

## APPENDIX B – Functional Requirements

The following tables and pages are a tabular view of the functional requirements developed by the RAD-IT software for the Cache Valley MPO. More details and a flow-based diagram of interconnections can be found in the RAD-IT software file accompanying this report.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
511 Service	Center, Data Distribution System, Traveler Information Voice System			
511 Service	Personal Information Device	Personal Emergency Notification	'Personal Emergency Notification' provides the capability for travelers to report an emergency or activate a panic button to summon assistance. The personal mayday capability is provided by a portable device such as a smart phone.	
511 Service	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.	The personal traveler interface shall receive traffic information from a center and present it to the traveler upon request., The personal traveler interface shall receive event information from a center and present it to the traveler upon request., The personal traveler interface shall receive wide-area alerts and present it to the traveler.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
511 Service	Personal Information Device	Personal Traveler Information Reception	'Personal 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. The traveler information broadcasts are received by personal devices including personal computers and personal portable devices such as smart phones.	The personal traveler interface shall receive event information from a center and present it to the traveler., The personal traveler interface shall receive traffic information from a center and present it to the traveler., The personal traveler interface shall receive evacuation information from a center and present it to the traveler., The personal traveler interface shall receive wide-area alerts and present it to the traveler., The personal traveler interface shall support traveler input in audio or manual form., The personal traveler interface shall present information to the traveler in audible or visual forms, consistent with a personal device., The personal traveler interface shall provide the capability for digitized map data to act as the background to the information presented to the traveler.
511 Service	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.	

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
511 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.		The center shall receive and forward region-specific wide-area alert and advisory information to the traveler telephone information system, including major emergencies such as a natural or man-made disaster, civil emergency, child abductions, severe weather watches and warnings, military activities, and law enforcement warnings., The center shall provide the capability to support both specific caller requests as well as bulk upload of regional traveler information., The center shall provide roadway environment conditions information in the requested voice format and for the requested location., The center shall provide the capability to process voice-formatted requests for traveler information from a traveler telephone information system, and return the information in the requested format., The center shall provide the capability to process dual-tone multifrequency (DTMF)-based requests (touch-tone) for traveler information from a traveler telephone information system., The center shall provide the capability to process traveler information requests from a traveler telephone information system., The center shall provide work zone and roadway maintenance information in the requested voice format and for the requested location., The center shall provide information on traffic conditions in the requested voice format and for the requested location.
Air Quality Monitoring Station	Emissions Management Operator				
Cache County and Logan EOCs	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.		The center shall collect emergency service data, emergency vehicle management data, emergency vehicle data, sensor and surveillance data, threat data, and incident data., The center shall receive and respond to requests from ITS Archives for either a catalog of the emergency management data or for the data itself.

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
Cache County and Logan EOCs	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.		The center shall dispatch emergency vehicles to respond to verified emergencies under center personnel control., The center shall store the current status of all emergency vehicles available for dispatch and those that have been dispatched., The center shall relay location and incident details to the responding vehicles., The center shall track the location and status of emergency vehicles responding to an emergency based on information from the emergency vehicle., The center shall store and maintain the emergency service responses in an action log., The center shall coordinate response to incidents with other Emergency Management centers to ensure appropriate resources are dispatched and utilized., The center shall provide the capability to request remote control of traffic surveillance devices., The center shall provide the capability for digitized map data to act as the background to the information presented to the emergency system operator.
Cache County and Logan EOCs	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.		The center shall collect current and forecast road and weather information from weather service providers (such as the National Weather Service and value-added sector specific meteorological services), The center shall collect asset restrictions information from roadway maintenance operations., The center shall assimilate current and forecast road conditions and surface weather information to support incident management., The center shall provide the road and weather warning and advisories to the emergency responders.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
Cache County and Logan EOCs	Emergency Management Center	Emergency Evacuation Support	<p>'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.</p>	

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
Cache County and Logan EOCs	Emergency Management Center	Emergency Incident Command	'Emergency 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.	Incident	The center shall provide tactical decision support, resource coordination, and communications integration for first responders to support local management of an incident., The center shall provide incident command communications with public safety, emergency management, transportation, and other allied response agency centers., The center shall track and maintain resource information and action plans pertaining to the incident command., The center shall share incident command information with other public safety agencies including resource deployment status, hazardous material information, rail incident information, evacuation advice as well as traffic, road, and weather conditions., The center shall assess the status of responding emergency vehicles as part of an incident command.
Cache County and Logan EOCs	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.	Notification	The center shall monitor subscribed vehicle data, including changes in velocity, attitude/orientation, position, and air bag status to determine when an emergency situation (crash) has happened., The center shall collect mayday messages from travelers via personal handheld devices., The center shall acknowledge the request for emergency assistance, whether originated by the driver, automatically by the vehicle's safety systems, or by a traveler via a personal handheld device., After the mayday becomes a verified incident, the center shall determine the appropriate response to the mayday message., The center shall determine whether the mayday message indicates an emergency that requires the attention of public safety agencies, and forward mayday emergency data to the appropriate agency as necessary.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
Cache County and Logan EOCs	Emergency Management Center	Emergency Response Management	<p>'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.</p>	<p>The center shall provide strategic emergency response capabilities provided by an Emergency Operations Center for large-scale incidents and disasters., The center shall manage coordinated inter-agency responses to and recovery from large-scale emergencies. Such agencies include traffic management, transit, maintenance and construction management, rail operations, and other emergency management agencies., The center shall provide the capability to implement response plans and track progress through the incident by exchanging incident information and response status with allied agencies., The center shall develop, coordinate with other agencies, and store emergency response plans., The center shall track the availability of resources and coordinate resource sharing with allied agency centers including traffic, maintenance, or other emergency centers., The center shall allocate the appropriate emergency services, resources, and vehicle (s) to respond to incidents, and shall provide the capability to override the current allocation to suit the special needs of a current incident., The center shall receive event scheduling information from Event Promoters., The center shall support remote control of field equipment normally under control of the traffic management center including traffic signals, dynamic message signs, gates, and barriers., The center shall provide the capability to remotely control and monitor CCTV systems normally operated by a traffic management center., The center shall provide information to the media concerning the status of an emergency response., The center shall provide the capability for center personnel to provide inputs to the management of incidents, disasters and evacuations., The center shall collect information about the status of the recovery efforts for the infrastructure during disasters., The center shall provide the overall status of infrastructure recovery efforts to traveler information providers and media., The center shall provide the capability to communicate information about emergency situations to local population through the Emergency Telecommunications System., The center shall provide the capability to identify</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
Cache County and Logan EOCs	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.		The center shall store the current status of all service patrol vehicles available for dispatch and those that have been dispatched., The center shall track the location and status of service patrol vehicles., The center shall dispatch roadway service patrol vehicles to identified incident locations., The center shall share incident information collected by the service patrol with traffic, maintenance and construction, and traveler information centers for incident management, incident notification to travelers, and incident cleanup.



Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
Cache County and Logan EOCs, Cache County Consolidated 911 Response and Dispatch	Emergency Management Center	Emergency Call-Taking	<p>'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.</p>	<p>The center shall support the interface to the Emergency Telecommunications System (e.g. 911 or 7-digit call routing) to receive emergency notification information and provide it to the emergency system operator., The center shall receive emergency call information from 911 services and present the possible incident information to the emergency system operator., The center shall receive emergency call information from vehicles and present the possible incident information to the emergency system operator., The center shall receive emergency notification information from other public safety agencies and present the possible incident information to the emergency system operator., The center shall receive emergency notification information from public transit systems and present the possible incident information to the emergency system operator., The center shall coordinate, correlate, and verify all emergency inputs, including those identified based on external calls and internal analysis of security sensor and surveillance data, and assign each a level of confidence., The center shall forward the verified emergency information to the responding agency based on the location and nature of the emergency., The center shall update the incident information log once the emergency system operator has verified the incident., The center shall provide the capability for digitized map data to act as the background to the emergency information presented to the emergency system operator.</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
Cache County and Logan EOCs, Cache County Consolidated 911 Response and Dispatch	Emergency Management Center	Emergency Commercial Vehicle Response	'Emergency Commercial Vehicle Response' identifies and initiates a response to commercial vehicle and freight 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.		The center shall receive emergency notification information from commercial vehicles, commercial vehicle check stations, or commercial fleet operators and present the possible incident information to the emergency system operator. This may include detection of non-permitted transport of security sensitive hazmat, hazardous cargo spills, etc., The center shall receive details of the cargo being carried by commercial vehicles from their commercial fleet manager for incidents involving potential hazardous materials., The center shall forward the verified emergency information to the responding agency based on the location and nature of the emergency., The center shall provide the capability to request Fleet and Freight Management to disable a specific vehicle in their fleet.
Cache County and Logan EOCs, Cache County Consolidated 911 Response and Dispatch	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.		The center shall collect current traffic and road condition information for emergency vehicle route calculation., The center shall receive information on the location and status of traffic control equipment and work zones along potential emergency routes., The center shall receive status information from care facilities to determine the appropriate facility and its location., The center shall receive asset restriction information to support the dispatching of appropriate emergency resources., The center shall track current emergency vehicle location and status along with other emergency vehicle characteristics., The center shall provide the capability to request special traffic control measures, such as signal preemption, from the traffic management center to facilitate emergency vehicle progress along the suggested route.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
Cache County and Logan EOCs, Cache County Consolidated 911 Response and Dispatch	Emergency Management Center	Emergency Secure Area Alarm Support	'Emergency Secure Area 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.	After the alarm message becomes a verified incident, the center shall determine the appropriate response., The center shall determine whether the alarm message indicates an emergency that requires the attention of public safety agencies, and forward alarm message data to the appropriate agency as necessary., The center shall forward the alarm message to center personnel and respond to the traveler or transit vehicle operator as directed by the personnel.
Cache County and Logan EOCs, Cache County Consolidated 911 Response and Dispatch	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.	The center shall remotely monitor video images and audio surveillance data collected in secure areas including facilities (e.g. transit yards) and transportation infrastructure (e.g. bridges, tunnels, interchanges, roadway infrastructure, and transit railways or guideways). The data may be raw or pre-processed in the field., The center shall remotely monitor video images and audio surveillance data collected in traveler secure areas, which include transit stations, transit stops, rest areas, park and ride lots, and other fixed sites along travel routes (e.g., emergency pull-off areas and travel information centers). The data may be raw or pre-processed in the field., The center shall identify potential security threats based on collected security surveillance data., The center shall verify potential security threats by correlating security surveillance data from multiple sources., The center shall remotely control security surveillance devices in secure areas including facilities (e.g. transit yards) and transportation infrastructure (e.g. bridges, tunnels, interchanges, roadway infrastructure, and transit railways or guideways),. The center shall exchange traveler images with other emergency management centers to support traveler image matching.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
Cache County and Logan EOCs, Logan City and Other Cities Traffic Management, UDOT Region 1 Traffic Operations	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.	
Cache County and Logan EOCs, UDOT Region 1 Traffic Operations, UDOT Statewide Traffic Operations Center (TOC)	Center	Center Peer-to-Peer Data Communications	'Center Peer-to-Peer Data Communications' supports general back office communications services. It supports peer-to-peer communications with other regional centers supporting operational data sharing. It also supports general communications with vehicles, supporting the transfer of non-specified (proprietary) data using connected vehicle standards-based communications.	The center shall collect real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information., The center shall support the capability for the system operator to monitor and control the information collection service.
Cache County Consolidated Response and Dispatch	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.	The center shall dispatch emergency vehicles to respond to verified emergencies under center personnel control., The center shall relay location and incident details to the responding vehicles.

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Cache Consolidated Response Dispatch	County 911 and	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.		The center shall manage coordinated inter-agency responses to and recovery from large-scale emergencies. Such agencies include traffic management, transit, maintenance and construction management, rail operations, and other emergency management agencies., The center shall provide the capability to implement response plans and track progress through the incident by exchanging incident information and response status with allied agencies., The center shall develop, coordinate with other agencies, and store emergency response plans., The center shall track the availability of resources and coordinate resource sharing with allied agency centers including traffic, maintenance, or other emergency centers., The center shall allocate the appropriate emergency services, resources, and vehicle (s) to respond to incidents, and shall provide the capability to override the current allocation to suit the special needs of a current incident., The center shall receive event scheduling information from Event Promoters., The center shall support remote control of field equipment normally under control of the traffic management center including traffic signals, dynamic message signs, gates, and barriers., The center shall provide the capability to remotely control and monitor CCTV systems normally operated by a traffic management center., The center shall provide information to the media concerning the status of an emergency response., The center shall provide the capability for center personnel to provide inputs to the management of incidents, disasters and evacuations., The center shall collect information about the status of the recovery efforts for the infrastructure during disasters., The center shall provide the overall status of infrastructure recovery efforts to traveler information providers and media., The center shall provide the capability to communicate information about emergency situations to local population through the Emergency Telecommunications System., The center shall provide the capability to identify neighborhoods and businesses that should be informed of an emergency situation based on information collected about incidents including their severity,

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
Cache County Consolidated Response and Dispatch, Cache Valley Maintenance and Construction Operations, Logan City EOC Dynamic Message Signs, UDOT Region 1 Maintenance and Construction, USU Police Dispatch, USU Traffic Simulation Lab	Center				
Cache County Radio and Public Service Television	Media				
Cache MPO	Archived Data Administrator				
Cache School District Transit Management 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.		The center shall dispatch fixed route or flexible route transit vehicles., The center shall collect transit operational data for use in the generation of routes and schedules., The center shall provide instructions or corrective actions to the transit vehicle operators based upon operational needs.
Cache School District Transit Management Center, LTD/CVTD Transit Management Center, USU Transit Dispatch	Archived Data User System, Center				
Cache Valley Emergency Vehicles	Emergency Vehicle OBE				
Cache Valley Maintenance and Construction Operations	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.		The center shall process the collected infrastructure information and use it to monitor the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure., The center shall collect current maintenance and repair needs from the asset management system and correlate this data with data collected through infrastructure monitoring systems., The center shall report infrastructure repair needs to the maintenance center personnel.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
Cache Maintenance Construction Operations	Valley and Center	MCM Roadway Maintenance	<p>'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 both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling routine maintenance activities.</p>	<p>The center shall maintain an interface with asset management systems to track the inventory, restrictions, repair needs and status updates of transportation assets (pavement, bridges, signs, etc.) including location, installation and materials information, vendor/contractor, current maintenance status, standard height, width, and weight restrictions., The center shall respond to requests from emergency management and traffic management centers for hazard removal, field equipment repair, and other roadway maintenance., The center shall exchange information with administrative systems to support the planning and scheduling of maintenance activities. This information includes: equipment and consumables resupply purchase request status, personnel qualifications including training and special certifications, environmental regulations and rules that may impact maintenance activities, and requests and project requirements from contract administration., The center shall provide emergency management and traffic management centers with information about scheduled maintenance and construction work activities including anticipated closures and impact to the roadway, alternate routes, anticipated delays, closure times, and durations., The center shall collect the status and fault data from roadside equipment, such as traffic, infrastructure, and environmental sensors, highway advisory radio and dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, short range communications equipment, security sensors and surveillance equipment, etc., and provide a cohesive view of equipment repair needs., The center shall receive equipment availability and materials storage status information from storage facilities to support the scheduling of roadway maintenance and construction activities., The center shall collect current and forecast traffic and weather information from traffic management centers and weather service providers (such as the National Weather Service and value-added sector</p>

