	10.40	1 :4-4:+	0			001	A				
Sunsystam/linit Cost Flamont	IDAS I	Lifetime*	Capita	l Cost High	Cost Date	O&M Low	Cost High	Cost Date	Description		
Roadside Telecommunications (RS-TC)	NO."	(years)	Low	High		Low	High		·		
	TC001	20	0.5	1	1995	0.6	1.2	2003	56Kbps capacity. Leased with typical distance from terminus to terminus is 8-15 miles, but most of the cost is not distance sensitive.		
	TC002	20	0.5	1	1995	4.8	8.4	2003	1.544Mbps capacity (T1 line). Leased with typical distance from terminus to terminus is 8-15 miles, but most of the cost is not distance sensitive.		
	TC003	20	3	5	1995	24	72	2001	44.736 Mbps capacity (T3 line). Leased with typical distance from terminus to terminus is 8-15 miles, but most of the cost is not distance sensitive.		
	TC007	20	Ŭ		1000	0.18	0.6	2002	Monthly service fee ranges from \$15 per month for regular dial-up service to \$50 per month for DSL.		
Direct Bury Armor Encased Fiber Cable	10007		6	0	1999	0.10		1999	Cost is per mile. Includes cable and installation.		
Conduit Design and Installation - Corridor		20							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		
Conduit Debign and Indianation Contact			50	65	2003	0.0	02	1999	would cost significantly less if implemented in conjunction with a construction project.		
Twisted Pair Installation		20	1:	2	1999	0.0	12	1999	Cost is per mile.		
Fiber Optic Cable Installation		20				-			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		
i iboi opuo oubio inotanation			20	50	2003	0.0	02	1999	less if implemented in conjunction with a construction project.		
Cellular Communication			0.	5	1999	0.3	0.4	1999	Cost is for one unit.		
900 MHz Spread Spectrum Radio		10	9		1999	0.15	0.4	1999	Cost is per link.		
Microwave Communication		10	10	20	2002	0.5	1	2002	Cost is per link. Cost could be higher depending on tower/antenna installation.		
	TC004					0.12	0.2	2003	125 Kbytes/month available usage (non-continuous use).		
	TC005					0.6	0.7	1995	1,000 Kbytes/month available usage (non-continuous use).		
Wireless Communications, High Usage		20	0.5	1	1995	1.2	1.8	2002	3,000 Kbytes/month available usage (non-continuous use).		
Call Box		10	4	5.9	2002	0.7	14	1999	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	0.5	0.8	1995	Double set (4 loops) with controller, power, etc.		
Inductive Loop Surveillance at Intersection		5	9	16	2003	1	1.6	1999	Four legs, 2 lanes/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	20	25.7	2003	0.2	0.5	2003	Four-way intersection, one camera per approach. Does not include installation.		
Passive Acoustic Sensor on Corridor									Cost range is for a single sensor covering up to 5 lanes. Low cost is for basic sensor, which consists of the sensor, mounting kit, junction box, & cabinet		
			3.7	8	2002	0.2	0.4	1998	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 8 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, 4 leg intersection.		
Remote Traffic Microwave Sensor on Corridor		10	3.3	6	2002	0.		2001	One sensor both directions of travel. Includes installation.		
Remote Traffic Microwave Sensor at Intersection		10	18	8	2001	0.	.1	2001	Four sensors, 4 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.		
	RS007	10	7.5	17	2003	1.5	2.4	2001	Cost includes color video camera with pan, tilt, and zoom (PTZ), and installation.		
	RS008	20	4	12	2003				Low cost is for a 35 ft. tower. High cost is for 90 ft. tower. Includes foundation, pole, conduit, and labor.		
Pedestrian Detection Microwave			0.	6	2001				Cost is per device. Typical deployment consists of 2 devices per crosswalk for detection of pedestrian in crosswalk. Can be used for detection of		
			<u> </u>	Ü	2001				pedestrian at the curbside.		
Pedestrian Detection Infrared			0.3	0.5	2002				Cost is per device. Does not included installation. Typical deployment consists of 2 devices per crosswalk for detection of pedestrian at the sidewalk. Car		
			0.5	0.5	2002				be used for detection of pedestrian in the crosswalk.		
Environmental Sensing Station (Weather Station)		25							Environmental Sensing Station (ESS), also known as a weather station, consists of pavement temperature sensor, subsurface temperature sensor,		
			30	50	2003	1.9	4.1	2003	precipitation sensor (type & rate), wind sensor (speed & direction), air temperature and humidity sensors, visibility sensors, and remote processing unit		
			30	50	2000	1.5	7.1	2000	(RPU). ESS provide condition data and are basic components of larger Road Weather Information Systems (see RWIS under TMC subsystem). RPU		
									replaced every 5 years at \$6.4K. O&M includes calibration, equipment repairs, and replacement of damaged equipment. O&M costs could be higher if		
Traffic Camera for Red Light Running									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,		
Enforcement			75	136	2001	6	0	2001	cabinet foundation). High capital range is for digital camera, which includes a total of 2 cameras for a 3-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		
									The vendor receives compensation from fines charged to violators. Cost includes the lowering system and the pole (pole height ranging 40 feet to 70 feet). Installation costs not included. The lowering system is		
Lowering System		20	8	10.5	2003				, , , , , , , , , , , , , , , , , , , ,		
			ŭ						mechanically operated; requires routine lubrication.		
Portable Speed Monitoring System		15	_						Trailer mounted two-digit dynamic message sign, radar gun, computer; powered by generator or operates off of solar power; and requires minim		
			5	15	2002			operations and maintenance work. The system determines a vehicle's speed with the radar gun and displays the current speed, in real-time, a			
								stores the speeds in a computer for further analysis.			
Portable Traffic Management System								This portable unit collects traffic data, communicates with a central control facility, and displays real time traffic information to travelers. The			
	J		80	100	2003			includes a trailer mounted dynamic message sign and mast de quipped with a PTZ video camera, sensors, and wireless communications. (
								depending on the type and number of traffic sensors installed.			

