control. It also includes field masters, and equipment that supports communications with a central monitoring and/or control system, as applicable. The communications link supports upload and download of signal timings and other parameters and reporting of current intersection status. It represents the field equipment used in all levels of traffic signal control from basic actuated systems that operate on fixed timing plans through adaptive systems. It also supports all signalized intersection configurations, including those that accommodate pedestrians. In advanced, future implementations, environmental data may be monitored and used to support dilemma zone processing and other aspects of signal control that are sensitive to local environmental conditions.
Lane Control Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.
Lane Control Roadside Equipment	ITS Roadway Equipment	Roadway Dynamic Lane Management and Shoulder Use	'Roadway Dynamic Lane Management and Shoulder Use' includes the field equipment, physical overhead lane signs and associated control electronics that are used to manage and control specific lanes and/or the shoulders. This equipment can be centrally controlled by a Traffic Management Center or it can be autonomous and monitor traffic conditions and demand along the roadway and determine how to change the lane controls to respond to current conditions. Lane controls can be used to change the lane configuration of the roadway, reconfigure intersections and/or interchanges, allow use of shoulders as temporary travel lanes, designate lanes for use by special vehicles only, such as buses, high occupancy vehicles (HOVs), vehicles attending a special event, etc. and/or prohibit or restrict types of vehicles from using particular lanes. Guidance and information for drivers can be posted on dynamic message signs.
Lane/Ramp Access Control Roadside Equipment	ITS Roadway Equipment	Roadway Barrier System Control	'Roadway Barrier System Control' includes the field equipment that controls barrier systems used to control access to transportation facilities and infrastructure. Barrier systems include automatic or remotely controlled gates, barriers and other access control systems.
Lane/Ramp Access Control Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.

Element Name	Physical Object	Functional Object	Functional Object Description
Lane/Ramp Access Control Roadside Equipment	ITS Roadway Equipment	Roadway Reversible Lanes	'Roadway Reversible Lanes' includes field elements that monitor and control reversible lane facilities. It includes the traffic sensors, surveillance equipment, lane control signals, physical lane access controls, and other field elements that manage traffic on these facilities. It provides current reversible lane facility status information and accepts requests and control commands from the controlling center.
Lane/Ramp Access Control Roadside Equipment	ITS Roadway Equipment	Roadway Traffic Information Dissemination	'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios.
Lane/Ramp Access Control Roadside Equipment	ITS Roadway Equipment	Roadway Work Zone Traffic Control	'Roadway Work Zone Traffic Control' controls traffic in areas of the roadway where maintenance and construction activities are underway, monitoring and controlling traffic using field equipment such as video monitoring cameras, dynamic messages signs, and gates/barriers. Work zone speeds and delays are provided to the motorist prior to the work zones.
Lift Bridge Traffic Control Central System	Traffic Management Center	TMC Multimodal Crossing Management	'TMC Multimodal Crossing Management' remotely monitors and manages multimodal crossings, including draw bridges and other crossings between highway traffic and other modes. Equipment controlled includes warning lights, gates, dynamic message signs, and other systems that provide driver information and control traffic at multimodal crossings. Railroad grade crossings are covered by other functional objects.
Lift Bridge Traffic Control Roadside Equipment	ITS Roadway Equipment	Roadway Multimodal Crossing Control	'Roadway Multimodal Crossing Control' monitors multimodal crossings and monitors and controls traffic control equipment in the vicinity of the crossing. Equipment controlled includes warning lights, gates, dynamic message signs, and other systems associated with multimodal crossings. It manages draw bridges and miscellaneous other crossings between highway traffic and other modes. Railroad grade crossings are covered by other functional objects.

Element Name	Physical Object	Functional Object	Functional Object Description
Light Rail Operations Center	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.
Light Rail Operations Center	Emergency Management Center	Emergency Secure Area Alarm Support	'Emergency Secure Area Alarm Support' receives traveler or transit vehicle operator alarm messages, notifies the system operator, and provides acknowledgement of alarm receipt back to the originator of the alarm. The alarms received can be generated by silent or audible alarm systems and may originate from public areas (e.g. transit stops, park and ride lots, transit stations, rest areas) or transit vehicles. The nature of the emergency may be determined based on the information in the alarm message as well as other inputs.
Light Rail Operations Center	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.

Element Name	Physical Object	Functional Object	Functional Object Description
Light Rail Operations Center	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.
Light Rail Operations Center	Transit Management Center	Transit Center Connection Protection	'Transit Center Connection Protection' manages the coordination of transit transfers between routes within a single transit agency, between routes of different transit agencies, or between different modes (e.g. a bus transit route and a ferry route). This functional object also supports the capability for an individual traveler to obtain connection protection throughout a specific transit trip. This application may be implemented through peer-to-peer sharing between agencies control systems or as a central transit transfer request brokerage that facilitates the management and coordination of transfers across multiple agencies and control systems.
Light Rail Operations Center	Transit Management Center	Transit Center Fixed-Route Operations	'Transit Center Fixed-Route Operations' manages fixed route transit operations. It supports creation of schedules, blocks and runs for fixed and flexible route transit services. It allows fixed-route and flexible-route transit services to disseminate schedules and automatically updates customer service operator systems with the most current schedule information. It also supports automated dispatch of transit vehicles. Current vehicle schedule adherence and optimum scenarios for schedule adjustment are also provided. It also receives and processes transit vehicle loading data.
Light Rail Operations Center	Transit Management Center	Transit Center Security	'Transit Center Security' monitors transit vehicle operator or traveler activated alarms received from on-board a transit vehicle. It supports transit vehicle operator authentication and provides the capability to remotely disable a transit vehicle. It also includes the capability to alert operators and police to potential incidents identified by these security features.
Light Rail Operations Center	Transit Management Center	Transit Center Vehicle Assignment	'Transit Center Vehicle Assignment' assigns individual transit vehicles to vehicle blocks and downloads this information to the transit vehicle. It also provides an exception handling process for the vehicle assignment function to generate new, supplemental vehicle assignments when required by changes during the operating day. It provides an inventory management function for the transit facility which stores functional attributes about each of the vehicles owned by the transit operator. These attributes permit the planning and assignment functions to match vehicles with routes based on suitability for the types of service required by the particular routes.

Element Name	Physical Object	Functional Object	Functional Object Description
Light Rail Operations Center	Transit Management Center	Transit Garage Maintenance	'Transit Garage Maintenance' provides advanced maintenance functions for the transit property. It collects operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors operators and vehicles. It collects vehicle mileage data and uses it to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data. In addition, it provides information to service personnel to support maintenance activities and records and verifies that maintenance work was performed.
Local Agency Traveler Information Website	Transportation Information Center	TIC Data Collection	'TIC Data Collection' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers.
Local Agency Traveler Information Website	Transportation Information Center	TIC Traveler Information Broadcast	'TIC Traveler Information Broadcast' disseminates traveler information including traffic and road conditions, incident information, maintenance and construction information, event information, transit information, parking information, and weather information. The same information is broadcast to all equipped traveler interface systems and vehicles.
Local TMCs	Traffic Management Center	TMC Basic Surveillance	'TMC Basic Surveillance' remotely monitors and controls traffic sensor systems and surveillance (e.g., video monitoring) equipment, and collects, processes and stores the collected traffic data. Current traffic information and other real-time transportation information is also collected from other centers. The collected information is provided to traffic operations personnel and made available to other centers.
Local TMCs	Traffic Management Center	TMC Data Collection	'TMC Data Collection' collects and stores information that is created in the course of traffic operations performed by the Traffic Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Local TMCs	Traffic Management Center	TMC Incident Detection	'TMC Incident Detection' identifies and reports incidents to Traffic Operations Personnel. It remotely monitors and controls traffic sensor and surveillance systems that support incident detection and verification. It analyzes and reduces the collected sensor and surveillance data, external alerting and advisory and incident reporting systems, anticipated demand information from intermodal freight depots, border crossings, special event information, and identifies and reports incidents and hazardous conditions

Element Name	Physical Object	Functional Object	Functional Object Description
Local TMCs	Traffic Management Center	TMC Incident Dispatch Coordination	'TMC Incident Dispatch Coordination' formulates and manages an incident response that takes into account the incident potential, incident impacts, and resources required for incident management. It provides information to support dispatch and routing of emergency response and service vehicles as well as coordination with other cooperating agencies. It provides access to traffic management resources that provide surveillance of the incident, traffic control in the surrounding area, and support for the incident response. It monitors the incident response and collects performance measures such as incident response and clearance times.
Local TMCs	Traffic Management Center	TMC Multi-Modal Coordination	'TMC Multi-Modal Coordination' supports center-to-center coordination between the Traffic Management and Transit Management Centers. It monitors transit operations and provides traffic signal priority for transit vehicles on request from the Transit Management Center.
Local TMCs	Traffic Management Center	TMC Regional Traffic Management	'TMC Regional Traffic Management' supports coordination between Traffic Management Centers in order to share traffic information between centers as well as control of traffic management field equipment. This coordination supports wide area optimization and regional coordination that spans jurisdictional boundaries; for example, coordinated signal control in a metropolitan area or coordination between freeway operations and arterial signal control within a corridor.
Local TMCs	Traffic Management Center	TMC Roadway Equipment Monitoring	'TMC Roadway Equipment Monitoring' monitors the operational status of field equipment and detects failures. It presents field equipment status to Traffic Operations Personnel and reports failures to the Maintenance and Construction Management Center. It tracks the repair or replacement of the failed equipment. The entire range of ITS field equipment may be monitored including sensors (traffic, infrastructure, environmental, security, speed, etc.) and devices (highway advisory radio, dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, beacons, security surveillance equipment, etc.).
Local TMCs	Traffic Management Center	TMC Signal Control	'TMC Signal Control' provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single Traffic Management Center and are responsive to traffic conditions and adapt to support incidents, preemption and priority requests, pedestrian crossing calls, etc.

Element Name	Physical Object	Functional Object	Functional Object Description
Local TMCs	Traffic Management Center	TMC Traffic Information Dissemination	'TMC Traffic Information Dissemination' disseminates traffic and road conditions, closure and detour information, incident information, driver advisories, and other traffic-related data to other centers, the media, and driver information systems. It monitors and controls driver information system field equipment including dynamic message signs and highway advisory radio, managing dissemination of driver information through these systems.
Local TMCs	Traffic Management Center	TMC Traffic Metering	'TMC Traffic Metering' provides center monitoring and control of traffic metering systems including on ramps, through interchanges, and on the mainline roadway. All types of metering are covered including pre-timed/fixed time, time-based, dynamic and adaptive metering strategies and special bypasses. Metering rates can be calculated based upon historical data or current conditions including traffic, air quality, etc.
Local Transit Management Centers	Emergency Management Center	Emergency Data Collection	'Emergency Data Collection' collects and stores emergency information that is collected in the course of operations by the Emergency Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Local Transit Management Centers	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.

Element Name	Physical Object	Functional Object	Functional Object Description
Local Transit Management Centers	Emergency Management Center	Emergency Secure Area Alarm Support	'Emergency Secure Area Alarm Support' receives traveler or transit vehicle operator alarm messages, notifies the system operator, and provides acknowledgement of alarm receipt back to the originator of the alarm. The alarms received can be generated by silent or audible alarm systems and may originate from public areas (e.g. transit stops, park and ride lots, transit stations, rest areas) or transit vehicles. The nature of the emergency may be determined based on the information in the alarm message as well as other inputs.
Local Transit Management Centers	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.
Local Transit Management Centers	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.
Local Transit Management Centers	Transit Management Center	Transit Center Connection Protection	'Transit Center Connection Protection' manages the coordination of transit transfers between routes within a single transit agency, between routes of different transit agencies, or between different modes (e.g. a bus transit route and a ferry route). This functional object also supports the capability for an individual traveler to obtain connection protection throughout a specific transit trip. This application may be implemented through peer-to-peer sharing between agencies control systems or as a central transit transfer request brokerage that facilitates the management and coordination of transfers across multiple agencies and control systems.

Element Name	Physical Object	Functional Object	Functional Object Description
Local Transit Management Centers	Transit Management Center	Transit Center Data Collection	'Transit Center Data Collection' collects and stores transit information that is collected in the course of transit operations performed by the Transit Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Local Transit Management Centers	Transit Management Center	Transit Center Fare Management	'Transit Center Fare Management' manages fare collection and passenger load management at the transit center. It provides the back office functions that support transit fare collection, supporting payment reconciliation with links to financial institutions and enforcement agencies for fare violations. It collects data required to determine accurate ridership levels, establish fares, and distribute fare information. It loads fare data into the vehicle prior to the beginning of normal operations and unloads fare collection data from the vehicle at the close out of normal operations.
Local Transit Management Centers	Transit Management Center	Transit Center Fixed-Route Operations	'Transit Center Fixed-Route Operations' manages fixed route transit operations. It supports creation of schedules, blocks and runs for fixed and flexible route transit services. It allows fixed-route and flexible-route transit services to disseminate schedules and automatically updates customer service operator systems with the most current schedule information. It also supports automated dispatch of transit vehicles. Current vehicle schedule adherence and optimum scenarios for schedule adjustment are also provided. It also receives and processes transit vehicle loading data.
Local Transit Management Centers	Transit Management Center	Transit Center Information Services	'Transit Center Information Services' collects the latest available information for a transit service and makes it available to transit customers and to Transportation Information Centers for further distribution. Customers are provided information at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute. Information provided can include the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events. In addition to general service information, tailored information (e.g., itineraries) are provided to individual transit users.
Local Transit Management Centers	Transit Management Center	Transit Center Multi-Modal Coordination	'Transit Center Multi-Modal Coordination' supports transit service coordination between transit properties and coordinates with other surface and air transportation modes. As part of service coordination, it shares schedule and trip information, as well as transit transfer cluster (a collection of stop points, stations, or terminals where transfers can be made conveniently) and transfer point information between Multimodal Transportation Service Providers, Transit Agencies, and ISPs. An interface to Traffic Management also supports demand management strategies.

Element Name	Physical Object	Functional Object	Functional Object Description
Local Transit Management Centers	Transit Management Center	Transit Center Paratransit Operations	'Transit Center Paratransit Operations' manages demand responsive transit services, including paratransit services. It supports planning and scheduling of these services, allowing paratransit and other demand response transit services to plan efficient routes and better estimate arrival times. It also supports automated dispatch of paratransit vehicles and tracks passenger pick-ups and drop-offs. Customer service operator systems are updated with the most current schedule information.
Local Transit Management Centers	Transit Management Center	Transit Center Passenger Counting	'Transit Center Passenger Counting' receives and processes transit vehicle loading data using two-way communications from equipped transit vehicles.
Local Transit Management Centers	Transit Management Center	Transit Center Priority Management	'Transit Center Priority Management' monitors transit schedule performance and generates requests for transit priority on routes and at certain intersections. It may coordinate with the Traffic Management Center to provide transit priority along the selected route, including allocation of dynamic lanes and granting signal priority. It also coordinates with the Transit Vehicle OBE to monitor and manage local transit signal priority requests at individual intersections.
Local Transit Management Centers	Transit Management Center	Transit Center Security	'Transit Center Security' monitors transit vehicle operator or traveler activated alarms received from on-board a transit vehicle. It supports transit vehicle operator authentication and provides the capability to remotely disable a transit vehicle. It also includes the capability to alert operators and police to potential incidents identified by these security features.
Local Transit Management Centers	Transit Management Center	Transit Center Vehicle Assignment	'Transit Center Vehicle Assignment' assigns individual transit vehicles to vehicle blocks and downloads this information to the transit vehicle. It also provides an exception handling process for the vehicle assignment function to generate new, supplemental vehicle assignments when required by changes during the operating day. It provides an inventory management function for the transit facility which stores functional attributes about each of the vehicles owned by the transit operator. These attributes permit the planning and assignment functions to match vehicles with routes based on suitability for the types of service required by the particular routes.
Local Transit Management Centers	Transit Management Center	Transit Center Vehicle Tracking	'Transit Center Vehicle Tracking' monitors transit vehicle location. The location information is collected via a data communication link between the transit vehicles and the transit center. The location information is presented to the transit operator on a digitized map of the transit service area. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time. The real-time schedule information is disseminated to other information providers, which furnish the information to travelers.

Element Name	Physical Object	Functional Object	Functional Object Description
Local Transit Management Centers	Transit Management Center	Transit Garage Maintenance	'Transit Garage Maintenance' provides advanced maintenance functions for the transit property. It collects operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors operators and vehicles. It collects vehicle mileage data and uses it to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data. In addition, it provides information to service personnel to support maintenance activities and records and verifies that maintenance work was performed.
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Automated Treatment System Control	'MCM Automated Treatment System Control' remotely monitors and controls automated road treatment systems that disperse anti-icing chemicals or otherwise treat a road segment. The automated treatment system may be remotely activated by this object or it may include environmental sensors that activate the system automatically based on sensed environmental conditions. This object monitors treatment system operation, sets operating parameters, and directly controls system activation if necessary.
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Data Collection	'MCM Data Collection' collects and stores maintenance and construction information that is collected in the course of operations by the Maintenance and Construction Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Environmental Information Processing	'MCM Environmental Information Processing' processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. The processed environmental information products are presented to center personnel and disseminated to other centers.
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Incident Management	'MCM Incident Management' supports maintenance and construction participation in coordinated incident response. Incident notifications are shared, incident response resources are managed, and the overall incident situation and incident response status is coordinated among allied response organizations.
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Infrastructure Monitoring	'MCM Infrastructure Monitoring' monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It monitors the infrastructure, collecting data from both fixed and vehicle-based sensors. In addition to specialized infrastructure monitoring sensors, it also monitors the broader population of equipped vehicles for vertical acceleration data and other situation data that may be used to determine current pavement condition.

Element Name	Physical Object	Functional Object	Functional Object Description
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Maintenance Decision Support	'MCM Maintenance Decision Support' recommends maintenance courses of action based on current and forecast environmental and road conditions and additional application specific information. Decisions are supported through understandable presentation of filtered and fused environmental and road condition information for specific time horizons as well as specific maintenance recommendations that are generated by the system based on this integrated information. The recommended courses of action are supported by information on the anticipated consequences of action or inaction, when available.
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Reduced Speed Zone Warning	'MCM Reduced Speed Zone Warning' supports remote control and monitoring of reduced speed zone warning roadside equipment. It provides posted speed limits and associated schedules and information about associated road configuration changes including lane merges and shifts. It monitors field equipment operation and reports current status to the operator.
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Roadway Maintenance	'MCM Roadway Maintenance' provides overall management and support for routine maintenance on a roadway system or right-of-way. Services managed include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of non-ITS equipment on the roadway (e.g., signs, gantries, cabinets, guard rails, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling routine maintenance activities. See also MCM Field Equipment Maintenance for maintenance of ITS field equipment.
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Vehicle Tracking	'MCM Vehicle Tracking' tracks the location of maintenance and construction vehicles and other equipment. Vehicle/equipment location and associated information is presented to the operator.
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Winter Maintenance Management	'MCM Winter Maintenance Management' manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications), and other snow and ice control operations. It monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities, determine the appropriate snow and ice control response, and track and manage response operations.
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Work Activity Coordination	'MCM Work Activity Coordination' disseminates work activity schedules and current asset restrictions to other agencies. Work schedules are coordinated with operating agencies, factoring in the needs and activities of other agencies and adjacent jurisdictions. Work schedules are also distributed to Transportation Information Centers for dissemination to the traveling public.

Element Name	Physical Object	Functional Object	Functional Object Description
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Work Zone Management	'MCM Work Zone Management' remotely monitors and supports work zone activities, controlling traffic through dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers, and informing other groups of activity (e.g., traveler information, traffic management, other maintenance and construction centers) for better coordination management. Work zone speeds, and delays, and closures are provided to the motorist prior to the work zones. This application provides control of field equipment in all maintenance areas, including fixed and portable field equipment supporting both stationary and mobile work zones.
Maintenance and Construction Management Center	Maint and Constr Management Center	MCM Work Zone Safety Management	'MCM Work Zone Safety Management' remotely monitors work zone safety systems that detect vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone.
Maintenance and Construction Management Center	Traffic Management Center	TMC Data Collection	'TMC Data Collection' collects and stores information that is created in the course of traffic operations performed by the Traffic Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Maintenance and Construction Management Center	Traffic Management Center	TMC Environmental Monitoring	'TMC Environmental Monitoring' assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information, information collected by other centers such as the Maintenance and Construction Management Center, data collected from environmental sensors deployed on and about the roadway, and information collected from connected vehicles. The collected environmental information is monitored and presented to the operator. This information can be used to issue general traveler advisories and support location specific warnings to drivers.
Maintenance and Construction Management Center	Traffic Management Center	TMC Evacuation Support	'TMC Evacuation Support' supports development, coordination, and execution of special traffic management strategies during evacuation and subsequent reentry of a population in the vicinity of a disaster or major emergency. A traffic management strategy is developed based on anticipated demand, the capacity of the road network including access to and from the evacuation routes, and existing and forecast conditions. The strategy supports efficient evacuation and also protects and optimizes movement of response vehicles and other resources that are responding to the emergency.

Element Name	Physical Object	Functional Object	Functional Object Description
Maintenance and Construction Management Center	Traffic Management Center	TMC Incident Detection	'TMC Incident Detection' identifies and reports incidents to Traffic Operations Personnel. It remotely monitors and controls traffic sensor and surveillance systems that support incident detection and verification. It analyzes and reduces the collected sensor and surveillance data, external alerting and advisory and incident reporting systems, anticipated demand information from intermodal freight depots, border crossings, special event information, and identifies and reports incidents and hazardous conditions
Maintenance and Construction Management Center	Traffic Management Center	TMC Incident Dispatch Coordination	'TMC Incident Dispatch Coordination' formulates and manages an incident response that takes into account the incident potential, incident impacts, and resources required for incident management. It provides information to support dispatch and routing of emergency response and service vehicles as well as coordination with other cooperating agencies. It provides access to traffic management resources that provide surveillance of the incident, traffic control in the surrounding area, and support for the incident response. It monitors the incident response and collects performance measures such as incident response and clearance times.
Maintenance and Construction Management Center	Traffic Management Center	TMC Roadway Equipment Monitoring	'TMC Roadway Equipment Monitoring' monitors the operational status of field equipment and detects failures. It presents field equipment status to Traffic Operations Personnel and reports failures to the Maintenance and Construction Management Center. It tracks the repair or replacement of the failed equipment. The entire range of ITS field equipment may be monitored including sensors (traffic, infrastructure, environmental, security, speed, etc.) and devices (highway advisory radio, dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, beacons, security surveillance equipment, etc.).
Maintenance and Construction Management Center	Traffic Management Center	TMC Speed Warning	'TMC Speed Warning' supports remote control and monitoring of reduced speed zone warning roadside equipment. It provides the location and extent of the reduced speed zone, the posted speed limit(s) with information about the applicability of the speed limit(s) (e.g., time of day, day of week, seasonality, relevant vehicle types) and information about associated road configuration changes including lane merges and shifts. It monitors field equipment operation and reports current status to the operator.
Maintenance and Construction Management Center	Traffic Management Center	TMC Traffic Information Dissemination	'TMC Traffic Information Dissemination' disseminates traffic and road conditions, closure and detour information, incident information, driver advisories, and other traffic-related data to other centers, the media, and driver information systems. It monitors and controls driver information system field equipment including dynamic message signs and highway advisory radio, managing dissemination of driver information through these systems.

Element Name	Physical Object	Functional Object	Functional Object Description
Maintenance and Construction Management Center	Traffic Management Center	TMC Work Zone Traffic Management	'TMC Work Zone Traffic Management' coordinates work plans with maintenance systems so that work zones are established that have minimum traffic impact. Traffic control strategies are implemented to further mitigate traffic impacts associated with work zones that are established, providing work zone information to driver information systems such as dynamic message signs.
Maintenance and Construction Vehicle Equipment	Maint and Constr Vehicle OBE	MCV Barrier System Control	'MCV Barrier System Control' provides local control of automatic or remotely controlled gates and other barrier systems from a maintenance and construction vehicle. This allows maintenance and construction field personnel (e.g., snow plow operators) to open and close gates and other barrier systems without leaving the vehicle, using V2I Communications to control the barriers.
Maintenance and Construction Vehicle Equipment	Maint and Constr Vehicle OBE	MCV Environmental Monitoring	'MCV Environmental Monitoring' collects current road and surface weather conditions from sensors on-board the maintenance and construction vehicle or by querying fixed sensors on or near the roadway. Environmental information including road surface temperature, air temperature, and wind speed is measured and spatially located and time stamped, and reported back to a center.
Maintenance and Construction Vehicle Equipment	Maint and Constr Vehicle OBE	MCV Roadway Maintenance and Construction	'MCV Roadway Maintenance and Construction' includes the on-board systems that support routine non-winter maintenance on a roadway system or right-of-way. Routine maintenance includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, etc.).
Maintenance and Construction Vehicle Equipment	Maint and Constr Vehicle OBE	MCV Vehicle Location Tracking	'MCV Vehicle Location Tracking' monitors vehicle location and reports the position and timestamp information to the dispatch center.
Maintenance and Construction Vehicle Equipment	Maint and Constr Vehicle OBE	MCV Vehicle Safety Monitoring	'MCV Vehicle Safety Monitoring' detects vehicle intrusions in the vicinity of the vehicle and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone. It can be used for stationary work zones or in mobile applications where a safe zone is maintained around the moving vehicle.
Maintenance and Construction Vehicle Equipment	Maint and Constr Vehicle OBE	MCV Winter Maintenance	'MCV Winter Maintenance' supports snow plow operations and other roadway treatments (e.g., salt spraying and other material applications). It supports communications with the center to receive information and instructions that are provided to the vehicle operator and also supports remote control of on-board systems. It tracks operational status of snow and ice control operations and provides this information back to the center.

Element Name	Physical Object	Functional Object	Functional Object Description
Maintenance and Construction Vehicle Equipment	Maint and Constr Vehicle OBE	MCV Work Zone Support	'MCV Work Zone Support' provides communications and support for local management of a work zone. It supports communications between field personnel and the managing center to keep the center appraised of current work zone status. It controls vehicle-mounted driver information systems (e.g., dynamic message signs) and uses short range communications to monitor and control other fixed or portable driver information systems in the work zone.
Maintenance Decision Support System	Maint and Constr Management Center	MCM Maintenance Decision Support	'MCM Maintenance Decision Support' recommends maintenance courses of action based on current and forecast environmental and road conditions and additional application specific information. Decisions are supported through understandable presentation of filtered and fused environmental and road condition information for specific time horizons as well as specific maintenance recommendations that are generated by the system based on this integrated information. The recommended courses of action are supported by information on the anticipated consequences of action or inaction, when available.
Maintenance Decision Support System	Maint and Constr Management Center	MCM Winter Maintenance Management	'MCM Winter Maintenance Management' manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications), and other snow and ice control operations. It monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities, determine the appropriate snow and ice control response, and track and manage response operations.
Mayday System	Emergency Management Center	Emergency Notification Support	'Emergency Notification Support' receives emergency notification messages from vehicles or personal handheld devices, determines an appropriate response, and either uses internal resources or contacts a local agency to provide that response. The nature of the emergency is determined based on the information in the received message as well as other inputs. This object effectively serves as an interface between automated collision notification systems and the local public safety answering point for messages that require a public safety response. This capability depends on an up-to-date registry of public safety answering points/response agencies by coverage area, the type of emergency, and hours of service.
Mayday System	Emergency Management Center	Emergency Secure Area Alarm Support	'Emergency Secure Area Alarm Support' receives traveler or transit vehicle operator alarm messages, notifies the system operator, and provides acknowledgement of alarm receipt back to the originator of the alarm. The alarms received can be generated by silent or audible alarm systems and may originate from public areas (e.g. transit stops, park and ride lots, transit stations, rest areas) or transit vehicles. The nature of the emergency may be determined based on the information in the alarm message as well as other inputs.

Element Name	Physical Object	Functional Object	Functional Object Description
Mayday System	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.
Mayday System Vehicle Equipment	Vehicle OBE	Vehicle Emergency Notification	'Vehicle Emergency Notification' provides the capability for drivers or collision detection sensors to report an emergency and summon assistance. It gathers data from on-board collision detection sensors, provides a mechanism for the driver to summon assistance, and includes a communications capability to report the collision including indicators of collision severity, the number of passengers involved, and information about the vehicle that may affect the response.
Mayday System Vehicle Equipment	Vehicle OBE	Vehicle Location Determination	'Vehicle Location Determination' receives current location of the vehicle and provides this information to vehicle applications that use the location information to provide ITS services.
Media Information Release System	Archived Data System	Archive Data Repository	'Archive Data Repository' collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. It includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. It supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region. Repositories may be established to support operations planning, performance monitoring and management, and policy and investment decisions.
Media Information Release System	Archived Data System	Archive Government Reporting	'Archive Government Reporting' selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements. It provides transportation system statistics and performance measures in required formats to support investment and policy decisions.
Media Information Release System	Archived Data System	Archive Situation Data Archival	'Archive Situation Data Archival' collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. It controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes, rather than for traffic management. It also collects situation data from connected vehicles. The data collected, quality checks performed, and aggregation strategies are defined to support transportation system performance monitoring and management.

Element Name	Physical Object	Functional Object	Functional Object Description
Metro Area Transit Management Centers	Emergency Management Center	Emergency Data Collection	'Emergency Data Collection' collects and stores emergency information that is collected in the course of operations by the Emergency Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Metro Area Transit Management Centers	Emergency Management Center	Emergency Early Warning System	'Emergency Early Warning System' monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies and uses this information to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to initiate the emergency response, including public notification using ITS traveler information systems, where appropriate.
Metro Area Transit Management Centers	Emergency Management Center	Emergency Environmental Monitoring	'Emergency Environmental Monitoring' collects current and forecast road conditions and surface weather information from a variety of sources. The collected environmental information is monitored and presented to the operator and used to more effectively manage incidents.
Metro Area Transit Management Centers	Emergency Management Center	Emergency Incident Command	'Emergency Incident Command' provides tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident. It supports communications with public safety, emergency management, transportation, and other allied response agency centers, tracks and maintains resource information, action plans, and the incident command organization itself. Information is shared with agency centers including resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response. It supports the functions and interfaces commonly supported by a mobile command center.

Element Name	Physical Object	Functional Object	Functional Object Description
Metro Area Transit Management Centers	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.
Metro Area Transit Management Centers	Emergency Management Center	Emergency Secure Area Alarm Support	'Emergency Secure Area Alarm Support' receives traveler or transit vehicle operator alarm messages, notifies the system operator, and provides acknowledgement of alarm receipt back to the originator of the alarm. The alarms received can be generated by silent or audible alarm systems and may originate from public areas (e.g. transit stops, park and ride lots, transit stations, rest areas) or transit vehicles. The nature of the emergency may be determined based on the information in the alarm message as well as other inputs.
Metro Area Transit Management Centers	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.

Element Name	Physical Object	Functional Object	Functional Object Description
Metro Area Transit Management Centers	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.
Metro Area Transit Management Centers	Transit Management Center	Transit Center Connection Protection	'Transit Center Connection Protection' manages the coordination of transit transfers between routes within a single transit agency, between routes of different transit agencies, or between different modes (e.g. a bus transit route and a ferry route). This functional object also supports the capability for an individual traveler to obtain connection protection throughout a specific transit trip. This application may be implemented through peer-to-peer sharing between agencies control systems or as a central transit transfer request brokerage that facilitates the management and coordination of transfers across multiple agencies and control systems.
Metro Area Transit Management Centers	Transit Management Center	Transit Center Data Collection	'Transit Center Data Collection' collects and stores transit information that is collected in the course of transit operations performed by the Transit Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Metro Area Transit Management Centers	Transit Management Center	Transit Center Fare Management	'Transit Center Fare Management' manages fare collection and passenger load management at the transit center. It provides the back office functions that support transit fare collection, supporting payment reconciliation with links to financial institutions and enforcement agencies for fare violations. It collects data required to determine accurate ridership levels, establish fares, and distribute fare information. It loads fare data into the vehicle prior to the beginning of normal operations and unloads fare collection data from the vehicle at the close out of normal operations.
Metro Area Transit Management Centers	Transit Management Center	Transit Center Fixed-Route Operations	'Transit Center Fixed-Route Operations' manages fixed route transit operations. It supports creation of schedules, blocks and runs for fixed and flexible route transit services. It allows fixed-route and flexible-route transit services to disseminate schedules and automatically updates customer service operator systems with the most current schedule information. It also supports automated dispatch of transit vehicles. Current vehicle schedule adherence and optimum scenarios for schedule adjustment are also provided. It also receives and processes transit vehicle loading data.

Element Name	Physical Object	Functional Object	Functional Object Description
Metro Area Transit Management Centers	Transit Management Center	Transit Center Information Services	'Transit Center Information Services' collects the latest available information for a transit service and makes it available to transit customers and to Transportation Information Centers for further distribution. Customers are provided information at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute. Information provided can include the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events. In addition to general service information, tailored information (e.g., itineraries) are provided to individual transit users.
Metro Area Transit Management Centers	Transit Management Center	Transit Center Multi-Modal Coordination	'Transit Center Multi-Modal Coordination' supports transit service coordination between transit properties and coordinates with other surface and air transportation modes. As part of service coordination, it shares schedule and trip information, as well as transit transfer cluster (a collection of stop points, stations, or terminals where transfers can be made conveniently) and transfer point information between Multimodal Transportation Service Providers, Transit Agencies, and ISPs. An interface to Traffic Management also supports demand management strategies.
Metro Area Transit Management Centers	Transit Management Center	Transit Center Paratransit Operations	'Transit Center Paratransit Operations' manages demand responsive transit services, including paratransit services. It supports planning and scheduling of these services, allowing paratransit and other demand response transit services to plan efficient routes and better estimate arrival times. It also supports automated dispatch of paratransit vehicles and tracks passenger pick-ups and drop-offs. Customer service operator systems are updated with the most current schedule information.
Metro Area Transit Management Centers	Transit Management Center	Transit Center Passenger Counting	'Transit Center Passenger Counting' receives and processes transit vehicle loading data using two-way communications from equipped transit vehicles.
Metro Area Transit Management Centers	Transit Management Center	Transit Center Priority Management	'Transit Center Priority Management' monitors transit schedule performance and generates requests for transit priority on routes and at certain intersections. It may coordinate with the Traffic Management Center to provide transit priority along the selected route, including allocation of dynamic lanes and granting signal priority. It also coordinates with the Transit Vehicle OBE to monitor and manage local transit signal priority requests at individual intersections.
Metro Area Transit Management Centers	Transit Management Center	Transit Center Security	'Transit Center Security' monitors transit vehicle operator or traveler activated alarms received from on-board a transit vehicle. It supports transit vehicle operator authentication and provides the capability to remotely disable a transit vehicle. It also includes the capability to alert operators and police to potential incidents identified by these security features.

