ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Arterial Management	Traffic Control	Transit Signal Priority	Transit signal priority systems use sensors to detect approaching transit vehicles and alter signal timings to improve transit performance. For example, some systems extend the duration of green signals for public transportation vehicles when necessary.	Yes - Benefits are derived by applying increase in link speed (or travel time). This is unclear if this is for transit vehicles only or all vehicles on link. Models basic type of transit preemption system using optical detection system. For complicated deployment may have high implementation costs.	No	Limited - Microsimulation can be used to quantify the operational improvements (i.e., reduction in transit travel times) of different transit signal priority algorithms at the individual or corridor level.
		Emergency Vehicle Preemption	Signal preemption systems for emergency vehicles use sensors to detect an approaching emergency vehicle and provide a green signal to the vehicle.	Yes - Specificially evaluates impacts and costs associated with deployment of emergency vehcile preemption systems (different than priority!). Technology assessed is typical current optical detection systems.	No	Yes - Microsimulation can be used to provide detailed assess of impacts of operations of specific signal timing changes on operations at the intersection- or corridor-level.
		Adaptive Signal Control	Adaptive signal control systems coordinate control of traffic signals across a signal network, adjusting the lengths of signal phases based on prevailing traffic conditions.	Limited - Specifically evaluates impacts and costs associated with deployment of isolated traffic actuated signals. Can be used to assess impacts of program to upgrade detection systems or traffic signal controller technology from pretimed control. Does not assess benefits and costs of more complex adaptive control strategies such as RHODES, SCOOT, SCAT, etc.	Limited - DYNASMART can model actuated signal, but cannot evaluate complex adaptive signal control systems such as RHODES, SCOOT, SCAT, etc.	Yes - Microsimulation can be used to provide detailed assess of impacts of operations of specific signal timing changes on operations at the intersection- or corridor-level. Most microsimulation include control logic form basic actuated control. More complex traffic adapative control logic requires use of hardware-in-the-loop simulation or use of external program to simulate control logic.
		Advanced Signal Systems	Advanced signal systems include coordinated signal operations across neighboring jurisdictions, as well as centralized control of traffic signals which may include some necessary technologies for the later development of adaptive signal control.	Yes - IDAS does specifically assess the impacts and costs associated with implementing coordinated control at mulitple levels, including actuated coordinated control, pre-timed coordinated control, and central coordinated control.	Limited - Does allow user to asses elementary coordination schemes (such as fixed time control). Does not explicitly model actuated coordinated control or centeral control systems.	Yes - There are many microsimulation models that can assess benefits of providing coordination; however, most can only simulation fixed time, time-of-day coordination timings.
		Varaible Speed Limits	Variable speed limit systems use sensors to monitor prevailing traffic and/or weather conditions, posting appropriate enforceable speed limits on dynamic message signs.	No	Potentially - Because of its dynamic traffic assignment capabilities, it may be possible to evaluate this strategy, but not sure is link speed can be changed dynamically model.	Yes - Microsimulation can be used to assess the potential operational improvements that could potentially occur as a result of deploying variable speed limits.
		Bicycle & Pedestrian	Pedestrian detectors, pedestrian activated lighted crosswalks, specialized pedestrian signals (e.g., 'countdown' WALK/DON'T WALK signals), and bicycle-actuated signals can improve the safety of all road users at signalized intersections and unsignalized crossings.	No	No	Potentially - It may be possible to use microsimulation to evaluate specific intersection-level improvements, but depends on capabilities of microsimulation model being used. For example, CORSIM does not explicitly model pedestrian or bicycle operations while other simulation softwares do.

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Arterial Management	Lane Management	HOV Facilities	Sensors detecting the traffic conditions support the use of dynamic message signs and moveable barriers (e.g., gates) to control the operation of HOV facilities.	Limited - IDAS does allow user to identify links as being used by HOV vehicles only; however, this is done through the travel demand modelling process outside of IDAS. IDAS does not specifically assess the ITS technology (ji.e. DMSs, gates, etc) needed to operate HOV system	Yes - can specifically model HOV lanes. Because of dynamic traffic assignment capabilities, it can also evaluate congestion pricing and variable tolling operations as well.	Limited - Microsimulation can be used quantify magnitude of operational improvements provided by HOV lane at facility or corridor level. Evaluation of a region-wide deployment of HOV systems not practical with microsimulation. User would need to provide estimates of cost of technology to support operations.
		Reversible Flow Lanes	Traffic sensors and lane control signs can be used to implement reversible flow lanes allowing travel in the peak direction during rush hours.	Potentially - IDAS could potentially be used to assess the operatioanl impacts of these types of strategies. User would need to change number of lanes each direction in the input files. User would need to estimate costs for technologies to deploy operational strategy.	No	No
		Congestion Pricing	Traffic sensors, electronic payment, and automated enforcement technologies can support the implementation of congestion pricing strategies, varying the cost of using transportation facilities based on demand.	Limited - IDAS is capable of assessing the impacts of changing operation of lane from general purpose to toll lane and the use of electronic toll collection technology. IDAS does not specifically evaluation of variable tolling or congestion pricing strategies.	Yes - has capabilities to model congestion pricing and variable tolling operations.	No
		Lane Control	Lane control signs, supported by surveillance and detection technologies, allow the temporary closure of lanes to avoid incidents or construction on arterial roadways.	No	Potentially - Could model Red X by placing incident in lane, and making Yellow X a DMS with message to exit lane or lane closed ahead.	No
		Variable Speed Limit	Variable speed limit systems use sensors to monitor prevailing traffic and/or weather conditions, posting appropriate enforceable speed limits on dynamic message signs.	No	No	Yes - Microsimulation can be used to assess the potential operational improvements that could potential occur as a result of deploying variable speed limits.
		Emergency Evacuations	Lane management applications such as reversible flow lanes and lane control can be used to support emergency evacuations. Such plans can also involve th implementation of special traffic signal timing plans, variable speed limits, and other measures.	No	Yes - This situation is one of their example problems where they look at the impact of travel infomration on a hurricane evacuation.	Yes - Microsimulation can be used to assess the potential operational improvements that could occur by coordinating multiple strategies to provide emergency evacuations. Analysis would need to be limitedto corridor-level.