	IDAS	Lifetime*	Capita	l Cost		O&M	Cost	_	
Subsystem/Unit Cost Element	No.^	(vears)	Low	High	Cost Date	Low	High	Cost Date	Description
Roadside Control (RS-C)		()							
Linked Signal System LAN	RS002	20	40	70	1995	0.4	0.8	1995	This element provides the connections to the linked signal system.
Signal Controller Upgrade for Signal Contro	RS003	20	2.5	6	2003	0.2	0.5	1995	Local controller upgrade to provide advanced signal control.
Signal Controller and Cabinet			8	15	2003	0.2	0.5	2001	Includes installation of traffic signal controller and cabinet per intersection.
Traffic Signal			0.5	445	0004	0.4	0	4000	Includes installation for one signal (four leg intersection), conduit, controller, and detection device. Cost ranges from traffic signal with inductive loop
			95	115	2001	2.4	3	1999	detection (low) to non-intrusive detection (high).
Signal Preemption Receiver	RS004	5	2	8	1995	0.05	0.2	1995	Two per intersection. Complement of IDAS elements RS005 and TV004.
Signal Controller Upgrade for Signal Preemptior	RS005	10	2	5	1995				Add-on to base capability (per intersection). Complement of IDAS elements RS004 and TV004.
Roadside Signal Preemption/Priority									Includes infrared detector, detector cable, phase selector, and system software. Capital costs range is for 2-directions (low) and 4-directions (high). Does
· · · · · · · · · · · · · · · · · · ·			2.5	5.5	2003				not include installation costs. Complement to transit (or emergency vehicle) on-board Signal Preemption/Priority Emitter.
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	2.5	3	1995	Per location.
Fixed Lane Signal	RS009	20	6	8	1995	0.6	0.8	1995	Terriceatori. Cost per signal.
Automatic Anti-icing System Short span	110003	12		- 0					Exorative automatic anti-icing system consists of a control system, chemical storage tank, distribution lines, pump, and nozzles. Pump and control hardware
Automatic Anti-icing System Short span		12	2	5	1998	2	2	1998	rypical autoniaus aministing system consists of a comion system, internal storage rains, usuabuton mes, purily, and nozzes. Temp and comion residuals replaced every 5 years at cost of \$3.5K. For a short span system ranging from 120 to 180 feet. O&M includes system maintenance, utilities, materials,
Automatic Anti ising Custom Long Chan		12	1						Typical automatic anti-icing system consists of a control system, chemical storage tank, distribution lines, pump, and nozzles. Pump and control hardware
Automatic Anti-icing System Long Span		12	50	495	1999	1.5	29.5	1999	hypical automatic attenting system consists of a continuous system, criterinal suchage rains, distribution lines, purint, and notizeles. Furnip and control rainward replaced every 5 years at cost of \$3.5K. For a long span system ranging from 320 feet to greater than 1/2 mile. O&M includes system maintenance,
			50	495	1999	1.5	29.5	1999	replaced every 5 years at cost of \$5.5%. For a long span system langing montact lett to greater than 1/2 time. Own includes system maintenance, judifies, 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)									jutilities, materials, and labor. The high Okivi cost is for a much larger system, hence, the need for a greater amount or materials
	RS010	20	50	75	1005	2.5	3.75	1995	Fixed manager board for HOV and HOT long
Roadside Message Sign		20	50	75		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 VMS (0.5 mile upstation).