Element Name	Physical Object	Functional Object	Functional Object Description
Metro Area Transit Management Centers	Transit Management Center	Transit Center Vehicle Assignment	'Transit Center Vehicle Assignment' assigns individual transit vehicles to vehicle blocks and downloads this information to the transit vehicle. It also provides an exception handling process for the vehicle assignment function to generate new, supplemental vehicle assignments when required by changes during the operating day. It provides an inventory management function for the transit facility which stores functional attributes about each of the vehicles owned by the transit operator. These attributes permit the planning and assignment functions to match vehicles with routes based on suitability for the types of service required by the particular routes.
Metro Area Transit Management Centers	Transit Management Center	Transit Center Vehicle Tracking	'Transit Center Vehicle Tracking' monitors transit vehicle location. The location information is collected via a data communication link between the transit vehicles and the transit center. The location information is presented to the transit operator on a digitized map of the transit service area. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time. The real-time schedule information is disseminated to other information providers, which furnish the information to travelers.
Metro Area Transit Management Centers	Transit Management Center	Transit Garage Maintenance	'Transit Garage Maintenance' provides advanced maintenance functions for the transit property. It collects operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors operators and vehicles. It collects vehicle mileage data and uses it to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data. In addition, it provides information to service personnel to support maintenance activities and records and verifies that maintenance work was performed.
Minneapolis TMC	Traffic Management Center	TMC Basic Surveillance	'TMC Basic Surveillance' remotely monitors and controls traffic sensor systems and surveillance (e.g., video monitoring) equipment, and collects, processes and stores the collected traffic data. Current traffic information and other real-time transportation information is also collected from other centers. The collected information is provided to traffic operations personnel and made available to other centers.
Minneapolis TMC	Traffic Management Center	TMC Incident Detection	'TMC Incident Detection' identifies and reports incidents to Traffic Operations Personnel. It remotely monitors and controls traffic sensor and surveillance systems that support incident detection and verification. It analyzes and reduces the collected sensor and surveillance data, external alerting and advisory and incident reporting systems, anticipated demand information from intermodal freight depots, border crossings, special event information, and identifies and reports incidents and hazardous conditions

Element Name	Physical Object	Functional Object	Functional Object Description
Minneapolis TMC	Traffic Management Center	TMC Incident Dispatch Coordination	'TMC Incident Dispatch Coordination' formulates and manages an incident response that takes into account the incident potential, incident impacts, and resources required for incident management. It provides information to support dispatch and routing of emergency response and service vehicles as well as coordination with other cooperating agencies. It provides access to traffic management resources that provide surveillance of the incident, traffic control in the surrounding area, and support for the incident response. It monitors the incident response and collects performance measures such as incident response and clearance times.
Minneapolis TMC	Traffic Management Center	TMC Multi-Modal Coordination	'TMC Multi-Modal Coordination' supports center-to-center coordination between the Traffic Management and Transit Management Centers. It monitors transit operations and provides traffic signal priority for transit vehicles on request from the Transit Management Center.
Minneapolis TMC	Traffic Management Center	TMC Regional Traffic Management	'TMC Regional Traffic Management' supports coordination between Traffic Management Centers in order to share traffic information between centers as well as control of traffic management field equipment. This coordination supports wide area optimization and regional coordination that spans jurisdictional boundaries; for example, coordinated signal control in a metropolitan area or coordination between freeway operations and arterial signal control within a corridor.
Minneapolis TMC	Traffic Management Center	TMC Roadway Equipment Monitoring	'TMC Roadway Equipment Monitoring' monitors the operational status of field equipment and detects failures. It presents field equipment status to Traffic Operations Personnel and reports failures to the Maintenance and Construction Management Center. It tracks the repair or replacement of the failed equipment. The entire range of ITS field equipment may be monitored including sensors (traffic, infrastructure, environmental, security, speed, etc.) and devices (highway advisory radio, dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, beacons, security surveillance equipment, etc.).
Minneapolis TMC	Traffic Management Center	TMC Signal Control	'TMC Signal Control' provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single Traffic Management Center and are responsive to traffic conditions and adapt to support incidents, preemption and priority requests, pedestrian crossing calls, etc.

Element Name	Physical Object	Functional Object	Functional Object Description
Minneapolis TMC	Traffic Management Center	TMC Speed Warning	'TMC Speed Warning' supports remote control and monitoring of reduced speed zone warning roadside equipment. It provides the location and extent of the reduced speed zone, the posted speed limit(s) with information about the applicability of the speed limit(s) (e.g., time of day, day of week, seasonality, relevant vehicle types) and information about associated road configuration changes including lane merges and shifts. It monitors field equipment operation and reports current status to the operator.
Minneapolis TMC	Traffic Management Center	TMC Traffic Information Dissemination	'TMC Traffic Information Dissemination' disseminates traffic and road conditions, closure and detour information, incident information, driver advisories, and other traffic-related data to other centers, the media, and driver information systems. It monitors and controls driver information system field equipment including dynamic message signs and highway advisory radio, managing dissemination of driver information through these systems.
Minneapolis TMC	Traffic Management Center	TMC Traffic Metering	'TMC Traffic Metering' provides center monitoring and control of traffic metering systems including on ramps, through interchanges, and on the mainline roadway. All types of metering are covered including pre-timed/fixed time, time-based, dynamic and adaptive metering strategies and special bypasses. Metering rates can be calculated based upon historical data or current conditions including traffic, air quality, etc.
Minnesota Emergency Responder Database	Archived Data System	Archive Data Repository	'Archive Data Repository' collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. It includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. It supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region. Repositories may be established to support operations planning, performance monitoring and management, and policy and investment decisions.
Minnesota Emergency Responder Database	Archived Data System	Archive Government Reporting	'Archive Government Reporting' selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements. It provides transportation system statistics and performance measures in required formats to support investment and policy decisions.

Element Name	Physical Object	Functional Object	Functional Object Description
Minnesota Emergency Responder Database	Archived Data System	Archive On-Line Analysis and Mining	'Archive On-Line Analysis and Mining' provides advanced data analysis, summarization, and mining features that facilitate discovery of information, patterns, and correlations in large data sets. Multidimensional analysis, selective summarization and expansion of data details, and many other advanced analysis services may be offered. Complex performance measures that are derived from multiple data sources may also be produced.
Minnesota Emergency Responder Database	Archived Data System	Archive Situation Data Archival	'Archive Situation Data Archival' collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. It controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes, rather than for traffic management. It also collects situation data from connected vehicles. The data collected, quality checks performed, and aggregation strategies are defined to support transportation system performance monitoring and management.
Minnesota State Emergency Operations Center (SEOC)	Emergency Management Center	Emergency Commercial Vehicle Response	'Emergency Commercial Vehicle Response' identifies and initiates a response to commercial vehicle and freight equipment related emergencies. These emergencies may include incidents involving hazardous materials as well as the detection of non-permitted transport of security sensitive hazmat. It identifies the location of the vehicle, the nature of the incident, the route information, and information concerning the freight itself. The information supports the determination of the response and identifies the responding agencies to notify.
Minnesota State Emergency Operations Center (SEOC)	Emergency Management Center	Emergency Data Collection	'Emergency Data Collection' collects and stores emergency information that is collected in the course of operations by the Emergency Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Minnesota State Emergency Operations Center (SEOC)	Emergency Management Center	Emergency Early Warning System	'Emergency Early Warning System' monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies and uses this information to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to initiate the emergency response, including public notification using ITS traveler information systems, where appropriate.
Minnesota State Emergency Operations Center (SEOC)	Emergency Management Center	Emergency Environmental Monitoring	'Emergency Environmental Monitoring' collects current and forecast road conditions and surface weather information from a variety of sources. The collected environmental information is monitored and presented to the operator and used to more effectively manage incidents.

Element Name	Physical Object	Functional Object	Functional Object Description
Minnesota State Emergency Operations Center (SEOC)	Emergency Management Center	Emergency Evacuation Support	'Emergency Evacuation Support' coordinates evacuation plans among allied agencies and manages evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety. Where appropriate, the affected population is evacuated in shifts, using more than one evacuation route, and including several evacuation destinations to spread demand and thereby expedite the evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. The public is provided with real-time evacuation guidance including basic information to assist potential evacuees in determining whether evacuation is necessary. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. The evacuation and reentry status are monitored and used to refine the plan and resource allocations during the evacuation and subsequent reentry. It communicates with public health systems to develop evacuation plans and recommended strategies for disasters and evacuation scenarios involving biological or other medical hazards.
Minnesota State Emergency Operations Center (SEOC)	Emergency Management Center	Emergency Incident Command	'Emergency Incident Command' provides tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident. It supports communications with public safety, emergency management, transportation, and other allied response agency centers, tracks and maintains resource information, action plans, and the incident command organization itself. Information is shared with agency centers including resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response. It supports the functions and interfaces commonly supported by a mobile command center.
Minnesota State Emergency Operations Center (SEOC)	Emergency Management Center	Emergency Notification Support	'Emergency Notification Support' receives emergency notification messages from vehicles or personal handheld devices, determines an appropriate response, and either uses internal resources or contacts a local agency to provide that response. The nature of the emergency is determined based on the information in the received message as well as other inputs. This object effectively serves as an interface between automated collision notification systems and the local public safety answering point for messages that require a public safety response. This capability depends on an up-to-date registry of public safety answering points/response agencies by coverage area, the type of emergency, and hours of service.

Element Name	Physical Object	Functional Object	Functional Object Description
Minnesota State Emergency Operations Center (SEOC)	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.
Minnesota State Emergency Operations Center (SEOC)	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.
Minnesota State Emergency Operations Center (SEOC)	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.

Element Name	Physical Object	Functional Object	Functional Object Description
Minnesota State Patrol Databases	Archived Data System	Archive Data Repository	'Archive Data Repository' collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. It includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. It supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region. Repositories may be established to support operations planning, performance monitoring and management, and policy and investment decisions.
Minnesota State Patrol Databases	Archived Data System	Archive Government Reporting	'Archive Government Reporting' selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements. It provides transportation system statistics and performance measures in required formats to support investment and policy decisions.
Minnesota State Patrol Databases	Archived Data System	Archive On-Line Analysis and Mining	'Archive On-Line Analysis and Mining' provides advanced data analysis, summarization, and mining features that facilitate discovery of information, patterns, and correlations in large data sets. Multidimensional analysis, selective summarization and expansion of data details, and many other advanced analysis services may be offered. Complex performance measures that are derived from multiple data sources may also be produced.
Minnesota State Patrol Databases	Archived Data System	Archive Situation Data Archival	'Archive Situation Data Archival' collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. It controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes, rather than for traffic management. It also collects situation data from connected vehicles. The data collected, quality checks performed, and aggregation strategies are defined to support transportation system performance monitoring and management.
Minnesota State Patrol District Office	Center	Center Data Collection	'Center Data Collection' collects and stores information that is created in the course of center operations. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.

Element Name	Physical Object	Functional Object	Functional Object Description
Minnesota State Patrol District Office	Center	Center Data Subscription Management	'Center Data Subscription Management' manages data subscriptions for an end user. It provides access to a catalog of available data, manages the necessary user information and rules that govern the data subscriptions, supports communications with data providers to collect data per the subscription rules, and makes the data available to the end user. It provides the local user interface through which a user can specify and manage subscriptions. It supports different mechansims for collecting subscribed data for the end-user including one-time query-response as well as publish-subscribe services.
Minnesota State Patrol District Office	Emergency Management Center	Emergency Call-Taking	'Emergency Call-Taking' supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other objects that formulate and manage the emergency response. It receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.
Minnesota State Patrol District Office	Emergency Management Center	Emergency Commercial Vehicle Response	'Emergency Commercial Vehicle Response' identifies and initiates a response to commercial vehicle and freight equipment related emergencies. These emergencies may include incidents involving hazardous materials as well as the detection of non-permitted transport of security sensitive hazmat. It identifies the location of the vehicle, the nature of the incident, the route information, and information concerning the freight itself. The information supports the determination of the response and identifies the responding agencies to notify.
Minnesota State Patrol District Office	Emergency Management Center	Emergency Data Collection	'Emergency Data Collection' collects and stores emergency information that is collected in the course of operations by the Emergency Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Minnesota State Patrol District Office	Emergency Management Center	Emergency Dispatch	'Emergency Dispatch' tracks the location and status of emergency vehicles and dispatches these vehicles to incidents. Pertinent incident information is gathered from the public and other public safety agencies and relayed to the responding units. Incident status and the status of the responding units is tracked so that additional units can be dispatched and/or unit status can be returned to available when the incident is cleared and closed.
Minnesota State Patrol District Office	Emergency Management Center	Emergency Early Warning System	'Emergency Early Warning System' monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies and uses this information to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to initiate the emergency response, including public notification using ITS traveler information systems, where appropriate.

Element Name	Physical Object	Functional Object	Functional Object Description
Minnesota State Patrol District Office	Emergency Management Center	Emergency Environmental Monitoring	'Emergency Environmental Monitoring' collects current and forecast road conditions and surface weather information from a variety of sources. The collected environmental information is monitored and presented to the operator and used to more effectively manage incidents.
Minnesota State Patrol District Office	Emergency Management Center	Emergency Evacuation Support	'Emergency Evacuation Support' coordinates evacuation plans among allied agencies and manages evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety. Where appropriate, the affected population is evacuated in shifts, using more than one evacuation route, and including several evacuation destinations to spread demand and thereby expedite the evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. The public is provided with real-time evacuation guidance including basic information to assist potential evacuees in determining whether evacuation is necessary. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. The evacuation and reentry status are monitored and used to refine the plan and resource allocations during the evacuation and subsequent reentry. It communicates with public health systems to develop evacuation plans and recommended strategies for disasters and evacuation scenarios involving biological or other medical hazards.
Minnesota State Patrol District Office	Emergency Management Center	Emergency Incident Command	'Emergency Incident Command' provides tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident. It supports communications with public safety, emergency management, transportation, and other allied response agency centers, tracks and maintains resource information, action plans, and the incident command organization itself. Information is shared with agency centers including resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response. It supports the functions and interfaces commonly supported by a mobile command center.

Element Name	Physical Object	Functional Object	Functional Object Description
Minnesota State Patrol District Office	Emergency Management Center	Emergency Notification Support	'Emergency Notification Support' receives emergency notification messages from vehicles or personal handheld devices, determines an appropriate response, and either uses internal resources or contacts a local agency to provide that response. The nature of the emergency is determined based on the information in the received message as well as other inputs. This object effectively serves as an interface between automated collision notification systems and the local public safety answering point for messages that require a public safety response. This capability depends on an up-to-date registry of public safety answering points/response agencies by coverage area, the type of emergency, and hours of service.
Minnesota State Patrol District Office	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.
Minnesota State Patrol District Office	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.

Element Name	Physical Object	Functional Object	Functional Object Description
Minnesota State Patrol District Office	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.
Minnesota State Patrol District Office	Traffic Management Center	TMC Basic Surveillance	'TMC Basic Surveillance' remotely monitors and controls traffic sensor systems and surveillance (e.g., video monitoring) equipment, and collects, processes and stores the collected traffic data. Current traffic information and other real-time transportation information is also collected from other centers. The collected information is provided to traffic operations personnel and made available to other centers.
Minnesota State Patrol District Office	Traffic Management Center	TMC Data Collection	'TMC Data Collection' collects and stores information that is created in the course of traffic operations performed by the Traffic Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Minnesota State Patrol District Office	Traffic Management Center	TMC Evacuation Support	'TMC Evacuation Support' supports development, coordination, and execution of special traffic management strategies during evacuation and subsequent reentry of a population in the vicinity of a disaster or major emergency. A traffic management strategy is developed based on anticipated demand, the capacity of the road network including access to and from the evacuation routes, and existing and forecast conditions. The strategy supports efficient evacuation and also protects and optimizes movement of response vehicles and other resources that are responding to the emergency.
Minnesota State Patrol District Office	Traffic Management Center	TMC HOV Lane Management	'TMC HOV Lane Management' provides center monitoring and control of HOV lanes. It coordinates freeway ramp meters and connector signals with HOV lane usage signals to provide preferential treatment to HOV lanes. In advanced implementations, it automatically detects HOV violators.
Minnesota State Patrol District Office	Traffic Management Center	TMC Incident Detection	'TMC Incident Detection' identifies and reports incidents to Traffic Operations Personnel. It remotely monitors and controls traffic sensor and surveillance systems that support incident detection and verification. It analyzes and reduces the collected sensor and surveillance data, external alerting and advisory and incident reporting systems, anticipated demand information from intermodal freight depots, border crossings, special event information, and identifies and reports incidents and hazardous conditions

Element Name	Physical Object	Functional Object	Functional Object Description
Minnesota State Patrol District Office	Traffic Management Center	TMC Incident Dispatch Coordination	'TMC Incident Dispatch Coordination' formulates and manages an incident response that takes into account the incident potential, incident impacts, and resources required for incident management. It provides information to support dispatch and routing of emergency response and service vehicles as well as coordination with other cooperating agencies. It provides access to traffic management resources that provide surveillance of the incident, traffic control in the surrounding area, and support for the incident response. It monitors the incident response and collects performance measures such as incident response and clearance times.
Minnesota State Patrol District Office	Traffic Management Center	TMC Speed Warning	'TMC Speed Warning' supports remote control and monitoring of reduced speed zone warning roadside equipment. It provides the location and extent of the reduced speed zone, the posted speed limit(s) with information about the applicability of the speed limit(s) (e.g., time of day, day of week, seasonality, relevant vehicle types) and information about associated road configuration changes including lane merges and shifts. It monitors field equipment operation and reports current status to the operator.
Minnesota State Patrol District Office	Traffic Management Center	TMC Traffic Information Dissemination	'TMC Traffic Information Dissemination' disseminates traffic and road conditions, closure and detour information, incident information, driver advisories, and other traffic-related data to other centers, the media, and driver information systems. It monitors and controls driver information system field equipment including dynamic message signs and highway advisory radio, managing dissemination of driver information through these systems.
MnPASS Roadside Equipment	ITS Roadway Payment Equipment	Roadway Payment Support	'Roadway Payment Support' represents the equipment that works in conjunction with the RSE to detect vehicles and identify and process violators when the RSE is used to support electronic payment. Various fee structures and payment strategies are supported including strategies that support reimbursements or credits that incentivize desired driving behavior.
MnPASS Roadside Equipment	ITS Roadway Payment Equipment	Roadway Toll Collection Support	'Roadway Toll Collection Support' provides toll plazas the capability to identify properly equipped vehicles, collect electronic tolls, and provide a positive indication to the driver that a toll was collected. Violators are identified and images are collected. Toll transactions are stored and reported to the Payment Administration Center.

Element Name	Physical Object	Functional Object	Functional Object Description
MnPASS Service Center	Payment Administration Center	PAC Payment Administration	'PAC Payment Administration' provides administration and management of payments associated with electronic toll collection, parking payments, and other e-payments. It provides the back office functions that support enrollment, pricing, payment reconciliation with financial institutions, and violation notification to enforcement agencies. It also supports dynamic pricing to support demand management. Secure communications with the financial infrastructure and distributed payment infrastructure, including toll plazas, support electronic payments and other ancillary requirements such as lost payment device identification and management.
MnPASS Vehicle Equipment	Vehicle OBE	Vehicle Basic Toll/Parking Payment	'Vehicle Basic Toll/Parking Payment' includes the traditional on-board systems that pay for tolls and parking electronically. It includes the 'tag' in-vehicle equipment that communicates with the toll/parking plaza and an optional interface to a carry-in payment device. See also 'Vehicle Payment Services', which provides a broader range of payment services.
Motor Carrier Information System	Commercial Vehicle Administration Center	CVAC Credentials and Taxes Administration	'CVAC Credentials and Taxes Administration' issues credentials, collects fees and taxes, and supports enforcement of credential requirements. It manages driver licensing and enrolls carriers in additional CVO programs such as wireless roadside inspection programs. It communicates with the Fleet and Freight Management Centers associated with the motor carriers to process applications and collect fuel taxes, weight/distance taxes, and other taxes and fees associated with commercial vehicle operations. It also receives applications for, and issues special Oversize/Overweight and HAZMAT permits in coordination with other cognizant authorities. It supports user account management and receives and processes requests for review of carrier and driver status. It communicates with peer functional objects in other jurisdictions to exchange credentials database information.
Motor Carrier Information System	Commercial Vehicle Administration Center	CVAC Information Exchange	'CVAC Information Exchange' supports the exchange of safety, credentials, permit data, and other data concerning the operation of commercial vehicles among jurisdictions. The object also supports the exchange of safety, credentials, permit, and operations data between systems (for example, an administrative center and the roadside check facilities) within a single jurisdiction. Data are collected from multiple authoritative sources and packaged into snapshots (top-level summary and critical status information) and profiles (detailed and historical data). Data is made available to fleet operators and other information requestors on request or based on subscriptions established by the requestor.

Element Name	Physical Object	Functional Object	Functional Object Description
Neighboring State Traffic Management Centers	Traffic Management Center	TMC Incident Detection	'TMC Incident Detection' identifies and reports incidents to Traffic Operations Personnel. It remotely monitors and controls traffic sensor and surveillance systems that support incident detection and verification. It analyzes and reduces the collected sensor and surveillance data, external alerting and advisory and incident reporting systems, anticipated demand information from intermodal freight depots, border crossings, special event information, and identifies and reports incidents and hazardous conditions
Neighboring State Traffic Management Centers	Traffic Management Center	TMC Incident Dispatch Coordination	'TMC Incident Dispatch Coordination' formulates and manages an incident response that takes into account the incident potential, incident impacts, and resources required for incident management. It provides information to support dispatch and routing of emergency response and service vehicles as well as coordination with other cooperating agencies. It provides access to traffic management resources that provide surveillance of the incident, traffic control in the surrounding area, and support for the incident response. It monitors the incident response and collects performance measures such as incident response and clearance times.
Neighboring State Traffic Management Centers	Traffic Management Center	TMC Regional Traffic Management	'TMC Regional Traffic Management' supports coordination between Traffic Management Centers in order to share traffic information between centers as well as control of traffic management field equipment. This coordination supports wide area optimization and regional coordination that spans jurisdictional boundaries; for example, coordinated signal control in a metropolitan area or coordination between freeway operations and arterial signal control within a corridor.
Neighboring State Traffic Management Centers	Traffic Management Center	TMC Signal Control	'TMC Signal Control' provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single Traffic Management Center and are responsive to traffic conditions and adapt to support incidents, preemption and priority requests, pedestrian crossing calls, etc.
Neighboring State Traffic Management Centers	Traffic Management Center	TMC Traffic Metering	'TMC Traffic Metering' provides center monitoring and control of traffic metering systems including on ramps, through interchanges, and on the mainline roadway. All types of metering are covered including pre-timed/fixed time, time-based, dynamic and adaptive metering strategies and special bypasses. Metering rates can be calculated based upon historical data or current conditions including traffic, air quality, etc.
Neighboring State Traffic Management Centers Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.

Element Name	Physical Object	Functional Object	Functional Object Description
Neighboring State Traffic Management Centers Roadside Equipment	ITS Roadway Equipment	Roadway Incident Detection	'Roadway Incident Detection' provides incident detection using traffic detectors and surveillance equipment. It monitors for unusual traffic conditions that may indicate an incident or processes surveillance images, watching for potential incidents. It provides potential incident information as well as traffic flow and images to the center for processing and presentation to traffic operations personnel.
Neighboring State Traffic Management Centers Roadside Equipment	ITS Roadway Equipment	Roadway Traffic Information Dissemination	'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios.
North/West Passage Corridor Traveler Information Website	Transportation Information Center	TIC Data Collection	'TIC Data Collection' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers.
North/West Passage Corridor Traveler Information Website	Transportation Information Center	TIC Traveler Information Broadcast	'TIC Traveler Information Broadcast' disseminates traveler information including traffic and road conditions, incident information, maintenance and construction information, event information, transit information, parking information, and weather information. The same information is broadcast to all equipped traveler interface systems and vehicles.
Oversize Warning Roadside Equipment	ITS Roadway Equipment	Roadway Speed Monitoring and Warning	'Roadway Speed Monitoring and Warning' includes the field elements that monitor vehicle speeds. If the speed is determined to be excessive, an advisory or warning is displayed. Current environmental conditions and other factors that may reduce safe operating speeds may also be taken into account. The operational status (state of the device, configuration, and fault data) is provided to the center. This application can also provide an enforcement function, reporting speed violations to an enforcement agency.
Park-and-Ride Parking Information System Roadside Equipment	Parking Management System	Parking Electronic Payment	'Parking Electronic Payment' supports electronic payment of parking fees using in-vehicle equipment (e.g., tags) or contact or proximity cards. It includes the field elements that provide the interface to the in-vehicle or card payment device and the back-office functionality that performs the transaction.

Element Name	Physical Object	Functional Object	Functional Object Description
Park-and-Ride Parking Information System Roadside Equipment	Parking Management System	Parking Management	'Parking Management' detects and classifies vehicles at parking facility entrances, exits, and other designated locations within the facility. Current parking availability is monitored and used to inform drivers through dynamic message signs/displays so that vehicles are efficiently routed to available spaces. Parking facility information, including current parking rates and directions to entrances and available exits, is also provided to drivers.
Park-and-Ride Parking Information System Roadside Equipment	Parking Management System	Parking Park and Ride Operations	'Parking Park and Ride Operations' manages parking lots specifically to support park and ride operations, providing additional coordination with transit operations on parking arrivals and transit arrivals and departures, smoothing the transition between parking and riding for park and ride customers.
Parking Management Roadside Equipment	Parking Management System	Parking Electronic Payment	'Parking Electronic Payment' supports electronic payment of parking fees using in-vehicle equipment (e.g., tags) or contact or proximity cards. It includes the field elements that provide the interface to the in-vehicle or card payment device and the back-office functionality that performs the transaction.
Parking Management Roadside Equipment	Parking Management System	Parking Management	'Parking Management' detects and classifies vehicles at parking facility entrances, exits, and other designated locations within the facility. Current parking availability is monitored and used to inform drivers through dynamic message signs/displays so that vehicles are efficiently routed to available spaces. Parking facility information, including current parking rates and directions to entrances and available exits, is also provided to drivers.
Parking Management Roadside Equipment	Parking Management System	Parking Park and Ride Operations	'Parking Park and Ride Operations' manages parking lots specifically to support park and ride operations, providing additional coordination with transit operations on parking arrivals and transit arrivals and departures, smoothing the transition between parking and riding for park and ride customers.
Parking Management System	Parking Management System	Parking Electronic Payment	'Parking Electronic Payment' supports electronic payment of parking fees using in-vehicle equipment (e.g., tags) or contact or proximity cards. It includes the field elements that provide the interface to the in-vehicle or card payment device and the back-office functionality that performs the transaction.
Parking Management System	Parking Management System	Parking Management	'Parking Management' detects and classifies vehicles at parking facility entrances, exits, and other designated locations within the facility. Current parking availability is monitored and used to inform drivers through dynamic message signs/displays so that vehicles are efficiently routed to available spaces. Parking facility information, including current parking rates and directions to entrances and available exits, is also provided to drivers.

Element Name	Physical Object	Functional Object	Functional Object Description
Parking Management System	Parking Management System	Parking Park and Ride Operations	'Parking Park and Ride Operations' manages parking lots specifically to support park and ride operations, providing additional coordination with transit operations on parking arrivals and transit arrivals and departures, smoothing the transition between parking and riding for park and ride customers.
Private Fleet and Freight Management Center	Fleet and Freight Management Center	Fleet Administration	'Fleet Administration' provides vehicle tracking, dispatch, and reporting capabilities to fleet management personnel. It gathers current road conditions and traffic information, prepares vehicle routes, and provides a fleet interface for toll collection. It also provides route plan information for network performance evaluation. As part of the tracking function, it monitors commercial vehicle location, compares it against the known route and notifies the Emergency Management Center and Fleet-Freight Manager of any deviations, including HAZMAT route restriction violations. It supports carrier participation in wireless roadside inspection programs, monitoring geographic trigger areas and providing current safety data on behalf of the commercial vehicles it manages. It supports pre-hiring checks for potential drivers and monitors the performance of each driver who is hired. It also supports ongoing monitoring of the company's safety performance.
Private Fleet and Freight Management Center	Fleet and Freight Management Center	Fleet Credentials and Taxes Management and Reporting	'Fleet Credentials and Taxes Management and Reporting' provides the capability to purchase credentials, file taxes and trip reports electronically, apply for permits, and perform electronic enrollment in expedited border crossing programs. It tracks and manages credentials and provides electronic interfaces to appropriate state and federal commercial vehicle administration centers.
Private Fleet and Freight Management Center	Fleet and Freight Management Center	Freight Administration and Management	'Freight Administration and Management' manages the movement of freight from source to destination. It interfaces to intermodal customers to setup and schedule transportation and coordinates with intermodal terminals and freight consolidation stations to coordinate the shipment. It coordinates with the appropriate government agencies to expedite the movement of trucks, their drivers, and their cargo across international borders. The application monitors the status of the freight and freight equipment (container, trailer, or chassis) and monitors freight location and compares it against the planned route.
Private Information Service Providers	Transportation Information Center	TIC Data Collection	'TIC Data Collection' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers.

Element Name	Physical Object	Functional Object	Functional Object Description
Private Information Service Providers	Transportation Information Center	TIC Trip Planning	'TIC Trip Planning' provides pre-trip and en-route trip planning services for travelers. It receives origin, destination, constraints, and preferences and returns trip plan(s) that meet the supplied criteria. Trip plans may be based on current traffic and road conditions, transit schedule information, and other real-time traveler information. Candidate trip plans are multimodal and may include vehicle, transit, and alternate mode segments (e.g., rail, ferry, bicycle routes, and walkways) based on traveler preferences. It also confirms the trip plan for the traveler and supports reservations and advanced payment for portions of the trip. The trip plan includes specific routing information and instructions for each segment of the trip and may also include information and reservations for additional services (e.g., parking) along the route.
Queue Detection Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.
Queue Detection Roadside Equipment	ITS Roadway Equipment	Roadway Warning	'Roadway Warning' includes the field equipment used to warn drivers approaching hazards on a roadway. Warnings may be generated in response to roadway weather conditions, road surface conditions, traffic conditions including queues, obstacles or animals in the roadway, and any other transient events that can be sensed. The equipment monitors traffic and roadway conditions and may send data to a Traffic Management Center for processing or may process it to determine when a warning should be issued. When it is determined that a warning should be issued, the equipment is used to alert approaching drivers via dynamic warning signs, flashing lights, in-vehicle messages, etc.
Railroad Active Warning Roadside Equipment	ITS Roadway Equipment	Roadway Standard Rail Crossing	'Roadway Standard Rail Crossing' manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate advanced features (e.g., where rail operational speeds are less than 80 miles per hour). Either passive (e.g., the crossbuck sign) or active warning systems (e.g., flashing lights and gates) are supported depending on the specific requirements for each intersection. These traditional HRI warning systems may also be augmented with other standard traffic management devices. The warning systems are activated on notification of an approaching train by interfaced wayside equipment. The equipment at the HRI may also be interconnected with adjacent signalized intersections so that local control can be adapted to highway-rail intersection activities. Health monitoring of the HRI equipment and interfaces is performed; detected abnormalities are reported through interfaces to the wayside interface equipment and the Traffic Management Center.
Ramp Meter Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.

Element Name	Physical Object	Functional Object	Functional Object Description
Ramp Meter Roadside Equipment	ITS Roadway Equipment	Roadway Traffic Information Dissemination	'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios.
Ramp Meter Roadside Equipment	ITS Roadway Equipment	Roadway Traffic Metering	'Roadway Traffic Metering' includes the field equipment used to meter traffic on ramps, through interchanges, and on the mainline roadway. The equipment includes dynamic messages signs to provide guidance and information to drivers at and approaching a meter, including information for any special bypass lanes.
Real-Time Bus Arrival Time Display Roadside Equipment	Traveler Support Equipment	Transit Stop Information Services	'Transit Stop Information Services' furnishes transit users with real-time travel-related information at transit stops, multi-modal transfer points, and other public transportation areas. It provides transit users with information on transit routes, schedules, transfer options, available services, fares, and real-time schedule adherence. In addition to tailored information for individual transit users, it supports general annunciation and/or display of imminent arrival information and other information of general interest to transit users.
Real-Time Transit Travel Time Display Roadside Equipment	ITS Roadway Equipment	Roadway Traffic Information Dissemination	'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios.
Red Light Monitoring/Enforcement Roadside Equipment	ITS Roadway Equipment	Roadway Speed Monitoring and Warning	'Roadway Speed Monitoring and Warning' includes the field elements that monitor vehicle speeds. If the speed is determined to be excessive, an advisory or warning is displayed. Current environmental conditions and other factors that may reduce safe operating speeds may also be taken into account. The operational status (state of the device, configuration, and fault data) is provided to the center. This application can also provide an enforcement function, reporting speed violations to an enforcement agency.
Research Lab Network Surveillance Archive	Archived Data System	Archive Data Repository	'Archive Data Repository' collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. It includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. It supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region. Repositories may be established to support operations planning, performance monitoring and management, and policy and investment decisions.
Research Lab Network Surveillance Archive	Archived Data System	Archive Government Reporting	'Archive Government Reporting' selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements. It provides transportation system statistics and performance measures in required formats to support investment and policy decisions.

Element Name	Physical Object	Functional Object	Functional Object Description
Research Lab Network Surveillance Archive	Archived Data System	Archive Situation Data Archival	'Archive Situation Data Archival' collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. It controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes, rather than for traffic management. It also collects situation data from connected vehicles. The data collected, quality checks performed, and aggregation strategies are defined to support transportation system performance monitoring and management.
Research Lab Network Surveillance Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.
Research Lab New Surveillance Control System	Traffic Management Center	TMC Basic Surveillance	'TMC Basic Surveillance' remotely monitors and controls traffic sensor systems and surveillance (e.g., video monitoring) equipment, and collects, processes and stores the collected traffic data. Current traffic information and other real-time transportation information is also collected from other centers. The collected information is provided to traffic operations personnel and made available to other centers.
Research Lab New Surveillance Control System	Traffic Management Center	TMC Data Collection	'TMC Data Collection' collects and stores information that is created in the course of traffic operations performed by the Traffic Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Research Lab New Surveillance Control System	Traffic Management Center	TMC Roadway Equipment Monitoring	'TMC Roadway Equipment Monitoring' monitors the operational status of field equipment and detects failures. It presents field equipment status to Traffic Operations Personnel and reports failures to the Maintenance and Construction Management Center. It tracks the repair or replacement of the failed equipment. The entire range of ITS field equipment may be monitored including sensors (traffic, infrastructure, environmental, security, speed, etc.) and devices (highway advisory radio, dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, beacons, security surveillance equipment, etc.).
Rest Area WiFi	Transportation Information Center	TIC Data Collection	'TIC Data Collection' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers.

Element Name	Physical Object	Functional Object	Functional Object Description
Rest Area WiFi	Transportation Information Center	TIC Emergency Traveler Information	'TIC Emergency Traveler Information' provides emergency information to the public, including wide-area alerts and evacuation information. It provides emergency alerts, information on evacuation zones and evacuation requirements, evacuation destinations and shelter information, available transportation modes, and traffic and road conditions at the origin, destination, and along the evacuation routes. In addition to general evacuation information, personalized information including tailored evacuation routes, service information, and estimated travel times is also provided based on traveler specified origin, destination, and route parameters. Updated information is provided throughout the evacuation and subsequent reentry as status changes and plans are adapted.
Rest Area WiFi	Transportation Information Center	TIC Traveler Information Broadcast	'TIC Traveler Information Broadcast' disseminates traveler information including traffic and road conditions, incident information, maintenance and construction information, event information, transit information, parking information, and weather information. The same information is broadcast to all equipped traveler interface systems and vehicles.
Rest Area WiFi	Transportation Information Center	TIC Traveler Telephone Information	'TIC Traveler Telephone Information' services voice-based traveler requests for information that supports traveler telephone information systems like 511. It takes requests for traveler information, which could be voice-formatted traveler requests, dual-tone multi-frequency (DTMF)-based requests, or a simple traveler information request, and returns the requested traveler information in the proper format. In addition to servicing requests for traveler information, it also collects and forwards alerts and advisories to traveler telephone information systems.
Roadway Automated Treatment System	ITS Roadway Equipment	Roadway Automated Treatment	'Roadway Automated Treatment' automatically treats a roadway section based on environmental or atmospheric conditions or under center control. Treatments include fog dispersion, anti-icing chemicals, etc. It communicates with the center and environmental sensors to support system activation and optionally with sign(s) that warn the driver in adverse conditions when the system is activated.
Roadway Automated Treatment System	ITS Roadway Equipment	Roadway Traffic Information Dissemination	'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios.
Roadway Flooding Warning Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.
Roadway Flooding Warning Roadside Equipment	ITS Roadway Equipment	Roadway Incident Detection	'Roadway Incident Detection' provides incident detection using traffic detectors and surveillance equipment. It monitors for unusual traffic conditions that may indicate an incident or processes surveillance images, watching for potential incidents. It provides potential incident information as well as traffic flow and images to the center for processing and presentation to traffic operations personnel.

