

ITS Unit Costs Database (as of 30 October 2010)

Subsystem/Unit Cost Element	IDAS No. ^	Lifetime (years)*	Capital Cost (\$K)		Cost Date	O&M Cost (\$K/year)		Cost Date	Description
			Low	High		Low	High		
Roadside Telecommunications (RS-TC)									
DS0 Communication Line	TC001	20	0.5	1	1995	0.6	1.2	2003	56 Kbps capacity. Leased with typical distance from terminus to terminus is 8 to 15 miles, but most of the cost is not distance sensitive.
DS1 Communication Line	TC002	20	0.5	1	1995	4.8	9.6	2005	1.544 Mbps capacity (T1 line). Leased with typical distance from terminus to terminus is 8 to 15 miles, but most of the cost is not distance sensitive.
DS3 Communication Line	TC003	20	3	5	1995	24	72	2001	44.736 Mbps capacity (T3 line). Leased with typical distance from terminus to terminus is 8 to 15 miles, but most of the cost is not distance sensitive.
ISP Service Fee	TC007					0.17	0.6	2004	Monthly service fee ranges from \$15 per month for regular dial-up service to \$50 per month for DSL.
Conduit Design and Installation – Corridor		20	50	75	2005	3		2005	Cost is per mile. Includes boring, trenching, and conduit (3- or 4-inch). Cost would be significantly less for an aerial installation. In-ground installation would cost significantly less if implemented in conjunction with a construction project.
Twisted Pair Installation		20	11	15.8	2004	2		2004	Cost is per mile.
Fiber Optic Cable Installation		20	20	52	2005	1	2.5	2005	Cost is per mile for cable and in-ground installation. Cost would be significantly less for an aerial installation. In-ground installation would cost significantly less if implemented in conjunction with a construction project.
900 MHz Spread Spectrum Radio		10	9		1999	0.1	0.4	2004	Cost is per link.
Terrestrial Microwave		10	5	19.1	2005	0.5	1	2005	Cost is per link. Cost could be higher depending on tower/antenna installation.
Wireless Comm.– Low Usage	TC004					0.12	0.2	2003	125 Kbytes/month available usage (non-continuous use).
Wireless Comm.– Medium Usage	TC005					0.6	0.7	1995	1,000 Kbytes/month available usage (non-continuous use).
Wireless Comm.– High Usage	TC006	20	0.5	1	1995	1.2	1.8	2002	3,000 Kbytes/month available usage (non-continuous use).
Call Box		10	4	6.8	2004	0.25	0.58	2004	Capital cost includes call box and installation. O&M is cost per unit (per year) for service maintenance contract and annual cellular service fee.
Roadside Detection (RS-D)									
Inductive Loop Surveillance on Corridor		5	3	8	2001	0.4	0.6	2005	Double set (four loops) with controller, power, etc.
Inductive Loop Surveillance at Intersection		5	8.6	15.3	2005	0.9	1.4	2005	Four legs, two lanes per approach.
Machine Vision Sensor on Corridor		10	21.7	29	2003	0.2	0.4	2003	One sensor both directions of travel. Does not include installation.
Machine Vision Sensor at Intersection		10	16	25.5	2005	0.2	1	2005	Four-way intersection, one camera per approach. Does not include installation.
Passive Acoustic Sensor on Corridor			3.7	8	2002	0.2	0.4	1998	Cost range is for a single sensor covering up to five lanes. Low cost is for basic sensor, which consists of the sensor, mounting kit, junction box, & cabinet termination card. High cost includes basic sensor with solar and wireless option. This option consists of an antenna, solar charger, battery, & panel, and wireless base station, which will handle up to eight sensors. Capital costs do not include installation or mounting structure.
Passive Acoustic Sensor at Intersection			5	15	2001	0.2	0.4	2002	Four sensors, four-leg intersection.
Remote Traffic Microwave Sensor on Corridor		10	9	13	2005	0.1	0.58	2005	One sensor both directions of travel. Includes sensor, transceiver, cabinet, electrical service, and pole.
Remote Traffic Microwave Sensor at Intersection		10	18		2001	0.1		2001	Four sensors, four-leg intersection. Includes installation.
Infrared Sensor Active			6	7.5	2000				Sensors detects movement in two directions and determines vehicle speed, classification, and lane position.
Infrared Sensor Passive			0.7	1.2	2002				Sensor covers one lane and detects vehicle count, volume, and classification.
CCTV Video Camera	RS007	10	9	19	2005	1	2.3	2004	Cost includes color video camera with pan, tilt, and zoom (PTZ), cabinet, electrical services, encoder/decoder, and installation.
CCTV Video Camera Tower	RS008	20	4	12	2005				Low cost is for a 35 ft tower. High cost is for 90 ft tower. Includes foundation, pole, conduit, and labor. Camera lowering unit additional \$3.5K. Camera tower requires minimal maintenance.
Pedestrian Detection Microwave			0.6		2001				Cost is per device. Typical deployment consists of two devices per crosswalk for detection of pedestrian in crosswalk. Can be used for detection of pedestrian at the curbside.
Pedestrian Detection Infrared			0.3	0.5	2002				Cost is per device. Does not include installation. Typical deployment consists of two devices per crosswalk for detection of pedestrian at the sidewalk. Can be used for detection of pedestrian in the crosswalk.
Environmental Sensing Station (Weather Station)		25	29	48	2005	1.9	4	2004	Environmental Sensing Station (ESS), also known as a weather station, consists of pavement temperature sensor, subsurface temperature sensor, precipitation sensor (type & rate), wind sensor (speed & direction), air temperature and humidity sensors, visibility sensors, and remote processing unit (RPU). ESS provide condition data and are basic components of larger Road Weather Information Systems (see RWIS under TMC subsystem). RPU replaced every five years at \$6.4K. O&M includes calibration, equipment repairs, and replacement of damaged equipment. O&M costs could be higher if state provided maintenance.
Traffic Camera for Red Light Running Enforcement			75	136	2001	60		2001	Low capital range is for a 35-mm wet film camera, which includes installation of the camera (\$25K) and associated equipment (e.g., pole, loop detectors, cabinet foundation). High capital range is for digital camera, which includes a total of two cameras for a three-lane approach. O&M cost is for one 35-mm wet film camera per year. Note, most jurisdictions contract with a vendor to install and maintain, and process the back office functions of the RLR system. The vendor receives compensation from fines charged to violators.
Portable Speed Monitoring System		15	5	15	2002				Trailer mounted two-digit dynamic message sign, radar gun, computer; powered by generator or operates off of solar power; and requires minimal operations and maintenance work. The system determines a vehicle's speed with the radar gun and displays the current speed, in real-time, and also stores the speeds in a computer for further analysis.
Portable Traffic Management System			80	100	2003				This portable unit collects traffic data, communicates with a central control facility, and displays real time traffic information to travelers. The system includes a trailer mounted dynamic message sign and mast equipped with a PTZ video camera, sensors, and wireless communications. Cost will vary depending on the type and number of traffic sensors installed.

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Roadside Control (RS-C)									
Linked Signal System LAN	RS002	20	23	54	2005	0.4	0.8	1995	This element provides the connections to the linked signal system.
Signal Controller Upgrade for Signal Control	RS003	20	2.5	6	2003	0.2	0.4	2005	Local controller upgrade to provide advanced signal control.
Signal Controller and Cabinet			8	14	2005	0.2	0.5	2005	Includes installation of traffic signal controller and cabinet per intersection.
Traffic Signal			95	115	2001	2.4	3	1999	Includes installation for one signal (four-leg intersection), conduit, controller, and detection device. Cost ranges from traffic signal with inductive loop detection (low) to non-intrusive detection (high).
Signal Preemption Receiver	RS004	5	2	6	2004	0.04	0.2	2004	Two per intersection. Complement of IDAS elements RS005 and TV004.
Signal Controller Upgrade for Signal Preemption	RS005	10	2	4	2005				Add-on to base capability (per intersection). Complement of IDAS elements RS004 and TV004.
Roadside Signal Preemption/Priority		10	5	6	2005	0.2	1	2005	Includes infrared detector, detector cable, phase selector, system software, and installation. Capital costs range is for two-directions. O&M cost estimate for operating, monitoring, and maintaining. Complement to transit (or emergency vehicle) on-board Signal Preemption/Priority Emitter. Capital costs can rise to \$20K to \$30K per intersection if traffic control equipment and/or systems need to be replaced.
Ramp Meter	RS006	5	25	50	2003	1.2	2.8	2003	Includes ramp meter assembly, signal displays, controller, cabinet, detection, and optimization.
Software for Lane Control	RS011	20	25	50	1995	2.5	5	1995	Software and hardware at site. Software is off-the-shelf technology and unit price does not reflect product development.
Lane Control Gates	RS012	20	100	150	1995	2	3	1995	Per location.
Fixed Lane Signal	RS009	20	6	8	1995	0.6	0.8	1995	Cost per signal.
Automatic Anti-icing System – Short span		12	25		1998	2		1998	Typical automatic anti-icing system consists of a control system, chemical storage tank, distribution lines, pump, and nozzles. Pump and control hardware replaced every five years at cost of \$3.5K. For a short span system ranging from 120 to 180 feet. O&M includes system maintenance, utilities, materials, and labor.
Automatic Anti-icing System – Long Span		12	50	495	1999	1.5	29.5	1999	Typical automatic anti-icing system consists of a control system, chemical storage tank, distribution lines, pump, and nozzles. Pump and control hardware replaced every five years at cost of \$3.5K. For a long span system ranging from 320 feet to greater than 0.5 mile. O&M includes system maintenance, utilities, materials, and labor. The high O&M cost is for a much larger system; hence, the need for a greater amount of materials.
Roadside Information (RS-I)									
Roadside Message Sign	RS010	20	50	75	1995	2.5	3.75	1995	Fixed message board for HOV and HOT lanes.
Wireline to Roadside Message Sign	RS013	20	6	9	1995				Wireline to DMS (0.5 mile upstation).
Dynamic Message Sign	RS015	10	47	117	2005	2.3	6	2005	Low capital cost is for smaller DMS installed along arterial. High capital cost is for full matrix, LED, three-line, walk-in DMS installed on freeway. Cost does not include installation.
Dynamic Message Sign Tower	RS016	20	25	120	2005				Low capital cost is for a small structure for arterials. High capital cost is for a larger structure spanning three to four lanes. DMS tower structure requires minimal maintenance.
Dynamic Message Sign – Portable		14	18.3	24	2005	0.6	1.8	2005	Trailer mounted full matrix DMS (three-line, 8-inch character display); includes trailer, solar or diesel powered, and equipped with cellular modem for remote communication and control. Operating costs are for labor and replacement parts.
Highway Advisory Radio	RS017	20	15	35	2005	0.6	1	2005	Capital cost is for a 10-watt HAR. Includes processor, antenna, transmitters, battery back-up, cabinet, rack mounting, lighting, mounts, connectors, cable, and license fee. Super HAR costs an additional \$9K to \$10K (larger antenna). Primary use of the super HAR is to gain a stronger signal.
Highway Advisory Radio Sign		10	5	9	2005	0.25		2005	Cost is for a HAR sign with flashing beacons. Includes cost of the controller.
Roadside Probe Beacon	RS020	5	5	8	2001	0.5	0.8	2001	Two-way device (per location).
LED Count-down Signal		10	0.325	0.45	2001				Costs range from low (two 12x12-inch dual housing unit) to high (16x18-inch single housed unit). Signal indicates time remaining for pedestrian to cross, and a walk or don't walk icon. Count-down signals use low 8-watt LED bulbs, which require replacement approximately every five to seven years.
Pedestrian Crossing Illumination System		5	27.5	42	2003	2.75	4.2	2001	The capital cost range includes cost of equipment and installation. Equipment includes fixtures, four lamps per lane for a three lane crosswalk, controller, pole, and push button activator. Installation is estimated at 150% to 200% of the total equipment cost. Capital cost would be greater if the system included automated activation of the in-pavement lighting system. O&M is approximately 10% of the equipment cost.
Variable Speed Display Sign			3.7	5	2001				Low range is for a variable speed limit display system. High range includes static speed sign, speed detector (radar), and display system.
Roadside Rail Crossing (R-RC)									
Rail Crossing 4-Quad Gate, Signals	RS021	20	115	130	1995	4.25	4.85	1995	Gates and signals.
Rail Crossing Train Detector	RS022	20	16	21.5	1995	0.77	1.03	1995	Train detector circuitry and communication line from intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two track crossing with two 0.5 mile communication lines.
Rail Crossing Controller	RS023	10	8	10	1995	0.4	0.5	1995	Intelligent interface controller (IIC).
Rail Crossing Pedestrian Warning Signal, Gates	RS024	20	10	15	1995	0.2	0.3	1995	Pedestrian warning signal and gates.
Rail Crossing Trapped Vehicle Detector	RS025	10	25	30	1995	1.25	1.5	1995	Entrapped vehicle detection camera, with poles and controller.
Parking Management (PM)									
Entrance/Exit Ramp Meters		10	2	5	1995	0.2	0.5	1995	Ramp meters are used to detect and count vehicles entering/exiting the parking facility. O&M costs based on annual service contract.
Tag Readers		10	2	5	1995	0.2	0.5	1995	Readers support electronic payment scheme. O&M costs based on annual service contract.
Database and Software for Billing & Pricing		10	10	15	1995	1	2	1995	Database system contains parking pricing structure and availability. O&M costs based on annual service contract.
Parking Monitoring System		10	21	46	1998				Includes installation, detectors, and controllers.
Toll Plaza (TP)									
Electronic Toll Reader	TP001	10	2	5	2001	0.2	0.5	2001	Readers (per lane). O&M is estimated at 10% of capital cost.
High-Speed Camera	TP002	10	7	10	2003	0.5	1	1995	Cost includes one camera per two lanes.
Electronic Toll Collection Software	TP003	10	5	10	1995				Includes COTS software and database.
Electronic Toll Collection Structure	TP004	20	10	15	1995				Mainline structure.