Variable Message Sign	RS015	20	48	120	2003	2.4	6	2003	Low capital cost is for smaller VMS installed along arterial. High capital cost is for full matrix, LED, 3-line, walk-in VMS installed on freeway. Cost does no include installation.
Variable Message Sign Tower	RS016	20							Include instantation. Low capital cost is for a small structure for arterials. High capital cost is for a larger structure spanning 3-4 lanes. VMS tower structure requires minimal
Variable Message Sign Tower	10010	20	25	120	2003				maintenance.
Variable Message Sign - Portable		14	21.5	25.5	2002	1.2	2	2000	Trailer mounted VMS (3-line, 8" character display); includes trailer, solar or diesel powered.
Highway Advisory Radio	RS017	20	40	00	0004	0.0		0004	Capital cost is for a 10-watt HAR. Includes processor, antenna, transmitters, battery back-up, cabinet, rack mounting, lighting, mounts, connectors, cable,
			16	32	2001	0.6	1	2001	and license fee. Super HAR costs an additional \$9-10K (larger antenna). Primary use of the super HAR is to gain a stronger signal.
Highway Advisory Radio Sign		10	5	9	2003	0.2	25	2003	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							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,
g			0.325	0.45	2001				and a walk or don't walk icon. Count-down signals use low 8-watt LED bulbs, which require replacement approximately every 5-7 years.
Pedestrian Crossing Illumination System		5							The capital cost range includes cost of equipment and installation. Equipment includes fixtures - 4 lamps per lane - for a three lane crosswalk, controller,
Todoctian crocomy manimation cyclom		Ü	27.5	42	2003	2.75	4.2	2001	pole, and push button activator. Installation is estimated at 150 - 200 % of the total equipment cost. Capital cost would be greater if the system included
			20		2000	20		200.	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							Train detector circuitry and communication line from intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two track crossing
Trail Grossing Trail Detector		20	16	21.5	1995	0.77	1.03	1995	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 Controller Rail Crossing Pedestrian Warning Signal, Gates	RS024	20	10	15		0.4	0.3	1995	Interingent interiace controller (inc). Pedestrian warning signal and gates.
Rail Crossing Pedestrian Warning Signal, Gates Rail Crossing Trapped Vehicle Detector	RS024	10	25	30		1.25	1.5	1995	reuesulari warning signal and gates. Entrapped vehicle detection camera, with poles and controller.
	K3023	10	23	30	1990	1.20	1.5	1995	Entrapped venicle detection carriera, with poles and controller.
Parking Management (PM)	1	40		-	4005	0.0	0.5	4005	Down waters are used to detect and count unbigles extends (quinting the applicant facility, ORM seets based as a small as its contract
Entrance/Exit Ramp Meters	 	10	2	5	1995	0.2	0.5	1995	Ramp meters are used to detect and count vehicles entering/existing the parking facility. O&M costs based on annual service contract.
Tag Readers	—	10	10	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	21	15 46		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)	I TDOO!	40	ا		0004	0.0	0 -1	0004	Destruction (color) COM control of 40% of control
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		0.5	1	1995	Cost includes 1 camera/2 lanes.
Electronic Toll Collection Software	TP003	10	5	10					Includes COTS software and database.
Electronic Toll Collection Structure	TP004	20	10	15	1995				Mainline structure.