Element Name	Physical Object	Functional Object	Functional Object Description
Roadway Flooding Warning Roadside Equipment	ITS Roadway Equipment	Roadway Warning	'Roadway Warning' includes the field equipment used to warn drivers approaching hazards on a roadway. Warnings may be generated in response to roadway weather conditions, road surface conditions, traffic conditions including queues, obstacles or animals in the roadway, and any other transient events that can be sensed. The equipment monitors traffic and roadway conditions and may send data to a Traffic Management Center for processing or may process it to determine when a warning should be issued. When it is determined that a warning should be issued, the equipment is used to alert approaching drivers via dynamic warning signs, flashing lights, in-vehicle messages, etc.
Roadway Lighting Management Central Monitoring Equipment	Traffic Management Center	TMC Lighting System Control	'TMC Lighting System Control' provides the capability for traffic managers to monitor and manage the electrical lighting systems along the roadside. This capability includes implementing control plans for lighting systems that may be activated by time-of-day plans or by activating changes to the lighting based on traffic or incidents.
Roadway Lighting Management Roadside Equipment	ITS Roadway Equipment	Roadway Lighting System Control	'Roadway Lighting System Control' includes field equipment that controls lighting systems for transportation facilities and infrastructure. It includes the sensors, lighting controllers, and supporting field equipment that monitors and controls lighting systems. The equipment supports control based on sensed local conditions, stored timing plans, and remote commands from a center. It monitors lighting system status and reports status to the controlling center.
RTMC	Center	Center Data Collection	'Center Data Collection' collects and stores information that is created in the course of center operations. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
RTMC	Center	Center Data Subscription Management	'Center Data Subscription Management' manages data subscriptions for an end user. It provides access to a catalog of available data, manages the necessary user information and rules that govern the data subscriptions, supports communications with data providers to collect data per the subscription rules, and makes the data available to the end user. It provides the local user interface through which a user can specify and manage subscriptions. It supports different mechansims for collecting subscribed data for the end-user including one-time query-response as well as publish-subscribe services.
RTMC	Emergency Management Center	Emergency Call-Taking	'Emergency Call-Taking' supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other objects that formulate and manage the emergency response. It receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.

Element Name	Physical Object	Functional Object	Functional Object Description
RTMC	Emergency Management Center	Emergency Data Collection	'Emergency Data Collection' collects and stores emergency information that is collected in the course of operations by the Emergency Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
RTMC	Emergency Management Center	Emergency Dispatch	'Emergency Dispatch' tracks the location and status of emergency vehicles and dispatches these vehicles to incidents. Pertinent incident information is gathered from the public and other public safety agencies and relayed to the responding units. Incident status and the status of the responding units is tracked so that additional units can be dispatched and/or unit status can be returned to available when the incident is cleared and closed.
RTMC	Emergency Management Center	Emergency Early Warning System	'Emergency Early Warning System' monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies and uses this information to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to initiate the emergency response, including public notification using ITS traveler information systems, where appropriate.
RTMC	Emergency Management Center	Emergency Environmental Monitoring	'Emergency Environmental Monitoring' collects current and forecast road conditions and surface weather information from a variety of sources. The collected environmental information is monitored and presented to the operator and used to more effectively manage incidents.
RTMC	Emergency Management Center	Emergency Evacuation Support	'Emergency Evacuation Support' coordinates evacuation plans among allied agencies and manages evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety. Where appropriate, the affected population is evacuated in shifts, using more than one evacuation route, and including several evacuation destinations to spread demand and thereby expedite the evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. The public is provided with real-time evacuation guidance including basic information to assist potential evacuees in determining whether evacuation is necessary. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. The evacuation and reentry status are monitored and used to refine the plan and resource allocations during the evacuation and subsequent reentry. It communicates with public health systems to develop evacuation plans and recommended strategies for disasters and evacuation scenarios involving biological or other medical hazards.

Element Name	Physical Object	Functional Object	Functional Object Description
RTMC	Emergency Management Center	Emergency Incident Command	'Emergency Incident Command' provides tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident. It supports communications with public safety, emergency management, transportation, and other allied response agency centers, tracks and maintains resource information, action plans, and the incident command organization itself. Information is shared with agency centers including resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response. It supports the functions and interfaces commonly supported by a mobile command center.
RTMC	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.
RTMC	Emergency Management Center	Emergency Routing	'Emergency Routing' supports routing of emergency vehicles and enlists support from the Traffic Management Center to facilitate travel along these routes. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by the Traffic Management Center on request. Vehicles are tracked and routes are based on current vehicle location. It may coordinate with the Traffic Management Center to provide preemption or otherwise adapt the traffic control strategy along the selected route.

Element Name	Physical Object	Functional Object	Functional Object Description
RTMC	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.
RTMC	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.
RTMC	Maint and Constr Management Center	MCM Automated Treatment System Control	'MCM Automated Treatment System Control' remotely monitors and controls automated road treatment systems that disperse anti-icing chemicals or otherwise treat a road segment. The automated treatment system may be remotely activated by this object or it may include environmental sensors that activate the system automatically based on sensed environmental conditions. This object monitors treatment system operation, sets operating parameters, and directly controls system activation if necessary.
RTMC	Maint and Constr Management Center	MCM Data Collection	'MCM Data Collection' collects and stores maintenance and construction information that is collected in the course of operations by the Maintenance and Construction Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
RTMC	Maint and Constr Management Center	MCM Environmental Information Processing	'MCM Environmental Information Processing' processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. The processed environmental information products are presented to center personnel and disseminated to other centers.

Element Name	Physical Object	Functional Object	Functional Object Description
RTMC	Maint and Constr Management Center	MCM Incident Management	'MCM Incident Management' supports maintenance and construction participation in coordinated incident response. Incident notifications are shared, incident response resources are managed, and the overall incident situation and incident response status is coordinated among allied response organizations.
RTMC	Maint and Constr Management Center	MCM Infrastructure Monitoring	'MCM Infrastructure Monitoring' monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It monitors the infrastructure, collecting data from both fixed and vehicle-based sensors. In addition to specialized infrastructure monitoring sensors, it also monitors the broader population of equipped vehicles for vertical acceleration data and other situation data that may be used to determine current pavement condition.
RTMC	Maint and Constr Management Center	MCM Maintenance Decision Support	'MCM Maintenance Decision Support' recommends maintenance courses of action based on current and forecast environmental and road conditions and additional application specific information. Decisions are supported through understandable presentation of filtered and fused environmental and road condition information for specific time horizons as well as specific maintenance recommendations that are generated by the system based on this integrated information. The recommended courses of action are supported by information on the anticipated consequences of action or inaction, when available.
RTMC	Maint and Constr Management Center	MCM Reduced Speed Zone Warning	'MCM Reduced Speed Zone Warning' supports remote control and monitoring of reduced speed zone warning roadside equipment. It provides posted speed limits and associated schedules and information about associated road configuration changes including lane merges and shifts. It monitors field equipment operation and reports current status to the operator.
RTMC	Maint and Constr Management Center	MCM Roadway Maintenance	'MCM Roadway Maintenance' provides overall management and support for routine maintenance on a roadway system or right-of-way. Services managed include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of non-ITS equipment on the roadway (e.g., signs, gantries, cabinets, guard rails, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling routine maintenance activities. See also MCM Field Equipment Maintenance for maintenance of ITS field equipment.
RTMC	Maint and Constr Management Center	MCM Vehicle Tracking	'MCM Vehicle Tracking' tracks the location of maintenance and construction vehicles and other equipment. Vehicle/equipment location and associated information is presented to the operator.

Element Name	Physical Object	Functional Object	Functional Object Description
RTMC	Maint and Constr Management Center	MCM Winter Maintenance Management	'MCM Winter Maintenance Management' manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications), and other snow and ice control operations. It monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities, determine the appropriate snow and ice control response, and track and manage response operations.
RTMC	Maint and Constr Management Center	MCM Work Activity Coordination	'MCM Work Activity Coordination' disseminates work activity schedules and current asset restrictions to other agencies. Work schedules are coordinated with operating agencies, factoring in the needs and activities of other agencies and adjacent jurisdictions. Work schedules are also distributed to Transportation Information Centers for dissemination to the traveling public.
RTMC	Maint and Constr Management Center	MCM Work Zone Management	'MCM Work Zone Management' remotely monitors and supports work zone activities, controlling traffic through dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers, and informing other groups of activity (e.g., traveler information, traffic management, other maintenance and construction centers) for better coordination management. Work zone speeds, and delays, and closures are provided to the motorist prior to the work zones. This application provides control of field equipment in all maintenance areas, including fixed and portable field equipment supporting both stationary and mobile work zones.
RTMC	Maint and Constr Management Center	MCM Work Zone Safety Management	'MCM Work Zone Safety Management' remotely monitors work zone safety systems that detect vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone.
RTMC	Traffic Management Center	TMC Barrier System Management	'TMC Barrier System Management' remotely monitors and controls barrier systems for transportation facilities and infrastructure under control of center personnel. Barrier systems include automatic or remotely controlled gates, barriers and other access control systems. It also provides an interface to other centers to allow monitoring and control of the barriers from other centers (e.g., public safety or emergency operations centers).
RTMC	Traffic Management Center	TMC Basic Surveillance	'TMC Basic Surveillance' remotely monitors and controls traffic sensor systems and surveillance (e.g., video monitoring) equipment, and collects, processes and stores the collected traffic data. Current traffic information and other real-time transportation information is also collected from other centers. The collected information is provided to traffic operations personnel and made available to other centers.

Element Name	Physical Object	Functional Object	Functional Object Description
RTMC	Traffic Management Center	TMC Data Collection	'TMC Data Collection' collects and stores information that is created in the course of traffic operations performed by the Traffic Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
RTMC	Traffic Management Center	TMC Dynamic Lane Management and Shoulder Use	'TMC Dynamic Lane Management and Shoulder Use' remotely monitors and controls the system that is used to dynamically manage travel lanes, including temporary use of shoulders as travel lanes. It monitors traffic conditions and demand measured in the field and determines when the lane configuration of the roadway should be changed, when intersections and/or interchanges should be reconfigured, when the shoulders should be used for travel (as a lane), when lanes should be designated for use by special vehicles only, such as buses, high occupancy vehicles (HOVs), vehicles attending a special event, etc. and/or when types of vehicles should be prohibited or restricted from using particular lanes. It controls the field equipment used to manage and control specific lanes and the shoulders. It also can automatically notify the enforcement agency of lane control violations.
RTMC	Traffic Management Center	TMC Environmental Monitoring	'TMC Environmental Monitoring' assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information, information collected by other centers such as the Maintenance and Construction Management Center, data collected from environmental sensors deployed on and about the roadway, and information collected from connected vehicles. The collected environmental information is monitored and presented to the operator. This information can be used to issue general traveler advisories and support location specific warnings to drivers.
RTMC	Traffic Management Center	TMC Evacuation Support	'TMC Evacuation Support' supports development, coordination, and execution of special traffic management strategies during evacuation and subsequent reentry of a population in the vicinity of a disaster or major emergency. A traffic management strategy is developed based on anticipated demand, the capacity of the road network including access to and from the evacuation routes, and existing and forecast conditions. The strategy supports efficient evacuation and also protects and optimizes movement of response vehicles and other resources that are responding to the emergency.
RTMC	Traffic Management Center	TMC HOV Lane Management	'TMC HOV Lane Management' provides center monitoring and control of HOV lanes. It coordinates freeway ramp meters and connector signals with HOV lane usage signals to provide preferential treatment to HOV lanes. In advanced implementations, it automatically detects HOV violators.

Element Name	Physical Object	Functional Object	Functional Object Description
RTMC	Traffic Management Center	TMC Incident Detection	'TMC Incident Detection' identifies and reports incidents to Traffic Operations Personnel. It remotely monitors and controls traffic sensor and surveillance systems that support incident detection and verification. It analyzes and reduces the collected sensor and surveillance data, external alerting and advisory and incident reporting systems, anticipated demand information from intermodal freight depots, border crossings, special event information, and identifies and reports incidents and hazardous conditions
RTMC	Traffic Management Center	TMC Incident Dispatch Coordination	'TMC Incident Dispatch Coordination' formulates and manages an incident response that takes into account the incident potential, incident impacts, and resources required for incident management. It provides information to support dispatch and routing of emergency response and service vehicles as well as coordination with other cooperating agencies. It provides access to traffic management resources that provide surveillance of the incident, traffic control in the surrounding area, and support for the incident response. It monitors the incident response and collects performance measures such as incident response and clearance times.
RTMC	Traffic Management Center	TMC Multi-Modal Coordination	'TMC Multi-Modal Coordination' supports center-to-center coordination between the Traffic Management and Transit Management Centers. It monitors transit operations and provides traffic signal priority for transit vehicles on request from the Transit Management Center.
RTMC	Traffic Management Center	TMC Regional Traffic Management	'TMC Regional Traffic Management' supports coordination between Traffic Management Centers in order to share traffic information between centers as well as control of traffic management field equipment. This coordination supports wide area optimization and regional coordination that spans jurisdictional boundaries; for example, coordinated signal control in a metropolitan area or coordination between freeway operations and arterial signal control within a corridor.
RTMC	Traffic Management Center	TMC Reversible Lane Management	'TMC Reversible Lane Management' remotely monitors and controls reversible lanes. It provides an interface to reversible lane field equipment (traffic sensors, surveillance equipment, lane control signals, physical lane access controls, etc.) and to traffic operations personnel to support central monitoring and control of these facilities.
RTMC	Traffic Management Center	TMC Roadway Equipment Monitoring	'TMC Roadway Equipment Monitoring' monitors the operational status of field equipment and detects failures. It presents field equipment status to Traffic Operations Personnel and reports failures to the Maintenance and Construction Management Center. It tracks the repair or replacement of the failed equipment. The entire range of ITS field equipment may be monitored including sensors (traffic, infrastructure, environmental, security, speed, etc.) and devices (highway advisory radio, dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, beacons, security surveillance equipment, etc.).

Element Name	Physical Object	Functional Object	Functional Object Description
RTMC	Traffic Management Center	TMC Roadway Warning	'TMC Roadway Warning' remotely monitors and controls the systems used to warn drivers approaching hazards on a roadway. It monitors data on roadway conditions from sensors in the field and generates warnings in response to roadway weather conditions, road surface conditions, traffic conditions including queues, obstacles or animals in the roadway, and any other transient events that can be sensed.
RTMC	Traffic Management Center	TMC Safeguard System Management	'TMC Safeguard System Management' remotely monitors and controls safeguard systems for transportation facilities and infrastructure. Safeguard systems include blast shielding, exhaust systems and other automatic or remotely controlled systems intended to mitigate the impact of an incident. When access to a transportation facility is impacted by the activation of a safeguard system, impacted systems and travelers are notified.
RTMC	Traffic Management Center	TMC Service Patrol Management	'TMC Service Patrol Management' supports dispatch and communication with service patrol vehicles that monitor roads to aid motorists, offering rapid response to minor incidents.
RTMC	Traffic Management Center	TMC Signal Control	'TMC Signal Control' provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single Traffic Management Center and are responsive to traffic conditions and adapt to support incidents, preemption and priority requests, pedestrian crossing calls, etc.
RTMC	Traffic Management Center	TMC Speed Warning	'TMC Speed Warning' supports remote control and monitoring of reduced speed zone warning roadside equipment. It provides the location and extent of the reduced speed zone, the posted speed limit(s) with information about the applicability of the speed limit(s) (e.g., time of day, day of week, seasonality, relevant vehicle types) and information about associated road configuration changes including lane merges and shifts. It monitors field equipment operation and reports current status to the operator.
RTMC	Traffic Management Center	TMC Traffic Information Dissemination	'TMC Traffic Information Dissemination' disseminates traffic and road conditions, closure and detour information, incident information, driver advisories, and other traffic-related data to other centers, the media, and driver information systems. It monitors and controls driver information system field equipment including dynamic message signs and highway advisory radio, managing dissemination of driver information through these systems.

Element Name	Physical Object	Functional Object	Functional Object Description
RTMC	Traffic Management Center	TMC Traffic Metering	'TMC Traffic Metering' provides center monitoring and control of traffic metering systems including on ramps, through interchanges, and on the mainline roadway. All types of metering are covered including pre-timed/fixed time, time-based, dynamic and adaptive metering strategies and special bypasses. Metering rates can be calculated based upon historical data or current conditions including traffic, air quality, etc.
RTMC	Traffic Management Center	TMC Variable Speed Limits	'TMC Variable Speed Limits' provides center monitoring and control of variable speed limits systems. It monitors data on traffic and environmental conditions collected from sensors along the roadway. Based on the measured data, it calculates and sets suitable speed limits usually by lane. It controls equipment that posts the current speed limits and displays additional information such as basic safety rules and current traffic information to drivers.
RTMC	Traffic Management Center	TMC Work Zone Traffic Management	'TMC Work Zone Traffic Management' coordinates work plans with maintenance systems so that work zones are established that have minimum traffic impact. Traffic control strategies are implemented to further mitigate traffic impacts associated with work zones that are established, providing work zone information to driver information systems such as dynamic message signs.
RWIS Central Control System	Maint and Constr Management Center	MCM Data Collection	'MCM Data Collection' collects and stores maintenance and construction information that is collected in the course of operations by the Maintenance and Construction Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
RWIS Central Control System	Maint and Constr Management Center	MCM Environmental Information Collection	'MCM Environmental Information Collection' collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. In addition to fixed sensor stations at the roadside, this functional object also collects environmental information from sensor systems located on Maintenance and Construction Vehicles. It also collects current and forecast environmental conditions information that is made available by other systems. The functional object aggregates the sensor system data and provides it, along with data attributes to other applications.
RWIS Central Control System	Maint and Constr Management Center	MCM Environmental Information Processing	'MCM Environmental Information Processing' processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. The processed environmental information products are presented to center personnel and disseminated to other centers.

Element Name	Physical Object	Functional Object	Functional Object Description
RWIS Central Control System	Transportation Information Center	TIC Data Collection	'TIC Data Collection' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers.
RWIS Central Control System	Transportation Information Center	TIC Operations Data Collection	'TIC Operations Data Collection' collects and stores information that is collected about the transportation information service including data on the number of clients serviced and the services that were provided. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
RWIS Stations	ITS Roadway Equipment	Roadway Environmental Monitoring	'Roadway Environmental Monitoring' measures environmental conditions and communicates the collected information back to a center where it can be monitored and analyzed or to other field devices to support communications to vehicles. A broad array of general weather and road surface information may be collected. Weather conditions that may be measured include temperature, wind, humidity, precipitation, and visibility. Surface and sub-surface sensors can measure road surface temperature, moisture, icing, salinity, and other measures.
Security Monitoring Roadside Equipment	Security Monitoring Equipment	Field Secure Area Sensor Monitoring	'Field Secure Area Sensor Monitoring' includes sensors that monitor conditions of secure areas including facilities (e.g. transit yards), transportation infrastructure (e.g. Bridges, tunnels, interchanges, and transit railways or guideways), and public areas (e.g., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities). A range of acoustic, environmental threat (e.g. Chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity and motion and object sensors are included.
Security Monitoring Roadside Equipment	Security Monitoring Equipment	Field Secure Area Surveillance	'Field Secure Area Surveillance' includes video and audio surveillance equipment that monitors conditions of secure areas including facilities (e.g. transit yards), transportation infrastructure (e.g. as bridges, tunnels, interchanges, and transit railways or guideways), and public areas (e.g., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities). It provides the surveillance information to the Emergency Management Center for possible threat detection. It also provides local processing of the video or audio information, providing processed or analyzed results to the Emergency Management Center.

Element Name	Physical Object	Functional Object	Functional Object Description
Speed Monitoring Roadside Equipment	ITS Roadway Equipment	Roadway Speed Monitoring and Warning	'Roadway Speed Monitoring and Warning' includes the field elements that monitor vehicle speeds. If the speed is determined to be excessive, an advisory or warning is displayed. Current environmental conditions and other factors that may reduce safe operating speeds may also be taken into account. The operational status (state of the device, configuration, and fault data) is provided to the center. This application can also provide an enforcement function, reporting speed violations to an enforcement agency.
SRCC	Emergency Management Center	Emergency Call-Taking	'Emergency Call-Taking' supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other objects that formulate and manage the emergency response. It receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.
SRCC	Emergency Management Center	Emergency Data Collection	'Emergency Data Collection' collects and stores emergency information that is collected in the course of operations by the Emergency Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
SRCC	Emergency Management Center	Emergency Dispatch	'Emergency Dispatch' tracks the location and status of emergency vehicles and dispatches these vehicles to incidents. Pertinent incident information is gathered from the public and other public safety agencies and relayed to the responding units. Incident status and the status of the responding units is tracked so that additional units can be dispatched and/or unit status can be returned to available when the incident is cleared and closed.
SRCC	Emergency Management Center	Emergency Early Warning System	'Emergency Early Warning System' monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies and uses this information to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to initiate the emergency response, including public notification using ITS traveler information systems, where appropriate.
SRCC	Emergency Management Center	Emergency Environmental Monitoring	'Emergency Environmental Monitoring' collects current and forecast road conditions and surface weather information from a variety of sources. The collected environmental information is monitored and presented to the operator and used to more effectively manage incidents.

Element Name	Physical Object	Functional Object	Functional Object Description
SRCC	Emergency Management Center	Emergency Evacuation Support	'Emergency Evacuation Support' coordinates evacuation plans among allied agencies and manages evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety. Where appropriate, the affected population is evacuated in shifts, using more than one evacuation route, and including several evacuation destinations to spread demand and thereby expedite the evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. The public is provided with real-time evacuation guidance including basic information to assist potential evacuees in determining whether evacuation is necessary. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. The evacuation and reentry status are monitored and used to refine the plan and resource allocations during the evacuation and subsequent reentry. It communicates with public health systems to develop evacuation plans and recommended strategies for disasters and evacuation scenarios involving biological or other medical hazards.
SRCC	Emergency Management Center	Emergency Incident Command	'Emergency Incident Command' provides tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident. It supports communications with public safety, emergency management, transportation, and other allied response agency centers, tracks and maintains resource information, action plans, and the incident command organization itself. Information is shared with agency centers including resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response. It supports the functions and interfaces commonly supported by a mobile command center.

Element Name	Physical Object	Functional Object	Functional Object Description
SRCC	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.
SRCC	Emergency Management Center	Emergency Routing	'Emergency Routing' supports routing of emergency vehicles and enlists support from the Traffic Management Center to facilitate travel along these routes. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by the Traffic Management Center on request. Vehicles are tracked and routes are based on current vehicle location. It may coordinate with the Traffic Management Center to provide preemption or otherwise adapt the traffic control strategy along the selected route.
SRCC	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.

Element Name	Physical Object	Functional Object	Functional Object Description
SRCC	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.
SRCC	Emissions Management Center	Emissions Data Collection	'Emissions Data Collection' collects and stores air quality and emissions management information that is collected in the course of Emissions Management Center operations. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
SRCC	Emissions Management Center	Emissions Data Management	'Emissions Data Management' collects and stores air quality and vehicle emissions information by remotely monitoring and controlling area wide and point sensors. General air quality measures are distributed as general traveler information and also may be used in demand management programs. Collected roadside emissions are analyzed and used to detect, identify, and notify concerned parties regarding vehicles that exceed emissions standards.
SRCC	Maint and Constr Management Center	MCM Automated Treatment System Control	'MCM Automated Treatment System Control' remotely monitors and controls automated road treatment systems that disperse anti-icing chemicals or otherwise treat a road segment. The automated treatment system may be remotely activated by this object or it may include environmental sensors that activate the system automatically based on sensed environmental conditions. This object monitors treatment system operation, sets operating parameters, and directly controls system activation if necessary.
SRCC	Maint and Constr Management Center	MCM Data Collection	'MCM Data Collection' collects and stores maintenance and construction information that is collected in the course of operations by the Maintenance and Construction Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
SRCC	Maint and Constr Management Center	MCM Environmental Information Collection	'MCM Environmental Information Collection' collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. In addition to fixed sensor stations at the roadside, this functional object also collects environmental information from sensor systems located on Maintenance and Construction Vehicles. It also collects current and forecast environmental conditions information that is made available by other systems. The functional object aggregates the sensor system data and provides it, along with data attributes to other applications.

Element Name	Physical Object	Functional Object	Functional Object Description
SRCC	Maint and Constr Management Center	MCM Environmental Information Processing	'MCM Environmental Information Processing' processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. The processed environmental information products are presented to center personnel and disseminated to other centers.
SRCC	Maint and Constr Management Center	MCM Incident Management	'MCM Incident Management' supports maintenance and construction participation in coordinated incident response. Incident notifications are shared, incident response resources are managed, and the overall incident situation and incident response status is coordinated among allied response organizations.
SRCC	Maint and Constr Management Center	MCM Infrastructure Monitoring	'MCM Infrastructure Monitoring' monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It monitors the infrastructure, collecting data from both fixed and vehicle-based sensors. In addition to specialized infrastructure monitoring sensors, it also monitors the broader population of equipped vehicles for vertical acceleration data and other situation data that may be used to determine current pavement condition.
SRCC	Maint and Constr Management Center	MCM Maintenance Decision Support	'MCM Maintenance Decision Support' recommends maintenance courses of action based on current and forecast environmental and road conditions and additional application specific information. Decisions are supported through understandable presentation of filtered and fused environmental and road condition information for specific time horizons as well as specific maintenance recommendations that are generated by the system based on this integrated information. The recommended courses of action are supported by information on the anticipated consequences of action or inaction, when available.
SRCC	Maint and Constr Management Center	MCM Reduced Speed Zone Warning	'MCM Reduced Speed Zone Warning' supports remote control and monitoring of reduced speed zone warning roadside equipment. It provides posted speed limits and associated schedules and information about associated road configuration changes including lane merges and shifts. It monitors field equipment operation and reports current status to the operator.
SRCC	Maint and Constr Management Center	MCM Roadway Maintenance	'MCM Roadway Maintenance' provides overall management and support for routine maintenance on a roadway system or right-of-way. Services managed include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of non-ITS equipment on the roadway (e.g., signs, gantries, cabinets, guard rails, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling routine maintenance activities. See also MCM Field Equipment Maintenance for maintenance of ITS field equipment.

Element Name	Physical Object	Functional Object	Functional Object Description
SRCC	Maint and Constr Management Center	MCM Vehicle Tracking	'MCM Vehicle Tracking' tracks the location of maintenance and construction vehicles and other equipment. Vehicle/equipment location and associated information is presented to the operator.
SRCC	Maint and Constr Management Center	MCM Winter Maintenance Management	'MCM Winter Maintenance Management' manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications), and other snow and ice control operations. It monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities, determine the appropriate snow and ice control response, and track and manage response operations.
SRCC	Maint and Constr Management Center	MCM Work Activity Coordination	'MCM Work Activity Coordination' disseminates work activity schedules and current asset restrictions to other agencies. Work schedules are coordinated with operating agencies, factoring in the needs and activities of other agencies and adjacent jurisdictions. Work schedules are also distributed to Transportation Information Centers for dissemination to the traveling public.
SRCC	Maint and Constr Management Center	MCM Work Zone Management	'MCM Work Zone Management' remotely monitors and supports work zone activities, controlling traffic through dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers, and informing other groups of activity (e.g., traveler information, traffic management, other maintenance and construction centers) for better coordination management. Work zone speeds, and delays, and closures are provided to the motorist prior to the work zones. This application provides control of field equipment in all maintenance areas, including fixed and portable field equipment supporting both stationary and mobile work zones.
SRCC	Traffic Management Center	TMC Barrier System Management	'TMC Barrier System Management' remotely monitors and controls barrier systems for transportation facilities and infrastructure under control of center personnel. Barrier systems include automatic or remotely controlled gates, barriers and other access control systems. It also provides an interface to other centers to allow monitoring and control of the barriers from other centers (e.g., public safety or emergency operations centers).
SRCC	Traffic Management Center	TMC Basic Surveillance	'TMC Basic Surveillance' remotely monitors and controls traffic sensor systems and surveillance (e.g., video monitoring) equipment, and collects, processes and stores the collected traffic data. Current traffic information and other real-time transportation information is also collected from other centers. The collected information is provided to traffic operations personnel and made available to other centers.
SRCC	Traffic Management Center	TMC Data Collection	'TMC Data Collection' collects and stores information that is created in the course of traffic operations performed by the Traffic Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.

Element Name	Physical Object	Functional Object	Functional Object Description
SRCC	Traffic Management Center	TMC Environmental Monitoring	'TMC Environmental Monitoring' assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information, information collected by other centers such as the Maintenance and Construction Management Center, data collected from environmental sensors deployed on and about the roadway, and information collected from connected vehicles. The collected environmental information is monitored and presented to the operator. This information can be used to issue general traveler advisories and support location specific warnings to drivers.
SRCC	Traffic Management Center	TMC Evacuation Support	'TMC Evacuation Support' supports development, coordination, and execution of special traffic management strategies during evacuation and subsequent reentry of a population in the vicinity of a disaster or major emergency. A traffic management strategy is developed based on anticipated demand, the capacity of the road network including access to and from the evacuation routes, and existing and forecast conditions. The strategy supports efficient evacuation and also protects and optimizes movement of response vehicles and other resources that are responding to the emergency.
SRCC	Traffic Management Center	TMC Incident Detection	'TMC Incident Detection' identifies and reports incidents to Traffic Operations Personnel. It remotely monitors and controls traffic sensor and surveillance systems that support incident detection and verification. It analyzes and reduces the collected sensor and surveillance data, external alerting and advisory and incident reporting systems, anticipated demand information from intermodal freight depots, border crossings, special event information, and identifies and reports incidents and hazardous conditions
SRCC	Traffic Management Center	TMC Incident Dispatch Coordination	'TMC Incident Dispatch Coordination' formulates and manages an incident response that takes into account the incident potential, incident impacts, and resources required for incident management. It provides information to support dispatch and routing of emergency response and service vehicles as well as coordination with other cooperating agencies. It provides access to traffic management resources that provide surveillance of the incident, traffic control in the surrounding area, and support for the incident response. It monitors the incident response and collects performance measures such as incident response and clearance times.
SRCC	Traffic Management Center	TMC Regional Traffic Management	'TMC Regional Traffic Management' supports coordination between Traffic Management Centers in order to share traffic information between centers as well as control of traffic management field equipment. This coordination supports wide area optimization and regional coordination that spans jurisdictional boundaries; for example, coordinated signal control in a metropolitan area or coordination between freeway operations and arterial signal control within a corridor.

Element Name	Physical Object	Functional Object	Functional Object Description
SRCC	Traffic Management Center	TMC Roadway Equipment Monitoring	'TMC Roadway Equipment Monitoring' monitors the operational status of field equipment and detects failures. It presents field equipment status to Traffic Operations Personnel and reports failures to the Maintenance and Construction Management Center. It tracks the repair or replacement of the failed equipment. The entire range of ITS field equipment may be monitored including sensors (traffic, infrastructure, environmental, security, speed, etc.) and devices (highway advisory radio, dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, beacons, security surveillance equipment, etc.).
SRCC	Traffic Management Center	TMC Roadway Warning	'TMC Roadway Warning' remotely monitors and controls the systems used to warn drivers approaching hazards on a roadway. It monitors data on roadway conditions from sensors in the field and generates warnings in response to roadway weather conditions, road surface conditions, traffic conditions including queues, obstacles or animals in the roadway, and any other transient events that can be sensed.
SRCC	Traffic Management Center	TMC Safeguard System Management	'TMC Safeguard System Management' remotely monitors and controls safeguard systems for transportation facilities and infrastructure. Safeguard systems include blast shielding, exhaust systems and other automatic or remotely controlled systems intended to mitigate the impact of an incident. When access to a transportation facility is impacted by the activation of a safeguard system, impacted systems and travelers are notified.
SRCC	Traffic Management Center	TMC Signal Control	'TMC Signal Control' provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single Traffic Management Center and are responsive to traffic conditions and adapt to support incidents, preemption and priority requests, pedestrian crossing calls, etc.
SRCC	Traffic Management Center	TMC Speed Warning	'TMC Speed Warning' supports remote control and monitoring of reduced speed zone warning roadside equipment. It provides the location and extent of the reduced speed zone, the posted speed limit(s) with information about the applicability of the speed limit(s) (e.g., time of day, day of week, seasonality, relevant vehicle types) and information about associated road configuration changes including lane merges and shifts. It monitors field equipment operation and reports current status to the operator.

Element Name	Physical Object	Functional Object	Functional Object Description
SRCC	Traffic Management Center	TMC Traffic Information Dissemination	'TMC Traffic Information Dissemination' disseminates traffic and road conditions, closure and detour information, incident information, driver advisories, and other traffic-related data to other centers, the media, and driver information systems. It monitors and controls driver information system field equipment including dynamic message signs and highway advisory radio, managing dissemination of driver information through these systems.
SRCC	Traffic Management Center	TMC Traffic Metering	'TMC Traffic Metering' provides center monitoring and control of traffic metering systems including on ramps, through interchanges, and on the mainline roadway. All types of metering are covered including pre-timed/fixed time, time-based, dynamic and adaptive metering strategies and special bypasses. Metering rates can be calculated based upon historical data or current conditions including traffic, air quality, etc.
SRCC	Traffic Management Center	TMC Variable Speed Limits	'TMC Variable Speed Limits' provides center monitoring and control of variable speed limits systems. It monitors data on traffic and environmental conditions collected from sensors along the roadway. Based on the measured data, it calculates and sets suitable speed limits usually by lane. It controls equipment that posts the current speed limits and displays additional information such as basic safety rules and current traffic information to drivers.
SRCC	Traffic Management Center	TMC Work Zone Traffic Management	'TMC Work Zone Traffic Management' coordinates work plans with maintenance systems so that work zones are established that have minimum traffic impact. Traffic control strategies are implemented to further mitigate traffic impacts associated with work zones that are established, providing work zone information to driver information systems such as dynamic message signs.
Traffic Data and Video Archive	Archived Data System	Archive Data Repository	'Archive Data Repository' collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. It includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. It supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region. Repositories may be established to support operations planning, performance monitoring and management, and policy and investment decisions.
Traffic Data and Video Archive	Archived Data System	Archive Government Reporting	'Archive Government Reporting' selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements. It provides transportation system statistics and performance measures in required formats to support investment and policy decisions.

Element Name	Physical Object	Functional Object	Functional Object Description
Traffic Data and Video Archive	Archived Data System	Archive On-Line Analysis and Mining	'Archive On-Line Analysis and Mining' provides advanced data analysis, summarization, and mining features that facilitate discovery of information, patterns, and correlations in large data sets. Multidimensional analysis, selective summarization and expansion of data details, and many other advanced analysis services may be offered. Complex performance measures that are derived from multiple data sources may also be produced.
Traffic Data and Video Archive	Archived Data System	Archive Situation Data Archival	'Archive Situation Data Archival' collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. It controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes, rather than for traffic management. It also collects situation data from connected vehicles. The data collected, quality checks performed, and aggregation strategies are defined to support transportation system performance monitoring and management.
Traffic Detector Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.
Traffic Detector Roadside Equipment	ITS Roadway Equipment	Roadway Warning	'Roadway Warning' includes the field equipment used to warn drivers approaching hazards on a roadway. Warnings may be generated in response to roadway weather conditions, road surface conditions, traffic conditions including queues, obstacles or animals in the roadway, and any other transient events that can be sensed. The equipment monitors traffic and roadway conditions and may send data to a Traffic Management Center for processing or may process it to determine when a warning should be issued. When it is determined that a warning should be issued, the equipment is used to alert approaching drivers via dynamic warning signs, flashing lights, in-vehicle messages, etc.
Traffic Signal Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.
Traffic Signal Roadside Equipment	ITS Roadway Equipment	Roadway Field Management Station Operation	'Roadway Field Management Station Operation' supports direct communications between field management stations and the local field equipment under their control.

Element Name	Physical Object	Functional Object	Functional Object Description
Traffic Signal Roadside Equipment	ITS Roadway Equipment	Roadway Signal Control	'Roadway Signal Control' includes the field elements that monitor and control signalized intersections. It includes the traffic signal controllers, detectors, conflict monitors, signal heads, and other ancillary equipment that supports traffic signal control. It also includes field masters, and equipment that supports communications with a central monitoring and/or control system, as applicable. The communications link supports upload and download of signal timings and other parameters and reporting of current intersection status. It represents the field equipment used in all levels of traffic signal control from basic actuated systems that operate on fixed timing plans through adaptive systems. It also supports all signalized intersection configurations, including those that accommodate pedestrians. In advanced, future implementations, environmental data may be monitored and used to support dilemma zone processing and other aspects of signal control that are sensitive to local environmental conditions.
Traffic Signal Roadside Equipment	ITS Roadway Equipment	Roadway Signal Preemption	'Roadway Signal Preemption' includes the field elements that receive signal preemption requests from emergency vehicles approaching a signalized intersection and overrides the current operation of the traffic signals to stop conflicting traffic and grant right-of-way to the approaching vehicle.
Transit Center and Station Surveillance System Roadside Equipment	Traveler Support Equipment	Traveler Security	'Traveler Security' provides the capability to report an emergency or summon assistance from secure areas such as transit stops, transit stations, modal transfer facilities, rest stops and picnic areas, park-and-ride areas, tourism and travel information areas, and emergency pull off areas. This object includes interfaces that support initiation of an alarm and presentation of the returned alarm acknowledgement as well as a broadcast message to advise or warn the traveler.
Transit Data Archives	Archived Data System	Archive Data Repository	'Archive Data Repository' collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. It includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. It supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region. Repositories may be established to support operations planning, performance monitoring and management, and policy and investment decisions.
Transit Data Archives	Archived Data System	Archive Government Reporting	'Archive Government Reporting' selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements. It provides transportation system statistics and performance measures in required formats to support investment and policy decisions.