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Remote Location (RM)									
CCTV Camera	RM001	7	2	5	2005	0.1	0.24	2004	Interior fixed mount camera for security. Low cost represents black & white pan/tilt/zoom (PTZ). High cost represents color PTZ. Does not include installation.
Integration of Camera with Existing Systems	RM002	10	2	2.5	1995				Per location.
Informational Kiosk	RM003	7	11	24	2004	1.2	5	1998	Includes hardware, enclosure, installation, modem server, and map software.
Integration of Kiosk with Existing Systems	RM004	7	2.1	26.1	2005				Software costs are for COTS (low) and developed/outdoor (high).
Kiosk Upgrade for Interactive Usage	RM005	5	5	8	1995	0.5	0.8	1995	Interactive information display interface (upgrade from existing interface).
Kiosk Software Upgrade for Interactive Usage	RM006	5	10	12	1995				Software is COTS.
Transit Status Information Sign		10	4	8	2005				A LED display installed at transit terminal that provides status information on transit arrival. Cost depends on quality, size, and controller capabilities.
Smart Card Vending Machine	RM007	5	37	40	1995	1.85	2	1995	Ticket vending machine for smart card.
Software, Integration for Smart Card Vending	RM008	20	3	5	1995				Software is COTS.
Emergency Response Center (ER)									
Basic Facilities, Comm. for Large Area	EM006		4000		1995	400	600	1995	For population >750,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
Basic Facilities, Comm. for Medium Area	EM007		3200		1995	400	480	1995	For population <750,000 and >250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
Basic Facilities, Comm. for Small Area	EM008		2800		1995	400	420	1995	For population <250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
Emergency Response Hardware	EM001	5	9	12	2004	0.18	0.24	2004	Includes three workstations. O&M is estimated at 2% of capital cost.
Emergency Response Software	EM002	10	70	150	1995	0.5	3.5	1995	Includes emergency response plans database, vehicle tracking software, and real time traffic coordination.
Emergency Response Labor	EM003					50	165	1995	Two people. Salary costs are fully loaded including salary, overtime, overhead, benefits, etc.
Emergency Management Communications Software	EM004	20	5	10	1995	2.5	5	1995	Shared database between four sites. Cost is per site; software is COTS.
Hardware, Software Upgrade for E 9-1-1 and Mayday	EM005	10	105	180	1995	1.7	2.5	1995	Data communications translation software, E 9-1-1 interface software, processor, and three workstations.
800 MHz. two-way Radio		5	0.8	1.7	2001	0.09	0.12	2001	Cost is per radio.
Emergency Vehicle On-Board (EV)									
Communications Interface	EV001	10	0.3	2	2004	0.02		1995	Emergency vehicle communications. Cost is per vehicle.
Signal Preemption/Priority Emitter		10	0.5	2.1	2005				Data-encoded emitter; manually initiated. Complement to Roadside Signal Preemption/Priority (see Roadside Control subsystem).
Information Service Provider (ISP)									
Basic Facilities, Comm. for Large Area	IS019		4000		1995	400	600	1995	For population >750,000. (stand-alone) Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
Basic Facilities, Comm. for Medium Area	IS020		3200		1995	400	480	1995	For population <750,000 and >250,000. (stand-alone) Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
Basic Facilities, Comm. for Small Area	IS021		2800		1995	400	420	1995	For population <250,000. (stand-alone) Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
Information Service Provider Hardware	IS001	5	27	40	2004	0.54	0.8	2004	Includes two servers and five workstations. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.
Systems Integration	IS017	20	90	110	1998				Integration with other systems.
Information Service Provider Software	IS002	20	275	550	1995	13.75	27.5	1995	Includes database software (COTS) and traffic analysis software.
Map Database Software	IS003	2	10	28	2005				Software is COTS.
Information Service Provider Labor	IS004					175	250	1995	Two Staff @ \$50K to \$75K and one staff @ \$75K to \$100K. Salary cost are fully loaded prices and include base salary, overtime, overhead, benefits, etc.
FM Subcarrier Lease	IS005					120	240	1995	Cost is per year.
Hardware Upgrade for Interactive Information	IS006	5	12	18	2004	0.24	0.36	2004	Includes one server and two workstations. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.
Software Upgrade for Interactive Information	IS007	20	250	500	1995	12.5	25	1995	Trip planning software (includes some development costs).
Added Labor for Interactive Information	IS008					100	150	1995	One Staff @ \$50K to \$75K for two shifts. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Software Upgrade for Route Guidance	IS009	20	250	500	1995	12.5	25	1995	Route selection software. Software is COTS.
Map Database Upgrade for Route Guidance	IS010	2	100	200	1995				Map database software upgrade.
Hardware Upgrade for Emergency Route Planning	IS011	5	6	10	2004	0.12	0.2	2004	Includes one server. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.
Software Upgrade for Emergency Route Planning	IS012	20	50	100	1995	2.5	5	1995	Route guidance software. Software is COTS.
Hardware Upgrade for Dynamic Ridesharing	IS013	5	6	8	2004	0.12	0.16	2004	Includes two workstations. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.
Software Upgrade for Dynamic Ridesharing	IS014	20	100	200	1998	5	10	1995	Software includes some development cost.
Added Labor for Dynamic Ridesharing	IS015					100	150	1995	One Staff @ \$50K to \$75K for two shifts. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Liability Insurance for Dynamic Ridesharing	IS016					50	100	1995	\$50K to \$100K per year.
Software Upgrade for Probe Information Collection	IS018	20	250	500	1995	12.5	25	1995	Software includes COTS and some development cost.

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Transportation Management Center (TM)									
Basic Facilities, Comm. for Large Area	TM040		3500	8000	2003	350	1200	2003	For population >750,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc. O&M is estimated at 10% to 15% of the capital cost.
Basic Facilities, Comm. for Medium Area	TM041		3200	3200	1995	400	480	1995	For population <750,000 and >250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc. O&M is estimated at 10% to 15% of the capital cost.
Basic Facilities, Comm. for Small Area	TM042		2800	2800	1995	400	420	1995	For population <250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc. O&M is estimated at 10% to 15% of the capital cost.
Hardware for Signal Control	TM001	5	21	30	2004	9	10.5	2003	Includes one server and multiple workstations. O&M includes responsive and preventative maintenance.
Software, Integration for Signal Control	TM006	5	105	150	2003	150		2003	Software and integration for a large urban area. Cost would be lower (approx. \$10.5K) for a few arterial intersections. O&M includes software upgrades, revisions, and expansion of the system.
Labor for Signal Control	TM002					486	594	2001	Costs include labor for operations (two @ 50% of the time, at \$100K), transportation engineer (one at 50% of the time, at \$100K), update timing plans (\$2K per system per month for every 10 systems), and signal maintenance technician (two @ \$75K). Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Hardware, Software for Traffic Surveillance	TM003	20	135	165	1995	6.75	8.25	1995	Processor and software.
Integration for Traffic Surveillance	TM032	20	225	275	1995	11.25	13.75	1995	Integration with other systems.
Hardware for Freeway Control	TM004	5	9	12	2004	0.45	0.6	2004	Includes three workstations. O&M estimated at 5% of capital cost.
Software, Integration for Freeway Control	TM007	5	180	220	2002				Software and integration, installation and one year maintenance. Software is off-the-shelf technology and unit cost does not reflect product development.
Labor for Freeway Control	TM005					225	275	2001	Labor for operations (two @ 50% of \$100K) and maintenance technicians (two @ \$75K). Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Hardware for Lane Control	TM008	5	3	4	2004	0.15	0.2	2004	Includes one workstation and 19-inch monitor. O&M estimated at 5% of capital cost.
Software, Integration for Lane Control	TM009	10	225	275	1995	11.25	13.75	1995	Software development and integration and software upgrade for controllers. Software development is fine tune adjustments for local installations. Otherwise, software is COTS.
Labor for Lane Control	TM010					90	110	2001	Labor for two operators @ 50% of 100K.
Software, Integration for Regional Control	TM011	10	300	400	1998				Software and integration, installation and one year maintenance. Integration with other TMCs. Software is COTS.
Real-time, Traffic Adaptive Signal Control System		10	120	150	2001	20		2001	The cost range is based on commercially available packages, which run on a centralized computer. The high capital cost includes software packages for graphical user interface and incident management. The cost range is representative of 65 to 235 intersections; cost would be lower for a smaller number of intersections.
Labor for Regional Control	TM012					180	220	2001	Labor for operators (two @ 50% of \$100K), transportation engineer (one @ 50% of \$100K), and maintenance contract. Salary costs are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Video Monitors, Wall for Incident Detection	TM013	10	57	103	2003	3	5	2003	Video wall and monitors. O&M estimated at 5% of capital cost.
Hardware for Incident Detection	TM014	5	39.8	61.6	2004	2	3	2004	Includes four servers, five workstations, and two laser printers. O&M estimated at 5% of capital cost; could be higher for responsive and preventative maintenance.
Integration for Incident Detection	TM025	20	90	110	1995	4.5	5.5	1995	Integration with other systems.
Software for Incident Detection	TM015	5	90	110	2002	4.5	5.5	2002	Software is COTS and includes development cost. O&M is estimated at 5% of capital.
Labor for Incident Detection	TM016					630	770	2001	Labor for operators (four @ \$100K and one manager @ \$150K) and two maintenance techs @ \$75K.
Hardware for Incident Response	TM018	5	3	4	2004	0.15	0.2	2004	Includes one workstation and monitor. O&M estimated at 5% of capital cost.
Integration for Incident Response	TM026	20	180	220	1995				Integration with other systems.
Software for Incident Response	TM019	2	13.5	16.5	1995	0.675	0.825	1995	Software is COTS.
Labor for Incident Response	TM020					90	110	2001	Labor for incident management coordinator (one @ \$100K).
Automated Incident Investigation System		5	15		2001				Includes workstation, tripod, monopole antenna, Auto Integration, and AutoCAD software.
Hardware for Traffic Information Dissemination	TM021	5	3	4	2004	0.15	0.2	2004	Includes one workstation. O&M estimated at 5% of capital cost.
Software for Traffic Information Dissemination	TM022	5	18	22	1995	0.9	1.1	1995	Software is COTS.
Integration for Traffic Information Dissemination	TM023	20	90	110	2000	4.5	5.5	1995	Integration with other systems.
Labor for Traffic Information Dissemination	TM024					90	110	2001	Labor for one operator @ \$100K. Salary costs are fully loaded and include base salary, overtime, overhead, benefits, etc.
Software for Dynamic Electronic Tolls	TM027	5	22.5	27.5	1995	1.125	1.375	1995	Includes software installation and one year maintenance. Software is COTS.
Integration for Dynamic Electronic Tolls	TM028	20	90	110	1995	4.5	5.5	1995	Integration with other systems.
Hardware for Probe Information Collection	TM033	3	3	4	2004	0.15	0.2	2004	Includes one workstation. O&M estimated at 5% of capital cost.
Software for Probe Information Collection	TM034	5	18	22	1995	1.8	2.2	1995	Includes software installation and one year maintenance. Software is COTS.
Integration for Probe Information Collection	TM035	20	135	165	1995	13.5	16.5	1995	Integration with other systems.
Labor for Probe Information Collection	TM036					45	55	2001	Labor for one operator (four hours per day @ \$100K per year). Salary costs are fully loaded prices and include base salary, overtime, overhead, benefits etc.
Software for Rail Crossing Monitor	TM037	5	18	22	1995	1.8	2.2	1995	Includes software installation and one year maintenance. Software is COTS.
Integration for Rail Crossing Monitor	TM038	20	90	110	1995				Integration with other systems.
Labor for Rail Crossing Monitor	TM039					45	55	2001	Operators (one @ 50% of \$100K). Salary costs are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Road Weather Information System (RWIS)		25	25		1998	0.4	2.5	2001	A RWIS consists of several components: an environmental sensing station (ESS), CPU, workstation with RWIS software, and communications equipment. All components of the RWIS reside at the TMC with the exception of the ESS. See Roadside Detection subsystem for costs of ESS. Cost of the ESS (\$29K to \$48K) should be added to \$25K listed here in order to cost out the entire system. CPU replaced every five years at a cost of \$4K. O&M costs range includes communication, and optional weather forecast/meteorological service.

ITS Unit Costs Database (as of 30 October 2010)

Subsystem/Unit Cost Element	IDAS No. ^	Lifetime (years)*	Capital Cost (\$K)		Cost Date	O&M Cost (\$K/year)		Cost Date	Description
			Low	High		Low	High		
Transit Management Center (TR)									
Basic Facilities, Comm. for Large Area	TR014		4000	4000	1995	400	600	1995	For population >750,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
Basic Facilities, Comm. for Medium Area	TR015		3200	3200	1995	400	480	1995	For population <750,000 and >250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
Basic Facilities, Comm. for Small Area	TR016		2800	2800	1995	400	420	1995	For population <250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
Transit Center Hardware	TR001	5	9	12	2004	0.18	0.24	2004	Includes three workstations. O&M estimated at 2% of capital cost.
Transit Center Software, Integration	TR002	20	775	1636	2005	6	12	1995	Includes vehicle tracking & scheduling, database & information storage, schedule adjustment software, real time travel information software, and integration. Software is COTS.
Transit Center Additional Building Space	TR003					6	9	1995	Additional space required for ITS technology. 500 sq.ft. (\$12 to \$18 per sq.ft.)
Transit Center Labor	TR004					100	400	2005	Labor for one to three staff @ \$125K. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Upgrade for Auto. Scheduling, Run Cutting, or Fare Payment	TR005	20	20	40	1995	0.4	0.8	1995	Processor/software upgrade, installation and one year maintenance (for processor). Software is COTS.
Integration for Auto. Scheduling, Run Cutting, or Fare Payment	TR012	20	214	476	2005				Integration with other systems.
Further Software Upgrade for E-Fare Payment	TR013	20	40	60	1995	0.8	1.2	1995	Software upgrade. Software is COTS. Automatic passenger counter processing software costs an additional \$25K to several hundred thousand dollars depending on the system.
Vehicle Location Interface	TR007	20	10	15	1995				Vehicle location interface.
Video Monitors for Security System	TR008	5	3	7	2003	0.06	0.14	2003	Five per site. O&M estimated at 2% of capital cost.
Hardware for Security System	TR009	5	15	22	2004	0.3	0.44	2004	Includes one server and three workstations. O&M estimated at 2% of capital cost; could be higher for preventative and responsive maintenance.
Integration of Security System with Existing Systems	TR010	20	250	500	1995				Integration with other systems.
Labor for Security System	TR011					202	247	1995	Labor for three staff @ \$75K each. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Toll Administration (TA)									
Toll Administration Hardware	TA001	5	6.4	9.6	2004	0.32	0.48	2004	Includes two workstations, printer, and modem. O&M estimated at 5% of capital costs.
Toll Administration Software	TA002	10	40	80	1995	4	8	1995	Includes local database and national database coordination. Software is COTS.
Transit Vehicle On-Board (TV)									
Driver Interface and Schedule Processor	TV001	10	0.3	0.5	1995	0.006	0.01	1995	On-board schedule processor and database.
Cell Based Communication Equipment	TV002	10	0.15	0.25	1995	0.008	0.013	1995	Cell-based radio with data capacity.
GPS/DGPS for Vehicle Location	TV003	10	0.5	2	2002	0.01	0.04	2002	AVL GPS/DGPS. Capital cost depends on features of unit. O&M cost (estimated at 2% of capital) is for unit maintenance and does not include annual telecom service fees.
Signal Preemption Processor	TV004	10	0.3	0.6	1995	0.006	0.01	1995	On-board schedule processor and database. Complement to IDAS elements RS004 and RS005.
Signal Preemption/Priority Emitter		10	0.5	2.1	2005		0.1	2005	Data-encoded emitter; manually initiated. Complement to Roadside Signal Preemption/Priority (see Roadside Control subsystem). Estimated O&M.
Preemption/Priority Transponder			0.075		2000				Passive transponder mounted on underside of transit vehicle. Requires transit priority system at the Transit Management Center.
Trip Computer and Processor	TV005	10	0.1	0.15	1995	0.002	0.003	1995	On-board processor for trip reporting and data storage.
Security Package	TV006	10	3.2	6.2	2005	0.21	0.265	1995	On-board CCTV surveillance camera and hot button. The high capital cost represents a common installation of a digital event recorder system.
Electronic Farebox	TV007	10	0.8	1.5	1995	0.04	0.075	1995	On-board flex fare system DBX processor, on-board farebox, and smart card reader.
Automatic Passenger Counting System		10	0.96	9.6	2005				Low cost reflects the APC system as an add-on to an existing route scheduling or tracking system. High cost reflects the APC system as a stand alone installation. Cost is per vehicle and includes installation.