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Arterial Management	Parking Management	Data Collection	Parking management systems, most commonly deployed in urban centers or at modal transfer points such as airports, monitor the availability of parking and disseminate the information to drivers, reducing traveler frustration and congestion associated with searching for parking.	No	No	No
	Parking Management	Information Dissemination	Parking management systems with information dissemination capabilities, most commonly deployed in urban centers or at modal transfer points such as airports, monitor the availability of parking and disseminate the information to drivers, reducing traveler frustration and congestion associated with searching for parking.	No	Potentially - DYNASMART-P could potentially be used to assess operational improvements. Could potentially set up specific O-D pattern that could would simulate specific users that would benefit from parking management information systems.	No
	Information Dissemination	Dynamic Message Signs	Organizations operating ITS can share information collected by detectors associated with arterial management systems with road users through technologies within the arterial network, such as dynamic messages signs or highway advisory radio. ITS operators may also send information to in-vehicle devices capable of displaying traveler information. Coordination with regional or multimodal traveler information efforts, as well as freeway and incident management programs, can increase the availability of information on arterial travel conditions.	Indirectly - IDAS does not evaluate the use these technologies specifically for arterial management purposes, but does allow the quantification of benefits as part of the capability of a regional transportation management center.	Yes - Uses dynamic traffic assignment to model potential driver reactions to information.	No
		In-Vehicle Systems		Yes - IDAS does not evaluate the use these technologies specifically for arterial management purposes, but does allow the quantification of benefits as part of the capability of a in-vehicle traveler information system with or without route guidance capaiblities.	Yes - Uses dynamic traffic assignment to model potential driver reactions to information.	No
		Highway Advisory Radio (HAR)		Indirectly - IDAS does not evaluate the use these technologies specifically for arterial management purposes, but does allow the quantification of benefits as part of the capability of a regional transportation management center.	Potentially - Could assume HAR to be a DMS. Not sure if it is capable of modeling HAR and DMS in same network.	No
		Speed Enforcement	Automated enforcement technologies can assist with the enforcement of speed limit compliance. Still or vide cameras, activated by detectors, can record vehicles traveling faster than the speed limit.	No	No	No

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
	Enforcement	Stop / Yield Enforcement	Automated enforcement technologies can assist with the enforcement of traffic signal compliance. Still or video cameras, activated by detectors, can record vehicles traveling through a red signal.	No	No	No
	Enforcement	High Occupancy Vehciles (HOV)	Automated enforcement technologies can assist with the enforcement of high occupancy vehicle (HOV) restrictions. Enforcement personnel can trigger recording technology, such as cameras, to record vehicles in violation of the requirements.	No	No	No
Arterial Management	Enforcement	Ramp Meter Enforcement	Automated enforcement technologies can assist with the enforcement of ramp metering compliance. Still or video cameras, activated by detectors, can record vehicles traveling through a red signal.	No	No	No
nagement	Ramp Control	Ramp Metering	Traffic signals on freeway ramp meters alternate between red and green signals to control the flow of vehicles entering the freeway. Metering rates can be altered based on freeway traffic conditions.	Yes - IDAS allows users to assess the impacts and costs associated with three different ramp metering strategies: Fixed time metering systems, traffic actuated metering systems and centrally controlled metering systems.	Limited - DYNASMART does permit modeling of ramp meter, but can only model ramp metering operations that use ALINEA algorithm. User cannot model other control algorithms. Does not model queue flushing operations.	Yes - Microsimulation can be used to quantify the impacts of different ramp metering control algorithms and deployments. Mirosimulation would be good tool to assess the impacts of ramp metering at a specific ramp or at a corridor level. Microsimulation could also be used to quantify impacts of implementing freeway-to-freeway ramp metering.
	Ramp Control	Ramp Closures	Surveillance and control technologies can allow for the temporary closure of freeway ramps to accommodate peak traffic conditions or inclement weather conditions.	Potentially - It may be possible to use IDAS to assess the impacts of these types of operational strategies, especially those deployed for peak period improvements. User would have to revise basic inputs from travel demand model to eliminate ramp connection for peak period analysis. User would need to provide cost estimates of technologies to deploy peak period ramp closures.	Potentially - could set potentially set metering rate to zero. Could also simulating by using incident to block ramp.	Yes - Microsimulation can be used to quantify the impacts of different ramp metering control algorithms and deployments. Mirosimulation would be good tool to assess the impacts of ramp metering at a specific ramp or at a corridor level. Microsimulation could also be used to quantify impacts of implementing freeway-to-freeway ramp metering.

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Freeway Ma		Priority Access	Communication between ramp metering signal hardware or ramp closure gates, and emergency or transit vehicles can allow priority access to these vehicles, providing a green signal or opening the gates to allow for passage of the approaching vehicle.	Potentially - It may be possible to use IDAS to assess the impacts of these types of operational strategies, especially those deployed for peak period improvements. User would have to revise basic inputs from travel demand model to change ramp configuratio to allow HOV vehicles only. User would need to provide cost estimates of technologies to deploy peak period ramp closures.	Potentially - might be able to make a second lane on ramp an HOV lane and bypass meter altogether.	Potentially - Microsimulation could potentially be used to quantify the impacts of providing ramp-meter bypass of specific classes of vehicles (either HOV or HOT vehicles). Appropriate analysis tools for ramp-level or potentially facility level type of operations. Not all simulation models are capable of providing this type of analysis. Would need to select simulation model that allows different control strategies to be applied to different vehicles types.
	Special Events Management	Occasional Events	Special event transportation management systems can help control the impact of congestion at locations hosting large events, such as fairgrounds, stadiums, or convention centers. In areas with occasional or one-tim events, portable equipment such as dynamic message signs or portable lane control signs can help smooth traffic flow.	No	Yes - Uses dynamic traffic assignment to model potential driver reactions to information.	Yes - Microsimulation is commonly used to quantify potential benefits and identify potential bottlenecks associated with a coordinated response for special events. Microsimulation can be used to provide quatification of benefits at the corridor-, facility, or intersection-levels.
	Special Events Management	Frequent Events	Special event transportation management systems can help control the impact of congestion at locations hosting large events, such as fairgrounds, stadiums, or convention centers. In areas with frequent events, permanent dynamic message signs, large changeable destination signs or other lane control equipment can b installed.	Potentially - IDAS could potentially be used to assess different operational strategies and technologies implemente to provide special event managmeent for frequent events. Generally, with these types of events, traffic patterns are well established and relatively consistent in when and how they arrive. IDAS could potentially be used by modify link volumes to reflect special event traffic.	Yes - Uses dynamic traffic assignment to model potential driver reactions to information.	Yes - Microsimulation is commonly used to quantify potential benefits and identify potential bottlenecks associated with a coordinated response for special events. Microsimulation can be used to provide quatification of benefits at the corridor-, facility, or intersection-levels.
nt	Special Events Management	Other Events	Portable ITS equipment such as dynamic message signs can help meet unique circumstances surrounding one-time special events or unusual events at customary event locations that require extra traffic management.	Limited - These events would include implement diversion plans for incidents. IDAS contain way of assign incident management capabities to a corridor, but not possible to model full effectiveness of operational strategies to divert traffic in response to incidents.	Yes - Uses dynamic traffic assignment to model potential driver reactions to information. This would be similar to model incident managmenet response plan.	No