Element Name	Physical Object	Functional Object	Functional Object Description
Transit Data Archives	Archived Data System	Archive On-Line Analysis and Mining	'Archive On-Line Analysis and Mining' provides advanced data analysis, summarization, and mining features that facilitate discovery of information, patterns, and correlations in large data sets. Multidimensional analysis, selective summarization and expansion of data details, and many other advanced analysis services may be offered. Complex performance measures that are derived from multiple data sources may also be produced.
Transit Data Archives	Archived Data System	Archive Situation Data Archival	'Archive Situation Data Archival' collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. It controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes, rather than for traffic management. It also collects situation data from connected vehicles. The data collected, quality checks performed, and aggregation strategies are defined to support transportation system performance monitoring and management.
Transit Information Telephone Systems	Personal Information Device	Personal Interactive Traveler Information	'Personal Interactive Traveler Information' provides traffic information, road conditions, transit information, yellow pages (traveler services) information, special event information, and other traveler information that is specifically tailored based on the traveler's request and/or previously submitted traveler profile information. It also supports interactive services that support enrollment, account management, and payments for transportation services. The interactive traveler information capability is provided by personal devices including personal computers and personal portable devices such as smart phones.
Transit Information Telephone Systems	Transit Management Center	Transit Center Information Services	'Transit Center Information Services' collects the latest available information for a transit service and makes it available to transit customers and to Transportation Information Centers for further distribution. Customers are provided information at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute. Information provided can include the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events. In addition to general service information, tailored information (e.g., itineraries) are provided to individual transit users.

Element Name	Physical Object	Functional Object	Functional Object Description
Transit Information Websites	Transportation Information Center	TIC Data Collection	'TIC Data Collection' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers.
Transit Information Websites	Transportation Information Center	TIC Dynamic Ridesharing	'TIC Dynamic Ridesharing' provides dynamic rideshare matches for eligible travelers, connecting riders and drivers for specific trips based on preferences. This ridesharing/ride matching capability also arranges connections to transit or other multimodal services for portions of a multi-segment trip that includes ridesharing. Reservations and advanced payment are also supported so that each segment of the trip may be confirmed.
Transit Information Websites	Transportation Information Center	TIC Interactive Traveler Information	'TIC Interactive Traveler Information' disseminates personalized traveler information including traffic and road conditions, transit information, parking information, maintenance and construction information, multimodal information, event information, and weather information. Tailored information is provided based on the traveler's request in this interactive service.
Transit Information Websites	Transportation Information Center	TIC Traveler Information Broadcast	'TIC Traveler Information Broadcast' disseminates traveler information including traffic and road conditions, incident information, maintenance and construction information, event information, transit information, parking information, and weather information. The same information is broadcast to all equipped traveler interface systems and vehicles.
Transit Information Websites	Transportation Information Center	TIC Traveler Telephone Information	'TIC Traveler Telephone Information' services voice-based traveler requests for information that supports traveler telephone information systems like 511. It takes requests for traveler information, which could be voice-formatted traveler requests, dual-tone multi-frequency (DTMF)-based requests, or a simple traveler information request, and returns the requested traveler information in the proper format. In addition to servicing requests for traveler information, it also collects and forwards alerts and advisories to traveler telephone information systems.

Element Name	Physical Object	Functional Object	Functional Object Description
Transit Information Websites	Transportation Information Center	TIC Trip Planning	'TIC Trip Planning' provides pre-trip and en-route trip planning services for travelers. It receives origin, destination, constraints, and preferences and returns trip plan(s) that meet the supplied criteria. Trip plans may be based on current traffic and road conditions, transit schedule information, and other real-time traveler information. Candidate trip plans are multimodal and may include vehicle, transit, and alternate mode segments (e.g., rail, ferry, bicycle routes, and walkways) based on traveler preferences. It also confirms the trip plan for the traveler and supports reservations and advanced payment for portions of the trip. The trip plan includes specific routing information and instructions for each segment of the trip and may also include information and reservations for additional services (e.g., parking) along the route.
Transit Kiosks	Traveler Support Equipment	Transit Stop Information Services	'Transit Stop Information Services' furnishes transit users with real-time travel-related information at transit stops, multi-modal transfer points, and other public transportation areas. It provides transit users with information on transit routes, schedules, transfer options, available services, fares, and real-time schedule adherence. In addition to tailored information for individual transit users, it supports general annunciation and/or display of imminent arrival information and other information of general interest to transit users.
Transit Kiosks	Traveler Support Equipment	Traveler Fare Management	'Traveler Fare Management' provides the capability for the traveler to access and use a common fare medium for transit fares, tolls, and/or parking lot charges using a public device at or near the point of service. It accepts a service request and means of payment, verifies eligibility, calculates the amount due, collects payment, and identifies payment problems. It may be implemented using a card reader/dispenser in a point of sale device that includes a communications interface to the financial infrastructure to support payment collection and reconciliation.
Transit Vehicle Equipment	Transit Vehicle OBE	Transit Vehicle On-Board Fare Management	'Transit Vehicle On-board Fare Management' supports fare collection using a standard fare card or other non-monetary fare medium and detects payment violations. Collected fare data are made available to the center.
Transit Vehicle Equipment	Transit Vehicle OBE	Transit Vehicle On-Board Information Services	'Transit Vehicle On-board Information Services' furnishes en-route transit users with real-time travel-related information on-board a transit vehicle. Current information that can be provided to transit users includes transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, non-motorized transportation services, and special events are provided. In addition to tailored information for individual transit users, it also supports general annunciation and/or display of general schedule information, imminent arrival information, and other information of general interest to transit users.

Element Name	Physical Object	Functional Object	Functional Object Description
Transit Vehicle Equipment	Transit Vehicle OBE	Transit Vehicle On-Board Maintenance	'Transit Vehicle On-Board Maintenance' collects and processes transit vehicle maintenance data on-board the vehicle, including mileage and vehicle operating conditions. This maintenance information is provided to the management center and used to schedule future vehicle maintenance and repair.
Transit Vehicle Equipment	Transit Vehicle OBE	Transit Vehicle On-Board Paratransit Operations	'Transit Vehicle On-board Paratransit Operations' forwards paratransit and flexible-route dispatch requests to the operator and forwards acknowledgements to the center. It coordinates with, and assists the operator in managing multi-stop runs associated with demand responsive transit services including paratransit. It collects transit vehicle passenger data and makes it available to the center.
Transit Vehicle Equipment	Transit Vehicle OBE	Transit Vehicle On-Board Trip Monitoring	'Transit Vehicle On-Board Trip Monitoring' tracks vehicle location, monitors fuel usage, collects operational status (doors opened/closed, running times, etc.) and sends the collected, time stamped data to the Transit Management Center.
Transit Vehicle Equipment	Transit Vehicle OBE	Transit Vehicle Passenger Counting	'Transit Vehicle Passenger Counting' collects transit vehicle loading data and makes it available to the center.
Transit Vehicle Equipment	Transit Vehicle OBE	Transit Vehicle Schedule Management	'Transit Vehicle Schedule Management' monitors schedule performance and identifies corrective actions when a deviation is detected. It provides two-way communication between the transit vehicle and center, enabling the center to communicate with the vehicle operator and monitor on-board systems.
Transit Vehicle Equipment	Transit Vehicle OBE	Transit Vehicle Security	'Transit Vehicle Security' provides security and safety functions on-board the transit vehicle. It includes surveillance and sensor systems that monitor the on-board environment, silent alarms that can be activated by transit user or vehicle operator, operator authentication, and a remote vehicle disable function. The surveillance equipment includes video (e.g. video monitoring cameras), audio systems and/or event recorder systems. The sensor equipment includes threat sensors (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors) and object detection sensors (e.g. metal detectors).
Transit Vehicle Equipment	Transit Vehicle OBE	Transit Vehicle Signal Priority	'Transit Vehicle Signal Priority' provides the capability for transit vehicles to determine eligibility for priority and request signal priority at signalized intersections, ramps, and interchanges through short range communication with traffic control equipment at the roadside.

Element Name	Physical Object	Functional Object	Functional Object Description
Transit Vehicle Equipment	Vehicle OBE	Vehicle Control Warning	'Vehicle Control Warning' monitors areas around the vehicle and provides warnings to a driver so the driver can take action to recover and maintain safe control of the vehicle. It includes lateral warning systems that warn of lane departures and obstacles or vehicles to the sides of the vehicle and longitudinal warning systems that monitor areas in the vehicle path and provide warnings when headways are insufficient or obstacles are detected in front of or behind the vehicle. It includes on-board sensors, including radars and imaging systems, and the driver information system that provides the visual, audible, and/or haptic warnings to the driver.
Transit Vehicle Equipment	Vehicle OBE	Vehicle Location Determination	'Vehicle Location Determination' receives current location of the vehicle and provides this information to vehicle applications that use the location information to provide ITS services.
Transportation Information System (TIS)	Archived Data System	Archive Data Repository	'Archive Data Repository' collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. It includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. It supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region. Repositories may be established to support operations planning, performance monitoring and management, and policy and investment decisions.
Transportation Information System (TIS)	Archived Data System	Archive Government Reporting	'Archive Government Reporting' selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements. It provides transportation system statistics and performance measures in required formats to support investment and policy decisions.
Transportation Information System (TIS)	Archived Data System	Archive On-Line Analysis and Mining	'Archive On-Line Analysis and Mining' provides advanced data analysis, summarization, and mining features that facilitate discovery of information, patterns, and correlations in large data sets. Multidimensional analysis, selective summarization and expansion of data details, and many other advanced analysis services may be offered. Complex performance measures that are derived from multiple data sources may also be produced.

Element Name	Physical Object	Functional Object	Functional Object Description
Transportation Information System (TIS)	Archived Data System	Archive Situation Data Archival	'Archive Situation Data Archival' collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. It controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes, rather than for traffic management. It also collects situation data from connected vehicles. The data collected, quality checks performed, and aggregation strategies are defined to support transportation system performance monitoring and management.
Traveler Information and Parking Kiosks	Traveler Support Equipment	Traveler Interactive Information	'Traveler Interactive Information' provides traffic information, road conditions, transit information, yellow pages (traveler services) information, special event information, and other traveler information that is specifically tailored based on the traveler's request and/or previously submitted traveler profile information. It also supports interactive services that support enrollment, account management, and payments for transportation services. The interactive traveler information capability is provided by a public traveler interface, such as a kiosk.
Truck Center	Commercial Vehicle Administration Center	CVAC Credentials and Taxes Administration	'CVAC Credentials and Taxes Administration' issues credentials, collects fees and taxes, and supports enforcement of credential requirements. It manages driver licensing and enrolls carriers in additional CVO programs such as wireless roadside inspection programs. It communicates with the Fleet and Freight Management Centers associated with the motor carriers to process applications and collect fuel taxes, weight/distance taxes, and other taxes and fees associated with commercial vehicle operations. It also receives applications for, and issues special Oversize/Overweight and HAZMAT permits in coordination with other cognizant authorities. It supports user account management and receives and processes requests for review of carrier and driver status. It communicates with peer functional objects in other jurisdictions to exchange credentials database information.
Truck Center	Commercial Vehicle Administration Center	CVAC Information Exchange	'CVAC Information Exchange' supports the exchange of safety, credentials, permit data, and other data concerning the operation of commercial vehicles among jurisdictions. The object also supports the exchange of safety, credentials, permit, and operations data between systems (for example, an administrative center and the roadside check facilities) within a single jurisdiction. Data are collected from multiple authoritative sources and packaged into snapshots (top-level summary and critical status information) and profiles (detailed and historical data). Data is made available to fleet operators and other information requestors on request or based on subscriptions established by the requestor.

Element Name	Physical Object	Functional Object	Functional Object Description
Tunnel Emissions Roadside Equipment	ITS Roadway Equipment	Roadway Barrier System Control	'Roadway Barrier System Control' includes the field equipment that controls barrier systems used to control access to transportation facilities and infrastructure. Barrier systems include automatic or remotely controlled gates, barriers and other access control systems.
Tunnel Emissions Roadside Equipment	ITS Roadway Equipment	Roadway Emissions Monitoring	'Roadway Emissions Monitoring' monitors emissions and general air quality and communicates the collected information back to the Emissions Management Center where it can be monitored, analyzed, and used. This functional object supports point monitoring of individual vehicle emissions as well as general monitoring of standard air quality measures.
Tunnel Emissions Roadside Equipment	ITS Roadway Equipment	Roadway Safeguard System Control	'Roadway Safeguard System Control' includes field equipment that controls safeguard systems for transportation facilities and infrastructure. Safeguard systems include blast shields, exhaust systems and other automatic or remotely controlled systems intended to mitigate the impact of an incident.
Tunnel Emissions Roadside Equipment	Security Monitoring Equipment	Field Secure Area Sensor Monitoring	'Field Secure Area Sensor Monitoring' includes sensors that monitor conditions of secure areas including facilities (e.g. transit yards), transportation infrastructure (e.g. Bridges, tunnels, interchanges, and transit railways or guideways), and public areas (e.g., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities). A range of acoustic, environmental threat (e.g. Chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity and motion and object sensors are included.
Tunnel Emissions Roadside Equipment	Security Monitoring Equipment	Field Secure Area Surveillance	'Field Secure Area Surveillance' includes video and audio surveillance equipment that monitors conditions of secure areas including facilities (e.g. transit yards), transportation infrastructure (e.g. as bridges, tunnels, interchanges, and transit railways or guideways), and public areas (e.g., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities). It provides the surveillance information to the Emergency Management Center for possible threat detection. It also provides local processing of the video or audio information, providing processed or analyzed results to the Emergency Management Center.

Element Name	Physical Object	Functional Object	Functional Object Description
UMD Transportation Data Research Laboratory (TDRL)	Archived Data System	Archive Data Repository	'Archive Data Repository' collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. It includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. It supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region. Repositories may be established to support operations planning, performance monitoring and management, and policy and investment decisions.
UMD Transportation Data Research Laboratory (TDRL)	Archived Data System	Archive Government Reporting	'Archive Government Reporting' selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements. It provides transportation system statistics and performance measures in required formats to support investment and policy decisions.
UMD Transportation Data Research Laboratory (TDRL)	Archived Data System	Archive Situation Data Archival	'Archive Situation Data Archival' collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. It controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes, rather than for traffic management. It also collects situation data from connected vehicles. The data collected, quality checks performed, and aggregation strategies are defined to support transportation system performance monitoring and management.
UMD Transportation Data Research Laboratory (TDRL)	Transportation Information Center	TIC Operations Data Collection	'TIC Operations Data Collection' collects and stores information that is collected about the transportation information service including data on the number of clients serviced and the services that were provided. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
User Personal Portable and Computing Devices	Personal Information Device	Personal Interactive Traveler Information	'Personal Interactive Traveler Information' provides traffic information, road conditions, transit information, yellow pages (traveler services) information, special event information, and other traveler information that is specifically tailored based on the traveler's request and/or previously submitted traveler profile information. It also supports interactive services that support enrollment, account management, and payments for transportation services. The interactive traveler information capability is provided by personal devices including personal computers and personal portable devices such as smart phones.

Element Name	Physical Object	Functional Object	Functional Object Description
User Personal Portable and Computing Devices	Personal Information Device	Personal Location Determination	'Personal Location Determination' receives current location information and provides this information to other applications that use the location information to provide guidance and emergency notification services. It interfaces with and encapsulates positioning technology such as a GPS receiver that is embedded in the user's device.
User Personal Portable and Computing Devices	Personal Information Device	Personal Traveler Information Reception	'Personal Traveler Information Reception' receives formatted traffic advisories, road conditions, traffic regulations, transit information, broadcast alerts, and other general traveler information broadcasts and presents the information to the traveler. The traveler information broadcasts are received by personal devices including personal computers and personal portable devices such as smart phones.
User Personal Portable and Computing Devices	Personal Information Device	Personal Trip Planning and Route Guidance	'Personal Trip Planning and Route Guidance' provides a personalized trip plan to the traveler. The trip plan is calculated based on preferences and constraints supplied by the traveler and provided to the traveler for confirmation. Coordination may continue during the trip so that the route plan can be modified to account for new information. Many equipment configurations are possible including systems that provide a basic trip plan to the traveler as well as more sophisticated systems that can provide transition by transition guidance to the traveler along a multi-modal route with transfers. Devices represented by this functional object include desktop computers at home, work, or at major trip generation sites, plus personal devices such as tablets and smart phones.
Variable Speed Limit Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and video monitoring cameras.
Variable Speed Limit Roadside Equipment	ITS Roadway Equipment	Roadway Traffic Information Dissemination	'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios.
Variable Speed Limit Roadside Equipment	ITS Roadway Equipment	Roadway Variable Speed Limits	'Roadway Variable Speed Limits' includes the field equipment, physical overhead lane signs and associated control electronics that are used to manage and control variable speed limits systems. This equipment monitors traffic and environmental conditions along the roadway. The system can be centrally monitored and controlled by a Traffic Management Center or it can be autonomous, calculating and setting suitable speed limits, usually by lane. This application displays the speed limits and additional information such as basic safety rules and current traffic information to drivers.
Variable Speed Limit Roadside Equipment	ITS Roadway Equipment	Roadway Work Zone Traffic Control	'Roadway Work Zone Traffic Control' controls traffic in areas of the roadway where maintenance and construction activities are underway, monitoring and controlling traffic using field equipment such as video monitoring cameras, dynamic messages signs, and gates/barriers. Work zone speeds and delays are provided to the motorist prior to the work zones.

Element Name	Physical Object	Functional Object	Functional Object Description
Vehicle	Vehicle OBE	Vehicle Basic Toll/Parking Payment	'Vehicle Basic Toll/Parking Payment' includes the traditional on-board systems that pay for tolls and parking electronically. It includes the 'tag' in-vehicle equipment that communicates with the toll/parking plaza and an optional interface to a carry-in payment device. See also 'Vehicle Payment Services', which provides a broader range of payment services.
Vehicle	Vehicle OBE	Vehicle Emergency Notification	'Vehicle Emergency Notification' provides the capability for drivers or collision detection sensors to report an emergency and summon assistance. It gathers data from on-board collision detection sensors, provides a mechanism for the driver to summon assistance, and includes a communications capability to report the collision including indicators of collision severity, the number of passengers involved, and information about the vehicle that may affect the response.
Vehicle	Vehicle OBE	Vehicle Location Determination	'Vehicle Location Determination' receives current location of the vehicle and provides this information to vehicle applications that use the location information to provide ITS services.
Vehicle	Vehicle OBE	Vehicle Safety Monitoring	'Vehicle Safety Monitoring' monitors critical components of the vehicle and warns the driver of safety issues. These capabilities are provided by on-board sensors that monitor vehicle condition and performance, including steering, braking, acceleration, emissions, fuel economy, engine performance, etc. This functional object can also monitor the driver's condition and warn the driver of potential safety issues. It includes sensors and behavior monitoring capabilities that assess the suitability of the driver (e.g., fitness and alertness) to assume or maintain manual control of the vehicle.
Vehicle	Vehicle OBE	Vehicle Situation Data Monitoring	'Vehicle Situation Data Monitoring' is the highest-level representation of the functionality required to collect traffic and environmental situation data by monitoring and storing the experience of the vehicle as it travels through the road network. Collected data is aggregated into snapshots that are reported when communications is available and with flow control based on parameters provided by the infrastructure. Note that this functional object supports collection of data for areas remote from RSEs or other communications infrastructure.

Element Name	Physical Object	Functional Object	Functional Object Description
Vehicle	Vehicle OBE	Vehicle Trip Planning and Route Guidance	'Vehicle Trip Planning and Route Guidance' includes the in-vehicle system that coordinates with a traveler information center to provide a personalized trip plan to the driver. The trip plan is calculated by the Transportation Information Center (TIC) based on preferences and constraints supplied by the driver and provided to the driver for confirmation. Reservations and advanced payment may also be processed to confirm the trip plan. Coordination with the TIC may continue during the trip so that the route plan can be modified to account for new information. Many equipment configurations are possible including in-vehicle systems that provide a basic trip plan to the driver as well as more sophisticated systems that can provide turn by turn guidance to the driver along the route.
Vehicle Occupancy Monitoring/Enforcement Roadside Equipment	ITS Roadway Equipment	Roadway HOV Control	'Roadway HOV Control' monitors and controls high occupancy vehicle (HOV) and high occupancy toll (HOT) lanes. It includes traffic sensors that monitor HOV lane usage and display equipment such as lane control signals that provide lane status to drivers.
Virtual Weigh Stations	Commercial Vehicle Check Equipment	CVCE Citation and Accident Electronic Recording	'CVCE Citation and Accident Electronic Recording' documents accidents, citations, and violations identified during roadside safety inspections and forwards the information to the Commercial Vehicle Administration Center for processing. It collects data from the vehicle to help characterize the circumstances surrounding the accident.
Virtual Weigh Stations	Commercial Vehicle Check Equipment	CVCE Electronic Screening	'CVCE Electronic Screening' supports electronic credentials and safety screening of commercial vehicles at mainline speeds. It processes the data from the commercial vehicles along with accessed database information to determine whether a pull-in message is needed. It may also generate random pull-in messages with provisions for facility operators and enforcement officials to have manual override capabilities.

Element Name	Physical Object	Functional Object	Functional Object Description
Virtual Weigh Stations	Commercial Vehicle Check Equipment	CVCE Safety and Security Inspection	'CVCE Safety and Security Inspection' supports the roadside safety inspection process, including wireless roadside inspections that are conducted remotely. It reads on-board safety data at mainline speeds to rapidly check the vehicle and driver and accesses historical safety data after identifying vehicles at mainline speeds or while stopped at the roadside. The capabilities to process safety data and issue pull-in messages or provide warnings to the driver, carrier, and enforcement agencies are also provided. It includes hand held or automatic devices to rapidly inspect the vehicle and driver. Results of screening and summary safety inspection data are stored and maintained. Since a vehicle may cross jurisdictional boundaries during a trip, it supports the concept of a last clearance event record carried on the vehicle tag. The last clearance event record reflects the results of the roadside verification action. For example, if the vehicle is pulled over in State A and undergoes credential, weight, and safety checks, the results of the clearance process are written to the vehicle s tag. If the vehicle continues the trip and passes a roadside station in State B, the State B station has access to the results of the previous pull-in because it can read the last clearance event record written by the State A roadside station. It associates high-risk cargo with the container/chassis, manifest, carrier, vehicle and driver transporting it.
Virtual Weigh Stations	Commercial Vehicle Check Equipment	CVCE Weigh-In-Motion	'CVCE Weigh-In-Motion' measures and records axle weights and gross vehicle weight without requiring the vehicle to come to a stop. Both permanent and portable installations are supported and may be performed in conjunction with electronic clearance or as a separate application.
Weigh In Motion (WIM) Stations	Commercial Vehicle Check Equipment	CVCE Citation and Accident Electronic Recording	'CVCE Citation and Accident Electronic Recording' documents accidents, citations, and violations identified during roadside safety inspections and forwards the information to the Commercial Vehicle Administration Center for processing. It collects data from the vehicle to help characterize the circumstances surrounding the accident.
Weigh In Motion (WIM) Stations	Commercial Vehicle Check Equipment	CVCE Electronic Screening	'CVCE Electronic Screening' supports electronic credentials and safety screening of commercial vehicles at mainline speeds. It processes the data from the commercial vehicles along with accessed database information to determine whether a pull-in message is needed. It may also generate random pull-in messages with provisions for facility operators and enforcement officials to have manual override capabilities.

Element Name	Physical Object	Functional Object	Functional Object Description
Weigh In Motion (WIM) Stations	Commercial Vehicle Check Equipment	CVCE Safety and Security Inspection	'CVCE Safety and Security Inspection' supports the roadside safety inspection process, including wireless roadside inspections that are conducted remotely. It reads on-board safety data at mainline speeds to rapidly check the vehicle and driver and accesses historical safety data after identifying vehicles at mainline speeds or while stopped at the roadside. The capabilities to process safety data and issue pull-in messages or provide warnings to the driver, carrier, and enforcement agencies are also provided. It includes hand held or automatic devices to rapidly inspect the vehicle and driver. Results of screening and summary safety inspection data are stored and maintained. Since a vehicle may cross jurisdictional boundaries during a trip, it supports the concept of a last clearance event record carried on the vehicle tag. The last clearance event record reflects the results of the roadside verification action. For example, if the vehicle is pulled over in State A and undergoes credential, weight, and safety checks, the results of the clearance process are written to the vehicle s tag. If the vehicle continues the trip and passes a roadside station in State B, the State B station has access to the results of the previous pull-in because it can read the last clearance event record written by the State A roadside station. It associates high-risk cargo with the container/chassis, manifest, carrier, vehicle and driver transporting it.
Weigh In Motion (WIM) Stations	Commercial Vehicle Check Equipment	CVCE Weigh-In-Motion	'CVCE Weigh-In-Motion' measures and records axle weights and gross vehicle weight without requiring the vehicle to come to a stop. Both permanent and portable installations are supported and may be performed in conjunction with electronic clearance or as a separate application.
Weigh Station Roadside Equipment	Commercial Vehicle Check Equipment	CVCE Citation and Accident Electronic Recording	'CVCE Citation and Accident Electronic Recording' documents accidents, citations, and violations identified during roadside safety inspections and forwards the information to the Commercial Vehicle Administration Center for processing. It collects data from the vehicle to help characterize the circumstances surrounding the accident.
Weigh Station Roadside Equipment	Commercial Vehicle Check Equipment	CVCE Electronic Screening	'CVCE Electronic Screening' supports electronic credentials and safety screening of commercial vehicles at mainline speeds. It processes the data from the commercial vehicles along with accessed database information to determine whether a pull-in message is needed. It may also generate random pull-in messages with provisions for facility operators and enforcement officials to have manual override capabilities.

9 Interfaces Between Systems

The interfaces of the transportation systems in Minnesota Statewide Regional ITS Architecture are based on ARC-IT and tailored to reflect the plan for Minnesota. Architecture diagrams display the transportation systems in the Minnesota Statewide Regional ITS Architecture, and more importantly, how these systems are and will be connected with one another so information can be exchanged and transportation services can be coordinated. Stakeholders may use these diagrams to identify integration opportunities. Each system in Minnesota is represented with two types of diagrams, a context diagram and an interface diagram.

A context diagram shows a particular system and all other systems with which it shares information. Interconnects are represented as single lines and indicate information sharing without specifying the type of information being shared or the direction of the information movement.

Following each interconnect context diagram are a series of interface diagrams showing the information (i.e., information flows) movement between the various systems. Descriptions of the information flows are included at the end of Table 7.

Information about the interfaces of the systems in Minnesota is contained in the RAD-IT database. RAD-IT can be used to create tailored interconnect and information flow diagrams for any system in the database.

Table 7: Information Flows

Source Element	Destination Element	Flow Name	Flow Status
511 Telephone Information Service	Condition Acquisition and Reporting System (CARS)	alternate mode information	Planned
511 Telephone Information Service	Condition Acquisition and Reporting System (CARS)	emergency traveler information	Existing
511 Telephone Information Service	Condition Acquisition and Reporting System (CARS)	incident information for public	Existing
511 Telephone Information Service	Condition Acquisition and Reporting System (CARS)	parking information	Planned
511 Telephone Information Service	Condition Acquisition and Reporting System (CARS)	road network conditions	Existing
511 Telephone Information Service	Condition Acquisition and Reporting System (CARS)	traffic images	Planned
511 Telephone Information Service	Condition Acquisition and Reporting System (CARS)	transit service information	Planned
511 Telephone Information Service	Condition Acquisition and Reporting System (CARS)	voice-based traveler request	Existing
511 Telephone Information Service	Parking Management Roadside Equipment	parking reservation request	Planned
511 Telephone Information Service	User Personal Portable and Computing Devices	interactive traveler information	Existing

Source Element	Destination Element	Flow Name	Flow Status
511 Traveler Information Website	Condition Acquisition and Reporting System (CARS)	alternate mode information	Existing
511 Traveler Information Website	Condition Acquisition and Reporting System (CARS)	emergency traveler information	Existing
511 Traveler Information Website	Condition Acquisition and Reporting System (CARS)	incident information for public	Existing
511 Traveler Information Website	Condition Acquisition and Reporting System (CARS)	parking information	Planned
511 Traveler Information Website	Condition Acquisition and Reporting System (CARS)	road network conditions	Existing
511 Traveler Information Website	Condition Acquisition and Reporting System (CARS)	traffic images	Existing
511 Traveler Information Website	Condition Acquisition and Reporting System (CARS)	transit service information	Existing
511 Traveler Information Website	MnPASS Service Center	toll data request	Planned
511 Traveler Information Website	North/West Passage Corridor Traveler Information Website	alternate mode information	Planned
511 Traveler Information Website	North/West Passage Corridor Traveler Information Website	emergency traveler information	Planned
511 Traveler Information Website	North/West Passage Corridor Traveler Information Website	incident information for public	Planned
511 Traveler Information Website	North/West Passage Corridor Traveler Information Website	parking information	Planned
511 Traveler Information Website	North/West Passage Corridor Traveler Information Website	road network conditions	Planned
511 Traveler Information Website	North/West Passage Corridor Traveler Information Website	traffic images	Planned
511 Traveler Information Website	North/West Passage Corridor Traveler Information Website	transit service information	Planned
511 Traveler Information Website	Parking Management Roadside Equipment	parking reservation request	Planned
511 Traveler Information Website	Rest Area WiFi	emergency traveler information	Planned
511 Traveler Information Website	User Personal Portable and Computing Devices	broadcast traveler information	Existing
511 Traveler Information Website	User Personal Portable and Computing Devices	emergency traveler information	Existing
511 Traveler Information Website	User Personal Portable and Computing Devices	interactive traveler information	Existing
511 Traveler Information Website	User Personal Portable and Computing Devices	trip plan	Planned
911 Dispatch Center	Condition Acquisition and Reporting System (CARS)	incident information for public	Planned
911 Dispatch Center	County Emergency Operations Centers	incident response coordination	Existing
911 Dispatch Center	County Sheriff and City Police Offices	incident response coordination	Existing

Source Element	Destination Element	Flow Name	Flow Status
911 Dispatch Center	Emergency Vehicle Equipment	emergency dispatch requests	Existing
911 Dispatch Center	Local TMCs	incident information	Existing
911 Dispatch Center	Minneapolis TMC	incident information	Existing
911 Dispatch Center	Minnesota Emergency Responder Database	emergency archive data	Planned
911 Dispatch Center	Minnesota State Emergency Operations Center (SEOC)	incident response coordination	Existing
911 Dispatch Center	Minnesota State Patrol Databases	emergency archive data	Planned
911 Dispatch Center	RTMC	incident information	Existing
911 Dispatch Center	Security Monitoring Roadside Equipment	infrastructure monitoring sensor control	Planned
911 Dispatch Center	Security Monitoring Roadside Equipment	secure area sensor control	Planned
911 Dispatch Center	Security Monitoring Roadside Equipment	secure area surveillance control	Planned
911 Dispatch Center	SRCC	incident information	Existing
911 Dispatch Center	Transit Center and Station Surveillance System Roadside Equipment	alarm acknowledge	Existing
Account Management Providers	Local Transit Management Centers	transaction status	Existing
Account Management Providers	Metro Area Transit Management Centers	transaction status	Existing
Account Management Providers	MnPASS Service Center	transaction status	Existing
Account Management Providers	Motor Carrier Information System	transaction status	Existing
Advance Warning Flasher Roadside Equipment	Traffic Signal Roadside Equipment	roadway equipment coordination	Existing
Advanced Pavement Condition and Visibility Warning System Roadside Equipment	SRCC	environmental sensor data	Planned
Advanced Pavement Condition and Visibility Warning System Roadside Equipment	SRCC	roadway dynamic signage status	Planned
Airport	Condition Acquisition and Reporting System (CARS)	alert notification	Existing
Airport	Condition Acquisition and Reporting System (CARS)	evacuation information	Existing
Airport	Condition Acquisition and Reporting System (CARS)	incident information for public	Existing
Airport	Metro Area Transit Management Centers	incident information	Existing
Animal Crossing Warning Roadside Equipment	Driver	driver information	Planned
Arrow Board Reporting System	RTMC	roadway dynamic signage status	Planned

Source Element	Destination Element	Flow Name	Flow Status
Arrow Board Reporting System	RTMC	roadway warning system status	Planned
Automated Crash Notification System	911 Dispatch Center	incident report	Planned
Automated Crash Notification System	FIRST Emergency Vehicles	emergency dispatch requests	Planned
Automated Crash Notification System	FIRST Emergency Vehicles	suggested route	Planned
Automated Crash Notification System	RTMC	incident information	Planned
Automated Crash Notification System	RTMC	incident report	Planned
Automated Crash Notification System	SRCC	incident information	Planned
Automated Crash Notification System	Vehicle	emergency acknowledge	Planned
Automated Crash Notification System	Vehicle	emergency data request	Planned
Automated Permit Routing System (RouteBuilder)	Condition Acquisition and Reporting System (CARS)	alternate mode information	Planned
Automated Permit Routing System (RouteBuilder)	Condition Acquisition and Reporting System (CARS)	emergency traveler information	Planned
Automated Permit Routing System (RouteBuilder)	Condition Acquisition and Reporting System (CARS)	incident information for public	Planned
Automated Permit Routing System (RouteBuilder)	Condition Acquisition and Reporting System (CARS)	road network conditions	Planned
Automated Permit Routing System (RouteBuilder)	Condition Acquisition and Reporting System (CARS)	traffic images	Planned
Automated Permit Routing System (RouteBuilder)	Private Fleet and Freight Management Center	freight-specific traveler information	Planned
AWOS Central Control System	AWOS Roadside Equipment	environmental sensors control	Existing
AWOS Central Control System	Maintenance and Construction Management Center	road weather information	Existing
AWOS Central Control System	User Personal Portable and Computing Devices	broadcast traveler information	Existing
AWOS Roadside Equipment	AWOS Central Control System	environmental sensor data	Existing
Basic Vehicle	Vehicle	host vehicle status	Planned
Bridge Inspection / Structural Monitoring Roadside Equipment	Maintenance and Construction Management Center	infrastructure monitoring sensor data	Planned
Bridge Inspection / Structural Monitoring Roadside Equipment	RTMC	infrastructure monitoring sensor data	Planned
Bridge Inspection / Structural Monitoring Roadside Equipment	SRCC	infrastructure monitoring sensor data	Planned

Source Element	Destination Element	Flow Name	Flow Status
Video Monitoring Roadside Equipment	Dynamic Message Sign Roadside Equipment	roadway equipment coordination	Planned
Video Monitoring Roadside Equipment	Ramp Meter Roadside Equipment	roadway equipment coordination	Planned
Video Monitoring Roadside Equipment	Ramp Meter Roadside Equipment	signal control data	Planned
Video Monitoring Roadside Equipment	RTMC	traffic images	Existing
Video Monitoring Roadside Equipment	Traffic Data and Video Archive	roadside archive data	Existing
Video Monitoring Roadside Equipment	Traffic Signal Roadside Equipment	roadway equipment coordination	Planned
Video Monitoring Roadside Equipment	Traffic Signal Roadside Equipment	signal control data	Planned
Clarus Weather System	AWOS Central Control System	qualified environmental conditions data	Existing
Clarus Weather System	RWIS Central Control System	qualified environmental conditions data	Existing
Commercial Vehicle Administration Center	Private Fleet and Freight Management Center	route restrictions	Existing
Commercial Vehicles	County Emergency Operations Centers	hazmat spill notification	Existing
Commercial Vehicles	FAST Compliance Management System	tag data	Existing
Commercial Vehicles	Minnesota State Emergency Operations Center (SEOC)	hazmat spill notification	Existing
Commercial Vehicles	Minnesota State Patrol District Office	hazmat spill notification	Existing
Commercial Vehicles	Private Fleet and Freight Management Center	driver to fleet request	Existing
Commercial Vehicles	Virtual Weigh Stations	tag data	Planned
Commercial Vehicles	Weigh In Motion (WIM) Stations	tag data	Existing
Commercial Vehicles	Weigh Station Roadside Equipment	tag data	Existing
Commuter Rail Operations Center	Metro Area Transit Management Centers	transit service coordination	Planned
Commuter Rail Operations Center	Transit Vehicle Equipment	alarm acknowledge	Planned
Commuter Rail Operations Center	Transit Vehicle Equipment	transit schedule information	Planned
Commuter Rail Operations Center	Transit Vehicle Equipment	transit vehicle operator information	Planned
Condition Acquisition and Reporting System (CARS)	511 Telephone Information Service	alternate mode information	Planned
Condition Acquisition and Reporting System (CARS)	511 Telephone Information Service	emergency traveler information	Existing
Condition Acquisition and Reporting System (CARS)	511 Telephone Information Service	incident information for public	Existing