ITS Unit Costs Database (as of 30 October 2010)

Subsystem/Unit Cost Element	IDAS No. ^	Lifetime (years)*	Capital Cost (\$K)		Cost Date	O&M Cost (\$K/year)		Cost Date	Description
			Low	High		Low	High		
Commercial Vehicle Electronic Credentialing (EC)/Administration									
Computer network server for EC		4	7.5	55	2004				Each.
Personal computer (desktop or laptop) for EC administration		4	1.6	3	2005				Each.
Supplies and materials for EC outreach, internal and external publicity, training, other deployment support			1	21	2003				Per state, consumables for publicity, training, and other deployment support.
Bar code readers for law enforcement for EC			0.5	0.8	2004				Each.
EC software purchased for back-end admin		5	40	74	2004				Per state, for database management and data processing or reporting.
EC software purchased for front-end interface		5	72	261	2005				Per state, for user interface and data entry. Depending on the functionality of the interface being developed, the cost could be much higher or much lower than the range shown.
State employee labor for new EC software development			72	250	2005				Per state. For states also reporting hours, FTEs ranged from about 0.2 to 2.6 FTE. Depending on the functionality of the system being developed, the dollar cost could be much higher or much lower than the range shown.
State employee labor for new EC hardware configuration			2.4	12	2003				Per state, after original hardware installation.
Contractor labor for new EC software development			150	902	2003				Per state. For states also reporting hours, FTEs ranged from about 1 to 3 FTE. Depending on the functionality of the system being developed, the cost could be much higher, or much lower than the range shown.
Contractor labor for new EC hardware configuration			3.3	6.4	2004				Per state, after original hardware installation.
Labor for existing (legacy) credentialing system interface and/or modification			12	40	2004				Per state, includes state employees, contractors, vendors. For states also reporting hours, FTEs ranged from about 0.1 to 0.4 FTE.
Labor for EC training			5	12	2003				Per state cost to state agency. Examples: Start-up workshops, training and publicity materials for administrators, law enforcement, and PRISM carriers.
Other start-up labor costs			10	40	2003				Per state, includes CVISN system architect, EC feasibility study; OS/OW permitting, program queries, IFTA/IRP program staff, maintenance, miscellaneous A&E, hardware, software, planning and facilitation, training and travel.
Membership fees paid to IRP Clearinghouse						8	15	2004	Per state, fees set by clearinghouse pro rata, based on registered power units per state.
Annual fees to IRP EC admin (back-end)						11	63	2003	Per thousand accounts, for third-party administrator (e.g., VISTA, Polk).
Annual fees to IRP EC admin (front-end)						5	29	2004	Per thousand accounts, for third-party administrator (e.g., VISTA, Polk).
Recurring costs for EC outreach						0.5	0.9	2004	Per thousand accounts. Outreach includes marketing, promotional, attendance at trade shows, advertising, booklets.
State employee annual labor IRP credentialing						45	159	2005	Per thousand accounts, for legacy system (pre-CVISN) labor.
Contractor annual labor for IRP credentialing						6	16	2004	Per thousand accounts, for legacy system (pre-CVISN) labor.
Membership fees paid to IFTA Clearinghouse							1	2005	Per state, fees set by clearinghouse.
Annual fees to IFTA EC admin (back-end)						11	33	2004	Per thousand accounts, for third-party administrator (e.g., VISTA, Polk).
Annual fees to IFTA EC admin (front-end)						7	12	2004	Per thousand accounts, for third-party administrator (e.g., VISTA, Polk).
State employee annual labor IFTA credentialing						13	105	2004	Per thousand accounts, for legacy system (pre-CVISN) labor.
Vendor annual labor for IFTA credentialing						1	18	2004	Per thousand accounts, for legacy system (pre-CVISN) labor.
Commercial Vehicle Safety Information Exchange (SIE)									
Computer network server for SIE		4	5.5	25	2004				Each, includes mobile servers used in roadside enforcement.
Desktop personal computer for SIE		4	1.1	2	2004				Each, includes computers used at roadside check stations.
Laptop personal computer for SIE		3	3	4	2004				Each.
Portable printer for mobile enforcement		4	0.3	0.4	2004				Each.
Wireless modem for vehicle and/or roadside use		3	0.5	0.9	2003				Each.
Supplies and materials for SIE outreach, training			5		2004				Per state, consumables for publicity and other deployment support.
Router for SIE		5	5	12	2004				Each.
T1 Lines for SIE		5	3	30	2004				Each line.
SIE software purchased off the shelf			6	20	2004				Per state.
State employee labor for new SIE software development			19	118	2005				Per state (e.g., CVIEW (Commercial Vehicle Information Exchange Window). For states also reporting hours, FTEs ranged from about 0.2 to 2 FTE).
State employee labor for new SIE hardware configuration			4.8	5	2004				Per state.
Contractor labor for new SIE software development			45	170	2004				Per state. Depending on the functionality of the system being developed, the cost could be much higher or much lower than the range shown.
Labor for existing (legacy) SIE system interface			72	250	2005				Per state, includes state employees, contractors, vendors.
Labor for training for SIE system deployment			4	7.1	2004				Per state.
Telephone and internet annual service charges for SIE						0.5	40	2004	Per state.
Wireless comm.annual charges for SIE						26	62	2004	Per state.
State employee annual labor for SIE						19	63	2004	Per state.
Contractor annual labor for SIE						14	40	2004	Per state.

ITS Unit Costs Database (as of 30 October 2010)

Subsystem/Unit Cost Element	IDAS No. ^	Lifetime (years)*	Capital Cost (\$K)		Cost Date	O&M Cost (\$K/year)		Cost Date	Description
			Low	High		Low	High		
Commercial Vehicle Electronic Screening (ES) (Preclearance)									
Computer network server dedicated to ES		5	10	13	2004				Each.
Desktop PC dedicated to ES		5	2.5	3	2005				Each.
Laptop personal computer dedicated to ES		4		3	2004				Each.
Mainline (highway speed) WIM scale		10	60	250	2004				Each. Depending on the functionality of the equipment deployed, the cost could be much higher or much lower than the range shown. Some states reported equipment cost only; others reported installed cost, with accessories (e.g., signs, loop detectors, wiring, etc.).
Sorter lane (ramp speed) WIM scale		12	100	250	2003				Each.
ES transponder purchased by state for free distribution		5	0.01	0.05	2004				Each.
ES transponder purchased by state for resale		4	0.04	0.05	2004				Each.
Automated vehicle identification (AVI) equipment/system		10	50	99	2004				Each.
ES telecom. equipment (upstream to weigh station)		20	0.8	28	2004				Per state (e.g., fiber optic cable).
Electronic sign for weigh station		20	12	48	2004				Each (e.g., Open/Closed, directional arrows, or variable-message signs).
Loop detector for weigh station		20	1	6	2005				Each.
Upgrade of fixed-site weigh station for ES (excluding items listed above)			44	80	2004				Each. Some states reported building modifications, counters, cabinets, wiring, HVAC, structural changes to static scale building, highway poles and bases.
One-time start-up fees paid to ES admin				15	2004				Per state (e.g., PrePass or Norpass).
Supplies and materials for ES outreach and publicity			0.5	2	2004				Per state.
ES software purchased off the shelf			0.5	4	2004				Per state.
State employee labor for ES software development			12	29	2004				Per state.
State employee labor for new ES hardware configuration			4.8	5	2004				Per state.
Contractor labor for ES software development			185	188	2004				Per state.
Contractor labor for new ES hardware configuration			130	189	2004				Per state.
Labor for existing (legacy) system interface			29	30	2004				Per state, includes state employees, contractors, vendors.
Labor for training associated with ES system deployment			3.6	20	2004				Per state.
Annual payments made to ES admin							15	2005	Per state (e.g., PrePass or Norpass).
Annual maintenance cost for mainline WIM scale						52	128	2004	Each. Depending on the functionality of the equipment being maintained, the cost could be much higher or much lower than the range shown.
Annual maintenance cost for sorter-lane WIM scale for ES						10	36	2004	Each.
Annual costs for marketing, outreach, publicity, etc.						0.5	5	2004	Per state.
State employee annual labor for ES, higher-volume state						50	167	2004	Per state, volume based on relative numbers of carriers, vehicles, and inspections.
State employee annual labor for ES, lower-volume state						4.8	6	2004	Per state, volume based on relative numbers of carriers, vehicles, and inspections.
Commercial Vehicle On-Board (CV)									
Electronic ID Tag	CV001	10	0.65	1.1	1995	0.013	0.022	1995	Includes ID tag, additional software & processing, and database storage. Software is COTS.
Communication Equipment	CV002	10	1.15	2.25	1995	0.008	0.013	1995	Commercial vehicle communication interface and communication device (cell-based radio).
Central Processor and Storage	CV003	10	0.3	0.5	1995	0.006	0.01	1995	Equipment on board for the processing and storage of cargo material.
GPS/DGPS	CV004	10	0.5	1.8	2004	0.12	0.6	2004	GPS for vehicle location. Capital cost depends on features of unit. O&M cost includes annual service fees.
Driver and Vehicle Safety Sensors, Software	CV005	10	1.1	2.2	1995	0.04	0.08	1995	Additional software and processor for warning indicator and audio system interface, and onboard sensors for engine/vehicle and driver. Software is COTS.
Cargo Monitoring Sensors and Gauges	CV006	10	0.17	0.35	1995	0.017	0.035	1995	Optional on-board sensors for measuring temperature, pressure, and load leveling.
Electronic Cargo Seal Disposable			0.01	0.025	2003				Cost for a disposable radio frequency identification (RFID) E-seal that provides a complete and accurate audit trail of seal status during transport. Low is for passive, and high is for active E-seal.
Electronic Cargo Seal Reusable			0.035	0.44	2002				Cost for a reusable radio frequency identification (RFID) E-seal that provides a complete and accurate audit trail of seal status during transport. Low is for passive, and high is for active E-seal. Depending on the vendor, some E-seals may incur a monthly service charge.
Autonomous Tracking Unit			0.35	0.8	2003	0.144	0.42	2003	Chassis or container mounted unit that tracks location and condition of assets (cost for on-board sensors not included). Higher priced units provide greater functionality, such as polling of location information and increased quantities of sensor data. Annual service charges include the communications link between unit and data center, and information services.

ITS Unit Costs Database (as of 30 October 2010)

Subsystem/Unit Cost Element	IDAS No. ^	Lifetime (years)*	Capital Cost (\$K)		Cost Date	O&M Cost (\$K/year)		Cost Date	Description
			Low	High		Low	High		
Fleet Management Center (FM)									
Fleet Center Hardware	FM001	5	9	12	2004	0.18	0.24	2004	Costs include three workstations. O&M estimated at 2% of capital cost.
Fleet Center Software, Integration	FM002	20	215	500	1995				Includes processor and integration. Software is COTS.
Fleet Center Labor	FM003					337	412	1995	Labor for five staff @ \$75K. Salary costs are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Software for Electronic Credentialing, Clearance	FM004	20	80	180	1995				Includes electronic credential purchase software, database and management for trip reports, and database management for preclearance. Software is COTS.
Software for Tracking and Scheduling	FM005	20	10	33	2004	4	10	1995	Vehicle tracking and scheduling. Software is COTS.
Vehicle Location Interface	FM006	20	10	15	1995				Vehicle location interface from FMS to TMS.
Software Upgrade for Fleet Maintenance	FM007	20	20	40	1995	0.4	0.8	1995	Processor/software upgrade to add capability to automatically generate preventative maintenance schedules from vehicle mileage data. Software is COTS.
Integration for Fleet Maintenance	FM008	20	100	200	1995	2	4	1995	Integration with other systems.
Software Upgrade for HAZMAT Management	FM009	20	20	40	1995	0.4	0.8	1995	Vehicle tracking & scheduling enhancement. Software is COTS.
Hardware Upgrade for HAZMAT Management	FM010	5	3	4	2004	0.06	0.08	2004	Includes one workstation. O&M estimated at 2% of capital cost.
Electronic Cargo Seal Reader			0.3	1.5	2002				Unit cost depends on quantity purchased. Low cost is for handheld reader. High cost is for fixed reader. Cost will be significantly increased if reader is equipped with additional security features.
Vehicle On-Board (VS)									
Communication Equipment	VS001	7	0.2	0.4	1995	0.004	0.008	1995	Wireless data transceiver.
In-Vehicle Display	VS002	7	0.05	0.1	1995	0.001	0.002	1995	In-vehicle display/warning interface. Software is COTS.
In-Vehicle Signing System	VS003	7	0.16	0.4	1995	0.003	0.008	1995	Interface to active tag reader, processor for active tag decode, and display device for messages.
GPS/DGPS	VS004	7	0.25	0.5	1995	0.005	0.01	1995	Global Positioning System/Differential Global Positioning Systems.
GIS Software	VS005	7	0.2	0.3	1995				Geographical Information System (GIS) software for performing route planning.
Route Guidance Processor	VS006	7	0.1	0.15	1995	0.002	0.003	1995	Limited processor for route guidance functionality.
Sensors for Lateral Control	VS007	7	0.8	1.1	1995	0.016	0.022	1995	Includes lane sensors in vehicle and lateral sensors millimeter microwave radar.
Electronic Toll Equipment	VS008	7	0.04	0.1	1995				Active tag interface and debit/credit card interface.
Mayday Sensor and Processor	VS009	7	0.15	0.65	1995	0.003	0.013	1995	Collision detector sensor and interface for Mayday processor. Software is COTS.
Sensors for Longitudinal Control	VS010	7	0.3	0.5	1995	0.006	0.01	1995	Longitudinal sensors millimeter microwave radar.
Advanced Steering Control	VS011	7	0.5	0.6	1995	0.01	0.012	1995	Advanced steering control ("hands off" driving). Software is COTS.
Advanced Cruise Control	VS012	7	0.15	0.3	1995	0.003	0.006	1995	Adaptive cruise control (automatic braking and accelerating).
Intersection Collision Avoidance Processor, Software	VS013	7	0.28	0.55	1995	0.006	0.011	1995	Software/processor for infrastructure transmitted information, interface to in-vehicle signing and audio system, software and processor to link to longitudinal and lateral vehicle control modules based on input signal from vehicle intersection collision warning equipment package. Software is COTS.
Vision Enhancement System	VS014	7	2	2.5	2003	0.1	0.125	2003	In-vehicle camera, software & processor, heads-up display, and infra-red sensors (local sensor system). Software is COTS. O&M estimated at 5% of capital.
Driver and Vehicle Safety Monitoring System	VS015	7	0.66	1.25	1995	0.033	0.063	1995	Safety collection processor and software, driver condition sensors, six vehicle condition sensors (@ \$50 each), and vehicle data storage. Software is COTS.
Pre-Crash Safety System	VS016	7	1.1	2.15	1995	0.037	0.067	1995	Vehicle condition sensors, vehicle performance sensors, software/processor, interface, pre-crash safety systems deployment actuators. Software is COTS.
Software, Processor for Probe Vehicle	VS020	7	0.05	0.15	1995	0.001	0.003	1995	Software and processor for communication to roadside infrastructure, signal generator, message generator. Software is COTS.
Toll Tag/Transponder		5	0.025		2004				Most toll tags/transponders cost approximately \$25 each. Some toll agencies require users to pay a refundable deposit in lieu of purchasing a tag. The user is charged the cost of the tag if the tag is lost.
In-Vehicle Navigation System		7	2.8		1998				COTS product that includes in-vehicle display and supporting software.
Personal Devices (PD)									
Basic PDA	PD001	7	0.1	0.3	2004				Personal digital assistant. O&M estimated at 2% of capital.
Advanced PDA for Route Guidance, Interactive Info	PD002	7	0.4	0.6	2004				Personal digital assistant with advanced capabilities (route guidance, interactive).
Modem Interface, Antenna for PDA	PD003	7	0.18	0.25	1995	0.004	0.005	1995	Modem interface and separate antenna for wireless capability.
PDA with Wireless Modem		2	0.2	0.6	2003	0.12	0.3	2001	Personal digital assistant with wireless modem. O&M based on monthly subscriber rate plans of 50 Kbytes (low) and 150 Kbytes (high).
GPS/DGPS	PD005	7	0.15	0.18	2001	0.003	0.004	2001	GPS/DGPS. O&M estimated at 2% of capital cost.
GIS Software	PD006	7	0.1	0.15	1995	0.005	0.008	1995	Additional GIS/GUI capability.
* Not available for all unit cost elements									
^ Applicable to the ITS Deployment Analysis System (IDAS) software									