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Freeway Manageme		Temporary TMCs	Major events may require the creation of temporary traffic management centers or satellite locations for existing TMCs, often using portable TMC technologies. These centers can help coordinate traffic management activities associated with the event.	No	No	No
	Information Dissemination	Dynamic Message Signs (DMS)	Organizations operating ITS can share information collected by detectors associated with freeway management systems with road users through technologies within the freeway network, such as dynamic messages signs or highway advisory radio. ITS operators may also send information to in-vehicle devices capable of displaying traveler information. Coordination with regional or multimodal traveler information efforts, as well as arterial and incident management programs, can increase the availability of information on freeway travel conditions.	Yes -- IDAS specifically assesses the benefits and costs associated with deploying DMSs for freeeway managmenet and incident management purposes.	Yes - Uses dynamic traffic assignment to model potential driver reactions to information.	No
		In-Vehicle Systems (IVS)		Yes - IDAS does not evaluate the use these technologies specifically for arterial management purposes, but does allow the quantification of benefits as part of the capability of a in-vehicle traveler information system with or without route guidance capaiblities.	Yes - Uses dynamic traffic assignment to model potential driver reactions to information.	No
		Highway Advisory Radio (HAR)		Indirectly- IDAS does not evaluate the use these technologies specifically for incident management purposes, but does allow the quantification of benefits as part of the capability of a regional transportation management center.	Potentially - Could assume HAR to be a DMS. Not sure if it is capable of modeling HAR and DMS in same network.	No
ent	Safety & Security	In-Vehicle Surveillance	Video cameras monitor the interior of buses or train cars. Wireless communication can make images available to transit dispatch or transit management centers. Microphones and transmitters can also enable audio surveillance. Automatic vehicle location systems often incorporate silent alarm features, allowing operators to report problems and vehicle location to dispatchers.	Yes - IDAS specifically evaluates one type of deployment that involves implementing technologies to improve in-vehicle safety and security. Agencies may need to revise deployment cost to reflect more closely the technology being deployed in an area.	No	No
		Facility Surveillance	Video and audio surveillance technologies can be deployed to enhance the security of train stations, bus depots, and transit stops.	No	No	No
		Employee Credentialing	A variety of identification and access control systems can help maintain the security of public transportation management and support facilities.	No	No	No

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Transit Management		Remote Disabling System	Transit vehicles in distress can be remotely shutdown via wireless communication and control, typically from dispatch centers.	No	No	No
	Transportation Demand Management	Ride Sharing / Matching	Computer database and internet technologies can facilitate ride sharing and carpool matching services.	No	No	No
		Dynamic Routing / Scheduling	Automatic vehicle location, combined with dispatching and reservation technologies facilitate the implementation of flexible public transportation routing and scheduling.	Yes - IDAS specifically evaluates one type of deployment that involves implementing technologies. IDAS provides mechanism for evaluating deployment for both fixed route and variable route (paratransit) transit operations. Agencies may need to revise deployment cost to reflect more closely the technology being deployed in an area.	Yes - DYNASMART is capable of modeling dynamic traffic assignment. May be possible to assign only transit vehicles to react to information	No
		Service Coordination	Vehicle monitoring and communication technologies facilitate the coordination of passenger transfers between vehicles or transit systems.	No	No	Potentially - Microsimulation could potentially be used to quantify the improvement in bus travel times and on-time performance as a results of implementing strategies to improve coordination of arrival times of transit vehicles at transfer points.
Transit Management	Fleet Management	AVL / CAD	Automatic vehicle location and computer aided dispatch systems facilitate the management of transit operations by providing up-to-date information on vehicle locations to assist transit dispatchers as well as inform travelers of bus status.	Yes - IDAS specifically evaluates one type of deployment that involves implementing technologies. IDAS provides mechanism for evaluating deployment for both fixed route and variable route (paratransit) transit operations. Agencies may need to revise deployment cost to reflect more closely the technology being deployed in an area.	No	No
		Maintenance	Maintenance monitoring technologies allow for the automatic collection and reporting of vehicle maintenance information. Information can be uploaded at the end of a run, or while in service via wireless communication.	No	No	No
		Planning	A variety of technologies, including records from AVL/CAD systems and automatic passenger counter systems, can assist in the planning of new and modified transit services.	No	No	No