Source Element	Destination Element	Flow Name	Flow Status
Condition Acquisition and Reporting System (CARS)	511 Telephone Information Service	parking information	Planned
Condition Acquisition and Reporting System (CARS)	511 Telephone Information Service	road network conditions	Existing
Condition Acquisition and Reporting System (CARS)	511 Telephone Information Service	traffic images	Planned
Condition Acquisition and Reporting System (CARS)	511 Telephone Information Service	transit service information	Planned
Condition Acquisition and Reporting System (CARS)	511 Telephone Information Service	voice-based alert notification	Existing
Condition Acquisition and Reporting System (CARS)	511 Telephone Information Service	voice-based traveler information	Existing
Condition Acquisition and Reporting System (CARS)	511 Traveler Information Website	alternate mode information	Existing
Condition Acquisition and Reporting System (CARS)	511 Traveler Information Website	emergency traveler information	Existing
Condition Acquisition and Reporting System (CARS)	511 Traveler Information Website	incident information for public	Existing
Condition Acquisition and Reporting System (CARS)	511 Traveler Information Website	parking information	Planned
Condition Acquisition and Reporting System (CARS)	511 Traveler Information Website	road network conditions	Existing
Condition Acquisition and Reporting System (CARS)	511 Traveler Information Website	traffic images	Existing
Condition Acquisition and Reporting System (CARS)	511 Traveler Information Website	transit service information	Existing
Condition Acquisition and Reporting System (CARS)	Airport	alert status	Existing
Condition Acquisition and Reporting System (CARS)	Automated Permit Routing System (RouteBuilder)	alternate mode information	Planned
Condition Acquisition and Reporting System (CARS)	Automated Permit Routing System (RouteBuilder)	emergency traveler information	Planned
Condition Acquisition and Reporting System (CARS)	Automated Permit Routing System (RouteBuilder)	incident information for public	Planned
Condition Acquisition and Reporting System (CARS)	Automated Permit Routing System (RouteBuilder)	road network conditions	Planned
Condition Acquisition and Reporting System (CARS)	Automated Permit Routing System (RouteBuilder)	traffic images	Planned
Condition Acquisition and Reporting System (CARS)	Neighboring State CARS / Roadway Information Systems	alternate mode information	Existing
Condition Acquisition and Reporting System (CARS)	Neighboring State CARS / Roadway Information Systems	emergency traveler information	Existing
Condition Acquisition and Reporting System (CARS)	Neighboring State CARS / Roadway Information Systems	incident information for public	Existing
Condition Acquisition and Reporting System (CARS)	Neighboring State CARS / Roadway Information Systems	road network conditions	Existing
Condition Acquisition and Reporting System (CARS)	Neighboring State CARS / Roadway Information Systems	traffic images	Existing

Source Element	Destination Element	Flow Name	Flow Status
Condition Acquisition and Reporting System (CARS)	North/West Passage Corridor Traveler Information Website	alternate mode information	Planned
Condition Acquisition and Reporting System (CARS)	North/West Passage Corridor Traveler Information Website	emergency traveler information	Planned
Condition Acquisition and Reporting System (CARS)	North/West Passage Corridor Traveler Information Website	incident information for public	Planned
Condition Acquisition and Reporting System (CARS)	North/West Passage Corridor Traveler Information Website	parking information	Planned
Condition Acquisition and Reporting System (CARS)	North/West Passage Corridor Traveler Information Website	road network conditions	Planned
Condition Acquisition and Reporting System (CARS)	North/West Passage Corridor Traveler Information Website	traffic images	Planned
Condition Acquisition and Reporting System (CARS)	Traveler Information and Parking Kiosks	interactive traveler information	Planned
County Emergency Operations Centers	911 Dispatch Center	incident response coordination	Existing
County Emergency Operations Centers	Event Promoters	event confirmation	Existing
County Emergency Operations Centers	Maintenance and Construction Management Center	emergency route request	Existing
County Emergency Operations Centers	Maintenance and Construction Management Center	emergency traffic control request	Existing
County Emergency Operations Centers	Maintenance and Construction Management Center	incident information	Existing
County Emergency Operations Centers	Maintenance and Construction Management Center	incident response status	Existing
County Emergency Operations Centers	Maintenance and Construction Management Center	maint and constr resource request	Existing
County Emergency Operations Centers	Maintenance and Construction Management Center	resource request	Existing
County Emergency Operations Centers	Media Outlets	incident information for media	Existing
County Emergency Operations Centers	Metro Area Transit Management Centers	emergency transit service request	Existing
County Emergency Operations Centers	Minnesota Emergency Responder Database	emergency archive data	Planned
County Emergency Operations Centers	Minnesota State Emergency Operations Center (SEOC)	alert notification coordination	Existing
County Emergency Operations Centers	Minnesota State Emergency Operations Center (SEOC)	emergency plan coordination	Existing
County Emergency Operations Centers	Minnesota State Emergency Operations Center (SEOC)	evacuation coordination	Existing
County Emergency Operations Centers	Minnesota State Emergency Operations Center (SEOC)	incident command information coordination	Existing
County Emergency Operations Centers	Minnesota State Emergency Operations Center (SEOC)	incident response coordination	Existing
County Emergency Operations Centers	Minnesota State Patrol Databases	emergency archive data	Planned

Source Element	Destination Element	Flow Name	Flow Status
County Emergency Operations Centers	Private Fleet and Freight Management Center	hazmat information request	Existing
County Sheriff and City Police Offices	911 Dispatch Center	incident response coordination	Existing
County Sheriff and City Police Offices	Intercity Transit Management Centers	incident response status	Planned
County Sheriff and City Police Offices	Local Transit Management Centers	incident response status	Planned
County Sheriff and City Police Offices	Maintenance and Construction Management Center	alert notification	Existing
County Sheriff and City Police Offices	Maintenance and Construction Management Center	evacuation information	Existing
County Sheriff and City Police Offices	Maintenance and Construction Management Center	incident information	Existing
County Sheriff and City Police Offices	Metro Area Transit Management Centers	incident response status	Planned
County Sheriff and City Police Offices	Minnesota State Patrol District Office	incident command information coordination	Existing
County Sheriff and City Police Offices	Minnesota State Patrol District Office	incident response coordination	Existing
County Sheriff and City Police Offices	Transit Center and Station Surveillance System Roadside Equipment	alarm acknowledge	Existing
CV Roadside Equipment	Dynamic Message Sign Roadside Equipment	barrier system control	Planned
CV Roadside Equipment	Dynamic Message Sign Roadside Equipment	intersection status monitoring	Planned
CV Roadside Equipment	Dynamic Message Sign Roadside Equipment	roadway dynamic signage data	Planned
CV Roadside Equipment	Dynamic Message Sign Roadside Equipment	signal service request	Planned
CV Roadside Equipment	Dynamic Message Sign Roadside Equipment	traffic situation data	Planned
CV Roadside Equipment	Maintenance and Construction Vehicle Equipment	environmental sensor data	Planned
CV Roadside Equipment	Maintenance and Construction Vehicle Equipment	intersection geometry	Planned
CV Roadside Equipment	Maintenance and Construction Vehicle Equipment	intersection status	Planned
CV Roadside Equipment	Maintenance and Construction Vehicle Equipment	lane closure information	Planned
CV Roadside Equipment	Maintenance and Construction Vehicle Equipment	reduced speed notification	Planned
CV Roadside Equipment	Maintenance and Construction Vehicle Equipment	roadway dynamic signage status	Planned
CV Roadside Equipment	Maintenance and Construction Vehicle Equipment	vehicle signage data	Planned

Source Element	Destination Element	Flow Name	Flow Status
CV Roadside Equipment	Maintenance and Construction Vehicle Equipment	vehicle situation data parameters	Planned
CV Roadside Equipment	Maintenance and Construction Vehicle Equipment	work zone warning notification	Planned
CV Roadside Equipment	Ramp Meter Roadside Equipment	intersection status monitoring	Planned
CV Roadside Equipment	Ramp Meter Roadside Equipment	signal service request	Planned
CV Roadside Equipment	Ramp Meter Roadside Equipment	traffic situation data	Planned
CV Roadside Equipment	RTMC	device identification	Planned
CV Roadside Equipment	RTMC	infrastructure situation data	Planned
CV Roadside Equipment	RTMC	intersection management application status	Planned
CV Roadside Equipment	RTMC	restricted lanes application status	Planned
CV Roadside Equipment	RTMC	road closure application status	Planned
CV Roadside Equipment	RTMC	RSE application status	Planned
CV Roadside Equipment	RTMC	speed warning application status	Planned
CV Roadside Equipment	RTMC	traffic situation data	Planned
CV Roadside Equipment	RTMC	vehicle signage application status	Planned
CV Roadside Equipment	RTMC	work zone safety application status	Planned
CV Roadside Equipment	Traffic Data and Video Archive	local situation data	Planned
CV Roadside Equipment	Traffic Signal Roadside Equipment	intersection status monitoring	Planned
CV Roadside Equipment	Traffic Signal Roadside Equipment	signal preemption request	Planned
CV Roadside Equipment	Traffic Signal Roadside Equipment	signal priority service request	Planned
CV Roadside Equipment	Traffic Signal Roadside Equipment	signal service request	Planned
CV Roadside Equipment	Traffic Signal Roadside Equipment	traffic situation data	Planned
CV Roadside Equipment	Transit Vehicle Equipment	intersection geometry	Planned
CV Roadside Equipment	Transit Vehicle Equipment	intersection status	Planned
CV Roadside Equipment	Transit Vehicle Equipment	signal priority status	Planned
CV Roadside Equipment	Transit Vehicle Equipment	vehicle signage data	Planned
CV Roadside Equipment	Transit Vehicle Equipment	vehicle situation data parameters	Planned
CV Roadside Equipment	Vehicle	intersection geometry	Planned

Source Element	Destination Element	Flow Name	Flow Status
CV Roadside Equipment	Vehicle	intersection status	Planned
CV Roadside Equipment	Vehicle	parking availability	Planned
CV Roadside Equipment	Vehicle	restricted lanes information	Planned
CV Roadside Equipment	Vehicle	vehicle payment request	Planned
CV Roadside Equipment	Vehicle	vehicle payment update	Planned
CV Roadside Equipment	Vehicle	vehicle signage data	Planned
CV Roadside Equipment	Vehicle	vehicle situation data parameters	Planned
Driver	Vehicle	driver input	Planned
Dynamic Late Merge Central Control System	Dynamic Late Merge Roadside Equipment	roadway dynamic signage data	Existing
Dynamic Late Merge Central Control System	Maintenance and Construction Management Center	work zone information	Planned
Dynamic Late Merge Central Control System	RTMC	work zone information	Planned
Dynamic Late Merge Central Control System	SRCC	work zone information	Planned
Dynamic Late Merge Roadside Equipment	Driver	driver information	Existing
Dynamic Late Merge Roadside Equipment	Dynamic Late Merge Central Control System	field equipment status	Existing
Dynamic Late Merge Roadside Equipment	Dynamic Late Merge Central Control System	roadway dynamic signage status	Existing
Dynamic Message Sign Roadside Equipment	Video Monitoring Roadside Equipment	roadway equipment coordination	Planned
Dynamic Message Sign Roadside Equipment	CV Roadside Equipment	barrier system status	Planned
Dynamic Message Sign Roadside Equipment	CV Roadside Equipment	conflict monitor status	Planned
Dynamic Message Sign Roadside Equipment	CV Roadside Equipment	intersection control status	Planned
Dynamic Message Sign Roadside Equipment	CV Roadside Equipment	reduced speed warning info	Planned
Dynamic Message Sign Roadside Equipment	CV Roadside Equipment	roadway dynamic signage status	Planned
Dynamic Message Sign Roadside Equipment	CV Roadside Equipment	vehicle signage local data	Planned
Dynamic Message Sign Roadside Equipment	Driver	driver information	Existing
Dynamic Message Sign Roadside Equipment	Intelligent Work Zone System Roadside Equipment	roadway equipment coordination	Existing
Dynamic Message Sign Roadside Equipment	Local TMCs	roadway dynamic signage status	Planned
Dynamic Message Sign Roadside Equipment	Maintenance and Construction Management Center	speed monitoring information	Planned

Source Element	Destination Element	Flow Name	Flow Status
Dynamic Message Sign Roadside Equipment	Minneapolis TMC	roadway dynamic signage status	Existing
Dynamic Message Sign Roadside Equipment	Neighboring State Traffic Management Centers	roadway dynamic signage status	Planned
Dynamic Message Sign Roadside Equipment	Parking Management System	roadway dynamic signage status	Planned
Dynamic Message Sign Roadside Equipment	RTMC	roadway dynamic signage status	Existing
Dynamic Message Sign Roadside Equipment	Speed Monitoring Roadside Equipment	roadway equipment coordination	Planned
Dynamic Message Sign Roadside Equipment	SRCC	roadway dynamic signage status	Existing
Emergency Vehicle Equipment	911 Dispatch Center	emergency dispatch response	Existing
Emergency Vehicle Equipment	911 Dispatch Center	emergency vehicle tracking data	Existing
Emergency Vehicle Equipment	911 Dispatch Center	incident status	Existing
Emergency Vehicle Equipment	Minnesota State Patrol District Office	emergency dispatch response	Existing
Emergency Vehicle Equipment	Minnesota State Patrol District Office	emergency vehicle tracking data	Existing
Emergency Vehicle Equipment	Minnesota State Patrol District Office	incident status	Existing
Emergency Vehicle Equipment	RTMC	emergency dispatch response	Existing
Emergency Vehicle Equipment	RTMC	emergency vehicle tracking data	Existing
Emergency Vehicle Equipment	SRCC	emergency dispatch response	Existing
Emergency Vehicle Equipment	SRCC	emergency vehicle tracking data	Existing
Emergency Vehicle Equipment	Traffic Signal Roadside Equipment	local signal preemption request	Existing
Event Promoters	County Emergency Operations Centers	event plans	Existing
Event Promoters	Minneapolis TMC	event plans	Existing
Event Promoters	Minnesota State Patrol District Office	event plans	Existing
Event Promoters	RTMC	event plans	Existing
Event Promoters	SRCC	event plans	Existing
FAST Compliance Management System	Commercial Vehicle Administration Center	border clearance event records	Existing
FAST Compliance Management System	Commercial Vehicles	request tag data	Existing
FIRST Emergency Vehicles	Automated Crash Notification System	emergency dispatch response	Planned
FIRST Emergency Vehicles	Automated Crash Notification System	emergency vehicle tracking data	Planned

Source Element	Destination Element	Flow Name	Flow Status
FIRST Emergency Vehicles	Automated Crash Notification System	incident status	Planned
FIRST Emergency Vehicles	RTMC	emergency dispatch response	Existing
FIRST Emergency Vehicles	RTMC	emergency vehicle tracking data	Existing
FIRST Emergency Vehicles	RTMC	incident status	Existing
Highway Advisory Radio Roadside Equipment	Driver	driver information	Existing
Highway Advisory Radio Roadside Equipment	RTMC	roadway dynamic signage status	Existing
Highway Advisory Radio Roadside Equipment	SRCC	roadway dynamic signage status	Existing
IFTA Clearinghouse	Motor Carrier Information System	credential fee coordination	Existing
IFTA Clearinghouse	Motor Carrier Information System	credentials information	Existing
IFTA Clearinghouse	Motor Carrier Information System	credentials status information	Existing
IFTA Clearinghouse	Truck Center	credential fee coordination	Existing
IFTA Clearinghouse	Truck Center	credentials information	Existing
IFTA Clearinghouse	Truck Center	credentials status information	Existing
IFTA Clearinghouse	Truck Center	safety inspection report	Existing
In Vehicle Signing Roadside Equipment	In Vehicle Signing Vehicle Equipment	vehicle signage data	Planned
In Vehicle Signing Vehicle Equipment	Driver	driver updates	Planned
Infrastructure GIS Database Systems	Maintenance and Construction Management Center	asset inventory	Planned
Infrastructure GIS Database Systems	Maintenance and Construction Management Center	asset restrictions	Planned
Infrastructure GIS Database Systems	Maintenance and Construction Management Center	maintenance and repair needs	Planned
Infrastructure GIS Database Systems	RTMC	asset inventory	Planned
Infrastructure GIS Database Systems	RTMC	asset restrictions	Planned
Infrastructure GIS Database Systems	RTMC	maintenance and repair needs	Planned
Infrastructure GIS Database Systems	SRCC	asset inventory	Planned
Infrastructure GIS Database Systems	SRCC	asset restrictions	Planned

Source Element	Destination Element	Flow Name	Flow Status
Infrastructure GIS Database Systems	SRCC	maintenance and repair needs	Planned
Intelligent Work Zone System Roadside Equipment	Dynamic Message Sign Roadside Equipment	roadway equipment coordination	Planned
Intelligent Work Zone System Roadside Equipment	Maintenance and Construction Field Personnel	work zone warning	Planned
Intelligent Work Zone System Roadside Equipment	Maintenance and Construction Management Center	roadway treatment system status	Planned
Intelligent Work Zone System Roadside Equipment	Maintenance and Construction Management Center	work zone warning status	Planned
Intelligent Work Zone System Roadside Equipment	Maintenance and Construction Vehicle Equipment	roadway dynamic signage status	Planned
Intelligent Work Zone System Roadside Equipment	Queue Detection Roadside Equipment	roadway equipment coordination	Existing
Intelligent Work Zone System Roadside Equipment	RTMC	field equipment status	Existing
Intelligent Work Zone System Roadside Equipment	RTMC	roadway dynamic signage status	Existing
Intelligent Work Zone System Roadside Equipment	RTMC	work zone warning status	Existing
Intelligent Work Zone System Roadside Equipment	SRCC	roadway dynamic signage status	Planned
Intelligent Work Zone System Roadside Equipment	SRCC	work zone warning status	Planned
Intercity Transit Management Centers	County Sheriff and City Police Offices	transit emergency data	Planned
Intercity Transit Management Centers	Local Transit Management Centers	transit service coordination	Planned
Intercity Transit Management Centers	Real-Time Bus Arrival Time Display Roadside Equipment	transit traveler information	Planned
Intercity Transit Management Centers	Transit Information Telephone Systems	personal transit information	Planned
Intercity Transit Management Centers	Transit Information Websites	transit and fare schedules	Planned
Intercity Transit Management Centers	Transit Kiosks	transit traveler information	Planned
Intercity Transit Management Centers	Transit Vehicle Equipment	alarm acknowledge	Planned
Intercity Transit Management Centers	Transit Vehicle Equipment	transit schedule information	Existing
Intercity Transit Management Centers	User Personal Portable and Computing Devices	personal transit information	Planned
Intermodal Freight Depots	Private Fleet and Freight Management Center	freight transportation status	Planned
Intersection Collision Warning Roadside Equipment	Driver	driver information	Planned
Intersection Collision Warning Roadside Equipment	Driver	intersection warning	Planned

Source Element	Destination Element	Flow Name	Flow Status
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	automated lane status	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	barrier system status	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	environmental sensor data	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	environmental situation data	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	field equipment status	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	infrastructure monitoring sensor data	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	lane management information	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	lighting system status	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	rail crossing blockage notification	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	rail crossing status	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	reversible lane status	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	right-of-way request notification	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	roadway dynamic signage status	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	roadway treatment system status	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	safeguard system status	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	signal control status	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	signal fault data	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	speed monitoring information	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	traffic detector data	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	traffic images	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	traffic metering status	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	traffic situation data	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	vehicle signage application status	Planned
Intersection Collision Warning Roadside Equipment	Maintenance and Construction Management Center	work zone warning status	Planned

Source Element	Destination Element	Flow Name	Flow Status
IRP Clearinghouse	Motor Carrier Information System	credential fee coordination	Existing
IRP Clearinghouse	Motor Carrier Information System	credentials information	Existing
IRP Clearinghouse	Motor Carrier Information System	credentials status information	Existing
IRP Clearinghouse	Truck Center	border clearance status	Existing
IRP Clearinghouse	Truck Center	credential fee coordination	Existing
IRP Clearinghouse	Truck Center	credentials information	Existing
IRP Clearinghouse	Truck Center	credentials status information	Existing
IRP Clearinghouse	Truck Center	safety inspection report	Existing
Lane Control Roadside Equipment	Driver	driver information	Existing
Lane Control Roadside Equipment	RTMC	roadway dynamic signage status	Existing
Lane Control Roadside Equipment	SRCC	roadway dynamic signage status	Planned
Lane Control Roadside Equipment	Variable Speed Limit Roadside Equipment	roadway equipment coordination	Existing
Lane/Ramp Access Control Roadside Equipment	RTMC	reversible lane status	Existing
Lane/Ramp Access Control Roadside Equipment	SRCC	barrier system status	Existing
Lane/Ramp Access Control Roadside Equipment	SRCC	roadway dynamic signage status	Existing
Lane/Ramp Access Control Roadside Equipment	SRCC	traffic images	Existing
Lift Bridge Traffic Control Central System	Lift Bridge Traffic Control Roadside Equipment	roadway dynamic signage data	Existing
Lift Bridge Traffic Control Central System	Lift Bridge Traffic Control Roadside Equipment	signal control commands	Existing
Lift Bridge Traffic Control Central System	Lift Bridge Traffic Control Roadside Equipment	signal control device configuration	Existing
Lift Bridge Traffic Control Central System	Lift Bridge Traffic Control Roadside Equipment	signal control plans	Existing
Lift Bridge Traffic Control Central System	Lift Bridge Traffic Control Roadside Equipment	signal system configuration	Existing
Lift Bridge Traffic Control Roadside Equipment	Driver	driver information	Planned
Lift Bridge Traffic Control Roadside Equipment	Lift Bridge Traffic Control Central System	roadway dynamic signage status	Existing
Lift Bridge Traffic Control Roadside Equipment	Lift Bridge Traffic Control Central System	signal control status	Existing

Source Element	Destination Element	Flow Name	Flow Status
Lift Bridge Traffic Control Roadside Equipment	Lift Bridge Traffic Control Central System	signal fault data	Existing
Light Rail Operations Center	Transit Center and Station Surveillance System Roadside Equipment	alarm acknowledge	Existing
Light Rail Operations Center	Transit Vehicle Equipment	alarm acknowledge	Existing
Light Rail Operations Center	Transit Vehicle Equipment	fare management information	Planned
Light Rail Operations Center	Transit Vehicle Equipment	secure area surveillance control	Existing
Light Rail Operations Center	Transit Vehicle Equipment	transit schedule information	Existing
Light Rail Operations Center	Transit Vehicle Equipment	transit traveler information	Planned
Light Rail Operations Center	Transit Vehicle Equipment	transit vehicle operator information	Existing
Local Agency Traveler Information Website	User Personal Portable and Computing Devices	broadcast traveler information	Existing
Local TMCs	County Emergency Operations Centers	traffic image data	Existing
Local TMCs	Dynamic Message Sign Roadside Equipment	roadway dynamic signage data	Planned
Local TMCs	Local Agency Traveler Information Website	road network conditions	Existing
Local TMCs	Metro Area Transit Management Centers	road network conditions	Planned
Local TMCs	Minneapolis TMC	device control request	Planned
Local TMCs	Minneapolis TMC	device data	Planned
Local TMCs	Minneapolis TMC	device status	Planned
Local TMCs	Minneapolis TMC	emergency traffic coordination	Planned
Local TMCs	Minneapolis TMC	incident information	Planned
Local TMCs	Minneapolis TMC	road network conditions	Planned
Local TMCs	Minneapolis TMC	traffic images	Planned
Local TMCs	Minnesota State Emergency Operations Center (SEOC)	incident response status	Planned
Local TMCs	Minnesota State Emergency Operations Center (SEOC)	road network conditions	Planned
Local TMCs	Minnesota State Emergency Operations Center (SEOC)	traffic images	Planned
Local TMCs	Ramp Meter Roadside Equipment	roadway dynamic signage data	Existing
Local TMCs	RTMC	device control request	Planned
Local TMCs	RTMC	device data	Planned
Local TMCs	RTMC	device status	Planned

Source Element	Destination Element	Flow Name	Flow Status
Local TMCs	RTMC	emergency traffic coordination	Planned
Local TMCs	SRCC	device control request	Planned
Local TMCs	SRCC	device data	Planned
Local TMCs	SRCC	device status	Planned
Local TMCs	SRCC	emergency traffic coordination	Planned
Local TMCs	Traffic Data and Video Archive	archived data product requests	Planned
Local TMCs	Traffic Data and Video Archive	traffic archive data	Planned
Local TMCs	Traffic Detector Roadside Equipment	traffic detector control	Existing
Local TMCs	Traffic Signal Roadside Equipment	signal control commands	Existing
Local TMCs	Traffic Signal Roadside Equipment	signal control device configuration	Existing
Local TMCs	Traffic Signal Roadside Equipment	signal control plans	Existing
Local TMCs	Traffic Signal Roadside Equipment	signal system configuration	Existing
Local Transit Management Centers	911 Dispatch Center	transit emergency data	Planned
Local Transit Management Centers	Account Management Providers	payment request	Existing
Local Transit Management Centers	County Sheriff and City Police Offices	transit emergency data	Planned
Local Transit Management Centers	Intercity Transit Management Centers	transit service coordination	Planned
Local Transit Management Centers	Media Outlets	transit information for media	Existing
Local Transit Management Centers	Real-Time Bus Arrival Time Display Roadside Equipment	transit traveler information	Planned
Local Transit Management Centers	RTMC	transit emergency data	Planned
Local Transit Management Centers	SRCC	transit emergency data	Planned
Local Transit Management Centers	Transit Center and Station Surveillance System Roadside Equipment	alarm acknowledge	Existing
Local Transit Management Centers	Transit Data Archives	archived data product requests	Planned
Local Transit Management Centers	Transit Data Archives	transit archive data	Planned
Local Transit Management Centers	Transit Information Telephone Systems	personal transit information	Planned
Local Transit Management Centers	Transit Information Websites	demand responsive transit plan	Planned
Local Transit Management Centers	Transit Information Websites	transit and fare schedules	Existing

Source Element	Destination Element	Flow Name	Flow Status
Local Transit Management Centers	Transit Kiosks	transit traveler information	Planned
Local Transit Management Centers	Transit Vehicle Equipment	transit schedule information	Existing
Local Transit Management Centers	Transit Vehicle Equipment	transit vehicle operator information	Existing
Local Transit Management Centers	Transit Vehicle Operator	route assignment	Planned
Local Transit Management Centers	User Personal Portable and Computing Devices	personal transit information	Existing
Maintenance and Construction Field Personnel	Intelligent Work Zone System Roadside Equipment	personnel monitoring	Planned
Maintenance and Construction Management Center	Bridge Inspection / Structural Monitoring Roadside Equipment	infrastructure monitoring sensor control	Planned
Maintenance and Construction Management Center	Condition Acquisition and Reporting System (CARS)	road network conditions	Existing
Maintenance and Construction Management Center	Condition Acquisition and Reporting System (CARS)	roadway maintenance status	Existing
Maintenance and Construction Management Center	County Emergency Operations Centers	current infrastructure restrictions	Planned
Maintenance and Construction Management Center	County Emergency Operations Centers	emergency routes	Existing
Maintenance and Construction Management Center	County Emergency Operations Centers	emergency traffic control information	Existing
Maintenance and Construction Management Center	County Emergency Operations Centers	incident information	Existing
Maintenance and Construction Management Center	County Emergency Operations Centers	incident response status	Existing
Maintenance and Construction Management Center	County Emergency Operations Centers	maint and constr resource response	Existing
Maintenance and Construction Management Center	County Emergency Operations Centers	maint and constr work plans	Planned
Maintenance and Construction Management Center	County Emergency Operations Centers	roadway maintenance status	Planned
Maintenance and Construction Management Center	County Emergency Operations Centers	work zone information	Planned
Maintenance and Construction Management Center	Dynamic Message Sign Roadside Equipment	speed monitoring control	Planned
Maintenance and Construction Management Center	Infrastructure GIS Database Systems	asset status update	Planned
Maintenance and Construction Management Center	Intelligent Work Zone System Roadside Equipment	roadway dynamic signage data	Planned
Maintenance and Construction Management Center	Intelligent Work Zone System Roadside Equipment	work zone warning device control	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	automated lane control data	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	barrier system control	Planned

Source Element	Destination Element	Flow Name	Flow Status
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	environmental sensors control	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	infrastructure monitoring sensor control	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	lighting system control data	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	rail crossing control data	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	rail crossing request	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	reversible lane control	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	roadway dynamic signage data	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	roadway treatment system control	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	safeguard system control	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	signal control commands	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	signal control device configuration	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	signal control plans	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	signal system configuration	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	speed monitoring control	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	traffic detector control	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	traffic metering control	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	vehicle signage application info	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	video surveillance control	Planned
Maintenance and Construction Management Center	Intersection Collision Warning Roadside Equipment	work zone warning device control	Planned
Maintenance and Construction Management Center	Local Transit Management Centers	current infrastructure restrictions	Existing
Maintenance and Construction Management Center	Local Transit Management Centers	roadway maintenance status	Existing
Maintenance and Construction Management Center	Local Transit Management Centers	work zone information	Existing
Maintenance and Construction Management Center	Maintenance and Construction Vehicle Equipment	maint and constr dispatch information	Existing

Source Element	Destination Element	Flow Name	Flow Status
Maintenance and Construction Management Center	Maintenance and Construction Vehicle Equipment	vehicle commands	Existing
Maintenance and Construction Management Center	Maintenance and Construction Vehicle Equipment	vehicle configuration settings	Existing
Maintenance and Construction Management Center	Maintenance and Construction Vehicle Equipment	vehicle service information	Existing
Maintenance and Construction Management Center	Maintenance and Construction Vehicle Equipment	vehicle service response	Existing
Maintenance and Construction Management Center	Maintenance and Construction Vehicle Equipment	vehicle software install/upgrade	Existing
Maintenance and Construction Management Center	Metro Area Transit Management Centers	alert status	Existing
Maintenance and Construction Management Center	Metro Area Transit Management Centers	current infrastructure restrictions	Existing
Maintenance and Construction Management Center	Metro Area Transit Management Centers	roadway maintenance status	Existing
Maintenance and Construction Management Center	Metro Area Transit Management Centers	work zone information	Existing
Maintenance and Construction Management Center	Minnesota State Emergency Operations Center (SEOC)	alert status	Existing
Maintenance and Construction Management Center	Roadway Automated Treatment System	roadway treatment system control	Planned
Maintenance and Construction Management Center	RTMC	work plan coordination	Existing
Maintenance and Construction Management Center	SRCC	maint and constr resource coordination	Planned
Maintenance and Construction Management Center	SRCC	roadway maintenance status	Planned
Maintenance and Construction Management Center	SRCC	work plan coordination	Planned
Maintenance and Construction Management Center	SRCC	work zone information	Planned
Maintenance and Construction Management Center	Surface Transportation Weather Service Providers	road weather information	Existing
Maintenance and Construction Vehicle Equipment	CV Roadside Equipment	environmental sensor data	Planned
Maintenance and Construction Vehicle Equipment	CV Roadside Equipment	environmental sensors control	Planned
Maintenance and Construction Vehicle Equipment	CV Roadside Equipment	roadway dynamic signage data	Planned
Maintenance and Construction Vehicle Equipment	CV Roadside Equipment	vehicle environmental data	Planned
Maintenance and Construction Vehicle Equipment	CV Roadside Equipment	vehicle location and motion	Planned
Maintenance and Construction Vehicle Equipment	CV Roadside Equipment	vehicle location and motion for surveillance	Planned

Source Element	Destination Element	Flow Name	Flow Status
Maintenance and Construction Vehicle Equipment	CV Roadside Equipment	vehicle situation data	Planned
Maintenance and Construction Vehicle Equipment	CV Roadside Equipment	work zone warning notification	Planned
Maintenance and Construction Vehicle Equipment	Intelligent Work Zone System Roadside Equipment	roadway dynamic signage data	Planned
Maintenance and Construction Vehicle Equipment	Maintenance and Construction Management Center	maint and constr dispatch status	Existing
Maintenance and Construction Vehicle Equipment	Maintenance and Construction Management Center	maint and constr vehicle conditions	Existing
Maintenance and Construction Vehicle Equipment	Maintenance and Construction Management Center	maint and constr vehicle location data	Planned
Maintenance and Construction Vehicle Equipment	Maintenance and Construction Management Center	vehicle diagnostic data	Existing
Maintenance and Construction Vehicle Equipment	Maintenance and Construction Management Center	vehicle service request	Existing
Maintenance and Construction Vehicle Equipment	Maintenance Decision Support System	maint and constr vehicle conditions	Existing
Maintenance and Construction Vehicle Equipment	Maintenance Decision Support System	maint and constr vehicle location data	Existing
Maintenance and Construction Vehicle Equipment	Maintenance Decision Support System	maint and constr vehicle operational data	Existing
Maintenance and Construction Vehicle Equipment	RTMC	maint and constr vehicle location data	Existing
Maintenance and Construction Vehicle Equipment	RWIS Central Control System	environmental sensor data	Existing
Maintenance and Construction Vehicle Equipment	SRCC	environmental sensor data	Existing
Maintenance and Construction Vehicle Equipment	SRCC	maint and constr dispatch status	Existing
Maintenance and Construction Vehicle Equipment	SRCC	maint and constr vehicle location data	Existing
Maintenance and Construction Vehicle Equipment	SRCC	maint and constr vehicle operational data	Existing
Maintenance Decision Support System	Maintenance and Construction Vehicle Equipment	maint and constr vehicle system control	Existing
Mayday System	911 Dispatch Center	incident report	Existing
Mayday System	Mayday System Vehicle Equipment	emergency acknowledge	Existing
Mayday System	Mayday System Vehicle Equipment	emergency data request	Existing
Mayday System	Minneapolis TMC	incident information	Existing
Mayday System	Minnesota State Patrol District Office	incident information	Existing

Source Element	Destination Element	Flow Name	Flow Status
Mayday System	RTMC	incident command information coordination	Existing
Mayday System Vehicle Equipment	Mayday System	emergency notification	Existing
Media Information Release System	Minnesota State Patrol District Office	archive requests	Existing
Media Information Release System	Minnesota State Patrol District Office	archive status	Existing
Media Outlets	Maintenance and Construction Management Center	external reports	Existing
Media Outlets	Minneapolis TMC	external reports	Existing
Media Outlets	RTMC	external reports	Existing
Media Outlets	SRCC	external reports	Existing
Metro Area Transit Management Centers	911 Dispatch Center	transit emergency data	Planned
Metro Area Transit Management Centers	Account Management Providers	payment request	Existing
Metro Area Transit Management Centers	Commuter Rail Operations Center	transit service coordination	Planned
Metro Area Transit Management Centers	County Emergency Operations Centers	emergency transit service response	Existing
Metro Area Transit Management Centers	County Sheriff and City Police Offices	transit emergency data	Planned
Metro Area Transit Management Centers	Media Outlets	incident information for media	Existing
Metro Area Transit Management Centers	Media Outlets	transit information for media	Existing
Metro Area Transit Management Centers	Minneapolis TMC	incident information	Planned
Metro Area Transit Management Centers	Park-and-Ride Parking Information System Roadside Equipment	transit park and ride information	Existing
Metro Area Transit Management Centers	Real-Time Bus Arrival Time Display Roadside Equipment	transit traveler information	Existing
Metro Area Transit Management Centers	Real-Time Transit Travel Time Display Roadside Equipment	transit travel time estimates	Existing
Metro Area Transit Management Centers	Transit Center and Station Surveillance System Roadside Equipment	alarm acknowledge	Existing
Metro Area Transit Management Centers	Transit Data Archives	archived data product requests	Planned
Metro Area Transit Management Centers	Transit Data Archives	transit archive data	Planned
Metro Area Transit Management Centers	Transit Information Websites	transit and fare schedules	Existing
Metro Area Transit Management Centers	Transit Kiosks	transit traveler information	Existing