Index Information for the ITS Unit Costs Database (as of October 2010)

CONVERSION RATIOS

Index	2009/1995	2009/1998	2009/1999	2009/2000	2009/2001	2009/2002	2009/2003	2009/2004	2009/2005	2009/2006	2009/2007	2009/2008
1 WPU1176	0.9429		0.9379		0.9653	0.9823	1.0019	1.0232	1.0312	1.0322	1.0242	1.0086
2 WPU1178	0.6637	0.7540	0.7678	0.7765	0.8030	0.8160	0.8304	0.8491	0.8667	0.8520	0.9162	0.9792
3 PCU511210511210502	0.9945	0.9788	0.9729	0.9408	0.9345	0.9436	0.9918	1.0352	1.0453	1.0232	1.0146	1.0000
4 NDU BBLD-BBLD	1.4362						1.3161	1.2212	1.1347	1.0678	1.0337	0.9577
5 WPU115	0.2173	0.3475	0.4021		0.4796		0.6114	0.6643	0.7245	0.7866	0.8584	0.9330
6 CIU101000000710I	1.5847				1.2943		1.2012	1.1571	1.1206	1.0877	1.0519	1.0195
7 CUUR0000SA0	1.4077						1.1660	1.1357	1.0985	1.0642	1.0347	0.9964
8 WPU09130124							1.2932	1.2783	1.2187	1.1483	1.1026	1.0152
9 WPU10740512									1.1327	1.0822	1.0329	0.8899

NOTES

1 WPU1176	Applied to communications and related equipment
2 WPU1178	Applied to elements that contain electronic components
3 PCU511210511210502	Applied to software and integration elements
4 NDU BBLD-BBLD	Applied to physical dwellings at Centers and Toll Plaza
5 WPU115	Applied to computer hardware
6 CIU101000000710I	Applied to labor categories
7 CUUR0000SA0	Applied to ISP Liability Insurance (IS016)
8 WPU09130124	Applied to elements related to outreach and publicity
9 WPU10740512	Applied to towers and overhead structures

YEAR-BY-YEAR INDEX SERIES FROM 1995-2009 (as of October 2010)

1 Series Id: WPU1176	Source: www.bis.gov/ppi												
Not Seasonally Adjusted													
Group: Machinery and equipment													
Item: Communication and related equipment													
Base Date : 198512													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
1995	111.9	112.1	112.1	112.2	112.1	111.9	111.8	111.9	112.3	112.3	112.3	112.2	112.1
1996	112.9	113.1	113.0	113.0	112.7	112.6	112.9	113.1	113.1	113.2	113.0	113.9	113.0
1997	113.9	114.0	113.4	113.5	113.7	113.6	114.4	114.2	114.1	114.1	114.8	114.8	114.0
1998	114.8	114.8	114.6	114.4	114.1	114.1	113.7	113.6	113.6	113.7	113.7	113.5	114.1
1999	114.3	114.2	114.1	114.0	113.0	112.8	112.6	112.1	111.2	111.4	111.3	111.3	112.7
2000	111.4	110.9	110.8	110.6	110.8	110.4	110.5	110.5	110.5	110.4	110.4	109.8	110.6
2001	110.3	110.3	110.3	109.6	109.6	109.5	109.2	109.2	109.2	109.1	109.1	109.0	109.5
2002	109.3	108.7	108.8	107.9	107.9	107.7	106.9	107.1	107.4	106.7	106.8	106.2	107.6
2003	106.1	105.7	106.4	106.2	106.1	105.7	104.8	104.9	105.2	104.9	105.2	105.2	105.5
2004	105.0	103.4	103.4	103.3	103.4	103.1	103.0	103.2	103.1	102.6	103.1	103.0	103.3
2005	102.7	102.6	102.7	102.8	102.7	102.6	102.5	102.5	102.2	102.4	102.3	102.3	102.5
2006	102.0	102.3	102.1	102.5	102.5	102.7	102.6	102.7	102.7	102.5	102.5	102.1	102.4
2007	102.7	102.9	103.2	103.3	103.3	103.2	103.2	103.1	103.2	103.3	103.3	103.3	103.2
2008	103.8	104.6	104.6	104.6	104.9	104.9	105.0	105.1	105.0	104.9	105.1	105.2	104.8
2009	105.9	105.7	105.7	105.7	105.6	105.6	105.6	105.7	105.7	105.7	105.7	105.7	105.7
2010	106.1	105.9	106.0	105.8	105.7(P)	105.7(P)	105.7(P)	105.7(P)					

P: Preliminary. All indexes are subject to revision four months after original publication.

Index Information for the ITS Unit Costs Database (as of October 2010)

2 Series Id: WPU1178 Source: www.bls.gov/ppi
 Not Seasonally Adjusted
 Group: Machinery and equipment
 Item: Electronic components and accessories
 Base Date : 198200

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
1995	114.6	115.0	114.3	114.4	114.0	113.7	113.1	112.9	112.9	112.9	113.1	112.9	113.6
1996	112.5	112.2	110.8	109.4	108.5	107.9	108.0	108.0	108.1	107.3	107.3	107.2	108.9
1997	106.7	106.0	105.8	105.4	104.5	104.5	104.4	103.0	102.9	101.9	101.6	101.4	104.0
1998	101.1	100.7	100.7	100.4	100.1	100.0	99.7	99.6	99.5	99.4	99.2	99.1	100.0
1999	98.8	98.6	98.6	98.3	98.1	97.8	97.6	97.7	98.1	98.3	98.2	97.9	98.2
2000	97.2	96.9	96.8	97.3	97.1	97.3	97.7	97.6	97.5	97.2	96.9	96.1	97.1
2001	95.9	95.3	95.1	94.9	94.6	94.0	93.5	92.9	92.6	92.4	92.6	92.7	93.9
2002	92.8	93.0	93.2	92.8	92.5	92.5	92.3	92.3	92.3	92.0	92.0	91.5	92.4
2003	91.3	91.1	91.2	91.3	91.4	91.1	90.9	90.6	90.3	90.2	90.3	89.7	90.8
2004	88.9	89.4	89.2	89.6	89.1	89.3	88.4	88.3	88.2	88.4	88.2	88.2	88.8
2005	88.2	88.0	87.7	87.5	87.1	87.0	87.3	87.4	86.8	86.6	85.7	85.2	87.0
2006	84.9	84.8	87.7	88.6	88.7	88.7	89.0	89.8	90.3	89.9	89.7	89.7	88.5
2007	89.0	85.2	83.9	83.8	82.7	83.1	81.7	80.8	80.2	79.5	79.1	78.4	82.3
2008	77.7	77.7	77.6	77.4	77.3	77.4	77.1	76.7	76.6	76.8	76.3	75.8	77.0
2009	75.3	75.5	75.8	75.7	75.9	75.4	75.4	75.4	75.2	75.2	75.2	74.8	75.4
2010	74.3	74.4	74.4	74.3	74.2(P)	74.1(P)	73.9(P)	73.8(P)					

P: Preliminary. All indexes are subject to revision four months after original publication.

3 Series Id: PCU511210511210502 Source: www.bls.gov/ppi
 Industry: Software publishers
 Product: Application software publishing
 Base Date: 199712

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
1997												100.0	
1998	101.2	99.1	97.9	97.8	99.7	99.8	99.2	98.1	100.2	100.2	98.3	98.2	99.1
1999	99.1	99.5	99.5	99.5	99.3	100.0	99.8	100.6	99.9	99.9	99.7	99.6	99.7
2000	100.0	101.1	99.2	101.9	103.1	100.8	103.2	106.2	106.3	106.9	104.2	103.9	103.1
2001	105.3	104.0	104.7	107.8	103.1	103.8	100.2	103.5	103.6	103.5	103.0	103.9	103.8
2002	103.9	103.8	103.2	102.0	102.2	102.0	102.1	103.2	103.0	103.1	102.3	102.8	102.8
2003	98.6	100.2	99.3	99.5	99.5	99.0	100.1	97.7	94.2	94.6	95.7	95.0	97.8
2004	94.3	94.9	94.6	94.9	93.1	93.7	95.2	93.5	93.3	93.0	92.4	91.4	93.7
2005	93.2	92.3	92.7	93.2	92.1	93.3	92.3	92.8	92.9	92.8	92.7	92.8	92.8
2006	93.0	93.6	93.9	93.4	95.4	95.5	95.5	95.5	95.6	95.8	95.7	94.9	94.8
2007	95.4	95.4	95.2	95.4	95.4	95.5	95.7	95.6	95.6	96.3	95.7	96.0	95.6
2008	95.8	96.3	96.6	96.8	97.3	97.4	97.6	97.1	97.1	96.8	97.5	97.2	97.0
2009	97.2	97.5	97.2	97.4	97.5	96.8	94.9	97.3	96.7	97.7	97.3	96.7	97.0
2010	96.2	97.1	97.6	97.3	97.0(P)	97.0(P)	96.7(P)	97.1(P)					

P: Preliminary. All indexes are subject to revision four months after original publication.
 NOTE: Index data were not available for 1995. The 1995 annual value was derived using linear regression. A linear trendline was developed using data points from March 2000 and before. Based on this trendline, we estimate a 0.52 decrease in the annual index from year to year. The 1995 annual index value is estimated to be 97.5.

Index Information for the ITS Unit Costs Database (as of October 2010)

4 **Series ID: NDUBBLD--BBLD--** Source: www.bls.gov/ppi
 Not Seasonally Adjusted
 Industry: Non-residential buildings
 Product: Non-residential buildings
 Base Date : 198606

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
1995	124.3	124.7	125.3	125.9	126.1	126.2	126.5	126.7	126.9	126.8	126.8	126.8	126.1
1996	127.0	127.1	127.3	127.6	128.1	128.4	128.4	128.6	129.0	129.0	129.3	129.3	128.2
1997	129.6	129.9	130.0	130.3	130.7	130.7	130.8	130.9	130.9	130.8	130.9	130.7	130.5
1998	130.6	130.6	130.7	131.1	131.2	131.4	131.6	131.6	131.7	131.6	131.4	131.1	131.2
1999	131.4	131.5	131.8	132.3	132.6	133.1	133.5	133.9	133.9	133.8	134.0	134.2	133.0
2000	134.7	135.2	135.7	135.8	135.5	136.0	135.8	135.5	135.9	135.8	135.7	135.6	135.6
2001	135.8	136.0	135.9	136.2	136.8	136.7	136.2	136.2	136.3	136.2	136.0	134.9	136.0
2002	135.1	135.1	135.4	135.8	135.8	135.8	136.0	136.3	136.4	136.2	136.0	135.9	135.8
2003	136.2	136.6	136.8	136.8	136.9	137.0	137.5	137.8	138.8	138.9	139.2	139.1	137.6
2004	140.5	142.0	144.0	146.3	148.2	148.4	149.2	150.8	151.7	153.1	152.9	152.1	148.3
2005	153.9	155.2	157.0	157.7	157.4	158.5	159.8	160.7	163.2	165.5	162.7	163.3	159.6
2006	165.3	165.1	166.6	169.1	170.6	171.9	172.7	173.4	170.8	169.6	169.5	169.9	169.6
2007	169.7	170.7	172.6	174.5	175.9	176.1	177.2	175.8	176.3	176.3	178.9	178.1	175.2
2008	179.3	180.3	183.9	186.7	190.9	194.2	198.1	197.2	198.0	192.5	186.5	182.0	189.1
2009	182.0	180.1	178.9	179.3	180.1	181.5	180.3	182.4	181.8	181.4	182.6	182.6	181.1
2010	184.7	184.3	186.7	188.5	189.7(P)	188.3(P)							

P: Preliminary. All indexes are subject to revision four months after original publication.