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
	Information Dissemination	In-Vehicle Systems	Transit agencies can disseminate both schedule and system performance information to travelers through a variety of applications, in-vehicle, wayside, or in-termin dynamic messages signs, as well as the internet or wireless devices. Coordination with regional or multimodal traveler information efforts can also increas the availability of this transit schedule and syster	Indirectly - IDAS does not evaluate the use these technologies specifically for transit management purposes, but does allow the quantification of benefits within the context of a regional traveler information system. Improved information about transit operations would be provided through this system.	No	No
		In-Terminal / Wayside			No	No
		Internet / Wireless / Phone			No	No
Incident Management	Surveillance & Detection	Detectors	A variety of surveillance and detection technologies can help detect incidents quickly, including inductive loop o acoustic road way detectors, and camera systems providing frequent still images or full-motion pictures.	Indirectly- IDAS does not evaluate these technologies specifically, but does allow the user to estimate the impacts of improving incident detection / verification in an area. The IDAS benefits to be derived from better detection / verification are generated based on computer and communications improvement that can b made to better process traffic data in a control center. does not include technologies that would be implemented to improve surveillance capabilities.	No	Potentially- Could potentially be used to quantify the effectiveness of different incident detection algorithms and level of detectorization on facility.
		Imaging / Video			No	No
		Wireless E911	Information from wireless enhanced 911 systems, mayday and automated collision notification systems, as well as roadside call boxes help incident management system personnel identify incident		No	No
		Mayday / CAN			t No	No
		Call Boxes			No	No
		Traveler Reported	Sensors and other means of detection may include various types of traffic detectors, still imaging or video surveillance, location information from wireless E-911 phone calls, information from Mayday or automated collision notification systems, and incidents reported by travelers via roadside call boxes, or mobile phones.		No	No
	ion & Response	AVL / CAD	Automated vehicle location and computer aided dispatch systems assist emergency dispatchers in locating and assigning appropriate responders to incidents that occur throughout a response area, including those that occur on the transportation system	No	No	No
		Response Routing	Response routing systems assist responders in identifying the quickest safe route to incident locations. Advanced systems may incorporate information on current traffic congestion, allowing responders to avoid traffic delays.	No	Yes - is capable of performing dynamic routing. Could potentially use feature to model operations of emergency vehicle. Could definitely so benefits of providing real-time information to emergency vehicles.	No

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Incident Management	Mobiliza	Motorist Assistance Patrol	Motorist assistance patrols, occasionally initiated prior to the emergence of ITS technologies, are now frequently incorporated into traffic management systems. These patrols typically consist of specially equipped vehicles and trained staff that can assist stranded motorists, help clear minor incidents and assist with the safe management of traffic around major incident scenes.	No	No	No
	Information Dissemination	Dynamic Message Signs (DMS)	Organizations operating ITS can share information concerning ongoing incidents with road users through technologies deployed as part of incident management programs, such as dynamic messages signs or highwa advisory radio. ITS operators may also send informatio to in-vehicle devices capable of displaying traveler	Indirectly - IDAS does not evaluate the use these technologies specifically for incident management purposes, but does allow the quantification of benefits as part of the capability of a regional transportation management center.	Yes - Uses dynamic traffic assignment to model potential driver reactions to information.	No
		Highway Advisory Radio (HAR)			Potentially - Could assume HAR to be a DMS. Not sure if it is capable of modeling HAR and DMS in same network.	No
Incident Management	Clearance & Recovery	Investigation	Several technologies are available to speed the investigation of incident scenes and record necessary information for later analysis.	Indirectly - IDAS does not evaluate the use these technologies specifically for incident management purposes, but does allow the quantification of benefits as part of the improvement to the overall incident response and clearace capabilities	Indirectly- could make assumption about how improvements in the investigation process (such as use of photogrametry or TOTAL stations) might lessen time to complete investigation. Would model this as a reduction in incident duration.	Indirectly- Microsimulation can be used to assess impacts of strategies to reduce incident duration. Simuation studies can be performed to determine the magnitude of the delay saving that can be generated by implementing strategies to reduce overall incident duration (or blockage time).
		Video	Video imaging can assist with data collection at inciden scenes and speed the reopening of travel lanes.		No	No
	Clearance & Recovery	Temporary Traffic Control	Temporary traffic control devices, such as portable message signs and lane control signs, help ensure the safety of incident responders and provide for the safe travel of vehicles around the incident site.	No	Potentially - might be able to assume that traffic control devices where equivalent to DMS and assign driver responsiveness accordingly.	No
	ment	Tracking	Vehicle-mounted hardware provides the capability to track HAZMAT shipments and support the notification of management centers when a shipment deviates from its intended route.	No	No	No

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Emergency Management	Hazardous Materials Manage	Detection	Roadside detectors can monitor for the presence of hazardous shipments in sensitive areas and, if electronic tag information is available on the detected vehicle, confirm that the shipment is on the expected route.	No	No	No
		Driver Authentification	Driver authentication technology can confirm that the individual operating a HAZMAT vehicle is authorized to do so and report operation by unexpected drivers to public safety entities.	No	No	No
		Route Planning	ITS can provide assistance to commercial vehicle operators via electronic route planning services, ensuring compliance with HAZMAT shipment restrictions along planned travel routes.	Yes	Potentially - might be able to estimate benefits by assuming only HAZMAT vehicle will respond to DMS messages.	No
	Emergency Medical Services	Advance CAN	Advanced automated collision notification systems use vehicle-mounted sensors and wireless communication to notify emergency personnel and provide them with valuable information on the crash, including location, crash characteristics, and possibly relevant medical information regarding the vehicle occupants.	No	No	No
		Telemedicine	Telemedicine systems provide a link between responding ambulances and nearby emergency medical facilities, enabling doctors to advise emergency medical personnel regarding treatment of patients en-route to the hospital.	No	No	No

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Emergency Managemen	Response & Recovery	Early Warning System	The variety of sensors deployed on the transportation infrastructure can help provide an early warning system to detect large-scale emergencies including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (HAZMAT incidents, nuclear power plant accidents, and acts of terrorism including nuclear, chemical, biological, and radiological weapons attacks). Early warning systems monitor alerting and advisory systems, ITS sensors and surveillance systems, field reports, and emergency call-taking systems to identify emergencies and notify all responding agencies of detected emergencies.	No	No	No
		Response Management	Response management may include the tracking of emergency vehicle fleets using automated vehicle location (AVL) technology and two-way communications between emergency vehicles and dispatchers. Integration with traffic and transit management systems enables emergency information to be shared between public and private agencies and the traveling public.	Yes	No	No
		Evacuation and Re-Entry Management	Evacuation operations often require a coordinated emergency response involving multiple agencies, various emergency centers, and numerous response plans. Various communication technologies can suppor the management of evacuations, which may also includ a variety of traffic and transit management activities.	Yes	Yes - Could show potential impacts of a well coordinated, well thought-out evacuation plan	No
		Emergency Traveler Information	Integration with traffic and transit management systems enables emergency information to be shared between public and private agencies and the traveling public. This communication and cooperation also enables the use of the variety of ITS information dissemination capabilities to provide emergency traveler information.	No	No	No