Cubanatan Ulais Cont Flamont IDAS Lifetime* Capital Cost O. D. O&M Cost															
Subsystem/Unit Cost Element	No.^	(vears)	Low	High	Cost Date	Low	High	Cost Date	Description						
Remote Location (RM)	110.	(yours)	LOW	mgn		LOW	iligii								
CCTV Camera	RM001	7	2.1	5	2003	0.1	0.25	2003	Interior fixed mount camera for security. Low cost represents black & white pan/tilt/zoom (PTZ). High cost represents color PTZ. Does not include						
Integration of Camera with Existing Systems	RM002	10	2	2.5	1995	0	0.20	2000	Per location.						
Informational Kiosk	RM003	7	12	25	2001	1.2	5	1998	Includes hardware, enclosure, installation, modern server, and map software.						
Integration of Kiosk with Existing Systems	RM004	7	2.2	27.4	1995	1.2		1330	Includes training, circioant, installation, modern map solver, and map solver. 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	Soliware costs are for Cot's (low) and developerationation (lingth). Interactive information display interface (upgrade from existing interface).						
	RM006		10	12		0.5	0.0	1990	Interactive minimation display interface (upgrade nom existing interface). Software is COTS.						
Kiosk Software Upgrade for Interactive Usage	RIVIU06	5	10		1995 2002										
Transit Status Information Sign	D1100=	10	4	8					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		40	00	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		32	00	1995	400	480	1995	For population <750,000 and >250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment						
			32	00	1995	400	480	1995	internal to the facility such as equipment racks, multiplexers, modems, etc.						
Basic Facilities, Comm for Small Area	EM008		28	00	1995	400	420	1995	For population <250,000. Based on purchase of building rather than leasing space. Communications includes communications equipment internal to the						
			20	00	1995	400	420	1990	facility such as equipment racks, multiplexers, modems, etc.						
Emergency Response Hardware	EM001	5	6	9	2003	0.12	0.18	2003	Includes 3 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	EM004	20	5	10	1995	2.5	5	1995	Shared database between 4 sites. Cost is per site; software is COTS.						
Hardware, Software Upgrade for E-911 and	EM005	10	105	180	1995	1.7	2.5	1995	Data communications translation software, E911 interface software, processor, and 3 workstations.						
800 MHz. 2-way Radio	LIVIOUS	5	0.8	1.7	2001	0.09	0.12	2001	Deta communications translation software, EST1 interface software, processor, and 5 workstations. Cost is per radio.						
		5	0.0	1.7	2001	0.09	0.12	2001	Cost is per radio.						
Emergency Vehicle On-Board (EV)	E) (004	40	0.0	0	4005	0.0	20	4005	English and the Court of the Co						
Communications Interface	EV001	10	0.3	2	1995	0.0	JZ	1995	Emergency vehicle communications. Cost is per vehicle.						
Signal Preemption/Priority Emitter			0.5	2.1	2003				Data-encoded emitter; manually initiated. Complement to Roadside Signal Preemption/Priority (see Roadside Control subsystem).						
Information Service Provider (ISP)	1														
Basic Facilities, Comm for Large Area	IS019		40	00	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		00	00	1005	400	400	4005	For population <750,000 and >250,000. (stand-alone) Based on purchase of building rather than leasing space. Communications includes						
,			32	00	1995	400	480	1995	communications equipment internal to the facility such as equipment racks, multiplexers, modems, etc.						
Basic Facilities. Comm for Small Area	IS021								For population <250,000. (stand-alone) Based on purchase of building rather than leasing space. Communications includes communications equipment						
basic Facilities, Committor Small Area	13021		28	00	1995	400	420	1995	internal to the facility such as equipment racks, multiplexers, moderns, etc.						
I for a fire Control Book I to Hard	10004	-	00	0.5	0000	0.5	0.7	0000							
Information Service Provider Hardware	IS001	5	26	35	2003	0.5	0.7	2003	Includes 2 servers and 5 workstations. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.						
Systems Integration	IS017	20	90	110	1998	40.00			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	15	30	2003				Software is COTS.						
Information Service Provider Labor	IS004					175	250	1995	2 Staff @ 50K to 75K and 1 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	16	2003	0.24	0.32	2003	Includes 1 server and 2 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	1 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		5	8	10	2003	0.16	0.2	2003	Includes 1 server. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.						
Software Upgrade for Emergency Route Planning	IS011	20	50	100	1995	2.5	5	1995	Includes 1 service. Odwin sestimated at 2n, could be higher for responsive and preventative maintenance. Route quidance software. Software is COTS.						
Hardware Upgrade for Dynamic Ridesharing	IS012	5	30	100	2003	0.08	0.12	2003	Includes 2 workstations. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.						
		20	100	200	1998	0.08	10								
Software Upgrade for Dynamic Ridesharing	IS014	20	100	200	1990	_		1995	Software includes some development cost.						
Added Labor for Dynamic Ridesharing	IS015					100	150	1995	1 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	IS018	20	250	500	1995	12.5	25	1995	Software includes COTS and some development cost.						