5 **Series Id: WPU115** Source: www.bls.gov/ppi
 Not Seasonally Adjusted
 Group: Machinery and equipment
 Item: Electronic computers and computer equipment
 Base Date: 199812

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
1995	181.1	178.4	176.9	177.3	176.1	174.2	173.1	170.2	168.7	167.6	166.4	165.8	173.0
1996	163.1	159.5	157.5	153.4	152.2	150.5	148.7	148.0	146.9	144.8	142.9	140.7	150.7
1997	139.6	138.0	136.7	135.1	130.9	129.3	127.9	126.3	125.0	123.7	122.4	121.6	129.7
1998	118.9	116.1	113.8	110.9	109.4	108.6	107.3	105.0	104.4	102.4	101.8	100.0	108.2
1999	97.9	97.3	96.7	95.0	94.5	94.0	92.9	91.6	91.3	90.8	90.4	89.9	93.5
2000	88.8	88.4	87.7	87.1	86.2	85.9	86.0	85.3	85.1	85.2	85.0	84.2	86.3
2001	82.9	81.7	80.5	80.4	80.0	79.1	78.6	76.1	76.1	75.6	75.0	74.6	78.4
2002	72.6	71.5	71.0	70.8	70.3	69.4	68.4	67.5	67.1	66.4	65.6	65.4	68.9
2003	64.7	63.9	62.9	62.8	62.1	61.8	61.5	60.7	60.6	59.5	58.9	58.4	61.5
2004	58.2	57.9	57.7	57.7	57.2	56.6	56.5	56.3	55.9	55.7	54.5	54.6	56.6
2005	53.9	53.6	53.1	53.0	52.4	52.1	51.7	51.5	51.0	50.6	50.5	49.9	51.9
2006	49.8	49.4	49.2	48.6	48.2	47.7	47.5	47.1	46.8	46.5	46.5	46.4	47.8
2007	46.0	45.7	45.2	44.8	44.1	43.5	43.2	42.9	42.8	42.6	42.3	42.2	43.8
2008	42.0	41.7	40.9	40.7	40.6	40.6	40.4	40.1	39.8	39.3	39.1	39.0	40.3
2009	39.0	38.4	38.3	37.9	37.8	37.3	37.1	37.2	37.0	37.4	37.2	37.0	37.6
2010	37.0	36.7	36.6	36.1	36.0(P)	35.8(P)	35.5(P)	35.6(P)					

P: Preliminary. All indexes are subject to revision four months after original publication.

Index Information for the ITS Unit Costs Database (as of October 2010)

6 Series Id: CIU101000000710I (B,J,Q) Source: www.bls.gov/nsc/ect/home.htm Previously used Series Id: ECU11061I					
Not Seasonally Adjusted Compensation: Total compensation Ownership: All civilian Periodicity: Index number Group: All workers, excluding incentive paid					
Year	Qtr1	Qtr2	Qtr3	Qtr4	Ann
2006	100.8	101.5	102.7	103.4	102.1
2007	104.2	105.1	106.2	106.8	105.6
2008	107.8	108.5	109.5	109.9	108.9
2009	110.5	110.8	111.3	111.6	111.1
2010	112.4	112.8			
B : Includes wages, salaries, and employer costs for employee benefits. J : New series. Historical data are available beginning with December 2005. Q : The index for this series is not strictly comparable to other series in this family.					
Previously used Series Id: CIU101000000X000I					
Not Seasonally Adjusted Compensation: Total compensation Ownership: Civilian Periodicity: Index number Group: All workers, excluding sales					
Year	Qtr1	Qtr2	Qtr3	Qtr4	Ann
2001	84.7	85.4	86.5	87.1	85.9
2002	88.0	88.6	89.5	90.0	89.0
2003	91.3	92.0	93.0	93.5	92.5
2004	94.7	95.5	96.4	97.0	95.9
2005	98.0	98.6	99.5	100.0	99.0
2006	100.8	101.6	102.8	103.4	102.2
2007	No data available for this year.				
Not Seasonally Adjusted Compensation: Total compensation Ownership: Civilian Periodicity: Index number Group: All workers, excluding sales occupations					
Year	Qtr1	Qtr2	Qtr3	Qtr4	Ann
1995	69.4	69.8	70.4	70.7	70.1
1996	71.3	71.8	72.4	72.8	72.1
1997	73.3	73.8	74.4	75.0	74.1
1998	75.7	76.2	77.0	77.4	76.6
1999	77.9	78.6	79.4	80.1	79.0
2000	81.1	81.9	82.9	83.5	82.4
2001	84.6	85.3	86.3	87.0	85.8
2002	87.9	88.6	89.5	90.0	89.0
2003	91.3	92.0	93.0	93.5	92.5
2004	94.7	95.6	96.5	97.1	96.0
2005	98.1	98.7	99.6	100.0	99.1
2006	No data available for this year.				

7 Series Id: CUUR0000SA0 Source: www.bls.gov/cpi/home.htm															
Not Seasonally Adjusted Area: U.S. city average Item: All items Base Period : 1982-84=100															
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	HALF1	HALF2
1995	150.300	150.900	151.400	151.900	152.200	152.500	152.500	152.900	153.200	153.700	153.600	153.500	152.400	151.500	153.200
1996	154.400	154.900	155.700	156.300	156.600	156.700	157.000	157.300	157.800	158.300	158.600	158.600	156.900	155.800	157.900
1997	159.100	159.600	160.000	160.200	160.100	160.300	160.500	160.800	161.200	161.600	161.500	161.300	160.500	159.900	161.200
1998	161.600	161.900	162.200	162.500	162.800	163.000	163.200	163.400	163.600	164.000	164.000	163.900	163.000	162.300	163.700
1999	164.300	164.500	165.000	166.200	166.200	166.200	166.700	167.100	167.900	168.200	168.300	168.300	166.600	165.400	167.800
2000	168.800	169.800	171.200	171.300	171.500	172.400	172.800	172.800	173.700	174.000	174.100	174.000	172.200	170.800	173.600
2001	175.100	175.800	176.200	176.900	177.700	178.000	177.500	177.500	178.300	177.700	177.400	176.700	177.100	176.600	177.500
2002	177.100	177.800	178.800	179.800	179.800	179.900	180.100	180.700	181.000	181.300	181.300	180.900	179.900	178.900	180.900
2003	181.700	183.100	184.200	183.800	183.500	183.700	183.900	184.600	185.200	185.000	184.500	184.300	184.000	183.300	184.600
2004	185.200	186.200	187.400	188.000	189.100	189.700	189.400	189.500	189.900	190.900	191.000	190.300	188.900	187.600	190.200
2005	190.700	191.800	193.300	194.600	194.400	194.500	195.400	196.400	198.800	199.200	197.600	196.800	195.300	193.200	197.400
2006	198.300	198.700	199.800	201.500	202.500	202.900	203.500	203.900	202.900	201.800	201.500	201.800	201.600	200.600	202.600
2007	202.416	203.499	205.352	206.686	207.949	208.352	208.299	207.917	208.490	208.936	210.177	210.036	207.342	205.709	209.000
2008	211.080	211.693	213.528	214.823	216.632	218.815	219.964	219.086	218.783	216.573	212.425	210.228	215.303	214.429	216.177
2009	211.143	212.193	212.709	213.240	213.856	215.693	215.351	215.834	215.969	216.177	216.330	215.949	214.537	213.139	215.935
2010	216.687	216.741	217.631	218.009	218.178	217.965	218.011	218.312						217.535	

Index Information for the ITS Unit Costs Database (as of October 2010)

8 Series ID : WPU09130124 Source: www.bls.gov/ppi

Not Seasonally Adjusted
 Group: Pulp, paper, and allied products
 Item: Publication and printing paper, all types
 Base Date :199912

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
2003	103.4	103.2	103.0	103.9	103.8	104.0	103.9	103.3	103.3	102.0	101.4	101.2	103.0
2004	100.9	100.2	100.4	101.4	102.2	106.2	104.6	105.3	105.6	107.0	108.2	108.2	104.2
2005	108.2	110.1	110.7	110.6	110.8	110.2	109.7	109.0	108.8	108.7	107.7	107.8	109.3
2006	109.9	111.5	111.5	114.0	115.5	116.7	118.1	116.7	119.9	119.2	119.3	119.3	116.0
2007	119.6	119.6	119.6	119.6	119.9	120.5	120.7	120.6	120.5	121.3	123.9	124.2	120.8
2008	123.7	123.7	125.7	128.3	130.0	130.5	131.4	134.8	136.3	136.8	136.9	137.0	131.2
2009	136.7	135.5	134.5	134.4	134.2	133.3	132.8	131.2	131.3	131.1	131.4	131.9	133.2
2010	132.0	131.3	131.1	132.3	132.7(P)	134.3(P)	136.1(P)	138.0(P)					

P: Preliminary. All indexes are subject to revision four months after original publication.

9 Series ID : WPU10740512 Source: www.bls.gov/ppi

Not Seasonally Adjusted
 Group: Metals and metal products
 Item: Other fabricated structural metal
 Base Date : 198206

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
2004	151.6	156.8	164.3	169.4	174.9	173.7	177.4	181.4	184.0	185.9	186.7	186.9	174.4
2005	187.2	186.6	186.9	186.8	186.2	187.6	187.2	187.6	189.3	191.4	192.3	191.8	188.4
2006	194.0	191.7	192.9	193.9	194.3	197.5	200.0	201.4	201.6	201.6	198.7	198.9	197.2
2007	199.1	202.6	202.9	205.5	207.1	208.0	208.1	207.9	207.6	209.1	210.0	211.8	206.6
2008	212.7	216.6	222.5	235.6	240.9	244.6	249.8	254.0	252.9	251.2	250.2	246.5	239.8
2009	232.9	229.6	224.8	220.4	215.9	211.8	209.4	207.6	207.2	203.9	199.0	198.4	213.4
2010	198.7	200.0	202.7	207.0	208.0(P)	205.9(P)	206.7(P)	209.4(P)					

P: Preliminary. All indexes are subject to revision four months after original publication.

ITS Unit Costs Database (in 2009 dollars) as of 30 October 2010

Index	Subsystem/Unit Cost Element	IDAS No.*	Lifetime (years)*	Capital Cost (\$K)		Adjusted From Date	O&M Cost (\$K/year)		Adjusted From Date	Description
				Low	High		Low	High		
Roadside Telecommunications (RS-TC)										
1	DS0 Communication Line	TC001	20	0.5	0.9	1995	0.6	1.2	2003	56 Kbps capacity. Leased with typical distance from terminus to terminus is 8 to 15 miles, but most of the cost is not distance sensitive.
1	DS1 Communication Line	TC002	20	0.5	0.9	1995	4.9	9.9	2005	1.544 Mbps capacity (T1 line). Leased with typical distance from terminus to terminus is 8 to 15 miles, but most of the cost is not distance sensitive.
1	DS3 Communication Line	TC003	20	2.8	4.7	1995	23	70	2001	44.736 Mbps capacity (T3 line). Leased with typical distance from terminus to terminus is 8 to 15 miles, but most of the cost is not distance sensitive.
1	ISP Service Fee	TC007					0.17	0.6	2004	Monthly service fee. Regular dial-up service (low) and DSL (high).
1	Conduit Design and Installation – Corridor		20	52	77	2005	3		2005	Cost is per mile. Includes boring, trenching, and conduit (3- or 4-inch). Cost would be significantly less for an aerial installation. In-ground installation would cost significantly less if implemented in conjunction with a construction project.
1	Twisted Pair Installation		20	11	16.2	2004	2.05		2004	Cost is per mile.
1	Fiber Optic Cable Installation		20	21	54	2005	1	2.6	2005	Cost is per mile for cable and in-ground installation. Cost would be significantly less for an aerial installation. In-ground installation would cost significantly less if implemented in conjunction with a construction project.
1	900 MHz Spread Spectrum Radio		10	8.4		1999	0.1	0.4	2004	Cost is per link.
1	Terrestrial Microwave		10	5	19.7	2005	0.5	1	2005	Cost is per link. Cost could be higher depending on tower/antenna installation.
1	Wireless Comm.– Low Usage	TC004					0.12	0.2	2003	125 Kbytes/month available usage (non-continuous use).
1	Wireless Comm.– Medium Usage	TC005					0.6	0.7	1995	1,000 Kbytes/month available usage (non-continuous use).
1	Wireless Comm.– High Usage	TC006	20	0.5	0.9	1995	1.2	1.8	2002	3,000 Kbytes/month available usage (non-continuous use).
1	Call Box		10	4	7.0	2004	0.26	0.59	2004	Capital cost includes call box and installation. O&M is cost per unit (per year) for service maintenance contract and annual cellular service fee.
Roadside Detection (RS-D)										
2	Inductive Loop Surveillance on Corridor		5	2	6	2001	0.3	0.5	2005	Double set (four loops) with controller, power, etc.
2	Inductive Loop Surveillance at Intersection		5	7.5	13.3	2005	0.8	1.2	2005	Four legs, two lanes per approach.
2	Machine Vision Sensor on Corridor		10	18.0	24	2003	0.2	0.3	2003	One sensor both directions of travel. Does not include installation.
2	Machine Vision Sensor at Intersection		10	14	22.1	2005	0.2	1	2005	Four-way intersection, one camera per approach. Does not include installation.
2	Passive Acoustic Sensor on Corridor			3.0	6.5	2002	0.2	0.3	1998	Cost range is for a single sensor covering up to five lanes. Low cost is for basic sensor, which consists of the sensor, mounting kit, junction box, & cabinet termination card. High cost includes basic sensor with solar and wireless option. This option consists of an antenna, solar charger, battery, & panel, and wireless base station, which will handle up to eight sensors. Capital costs do not include installation or mounting structure.
2	Passive Acoustic Sensor at Intersection			4	12	2001	0.2	0.3	2002	Four sensors, four-leg intersection.
2	Remote Traffic Microwave Sensor on Corridor		10	8	11	2005	0.1	0.50	2005	One sensor both directions of travel. Includes sensor, transceiver, cabinet, electrical service, and pole.
2	Remote Traffic Microwave Sensor at Intersection		10	14		2001	0.1		2001	Four sensors, four-leg intersection. Includes installation.
2	Infrared Sensor Active			4.7	6	2000				Sensors detects movement in two directions and determines vehicle speed, classification, and lane position.
2	Infrared Sensor Passive			0.6	1.0	2002				Sensor covers one lane and detects vehicle count, volume, and classification.
2	CCTV Video Camera	RS007	10	8	16	2005	1	2.0	2004	Cost includes color video camera with pan, tilt, and zoom (PTZ), cabinet, electrical services, encoder/decoder, and installation.
9	CCTV Video Camera Tower	RS008	20	5	14	2005				Low cost is for a 35 ft tower. High cost is for 90 ft tower. Includes foundation, pole, conduit, and labor. Camera lowering unit would be additional. Camera tower requires minimal maintenance.
2	Pedestrian Detection Microwave			0.5		2001				Cost is per device. Typical deployment consists of two devices per crosswalk for detection of pedestrian in crosswalk. Can be used for detection of pedestrian at the curbside.
2	Pedestrian Detection Infrared			0.2	0.4	2002				Cost is per device. Does not include installation. Typical deployment consists of two devices per crosswalk for detection of pedestrian at the sidewalk. Can be used for detection of pedestrian in the crosswalk.
2	Environmental Sensing Station (Weather Station)		25	25	42	2005	1.6	3	2004	Environmental Sensing Station (ESS), also known as a weather station, consists of pavement temperature sensor, subsurface temperature sensor, precipitation sensor (type & rate), wind sensor (speed & direction), air temperature and humidity sensors, visibility sensors, and remote processing unit (RPU). ESS provide condition data and are basic components of larger Road Weather Information Systems (see RWIS under TMC subsystem). RPU replaced every five years. O&M includes calibration, equipment repairs, and replacement of damaged equipment. O&M costs could be higher if state provided maintenance.
2	Traffic Camera for Red Light Running Enforcement			60	109	2001	48		2001	Low capital range is for a 35-mm wet film camera, which includes installation of the camera and associated equipment (e.g., pole, loop detectors, cabinet foundation). High capital range is for digital camera, which includes a total of two cameras for a three-lane approach. O&M cost is for one 35-mm wet film camera per year. Note, most jurisdictions contract with a vendor to install and maintain, and process the back office functions of the RLR system. The vendor receives compensation from fines charged to violators.
2	Portable Speed Monitoring System		15	4.1	12.2	2002				Trailer mounted two-digit dynamic message sign, radar gun, computer; powered by generator or operates off of solar power; and requires minimal operations and maintenance work. The system determines a vehicle's speed with the radar gun and displays the current speed, in real-time, and also stores the speeds in a computer for further analysis.
2	Portable Traffic Management System			66	83	2003				This portable unit collects traffic data, communicates with a central control facility, and displays real time traffic information to travelers. The system includes a trailer mounted dynamic message sign and mast equipped with a PTZ video camera, sensors, and wireless communications. Cost will vary depending on the type and number of traffic sensors installed.