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Cache Valley Maintenance Construction Operations	Maint and Constr Management Center	MCM Vehicle Maintenance Management	'MCM Vehicle Maintenance Management' monitors vehicle and equipment condition, tracks maintenance history, and schedules routine and corrective maintenance based on vehicle/equipment utilization and availability schedules.		The center shall exchange information with equipment repair facilities including status and history of repairs concerning maintenance and construction vehicles. This information includes vehicle status and diagnostic information, vehicle utilization, and coordination of when vehicles will be available for preventative and corrective maintenance., The center shall schedule preventive and corrective vehicle maintenance with the equipment repair facility based on fleet health reports, maintenance records, vehicle utilization and vehicle availability schedules.
Cache Valley Maintenance and Construction Vehicles	Maint and Constr Vehicle OBE				
Cache Valley School Buses	Transit Vehicle OBE				
GIS and Mapping Service Providers	Map Update System				
ITD District 5 Traffic Operations	Other Traffic Management Centers				
Logan City and Other Cities Traffic Management	Center	Center Peer-to-Peer Data Communications	'Center Peer-to-Peer Data Communications' supports general back office communications services. It supports peer-to-peer communications with other regional centers supporting operational data sharing. It also supports general communications with vehicles, supporting the transfer of non-specified (proprietary) data using connected vehicle standards-based communications.		
Logan City and Other Cities Traffic Management	Traffic Management Center	TMC Basic Surveillance	'TMC Basic Surveillance' remotely monitors and controls traffic sensor systems and surveillance (e.g., CCTV) 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.		The center shall monitor, analyze, and store traffic sensor data (speed, volume, occupancy) collected from field elements under remote control of the center., The center shall maintain a database of surveillance equipment and sensors and associated data (including the roadway on which they are located, the type of data collected, and the ownership of each )



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Logan City and Other Cities Traffic Management	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.).		
Logan City and Other Cities Traffic Management	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.		The center shall identify hazardous road weather and surface conditions., The center shall identify hazardous traffic conditions including queues., The center shall identify debris, animals, or other encroachment on the roadway dangerous to approaching motorists.
Logan City and Other Cities Traffic Management	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.		The center shall remotely control traffic signal controllers., The center shall accept notifications of pedestrian calls., The center shall collect traffic signal controller fault data from the field., The center shall manage (define, store and modify) control plans to coordinate signalized intersections, to be engaged at the direction of center personnel or according to a daily schedule., The center shall maintain traffic signal coordination including synchronizing clocks throughout the system.

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Logan City and Other Cities Traffic Management	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.		The center shall remotely control dynamic messages signs for dissemination of traffic and other information to drivers., The center shall remotely control driver information systems that communicate directly from a center to the vehicle radio (such as Highway Advisory Radios) for dissemination of traffic and other information to drivers., The center shall collect operational status for the driver information systems equipment (DMS, HAR, etc.).
Logan City and Other Cities Traffic Management	Traffic Management Center	TMC Traffic Network Performance Evaluation	'TMC Traffic Network Performance Evaluation' measures traffic network performance and predicts travel demand patterns to support traffic flow optimization, demand management, and incident management. It collects traffic data from sensors and surveillance equipment as well as input from other Traffic Management Centers, emissions management, transit operations, and event promoters and uses this information to measure traffic network performance. It collects route planning information from transportation information centers and integrates and uses this information to predict future traffic conditions. The planned control strategies can be passed back to the transportation information center so that the intended strategies can be reflected in future route planning.		
Logan City and Other Cities Traffic Management, UDOT Region 1 Traffic Operations	Archived Data User System				

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
Logan City and Other Cities Traffic Management, UDOT Region 1 Traffic Operations	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.	Traffic	The center shall exchange traffic information with other traffic management centers including incident information, congestion data, traffic data, signal timing plans, and real-time signal control information., The center shall exchange traffic control information with other traffic management centers to support remote monitoring and control of traffic management devices (e.g. signs, sensors, signals, cameras, etc.).
Logan City and Other Cities Traffic Management, UDOT Statewide Traffic Operations Center (TOC)	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 Name	Functional Object	Functional Description	Object Requirement
Logan City EOC Dynamic Message Signs	Emergency Management Center	Emergency Early Warning System	<p>'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.</p>	<p>The center shall monitor information from Alerting and Advisory Systems such as the Information Sharing and Analysis Centers (ISACs), the National Infrastructure Protection Center (NIPC), the Homeland Security Advisory System (HSAS), etc. The information may include assessments (general incident and vulnerability awareness information), advisories (identification of threats or recommendations to increase preparedness levels), or alerts (information on imminent or in-progress emergencies)., The center shall receive incident information from other transportation management centers to support the early warning system., The center shall support the entry of alert and advisory information directly from the emergency system operator., The center shall provide the capability to correlate alerts and advisories, incident information, and security sensor and surveillance data., The center shall broadcast wide-area alerts and advisories to traffic management centers for emergency situations such as severe weather events, civil emergencies, child abduction (AMBER alert system), military activities, and other situations that pose a threat to life and property., The center shall broadcast wide-area alerts and advisories to transit management centers for emergency situations such as severe weather events, civil emergencies, child abduction (AMBER alert system), military activities, and other situations that pose a threat to life and property., The center shall broadcast wide-area alerts and advisories to toll administration centers for emergency situations such as severe weather events, civil emergencies, child abduction (AMBER alert system), military activities, and other situations that pose a threat to life and property., The center shall broadcast wide-area alerts and advisories to traveler information service providers for emergency situations such as severe weather events, civil emergencies, child abduction (AMBER alert system), military activities, and other situations that pose a threat to life and property., The center shall broadcast wide-area alerts and advisories to maintenance centers for emergency situations such as severe weather events, civil emergencies, child</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
Logan City Traffic Signals	Connected Vehicle Roadside Equipment			
Logan City Traffic Signals, UDOT Region 1 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.	The field element shall control traffic signals under center control., The field element shall respond to pedestrian crossing requests by accommodating the pedestrian crossing., The field element shall provide the capability to notify the traffic management center of pedestrian calls and pedestrian accommodations., The field element shall report the current signal control information to the center., The field element shall report current preemption status to the center., The field element shall return traffic signal controller operational status to the center., The field element shall return traffic signal controller fault data to the center., The field element shall report current transit priority status to the center.
Logan City Traffic Signals, UDOT Region 1 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.	The field element shall respond to signal preemption requests from emergency vehicles.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
LTD/CVTD Transit Management Center	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.	The center shall monitor the locations of all transit vehicles within its network., The center shall determine adherence of transit vehicles to their assigned schedule., The center shall provide transit operational data to traveler information service providers., The center shall provide collected transit probe data to traffic management centers and traveler information service providers for use in measuring current traffic conditions., The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for transit tracking and dispatch.