	IDAS	Lifetime*	Capita	I Cost		O&M	Cost	Description						
Subsystem/Unit Cost Element	No.^	(years)	Low	High	Cost Date	Low	High	Cost Date	Description					
Transportation Management Center (TM)	1	()												
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 10-15% 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 10-15% 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 in facility such as equipment racks, multiplexers, modems, etc. O&M is estimated at 10-15% of the capital cost.					
Hardware for Signal Control	TM001	5	18.5	28.5	2003	9	10.5	2003	Includes I server and multiple workstations. O&M includes responsive and preventative maintenance.					
Software, Integration for Signal Control	TM006	5	105	150	2003	15	50	2003	Software and integration for a large urban area. Cost would be lower (approx.\$10,500) 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 (2 @ 50% of the time, at 100K), transportation engineer (1 at 50% of the time, at 100K), update timing plans (2K per system per month for every 10 systems), and signal maintenance technician (2 @ 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	6	9	2003	0.3	0.45	2003	Includes 3 workstations. O&M estimated at 5% of capital cost.					
Software, Integration for Freeway Contro Labor for Freeway Control	TM007 TM005	5	180	220	2002	225	275	2001	Software and integration, installation and 1 year maintenance. Software is off-the-shelf technology and unit cost does not reflect product development. Labor for operations (2 @ 50% of 100K) and maintenance technicians (2 @ 75K). Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.					
Hardware for Lane Control	TM008	5	2	3	2003	0.1	0.15	2003	Includes 1 workstation and 19" 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 2 operators @ 50% of 100K.					
Software, Integration for Regional Contro	TM011	10	300	400	1998				Software and integration, installation and 1 year maintenance. Integration with other TMC's. Software is COTS.					
Real-time, Traffic Adaptive Signal Control System		10	120	150	2001	2	0	2001	The costs 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.					
Labor for Regional Control	TM012					180	220	2001	Labor for operators (2 @ 50% of 100K), transportation engineer (1 @ 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	15	57	103	2003	3	5	2003	Video wall and monitors. O&M estimated at 5% of capital cost.					
Hardware for Incident Detection	TM014	5	43	57	2003	2.15	2.85	2003	Includes 4 servers, 5 workstations, and 2 laser printers. O&M estimated at 5% of capital cost; could be higher for responsive and preventative					
Integration for Incident Detectior	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	_	0.0	4.5	0000	630	770	2001	Labor for operators (4 @ 100K and 1 manager @ 150K) and 2 maintenance techs @ 75K.					
Video Monitor for Incident Response	TM017 TM018	5	0.6	1.5	2003	0.1	0.15	2003	Includes 1 19" monitor.					
Hardware for Incident Response Integration for Incident Response	TM018	5 20	180	220	1995	0.1	0.15	2003	Includes 1 workstation. O&M estimated at 5% of capital cost. Integration with other systems.					
Software for Incident Response	TM019	20	13.5	16.5	1995	0.675	0.825	1995	integration with order systems. Software is COTS.					
Labor for Incident Response	TM020		13.3	10.5	1995	90	110	2001	Soliware is COTS. Labor for incident management coordinator (1 @ 100K).					
Automated Incident Investigation System	1101020	5	1	5	2001	30	110	2001	Includes workstation, tripnod, monopole antenna, Auto Integration, and AutoCAD software.					
Hardware for Traffic Information Dissemination	TM021	5	2	3	2003	0.1	0.15	2003	Includes 1 workstation. O&M estimated at 5% of capital cost.					
Software for Traffic Information Dissemination	TM022	5	18	22	1995	0.9	1.1		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 1 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 1 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	2	3	2003	0.1	0.15	2003	Includes 1 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 1 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	Labor for 1 operator (4 hours per day @ 100K/year). Salary costs are fully loaded prices and include base salary, overtime, overhead, benefits						
Software for Rail Crossing Monitor	TM037	5	18	22	1995	1.8	2.2							
Integration for Rail Crossing Monitor	TM038	20	90	110	1995			Integration with other systems. 55 2001 Operators (1 @ 50% of 100K). Salary costs are fully loaded prices including base salary overtime overhead benefits etc.						
Labor for Rail Crossing Monitor	TM039	0-				45								
Road Weather Information System (RWIS)		25	2	5	1998	0.4	2.5	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 ES the ESS (\$10K-\$50K) should be added to \$25K listed here in order to cost out the entire system. CPU replaced every 5 years at a cost of \$4K costs range includes communication, and optional weather forecast/meteorological service.						