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				Low	High		Low	High		
Roadside Control (RS-C)										
2	Linked Signal System LAN	RS002	20	20	47	2005	0.3	0.5	1995	This element provides the connections to the linked signal system.
2	Signal Controller Upgrade for Signal Control	RS003	20	2.1	5	2003	0.2	0.3	2005	Local controller upgrade to provide advanced signal control.
2	Signal Controller and Cabinet			7	12	2005	0.2	0.4	2005	Includes installation of traffic signal controller and cabinet per intersection.
2	Traffic Signal			76	92	2001	1.8	2.3	1999	Includes installation for one signal (four-leg intersection), conduit, controller, and detection device. Cost ranges from traffic signal with inductive loop detection (low) to non-intrusive detection (high).
2	Signal Preemption Receiver	RS004	5	2	5	2004	0.03	0.2	2004	Two per intersection. Complement of IDAS elements RS005 and TV004.
2	Signal Controller Upgrade for Signal Preemption	RS005	10	2	3	2005				Add-on to base capability (per intersection). Complement of IDAS elements RS004 and TV004.
2	Roadside Signal Preemption/Priority		10	4	5	2005	0.2	1	2005	Includes infrared detector, detector cable, phase selector, system software, and installation. Capital costs range is for two-directions. O&M cost estimate for operating, monitoring, and maintaining. Complement to transit (or emergency vehicle) on-board Signal Preemption/Priority Emitter. Capital costs can exceed \$20K to \$30K per intersection if traffic control equipment and/or systems need to be replaced.
2	Ramp Meter	RS006	5	21	42	2003	1.0	2.3	2003	Includes ramp meter assembly, signal displays, controller, cabinet, detection, and optimization.
3	Software for Lane Control	RS011	20	25	50	1995	2	5	1995	Software and hardware at site. Software is off-the-shelf technology and unit price does not reflect product development.
2	Lane Control Gates	RS012	20	66	100	1995	1.3	2	1995	Per location.
2	Fixed Lane Signal	RS009	20	4	5	1995	0.4	0.5	1995	Cost per signal.
2	Automatic Anti-icing System – Short span		12	19		1998	1.5		1998	Typical automatic anti-icing system consists of a control system, chemical storage tank, distribution lines, pump, and nozzles. Pump and control hardware replaced every five years. For a short span system ranging from 120 to 180 feet. O&M includes system maintenance, utilities, materials, and labor.
2	Automatic Anti-icing System – Long Span		12	38	380	1999	1.2	22.7	1999	Typical automatic anti-icing system consists of a control system, chemical storage tank, distribution lines, pump, and nozzles. Pump and control hardware replaced every five years at cost of \$3.5K. For a long span system ranging from 320 feet to greater than 0.5 mile. O&M includes system maintenance, utilities, materials, and labor. The high O&M cost is for a much larger system; hence, the need for a greater amount of materials.
Roadside Information (RS-I)										
2	Roadside Message Sign	RS010	20	33	50	1995	2	2	1995	Fixed message board for HOV and HOT lanes.
1	Wireline to Roadside Message Sign	RS013	20	6	8	1995				Wireline to DMS (0.5 mile upstation).
2	Dynamic Message Sign	RS015	10	41	101	2005	2.0	5	2005	Low capital cost is for smaller DMS installed along arterial. High capital cost is for full matrix, LED, three-line, walk-in DMS installed on freeway. Cost does not include installation.
9	Dynamic Message Sign Tower	RS016	20	28	136	2005				Low capital cost is for a small structure for arterials. High capital cost is for a larger structure spanning three to four lanes. DMS tower structure requires minimal maintenance.
2	Dynamic Message Sign – Portable		14	15.9	21	2005	0.5	1.6	2005	Trailer mounted full matrix DMS (three-line, 8-inch character display); includes trailer, solar or diesel powered, and equipped with cellular modem for remote communication and control. Operating costs are for labor and replacement parts.
1	Highway Advisory Radio	RS017	20	15	36	2005	0.6	1	2005	Capital cost is for a 10-watt HAR. Includes processor, antenna, transmitters, battery back-up, cabinet, rack mounting, lighting, mounts, connectors, cable, and license fee. Super HAR costs can exceed \$9K additional. Primary use of the super HAR is to gain a stronger signal.
2	Highway Advisory Radio Sign		10	4	8	2005	0.22		2005	Cost is for a HAR sign with flashing beacons. Includes cost of the controller.
2	Roadside Probe Beacon	RS020	5	4	6	2001	0.4	0.6	2001	Two-way device (per location).
2	LED Count-down Signal		10	0.261	0.361	2001				Costs range from low (two 12x12-inch dual housing unit) to high (16x18-inch single housed unit). Signal indicates time remaining for pedestrian to cross, and a walk or don't walk icon. Count-down signals use low 8-watt LED bulbs, which require replacement approximately every five to seven years.
2	Pedestrian Crossing Illumination System		5	22.8	35	2003	2.2	3	2001	The capital cost range includes cost of equipment and installation. Equipment includes fixtures, four lamps per lane for a three lane crosswalk, controller, pole, and push button activator. Installation is estimated at 150% to 200% of the total equipment cost. Capital cost would be greater if the system included automated activation of the in-pavement lighting system. O&M is approximately 10% of the equipment cost.
2	Variable Speed Display Sign			3.0	4.0	2001				Low range is for a variable speed limit display system. High range includes static speed sign, speed detector (radar), and display system.
Roadside Rail Crossing (R-RC)										
2	Rail Crossing 4-Quad Gate, Signals	RS021	20	76	86	1995	2.8	3.2	1995	Gates and signals.
2	Rail Crossing Train Detector	RS022	20	11	14	1995	0.5	0.68	1995	Train detector circuitry and communication line from intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two track crossing with two 0.5 mile communication lines.
2	Rail Crossing Controller	RS023	10	5	7	1995	0.3	0.3	1995	Intelligent interface controller (IIC).
2	Rail Crossing Pedestrian Warning Signal, Gates	RS024	20	7	10	1995	0.1	0.2	1995	Pedestrian warning signal and gates.
2	Rail Crossing Trapped Vehicle Detector	RS025	10	17	20	1995	1	1.0	1995	Entrapped vehicle detection camera, with poles and controller.
Parking Management (PM)										
2	Entrance/Exit Ramp Meters		10	1	3	1995	0.1	0.3	1995	Ramp meters are used to detect and count vehicles entering/exiting the parking facility. O&M based on annual service contract.
2	Tag Readers		10	1	3	1995	0.1	0.3	1995	Readers support electronic payment scheme. O&M costs based on annual service contract.
3	Database and Software for Billing & Pricing		10	10	15	1995	1	2	1995	Database system contains parking pricing structure and availability. O&M costs based on annual service contract.
2	Parking Monitoring System		10	16	35	1998				Includes installation, detectors, and controllers.
Toll Plaza (TP)										
2	Electronic Toll Reader	TP001	10	2	4	2001	0.2	0.4	2001	Readers (per lane). O&M is estimated at 10% of capital cost.
2	High-Speed Camera	TP002	10	6	8	2003	0.3	0.7	1995	Cost includes one camera per two lanes.
3	Electronic Toll Collection Software	TP003	10	5	10	1995				Includes COTS software and database.
4	Electronic Toll Collection Structure	TP004	20	14	22	1995				Mainline structure.

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				Low	High		Low	High		
Remote Location (RM)										
2	CCTV Camera	RM001	7	2	4	2005	0.1	0.20	2004	Interior fixed mount camera for security. Low cost represents black & white pan/tilt/zoom (PTZ). High cost represents color PTZ. Does not include installation.
3	Integration of Camera with Existing Systems	RM002	10	2	2.5	1995				Per location.
2	Informational Kiosk	RM003	7	9	20	2004	1	3.8	1998	Includes hardware, enclosure, installation, modem server, and map software.
3	Integration of Kiosk with Existing Systems	RM004	7	2.2	27.3	2005				Software costs are for COTS (low) and developed/outdoor (high).
3	Kiosk Upgrade for Interactive Usage	RM005	5	5	8	1995	0.5	0.8	1995	Interactive information display interface (upgrade from existing interface).
3	Kiosk Software Upgrade for Interactive Usage	RM006	5	10	12	1995				Software is COTS.
2	Transit Status Information Sign		10	3	7	2005				A LED display installed at transit terminal that provides status information on transit arrival. Cost depends on quality, size, and controller capabilities.
2	Smart Card Vending Machine	RM007	5	25	27	1995	1.2	1.3	1995	Ticket vending machine for smart card.
3	Software, Integration for Smart Card Vending	RM008	20	3	5	1995				Software is COTS.
Emergency Response Center (ER)										
4	Basic Facilities, Comm. for Large Area	EM006		5745		1995	574	862	1995	For population >750,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
4	Basic Facilities, Comm. for Medium Area	EM007		4596		1995	574	689	1995	For population <750,000 and >250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
4	Basic Facilities, Comm. for Small Area	EM008		4021		1995	574	603	1995	For population <250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
5	Emergency Response Hardware	EM001	5	6	8	2004	0.12	0.28	2004	Includes three workstations. O&M is estimated at 2% of capital cost.
3	Emergency Response Software	EM002	10	70	149	1995	0.5	3.5	1995	Includes emergency response plans database, vehicle tracking software, and real time traffic coordination.
6	Emergency Response Labor	EM003					79	261	1995	Two people. Salary costs are fully loaded including salary, overtime, overhead, benefits, etc.
3	Emergency Management Communications Software	EM004	20	5	10	1995	2.5	5	1995	Shared database between four sites. Cost is per site; software is COTS.
3	Hardware, Software Upgrade for E 9-1-1 and Mayday	EM005	10	104	179	1995	1.7	2.5	1995	Data communications translation software, E 9-1-1 interface software, processor, and three workstations.
1	800 MHz. two-way Radio		5	0.8	1.6	2001	0.09	0.12	2001	Cost is per radio.
Emergency Vehicle On-Board (EV)										
1	Communications Interface	EV001	10	0.3	2	2004	0.02		1995	Emergency vehicle communications. Cost is per vehicle.
2	Signal Preemption/Priority Emitter		10	0.4	1.8	2005				Data-encoded emitter; manually initiated. Complement to Roadside Signal Preemption/Priority (see Roadside Control subsystem).
Information Service Provider (ISP)										
4	Basic Facilities, Comm. for Large Area	IS019		5745		1995	574	862	1995	For population >750,000. (stand-alone) Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
4	Basic Facilities, Comm. for Medium Area	IS020		4596		1995	574	689	1995	For population <750,000 and >250,000. (stand-alone) Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
4	Basic Facilities, Comm. for Small Area	IS021		4021		1995	574	603	1995	For population <250,000. (stand-alone) Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
5	Information Service Provider Hardware	IS001	5	18	27	2004	0.4	0.5	2004	Includes two servers and five workstations. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.
3	Systems Integration	IS017	20	88	108	1998				Integration with other systems.
3	Information Service Provider Software	IS002	20	273	547	1995	13.7	27.3	1995	Includes database software (COTS) and traffic analysis software.
3	Map Database Software	IS003	2	10	29	2005				Software is COTS.
6	Information Service Provider Labor	IS004					277	396	1995	Three staff. Salary cost are fully loaded prices and include base salary, overtime, overhead, benefits, etc.
1	FM Subcarrier Lease	IS005					113	226	1995	Cost is per year.
5	Hardware Upgrade for Interactive Information	IS006	5	8	12	2004	0.16	0.24	2004	Includes one server and two workstations. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.
3	Software Upgrade for Interactive Information	IS007	20	249	497	1995	12	25	1995	Trip planning software (includes some development costs).
6	Added Labor for Interactive Information	IS008					158	238	1995	Two staff. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
3	Software Upgrade for Route Guidance	IS009	20	249	497	1995	12	25	1995	Route selection software. Software is COTS.
3	Map Database Upgrade for Route Guidance	IS010	2	99	199	1995				Map database software upgrade.
5	Hardware Upgrade for Emergency Route Planning	IS011	5	4	7	2004	0.08	0.1	2004	Includes one server. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.
3	Software Upgrade for Emergency Route Planning	IS012	20	50	99	1995	2.5	5	1995	Route guidance software. Software is COTS.
5	Hardware Upgrade for Dynamic Ridesharing	IS013	5	4	5	2004	0.08	0.11	2004	Includes two workstations. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.
3	Software Upgrade for Dynamic Ridesharing	IS014	20	98	196	1998	5	10	1995	Software includes some development cost.
6	Added Labor for Dynamic Ridesharing	IS015					158	238	1995	Two staff. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
7	Liability Insurance for Dynamic Ridesharing	IS016					70	141	1995	Per year.
3	Software Upgrade for Probe Information Collection	IS018	20	249	497	1995	12	25	1995	Software includes COTS and some development cost.