Source Element	Destination Element	Flow Name	Flow Status
Metro Area Transit Management Centers	Transit Vehicle Equipment	alarm acknowledge	Existing
Metro Area Transit Management Centers	Transit Vehicle Equipment	fare management information	Existing
Metro Area Transit Management Centers	Transit Vehicle Equipment	transit schedule information	Existing
Metro Area Transit Management Centers	Transit Vehicle Equipment	transit vehicle operator information	Existing
Metro Area Transit Management Centers	Transit Vehicle Operator	route assignment	Planned
Metro Area Transit Management Centers	User Personal Portable and Computing Devices	personal transit information	Existing
Minneapolis TMC	Dynamic Message Sign Roadside Equipment	roadway dynamic signage data	Existing
Minneapolis TMC	Event Promoters	event confirmation	Existing
Minneapolis TMC	Metro Area Transit Management Centers	incident information	Planned
Minneapolis TMC	Metro Area Transit Management Centers	road network conditions	Planned
Minneapolis TMC	RTMC	alert status	Existing
Minneapolis TMC	RTMC	device control request	Planned
Minneapolis TMC	RTMC	device data	Planned
Minneapolis TMC	RTMC	device status	Planned
Minneapolis TMC	RTMC	emergency plan coordination	Planned
Minneapolis TMC	RTMC	emergency routes	Existing
Minneapolis TMC	RTMC	emergency traffic control information	Existing
Minneapolis TMC	RTMC	emergency traffic coordination	Planned
Minneapolis TMC	RTMC	incident information	Planned
Minneapolis TMC	RTMC	maint and constr resource request	Planned
Minneapolis TMC	RTMC	resource request	Planned
Minneapolis TMC	Traffic Detector Roadside Equipment	traffic detector control	Existing
Minneapolis TMC	Traffic Signal Roadside Equipment	signal control commands	Planned
Minneapolis TMC	Traffic Signal Roadside Equipment	signal control device configuration	Planned
Minneapolis TMC	Traffic Signal Roadside Equipment	signal control plans	Planned
Minneapolis TMC	Traffic Signal Roadside Equipment	signal system configuration	Planned
Minneapolis TMC	Transportation Information System (TIS)	archive analysis requests	Planned

Source Element	Destination Element	Flow Name	Flow Status
Minneapolis TMC	Transportation Information System (TIS)	archived data product requests	Planned
Minnesota Emergency Alert System	Minnesota State Patrol District Office	alerts and advisories	Existing
Minnesota Emergency Alert System	RTMC	alerts and advisories	Existing
Minnesota Emergency Alert System	SRCC	alerts and advisories	Existing
Minnesota Emergency Responder Database	911 Dispatch Center	archive requests	Planned
Minnesota Emergency Responder Database	911 Dispatch Center	archive status	Planned
Minnesota Emergency Responder Database	County Emergency Operations Centers	archive requests	Planned
Minnesota Emergency Responder Database	County Emergency Operations Centers	archive status	Planned
Minnesota Emergency Responder Database	Minnesota State Emergency Operations Center (SEOC)	archive requests	Planned
Minnesota Emergency Responder Database	Minnesota State Emergency Operations Center (SEOC)	archive status	Planned
Minnesota Emergency Responder Database	Minnesota State Patrol Databases	archive coordination	Planned
Minnesota State Emergency Operations Center (SEOC)	511 Traveler Information Website	incident information for public	Existing
Minnesota State Emergency Operations Center (SEOC)	911 Dispatch Center	incident response coordination	Existing
Minnesota State Emergency Operations Center (SEOC)	County Emergency Operations Centers	alert notification coordination	Existing
Minnesota State Emergency Operations Center (SEOC)	County Emergency Operations Centers	emergency plan coordination	Existing
Minnesota State Emergency Operations Center (SEOC)	County Emergency Operations Centers	evacuation coordination	Existing
Minnesota State Emergency Operations Center (SEOC)	County Emergency Operations Centers	incident command information coordination	Existing
Minnesota State Emergency Operations Center (SEOC)	County Emergency Operations Centers	incident response coordination	Existing
Minnesota State Emergency Operations Center (SEOC)	Local Agency Traveler Information Website	incident information for public	Existing
Minnesota State Emergency Operations Center (SEOC)	Local TMCs	incident information	Planned
Minnesota State Emergency Operations Center (SEOC)	Local TMCs	resource request	Planned
Minnesota State Emergency Operations Center (SEOC)	Local Transit Management Centers	alert notification	Planned
Minnesota State Emergency Operations Center (SEOC)	Maintenance and Construction Management Center	alert notification	Existing
Minnesota State Emergency Operations Center (SEOC)	Media Outlets	incident information for media	Existing

Source Element	Destination Element	Flow Name	Flow Status
Minnesota State Emergency Operations Center (SEOC)	Metro Area Transit Management Centers	alert notification	Existing
Minnesota State Emergency Operations Center (SEOC)	Minnesota Emergency Responder Database	emergency archive data	Planned
Minnesota State Emergency Operations Center (SEOC)	Minnesota State Patrol Databases	emergency archive data	Planned
Minnesota State Emergency Operations Center (SEOC)	Minnesota State Patrol District Office	alert notification	Existing
Minnesota State Emergency Operations Center (SEOC)	Minnesota State Patrol District Office	alert notification coordination	Existing
Minnesota State Emergency Operations Center (SEOC)	Minnesota State Patrol District Office	emergency route request	Existing
Minnesota State Emergency Operations Center (SEOC)	Minnesota State Patrol District Office	incident command information coordination	Existing
Minnesota State Emergency Operations Center (SEOC)	Neighboring State Emergency Management Agencies	incident response coordination	Existing
Minnesota State Emergency Operations Center (SEOC)	Neighboring State Emergency Management Agencies	resource coordination	Existing
Minnesota State Emergency Operations Center (SEOC)	North/West Passage Corridor Traveler Information Website	incident information for public	Planned
Minnesota State Emergency Operations Center (SEOC)	Private Fleet and Freight Management Center	hazmat information request	Existing
Minnesota State Emergency Operations Center (SEOC)	RTMC	emergency traffic control request	Existing
Minnesota State Emergency Operations Center (SEOC)	RTMC	evacuation information	Existing
Minnesota State Emergency Operations Center (SEOC)	RTMC	incident information	Existing
Minnesota State Emergency Operations Center (SEOC)	RTMC	incident response status	Existing
Minnesota State Emergency Operations Center (SEOC)	RTMC	resource request	Existing
Minnesota State Emergency Operations Center (SEOC)	RTMC	threat information	Existing
Minnesota State Emergency Operations Center (SEOC)	RTMC	transportation system status	Existing
Minnesota State Patrol Databases	911 Dispatch Center	archive requests	Planned
Minnesota State Patrol Databases	911 Dispatch Center	archive status	Planned
Minnesota State Patrol Databases	County Emergency Operations Centers	archive requests	Planned
Minnesota State Patrol Databases	County Emergency Operations Centers	archive status	Planned
Minnesota State Patrol Databases	Minnesota Emergency Responder Database	archive coordination	Planned
Minnesota State Patrol Databases	Minnesota State Emergency Operations Center (SEOC)	archive requests	Planned

Source Element	Destination Element	Flow Name	Flow Status
Minnesota State Patrol Databases	Minnesota State Emergency Operations Center (SEOC)	archive status	Planned
Minnesota State Patrol District Office	Automated Crash Notification System	incident report	Planned
Minnesota State Patrol District Office	Condition Acquisition and Reporting System (CARS)	incident information for public	Existing
Minnesota State Patrol District Office	Condition Acquisition and Reporting System (CARS)	road network conditions	Existing
Minnesota State Patrol District Office	County Sheriff and City Police Offices	incident command information coordination	Existing
Minnesota State Patrol District Office	County Sheriff and City Police Offices	incident response coordination	Existing
Minnesota State Patrol District Office	Emergency Vehicle Equipment	emergency dispatch requests	Existing
Minnesota State Patrol District Office	Event Promoters	event confirmation	Existing
Minnesota State Patrol District Office	Media Information Release System	emergency archive data	Existing
Minnesota State Patrol District Office	Minnesota State Emergency Operations Center (SEOC)	alert notification coordination	Existing
Minnesota State Patrol District Office	Minnesota State Emergency Operations Center (SEOC)	alert status	Existing
Minnesota State Patrol District Office	Minnesota State Emergency Operations Center (SEOC)	emergency routes	Existing
Minnesota State Patrol District Office	Minnesota State Emergency Operations Center (SEOC)	incident command information coordination	Existing
Minnesota State Patrol District Office	Minnesota State Patrol Databases	emergency archive data	Existing
Minnesota State Patrol District Office	Neighboring State Emergency Management Agencies	alert notification coordination	Existing
Minnesota State Patrol District Office	Neighboring State Emergency Management Agencies	emergency plan coordination	Existing
Minnesota State Patrol District Office	Neighboring State Emergency Management Agencies	evacuation coordination	Existing
Minnesota State Patrol District Office	Neighboring State Emergency Management Agencies	resource coordination	Existing
Minnesota State Patrol District Office	Private Fleet and Freight Management Center	hazmat information request	Existing
Minnesota State Patrol District Office	RTMC	incident information	Existing
Minnesota State Patrol District Office	RTMC	incident report	Existing
Minnesota State Patrol District Office	RTMC	incident response status	Existing
Minnesota State Patrol District Office	RTMC	traffic images	Existing

Source Element	Destination Element	Flow Name	Flow Status
Minnesota State Patrol District Office	SRCC	incident report	Existing
Minnesota State Patrol District Office	Tunnel Emissions Roadside Equipment	secure area sensor control	Existing
Minnesota State Patrol District Office	Tunnel Emissions Roadside Equipment	secure area surveillance control	Existing
Minnesota State Patrol District Office	Variable Speed Limit Roadside Equipment	roadway dynamic signage data	Planned
MnPASS Roadside Equipment	MnPASS Service Center	payment transactions	Existing
MnPASS Roadside Equipment	MnPASS Vehicle Equipment	vehicle payment request	Existing
MnPASS Roadside Equipment	MnPASS Vehicle Equipment	vehicle payment update	Existing
MnPASS Service Center	511 Traveler Information Website	toll data	Planned
MnPASS Service Center	Account Management Providers	payment request	Existing
MnPASS Service Center	MnPASS Roadside Equipment	payment instructions	Existing
MnPASS Vehicle Equipment	Emergency Vehicle Equipment	tag confirmation	Existing
MnPASS Vehicle Equipment	MnPASS Roadside Equipment	vehicle payment information	Existing
Motor Carrier Information System	Account Management Providers	payment request	Existing
Motor Carrier Information System	IFTA Clearinghouse	credential fee coordination	Existing
Motor Carrier Information System	IFTA Clearinghouse	credentials information	Existing
Motor Carrier Information System	IFTA Clearinghouse	credentials status information	Existing
Motor Carrier Information System	IRP Clearinghouse	credential fee coordination	Existing
Motor Carrier Information System	IRP Clearinghouse	credentials information	Existing
Motor Carrier Information System	IRP Clearinghouse	credentials status information	Existing
Motor Carrier Registration System	Truck Center	credentials information	Existing
National Weather Service	511 Telephone Information Service	weather information	Existing
National Weather Service	511 Traveler Information Website	weather information	Existing
National Weather Service	Condition Acquisition and Reporting System (CARS)	weather information	Existing
National Weather Service	County Emergency Operations Centers	weather information	Existing
National Weather Service	Local Agency Traveler Information Website	weather information	Existing
National Weather Service	Minneapolis TMC	weather information	Existing
National Weather Service	Minnesota State Patrol District Office	weather information	Existing
National Weather Service	RTMC	weather information	Existing

Source Element	Destination Element	Flow Name	Flow Status
National Weather Service	SRCC	weather information	Existing
National Weather Service	Truck Center	weather information	Existing
Neighboring State CARS / Roadway Information Systems	Condition Acquisition and Reporting System (CARS)	alternate mode information	Existing
Neighboring State CARS / Roadway Information Systems	Condition Acquisition and Reporting System (CARS)	emergency traveler information	Existing
Neighboring State CARS / Roadway Information Systems	Condition Acquisition and Reporting System (CARS)	incident information for public	Existing
Neighboring State CARS / Roadway Information Systems	Condition Acquisition and Reporting System (CARS)	road network conditions	Existing
Neighboring State CARS / Roadway Information Systems	Condition Acquisition and Reporting System (CARS)	traffic images	Existing
Neighboring State CARS / Roadway Information Systems	North/West Passage Corridor Traveler Information Website	alternate mode information	Planned
Neighboring State CARS / Roadway Information Systems	North/West Passage Corridor Traveler Information Website	emergency traveler information	Planned
Neighboring State CARS / Roadway Information Systems	North/West Passage Corridor Traveler Information Website	incident information for public	Planned
Neighboring State CARS / Roadway Information Systems	North/West Passage Corridor Traveler Information Website	parking information	Planned
Neighboring State CARS / Roadway Information Systems	North/West Passage Corridor Traveler Information Website	road network conditions	Planned
Neighboring State CARS / Roadway Information Systems	North/West Passage Corridor Traveler Information Website	traffic images	Planned
Neighboring State CARS / Roadway Information Systems	North/West Passage Corridor Traveler Information Website	transit service information	Planned
Neighboring State Emergency Management Agencies	Minnesota State Emergency Operations Center (SEOC)	incident response coordination	Existing
Neighboring State Emergency Management Agencies	Minnesota State Emergency Operations Center (SEOC)	resource coordination	Existing
Neighboring State Emergency Management Agencies	Minnesota State Patrol District Office	alert notification coordination	Existing
Neighboring State Emergency Management Agencies	Minnesota State Patrol District Office	emergency plan coordination	Existing
Neighboring State Emergency Management Agencies	Minnesota State Patrol District Office	evacuation coordination	Existing
Neighboring State Emergency Management Agencies	Minnesota State Patrol District Office	resource coordination	Existing
Neighboring State Traffic Management Centers	Dynamic Message Sign Roadside Equipment	roadway dynamic signage data	Planned
Neighboring State Traffic Management Centers	SRCC	device control request	Planned
Neighboring State Traffic Management Centers	SRCC	device data	Planned
Neighboring State Traffic Management Centers	SRCC	device status	Planned
Neighboring State Traffic Management Centers	SRCC	emergency traffic coordination	Existing

Source Element	Destination Element	Flow Name	Flow Status
Neighboring State Traffic Management Centers Roadside Equipment	SRCC	roadway dynamic signage status	Planned
Neighboring State Traffic Management Centers Roadside Equipment	SRCC	traffic images	Planned
North/West Passage Corridor Traveler Information Website	511 Traveler Information Website	alternate mode information	Planned
North/West Passage Corridor Traveler Information Website	511 Traveler Information Website	emergency traveler information	Planned
North/West Passage Corridor Traveler Information Website	511 Traveler Information Website	incident information for public	Planned
North/West Passage Corridor Traveler Information Website	511 Traveler Information Website	parking information	Planned
North/West Passage Corridor Traveler Information Website	511 Traveler Information Website	road network conditions	Planned
North/West Passage Corridor Traveler Information Website	511 Traveler Information Website	traffic images	Planned
North/West Passage Corridor Traveler Information Website	511 Traveler Information Website	transit service information	Planned
North/West Passage Corridor Traveler Information Website	Condition Acquisition and Reporting System (CARS)	alternate mode information	Planned
North/West Passage Corridor Traveler Information Website	Condition Acquisition and Reporting System (CARS)	emergency traveler information	Planned
North/West Passage Corridor Traveler Information Website	Condition Acquisition and Reporting System (CARS)	incident information for public	Planned
North/West Passage Corridor Traveler Information Website	Condition Acquisition and Reporting System (CARS)	parking information	Planned
North/West Passage Corridor Traveler Information Website	Condition Acquisition and Reporting System (CARS)	road network conditions	Planned
North/West Passage Corridor Traveler Information Website	Condition Acquisition and Reporting System (CARS)	traffic images	Planned
North/West Passage Corridor Traveler Information Website	Neighboring State CARS / Roadway Information Systems	alternate mode information	Planned
North/West Passage Corridor Traveler Information Website	Neighboring State CARS / Roadway Information Systems	emergency traveler information	Planned
North/West Passage Corridor Traveler Information Website	Neighboring State CARS / Roadway Information Systems	incident information for public	Planned
North/West Passage Corridor Traveler Information Website	Neighboring State CARS / Roadway Information Systems	parking information	Planned
North/West Passage Corridor Traveler Information Website	Neighboring State CARS / Roadway Information Systems	road network conditions	Planned
North/West Passage Corridor Traveler Information Website	Neighboring State CARS / Roadway Information Systems	traffic images	Planned
North/West Passage Corridor Traveler Information Website	Neighboring State CARS / Roadway Information Systems	transit service information	Planned
North/West Passage Corridor Traveler Information Website	User Personal Portable and Computing Devices	broadcast traveler information	Planned

Source Element	Destination Element	Flow Name	Flow Status
North/West Passage Corridor Traveler Information Website	User Personal Portable and Computing Devices	emergency traveler information	Planned
North/West Passage Corridor Traveler Information Website	User Personal Portable and Computing Devices	interactive traveler information	Planned
North/West Passage Corridor Traveler Information Website	User Personal Portable and Computing Devices	travel services information	Planned
North/West Passage Corridor Traveler Information Website	User Personal Portable and Computing Devices	trip plan	Planned
Other States TPIMS	Parking Management System	parking information	Planned
Other States TPIMS	TPIMS Central Data Repository	parking archive data	Planned
Oversize Warning Roadside Equipment	Driver	driver information	Existing
Oversize Warning Roadside Equipment	SRCC	roadway dynamic signage status	Existing
Park-and-Ride Parking Information System Roadside Equipment	Driver	driver parking information	Existing
Park-and-Ride Parking Information System Roadside Equipment	Metro Area Transit Management Centers	parking information	Existing
Parking Management Roadside Equipment	511 Telephone Information Service	parking information	Planned
Parking Management Roadside Equipment	511 Telephone Information Service	parking reservation confirmation	Planned
Parking Management Roadside Equipment	511 Traveler Information Website	parking information	Planned
Parking Management Roadside Equipment	511 Traveler Information Website	parking reservation confirmation	Planned
Parking Management Roadside Equipment	Driver	driver parking information	Existing
Parking Management Roadside Equipment	Driver	payment transaction status	Existing
Parking Management Roadside Equipment	Parking Management System	parking information	Planned
Parking Management Roadside Equipment	Parking Operator	parking status	Existing
Parking Management Roadside Equipment	Traveler Cards	request for payment	Existing
Parking Management System	Dynamic Message Sign Roadside Equipment	roadway dynamic signage data	Planned
Parking Management System	Other States TPIMS	parking traffic information	Planned
Parking Management System	Other States TPIMS	transportation operational strategies	Planned
Parking Management System	Parking Management Roadside Equipment	parking traffic information	Planned
Parking Management System	TPIMS Central Data Repository	traffic archive data	Planned
Parking Operator	Parking Management Roadside Equipment	parking operator input	Existing

Source Element	Destination Element	Flow Name	Flow Status
Private Fleet and Freight Management Center	Automated Permit Routing System (RouteBuilder)	freight traveler information preferences	Planned
Private Fleet and Freight Management Center	Commercial Vehicles	fleet to driver update	Existing
Private Fleet and Freight Management Center	County Emergency Operations Centers	hazmat information	Existing
Private Fleet and Freight Management Center	Intermodal Freight Depots	freight transportation status	Planned
Private Fleet and Freight Management Center	Minnesota State Emergency Operations Center (SEOC)	hazmat information	Existing
Private Fleet and Freight Management Center	Minnesota State Patrol District Office	hazmat information	Existing
Private Information Service Providers	User Personal Portable and Computing Devices	trip plan	Existing
Private Information Service Providers	Vehicle	trip plan	Existing
Queue Detection Roadside Equipment	Intelligent Work Zone System Roadside Equipment	roadway equipment coordination	Existing
Queue Detection Roadside Equipment	Ramp Meter Roadside Equipment	roadway equipment coordination	Existing
Queue Detection Roadside Equipment	RTMC	roadway dynamic signage status	Existing
Railroad Active Warning Roadside Equipment	Driver	driver information	Existing
Railroad Active Warning Roadside Equipment	Railroad Wayside Equipment	rail crossing operational status	Existing
Railroad Wayside Equipment	Railroad Active Warning Roadside Equipment	track status	Existing
Ramp Meter Roadside Equipment	Video Monitoring Roadside Equipment	roadway equipment coordination	Planned
Ramp Meter Roadside Equipment	Video Monitoring Roadside Equipment	signal control data	Planned
Ramp Meter Roadside Equipment	CV Roadside Equipment	conflict monitor status	Planned
Ramp Meter Roadside Equipment	CV Roadside Equipment	intersection control status	Planned
Ramp Meter Roadside Equipment	Local TMCs	roadway dynamic signage status	Existing
Ramp Meter Roadside Equipment	Queue Detection Roadside Equipment	roadway equipment coordination	Existing
Ramp Meter Roadside Equipment	RTMC	roadway dynamic signage status	Existing
Ramp Meter Roadside Equipment	RTMC	signal control status	Existing
Ramp Meter Roadside Equipment	RTMC	signal fault data	Existing
Ramp Meter Roadside Equipment	Traffic Detector Roadside Equipment	roadway equipment coordination	Existing

Source Element	Destination Element	Flow Name	Flow Status
Real-Time Bus Arrival Time Display Roadside Equipment	Traveler	traveler interface updates	Existing
Real-Time Transit Travel Time Display Roadside Equipment	RTMC	roadway dynamic signage status	Planned
Red Light Monitoring/Enforcement Roadside Equipment	Minnesota State Patrol District Office	speed violation notification	Planned
Red Light Monitoring/Enforcement Roadside Equipment	SRCC	speed monitoring information	Planned
Research Lab Network Surveillance Archive	Research Lab Network Surveillance Roadside Equipment	data collection and monitoring control	Existing
Research Lab Network Surveillance Archive	Research Lab New Surveillance Control System	archive requests	Existing
Research Lab Network Surveillance Archive	Research Lab New Surveillance Control System	archive status	Existing
Research Lab Network Surveillance Archive	RTMC	archived data products	Planned
Research Lab Network Surveillance Roadside Equipment	Research Lab Network Surveillance Archive	roadside archive data	Existing
Research Lab Network Surveillance Roadside Equipment	Research Lab New Surveillance Control System	traffic images	Existing
Research Lab New Surveillance Control System	Research Lab Network Surveillance Archive	traffic archive data	Existing
Research Lab New Surveillance Control System	Research Lab Network Surveillance Roadside Equipment	video surveillance control	Existing
Rest Area WiFi	User Personal Portable and Computing Devices	broadcast traveler information	Planned
Roadway Automated Treatment System	Driver	driver information	Existing
Roadway Automated Treatment System	Maintenance and Construction Management Center	roadway treatment system status	Planned
Roadway Automated Treatment System	RTMC	roadway treatment system status	Existing
Roadway Automated Treatment System	SRCC	roadway treatment system status	Existing
Roadway Flooding Warning Roadside Equipment	Driver	driver information	Existing
Roadway Lighting Management Central Monitoring Equipment	Roadway Lighting Management Roadside Equipment	lighting system control data	Planned
Roadway Lighting Management Roadside Equipment	Roadway Lighting Management Central Monitoring Equipment	lighting system status	Planned
RTMC	511 Traveler Information Website	incident information for public	Existing
RTMC	511 Traveler Information Website	road network conditions	Existing
RTMC	Arrow Board Reporting System	roadway dynamic signage data	Planned
RTMC	Arrow Board Reporting System	roadway warning system control	Planned

Source Element	Destination Element	Flow Name	Flow Status
RTMC	Bridge Inspection / Structural Monitoring Roadside Equipment	infrastructure monitoring sensor control	Planned
RTMC	Video Monitoring Roadside Equipment	video surveillance control	Existing
RTMC	Condition Acquisition and Reporting System (CARS)	alert notification	Existing
RTMC	Condition Acquisition and Reporting System (CARS)	maint and constr work plans	Existing
RTMC	Condition Acquisition and Reporting System (CARS)	road network conditions	Existing
RTMC	Condition Acquisition and Reporting System (CARS)	road weather information	Existing
RTMC	Condition Acquisition and Reporting System (CARS)	work zone information	Existing
RTMC	County Emergency Operations Centers	traffic image data	Planned
RTMC	CV Roadside Equipment	equipment control commands	Planned
RTMC	CV Roadside Equipment	intersection management application info	Planned
RTMC	CV Roadside Equipment	restricted lanes application info	Planned
RTMC	CV Roadside Equipment	road closure application info	Planned
RTMC	CV Roadside Equipment	RSE application information	Planned
RTMC	CV Roadside Equipment	RSE application install/upgrade	Planned
RTMC	CV Roadside Equipment	speed warning application info	Planned
RTMC	CV Roadside Equipment	vehicle signage application info	Planned
RTMC	CV Roadside Equipment	work zone safety application info	Planned
RTMC	Dynamic Late Merge Roadside Equipment	work zone warning device control	Existing
RTMC	Dynamic Message Sign Roadside Equipment	roadway dynamic signage data	Existing
RTMC	Emergency Vehicle Equipment	emergency dispatch requests	Existing
RTMC	Event Promoters	event confirmation	Existing
RTMC	FIRST Emergency Vehicles	emergency dispatch requests	Existing
RTMC	FIRST Emergency Vehicles	suggested route	Existing
RTMC	Highway Advisory Radio Roadside Equipment	roadway dynamic signage data	Existing

Source Element	Destination Element	Flow Name	Flow Status
RTMC	Infrastructure GIS Database Systems	asset status update	Planned
RTMC	Intelligent Work Zone System Roadside Equipment	roadway dynamic signage data	Existing
RTMC	Intelligent Work Zone System Roadside Equipment	work zone warning device control	Existing
RTMC	Lane Control Roadside Equipment	roadway dynamic signage data	Existing
RTMC	Lane/Ramp Access Control Roadside Equipment	reversible lane control	Existing
RTMC	Maintenance and Construction Management Center	maint and constr resource coordination	Existing
RTMC	Maintenance and Construction Management Center	road network conditions	Existing
RTMC	Maintenance and Construction Management Center	work plan coordination	Existing
RTMC	Mayday System	incident command information coordination	Existing
RTMC	Media Outlets	maint and constr work plans	Existing
RTMC	Media Outlets	road weather information	Existing
RTMC	Media Outlets	roadway maintenance status	Existing
RTMC	Media Outlets	traffic information for media	Existing
RTMC	Media Outlets	work zone information	Existing
RTMC	Metro Area Transit Management Centers	current infrastructure restrictions	Existing
RTMC	Metro Area Transit Management Centers	road network conditions	Existing
RTMC	Metro Area Transit Management Centers	roadway maintenance status	Existing
RTMC	Metro Area Transit Management Centers	work zone information	Existing
RTMC	Minneapolis TMC	device control request	Planned
RTMC	Minneapolis TMC	device data	Planned
RTMC	Minneapolis TMC	device status	Planned
RTMC	Minneapolis TMC	emergency plan coordination	Planned
RTMC	Minneapolis TMC	emergency traffic control request	Existing
RTMC	Minneapolis TMC	emergency traffic coordination	Planned

Source Element	Destination Element	Flow Name	Flow Status
RTMC	Minneapolis TMC	evacuation information	Planned
RTMC	Minneapolis TMC	incident information	Planned
RTMC	Minneapolis TMC	maint and constr resource response	Planned
RTMC	Minneapolis TMC	remote surveillance control	Planned
RTMC	Minneapolis TMC	resource request	Planned
RTMC	Minneapolis TMC	road network conditions	Planned
RTMC	Minneapolis TMC	road weather information	Planned
RTMC	Minneapolis TMC	traffic images	Planned
RTMC	Minnesota State Emergency Operations Center (SEOC)	emergency traffic control information	Existing
RTMC	Minnesota State Emergency Operations Center (SEOC)	resource deployment status	Existing
RTMC	Minnesota State Emergency Operations Center (SEOC)	road network conditions	Existing
RTMC	Minnesota State Emergency Operations Center (SEOC)	road network status assessment	Existing
RTMC	Minnesota State Emergency Operations Center (SEOC)	traffic images	Existing
RTMC	Minnesota State Patrol District Office	incident information	Existing
RTMC	Minnesota State Patrol District Office	incident report	Existing
RTMC	Minnesota State Patrol District Office	road network conditions	Existing
RTMC	North/West Passage Corridor Traveler Information Website	current infrastructure restrictions	Planned
RTMC	North/West Passage Corridor Traveler Information Website	maint and constr work plans	Planned
RTMC	North/West Passage Corridor Traveler Information Website	road network conditions	Planned
RTMC	North/West Passage Corridor Traveler Information Website	road weather information	Planned
RTMC	North/West Passage Corridor Traveler Information Website	roadway maintenance status	Planned
RTMC	North/West Passage Corridor Traveler Information Website	work zone information	Planned
RTMC	Private Information Service Providers	incident information for public	Planned
RTMC	Private Information Service Providers	road network conditions	Planned
RTMC	Queue Detection Roadside Equipment	roadway dynamic signage data	Existing

Source Element	Destination Element	Flow Name	Flow Status
RTMC	Ramp Meter Roadside Equipment	signal control commands	Existing
RTMC	Ramp Meter Roadside Equipment	signal control device configuration	Existing
RTMC	Ramp Meter Roadside Equipment	signal control plans	Existing
RTMC	Ramp Meter Roadside Equipment	signal system configuration	Existing
RTMC	Real-Time Transit Travel Time Display Roadside Equipment	roadway dynamic signage data	Planned
RTMC	Research Lab Network Surveillance Archive	archived data product requests	Planned
RTMC	Roadway Automated Treatment System	roadway treatment system control	Existing
RTMC	Security Monitoring Roadside Equipment	infrastructure monitoring sensor control	Planned
RTMC	Security Monitoring Roadside Equipment	secure area sensor control	Planned
RTMC	Security Monitoring Roadside Equipment	secure area surveillance control	Planned
RTMC	Surface Transportation Weather Service Providers	road weather information	Existing
RTMC	Traffic Data and Video Archive	archive analysis requests	Planned
RTMC	Traffic Data and Video Archive	archive coordination	Planned
RTMC	Traffic Data and Video Archive	archived data product requests	Planned
RTMC	Traffic Data and Video Archive	traffic archive data	Existing
RTMC	Traffic Detector Roadside Equipment	traffic detector control	Existing
RTMC	Traffic Signal Roadside Equipment	signal control commands	Existing
RTMC	Traffic Signal Roadside Equipment	signal control device configuration	Existing
RTMC	Traffic Signal Roadside Equipment	signal control plans	Existing
RTMC	Traffic Signal Roadside Equipment	signal system configuration	Existing
RTMC	Transportation Information System (TIS)	archive coordination	Existing
RTMC	Transportation Information System (TIS)	maint and constr archive data	Existing
RTMC	Transportation Information System (TIS)	traffic archive data	Existing
RTMC	Variable Speed Limit Roadside Equipment	roadway dynamic signage data	Existing
RTMC	Vehicle Occupancy Monitoring/Enforcement Roadside Equipment	traffic detector control	Planned

Source Element	Destination Element	Flow Name	Flow Status
RTMC	Vehicle Occupancy Monitoring/Enforcement Roadside Equipment	video surveillance control	Planned
RWIS Central Control System	511 Telephone Information Service	weather information	Existing
RWIS Central Control System	511 Traveler Information Website	weather information	Existing
RWIS Central Control System	Clarus Weather System	environmental conditions data	Planned
RWIS Central Control System	Condition Acquisition and Reporting System (CARS)	road weather information	Existing
RWIS Central Control System	Condition Acquisition and Reporting System (CARS)	weather information	Existing
RWIS Central Control System	Maintenance and Construction Management Center	environmental conditions data status	Existing
RWIS Central Control System	Maintenance and Construction Management Center	road weather information	Existing
RWIS Central Control System	Minnesota State Patrol District Office	weather information	Existing
RWIS Central Control System	RTMC	weather information	Existing
RWIS Central Control System	RWIS Stations	environmental sensors control	Existing
RWIS Central Control System	Transportation Information System (TIS)	archive coordination	Existing
RWIS Central Control System	UMD Transportation Data Research Laboratory (TDRL)	weather archive data	Existing
RWIS Stations	Clarus Weather System	environmental sensor data	Existing
RWIS Stations	RWIS Central Control System	environmental sensor data	Existing
Security Monitoring Roadside Equipment	911 Dispatch Center	infrastructure monitoring sensor data	Planned
Security Monitoring Roadside Equipment	911 Dispatch Center	secure area sensor data	Planned
Security Monitoring Roadside Equipment	911 Dispatch Center	secure area surveillance data	Planned
Security Monitoring Roadside Equipment	RTMC	infrastructure monitoring sensor data	Planned
Security Monitoring Roadside Equipment	RTMC	secure area sensor data	Planned
Security Monitoring Roadside Equipment	RTMC	secure area surveillance data	Planned
Security Monitoring Roadside Equipment	SRCC	infrastructure monitoring sensor data	Planned
Security Monitoring Roadside Equipment	SRCC	secure area sensor data	Planned

Source Element	Destination Element	Flow Name	Flow Status
Security Monitoring Roadside Equipment	SRCC	secure area surveillance data	Planned
Speed Monitoring Roadside Equipment	Dynamic Message Sign Roadside Equipment	roadway equipment coordination	Planned
Speed Monitoring Roadside Equipment	Minneapolis TMC	speed monitoring information	Planned
Speed Monitoring Roadside Equipment	Minneapolis TMC	traffic images	Planned
Speed Monitoring Roadside Equipment	Minnesota State Patrol District Office	speed monitoring information	Planned
Speed Monitoring Roadside Equipment	Minnesota State Patrol District Office	speed violation notification	Planned
Speed Monitoring Roadside Equipment	RTMC	speed monitoring information	Planned
SRCC	511 Telephone Information Service	incident information for public	Planned
SRCC	511 Telephone Information Service	road network conditions	Planned
SRCC	511 Traveler Information Website	incident information for public	Planned
SRCC	511 Traveler Information Website	road network conditions	Planned
SRCC	Advanced Pavement Condition and Visibility Warning System Roadside Equipment	environmental sensors control	Planned
SRCC	Advanced Pavement Condition and Visibility Warning System Roadside Equipment	roadway dynamic signage data	Planned
SRCC	Animal Crossing Warning Roadside Equipment	traffic detector control	Planned
SRCC	Bridge Inspection / Structural Monitoring Roadside Equipment	infrastructure monitoring sensor control	Planned
SRCC	Condition Acquisition and Reporting System (CARS)	alert notification	Existing
SRCC	Condition Acquisition and Reporting System (CARS)	maint and constr work plans	Existing
SRCC	Condition Acquisition and Reporting System (CARS)	road network conditions	Existing
SRCC	Condition Acquisition and Reporting System (CARS)	road weather information	Existing
SRCC	Condition Acquisition and Reporting System (CARS)	work zone information	Existing
SRCC	County Emergency Operations Centers	traffic image data	Planned
SRCC	Dynamic Late Merge Roadside Equipment	work zone warning device control	Existing
SRCC	Dynamic Message Sign Roadside Equipment	roadway dynamic signage data	Existing

Source Element	Destination Element	Flow Name	Flow Status
SRCC	Emergency Vehicle Equipment	emergency dispatch requests	Existing
SRCC	Event Promoters	event confirmation	Existing
SRCC	Highway Advisory Radio Roadside Equipment	roadway dynamic signage data	Existing
SRCC	Infrastructure GIS Database Systems	asset status update	Planned
SRCC	Intelligent Work Zone System Roadside Equipment	roadway dynamic signage data	Planned
SRCC	Intelligent Work Zone System Roadside Equipment	work zone warning device control	Planned
SRCC	Lane Control Roadside Equipment	roadway dynamic signage data	Planned
SRCC	Lane/Ramp Access Control Roadside Equipment	barrier system control	Existing
SRCC	Lane/Ramp Access Control Roadside Equipment	roadway dynamic signage data	Existing
SRCC	Lane/Ramp Access Control Roadside Equipment	video surveillance control	Existing
SRCC	Local TMCs	device control request	Planned
SRCC	Local TMCs	device data	Planned
SRCC	Local TMCs	device status	Planned
SRCC	Local TMCs	emergency traffic coordination	Planned
SRCC	Local TMCs	road network conditions	Planned
SRCC	Local TMCs	traffic images	Planned
SRCC	Maintenance and Construction Management Center	maint and constr resource coordination	Planned
SRCC	Maintenance and Construction Management Center	road network conditions	Existing
SRCC	Maintenance and Construction Management Center	work plan coordination	Planned
SRCC	Maintenance and Construction Vehicle Equipment	environmental sensors control	Existing
SRCC	Maintenance and Construction Vehicle Equipment	maint and constr dispatch information	Existing
SRCC	Maintenance and Construction Vehicle Equipment	maint and constr vehicle system control	Existing
SRCC	Media Outlets	maint and constr work plans	Existing
SRCC	Media Outlets	road weather information	Existing
SRCC	Media Outlets	roadway maintenance status	Existing