Subsystem/Unit Cost Element	IDAS	Lifetime*	Capita		Cost Date	O&M		Cost Date	Description			
	No.^	(years)	Low	High	Goot Buto	Low	High	Cool Bute	Boosi puoli			
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	6	9	2003	0.12	0.18	2003	Includes 3 workstations. O&M estimated at 2% of capital cost.			
Transit Genter National Transit Center Software, Integration	TR002	20	815	1720	1995	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 - \$12-\$18 / sq.ft, 500 sq.ft			
Transit Center Labor	TR004					50	250	1995	Labor for 3 staff @ 75K. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.			
Upgrade for Auto. Scheduling, Run Cutting, or	TR005	20	20	40	1995	0.4	0.8	1995	Processor/software upgrade, installation and 1 yr. maintenance (for processor). Software is COTS.			
Integration for Auto. Scheduling, Run Cutting, or	TR012	20	225	500	1995				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	14	19	2003	0.28	0.38	2003	Includes 1 server and 3 workstations. O&M estimated at 2% of capital cost; could be higher for preventative and responsive maintenance.			
Integration of Security System with Existing	TR010	20	250	500	1995	202	247	1995	Integration with other systems.			
Labor for Security System Toll Administration (TA)	TR011					202	247	1995	Labor for 3 staff @ 75K each. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.			
Toll Administration (TA) Toll Administration Hardware	TA001	5	4	6	2003	0.2	0.3	2003	Includes 2 workstations, printer, and modem. O&M estimated at 5% of capital costs.			
Toll Administration Flandware Toll Administration Software	TA001	10	40	80	1995	4	8	1995	Includes Coal database and national database coordination. Software is COTS.			
Transit Vehicle On-Board (TV)	171002	10	10	00	1000			1000	initial decided addubate and national database conditions. Contract to COTO.			
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	0.0075	0.0125	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			0.5	2.1	2003				Data-encoded emitter; manually initiated. Complement to Roadside Signal Preemption/Priority (see Roadside Control subsystem).			
Preemption/Priority Transponder			0.0		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	4.2	7	1995	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	8.0	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	1	10	2003				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.			
Commercial Vehicle Administration (CA)		_				0.40	0.40					
Commercial Vehicle Admin Hardware	CA001	5	200	9	2003	0.12	0.18	2003	Includes 3 workstations. O&M estimated at 2% of capital cost.			
Commercial Vehicle Admin Software, Integration	CA002 CA003	20	200	220	1995	270	4.4 330	1995 2003	Includes processor and integration. Software is COTS.			
Commercial Vehicle Admin Labor Software Upgrade for Electronic Credential	CA003	20	60	140	1995	1.2	2.8	1995	Labor for 4 staff @ 75K (average). Salary costs are fully loaded prices including base salary, overtime, overhead, benefits, etc. Electronic credentials purchase software, database and management for post-trip processing & E-credentials.			
Software Upgrade for Inter-Agency Info Exchange	CA005	20	20	40	1995	0.4	0.8	1995	Electronic determinals participated and management for posening processing a E-discontinuis. Processor and integration add-on. Software is COTS. Software is COTS.			
Added Labor for Inter-Agency Info Exchange	CA006			-10	1000	67	82	1995	Labor for 1 staff @ 75K (average). Salary cost are fully loaded prices including base salary, overtime, benefits, etc.			
Software Upgrade for Safety Administration	CA007	20	40	80	1995	0.8	1.6	1995	Database add-on, software, and integration. Software is COTS.			
Commercial Vehicle Check Station (CC)												
Check Station Structure	CC001	20	50	75	1995				Roadside structure - mainline w/ lane indicator signals.			
Signal Board	CC002	10	10	15	1995	1	1.5	1995	Roadside signal board.			
Signal Indicator	CC003	20	5	10		0.25	0.5	1995	Signal indicator system.			
Roadside Beacon	CC004	10	5	8	1995	0.5	0.8	1995	Roadside beacon used for electronic screening (not included in roadside subsystem). Beacon repair/replacement.			
Wireline to Roadside Beacon	CC005	20	10	20	1995				Dedicated wireline communication from beacon to roadside (1 mile upstream).			
Check Station Software, Integration	CC006	20	180	215	1995	0.04	0.00	2002	Software, processor and integration.			
Check Station Hardware Safety and Fitness Electronic Records (SAFER)	CC007	5		3	2003	0.04	0.06	2003	Includes 1 workstation. O&M estimated at 2% of capital cost. Includes portable computer with printer and wireless Internet modem to download, record, and upload carrier safety database records at field locations or			
Data Mailbox			7.5	9.2	1999	0.44	0.66	1999	check stations.			
Detection System	CC008	10	50	75	1995	2.5	3.75					
Software Upgrade for Safety Inspection	CC009	20	40	80	1995	0.8	1.6	1995	Safety-database add-on, and result writing to vehicle tag processor add-on. Software is COTS.			
Handheld Safety Devices	CC010	5	3	5	1995	0.3	0.5	1995	For commercial vehicle inspection. The devices either measure data themselves or read data from the vehicle. Three per location.			
Software Upgrade for Citation and Accident	CC011	20	20	40		1	2	1995	Software add-on for recording of citation and accident information to the commercial vehicle.			
Weigh-In-Motion Facility	CC012	10	14	21	1995	1.4	2.1	1995	Includes WIM fixed load cell and interface to roadside facility. Software is COTS.			
Wireline to Weigh-In-Motion Facility	CC013	10	1	2	1995	0.1	0.2	1995	Wireline communication (local line).			