ITS Component	Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Electronic Payment Systems	Toll Collection	Electronic toll collection (ETC) supports the collection of payment at toll plazas using automated systems to increase the operational efficiency and convenience of toll collection. Systems typically consist of vehicle-mounted transponders identified by readers located in dedicated and/or mixed-use lanes at toll plazas.	Yes	Potentially - Doesn't explicitly model ETC, but could potentially stop sign capabilities to examine effects of toll plaza with and without ETC	Yes - Mirosimulation has been used to quantify the impact of installing automatic toll collection systems on traffic operations at toll plazas. User would need to provide cost information of technology to be implemented to compute B/C.
	Transit Fare Payment	Electronic transit fare payment systems, often enabled by smart card or magnetic stripe technologies, can provide increased convenience to customers and generate significant cost savings to transportation agencies by increasing the efficiency of money handling processes and improving administrative controls.	Yes	No	No
	Parking Fee Payment	Electronic parking fee payment systems can provide benefits to parking facility operators, simplify payment for customers, and reduce congestion at entrances and exits to parking facilities. These payment systems can be enabled by any of a variety of technologies including magnetic stripe cards, smart cards, in-vehicle transponders, or vehicle-mounted bar-codes.	No	No	No
	Multi-Use Payment	Multi-use payment systems can make transit payment more convenient. Payment for bus, rail, and other public or private sector goods and services can be made using transit fare cards at terminal gates, or on check-out counters and phone booths of participating merchants located near transit stations. Multi-use systems may also incorporate the ability to pay highway tolls with the same card.	No	No	No
formation	ormation	Internet/Wireless	A variety of applications support pre-trip traveler information programs. Typically regional and/or multimodal in nature, these programs may include 511	Yes - IDAS provides separate analyses for web-based deployments, and PDA-based deployments	No	No

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Traveler Inf	Pre-Trip Inf	511	telephone information systems, internet website, TV an radio programs, and/or traveler information kiosks.	Yes - IDAS specifically evaluates the deployment of a telephone-based traveler information system.	No	No
		Other Telephone		No	No	No
	Pre-Trip Information	TV / Radio		No	No	No
		Kiosks		Yes - IDAS specifically evaluates the deployment of kiosks to provide multimodal traveler information using kiosks.	No	No
Traveler Information	En-Route Information	Wireless	Regional and/or multimodal traveler information programs intended for travelers en-route to their destinations may make use of 511 telephone systems, in-vehicle devices, radios, or other wireless devices such as pagers and PDAs.	Yes - IDAS provides separate analyses for PDA-based deployments that provide route guidance infromation	Potentially - Could assume other devices equivalent to a DMS. May not be possible to model use of other devices on same network as DMS.	No
		511		Yes - IDAS provides separate analyses for telepohone-based regional deployment that provide route guidance infromation		No
		Other Telephone		No		No
		Radio		No		No
		In-Vehicle Systems		Yes - IDAS provides separate analyses for PDA-based deployments that provide route guidance infromation	Yes - Uses dynamic traffic assignment to model potential driver reactions to information.	No
	Tourism & Events	Travel Services	Tourism and event-related travel information focuses on the needs of travelers in areas unfamiliar to them. Information services could include electronic yellow pages, incorporating lodging reservations systems and directions to points of interest.	No	No	No
		Advance Parking	Parking management systems, including availability an directional guidance posted on dynamic message signs, may be deployed at major tourist destinations.	No	No	No
		Electronic Payment	Custom electronic payment systems, using technologie such as magnetic stripe cards or smart cards, can facilitate traveler's payment for travel and other services at tourist destinations.		No	No

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Information Management		Data Archiving	Data archiving is the collection, storage and distribution of ITS data for transportation planning, administration, policy, operation, safety analyses, and research. Data archiving systems make use of a variety of software, database, and electronic data storage technologies.	No	No	No
Crash Prevention & Safety	Roadway Geometery Warning System	Ramp Rollover	Ramp rollover warning systems use roadside detectors and electronic warning signs to warn drivers, typically those in commercial trucks and other heavy vehicles, of potentially dangerous speeds in approach to freeway ramps.	Yes	No	No
		Curve Speed Warning	Curve speed warning systems use roadside detectors and electronic warning signs to warn drivers, typically those in commercial trucks and other heavy vehicles, of potentially dangerous speeds in approach to curves on highways.	No	No	No
		Downhill Speed Warning	Downhill speed warning systems use roadside detectors and electronic warning signs to warn drivers, typically those in commercial trucks and other heavy vehicles, of potentially dangerous speeds in approach to downhill grades.	Yes	No	No
		Overheight / Overwidth Warning	Overheight/Overwidth warning systems use roadside detectors and electronic warning signs to warn drivers of vehicles that are too tall or wide to pass under bridges or through tunnels.	No	No	No
	Highway-Rail Crossing System		Highway rail crossing systems use detectors, electronic warning signs and automated enforcement technologies to warn roadway traffic of approaching trains and discourage drivers from violating railroad crossing traffic controls.	Yes - For this deployment, benefits are derived from installing four quadrant gates, improve traffic signal and pedestrian warnings, and improved detection of trapped vehicles. Other common ITS-related grade crossing improvements included the use of Advanced Preemption track circuitry to provide earlier train detection information, and the use of pre-signal (traffic signals install upstream of grade crossing to prevent traffic from backing up over tracks). The deployment costs associated with these technologies can be significant.	No	Potentially - Microsimualtion can be used to quantify potential improvements of deploying different signal operations and other traffic control devices that affect operations. Simuation can be used to quantify impacts of improved coordination, installation of advance rail preemption, etc.. Can also produce surrogate safety measures (i.e., # of vehicle trapped at crossing, potential reductions in accidents, etc.)