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				Low	High		Low	High		
Transportation Management Center (TM)										
4	Basic Facilities, Comm. for Large Area	TM040		4606	10529	2003	461	1579	2003	For population >750,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc. O&M is estimated at 10% to 15% of the capital cost.
4	Basic Facilities, Comm. for Medium Area	TM041		4596		1995	574	689	1995	For population <750,000 and >250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc. O&M is estimated at 10% to 15% of the capital cost.
4	Basic Facilities, Comm. for Small Area	TM042		4021		1995	574	603	1995	For population <250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc. O&M is estimated at 10% to 15% of the capital cost.
5	Hardware for Signal Control	TM001	5	14	20	2004	6	6.4	2003	Includes one server and multiple workstations. O&M includes responsive and preventative maintenance.
3	Software, Integration for Signal Control	TM006	5	104	149	2003	149		2003	Software and integration for a large urban area. O&M includes software upgrades, revisions, and expansion of the system.
6	Labor for Signal Control	TM002					629	769	2001	Costs include labor for operations. Two staff (at 0.5 FTE each), one transportation engineer (at 0.5 FTE), update timing plans (10 systems), and two signal maintenance technicians. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
3	Hardware, Software for Traffic Surveillance	TM003	20	134	164	1995	6.7	8.2	1995	Processor and software.
3	Integration for Traffic Surveillance	TM032	20	224	273	1995	11.2	13.7	1995	Integration with other systems.
5	Hardware for Freeway Control	TM004	5	6	8	2004	0.30	0.4	2004	Includes three workstations. O&M estimated at 5% of capital cost.
3	Software, Integration for Freeway Control	TM007	5	170	208	2002				Software and integration, installation and one year maintenance. Software is off-the-shelf technology and unit cost does not reflect product development.
6	Labor for Freeway Control	TM005					291	356	2001	Labor for operations. Two staff (at 0.5 FTE each) and two maintenance technicians. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
5	Hardware for Lane Control	TM008	5	2	3	2004	0.10	0.1	2004	Includes one workstation and 19-inch monitor. O&M estimated at 5% of capital cost.
3	Software, Integration for Lane Control	TM009	10	224	273	1995	11	14	1995	Software development and integration and software upgrade for controllers. Software development is fine tune adjustments for local installations. Otherwise, software is COTS.
6	Labor for Lane Control	TM010					116	142	2001	Labor for two operators.
3	Software, Integration for Regional Control	TM011	10	294	392	1998				Software and integration, installation and one year maintenance. Integration with other TMCs. Software is COTS.
3	Real-time, Traffic Adaptive Signal Control System		10	112	140	2001	19		2001	The cost range is based on commercially available packages, which run on a centralized computer. The high capital cost includes software packages for graphical user interface and incident management. The cost range is representative of 65 to 235 intersections; cost would be lower for a smaller number of intersections.
6	Labor for Regional Control	TM012					233	285	2001	Labor for two operators (at 0.5 FTE each), one transportation engineer (at 0.5 FTE), and maintenance contract. Salary costs are fully loaded prices including base salary, overtime, overhead, benefits, etc.
5	Video Monitors, Wall for Incident Detection	TM013	10	35	63	2003	2	3	2003	Video wall and monitors. O&M estimated at 5% of capital cost.
5	Hardware for Incident Detection	TM014	5	26.4	40.9	2004	1	2	2004	Includes four servers, five workstations, and two laser printers. O&M estimated at 5% of capital cost; could be higher for responsive and preventative maintenance.
3	Integration for Incident Detection	TM025	20	90	109	1995	4.5	5.5	1995	Integration with other systems.
3	Software for Incident Detection	TM015	5	85	104	2002	4.2	5	2002	Software is COTS and includes development cost. O&M is estimated at 5% of capital.
6	Labor for Incident Detection	TM016					815	997	2001	Labor for operators. Four staff, one manager, and two maintenance techs.
5	Hardware for Incident Response	TM018	5	2	3	2004	0.10	0.1	2004	Includes one workstation and monitor. O&M estimated at 5% of capital cost.
3	Integration for Incident Response	TM026	20	179	219	1995				Integration with other systems.
3	Software for Incident Response	TM019	2	13	16	1995	0.671	0.820	1995	Software is COTS.
6	Labor for Incident Response	TM020					116	142	2001	Labor for one incident management coordinator.
2	Automated Incident Investigation System		5	12.0		2001				Includes workstation, tripod, monopole antenna, Auto Integration, and AutoCAD software.
5	Hardware for Traffic Information Dissemination	TM021	5	2	3	2004	0.10	0.1	2004	Includes one workstation. O&M estimated at 5% of capital cost.
3	Software for Traffic Information Dissemination	TM022	5	18	22	1995	0.9	1	1995	Software is COTS.
3	Integration for Traffic Information Dissemination	TM023	20	85	103	2000	4.5	5.5	1995	Integration with other systems.
6	Labor for Traffic Information Dissemination	TM024					116	142	2001	Labor for one operator. Salary costs are fully loaded and include base salary, overtime, overhead, benefits, etc.
3	Software for Dynamic Electronic Tolls	TM027	5	22	27	1995	1.1	1.4	1995	Includes software installation and one year maintenance. Software is COTS.
3	Integration for Dynamic Electronic Tolls	TM028	20	90	109	1995	4.5	5.5	1995	Integration with other systems.
5	Hardware for Probe Information Collection	TM033	3	2	3	2004	0.10	0.1	2004	Includes one workstation. O&M estimated at 5% of capital cost.
3	Software for Probe Information Collection	TM034	5	18	22	1995	1.8	2.2	1995	Includes software installation and one year maintenance. Software is COTS.
3	Integration for Probe Information Collection	TM035	20	134	164	1995	13	16	1995	Integration with other systems.
6	Labor for Probe Information Collection	TM036					58	71	2001	Labor for one operator (four hours per day). Salary costs are fully loaded prices and include base salary, overtime, overhead, benefits, etc.
3	Software for Rail Crossing Monitor	TM037	5	18	22	1995	1.8	2.2	1995	Includes software installation and one year maintenance. Software is COTS.
3	Integration for Rail Crossing Monitor	TM038	20	90	109	1995				Integration with other systems.
6	Labor for Rail Crossing Monitor	TM039					58	71	2001	One operator (at 0.5 FTE). Salary costs are fully loaded prices including base salary, overtime, overhead, benefits, etc.
5	Road Weather Information System (RWIS)		25	9		1998	0.2	1	2001	A RWIS consists of several components: an environmental sensing station (ESS), CPU, workstation with RWIS software, and communications equipment. All components of the RWIS reside at the TMC with the exception of the ESS. See Roadside Detection subsystem for costs of ESS. The cost of the ESS should be added to cost listed here to estimate the cost out the entire system. CPU replaced every five years. O&M costs range includes communication, and optional weather forecast/meteorological service.

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				Low	High		Low	High		
Transit Management Center (TR)										
4	Basic Facilities, Comm. for Large Area	TR014		5745		1995	574	862	1995	For population >750,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
4	Basic Facilities, Comm. for Medium Area	TR015		4596		1995	574	689	1995	For population <750,000 and >250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
4	Basic Facilities, Comm. for Small Area	TR016		4021		1995	574	603	1995	For population <250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.
5	Transit Center Hardware	TR001	5	6	8	2004	0.12	0.16	2004	Includes three workstations. O&M estimated at 2% of capital cost.
3	Transit Center Software, Integration	TR002	20	810	1710	2005	6	12	1995	Includes vehicle tracking & scheduling, database & information storage, schedule adjustment software, real time travel information software, and integration. Software is COTS.
4	Transit Center Additional Building Space	TR003					9	13	1995	Additional space required for ITS technology. 500 sq.ft. (\$12 to \$18 per sq.ft.)
6	Transit Center Labor	TR004					112	448	2005	Labor for one to three staff. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
3	Upgrade for Auto. Scheduling, Run Cutting, or Fare Payment	TR005	20	20	40	1995	0.4	0.8	1995	Processor/software upgrade, installation and one year maintenance (for processor). Software is COTS.
3	Integration for Auto. Scheduling, Run Cutting, or Fare Payment	TR012	20	224	498	2005				Integration with other systems.
3	Further Software Upgrade for E-Fare Payment	TR013	20	40	60	1995	0.8	1.2	1995	Software upgrade. Software is COTS. Automatic passenger counter processing software costs an additional \$25K to several hundred thousand dollars depending on the system.
3	Vehicle Location Interface	TR007	20	10	15	1995				Vehicle location interface.
5	Video Monitors for Security System	TR008	5	1	3	2003	0.04	0.09	2003	Five per site. O&M estimated at 2% of capital cost.
5	Hardware for Security System	TR009	5	10	15	2004	0.2	0.3	2004	Includes one server and three workstations. O&M estimated at 2% of capital cost; could be higher for preventative and responsive maintenance.
3	Integration of Security System with Existing Systems	TR010	20	249	497	1995				Integration with other systems.
6	Labor for Security System	TR011					320	391	1995	Labor for three staff. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Toll Administration (TA)										
5	Toll Administration Hardware	TA001	5	4.3	6.4	2004	0.21	0.32	2004	Includes two workstations, printer, and modem. O&M estimated at 5% of capital costs.
3	Toll Administration Software	TA002	10	40	80	1995	4.0	8.0	1995	Includes local database and national database coordination. Software is COTS.
Transit Vehicle On-Board (TV)										
2	Driver Interface and Schedule Processor	TV001	10	0.2	0.3	1995	0.004	0.01	1995	On-board schedule processor and database.
1	Cell Based Communication Equipment	TV002	10	0.14	0.24	1995	0.007	0.012	1995	Cell-based radio with data capacity.
2	GPS/DGPS for Vehicle Location	TV003	10	0.4	2	2002	0.01	0.033	2002	AVL GPS/DGPS. Capital cost depends on features of unit. O&M cost (estimated at 2% of capital) is for unit maintenance and does not include annual telecom service fees.
2	Signal Preemption Processor	TV004	10	0.2	0.4	1995	0.004	0.007	1995	On-board schedule processor and database. Complement to IDAS elements RS004 and RS005.
2	Signal Preemption/Priority Emitter		10	0.4	1.8	2005	0.1		2005	Data-encoded emitter, manually initiated. Complement to Roadside Signal Preemption/Priority (see Roadside Control subsystem). Estimated O&M.
2	Preemption/Priority Transponder			0.06		2000				Passive transponder mounted on underside of transit vehicle. Requires transit priority system at the Transit Management Center.
2	Trip Computer and Processor	TV005	10	0.1	0.10	1995	0.001	0.002	1995	On-board processor for trip reporting and data storage.
2	Security Package	TV006	10	2.8	5	2005	0.14	0.2	1995	On-board CCTV surveillance camera and hot button. The high capital cost represents a common installation of a digital event recorder system.
2	Electronic Farebox	TV007	10	0.5	1.0	1995	0.03	0.05	1995	On-board flex fare system DBX processor, on-board farebox, and smart card reader.
2	Automatic Passenger Counting System		10	0.83	8.3	2005				Low cost reflects the APC system as an add-on to an existing route scheduling or tracking system. High cost reflects the APC system as a stand alone installation. Cost is per vehicle and includes installation.

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Index	Subsystem/Unit Cost Element	IDAS No. ^a	Lifetime (years)*	Capital Cost (\$K)		Adjusted From Date	O&M Cost (\$K/year)		Adjusted From Date	Description
				Low	High		Low	High		
Commercial Vehicle Electronic Credentialing (EC)/Administration										
5	Computer network server for EC		4	5.0	36.5	2004				Each.
5	Personal computer (desktop or laptop) for EC administration		4	1.2	2	2005				Each.
8	Supplies and materials for EC outreach, internal and external publicity, training, other deployment support			1.3	27.2	2003				Per state, consumables for publicity, training, and other deployment support.
5	Bar code readers for law enforcement for EC			0.3	0.5	2004				Each.
3	EC software purchased for back-end admin		5	41.4	76.6	2004				Per state, for database management and data processing or reporting.
3	EC software purchased for front-end interface		5	75	273	2005				Per state, for user interface and data entry. Depending on the functionality of the interface being developed, the cost could be much higher or much lower than the range shown.
6	State employee labor for new EC software development			81	280	2005				Per state. For states also reporting hours, FTEs ranged from about 0.2 to 2.6 FTE. Depending on the functionality of the system being developed, the dollar cost could be much higher or much lower than the range shown.
6	State employee labor for new EC hardware configuration			2.9	14.4	2003				Per state, after original hardware installation.
6	Contractor labor for new EC software development			180	1083	2003				Per state. For states also reporting hours, FTEs ranged from about 1 to 3 FTE. Depending on the functionality of the system being developed, the cost could be much higher, or much lower than the range shown.
6	Contractor labor for new EC hardware configuration			3.8	7.4	2004				Per state, after original hardware installation.
6	Labor for existing (legacy) credentialing system interface and/or modification			13.9	46.3	2004				Per state, includes state employees, contractors, vendors. For states also reporting hours, FTEs ranged from about 0.1 to 0.4 FTE.
6	Labor for EC training			6.0	14.4	2003				Per state cost to state agency. Examples: Start-up workshops, training and publicity materials for administrators, law enforcement, and PRISM carriers.
6	Other start-up labor costs			12.0	48	2003				Per state, includes CVISN system architect, EC feasibility study; OS/OW permitting, program queries, IFTA/IRP program staff, maintenance, miscellaneous A&E, hardware, software, planning and facilitation, training and travel.
7	Membership fees paid to IRP Clearinghouse						9.1	17.0	2004	Per state, fees set by clearinghouse pro rata, based on registered power units per state.
7	Annual fees to IRP EC admin (back-end)						12.8	73.5	2003	Per thousand accounts, for third-party administrator (e.g., VISTA, Polk).
7	Annual fees to IRP EC admin (front-end)						5.7	33	2004	Per thousand accounts, for third-party administrator (e.g., VISTA, Polk).
8	Recurring costs for EC outreach						0.6	1.2	2004	Per thousand accounts. Outreach includes marketing, promotional, attendance at trade shows, advertising, booklets.
6	State employee annual labor IRP credentialing						50	178	2005	Per thousand accounts, for legacy system (pre-CVISN) labor.
6	Contractor annual labor for IRP credentialing						6.9	18.5	2004	Per thousand accounts, for legacy system (pre-CVISN) labor.
7	Membership fees paid to IFTA Clearinghouse						1		2005	Per state, fees set by clearinghouse.
7	Annual fees to IFTA EC admin (back-end)						12.5	37.5	2004	Per thousand accounts, for third-party administrator (e.g., VISTA, Polk).
7	Annual fees to IFTA EC admin (front-end)						8.0	13.6	2004	Per thousand accounts, for third-party administrator (e.g., VISTA, Polk).
6	State employee annual labor IFTA credentialing						15.0	121.5	2004	Per thousand accounts, for legacy system (pre-CVISN) labor.
6	Vendor annual labor for IFTA credentialing						1	20.8	2004	Per thousand accounts, for legacy system (pre-CVISN) labor.
Commercial Vehicle Safety Information Exchange (SIE)										
5	Computer network server for SIE		4	4	16.6	2004				Each, includes mobile servers used in roadside enforcement.
5	Desktop personal computer for SIE		4	1	1.3	2004				Each, includes computers used at roadside check stations.
5	Laptop personal computer for SIE		3	2.0	2.7	2004				Each.
5	Portable printer for mobile enforcement		4	0.2	0.3	2004				Each.
1	Wireless modem for vehicle and/or roadside use		3	0.5	0.9	2003				Each.
8	Supplies and materials for SIE outreach, training			6.4		2004				Per state, consumables for publicity and other deployment support.
5	Router for SIE		5	3.3	8	2004				Each.
1	T1 Lines for SIE		5	3	30.7	2004				Each line.
3	SIE software purchased off the shelf			6.2	20.7	2004				Per state.
6	State employee labor for new SIE software development			21	132	2005				Per state (e.g., CVIEW (Commercial Vehicle Information Exchange Window). For states also reporting hours, FTEs ranged from about 0.2 to 2 FTE).
6	State employee labor for new SIE hardware configuration			6	5.8	2004				Per state.
6	Contractor labor for new SIE software development			52.1	196.7	2004				Per state. Depending on the functionality of the system being developed, the cost could be much higher or much lower than the range shown.
6	Labor for existing (legacy) SIE system interface			81	280	2005				Per state, includes state employees, contractors, vendors.
6	Labor for training for SIE system deployment			4.6	8.2	2004				Per state.
1	Telephone and internet annual service charges for SIE						0.5	40.9	2004	Per state.
1	Wireless communication annual charges for SIE						26.6	63.4	2004	Per state.
6	State employee annual labor for SIE						22.0	72.9	2004	Per state.
6	Contractor annual labor for SIE						16.2	46.3	2004	Per state.