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
LTD/CVTD Transit Management 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.		The center shall collect operational and maintenance data from transit vehicles., The center shall monitor the condition of a transit vehicle to analyze brake, drive train, sensors, fuel, steering, tire, processor, communications equipment, and transit vehicle mileage to identify mileage based maintenance, out-of-specification or imminent failure conditions., The center shall generate transit vehicle maintenance schedules that identify the maintenance or repair to be performed and when the work is to be done., The center shall generate transit vehicle availability listings, current and forecast, to support transit vehicle assignment planning based, in part, on the transit vehicle maintenance schedule., The center shall assign technicians to a transit vehicle maintenance schedule, based upon such factors as personnel eligibility, work assignments, preferences and seniority., The center shall verify that the transit vehicle maintenance activities were performed correctly, using the transit vehicle's status, the maintenance personnel's work assignment, and the transit maintenance schedules., The center shall generate a time-stamped maintenance log of all maintenance activities performed on a transit vehicle., The center shall provide transit operations personnel with the capability to update transit vehicle maintenance information and receive reports on all transit vehicle operations data.
LTD/CVTD Transit Management Center, USU Transit Dispatch	Transit Management Center	Transit Center Emissions Monitoring	'Transit Center Emissions Monitoring' collects and/or estimates current transit fleet emissions and forecasts future fleet emissions. The collected, estimated, and forecast emissions is monitored and forwarded to other agencies to more effectively manage transit operations to reduce emissions.		The center shall assimilate current and forecast road conditions and surface weather information to more effectively manage transit operations., The center shall collect current and forecast road and weather information from weather service providers and roadway maintenance centers.

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
LTD/CVTD Transit Management Center, USU Transit Dispatch	Transit Management Center	Transit Center Environmental Monitoring	'Transit Center Environmental Monitoring' assimilates current and forecast road conditions and surface weather information from a variety of sources, including both weather service providers and vehicle probes. The collected environmental information is monitored and used to support transit operations.		
LTD/CVTD Transit Management Center, USU Transit Dispatch	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.		The center shall provide travelers using public transportation with traffic and advisory information upon request. Such information may include transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events., The center shall provide transit information to the media including details of deviations from schedule of regular transit services., The center shall exchange transit schedules, real-time arrival information, fare schedules, and general transit service information with other transit organizations to support transit traveler information systems., The center shall provide transit service information to traveler information service providers including routes, schedules, schedule adherence, and fare information as well as transit service information during evacuation., The center shall enable yellow pages (including non-motorized transportation) information to be output to the traveler., The center shall broadcast transit advisory data, including alerts and advisories pertaining to major emergencies, or man made disasters.



Element Name		Physical Object Name	Object	Functional Object	Functional Description	Object	Requirement
LTD/CVTD Vehicles	Transit	Transit OBE	Vehicle	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.		The transit vehicle shall broadcast advisories about the imminent arrival of the transit vehicle at the next stop via an on-board automated annunciation system., The transit vehicle shall enable traffic and travel advisory information to be requested and output to the traveler. Such information may include transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events., The transit vehicle shall enable yellow pages (including non-motorized transportation) information to be requested and output to the traveler., The transit vehicle shall tailor the output of the request traveler information based on the current location of the transit vehicle., The transit vehicle shall support input and output forms that are suitable for travelers with physical disabilities., The transit vehicle shall gather transit advisory data, including alerts and advisories pertaining to major emergencies, or man made disasters.
LTD/CVTD Vehicles, Campus Shuttle	Transit USU	Transit OBE	Vehicle	Transit Vehicle On-Board Vehicle Signing Communications	'Transit Vehicle On-Board Vehicle Signing Communications' provides the capability for the transit vehicle to distribute information to vehicles in the vicinity for in-vehicle display. The information provided supplements external signs and signals on the transit vehicle and may include notification that the vehicle (e.g., a school bus) is making a passenger stop or notice that the transit vehicle is attempting to merge and is requesting gap assistance. It includes an interface to the transit operator and the short range communications equipment that provides information to passing vehicles.		The transit vehicle shall notify nearby vehicles using short range communications when making a passenger stop, merging, and performing other operations that require cooperation from surrounding traffic., The transit vehicle shall provide the capability for the transit vehicle operator to monitor and control the operation of the short range communication system.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
LTD/CVTD Website	Personal Information Device	Personal Interactive Traveler Information	<p>'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.</p>	<p>The personal traveler interface shall receive traffic information from a center and present it to the traveler upon request., The personal traveler interface shall receive transit information from a center and present it to the traveler upon request., The personal traveler interface shall receive traveler services information (such as lodging, restaurants, theaters, bicycle facilities, and other tourist activities) from a center and present it to the traveler upon request., The personal traveler interface shall receive event information from a center and present it to the traveler upon request., The personal traveler interface shall receive evacuation information from a center and present it to the traveler., The personal traveler interface shall receive wide-area alerts and present it to the traveler., The personal traveler interface shall accept reservations for confirmed trip plans., The personal traveler interface shall support payment for services, such as confirmed trip plans, tolls, transit fares, parking lot charges, map updates, and advanced payment for tolls., The personal traveler interface shall provide an interface through which credit identity, stored credit value, or traveler information may be collected from a traveler card being used by a traveler with a personal device., The personal traveler interface shall base requests from the traveler on the traveler's current location or a specific location identified by the traveler, and filter the provided information accordingly., The personal traveler interface shall support traveler input in audio or manual form., The personal traveler interface shall present information to the traveler in audible or visual forms consistent with a personal device, and suitable for travelers with hearing and vision physical disabilities., The personal traveler interface shall be able to store frequently requested or used data, including the traveler's identity, home and work locations, etc., The personal traveler interface shall receive travel alerts and present them to the traveler. Relevant alerts are provided based on pre-supplied trip characteristics and preferences., The personal traveler interface shall accept personal preferences, recurring trip characteristics, and traveler alert subscription information from the traveler and send this information to the traveler.</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
LTD/CVTD Website	Personal Information Device	Personal Shared Use Planning	'Personal Shared Use Planning' provides a personalized connection to shared use mobility including vehicle shared use and arranging person trips. The shared use plan is calculated based on preferences and constraints supplied by the traveler and provided to the traveler for confirmation. 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.	
LTD/CVTD Website	Personal Information Device	Personal Traveler Information Reception	'Personal 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. The traveler information broadcasts are received by personal devices including personal computers and personal portable devices such as smart phones.	The personal traveler interface shall receive event information from a center and present it to the traveler., The personal traveler interface shall receive transit information from a center and present it to the traveler.