Source Element	Destination Element	Flow Name	Flow Status
SRCC	Minnesota State Emergency Operations Center (SEOC)	traffic images	Existing
SRCC	Minnesota State Patrol District Office	incident report	Existing
SRCC	Neighboring State Traffic Management Centers	device control request	Planned
SRCC	Neighboring State Traffic Management Centers	device data	Planned
SRCC	Neighboring State Traffic Management Centers	device status	Planned
SRCC	Neighboring State Traffic Management Centers	emergency traffic coordination	Existing
SRCC	Neighboring State Traffic Management Centers	road network conditions	Existing
SRCC	Neighboring State Traffic Management Centers	traffic images	Existing
SRCC	Neighboring State Traffic Management Centers Roadside Equipment	roadway dynamic signage data	Planned
SRCC	Neighboring State Traffic Management Centers Roadside Equipment	video surveillance control	Planned
SRCC	North/West Passage Corridor Traveler Information Website	current infrastructure restrictions	Planned
SRCC	North/West Passage Corridor Traveler Information Website	maint and constr work plans	Planned
SRCC	North/West Passage Corridor Traveler Information Website	road network conditions	Planned
SRCC	North/West Passage Corridor Traveler Information Website	road weather information	Planned
SRCC	North/West Passage Corridor Traveler Information Website	roadway maintenance status	Planned
SRCC	North/West Passage Corridor Traveler Information Website	work zone information	Planned
SRCC	Oversize Warning Roadside Equipment	roadway dynamic signage data	Existing
SRCC	Red Light Monitoring/Enforcement Roadside Equipment	speed monitoring control	Planned
SRCC	Red Light Monitoring/Enforcement Roadside Equipment	video surveillance control	Planned
SRCC	Roadway Automated Treatment System	roadway treatment system control	Existing
SRCC	Roadway Flooding Warning Roadside Equipment	traffic detector control	Existing
SRCC	Security Monitoring Roadside Equipment	infrastructure monitoring sensor control	Planned

Source Element	Destination Element	Flow Name	Flow Status
SRCC	Security Monitoring Roadside Equipment	secure area sensor control	Planned
SRCC	Security Monitoring Roadside Equipment	secure area surveillance control	Planned
SRCC	Surface Transportation Weather Service Providers	road weather information	Existing
SRCC	Traffic Data and Video Archive	archive analysis requests	Planned
SRCC	Traffic Data and Video Archive	archived data product requests	Planned
SRCC	Traffic Data and Video Archive	traffic archive data	Planned
SRCC	Traffic Detector Roadside Equipment	traffic detector control	Existing
SRCC	Traffic Signal Roadside Equipment	signal control commands	Existing
SRCC	Traffic Signal Roadside Equipment	signal control device configuration	Existing
SRCC	Traffic Signal Roadside Equipment	signal control plans	Existing
SRCC	Traffic Signal Roadside Equipment	signal system configuration	Existing
SRCC	Transportation Information System (TIS)	archive analysis requests	Existing
SRCC	Transportation Information System (TIS)	archive coordination	Existing
SRCC	Transportation Information System (TIS)	archived data product requests	Existing
SRCC	Transportation Information System (TIS)	maint and constr archive data	Existing
SRCC	Transportation Information System (TIS)	traffic archive data	Existing
SRCC	Tunnel Emissions Roadside Equipment	air quality sensor control	Existing
SRCC	Tunnel Emissions Roadside Equipment	secure area surveillance control	Existing
SRCC	Variable Speed Limit Roadside Equipment	roadway dynamic signage data	Planned
Surface Transportation Weather Service Providers	Local Agency Traveler Information Website	transportation weather information	Existing
Surface Transportation Weather Service Providers	Maintenance and Construction Management Center	transportation weather information	Existing
Surface Transportation Weather Service Providers	RTMC	transportation weather information	Existing
Surface Transportation Weather Service Providers	SRCC	transportation weather information	Existing
TPIMS Central Data Repository	Other States TPIMS	archive requests	Planned
TPIMS Central Data Repository	Other States TPIMS	archive status	Planned
TPIMS Central Data Repository	Parking Management System	archive requests	Planned
TPIMS Central Data Repository	Parking Management System	archive status	Planned

Source Element	Destination Element	Flow Name	Flow Status
Traffic Data and Video Archive	Video Monitoring Roadside Equipment	data collection and monitoring control	Existing
Traffic Data and Video Archive	Local TMCs	archive requests	Planned
Traffic Data and Video Archive	Local TMCs	archive status	Planned
Traffic Data and Video Archive	Local TMCs	archived data products	Planned
Traffic Data and Video Archive	RTMC	archive analysis results	Planned
Traffic Data and Video Archive	RTMC	archive coordination	Planned
Traffic Data and Video Archive	RTMC	archive request confirmation	Planned
Traffic Data and Video Archive	RTMC	archive requests	Existing
Traffic Data and Video Archive	RTMC	archive status	Existing
Traffic Data and Video Archive	RTMC	archived data products	Existing
Traffic Data and Video Archive	SRCC	archive analysis results	Planned
Traffic Data and Video Archive	SRCC	archive request confirmation	Planned
Traffic Data and Video Archive	SRCC	archive requests	Planned
Traffic Data and Video Archive	SRCC	archive status	Planned
Traffic Data and Video Archive	SRCC	archived data products	Planned
Traffic Data and Video Archive	Traffic Detector Roadside Equipment	data collection and monitoring control	Existing
Traffic Detector Roadside Equipment	Local TMCs	traffic detector data	Existing
Traffic Detector Roadside Equipment	Minneapolis TMC	traffic detector data	Existing
Traffic Detector Roadside Equipment	Ramp Meter Roadside Equipment	roadway equipment coordination	Existing
Traffic Detector Roadside Equipment	RTMC	traffic detector data	Existing
Traffic Detector Roadside Equipment	SRCC	traffic detector data	Existing
Traffic Detector Roadside Equipment	Traffic Data and Video Archive	roadside archive data	Existing
Traffic Signal Roadside Equipment	Advance Warning Flasher Roadside Equipment	roadway equipment coordination	Existing
Traffic Signal Roadside Equipment	Video Monitoring Roadside Equipment	roadway equipment coordination	Planned
Traffic Signal Roadside Equipment	Video Monitoring Roadside Equipment	signal control data	Planned
Traffic Signal Roadside Equipment	CV Roadside Equipment	conflict monitor status	Planned
Traffic Signal Roadside Equipment	CV Roadside Equipment	intersection control status	Planned

Source Element	Destination Element	Flow Name	Flow Status
Traffic Signal Roadside Equipment	Local TMCs	signal control status	Existing
Traffic Signal Roadside Equipment	Local TMCs	signal fault data	Existing
Traffic Signal Roadside Equipment	Minneapolis TMC	right-of-way request notification	Planned
Traffic Signal Roadside Equipment	Minneapolis TMC	signal control status	Planned
Traffic Signal Roadside Equipment	Minneapolis TMC	signal fault data	Planned
Traffic Signal Roadside Equipment	RTMC	right-of-way request notification	Existing
Traffic Signal Roadside Equipment	RTMC	signal control status	Existing
Traffic Signal Roadside Equipment	RTMC	signal fault data	Existing
Traffic Signal Roadside Equipment	RTMC	traffic detector data	Existing
Traffic Signal Roadside Equipment	SRCC	signal control status	Existing
Traffic Signal Roadside Equipment	SRCC	signal fault data	Existing
Transit Center and Station Surveillance System Roadside Equipment	911 Dispatch Center	alarm notification	Existing
Transit Center and Station Surveillance System Roadside Equipment	County Sheriff and City Police Offices	alarm notification	Existing
Transit Center and Station Surveillance System Roadside Equipment	Light Rail Operations Center	alarm notification	Existing
Transit Center and Station Surveillance System Roadside Equipment	Local Transit Management Centers	alarm notification	Existing
Transit Center and Station Surveillance System Roadside Equipment	Metro Area Transit Management Centers	alarm notification	Existing
Transit Data Archives	Local Transit Management Centers	archive requests	Planned
Transit Data Archives	Local Transit Management Centers	archive status	Planned
Transit Data Archives	Local Transit Management Centers	archived data products	Planned
Transit Data Archives	Metro Area Transit Management Centers	archive requests	Planned
Transit Data Archives	Metro Area Transit Management Centers	archive status	Planned
Transit Data Archives	Metro Area Transit Management Centers	archived data products	Planned
Transit Information Telephone Systems	Intercity Transit Management Centers	transit information user request	Planned
Transit Information Telephone Systems	Local Transit Management Centers	transit information user request	Planned
Transit Information Telephone Systems	User Personal Portable and Computing Devices	personal transit information	Existing
Transit Information Websites	Local Transit Management Centers	demand responsive transit request	Planned
Transit Information Websites	User Personal Portable and Computing Devices	broadcast traveler information	Existing

Source Element	Destination Element	Flow Name	Flow Status
Transit Information Websites	User Personal Portable and Computing Devices	interactive traveler information	Planned
Transit Information Websites	User Personal Portable and Computing Devices	trip plan	Existing
Transit Kiosks	Intercity Transit Management Centers	transit information user request	Planned
Transit Kiosks	Local Transit Management Centers	transit information user request	Planned
Transit Kiosks	Metro Area Transit Management Centers	transit information user request	Existing
Transit Kiosks	Traveler	traveler interface updates	Existing
Transit Kiosks	Traveler Cards	request for payment	Existing
Transit Vehicle Equipment	Commuter Rail Operations Center	alarm notification	Planned
Transit Vehicle Equipment	Commuter Rail Operations Center	transit vehicle conditions	Planned
Transit Vehicle Equipment	Commuter Rail Operations Center	transit vehicle location data	Planned
Transit Vehicle Equipment	Commuter Rail Operations Center	transit vehicle schedule performance	Planned
Transit Vehicle Equipment	CV Roadside Equipment	local signal priority request	Planned
Transit Vehicle Equipment	CV Roadside Equipment	vehicle location and motion	Planned
Transit Vehicle Equipment	CV Roadside Equipment	vehicle location and motion for surveillance	Planned
Transit Vehicle Equipment	CV Roadside Equipment	vehicle path prediction	Planned
Transit Vehicle Equipment	CV Roadside Equipment	vehicle situation data	Planned
Transit Vehicle Equipment	Driver	driver updates	Planned
Transit Vehicle Equipment	Intercity Transit Management Centers	alarm notification	Planned
Transit Vehicle Equipment	Intercity Transit Management Centers	transit vehicle schedule performance	Existing
Transit Vehicle Equipment	Lane/Ramp Access Control Roadside Equipment	gate system activation	Planned
Transit Vehicle Equipment	Light Rail Operations Center	alarm notification	Existing
Transit Vehicle Equipment	Light Rail Operations Center	demand response passenger and use data	Planned
Transit Vehicle Equipment	Light Rail Operations Center	fare collection data	Planned
Transit Vehicle Equipment	Light Rail Operations Center	secure area surveillance data	Existing

Source Element	Destination Element	Flow Name	Flow Status
Transit Vehicle Equipment	Light Rail Operations Center	transit traveler request	Planned
Transit Vehicle Equipment	Light Rail Operations Center	transit vehicle conditions	Existing
Transit Vehicle Equipment	Light Rail Operations Center	transit vehicle loading data	Planned
Transit Vehicle Equipment	Light Rail Operations Center	transit vehicle location data	Existing
Transit Vehicle Equipment	Light Rail Operations Center	transit vehicle schedule performance	Existing
Transit Vehicle Equipment	Local Transit Management Centers	transit vehicle conditions	Existing
Transit Vehicle Equipment	Local Transit Management Centers	transit vehicle schedule performance	Planned
Transit Vehicle Equipment	Metro Area Transit Management Centers	alarm notification	Existing
Transit Vehicle Equipment	Metro Area Transit Management Centers	demand response passenger and use data	Existing
Transit Vehicle Equipment	Metro Area Transit Management Centers	fare collection data	Existing
Transit Vehicle Equipment	Metro Area Transit Management Centers	transit vehicle conditions	Existing
Transit Vehicle Equipment	Metro Area Transit Management Centers	transit vehicle location data	Existing
Transit Vehicle Equipment	Metro Area Transit Management Centers	transit vehicle schedule performance	Existing
Transit Vehicle Equipment	Traffic Signal Roadside Equipment	local signal priority request	Existing
Transit Vehicle Equipment	Traveler	traveler interface updates	Planned
Transit Vehicle Equipment	Traveler Cards	request for payment	Existing
Transit Vehicle Operator	Local Transit Management Centers	transit vehicle operator availability	Planned
Transit Vehicle Operator	Metro Area Transit Management Centers	transit vehicle operator availability	Planned
Transportation Information System (TIS)	Condition Acquisition and Reporting System (CARS)	archive requests	Existing
Transportation Information System (TIS)	Condition Acquisition and Reporting System (CARS)	archive status	Existing
Transportation Information System (TIS)	Minneapolis TMC	archive analysis results	Planned
Transportation Information System (TIS)	Minneapolis TMC	archived data products	Planned
Transportation Information System (TIS)	RTMC	archive analysis results	Existing

Source Element	Destination Element	Flow Name	Flow Status
Transportation Information System (TIS)	RTMC	archive coordination	Existing
Transportation Information System (TIS)	RTMC	archive requests	Existing
Transportation Information System (TIS)	RTMC	archive status	Existing
Transportation Information System (TIS)	RTMC	archived data products	Existing
Transportation Information System (TIS)	RWIS Central Control System	archive coordination	Existing
Transportation Information System (TIS)	SRCC	archive analysis results	Existing
Transportation Information System (TIS)	SRCC	archive coordination	Existing
Transportation Information System (TIS)	SRCC	archive requests	Existing
Transportation Information System (TIS)	SRCC	archive status	Existing
Transportation Information System (TIS)	SRCC	archived data products	Existing
Traveler	Transit Kiosks	traveler input	Existing
Traveler	Traveler Information and Parking Kiosks	traveler input	Planned
Traveler	User Personal Portable and Computing Devices	traveler input	Existing
Traveler Cards	Parking Management Roadside Equipment	payment	Existing
Traveler Cards	Transit Kiosks	payment	Existing
Traveler Cards	Transit Vehicle Equipment	payment	Existing
Traveler Information and Parking Kiosks	Condition Acquisition and Reporting System (CARS)	traveler request	Planned
Traveler Information and Parking Kiosks	Traveler	traveler interface updates	Planned
Truck Center	CVO Information Requestor	cv driver record	Existing
Truck Center	IFTA Clearinghouse	credential fee coordination	Existing
Truck Center	IFTA Clearinghouse	credentials information	Existing
Truck Center	IFTA Clearinghouse	credentials status information	Existing
Truck Center	IFTA Clearinghouse	safety inspection report	Planned
Truck Center	IRP Clearinghouse	border clearance status	Existing
Truck Center	IRP Clearinghouse	credential fee coordination	Existing
Truck Center	IRP Clearinghouse	credentials information	Existing

Source Element	Destination Element	Flow Name	Flow Status
Truck Center	IRP Clearinghouse	credentials status information	Existing
Truck Center	IRP Clearinghouse	safety inspection report	Existing
Truck Center	Motor Carrier Registration System	credentials information	Existing
Truck Center	Private Fleet and Freight Management Center	freight-specific traveler information	Existing
Truck Center	Private Fleet and Freight Management Center	route restrictions	Existing
Tunnel Emissions Roadside Equipment	Minnesota State Patrol District Office	secure area sensor data	Existing
Tunnel Emissions Roadside Equipment	Minnesota State Patrol District Office	secure area surveillance data	Existing
Tunnel Emissions Roadside Equipment	SRCC	air quality sensor data	Existing
Tunnel Emissions Roadside Equipment	SRCC	secure area surveillance data	Existing
UMD Transportation Data Research Laboratory (TDRL)	RWIS Central Control System	archive requests	Existing
UMD Transportation Data Research Laboratory (TDRL)	RWIS Central Control System	archive status	Existing
UMD Transportation Data Research Laboratory (TDRL)	User Personal Portable and Computing Devices	archived data products	Existing
User Personal Portable and Computing Devices	511 Telephone Information Service	traveler request	Existing
User Personal Portable and Computing Devices	511 Telephone Information Service	user profile	Planned
User Personal Portable and Computing Devices	511 Traveler Information Website	emergency traveler information request	Existing
User Personal Portable and Computing Devices	511 Traveler Information Website	traveler request	Existing
User Personal Portable and Computing Devices	511 Traveler Information Website	trip confirmation	Planned
User Personal Portable and Computing Devices	511 Traveler Information Website	trip request	Planned
User Personal Portable and Computing Devices	Intercity Transit Management Centers	transit information user request	Planned
User Personal Portable and Computing Devices	Local Transit Management Centers	transit information user request	Existing
User Personal Portable and Computing Devices	Metro Area Transit Management Centers	transit information user request	Existing
User Personal Portable and Computing Devices	North/West Passage Corridor Traveler Information Website	emergency traveler information request	Planned
User Personal Portable and Computing Devices	North/West Passage Corridor Traveler Information Website	travel services request	Planned
User Personal Portable and Computing Devices	North/West Passage Corridor Traveler Information Website	traveler request	Planned

Source Element	Destination Element	Flow Name	Flow Status
User Personal Portable and Computing Devices	North/West Passage Corridor Traveler Information Website	trip confirmation	Planned
User Personal Portable and Computing Devices	North/West Passage Corridor Traveler Information Website	trip request	Planned
User Personal Portable and Computing Devices	North/West Passage Corridor Traveler Information Website	user profile	Planned
User Personal Portable and Computing Devices	Private Information Service Providers	trip request	Existing
User Personal Portable and Computing Devices	Transit Information Telephone Systems	transit information user request	Existing
User Personal Portable and Computing Devices	Transit Information Websites	traveler request	Existing
User Personal Portable and Computing Devices	Transit Information Websites	trip request	Existing
User Personal Portable and Computing Devices	Transit Information Websites	user profile	Existing
User Personal Portable and Computing Devices	Traveler	traveler interface updates	Existing
Variable Speed Limit Roadside Equipment	Driver	driver information	Existing
Variable Speed Limit Roadside Equipment	Lane Control Roadside Equipment	roadway equipment coordination	Existing
Variable Speed Limit Roadside Equipment	Minnesota State Patrol District Office	roadway dynamic signage status	Planned
Variable Speed Limit Roadside Equipment	RTMC	roadway dynamic signage status	Existing
Variable Speed Limit Roadside Equipment	SRCC	roadway dynamic signage status	Planned
Vehicle	Automated Crash Notification System	emergency notification	Planned
Vehicle	CV Roadside Equipment	vehicle location and motion	Planned
Vehicle	CV Roadside Equipment	vehicle location and motion for surveillance	Planned
Vehicle	CV Roadside Equipment	vehicle payment information	Planned
Vehicle	CV Roadside Equipment	vehicle profile	Planned
Vehicle	CV Roadside Equipment	vehicle situation data	Planned
Vehicle	Driver	driver updates	Planned
Vehicle	Private Information Service Providers	trip request	Existing
Vehicle Occupancy Monitoring/Enforcement Roadside Equipment	Minnesota State Patrol District Office	speed violation notification	Planned
Virtual Weigh Stations	Commercial Vehicles	request tag data	Planned
Weigh In Motion (WIM) Stations	Commercial Vehicles	request tag data	Existing

Architecture Flow Definitions

Flow Name	Description
air quality sensor control	Data used to configure and control area pollution and air quality sensors.
air quality sensor data	Measured air quality data, including measured levels of atmospheric pollutants including ozone, particulate matter, carbon monoxide, and nitrogen oxides, and operational status of the sensors.
alarm acknowledge	Confirmation that alarm was received, instructions and additional information for the alarm initiator, and requests for additional information.
alarm notification	Notification of activation of an audible or silent alarm by a traveler in a public area or by a transit vehicle operator using an on-board device.
alert notification	Notification of a major emergency such as a natural or man-made disaster, civil emergency, or child abduction for distribution to the public. The flow identifies the alert originator, the nature of the emergency, the geographic area affected by the emergency, the effective time period, and information and instructions necessary for the public to respond to the alert. This flow may also identify specific information that should not be released to the public.
alert notification coordination	Coordination of emergency alerts to be distributed to the public. This includes notification of a major emergency such as a natural or man-made disaster, civil emergency, or child abduction for distribution to the public and status of the public notification.
alert status	Information indicating the current status of the emergency alert including identification of the traveler and driver information systems that are being used to provide the alert.
alerts and advisories	Assessments (general incident and vulnerability awareness information), advisories (identification of threats or recommendations to increase preparedness levels), and alerts (information on imminent or in-progress emergencies). This flow also provides supporting descriptive detail on incidents, threats, and vulnerabilities to increase preparedness and support effective response to threats against the surface transportation system.
alternate mode information	Schedule information for alternate mode transportation providers such as air, ferry, and passenger-carrying heavy rail.
archive analysis requests	A user request that initiates data mining, analytical processing, aggregation or summarization, report formulation, or other advanced processing and analysis of archived data. The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.
archive analysis results	Processed information products, supporting meta data, and any associated transaction information resulting from data mining, analytical processing, aggregation or summarization, report formulation, or other on-line processing and analysis of archived data.
archive coordination	Catalog data, meta data, published data, and other information exchanged between archives to support data synchronization and satisfy user data requests.
archive request confirmation	Confirmation that an archive request has been received and processed with information on the disposition of the request.
archive requests	A request to a data source for information on available data (i.e., "catalog") or a request that defines the data to be archived. The request can be a general subscription intended to initiate a continuous or regular data stream or a specific request intended to initiate a one-time response from the recipient.
archive status	Notification that data provided to an archive contains erroneous, missing, or suspicious data or verification that the data provided appears valid. If an error has been detected, the offending data and the nature of the potential problem are identified.
archived data product requests	A user-specified request for archived data products (i.e., data, meta data, or data catalogs). The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.
archived data products	Raw or processed data, meta data, data catalogs and other data products provided to a user system upon request. The response may also include any associated transaction information.
asset inventory	Information on pavement, bridges, signs and other assets. This includes asset location, installation information, materials information, vendor/contractor information, current maintenance status, and a variety of other information (e.g., video logs) that define the transportation infrastructure.
asset restrictions	Restrictions levied on transportation asset usage based on infrastructure design, surveys, tests, or analyses. This includes standard height, width, and weight restrictions by facility as well as special restrictions such as spring weight restrictions and temporary bridge weight restrictions.

Flow Name	Description
asset status update	Changes to status of pavement, bridges, signs and other assets resulting from maintenance or construction activities or infrastructure monitoring. The updates may include changes in installation information, materials information, vendor/contractor information, condition, and current maintenance status. In addition to infrastructure asset updates, the information provided may also include status of the maintenance and construction support assets, including vehicle and equipment utilization and repair records.
automated lane control data	Control commands and operating parameters provided to RSEs that control and monitor automated vehicle operations, including tightly coupled platooned groups of vehicles operating in dedicated or mixed-mode lanes. This flow includes platoon parameters including maximum platoon size, target speeds and gaps, and vehicle restrictions.
automated lane status	Current operational status of lanes supporting automated vehicle operations. The flow includes the status of the RSEs, associated field equipment, and vehicles using the facility.
barrier system control	Information used to configure and control barrier systems that are represented by gates, barriers and other automated or remotely controlled systems used to manage entry to roadways.
barrier system status	Current operating status of barrier systems. Barrier systems represent gates, barriers and other automated or remotely controlled systems used to manage entry to roadways. Status of the systems includes operating condition and current operational state.
border clearance event records	Aggregate port clearance event data regarding action taken at border, including acceptance or override of system decisions, and date/time stamps.
border clearance status	Notification regarding the crossing status of commercial freight shipment scheduled to enter the U.S. Includes portions of border agency and transportation agency clearance results, as they become available.
broadcast traveler information	General traveler information that contains traffic and road conditions, link travel times, incidents, advisories, restrictions, transit service information, weather information, parking information, and other related traveler information.
conflict monitor status	A control flow that supports failsafe operation in the event that a conflict is detected that requires the RSE to enter a failsafe operating mode.
credential fee coordination	Jurisdiction's rates for various credentials (IRP, IFTA, etc.) that are exchanged between agencies.
credentials information	Response containing full vehicle fuel tax and registration credentials information. "Response" may be provided in reaction to a real-time query or a standing request for updated information. The query flow is not explicitly shown.
credentials status information	Credentials information such as registration, licensing, insurance, check flags, and electronic screening enrollment data. A unique identifier is included. Corresponds to the credentials portion of CVISN "snapshots." The status information may be provided as a response to a real-time query or as a result of a standing request for updated information (subscription). This may also include information about non-U.S. fleets for use by U.S. authorities, and information regarding U.S. fleets made available to Mexican and Canadian authorities. The query flow is not explicitly shown.
current infrastructure restrictions	Restrictions levied on transportation asset usage based on infrastructure design, surveys, tests, or analyses. This includes standard facility design height, width, and weight restrictions, special restrictions such as spring weight restrictions, and temporary facility restrictions that are imposed during maintenance and construction.
cv driver record	Information typically maintained by a state driver licensing agency about a driver of a commercial vehicle including driver identification data, license data, permit data, and driving history details. The query flow is not explicitly shown.
data collection and monitoring control	Information used to configure and control data collection and monitoring systems.
demand response passenger and use data	Data collected on board a demand response vehicle relating to the picking up and discharging of passengers.
demand responsive transit plan	Plan regarding overall demand responsive transit schedules and deployment.
demand responsive transit request	Request for paratransit support.
device control request	Request for device control action
device data	Data from detectors, environmental sensor stations, roadside equipment, and traffic control devices, including device inventory information.

Flow Name	Description
device identification	An identifier and device type designation that is used to uniquely identify a device in the Connected Vehicle Environment.
device status	Status information from devices
driver information	Regulatory, warning, and guidance information provided to the driver while en route to support safe and efficient vehicle operation.
driver input	Driver input to the vehicle on-board equipment including configuration data, settings and preferences, interactive requests, and control commands.
driver parking information	Presentation of general parking information to drivers including lot status, parking availability, and directions to available spaces, entrances, and exits.
driver to fleet request	Requests from the driver and vehicle for routing, payment, and enrollment information.
driver updates	Information provided to the driver including visual displays, audible information and warnings, and haptic feedback. The updates inform the driver about current conditions, potential hazards, and the current status of vehicle on-board equipment.
emergency acknowledge	Acknowledge request for emergency assistance and provide additional details regarding actions and verification requirements.
emergency archive data	Logged emergency information including information that characterizes identified incidents (routine highway incidents through disasters), corresponding incident response information, evacuation information, surveillance data, threat data, and resource information. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
emergency data request	A request for additional information or a control command issued by the emergency response agency in response to an emergency request for assistance from a traveler.
emergency dispatch requests	Emergency vehicle dispatch instructions including incident location and available information concerning the incident.
emergency dispatch response	Request for additional emergency dispatch information and provision of en route status.
emergency notification	An emergency request for assistance that is automatically initiated by a vehicle or manually initiated by a vehicle occupant. The request includes call-back number, date, time, location, pre-event vehicle heading, vehicle make, model, model year, and fuel type, and crash severity indicators. Crash severity indicators include: airbags deployed, number of impacts, crash delta velocity, principle direction of force, and rollover indication. In addition, seatbelt restraint use, number of occupants, occupant location, and intrusion may be included. For commercial vehicles, this flow may also include freight equipment type (box, flatbed, trailer, container, etc.), type of cargo (refrigerated, non-perishable, liquid, etc.), hazardous material data, quantity of cargo, and cargo permits as applicable (hazmat, special routing permissions).
emergency plan coordination	Information that supports coordination of emergency management plans, continuity of operations plans, emergency response and recovery plans, evacuation plans, and other emergency plans between agencies. This includes general plans that are coordinated prior to an incident and shorter duration tactical plans that are prepared during an incident.
emergency route request	Request for access routes for emergency response vehicles and equipment. This may be a request for ingress or egress routes or other emergency routes.
emergency routes	Suggested ingress and egress routes for access to and between the scene and staging areas or other specialized emergency access routes.
emergency traffic control information	Status of a special traffic control strategy or system activation implemented in response to an emergency traffic control request, a request for emergency access routes, a request for evacuation, a request to activate closure systems, a request to employ driver information systems to support public safety objectives, or other special requests. Identifies the selected traffic control strategy and system control status.
emergency traffic control request	Special request to preempt the current traffic control strategy in effect at one or more signalized intersections or highway segments, activate traffic control and closure systems such as gates and barriers, activate safeguard systems, or use driver information systems. For example, this flow can request all signals to red-flash, request a progression of traffic control preemptions along an emergency vehicle route, request a specific evacuation traffic control plan, request activation of a road closure barrier system, or place a public safety or emergency-related message on a dynamic message sign.

Flow Name	Description
emergency traffic coordination	Coordination supporting disaster response including evacuation and reentry. Includes coordination of special traffic control strategies that support efficient evacuation and reentry while protecting and optimizing movement of response vehicles and other resources responding to the emergency.
emergency transit service request	Request to modify transit service and fare schedules to address emergencies, including requests for transit services to evacuate people from and/or deploy response agency personnel to an emergency scene. The request may poll for resource availability or request pre-staging, staging, or immediate dispatch of transit resources.
emergency transit service response	Response indicating changes to transit service, fares, and/or restrictions that will be made and status of transit resources to be deployed to support emergency response and/or evacuation.
emergency traveler information	Public notification of an emergency such as a natural or man-made disaster, civil emergency, or child abduction. This flow also includes evacuation information including evacuation instructions, evacuation zones, recommended evacuation times, tailored evacuation routes and destinations, traffic and road conditions along the evacuation routes, traveler services and shelter information, and reentry times and instructions.
emergency traveler information request	Request for alerts, evacuation information, and other emergency information provided to the traveling public.
emergency vehicle tracking data	The current location and operating status of the emergency vehicle.
environmental conditions data	Current road conditions (e.g., surface temperature, subsurface temperature, moisture, icing, treatment status) and surface weather conditions (e.g., air temperature, wind speed, precipitation, visibility) as measured and reported by fixed and/or mobile environmental sensors and aggregated by the data collector. Attributes relating to the data collection (and aggregation) are also included.
environmental conditions data status	Status of the data quality of environmental conditions data provided by a data contributor. Includes not only status by sensor, but statistical data regarding the quality checking of data provided.
environmental sensor data	Current road conditions (e.g., surface temperature, subsurface temperature, moisture, icing, treatment status) and surface weather conditions (e.g., air temperature, wind speed, precipitation, visibility) as measured and reported by fixed and/or mobile environmental sensors. Operational status of the sensors is also included.
environmental sensors control	Data used to configure and control environmental sensors.
environmental situation data	Aggregated and filtered vehicle environmental data collected from vehicle safety and convenience systems including measured air temperature, exterior light status, wiper status, sun sensor status, rain sensor status, traction control status, anti-lock brake status, and other collected vehicle system status and sensor information. This information flow represents the aggregated and filtered environmental data sets that are provided by the RSE to the back office center. Depending on the RSE configuration and implementation, the data set may also include environmental sensor station data collected by the RSE.
equipment control commands	System-level control commands issued to the RSE such as reset and remote diagnostics.
evacuation coordination	Coordination of information regarding a pending or in-process evacuation. Includes evacuation zones, evacuation times, evacuation routes, forecast network conditions, and reentry times.
evacuation information	Evacuation instructions and information including evacuation zones, evacuation times, and reentry times.
event confirmation	Confirmation that special event details have been received and processed.
event plans	Plans for major events possibly impacting traffic.
external reports	Traffic and incident information that is collected by the media through a variety of mechanisms (e.g., radio station call-in programs, air surveillance).
fare collection data	Fare collection information including the summary of fare system data and financial payment transaction data.
fare management information	Transit fare information and transaction data used to manage transit fare processing.
field equipment status	Reports from field equipment (sensors, signals, signs, controllers, etc.) which indicate current operational status.
fleet to driver update	Updated instructions to the driver including dispatch, routing, and special instructions, including alerts and other advisories.

Flow Name	Description
freight transportation status	A time-stamped status of a freight shipment as it passes through the supply chain from manufacturer through arrival at its final destination; including cargo movement logs, routing information, and cargo ID's.
freight traveler information preferences	Traveler information preferences from fleet and freight management systems or commercial vehicle drivers including: area covered by fleet/driver, types of freight managed (including special restrictions), preferred routes, other travel preferences pertaining to trip costs or tolls.
freight-specific traveler information	Traveler information customized for freight users to indicate truck routes, permit information, truck stops, inspection stations, steep grades, high-profile vehicle advisories, etc. Information provided includes freight-related road and weather conditions, parking information, and route plans.
gate system activation	This flow represents an automated request from transit vehicles to open and close gates for access into and out of Bus Rapid Transit stations along major roadways.
hazmat information	Information about a particular hazmat load including nature of the load and unloading instructions. May also include hazmat vehicle route and route update information.
hazmat information request	Request for information about a particular hazmat load.
hazmat spill notification	Information provided to emergency response organizations when cargo sensors detect a release of hazardous material. This information will include sensor information, vehicle location and identification, and carrier identification.
host vehicle status	Information provided to the ITS on-board equipment from other systems on the vehicle platform. This includes the current status of the powertrain, steering, and braking systems, and status of other safety and convenience systems. In implementations where GPS is not integrated into the Vehicle On-Board Equipment, the host vehicle is also the source for data describing the vehicle's location in three dimensions (latitude, longitude, elevation) and accurate time that can be used for time synchronization across the ITS environment.
incident command information coordination	Information that supports local management of an incident. It includes resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response.
incident information	Notification of existence of incident and expected severity, location, time and nature of incident. As additional information is gathered and the incident evolves, updated incident information is provided. Incidents include any event that impacts transportation system operation ranging from routine incidents (e.g., disabled vehicle at the side of the road) through large-scale natural or human-caused disasters that involve loss of life, injuries, extensive property damage, and multi-jurisdictional response. This also includes special events, closures, and other planned events that may impact the transportation system.
incident information for media	Report of current desensitized incident information prepared for public dissemination through the media.
incident information for public	Report of current desensitized incident information prepared for public dissemination.
incident report	Report of an identified incident including incident location, type, severity and other information necessary to initiate an appropriate incident response.
incident response coordination	Incident response procedures and current incident response status that are shared between allied response agencies to support a coordinated response to incidents. This flow provides current situation information, including a summary of incident status and its impact on the transportation system and other infrastructure, and current and planned response activities. This flow also coordinates a positive hand off of responsibility for all or part of an incident response between agencies.
incident response status	Status of the current incident response including a summary of incident status and its impact on the transportation system, traffic management strategies implemented at the site (e.g., closures, diversions, traffic signal control overrides), and current and planned response activities.
incident status	Information gathered at the incident site that more completely characterizes the incident and provides current incident response status. This includes notification of medical facility transport and details about the vehicle occupants being transported.
infrastructure monitoring sensor control	Data used to configure and control infrastructure monitoring sensors.