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Crash Prevention & Safety	Intersection Collision Warning		Intersection collision warning systems use sensors to monitor traffic approaching dangerous intersections and warn vehicles of approaching cross traffic, via roadside or in-vehicle signage	No	No	No
	Pedestrian Safety		Pedestrian safety systems can help protect pedestrians by automatically activating in-pavement lighting to alert drivers as pedestrians enter crosswalks. Other systems include 'countdown' pedestrian traffic signals, and pedestrian detectors that extend the "Walk" phase for pedestrians needing more time to cross a street.	No	No	No
	Bicycle Warning Systems		Bicycle warning systems can use detectors and electronic warning signs to identify bicycle traffic and notify drivers when a cyclist is in an upcoming segment of roadway to improve safety on narrow bridges and tunnels.	No	No	No
	Animal Warning Systems		Animal warning systems typically use infrared or other detection technologies to identify large animals approaching the roadway, and alert drivers by activating flashers on warning signs located upstream of high frequency crossing areas. These systems may also activate in-vehicle warning devices.	No	No	No
ns & Maintenance	Information Dissemination	Portable DMS	Information dissemination technologies such as dynamic message signs or highway advisory radio can be deployed temporarily, or existing systems can be updated periodically to provide information on work zones or other highway maintenance activities. ITS operators may also send this information to in-vehicle devices capable of displaying traveler information.	No	Yes - Uses dynamic traffic assignment to model potential driver reactions to information.	No
		Highway Advisory Radio (HAR)		Indirectly - IDAS does not evaluate the use these technologies specifically for work zone management purposes, but does allow the quantification of benefits as part of the capability of a regional transportation management center.	Potentially - Could assume HAR to be a DMS. Not sure if it is capable of modeling HAR and DMS in same network.	No
		Internet / Wireless / Phone			No	No
	et Management	Fleet Management	Several applications help state DOTs with asset management, including fleet tracking applications such as automated vehicle location and computer aided dispatch systems, as well as handheld computers supporting data entry and reporting from the field.	No	No	No

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Roadway Operation	Asse	Infrastructure Management	Automated data collection systems can assist transportation agencies in monitoring the condition of highway infrastructure.	No	No	No
Roadway Operations & Maintenance	Work Zone Management	Temporary Traffic Management	ITS applications in work zones include the temporary implementation of traffic management applications such as components of arterial and freeway management systems. These temporary systems can be stand-alone implementations, or they may supplement existing systems in the area during construction.	No	Yes - Explicitly models work zone traffic contol	Yes - Microsimuation has been used to assess the operational benefits of deploying different traffic management strategiest in a work zone environment.
		Temporary Incident Mangement	Incident management programs may be temporarily implemented or existing programs supplemented to facilitate the safe clearance of incidents that occur in the area of work zones.	No	Potentially - Explicitly models incident conditions. Not sure it can model iincidents inside work zone.	Yes - Microsimuation has been used to assess the operational benefits of providing incident management in a work zone environment.
		Lane Control	Lane control signs, portable dynamic message signs, and other applications assist work zone managers in notifying drivers of changing lane configurations within work zones.	No	No	No
		Variable Speed Limit	Variable speed limit systems use sensors to monitor working conditions, traffic and/or weather conditions within work zones, posting appropriate enforceable speed limits on dynamic message signs.	No	No	Yes - Microsimulation can be used to assess the potential operational improvements that could potential occur as a result of deploying variable speed limits for Work Zone Management responses.
		Speed Enforcement	Automated speed detection in work zones can enable automated ticketing of vehicles exceeding posted speed limits when combined with automatically triggered vehicle identification technologies such as photographs, still or video digital imaging, or license plate recognition. Some systems transmit images of offending vehicles to police officers downstream of the work zone where enforcement can be carried out more safely.	No	No	No
		Intrusion Detection	Intrusion detection systems monitor work zones and alert highway workers and drivers when vehicles or construction equipment enter sensitive sections of the work area, such as those where personnel are actively working.	No	No	No

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		Road Closure Management	ITS can support traffic management along detour routes during full road closures to facilitate rapid and safe reconstruction projects.	Yes	Yes	
Road Weather Management	Surveillance, Monitoring, & Prediction	Pavement Condition	Road weather management systems rely on surveillance data to facilitate decisions on maintenance strategies and driver advisories. Road surface sensors detect the presence of ice and water on the road surface that could affect travelers or road maintenance decisions.	No	No	No
		Atmospheric Condition		No	No	No
		Water Level		No	No	No
	Information Dissemination	Dynamic Message Signs (DMS)	A variety of roadside technologies, such as dynamic messages signs and highway advisory radio, can be used to provide travelers with weather-related travel information. Weather specific internet sites and phone information lines may also be implemented. ITS operators may also send information to in-vehicle devices capable of displaying traveler information. Coordination with regional or multimodal traveler information efforts like 511, as well as arterial, freeway	Indirectly - IDAS does not evaluate the use these technologies specifically for road weather management purposes, but does allow the quantification of benefits as part of the capability of a regional transportation management center.	Yes - Uses dynamic traffic assignment to model potential driver reactions to information.	No
		Internet / Wireless / Phone			No	No
		Highway Advisory Radio (HAR)			Potentially - Could assume HAR to be a DMS. Not sure if it is capable of modeling HAR and DMS in same network.	No
Road Weather Management	Traffic Control	Variable Speed Limit	Variable speed limit systems use sensors to monitor prevailing traffic and/or weather conditions, posting appropriate enforceable speed limits on dynamic message signs.	No	No	Yes - Microsimulation can be used to assess the potential operational improvements that could potential occur as a result of deploying variable speed limits for Road Weather Management responses.
		Traffic Signal Control	Traffic signal timing plans can be adjusted to accommodate reduced travel speeds during inclement weather.	No	No	Yes
		Lane Use / Road Closure	Surveillance and control technologies can allow for the temporary closure of dangerous sections of roadway during inclement weather.	No	Indirectly- could mimic lane closure or road closure by implementing incident or work zone.	Yes
		Vehicle Restriction	Surveillance, control, and information dissemination technologies can support temporary restrictions on vehicles during implement weather conditions (e.g., road closures to high-profile vehicles during periods of high winds, snow tire/chain requirements during winter weather).	No	No	No
	tment	Fixed Winter Maintenance	Technologies such as anti-icing systems on bridges ca provide automatic winter maintenance activities in specific locations in need of special attention.	No	No	No