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
LTD/CVTD Website, UDOT Traffic Webpage	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.		The personal traveler interface shall allow a traveler to request and confirm multi-modal route guidance from a specified source to a destination., The personal traveler interface shall forward the request for route guidance to a traveler information center for route calculation., The personal traveler interface shall forward user preferences, background information, constraints, and payment information to the supplying traveler information center., The personal traveler interface shall present information to the traveler in audible or visual forms consistent with a personal device, and suitable for travelers with hearing and vision physical disabilities., The personal traveler interface shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used for route guidance displays.
Public Weather Services	Weather Service System				
Railroad Crossing	Multimodal Crossing Equipment, Rail Operations Center				
UDOT DMS and HAR	Center, Data Distribution System				

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
UDOT DMS and HAR	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.		The center shall disseminate traffic and highway condition information to travelers, including incident information, detours and road closures, event information, recommended routes, and current speeds on specific routes., The center shall disseminate maintenance and construction information to travelers, including scheduled maintenance and construction work activities and work zone activities., The center shall disseminate weather information to travelers., The center shall disseminate event information to travelers., The center shall disseminate air quality information to travelers., The center shall provide traffic and incident data to the media., The center shall provide the capability for a system operator to control the type and update frequency of broadcast traveler information.
UDOT Maintenance and Construction Vehicles	Maint and Constr Vehicle				
UDOT Region 1 Maintenance and Construction	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.		The center shall monitor the locations of all maintenance and construction vehicles and other equipment under its jurisdiction., The center shall present location data to center personnel for the fleet of maintenance and construction vehicles and other equipment., The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for maintenance and construction vehicle tracking.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
UDOT Region 1 Maintenance and Construction	Maint and Constr Management Center	MCM Winter Maintenance Management	<p>'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.</p>	<p>The center shall respond to requests from emergency management and traffic management centers for hazard removal, field equipment repair, and other winter roadway maintenance., The center shall exchange information with administrative systems to support the planning and scheduling of winter maintenance activities. This information includes: equipment and consumables resupply purchase request status, personnel qualifications including training and special certifications, environmental regulations and rules that may impact maintenance activities, and requests and project requirements from contract administration., The center shall provide status information about scheduled winter maintenance activities including anticipated closures and impact to the roadway, alternate routes, anticipated delays, closure times, and durations. The information is provided to other management centers such as traffic, emergency, transit, traveler information providers, other maintenance centers, and the media., The center shall receive equipment availability and materials storage status information from storage facilities to support the scheduling of winter maintenance activities., The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for the scheduling of winter maintenance activities., The center shall collect real-time information on the state of the regional transportation system from other centers including current traffic and road conditions, weather conditions, special event and incident information and use the collected information to support winter maintenance operations., The center shall dispatch and route winter maintenance vehicle drivers and support them with route-specific environmental, incident, advisory, threat, alert, and traffic congestion information., The center shall determine the need for roadway treatment based on current and forecasted weather information, current usage of treatments and materials, available resources, requests for action from other agencies, and recommendations from the Maintenance Planning Group.</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
UDOT Region 1 Roadside Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and CCTV cameras.		The field element shall collect, process, digitize, and send traffic sensor data (speed, volume, and occupancy) to the center for further analysis and storage, under center control., The field element shall collect, process, and send traffic images to the center for further analysis and distribution., The field element shall collect, digitize, and send multimodal crossing and high occupancy vehicle (HOV), and high occupancy toll (HOT) lane sensor data to the center for further analysis and storage., The field element shall return sensor and CCTV system operational status to the controlling center., The field element shall return sensor and CCTV system fault data to the controlling center for repair.
UDOT Region 1 Roadside Equipment	ITS Roadway Equipment	Roadway Data Collection	'Roadway Data Collection' collects traffic, road, and environmental conditions information for use in transportation planning, research, and other off-line applications where data quality and completeness take precedence over real-time performance. It includes the sensors, supporting roadside infrastructure, and communications equipment that collects and transfers information to a center for archival.		The field element shall collect traffic, road, and environmental conditions information., The field element shall include the sensors and supporting roadside devices that sense, collect, and send traffic, road, and environmental conditions information to a center for archival., The field element shall collect sensor status and sensor faults from roadside equipment and send it along with the recorded data to a center for archival.
UDOT Region 1 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.		The field element shall support an interface with field support equipment to accept installation of updates or configuration of field operations., The field element shall detect and report any fault conditions with the equipment being monitored back to its controlling center., The field element shall provide the capability for field personnel to locally control and configure this equipment., The field element shall send operational status of connected field equipment to the maintenance center., The field element shall monitor the operational status of field devices and detects and reports fault conditions.

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
UDOT Region 1 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.		The field element shall control lighting systems along the roadside under center control., The field element shall return operational status for the lighting system equipment to the center., The field element shall return lighting system equipment fault data to the center for repair.
UDOT Region 1 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 service objects.		The field element shall include sensors to monitor requests from non-highway traffic to cross at multimodal crossings for specified durations (such as draw bridges and miscellaneous other interference crossings between highway traffic and other modes such as river traffic, aircraft, etc.); the sensors are under center control., The field element shall include signals to control traffic at multimodal crossings on surface streets, under center control., The field element shall include driver information systems (such as dynamic messages signs, highway advisory radios (HAR), and equipment that controls warning lights and gates) that advise drivers at multimodal crossings, under center control., The field element shall provide operational status for the sensors, signals, and driver information systems equipment at multimodal crossings to the center., The field element shall provide fault data for the sensors, signals, and driver information systems equipment at multimodal crossings to the center for repair., The field element shall forward all requests for right-of-way at multimodal crossings to the controlling center.



Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
UDOT Region 1 Roadside Equipment	ITS Roadway Equipment	Roadway Standard Rail Crossing	<p>'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.</p>		<p>The field element shall support the integrated control of adjacent traffic signals to clear an area in advance of an approaching train and to manage traffic around the intersection., The field element shall monitor the status of the highway-rail intersection (HRI) equipment, including both the current state and mode of operation and the current equipment condition, to be forwarded on to the traffic management center., The field element shall monitor the status of the highway-rail intersection (HRI) equipment, including both the current state and mode of operation and the current equipment condition, to be forwarded on to the rail wayside equipment., The field element shall close the highway-rail intersection (HRI) when a train is approaching using gates, lights/signs, barriers, and traffic control signals., The field element shall forward rail traffic advisories received from the Wayside Equipment to the traffic management center., The field element shall collect and process, traffic sensor data in the vicinity of a highway-rail intersection (HRI)., The field element shall receive track status from the rail wayside equipment that can be passed on to the traffic management center. This may include the current status of the tracks and whether a train is approaching.</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
UDOT Region 1 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.	The field element shall include dynamic message signs for dissemination of traffic and other information to drivers, under center control; the DMS may be either those that display variable text messages, or those that have fixed format display(s) (e.g. vehicle restrictions, or lane open/close)., The field element shall include driver information systems that communicate directly from a center to the vehicle radio (such as Highway Advisory Radios) for dissemination of traffic and other information to drivers, under center control., The field element shall provide operational status for the driver information systems equipment (DMS, HAR, etc.) to the center., The field element shall provide fault data for the driver information systems equipment (DMS, HAR, etc.) to the center for repair., The field element shall include pedestrian information systems under center control (e.g. warning pedestrians of a potential hazard, or providing mandatory instructions as to the availability of pedestrian access).
UDOT Region 1 Traffic Operations	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, and data collected from environmental sensors deployed on and about the roadway. 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.	The center shall remotely control environmental sensors that measure road surface conditions including temperature, moisture, icing, salinity, and other measures., The center shall remotely control environmental sensors that measure weather conditions including temperature, wind, humidity, precipitation, and visibility., The center shall assimilate current and forecast road conditions and surface weather information using a combination of weather service provider information (such as the National Weather Service and value-added sector specific meteorological services), data from roadway maintenance operations, and environmental data collected from sensors deployed on and about the roadway., The center shall be able to receive road condition information from weather service providers., The center shall respond to control data from center personnel regarding environmental sensor control and weather data collection and processing.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
UDOT Region 1 Traffic Operations	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.).	The center shall exchange data with maintenance centers concerning the reporting of faulty equipment and the schedule/status of their repair. Information exchanged includes details of new equipment faults, and clearances when the faults are cleared., The center shall collect and store sensor (traffic, pedestrian, multimodal crossing) operational status.
UDOT Region 1 Traffic Operations	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.	The center shall retrieve locally stored traffic information, including current and forecasted traffic information, road and weather conditions, traffic incident information, information on diversions and alternate routes, closures, and special traffic restrictions (lane/shoulder use, weight restrictions, width restrictions, HOV requirements), and the definition of the road network itself., The center shall distribute traffic data to maintenance and construction centers, transit centers, emergency management centers, parking facilities, and traveler information providers., The center shall distribute traffic data to the media., The center shall provide the capability for center personnel to control the nature of the data that is available to non-traffic operations centers and the media.