Flow Name	Description
infrastructure monitoring sensor data	Data read from infrastructure-based sensors that monitor the condition or integrity of transportation infrastructure including bridges, tunnels, interchanges, pavement, culverts, signs, transit rail or guideway, and other roadway infrastructure. Includes sensor data and the operational status of the sensors.
infrastructure situation data	Aggregated and filtered vehicle data collected from vehicle safety and convenience systems that are indicative of insfrastructure condition including traction control status, anti-lock brake status, accelerometer status, and other collected vehicle system status and sensor information. This information flow represents the aggregated and filtered environmental data sets that are provided by the RSE to the back office center.
interactive traveler information	Traveler information provided in response to a traveler request. The provided information includes traffic and road conditions, advisories, incidents, payment information, transit services, parking information, weather information, and other travel-related data updates and confirmations.
intersection control status	Status data provided by the traffic signal controller including phase information, alarm status, and priority/preempt status.
intersection geometry	The physical geometry of an intersection covering the location and width of each approaching lane, egress lane, and valid paths between approaches and egresses. This flow also defines the location of stop lines, cross walks, specific traffic law restrictions for the intersection (e.g., turning movement restrictions), and other elements that support calculation of a safe and legal vehicle path through the intersection.
intersection management application info	Intersection and device configuration data, including intersection geometry, and warning parameters and thresholds. This flow also supports remote control of the application so the application can be taken offline, reset, or restarted.
intersection management application status	Infrastructure application status reported by the RSE. This includes current operational state and status of the RSE and a log of operations.
intersection status	Current signal phase and timing information for all lanes at a signalized intersection. This flow identifies active lanes and lanes that are being stopped and specifies the length of time that the current state will persist for each lane. It also identifies signal priority and preemption status and pedestrian crossing status information where applicable.
intersection status monitoring	Current signal phase and timing information for all lanes at a signalized intersection. This flow represents monitoring of communications by a receiver at the intersection to support monitoring for conflicts between actual signal states and RSE communications about those states.
intersection warning	Warning sent from roadside equipment to drivers that entry into an upcoming intersection is unsafe.
lane closure information	Lane closure information provided to passing vehicles. This flow provides information about roadway configuration changes such as lane closures and shifts.
lane management information	System status of managed lanes including current operational state, violations, and logged information. This includes lane usage information including both traditional traffic flow measures and special information associated with managed lanes such as measured passenger occupancies. It also includes the operational status of the lane management equipment.
lighting system control data	Information used to configure and control roadside lighting systems.
lighting system status	Status of roadside lighting controls including operating condition and current operational state.
local signal preemption request	Direct control signal or message to a signalized intersection that results in preemption of the current control plan and grants right-of-way to the requesting vehicle.
local signal priority request	Request from a vehicle to a signalized intersection for priority at that intersection. This flow also allows the vehicle to cancel a priority request (for example, when the vehicle clears the intersection).
local situation data	This general flow represents the traffic, environmental, and emissions situation data that is collected from connected vehicles by an RSE, aggregated, filtered, and provided to a back-office center. It also includes data collected from ITS roadway equipment that provides current intersection and road network status for the area proximate to the RSE.
maint and constr archive data	Information describing road construction and maintenance activities identifying the type of activity, the work performed, and work zone information including work zone configuration and safety (e.g., a record of intrusions and vehicle speeds) information. For construction activities, this information also includes a description of the completed infrastructure, including as-built plans as applicable. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.

Flow Name	Description
maint and constr dispatch information	Information used to dispatch maintenance and construction vehicles, equipment, and crews and information used to keep work zone crews informed. This information includes routing information, traffic information, road restrictions, incident information, environmental information, decision support information, maintenance schedule data, dispatch instructions, personnel assignments, alert notifications, and corrective actions.
maint and constr dispatch status	Current maintenance and construction status including work data, operator status, crew status, and equipment status.
maint and constr resource coordination	Request for road maintenance and construction resources that can be used in the diversion of traffic (cones, portable signs), clearance of a road hazard, repair of ancillary damage, or any other incident response.
maint and constr resource request	Request for road maintenance and construction resources that can be used in the diversion of traffic (cones, portable signs), clearance of a road hazard, repair of ancillary damage, or any other incident response. The request may poll for resource availability or request pre-staging, staging, or immediate dispatch of resources.
maint and constr resource response	Current status of maintenance and construction resources including availability and deployment status. General resource inventory information covering vehicles, equipment, materials, and people and specific resource deployment status may be included.
maint and constr vehicle conditions	Vehicle diagnostics information that is collected, filtered, and selectively reported by a maintenance and construction vehicle. The information includes engine temperature, mileage, tire wear, brake wear, belt wear, and any warnings or alarms concerning the operational condition of the vehicle and ancillary equipment.
maint and constr vehicle location data	The current location and related status (e.g., direction and speed) of the maintenance/construction vehicle.
maint and constr vehicle operational data	Data that describes the maintenance and construction activity performed by the vehicle. Operational data includes materials usage (amount stored and current application rate), operational state of the maintenance equipment (e.g., blade up/down, spreader pattern), vehicle safety status, and other measures associated with the operation of a maintenance, construction, or other special purpose vehicle. Operational data may include basic operational status of the vehicle equipment or a more precise record of the work performed (e.g., application of crack sealant with precise locations and application characteristics).
maint and constr vehicle system control	Configure and control data that supports remote control of on-board maintenance and construction vehicle systems and field equipment that is remotely controlled by the vehicle. For example, the data can be used to adjust material application rates and spread patterns.
maint and constr work plans	Future construction and maintenance work schedules and activities including anticipated closures with anticipated impact to the roadway, alternate routes, anticipated delays, closure times, and durations.
maintenance and repair needs	Recommended strategies and schedules for maintenance of the transportation infrastructure.
parking archive data	Data used to analyze and monitor trends in parking demand, pricing, and operational actions. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
parking availability	Information on available parking. This flow identifies available spaces with associated information about parking restrictions and location for each available space.
parking information	General parking information and status, including current parking availability.
parking operator input	User input from the parking operator to query current status and control the operation of the parking management system.
parking reservation confirmation	Confirmation for parking reservation.
parking reservation request	Reservation request for parking.
parking status	Presentation of information to the parking operator including operational status and transaction reports.
parking traffic information	Instructions for operation of local parking facilities to support regional traffic management objectives (e.g., which parking lot exits to use). Also, includes inputs from traffic sensors to monitor parking queues and support more effective management of parking entrances and exits.
payment	Payment of some kind (e.g., toll, parking, fare) by traveler which, in most cases, can be related to a credit account.

Flow Name	Description
payment instructions	Information provided to configure and support fixed point payment operations including pricing information.
payment request	Request for payment from financial institution.
payment transaction status	The status of an electronic payment transaction provided directly to the driver via sign or other roadside infrastructure.
payment transactions	Detailed list of transactions including violations. Each transaction includes the date/time, vehicle/customer, and transaction amount. Additional information is included to support delayed payment and violation processing.
personal transit information	General and personalized transit information for a particular fixed route, flexible route, or paratransit system.
personnel monitoring	Sensed presence of personnel within a work zone or incident scene that is monitored to enhance safety in work areas proximate to moving traffic.
qualified environmental conditions data	Current road conditions (e.g., surface temperature, subsurface temperature, moisture, icing, treatment status) and surface weather conditions (e.g., air temperature, wind speed, precipitation, visibility) that has had quality checks performed on it and has been formatted and consolidated by the Clarus system. Attributes relating to the data collection (and aggregation) are also included.
rail crossing blockage notification	Notification that a highway-rail intersection is obstructed and supporting information.
rail crossing control data	Data required for HRI information transmitted at railroad grade crossings and within railroad operations.
rail crossing operational status	Status of the highway-rail grade crossing equipment including both the current state or mode of operation and the current equipment condition.
rail crossing request	A request for highway-rail intersection status or a specific control request intended to modify HRI operation.
rail crossing status	Status of the highway-rail intersection equipment including both the current state or mode of operation and the current equipment condition.
reduced speed notification	Reduced speed zone information provided to passing vehicles. This flow provides the reduced speed limit, the location and extent of the reduced speed zone, and associated warning information.
reduced speed warning info	Real time notification of vehicle detections, measured vehicle characteristics (e.g., vehicle height), speed measurements, and warnings issued by roadway infrastructure. This flow can also include roadway configuration data, current speed limits, and warning parameters and thresholds enabling local speed management application configuration and management.
remote surveillance control	The control commands used to remotely operate another center's sensors or surveillance equipment so that roadside surveillance assets can be shared by more than one agency.
request for payment	Request to deduct cost of service from user's payment account.
request tag data	Request for tag information including tag id and associated data.
resource coordination	Coordination of resource inventory information, specific resource status information, resource prioritization and reallocation between jurisdictions, and specific requests for resources and responses that service those requests.
resource deployment status	Status of resource deployment identifying the resources (vehicles, equipment, materials, and personnel) available and their current status. General resource inventory information and specific status of deployed resources may be included.
resource request	A request for resources to implement special traffic control measures, assist in clean up, verify an incident, etc. The request may poll for resource availability or request pre-staging, staging, or immediate deployment of resources. Resources may be explicitly requested or a service may be requested and the specific resource deployment may be determined by the responding agency.
restricted lanes application info	Restricted lane application configuration data and messaging parameters. This flow defines the location, duration, and operating parameters for lanes that are reserved for the exclusive use of certain types of vehicles (e.g., transit vehicles) or vehicles that meet other qualifications (e.g., number of occupants, low emissions criteria). It identifies the lane(s), the start and stop locations, start and end times, vehicle restrictions, speed limits and platooning parameters. This flow also supports remote control of the application so the application can be taken offline, reset, or restarted.

Flow Name	Description
restricted lanes application status	Current RSE application status that is monitored by the back office center including the operational state of the RSE, current configuration parameters, and a log of lane use (aggregate profiles of vehicles that checked in to the lane and reported vehicle speeds in the lanes) and RSE communications activity.
restricted lanes information	This flow defines the location, duration, and operating parameters for lanes that are reserved for the exclusive use of certain types of vehicles (e.g., transit vehicles) or vehicles that meet other qualifications (e.g., number of occupants, low emissions criteria). It identifies the lane(s), the start and stop locations, start and end times, vehicle restrictions, speed limits and platooning parameters.
reversible lane control	Control of automated reversible lane configuration and driver information systems.
reversible lane status	Current reversible lane status including traffic sensor and surveillance data and the operational status and mode of the reversible lane control equipment.
right-of-way request notification	Notice that a request has occurred for signal prioritization, signal preemption, pedestrian call, multi-modal crossing activation, or other source for right-of-way.
road closure application info	Road closure signing application configuration data and messaging parameters. This flow identifies the vehicles that may initiate the road closure. This flow also provides access lists, groups, or classifications where selected vehicles are to be allowed access to the closed area.
road closure application status	Road closure application status reported by the RSE. This includes current operational state and status of the RSE, closure status, and a log of closure commands received and issued. For closures that allow entry by selected vehicles, this flow provides an access log identifying vehicles that have requested access with access status.
road network conditions	Current and forecasted traffic information, road and weather conditions, and other road network status. Either raw data, processed data, or some combination of both may be provided by this flow. Information on diversions and alternate routes, closures, and special traffic restrictions (lane/shoulder use, weight restrictions, width restrictions, HOV requirements) in effect is included.
road network status assessment	Assessment of damage sustained by the road network including location and extent of the damage, estimate of remaining capacity, required closures, alternate routes, necessary restrictions, and time frame for repair and recovery.
road weather information	Road conditions and weather information that are made available by road maintenance operations to other transportation system operators.
roadside archive data	A broad set of data derived from roadside sensors that includes current traffic conditions, environmental conditions, and any other data that can be directly collected by roadside sensors. This data also indicates the status of the sensors and reports of any identified sensor faults.
roadway dynamic signage data	Information used to initialize, configure, and control dynamic message signs. This flow can provide message content and delivery attributes, local message store maintenance requests, control mode commands, status queries, and all other commands and associated parameters that support remote management of these systems.
roadway dynamic signage status	Current operating status of dynamic message signs, highway advisory radios, or other configurable field equipment that provides dynamic information to the driver.
roadway equipment coordination	The direct flow of information between field equipment. This includes transfer of information between sensors and driver information systems (e.g., DMS, HAR, variable speed limit signs, dynamic lane signs) or control devices (e.g., traffic signals, ramp meters), direct coordination between adjacent control devices, interfaces between detection and warning or alarm systems, and any other direct communications between field equipment.
roadway maintenance status	Summary of maintenance fleet operations affecting the road network. This includes the status of winter maintenance (snow plow schedule and current status).
roadway treatment system control	Control data for remotely located, automated devices, that treat the road surface (e.g., de-icing applications).
roadway treatment system status	Current operational status of automated roadway treatment devices (e.g., anti-icing systems).
roadway warning system control	Information used to configure and control roadway warning systems.
roadway warning system status	Current operating status of roadway warning systems.
route assignment	Route assignment information for transit vehicle operator.
route restrictions	Information about routes, road segments, and areas that do not allow the transport of security sensitive hazmat cargoes or include other restrictions (such as height or weight limits).

Flow Name	Description
RSE application information	RSE application configuration data and parameters that are used to control applications and configure the application for a specific local use. This flow also supports remote control of the application so the application can be taken offline, reset, or restarted.
RSE application install/upgrade	This flow supports remote installation and update of software applications residing in the RSE. It supports transmission of the secure software installation files, including executable application code and associated support files.
RSE application status	Monitoring of RSE application status including current mode, operational status, and configuration settings. It includes the status of installed applications and the application-specific data provided by the RSE.
safeguard system control	Data that controls safeguard systems (remotely controlled equipment used to mitigate the impact of incidents on transportation infrastructure, such as blast shields, exhaust systems, etc.).
safeguard system status	Current operating status of safeguard systems (remotely controlled equipment used to mitigate the impact of incidents on transportation infrastructure, such as blast shields, exhaust systems, etc.). Status of the systems includes operating condition and current operational state.
safety inspection report	Report containing results of commercial vehicle safety inspection. The information may be provided as a response to a real-time query or proactively by the source. The query flow is not explicitly shown.
secure area sensor control	Information used to configure and control threat sensors (e.g., thermal, acoustic, radiological, chemical), object, motion and intrusion detection sensors. The provided information controls sensor data collection, aggregation, filtering, and other local processing.
secure area sensor data	Data provided by threat sensors (e.g., thermal, acoustic, radiological, chemical), and intrusion, motion, and object detection sensors in secure areas indicating the sensor's operational status, raw and processed sensor data, and alarm indicators when a threat has been detected.
secure area surveillance control	Information used to configure and control audio and video surveillance systems used for transportation infrastructure security in secure areas. The provided information controls surveillance data collection, aggregation, filtering, and other local processing.
secure area surveillance data	Data collected from surveillance systems used to monitor secure areas. Includes video, audio, processed surveillance data, equipment operational status, and alarm indicators when a threat has been detected.
signal control commands	Control of traffic signal controllers or field masters including clock synchronization.
signal control data	Information used to configure local traffic signal controllers.
signal control device configuration	Data used to configure traffic signal control equipment including local controllers and system masters.
signal control plans	Traffic signal timing parameters including minimum green time and interval durations for basic operation and cycle length, splits, offset, phase sequence, etc. for coordinated systems.
signal control status	Operational and status data of traffic signal control equipment including operating condition and current indications.
signal fault data	Faults reported by traffic signal control equipment.
signal preemption request	Direct request for preemption to a traffic signal controller that results in preemption of the current control plan and grants right-of-way to the requesting vehicle. This flow identifies the required phase and timing of the preemption. This flow may also cancel the preemption request (e.g., when the requesting vehicle clears the intersection).
signal priority service request	A service request for vehicle priority issued to a traffic signal controller that results in green extension or other accommodation for the priority vehicle, within the current signal timing plan. The request includes the priority level, the desired time and duration of service, and the intended travel path through the intersection. This flow also allows the RSE to cancel a previously issued request for priority.
signal priority status	In response to a request for signal priority, this flow indicates the status of the priority or preemption request.
signal service request	A call for service or extension for a signal control phase that is issued by the RSE for connected vehicles approaching an intersection and/or pedestrians at a crosswalk. This flow identifies the desired phase and service time.
signal system configuration	Data used to configure traffic signal systems including configuring control sections and mode of operation (time based or traffic responsive).

Flow Name	Description
speed monitoring control	Information used to configure and control automated speed monitoring, speed warning, and speed enforcement systems.
speed monitoring information	System status including current operational state and logged information including measured speeds, warning messages displayed, and violation records.
speed violation notification	Notification to enforcement agency of detected speed violations. This notification identifies the vehicle and documents the infraction date, time, and location, the measured speed, and current posted speed limit.
speed warning application info	Roadway configuration data, current speed limits including time of day, week, or season speed limits as necessary, and warning parameters and thresholds. This flow also supports remote control of the application so the application can be taken offline, reset, or restarted.
speed warning application status	Speed warning application status reported by the RSE. This includes current operational state and status of the RSE and a record of measured vehicle speeds and notifications, alerts, and warnings issued.
suggested route	Suggested route for a dispatched emergency or maintenance vehicle that may reflect current network conditions and the additional routing options available to en route emergency or maintenance vehicles that are not available to the general public.
tag confirmation	Message received by Minnesota State Patrol Emergency Vehicle that sufficient toll amount has been paid.
tag data	Unique tag ID and related vehicle information.
threat information	Threats regarding transportation infrastructure, facilities, or systems detected by a variety of methods (sensors, surveillance, threat analysis of advisories from outside agencies, etc.
toll data	Current toll schedules for different types of vehicles as well as advanced toll payment information.
toll data request	Request made to obtain toll schedule information or pay a toll in advance. The request can be a subscription that initiates as-needed information updates as well as a one-time request for information.
track status	Current status of the wayside equipment and notification of an arriving train.
traffic archive data	Information describing the use and vehicle composition on transportation facilities and the traffic control strategies employed. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
traffic detector control	Information used to configure and control traffic detector systems such as inductive loop detectors and machine vision sensors.
traffic detector data	Raw and/or processed traffic detector data which allows derivation of traffic flow variables (e.g., speed, volume, and density measures) and associated information (e.g., congestion, potential incidents). This flow includes the traffic data and the operational status of the traffic sensor system.
traffic image data	This flow represents the flow of traffic image data from roadside equipment to agencies and among transportation agencies.
traffic images	High fidelity, real-time traffic images suitable for surveillance monitoring by the operator or for use in machine vision applications. This flow includes the images and meta data that describes the images.
traffic information for media	Report of traffic conditions including traffic incident reports for public dissemination through the media. The reports may also include information on diversions and alternate routes, closures, and special traffic restrictions in effect.
traffic metering control	Control commands and operating parameters for ramp meters, interchange meters, mainline meters, and other systems equipment associated with roadway metering operations.
traffic metering status	Current operational status and operating parameters for ramp meters, interchange meters, mainline meters and other control equipment associated with roadway metering operations.
traffic situation data	Current, aggregate traffic data collected from connected vehicles that can be used to supplement or replace information collected by roadside traffic detectors. It includes raw and/or processed reported vehicle speeds, counts, and other derived measures. Raw and/or filtered vehicle control events may also be included to support incident detection.
transaction status	Response to transaction request. Normally dealing with a request for payment.
transit and fare schedules	Transit service information including routes, schedules, and fare information.
transit archive data	Data used to describe and monitor transit demand, fares, operations, and system performance. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.

Flow Name	Description
transit emergency data	Initial notification of transit emergency at a transit stop or on transit vehicles and further coordination as additional details become available and the response is coordinated.
transit information for media	Report of transit schedule deviations for public dissemination through the media.
transit information user request	Request for special transit routing, real-time schedule information, and availability information.
transit park and ride information	Detailed transit information to support parking and ride operations. This includes transit scheduled and actual arrival times at the park and ride facility and services offered by arriving transit vehicles.
transit schedule information	Current and projected transit schedule information used to initialize the transit vehicle with a vehicle assignment, monitor schedule performance, and develop corrective actions on-board.
transit service coordination	Schedule coordination or AVL information shared between local/regional transit organizations. This includes coordination of connections between transit properties.
transit service information	Transit service information including routes, schedules, and fare information as well as dynamic transit schedule adherence and transit vehicle location information.
transit travel time estimates	Transit travel time estimates sent from the Metro Transit Control Center to roadside equipment displaying transit travel times alongside vehicular travel times that are estimated by MnDOT RTMC.
transit traveler information	Transit information prepared to support transit users and other travelers. It contains transit schedules, real-time arrival information, fare schedules, alerts and advisories, and general transit service information.
transit traveler request	Request by a Transit traveler to summon assistance, request transit information, or request any other transit services.
transit vehicle conditions	Operating conditions of transit vehicle (e.g., engine running, oil pressure, fuel level and usage).
transit vehicle loading data	Data collected on board the transit vehicle relating to passenger boarding and alighting.
transit vehicle location data	Current transit vehicle location and related operational conditions data provided by a transit vehicle.
transit vehicle operator availability	Transit vehicle operator availability data that can be used to develop vehicle operator assignments and detailed operations schedules.
transit vehicle operator information	Transit service instructions, wide area alerts, traffic information, road conditions, and other information for both transit and paratransit operators.
transit vehicle schedule performance	Estimated times of arrival and anticipated schedule deviations reported by a transit vehicle.
transportation operational strategies	Operational strategies for each operating agency in a transportation corridor, downtown area, or other travel-impacted area, providing an integrated operations strategy for the freeways, tollways, arterials, transit services, parking facilities, and other transportation-related facilities in the area. These strategies can include dynamic adjustments to transit fares and tolls, parking fees and restrictions, dynamic lane restriction changes, and other active demand management strategies.
transportation system status	Current status and condition of transportation infrastructure (e.g., tunnels, bridges, interchanges, TMC offices, maintenance facilities). In case of disaster or major incident, this flow provides an assessment of damage sustained by the surface transportation system including location and extent of the damage, estimate of remaining capacity and necessary restrictions, and time frame for repair and recovery.
transportation weather information	Current and forecast road conditions and weather information (e.g., surface condition, flooding, wind advisories, visibility, etc.) associated with the transportation network. This information is of a resolution, timeliness, and accuracy to be useful in transportation decision making.
travel services information	Travel service information and reservations for tourist attractions, lodging, dining, service stations, emergency services, and other services and businesses of interest to the traveler.
travel services request	Request for travel service information including tourist attractions, lodging, restaurants, service stations, and emergency services. The request identifies the type of service, the area of interest, optional reservation request information, parameters that are used to prioritize or filter the returned information, and sorting preferences.
traveler input	User input from a traveler to summon assistance, request travel information, make a reservation, or request any other traveler service.

Flow Name	Description
traveler interface updates	Visual or audio information (e.g., routes, messages, guidance, emergency information) that is provided to the traveler.
traveler request	A request for traveler information including traffic, transit, toll, parking, road weather conditions, event, and passenger rail information. The request identifies the type of information, the area of interest, parameters that are used to prioritize or filter the returned information, and sorting preferences.
trip confirmation	Acknowledgement by the driver/traveler of acceptance of a trip plan with associated personal and payment information required to confirm reservations.
trip plan	A travel itinerary identifying a route and associated traveler information and instructions identifying recommended modes and transfer information, ride sharing options, and transit and parking reservation information.
trip request	Request for trip planning services that identifies the trip origin, destination(s), timing, preferences, and constraints. The request may also include the requestor's location or a request for transit and parking reservations and ridesharing options associated with the trip.
user profile	Information provided to register for a travel service and create a user account. The provided information includes personal identification, traveler preferences (e.g., maximum transfer wait time, maximum walking distance, mode preferences, special needs), device information, a user ID and password, and information to support payment transactions, if applicable.
vehicle commands	System-level control commands issued to vehicle equipment such as reset and remote diagnostics.
vehicle configuration settings	Control settings and parameters that are used to configure vehicle equipment.
vehicle diagnostic data	Information about the vehicle and its current operational status that supports vehicle performance monitoring, service, and repair. The flow identifies the vehicle and vehicle type and provides information about the vehicle's current operational status, the current performance of engine-related and other components, and notification of any identified malfunctions.
vehicle environmental data	Data from vehicle safety and convenience systems that can be used to estimate environmental and infrastructure conditions, including measured air temperature, exterior light status, wiper status, sun sensor status, rain sensor status, traction control status, anti-lock brake status, vertical acceleration and other collected vehicle system status and sensor information. The collected data is reported along with the location, heading, and time that the data was collected. Both current data and snapshots of recent events (e.g., traction control or anti-lock brake system activations) may be reported.
vehicle location and motion	Data describing the vehicle's position, heading, speed, acceleration, transmission, steering wheel angle, braking status, size information, and trajectory.
vehicle location and motion for surveillance	Data describing the vehicle's position, heading, speed, acceleration, transmission, steering wheel angle, braking status, size information, and trajectory. This flow represents monitoring of basic safety data ('vehicle location and motion') broadcast by passing connected vehicles for use in vehicle detection and traffic monitoring applications.
vehicle path prediction	The predicted future vehicle path of travel. This flow includes an indication of the future positions of the transmitting vehicle that can be used by receiving vehicles to support coordinated driving manuevers and enhance in-lane and out-of-lane threat classification.
vehicle payment information	Information provided for payment of tolls, parking, and other transportation fees including identification that can be used to identify the payment account or source and related vehicle and service information that are used to determine the type and price of service requested. The information exchange normally supports an account debit to pay fees, but an account credit may be initiated where pricing strategies include incentives.
vehicle payment request	Request for information supporting payments. For fee structures that include incentives, the request may support either an account debit or an account credit or reimbursement.
vehicle payment update	Data written to vehicle equipment to support electronic toll collection or parking payment.
vehicle profile	Information about a vehicle such as vehicle make and model, fuel type, engine type, size and weight, vehicle performance and level of control automation, average emissions, average fuel consumption, passenger occupancy, or other data that can be used to classify vehicle eligibility for access to specific lanes, road segments, or regions or participation in cooperative vehicle control applications.
vehicle service information	Vehicle problem diagnosis information and available vehicle service options, along with information about how to make a service reservation.
vehicle service request	Request for a service reservation from a connected vehicle.

Flow Name	Description
vehicle service response	Response to a request for service reservation.
vehicle signage application info	In-vehicle signing application configuration data and messaging parameters. This flow provides a list of regulatory, warning, and information messages to be displayed and parameters that support scheduling and prioritizing messages to be issued to passing vehicles. This flow also supports remote control of the application so the application can be taken offline, reset, or restarted.
vehicle signage application status	In-vehicle signing application status reported by the RSE. This includes current operational state and status of the RSE and a log of messages sent to passing vehicles.
vehicle signage data	In-vehicle signing data that augments regulatory, warning, and informational road signs and signals. The information provided would include static sign information (e.g., stop, curve warning, guide signs, service signs, and directional signs) and dynamic information (e.g., current signal states, grade crossing information, local traffic and road conditions, detours, advisories, and warnings).
vehicle signage local data	Information provided by adjacent field equipment to support in-vehicle signing of dynamic information that is currently being displayed to passing drivers. This includes the dynamic information (e.g., current signal states, grade crossing information, local traffic and road conditions, detours, advisories, parking availability, etc.) and control parameters that identify the desired timing, duration, and priority of the signage data.
vehicle situation data	This flow represents vehicle snapshots that may be provided by the vehicle to support traffic and environmental conditions monitoring. Snapshots are collected by the vehicle for specific events (e.g., when a sensor exceeds a threshold) or periodically and reported based on control parameters when communications is available. Traffic-related data includes snapshots of measured speed and heading and events including starts and stops, speed changes, and other vehicle control events. Environmental data may include measured air temperature, exterior light status, wiper status, sun sensor status, rain sensor status, traction control status, anti-lock brake status, and other collected vehicle system status and sensor information. The collected data is reported along with the location, heading, and time that the data was collected.
vehicle situation data parameters	A request for vehicle situation data that includes parameters used to control the data that is reported and the flow of data reported by the vehicle. This flow identifies the type of data/snapshots that are requested and reporting parameters such as snapshot frequency, filtering criteria (data thresholds for reporting), and reporting interval.
vehicle software install/upgrade	This flow supports installation and update of software residing in vehicle on-board equipment. It supports download of the software installation files, including executable code and associated support files.
video surveillance control	Information used to configure and control video surveillance systems.
voice-based alert notification	Information to be distributed to the traveling public via voice regarding a major emergency such as a natural or man-made disaster, civil emergency, severe weather or child abduction. The flow may identify the alert originator, the nature of the emergency, the geographic area affected by the emergency, the effective time period, and information and instructions necessary for the public to respond to the alert. The content of this architecture flow may be specially formatted for voice-based traveler information.
voice-based traveler information	Traveler information sent to the telecommunications systems for traveler information terminator. This flow may represent the bulk transfer of traveler information, including traffic conditions, incident information, transit information and weather and road condition information. It may be specially formatted for voice-based traveler information.
voice-based traveler request	The electronic traveler information request from the telecommunications systems for traveler information terminator. It may be specifically formatted for voice-based traveler requests. The request can be a general subscription intended to initiate a continuous or regular data stream or a specific request intended to initiate a one-time response from the recipient.
weather archive data	Accumulated forecasted and current weather data (e.g., temperature, pressure, wind speed, wind direction, humidity, precipitation, visibility, light conditions, etc.) as well as qualified environmental sensor data. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
weather information	Accumulated forecasted and current weather data (e.g., temperature, pressure, wind speed, wind direction, humidity, precipitation, visibility, light conditions, etc.).
work plan coordination	Coordination of work plan schedules and activities between maintenance and construction organizations or systems. This information includes the work plan schedules and comments and suggested changes that are exchanged as work plans are coordinated and finalized.

Flow Name	Description
work zone information	Summary of maintenance and construction work zone activities affecting the road network including the nature of the maintenance or construction activity, location, impact to the roadway, expected time(s) and duration of impact, anticipated delays, alternate routes, and suggested speed limits. This information may be augmented with images that provide a visual indication of current work zone status and traffic impacts.
work zone safety application info	Work zone safety application configuration data and warning parameters and thresholds. This includes work zone configuration including geofenced crew areas and travel lanes that provide a safety boundary between work zone personnel and passing vehicles. This flow also supports remote control of the application so the application can be taken offline, reset, or restarted.
work zone safety application status	Work zone safety application status reported by the RSE. This includes current operational state and status of the RSE and a record of identified work zone safety alerts and warnings issued.
work zone warning	Warnings provided to field personnel, indicating a work zone emergency or safety issue such as the intrusion of a vehicle into the work zone area or movement of personnel into the travel lanes.
work zone warning device control	Data used to configure and control work zone safety monitoring and warning devices.
work zone warning notification	Notification of a work zone emergency or safety issue. This flow identifies that a work zone emergency or safety issue has occurred so that warnings may be generated by more than one system in the work zone.
work zone warning status	Status of a work zone safety monitoring and warning devices. This flow documents system activations and includes additional supporting information (e.g., an image) that allows verification of the alarm.

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10 ITS Standards

Standardizing the flow of information between the systems is essential to cost-effectively integrating ITS throughout the region. ITS standards are fundamental to the establishment of an open ITS environment that achieves the goal of interoperability for ITS. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances and new approaches evolve.

Establishing standards for exchanging information among ITS systems is important not only from an interoperability point of view; it also provides interchangeability and expandability thereby reducing risk and cost. Since an agency using standardized interfaces can select among multiple vendors for products and applications, competition is maintained and prices are lower in the long term.

Standards Development Organizations (SDO) are developing ITS standards that support interoperability and interchangeability. Several of the communication standards overlap in applicability. This provides flexibility in the design of ITS systems allowing agencies to choose the most applicable standard for their needs. Before systems are designed, all stakeholders involved in the applicable ITS service(s) should decide upon the standards and their specifics that will be used. Once a decision is made, all future systems should use the agreed upon standards.

Table 8 – ITS Standards

SDO	Document ID	Standard Title	Standard Type
American Public Transportation Association	APTA TCIP-S-001 3.0.4	Standard for Transit Communications Interface Profiles	Message/Data
American Society for Testing and Materials	ASTM E2468-05	Standard Practice for Metadata to Support Archived Data Management Systems	Message/Data
American Society for Testing and Materials	ASTM E2665-08	Standard Specifications for Archiving ITS-Generated Traffic Monitoring Data	Message/Data
Consortium of AASHTO, ITE, and NEMA	NTCIP 1201	Global Object Definitions	Message/Data
Consortium of AASHTO, ITE, and NEMA	NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller (ASC) Units	Message/Data
Consortium of AASHTO, ITE, and NEMA	NTCIP 1203	Object Definitions for Dynamic Message Signs (DMS)	Message/Data
Consortium of AASHTO, ITE, and NEMA	NTCIP 1204	Object Definitions for Environmental Sensor Stations (ESS)	Message/Data
Consortium of AASHTO, ITE, and NEMA	NTCIP 1205	Object Definitions for Closed Circuit Television (CCTV) Camera Control	Message/Data
Consortium of AASHTO, ITE, and NEMA	NTCIP 1206	Object Definitions for Data Collection and Monitoring (DCM) Devices	Message/Data
Consortium of AASHTO, ITE, and NEMA	NTCIP 1207	Object Definitions for Ramp Meter Control (RMC) Units	Message/Data

SDO	Document ID	Standard Title	Standard Type
Consortium of AASHTO, ITE, and NEMA	NTCIP 1208	Object Definitions for Closed Circuit Television (CCTV) Switching	Message/Data
Consortium of AASHTO, ITE, and NEMA	NTCIP 1209	Data Element Definitions for Transportation Sensor Systems (TSS)	Message/Data
Consortium of AASHTO, ITE, and NEMA	NTCIP 1210	Field Management Stations (FMS) - Part 1: Object Definitions for Signal System Masters	Message/Data
Consortium of AASHTO, ITE, and NEMA	NTCIP 1211	Object Definitions for Signal Control and Prioritization (SCP)	Message/Data
Consortium of AASHTO, ITE, and NEMA	NTCIP 1213	Object Definitions for Electrical and Lighting Management Systems (ELMS)	Message/Data
European Committee for Standardization	TS 15531	Service Interface for Real-Time Information (SIRI)	Message/Data
General Transit Feed Specification Discussion Group	GTFS	General Transit Feed Specification (GTFS) Static	Message/Data
Institute of Electrical and Electronic Engineers	IEEE 1512 -2006	Standard for Common Incident Management Message Sets for use by Emergency Management Centers	Message/Data
Institute of Electrical and Electronic Engineers	IEEE 1512.3-2006	Standard for Hazardous Material Incident Management Message Sets for Use by Emergency Management Centers	Message/Data
Institute of Electrical and Electronic Engineers	IEEE 1570-2002	Standard for the Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection	Message/Data
Institute of Electrical and Electronic Engineers	IEEE 1609.11	Standard for Wireless Access in Vehicular Environments (WAVE) - Over- the-Air Data Exchange Protocol for Intelligent Transportation Systems (ITS)	Message/Data
Institute of Transportation Engineers	ITE TMDD	Traffic Management Data Dictionary (TMDD) and Message Sets for External Traffic Management Center Communications (MS/ETMCC)	Message/Data
Profile	Contact-Proximity-Interface	Proximity Communication Interface	Standard Profile
Profile	DSRC-UDP	Vehicle-to-Vehicle/Infrastructure using UDP	Standard Profile
Profile	DSRC-WSMP	Vehicle-to-Vehicle/Infrastructure using WSMP	Standard Profile
Profile	NTCIP-DATEX	NTCIP using DATEX	Standard Profile
Profile	NTCIP-SMTP	NTCIP using SMTP	Standard Profile
Profile	NTCIP-SNMP	NTCIP using SNMP	Standard Profile
Profile	RSE-C2F	RSE - Center to Field Communications	Standard Profile
Profile	RSE-C2F-SNMP	RSE - Center to Field Communications - SNMP	Standard Profile
Profile	RSE-F2F	Roadside Equipment to ITS Roadway Equipment	Standard Profile
Profile	RSEGateway-VehicleDestination	Vehicle Communications via RSEs, Vehicle Destination	Standard Profile
Profile	RSEGateway-VehicleSource	Vehicle Communications via RSEs, Vehicle Source	Standard Profile
Profile	SRC-Legacy	Legacy Short Range Comm Using IEEE 1455	Standard Profile
Profile	Vehicle-On-Board	Vehicle-On-Board	Standard Profile
Profile	WAB-Via-WAID	Wide-Area-Broadcast-Via-WAID	Standard Profile
Profile	WAW-ASN1	Wide Area Wireless using ASN.1 as encoding method	Standard Profile

SDO	Document ID	Standard Title	Standard Type
Profile	WAW-WWWBrowser-JSON	Wide Area Wireless using JSON as encoding method	Standard Profile
Profile	WAW-XML	Wide Area Wireless using XML as encoding method	Standard Profile
Profile	XML	eXtensible Markup Language	Standard Profile
Society of Automotive Engineers	J2945/1	On-Board System Requirements for V2V Safety Communications	Communications Protocol
Society of Automotive Engineers	SAE J2313	On-Board Land Vehicle Mayday Reporting Interface	Message/Data
Society of Automotive Engineers	SAE J2354	Message Set for Advanced Traveler Information System (ATIS)	Message/Data
Society of Automotive Engineers	SAE J2735	Dedicated Short Range Communications (DSRC) Message Set Dictionary	Message/Data
Society of Automotive Engineers	SAE J3067	Candidate Improvements to Dedicated Short Range Communications (DSRC) Message Set Dictionary [SAE J2735] Using Systems Engineering Methods	Message/Data