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Index	Subsystem/Unit Cost Element	IDAS No.*	Lifetime (years)*	Capital Cost (\$K)		Adjusted From Date	O&M Cost (\$K/year)		Adjusted From Date	Description
				Low	High		Low	High		
Commercial Vehicle Electronic Screening (ES) (Preclearance)										
5	Computer network server dedicated to ES		5	6.6	8.6	2004				Each.
5	Desktop PC dedicated to ES		5	1.8	2	2005				Each.
5	Laptop personal computer dedicated to ES		4	2.0		2004				Each.
2	Mainline (highway speed) WIM scale		10	50.9	212.3	2004				Each. Depending on the functionality of the equipment deployed, the cost could be much higher or much lower than the range shown. Some states reported equipment cost only; others reported installed cost, with accessories (e.g., signs, loop detectors, wiring, etc.).
2	Sorter lane (ramp speed) WIM scale		12	83.0	207.6	2003				Each.
2	ES transponder purchased by state for free distribution		5	0.01	0.04	2004				Each.
2	ES transponder purchased by state for resale		4	0.03	0.04	2004				Each.
2	Automated vehicle identification (AVI) equipment/system		10	42	84	2004				Each.
1	ES telecom. equipment (upstream to weigh station)		20	0.8	28.7	2004				Per state (e.g., fiber optic cable).
2	Electronic sign for weigh station		20	10.2	41	2004				Each (e.g., Open/Closed, directional arrows, or variable-message signs).
2	Loop detector for weigh station		20	1	5	2005				Each.
2	Upgrade of fixed-site weigh station for ES (excluding items listed above)			37.4	67.9	2004				Each. Some states reported building modifications, counters, cabinets, wiring, HVAC, structural changes to static scale building, highway poles and bases.
7	One-time start-up fees paid to ES admin			17.0		2004				Per state (e.g., PrePass or Norpass).
8	Supplies and materials for ES outreach and publicity			0.6	2.6	2004				Per state.
3	ES software purchased off the shelf			0.5	4	2004				Per state.
6	State employee labor for ES software development			13.9	34	2004				Per state.
6	State employee labor for new ES hardware configuration			6	5.8	2004				Per state.
6	Contractor labor for ES software development			214.1	217.5	2004				Per state.
6	Contractor labor for new ES hardware configuration			150.4	218.7	2004				Per state.
6	Labor for existing (legacy) system interface			34	34.7	2004				Per state, includes state employees, contractors, vendors.
6	Labor for training associated with ES system deployment			4.2	23.1	2004				Per state.
7	Annual payments made to ES admin						16	2005		Per state (e.g., PrePass or Norpass).
2	Annual maintenance cost for mainline WIM scale						44.2	108.7	2004	Each. Depending on the functionality of the equipment being maintained, the cost could be much higher or much lower than the range shown.
2	Annual maintenance cost for sorter-lane WIM scale for ES						8.5	30.6	2004	Each.
8	Annual costs for marketing, outreach, publicity, etc.						0.6	6.4	2004	Per state.
6	State employee annual labor for ES, higher-volume state						57.9	193	2004	Per state, volume based on relative numbers of carriers, vehicles, and inspections.
6	State employee annual labor for ES, lower-volume state						6	6.9	2004	Per state, volume based on relative numbers of carriers, vehicles, and inspections.
Commercial Vehicle On-Board (CV)										
2	Electronic ID Tag	CV001	10	0.4	0.7	1995	0.01	0.015	1995	Includes ID tag, additional software & processing, and database storage. Software is COTS.
1	Communication Equipment	CV002	10	1.1	2.1	1995	0.007	0.012	1995	Commercial vehicle communication interface and communication device (cell-based radio).
2	Central Processor and Storage	CV003	10	0.2	0.3	1995	0.004	0.01	1995	Equipment on board for the processing and storage of cargo material.
2	GPS/DGPS	CV004	10	0.4	1.5	2004	0.10	0.5	2004	GPS for vehicle location. Capital cost depends on features of unit. O&M cost includes annual service fees.
2	Driver and Vehicle Safety Sensors, Software	CV005	10	0.7	1.5	1995	0.03	0.05	1995	Additional software and processor for warning indicator and audio system interface, and onboard sensors for engine/vehicle and driver. Software is COTS.
2	Cargo Monitoring Sensors and Gauges	CV006	10	0.11	0.23	1995	0.011	0.023	1995	Optional on-board sensors for measuring temperature, pressure, and load leveling.
2	Electronic Cargo Seal Disposable			0.008	0.021	2003				Cost for a disposable radio frequency identification (RFID) E-seal that provides a complete and accurate audit trail of seal status during transport. Low is for passive, and high is for active E-seal.
2	Electronic Cargo Seal Reusable			0.029	0.36	2002				Cost for a reusable radio frequency identification (RFID) E-seal that provides a complete and accurate audit trail of seal status during transport. Low is for passive, and high is for active E-seal. Depending on the vendor, some E-seals may incur a monthly service charge.
2	Autonomous Tracking Unit			0.29	0.7	2003	0.120	0.3	2003	Chassis or container mounted unit that tracks location and condition of assets (cost for on-board sensors not included). Higher priced units provide greater functionality, such as polling of location information and increased quantities of sensor data. Annual service charges include the communications link between unit and data center, and information services.

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Index	Subsystem/Unit Cost Element	IDAS No. [^]	Lifetime (years)*	Capital Cost (\$K)		Adjusted From Date	O&M Cost (\$K/year)		Adjusted From Date	Description
				Low	High		Low	High		
Fleet Management Center (FM)										
5	Fleet Center Hardware	FM001	5	6	8	2004	0.12	0.16	2004	Costs include three workstations. O&M estimated at 2% of capital cost.
3	Fleet Center Software, Integration	FM002	20	214	497	1995				Includes processor and integration. Software is COTS.
6	Fleet Center Labor	FM003					534	653	1995	Labor for five staff. Salary costs are fully loaded prices including base salary, overtime, overhead, benefits, etc.
3	Software for Electronic Credentialing, Clearance	FM004	20	80	179	1995				Includes electronic credential purchase software, database and management for trip reports, and database management for preclearance. Software is COTS.
3	Software for Tracking and Scheduling	FM005	20	10	34	2004	4	10	1995	Vehicle tracking and scheduling. Software is COTS.
3	Vehicle Location Interface	FM006	20	10	15	1995				Vehicle location interface from FMS to TMS.
3	Software Upgrade for Fleet Maintenance	FM007	20	20	40	1995	0.4	0.8	1995	Processor/software upgrade to add capability to automatically generate preventative maintenance schedules from vehicle mileage data. Software is COTS.
3	Integration for Fleet Maintenance	FM008	20	99	199	1995	2	4	1995	Integration with other systems.
3	Software Upgrade for HAZMAT Management	FM009	20	20	40	1995	0.4	0.8	1995	Vehicle tracking & scheduling enhancement. Software is COTS.
5	Hardware Upgrade for HAZMAT Management	FM010	5	2	3	2004	0.04	0.05	2004	Includes one workstation. O&M estimated at 2% of capital cost.
2	Electronic Cargo Seal Reader			0.2	1.2	2002				Unit cost depends on quantity purchased. Low cost is for handheld reader. High cost is for fixed reader. Cost will be significantly increased if reader is equipped with additional security features.
Vehicle On-Board (VS)										
1	Communication Equipment	VS001	7	0.2	0.4	1995	0.004	0.008	1995	Wireless data transceiver.
1	In-Vehicle Display	VS002	7	0.03	0.1	1995	0.001	0.001	1995	In-vehicle display/warning interface. Software is COTS.
2	In-Vehicle Signing System	VS003	7	0.11	0.27	1995	0.002	0.005	1995	Interface to active tag reader, processor for active tag decode, and display device for messages.
2	GPS/DGPS	VS004	7	0.2	0.3	1995	0.003	0.01	1995	Global Positioning System/Differential Global Positioning Systems.
3	GIS Software	VS005	7	0.2	0.3	1995				Geographical Information System (GIS) software for performing route planning.
2	Route Guidance Processor	VS006	7	0.07	0.10	1995	0.001	0.002	1995	Limited processor for route guidance functionality.
2	Sensors for Lateral Control	VS007	7	0.5	0.7	1995	0.011	0.015	1995	Includes lane sensors in vehicle and lateral sensors millimeter microwave radar.
2	Electronic Toll Equipment	VS008	7	0.03	0.1	1995				Active tag interface and debit/credit card interface.
2	Mayday Sensor and Processor	VS009	7	0.10	0.4	1995	0.002	0.01	1995	Collision detector sensor and interface for Mayday processor. Software is COTS.
2	Sensors for Longitudinal Control	VS010	7	0.2	0.3	1995	0.004	0.01	1995	Longitudinal sensors millimeter microwave radar.
2	Advanced Steering Control	VS011	7	0.3	0.4	1995	0.007	0.01	1995	Advanced steering control ("hands off" driving). Software is COTS.
2	Advanced Cruise Control	VS012	7	0.10	0.20	1995	0.002	0.004	1995	Adaptive cruise control (automatic braking and accelerating).
2	Intersection Collision Avoidance Processor, Software	VS013	7	0.19	0.37	1995	0.004	0.007	1995	Software/processor for infrastructure transmitted information, interface to in-vehicle signing and audio system, software and processor to link to longitudinal and lateral vehicle control modules based on input signal from vehicle intersection collision warning equipment package. Software is COTS.
2	Vision Enhancement System	VS014	7	2	2.1	2003	0.1	0.10	2003	In-vehicle camera, software & processor, heads-up display, and infra-red sensors (local sensor system). Software is COTS. O&M estimated at 5% of capital.
2	Driver and Vehicle Safety Monitoring System	VS015	7	0.44	1	1995	0.022	0.04	1995	Safety collection processor and software, driver condition sensors, six vehicle condition sensors, and vehicle data storage. Software is COTS.
2	Pre-Crash Safety System	VS016	7	0.7	1.4	1995	0.02	0.04	1995	Vehicle condition sensors, vehicle performance sensors, software/processor, interface, pre-crash safety systems deployment actuators. Software is COTS.
3	Software, Processor for Probe Vehicle	VS020	7	0.05	0.15	1995	0.001	0.003	1995	Software and processor for communication to roadside infrastructure, signal generator, message generator. Software is COTS.
2	Toll Tag/Transponder		5	0.021		2004				Some toll agencies require users to pay a refundable deposit in lieu of purchasing a tag. The user is charged the cost of the tag if the tag is lost.
2	In-Vehicle Navigation System		7	2.1		1998				COTS product that includes in-vehicle display and supporting software.
Personal Devices (PD)										
2	Basic PDA	PD001	7	0.1	0.3	2004				Personal digital assistant. O&M estimated at 2% of capital.
2	Advanced PDA for Route Guidance, Interactive Info	PD002	7	0.3	0.5	2004				Personal digital assistant with advanced capabilities (route guidance, interactive).
2	Modem Interface, Antenna for PDA	PD003	7	0.12	0.2	1995	0.003	0.003	1995	Modem interface and separate antenna for wireless capability.
2	PDA with Wireless Modem		2	0.2	0.5	2003	0.10	0.2	2001	Personal digital assistant with wireless modem. O&M based on monthly subscriber rate plans of 50 Kbytes (low) and 150 Kbytes (high).
2	GPS/DGPS	PD005	7	0.12	0.14	2001	0.002	0.003	2001	GPS/DGPS. O&M estimated at 2% of capital cost.
3	GIS Software	PD006	7	0.1	0.15	1995	0.005	0.008	1995	Additional GIS/GUI capability.
* Not available for all unit cost elements										
^ Applicable to ITS Deployment Analysis System (IDAS) software										

Notes

This is the Notes page for the ITS Costs Database update for October 2010. ITS unit costs data is available in two formats: unadjusted and adjusted. Please read the information below. Comments and feedback are encouraged. Send correspondence to Cheryl Lowrance at cheryl.lowrance@noblis.org.

This Excel file contains 4 worksheets:

1) Equipment List Not Adjusted. These are cost data with the dollar year for capital and O&M cost identified. The header for this worksheet is "ITS Unit Costs Database (as of October 2010)."

2) Indexes. This sheet contains the index series and ratio values used to adjust the cost data. Also, the year-by-year index for 1995 to 2009 for each series is provided. Users are advised that they can select other indexes they think may be more appropriate. The formulas are setup such that users can enter another index ratio and the calculations will be automatic.

3) Equipment List Adjusted 2009. This is the adjusted cost data. The header for this worksheet is "ITS Unit Costs Database (in 2009 dollars) as of October 2010." The far left column "Index" contains a number. The number corresponds to the index on the Indexes worksheet and is the index used to adjust the capital and/or O&M cost values to 2009 dollars. The index is representative of the ITS element. For example, the first element in Roadside Detection, Inductive Loop Surveillance on Corridor, is tagged with Index 2. Index 2 is WPU1178 and is applied to elements that contain electronic components. The capital cost range is an adjusted value and was adjusted from 2001 (see column labeled "Adjusted From Date").

4) Reference Notes. This worksheet.