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
UDOT Region 1 Traffic Operations, UDOT Statewide Traffic Operations Center (TOC)	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.		The center shall remotely control traffic signal controllers., The center shall accept notifications of pedestrian calls., The center shall collect traffic signal controller operational status and compare against the control information sent by the center., The center shall collect traffic signal controller fault data from the field., The center shall manage (define, store and modify) control plans to coordinate signalized intersections, to be engaged at the direction of center personnel or according to a daily schedule., The center shall implement control plans to coordinate signalized intersections based on data from sensors., The center shall manage boundaries of the control sections used within the signal system., The center shall maintain traffic signal coordination including synchronizing clocks throughout the system.
UDOT Statewide Traffic Operations Center (TOC)	Alerting and Advisory System, Archived Data User System, Emergency System Operator, Traffic Operations Personnel				
UDOT Statewide Traffic Operations Center (TOC)	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.		The center shall collect transportation data such as traffic operational data, transit data, vehicle data, weather data, freight data, event logs, etc. and make it available for ITS Archives upon request., The center shall receive and respond to requests from ITS Archives for either a catalog of the traffic data or for the data itself.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
UDOT Statewide Traffic Operations Center (TOC)	Traffic Management Center	TMC Basic Surveillance	<p>'TMC Basic Surveillance' remotely monitors and controls traffic sensor systems and surveillance (e.g., CCTV) 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.</p>	<p>The center shall monitor, analyze, and store traffic sensor data (speed, volume, occupancy) collected from field elements under remote control of the center., The center shall monitor, analyze, and distribute traffic images from CCTV systems under remote control of the center., The center shall monitor, analyze, and store multimodal crossing, high occupancy vehicle (HOV) and high occupancy toll (HOT) lane sensor data under remote control of the center., The center shall distribute road network conditions data (raw or processed) based on collected and analyzed traffic sensor and surveillance data to other centers., The center shall respond to control data from center personnel regarding sensor and surveillance data collection, analysis, storage, and distribution., The center shall maintain a database of surveillance equipment and sensors and associated data (including the roadway on which they are located, the type of data collected, and the ownership of each ), The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for traffic data.</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
UDOT Statewide Traffic Operations Center (TOC)	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.	The center shall provide the capability for center personnel to control access and management of reversible lane facilities, including the direction of traffic flow changes during the day, especially between the peak hours and dedication of more lanes to the congestion direction during special events., The center shall remotely control automated reversible lane equipment and driver information systems (such as lane control signals) that control traffic in reversible lanes on freeways., The center shall collect operational status for the reversible lane field equipment., The center shall collect fault data for the reversible lane field equipment and send to the maintenance center for repair., The center shall remotely control devices to detect traffic in reversible lanes, including wrong-way vehicles., The center shall monitor the use of reversible lanes and detect wrong-way vehicles in reversible lanes using sensor and surveillance information, and the current lane control status (which direction the lane is currently operating)., The center shall remotely control automated reversible lane equipment and driver information systems (such as lane control signals) that control traffic in reversible lanes on surface streets.

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
UDOT Statewide Traffic Operations Center (TOC)	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.).		The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for traffic maintenance data., The center shall collect and store sensor (traffic, pedestrian, multimodal crossing) operational status., The center shall collect and store sensor (traffic, pedestrian, multimodal crossing) fault data and send to the maintenance center for repair., The center shall collect and store CCTV surveillance system (traffic, pedestrian) fault data send to the maintenance center for repair., The center shall collect environmental sensor operational status., The center shall exchange data with maintenance centers concerning the reporting of faulty equipment and the schedule/status of their repair. Information exchanged includes details of new equipment faults, and clearances when the faults are cleared., The center shall collect environmental sensor equipment fault data and send to the maintenance center for repair., The center shall collect and store CCTV surveillance system (traffic, pedestrian) operational status.
UDOT Statewide Traffic Operations Center (TOC)	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.		The center shall monitor data on traffic, environmental conditions, and other hazards collected from sensors along the roadway., The center shall identify hazardous road weather and surface conditions., The center shall identify hazardous traffic conditions including queues., The center shall identify debris, animals, or other encroachment on the roadway dangerous to approaching motorists., The center shall issue control commands to field equipment warning drivers approaching the identified hazardous conditions., The center shall monitor the operational status of the dynamic warning equipment, including fault reports.

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
UDOT Statewide Traffic Operations Center (TOC)	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.		The center shall remotely control dynamic messages signs for dissemination of traffic and other information to drivers., The center shall remotely control driver information systems that communicate directly from a center to the vehicle radio (such as Highway Advisory Radios) for dissemination of traffic and other information to drivers., The center shall collect operational status for the driver information systems equipment (DMS, HAR, etc.), The center shall collect fault data for the driver information systems equipment (DMS, HAR, etc.) for repair., The center shall retrieve locally stored traffic information, including current and forecasted traffic information, road and weather conditions, traffic incident information, information on diversions and alternate routes, closures, and special traffic restrictions (lane/shoulder use, weight restrictions, width restrictions, HOV requirements), and the definition of the road network itself., The center shall distribute traffic data to maintenance and construction centers, transit centers, emergency management centers, parking facilities, and traveler information providers., The center shall distribute traffic data to the media., The center shall provide the capability for center personnel to control the nature of the data that is available to non-traffic operations centers and the media.



Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
UDOT Statewide Traffic Operations Center (TOC)	Traffic Management Center	TMC Traffic Management Decision Support	<p>'TMC Traffic Management Decision Support' recommends courses of action to the traffic operator based on current and forecast road and traffic conditions. Traffic incidents, special events, maintenance activities and other events or conditions that impact capacity or demand are monitored. Historical data and models are used to compare the impact of potential courses of action and make recommendations to the operator. Decisions are supported through presentation of filtered and fused network-wide road and traffic conditions that identify network imbalances and recommended courses of action. The recommended actions may include predefined incident response plans, signal timing plan changes, DMS/HAR messages, truck restrictions, lane control strategies, metering strategies, and adjustment of variable speed limits. Multimodal strategies may also be recommended that include suggested transit strategies and suggested route and mode choices for travelers. Once a course of action is selected, traffic operations personnel implement these actions within the Traffic Management Center and coordinate the response with other centers in the region.</p>	<p>The center shall compare the impact of potential courses of action and make recommendations to the operator., The center shall provide center personnel with an integrated regional view of current and forecast road and traffic conditions including traffic incidents, special events, maintenance activities and other events or conditions that impact capacity or demand., The center shall identify network imbalances and potential courses of action., The recommended actions shall include multimodal strategies that include suggested transit strategies and suggested route and mode choices for travelers., The recommended actions shall include predefined incident response plans, signal timing plan changes, DMS/HAR messages, lane control strategies and freeway control strategies including ramp metering, interchange metering, and mainline metering., The center shall provide an interface to center personnel to input control parameters for the decision support process and receive recommended actions and supporting information presentation.</p>
UDOT Statewide Traffic Operations Center (TOC)	Traffic Management Center	TMC Traffic Metering	<p>'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.</p>	<p>The center shall remotely control systems to manage use of the freeways, including ramp, interchange, and mainline metering., The center shall collect operational status from ramp meters, interchange meters, and mainline meters and compare against the control information sent by the center., The center shall collect fault data from ramp meters, interchange meters, and mainline meters., The center shall implement control strategies, under control of center personnel, on some or all of the freeway network devices (e.g. ramp meters, interchange meters, and mainline meters), based on data from sensors monitoring traffic conditions upstream, downstream, and queue data on the approaches to the meters.</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
UDOT Statewide Traffic Operations Center (TOC)	Traffic Management Center	TMC Traffic Network Performance Evaluation	<p>'TMC Traffic Network Performance Evaluation' measures traffic network performance and predicts travel demand patterns to support traffic flow optimization, demand management, and incident management. It collects traffic data from sensors and surveillance equipment as well as input from other Traffic Management Centers, emissions management, transit operations, and event promoters and uses this information to measure traffic network performance. It collects route planning information from transportation information centers and integrates and uses this information to predict future traffic conditions. The planned control strategies can be passed back to the transportation information center so that the intended strategies can be reflected in future route planning.</p>		<p>The center shall provide an interface to the archive data repository to enable the operator to retrieve historical operating data for use in planning to predict future traffic patterns and conditions., The center shall exchange information with transit management centers including details current transit routes, the level of service on each route, and the progress of individual vehicles along their routes for use in forecasting demand and estimating current transportation network performance., The center shall collect and store anticipated route information from traveler information centers to support overall network performance evaluations and predictions., This center shall use the collected information to measure overall current and forecast network performance and predict travel demand patterns., The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for network performance evaluations., The center shall collect and store plans from event promoters for major future events possibly impacting traffic to support overall network performance evaluations., The center shall exchange traffic information with other traffic management centers, including incidents, congestion data, traffic data, signal timing plans, and real-time signal control information to support overall network performance evaluations., The center shall monitor, analyze, and store traffic sensor data (speed, volume, occupancy) collected from field elements under remote control of the center to support overall network performance evaluations., The center shall collect wide-area pollution data from emissions management centers to support overall network performance evaluations.</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
UDOT Statewide Traffic Operations Center (TOC)	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.		The center shall monitor data on traffic and environmental conditions collected from sensors along the roadway., Based on the measured data, the center shall calculate and set suitable speed limits by lane., The center shall control field equipment that posts the current speed limits and displays additional information such as basic safety rules and current traffic information to drivers., The center shall monitor the operational status of the variable speed limit equipment, including fault reports., The center shall provide center personnel current system status and respond to control data from center personnel regarding variable speed limits.
UDOT Statewide Traffic Operations Center (TOC)	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.		The center shall receive work zone images from a maintenance center., The center shall analyze work zone images for indications of a possible incident., The center shall remotely control driver information systems (such as dynamic messages signs, highway advisory radios) to advise drivers of activity around a work zone., The center shall collect operational status for the driver information systems equipment in work zones., The center shall collect fault data for the driver information systems equipment in work zones for repair., The center shall receive proposed maintenance and construction work plans, analyze the activity as a possible incident, and provide work plan feedback to the sending center.

Element Name		Physical Object Name	Functional Object	Functional Description	Object Requirement
UDOT Webpage	Traffic	Personal Information Device	Personal Traveler Information Reception	'Personal 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. The traveler information broadcasts are received by personal devices including personal computers and personal portable devices such as smart phones.	The personal traveler interface shall receive event information from a center and present it to the traveler., The personal traveler interface shall receive transit information from a center and present it to the traveler., The personal traveler interface shall receive traffic information from a center and present it to the traveler., The personal traveler interface shall receive evacuation information from a center and present it to the traveler., The personal traveler interface shall receive wide-area alerts and present it to the traveler., The personal traveler interface shall support traveler input in audio or manual form., The personal traveler interface shall present information to the traveler in audible or visual forms, consistent with a personal device., The personal traveler interface shall provide the capability for digitized map data to act as the background to the information presented to the traveler.
UDOT Forecast Service	Weather	Surface Transportation Weather Service			
USU Campus Shuttle		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.	The transit vehicle shall enable yellow pages (including non-motorized transportation) information to be requested and output to the traveler., The transit vehicle shall enable traffic and travel advisory information to be requested and output to the traveler. Such information may include transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events., The transit vehicle shall broadcast advisories about the imminent arrival of the transit vehicle at the next stop via an on-board automated annunciation system., The transit vehicle shall support input and output forms that are suitable for travelers with physical disabilities., The transit vehicle shall tailor the output of the request traveler information based on the current location of the transit vehicle., The transit vehicle shall gather transit advisory data, including alerts and advisories pertaining to major emergencies, or man made disasters.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
USU Police Dispatch	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.	The center shall support the interface to the Emergency Telecommunications System (e.g. 911 or 7-digit call routing) to receive emergency notification information and provide it to the emergency system operator., The center shall receive emergency call information from 911 services and present the possible incident information to the emergency system operator., The center shall receive emergency notification information from other public safety agencies and present the possible incident information to the emergency system operator., The center shall receive emergency notification information from public transit systems and present the possible incident information to the emergency system operator., The center shall coordinate, correlate, and verify all emergency inputs, including those identified based on external calls and internal analysis of security sensor and surveillance data, and assign each a level of confidence., The center shall send a request for remote control of Closed-circuit Television (CCTV) systems from a traffic management center in order to verify the reported incident., The center shall forward the verified emergency information to the responding agency based on the location and nature of the emergency., The center shall update the incident information log once the emergency system operator has verified the incident., The center shall provide the capability for digitized map data to act as the background to the emergency information presented to the emergency system operator.