Subsystem/Unit Cost Element	IDAS	Lifetime*		I Cost	Cost Date		Cost	Cost Date	Description
Subsystem/Offit Cost Element	No.^	(years)	Low	High	COSt Date	Low	High	COSt Date	Description
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	0.0075	0.0125	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	4.0	2002	0.04	0.000	2002	GPS for vehicle location. Capital cost depends on features of unit. O&M cost (estimated at 2% of capital) is for unit maintenance and does not include
			0.5	1.8	2002	0.01	0.036	2002	annual telecom 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
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						0.011	0.000		Cost for a disposable radio frequency identification (RFID) E-seal that provides a complete and accurate audit trail of seal status during transport. Low
Electronic cargo edan Biopecable			0.01	0.025	2003				for passive, and high is for active E-seal.
Electronic Cargo Seal Reusable									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
Liectionic Gargo Seal Neusable			0.035	0.44	2002				passive, and high is for active E-seal. Depending on the vendor, some E-seals may incur a monthly service charge.
Autonomous Tracking Unit			0.05	0.0	0000	0.444	0.40	0000	Chassis or container mounted unit that tracks location and condition of assets (cost for on-board sensors not included). Higher priced units provide
			0.35	0.8	2003	0.144	0.42	2003	greater functionality, such as polling of location information and increased quantities of sensor data. Annual service charges include the communicati
									link between unit and data center, and information services.
Fleet Management Center (FM)									
Fleet Center Hardware	FM001	5	6			0.12	0.18	2003	Costs include 3 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 5 staff @ 75K. Salary costs are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Software for Electronic Credentialing, Clearance	FM004	20	80		1995				Includes electronic credential purchase software, database and management for trip reports, and database management for preclearance. Software
Software for Tracking and Scheduling	FM005	20	40	100	1995	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
ntegration 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	2	3	2003	0.04	0.06	2003	Includes 1 workstation. O&M estimated at 2% of capital cost.
Electronic Cargo Seal Reader									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
			0.3	1.5	2002				equipped with additional security features.
Vehicle On-Board (VS)									Jadespee
Communication Equipment	VS001	7	0.2	0.4	1995	0.004	0.008	1995	Wireless data transceiver.
In-Vehicle Display	VS002	7	0.05	0.4	1995	0.001	0.002	1995	In-vehicle display/warning interface. Software is COTS.
In-Vehicle Signing System	VS003	7	0.16		1995	0.003	0.002	1995	Interface to active tag reader, processor for active tag decode, and display device for messages.
GPS/DGPS	VS003	7	0.10	0.5		0.005	0.000	1995	Global Positioning System/Differential Global Positioning Systems.
GIS Software	VS004	7	0.23	0.3	1995	0.003	0.01	1995	Sicular rusticular y Systemirumentual sicular vusituling y systemirus. Gloographical Information System (GIS) software for performing route planning.
Route Guidance Processor	VS005	7	0.2	0.15	1995	0.002	0.003	1995	Secgraphical mioritation system (cis) software for perioriting route pranning. Limited processor for route guidance functionality.
	VS007	7	0.1	1.1	1995	0.002	0.003	1995	Emineo processor for foute guidance functionality. Includes lane sensors in vehicle and lateral sensors MMW radar.
Sensors for Lateral Control Electronic Toll Equipment	VS007	7	0.04	0.1	1995	0.016	0.022	1995	Inicitudes falle serisors in Vertice and refer a serisors winver radar. Active tag interface and debit/credit card interface.
	VS009	7	0.04	0.65	1995	0.003	0.013	1995	
Mayday Sensor and Processor								1995	Collision detector sensor and interface for Mayday processor. Software is COTS.
Sensors for Longitudinal Contro	VS010	7	0.3	0.5		0.006	0.01		Longitudinal sensors MMW 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 breaking and accelerating).
Intersection Collision Avoidance Processor,	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
Software			0.20						longitudinal and lateral vehicle control modules based on input signal from vehicle intersection collision warning equipment package. Software is CO
Vision Enhancement System	VS014	7	2	2.5		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
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
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
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	0.0	205	0000				Most toll tags/transponders costs approx. \$25. Some toll agencies require users to pay a refundable deposit in lieu of purchasing a tag. The user is
- ,			0.0)25	2003				charged the cost of the tag is lost.
In-Vehicle Navigation System	1	7	2	.8	1998				COTS product that includes in-vehicle display and supporting software.
Personal Devices (PD)									
Basic PDA	PD001	7	0.2	0.4	2001	0.004	0.008	2001	Personal digital assistant. O&M estimated at 2% of capital.
Advanced PDA for Route Guidance, Interactive	PD001	7	0.2	0.75	1995	0.004		1995	Personal digital assistant: Own estimated at 2 to 1 capital. Personal digital assistant: Own estimated capabilities (route quidance, interactive).
Modem Interface, Antenna for PDA	PD002	7	0.3		1995	0.01	0.015	1995	reisona uguar assistant win auvarioeu dapaninies (roue guidance, meradive). Modem interface and separate antenna for wireless capability.
PDA with Wireless Modem	1-0003	2	0.18	0.25	2003	0.004	0.005	2001	Personal digital assistant with wireless modern. O&M based on monthly subscriber rate plans of 50 Kbytes (low) and 150 Kbytes (high).
	PD005	7	0.2	0.18	2003	0.12	0.004	2001	GPS/DGPS. O&M estimated at 2% of capital cost.
						u.UU3	0.004	_ ZUU I	
GPS/DGPS GIS Software	PD005	7	0.1	0.15	1995	0.005	0.008	1995	Additional GIS/GUI capability.