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	Response & Trea	Mobile Winter Maintenance	Use of a variety of technologies, including weather information services, automatic vehicle location for maintenance vehicles, and on-board devices monitorin equipment and chemical application can assist road maintenance managers in coordinating effective response to weather emergencies such as winter storms and widespread flooding.	No	No	No
Commercial Vehicle Operations	Credentials Administration	Electronic Funds	Various electronic data exchange methods can facilitat business and the transfer of registration fees, etc. between carriers and agencies.	No	No	No
		Electronic Registration / Permits	Electronic registration and permitting can improve the time required for states to approve permits. Internet applications and other electronic means can facilitate the exchange of credentials data between agencies an carriers.	Yes - This benefit derived from IDAS's Electronic Clearance - Credentials deployment could be used to assess benefits of potential deployments in this area.	No	No
	Safety Assurance	Safety Information Exchange	Safety information exchange programs assist the safe operation of commercial vehicles, providing inspectors with electronic access to carrier and vehicle safety information from previous inspections.	Yes - This would be equivalent to IDAS's Safety Information Exchange deployment	No	No
		Automated Inspection	Automated inspection equipment can be implemented to remotely test commercial trucks for faulty equipment such as non-functioning brakes.	Yes - This would be equivalent to IDAS's Electronic Clearance - Safety Inspection deployment	No	No
ations	reening	Safety Screening	In-vehicle transponders can communicate with inspection stations to pre-screen trucks for safety records.	Yes - This would be equivalent to IDAS's Electronic Clearance - Safety Inspection deployment	No	No
		Border Clearance	In-vehicle transponders can communicate with customs check points to pre-screen trucks for safety records, border clearance, and proper credentials.	Potentially - IDAS does provide assess of deployment to provie electronic clearance through creditialing. The benefits for this analysis could potentially be used to assess border crossing clearance	No	No

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Commercial Vehicle Oper	Electronic Sc	Weight Screening	In-vehicle transponders can communicate with weigh stations to pre-screen trucks for compliance with weight regulations. Weigh-in-motion (WIM) scales can be used for more efficient weight screening.	Yes - This would be equivalent to IDAS's Weigh-in-Motion deployment	No	No
		Credential Checking	In-vehicle transponders can communicate with weigh stations and customs check points to pre-screen trucks for proper credentials.	Potentially - IDAS does provide assess of deployment to provie electronic clearance through creditialing. The benefits for this analysis could potentially be used to assess border crossing clearance	No	No
Commercial Vehicle Operations	Carrier Operations & Fleet Management	AVL / CAD	Automated vehicle location and computer aided dispatch systems can assist carriers with scheduling and tracking of vehicle loads.	No	No	No
		On-Board Monitoring	On-board sensors can monitor cargo and alert drivers and carriers of potentially unsafe conditions for the cargo being transported, such as elevated temperature in a regrigerated trailer.	Yes - This would be equivalent to IDAS's On-Board Safety Monitoring deployment	No	No
		Traveler Information	Targeted traveler information systems can help carriers choose alternate departure times, avoid traffic, and arrive on time.	Indirectly-- Potential benefits associated with these technologies can be derived for overall impact of regional traveler information systems.	No	No
	Security Operations	Asset Tracking	ITS can be used to ensure the security of motor carriers. Asset tracking can improve the safety and security of drivers and vehicles by installing technologies that can monitor the location and condition of fleet assets (e.g., trailers, cabs, and trucks) in real-time.	No	No	No
		Remote Disabling System		No	No	No
	Freight Tracking		Freight tracking applications can monitor, detect, and communicate freight status information such as condition and location of goods while ensuring containerized cargo remains sealed within shipping containers while en-route.	No	No	No

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Intermodal Freight	Asset Tracking	Asset tracking technologies can monitor the location, identity and status of mobile or stored freight containers chassis, or other transportation assets in real-time.	No	No	No
	Freight Terminal Processes	ITS freight terminal processes can improve the efficiency of freight transfers or freight storage by activating transponder tags to track cargo containers within the terminal as they are processed and sealed for transfer or storage.	No	No	No
	Drayage Operations	ITS for drayage operations can promote the efficient loading, unloading, sorting, and transfer of cargo by implementing automated systems and robotics to optimize limited dock and port space.	No	No	No
	Freight-Highway Connector System	ITS applications that optimize traffic control and coordinate transfers near intermodal ports of entry can streamline increased freight movement on the nation?s freight highway connector system.	No	No	No
	International Border Crossing Protection	At international border crossings, automating tax revenue transactions and faster, more efficient verification of cargo manifest information can reduce delays associated with multi-agency processes.	No	No	No
	Intersection Collision Warning	Intersection collision warning systems are designed to detect and warn drivers of approaching traffic at high-speed intersections	Yes - Explicitly evaluated in IDAS	No	No
	Obstacle Detection	Obstacle detection systems use vehicle-mounted sensors to detect obstuctions, such as other vehicles, road debris, or animals, in a vehicle's path and alert the driver.	No	No	No
	Lane Change Assistance	Lane-change warning systems have been deployed to alert bus and truck drivers of vehicle, or obstuctions, in adjacent lanes when the driver prepares to change lanes	Potentially - IDAS does provide assess of deployment to provide lateral collison avoidance. In the absence of better analysis techniques, IDASs Lateral Collision Avoidance deployment could potentially be used to assess benefits of in-vehicle lane changing assistance systems.	No	No