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
USU Police Dispatch	Emergency Management Center	Emergency Dispatch	<p>'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.</p>	<p>The center shall dispatch emergency vehicles to respond to verified emergencies under center personnel control., The center shall store the current status of all emergency vehicles available for dispatch and those that have been dispatched., The center shall relay location and incident details to the responding vehicles., The center shall track the location and status of emergency vehicles responding to an emergency based on information from the emergency vehicle., The center shall coordinate response to incidents with other Emergency Management centers to ensure appropriate resources are dispatched and utilized., The center shall receive traffic images to support dispatch of emergency vehicles., The center shall provide the capability to request remote control of traffic surveillance devices.</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
USU Police Dispatch	Emergency Management Center	Emergency Response Management	<p>'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.</p>	<p>The center shall develop, coordinate with other agencies, and store emergency response plans., The center shall track the availability of resources and coordinate resource sharing with allied agency centers including traffic, maintenance, or other emergency centers., The center shall allocate the appropriate emergency services, resources, and vehicle (s) to respond to incidents, and shall provide the capability to override the current allocation to suit the special needs of a current incident., The center shall receive event scheduling information from Event Promoters., The center shall support remote control of field equipment normally under control of the traffic management center including traffic signals, dynamic message signs, gates, and barriers., The center shall provide the capability to remotely control and monitor CCTV systems normally operated by a traffic management center., The center shall provide the capability to request transit resource availability from transit centers for use during disaster and evacuation operations., The center shall assimilate the damage assessment of the transit, traffic, rail, maintenance, and other emergency center services and systems to create an overall transportation system status, and disseminate to each of these centers and the traveling public via traveler information providers., The center shall provide information to the media concerning the status of an emergency response., The center shall provide the capability for center personnel to provide inputs to the management of incidents, disasters and evacuations., The center shall collect information about the status of the recovery efforts for the infrastructure during disasters., The center shall provide the overall status of infrastructure recovery efforts to traveler information providers and media., The center shall provide the capability to identify neighborhoods and businesses that should be informed of an emergency situation based on information collected about incidents including their severity, impacted locations, and recovery schedule., The center shall retrieve information from public health systems to increase preparedness for, and implement a response to biological, chemical, radiation, and other public health</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
USU Police Dispatch	Emergency Management Center	Emergency Routing	<p>'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.</p>	<p>The center shall collect current traffic and road condition information for emergency vehicle route calculation., The center shall receive information on the location and status of traffic control equipment and work zones along potential emergency routes., The center shall receive status information from care facilities to determine the appropriate facility and its location., The center shall receive asset restriction information to support the dispatching of appropriate emergency resources., The center shall track current emergency vehicle location and status along with other emergency vehicle characteristics., The center shall calculate emergency vehicle routes, under center personnel control, based on the collected traffic and road conditions information., The center shall request and receive ingress and egress routes or other specialized emergency access routes from the traffic management center., The center shall provide the capability to request special traffic control measures, such as signal preemption, from the traffic management center to facilitate emergency vehicle progress along the suggested route., Once the route is calculated the route shall be provided to the dispatch function.</p>



Element Name	Physical Object Name	Functional Object	Functional Description	Object Requirement
USU Police Dispatch	Emergency Management Center	Emergency Secure Area Alarm Support	<p>'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.</p>	<p>The center shall collect silent and audible alarms received from travelers in secure areas (such as transit stops, rest areas, park and ride lots, modal interchange facilities)., The center shall collect silent and audible alarms received from transit vehicles, originated by the traveler or the transit vehicle operator., After the alarm message has been received, the center shall generate an alarm acknowledgment to the sender., After the alarm message becomes a verified incident, the center shall determine the appropriate response., The center shall determine whether the alarm message indicates an emergency that requires the attention of public safety agencies, and forward alarm message data to the appropriate agency as necessary., The center shall forward the alarm message to center personnel and respond to the traveler or transit vehicle operator as directed by the personnel.</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
USU Police Dispatch	Emergency Management Center	Emergency Secure Area Surveillance	<p>'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.</p>		<p>The center shall remotely monitor video images and audio surveillance data collected in secure areas including facilities (e.g. transit yards) and transportation infrastructure (e.g. bridges, tunnels, interchanges, roadway infrastructure, and transit railways or guideways). The data may be raw or pre-processed in the field., The center shall remotely monitor video images and audio surveillance data collected in traveler secure areas, which include transit stations, transit stops, rest areas, park and ride lots, and other fixed sites along travel routes (e.g., emergency pull-off areas and travel information centers). The data may be raw or pre-processed in the field., The center shall remotely monitor video images and audio surveillance data collected on-board transit vehicles. The data may be raw or pre-processed in the field., The center shall exchange surveillance data with other emergency centers., The center shall identify potential security threats based on collected security surveillance data., The center shall verify potential security threats by correlating security surveillance data from multiple sources., The center shall remotely control security surveillance devices in secure areas including facilities (e.g. transit yards) and transportation infrastructure (e.g. bridges, tunnels, interchanges, roadway infrastructure, and transit railways or guideways),. The center shall remotely control security surveillance devices in traveler secure areas, which include transit stations, transit stops, rest areas, park and ride lots, and other fixed sites along travel routes (e.g., emergency pull-off areas and travel information centers),. The center shall remotely control security surveillance devices on-board transit vehicles., The center shall match traveler video images against a database from the Alerting and Advisory Systems of known images that may represent criminals and terrorists., The center shall exchange traveler images with other emergency management centers to support traveler image matching., The center shall respond to control data from center personnel regarding security surveillance data collection, processing, threat detection, and image matching., The center shall monitor maintenance status of the</p>

Element Name	Physical Object Name	Functional Object	Functional Description	Object	Requirement
USU Police 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.		The emergency vehicle shall receive dispatch instructions sufficient to enable emergency personnel in the field to implement an effective incident response. It includes local traffic, road, and weather conditions, hazardous material information, and the current status of resources that have been allocated to an incident., The emergency vehicle shall provide an interface to the center for emergency personnel to transmit information about the incident site such as the extent of injuries, identification of vehicles and people involved, hazardous material, etc., The emergency vehicle shall provide an interface to the center for emergency personnel to transmit information about the current incident response status such as the identification of the resources on site, site management strategies in effect, and current clearance status., The emergency vehicle shall provide traffic incident information to other emergency vehicles using short range communications.
USU Traffic Simulation Lab	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.		The center shall perform quality checks on collected data., The center shall notify the system operator of errors related to data collection, analysis and archival., The center shall collect data from data distribution systems and other data sources., The center shall coordinate information exchange with a local data warehouse., The center shall support the collection of archived data from other archives on an as-needed basis. (This minimizes the need to duplicate the comprehensive set of data from the remote archives in the local data warehouse.), The center shall provide the local archived data schema to other archive systems.

Element Name	Physical Object Name	Object	Functional Object	Functional Description	Object Requirement
USU Traffic Simulation Lab	Archived System	Data	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.	The center shall provide the capability to perform activities such as data mining, data fusion, summarizations, aggregations, and recreation from archive data. This may include multidimensional analysis, selective summarization and expansion of data details, and many other advanced analysis services., The center shall collect regional data from data distribution centers.
USU Traffic Simulation Lab	Archived System	Data	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.	The center shall respond to requests from the administrator interface function to manage field-sourced data collection., The center shall provide the capability to adjust the collection of field-sourced data based on the statistical measures., The center shall provide the capability to execute methods on the incoming field data such as aggregation and statistical measures before the data is stored in the archive., The center shall collect traffic sensor information from roadside devices., The center shall collect environmental sensor information that from roadside devices., The center shall send the request for data and control parameters to the field equipment where the information is collected and returned.