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Collision Avoidance Systems	Lane Departure Warning	Lane departure warning systems warn drivers that their vehicle is unintentionally drifting out of the lane.	Potentially - IDAS does provide assess of deployment to provide lateral collison avoidance. In the absence of better analysis techniques, IDASs Lateral Collision Avoidance deployment could potentially be used to assess benefits of in-vehicle lane departure warning systems.	No	No
	Rollover Warning	Rollover warning systems notify drivers when they are traveling too fast for an approaching curve, given their vehicles operating characteristics. This has been primarily a focus of heavy trucks.	No - This deployment is for in-vehicle system.	No	No
	Road Departure Warning	Road departure warning systems have been tested using machine vision and other in-vehicle systems to detect and alert drivers of potentially unsafe lane-keeping practices and to keep drowsy drivers from running off the road.	Potentially - IDAS does provide assess of deployment to provide lateral collison avoidance. In the absence of better analysis techniques, IDASs Lateral Collision Avoidance deployment could potentially be used to assess benefits of in-vehicle lane departure warning systems.	No	No
	Forward Collision Warning	In the application area of forward-collision warning systems, microwave radar and machine vision technology help detect and avert vehicle collisions. These systems typically use in-vehicle displays or audible alerts to warn drivers of unsafe following distances. If a driver does not properly aply brakes in a critical situation, some systems automatically assume control and apply the brakes in an ttempt to avoid a collision.	Potentially - IDAS does provide assess of deployment to provide longitudinall collison avoidance. In the absence of better analysis techniques, IDASs Longitudinal Collision Avoidance deployment could potentially be used to assess benefits of in-vehicle lane departure warning systems.	No	No
Collision Avoidance Systems	Rear Impact Warning	Rear-impact warning systems use radar detection to prevent accidents. A warning sign is activated on the rear of the vehicle to warn tailgating drivers of impending danger.	Potentially - IDAS does provide assess of deployment to provide longitudinall collison avoidance. In the absence of better analysis techniques, IDASs Longitudinal Collision Avoidance deployment could potentially be used to assess benefits of in-vehicle lane departure warning systems.	No	No
ion Systems	Mayday / ACN	The typical Mayday/CAN product utilizes location technology, wireless communication, and a third-party response center to notify the closest Public Safety Answering Point (PSAP) for emergency response	Yes	No	No

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Collision Notificat	Advance CAN		Advanced collision notification systems use in-vehicle crash sensors, GPS technology, and wireless communications systems to supply public/private call centers with crash location information, and in some cases, the number of injured passengers and the nature of their injuries	No	No	No
Driver Assitance Systems	Navigation / Route Guidance		In-vehicle navigation systems with GPS technology may reduce driver error, increase safety, and save time by improving driver decision in unfamiliar areas	Yes	Yes - DYNASMART is capablity of modeling vehicles with assess to in-vehicle routing information.	No
	Driver Communication	With Other Drivers	Driver communication systems enable drivers to communicate with other drivers and dispatching centers. Uses include coordinating routing and re-routing decisions and fleet management.	No	No	No
		With Carrier / Dispatch	Driver communication systems enable drivers to communicate with other drivers and dispatching centers. Uses include coordinating routing and re-routing decisions and fleet management.	No	No	No
	Vision Enhancement		In-vehicle vision enhancement improves visibility for driving conditions involving reduced sight distance due to night driving, inadequate lighting, fog, drifting snow, other inclement weather conditons	Yes	No	No
	Object Detection		Object detection system warns the driver of an object (front, side or back) that is in the path or adjacent to the path of the vehicle. Note: the most common application is parking aids for passenger vehicles.	No	No	No
	Adaptive Cruise Control		Intelligent cruise control, speed control, guidance/steering, and coupling/decoupling systems which help transit operators link multiple buses or train cars into trains each assist drivers with routine tasks that weight on driver workload.	No	No	No

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Driver Assitance Systems	Intelligent Speed Control	Intelligent cruise control, speed control, guidance/steering, and coupling/decoupling systems which help transit operators link multiple buses or train cars into trains each assist drivers with routine tasks that weight on driver workload.	No	No	No
	Lane Keeping Assistance	Lane keeping assistance systems can make minor steering corrections if the vehicle detects an imminent lane departure without the use of a turn signal.	No	No	No
	Roll Stablity Control	Roll stability control systems take corrective action, suc as throttle control or braking, when sensors detect that a vehicle is in a potential rollover situation.	No	No	No
	Drowsy Driver Warning System	Drowsy driver warning alerts the driver that he or she is fatigued which may lead to lane departure or road departure.	No	No	No
	Precision Docking	Precision docking systems automate precise positioning of vehicles at loading/unloading areas.	No	No	No
	Coupling / Decoupling	Intelligent cruise control, speed control, guidance/steering, and coupling/decoupling systems which help transit operators link multiple buses or train cars into trains each assist drivers with routine tasks that weight on driver workload.	No	No	No
ns	Cargo Condition	On-board monitoring captures relevant information and presents it to the driver or transmits it off board. Electronic monitoring of cargo areas can provide notification of changes in cargo condition such as load shifting or rising temperatures in a refrigerated area.	No	No	No
	Safety & Security	On-board monitoring captures relevant information and presents it to the driver or transmits it off board. Safety and security monitoring can provide notification of tampering or contamination of cargo while en-route.	No	No	No

ITS Component		Operatonal Strategy	Description	IDAS	DYNASMART-P	Microsimulation
Driver Assitance Systen	On-Board Monitoring	Vehicle Diagnostics	On-board monitoring captures relevant information and presents it to the driver or transmits it off board. Vehicle diagnostic monitoring can provide advance notification of mechanical malfunctions, reducing repair costs, and aiding freight carriers with contingency planning for disabled vehicles.	No	No	No
		Event Data Recorder	On-board monitoring captures relevant information and presents it to the driver or transmits it off board. Event data recorders can monitor and record vehicle performance, speeds, steering and braking inputs, and other parameters. This information is typically stored to document activities surrounding crashes or near-crashes to aid in post-crash analysis and the identification of improvements in driver training and other operational practices to promote safety.	No	No	No