Conversion Ratios

<u>Index</u>	2003/1995	2003/1998	2003/1999	2003/2000	2003/2001	2003/2002
1 WPU1176	0.9411		0.9361		0.9635	0.9805
2 WPU1178	0.7993	0.9080	0.9246	0.9351	0.9422	0.9827
3 PCU5112105112102	1.0027	0.9869		0.9486	0.9422	0.9514
4 PCU BBLD-BBLD	1.0912					
5 WPU115	0.3555	0.5684	0.6578		0.7844	
6 ECI11061I	1.3147				1.0793	
7 CUUR0000SA0	1.2073					

Notes	
1 WPU1176	Applied to communications and related equipment
2 WPU1178	Applied to elements that contain electronic components
3 PCU5112105112102	Applied to software and integration elements
4 PCU BBLD-BBLD	Applied to physical dwellings at Centers and Toll Plaza
5 WPU115	Applied to computer hardware
6 ECI11061I	Applied to labor categories
7 CUUR0000SA0	Applied to ISP Liability Insurance (IS016)

Year-by-year index series from 1995-2003

1 Series Id: WPU1176

Source http://www.bls.gov/ppi/

Not Seasonally Adjusted

Group: Machinery and equipment

Item: Communication and related equipment

Base Date: 8512

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1994	110	110.1	110.2	110.9	111	111.1	111.1	110.8	110.8	111	111.1	111.2	110.8
1995	111.9	112.1	112.1	112.2	112.1	111.9	111.8	111.9	112.3	112	112.3	112.2	112.1
1996	112.9	113.1	113	113	112.7	112.6	112.9	113.1	113.1	113	113	113.9	113
1997	113.9	114	113.4	113.5	113.7	113.6	114.4	114.2	114.1	114	114.8	114.8	114
1998	114.8	114.8	114.6	114.4	114.1	114.1	113.7	113.6	113.6	114	113.7	113.5	114.1
1999	114.3	114.2	114.1	114	113	112.8	112.6	112.1	111.2	111	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	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	109.1	109	109.5
2002	109.3	108.7	108.8	107.9	107.9	107.7	106.9	107.1	107.4	107	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	105	105.2	105.2	105.5
0004					104.8(103.4(102.7(102.9(
2004	105	103.4	103.4	103.3	P)	P)	P)	P)					
P : Prelimin	ary. All index	es are sub	iect to re	vision fo	ur mont	hs after	original	publicati	on.	•	•		

2 Series Id: WPU1178

Source http://www.bls.gov/ppi/

Not Seasonally Adjusted

Group: Machinery and equipment

Item: Electronic components and accessories

Base Date: 8200

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1994	117.4	117.5	117.6	117.4	117.4	117.5	117.4	116.5	115.9	115	115.1	114.8	116.6
1995	114.6	115	114.3	114.4	114	113.7	113.1	112.9	112.9	113	113.1	112.9	113.6
1996	112.5	112.2	110.8	109.4	108.5	107.9	108	108	108.1	107	107.3	107.2	108.9
1997	106.7	106	105.8	105.4	104.5	104.5	104.4	103	102.9	102	101.6	101.4	104
1998	101.1	100.7	100.7	100.4	100.1	100	99.7	99.6	99.5	99.4	99.2	99.1	100
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	93.5	92.9	92.6	92.4	92.6	92.7	93.9
2002	92.8	93	93.2	92.8	92.5	92.5	92.3	92.3	92.3	92	92	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	89.9(P)	89.6(P)	89.7(P)	89.6(P)					

3 Series Id: PCU5112105112102

Source http://www.bls.gov/ppi/

Industry: Software publishers
Product: Applications software

Base Date: 9712

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1997												100	
1998	101.2	99.1	97.9	97.8	99.7	99.8	99.2	98.1	100.2	100	98.3	98.2	99.1
1999	99.1	99.5	99.5	99.5	99.3	100	99.8	100.6	99.9	99.9	99.7	99.6	99.7
2000	100	101.1	99.2	101.9	103.1	100.8	103.2	106.2	106.3	107	104.2	103.9	103.1
2001	105.3	104	104.7	107.8	103.1	103.8	100.2	103.5	103.6	104	103	103.9	103.8
2002	103.9	103.8	103.2	102	102.2	102	102.1	103.2	103	103	102.3	102.8	102.8
2003	98.6	100.2	99.3	99.5	99.5	99	100.1	97.7	94.2	94.6	95.7	95	97.8
2004	94.3	94.9	94.6	94.9	93.9(P)	93.3(P)	94.1(P)	92.9(P)					

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

NOTE: Index data was 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.

4 Series ID : PCUBBLD--BBLD--

Source http://www.bls.gov/ppi/

Not Seasonally Adjusted Industry: Non-residential buildings Product: Non-residential buildings

Base Date : 8606

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1994	119.5	119.8	120.1	120.3	120.6	121.2	121.5	121.9	122.3	123	123.2	123.4	121.4
1995	124.3	124.7	125.3	125.9	126.1	126.2	126.5	126.7	126.9	127	126.8	126.8	126.1
1996	127	127.1	127.3	127.6	128.1	128.4	128.4	128.6	129	129	129.3	129.3	128.2
1997	129.6	129.9	130	130.3	130.7	130.7	130.8	130.9	130.9	131	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	132	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	134	134	134.2	133
2000	134.7	135.2	135.7	135.8	135.5	136	135.8	135.5	135.9	136	135.7	135.6	135.6
2001	135.8	136	135.9	136.2	136.8	136.7	136.2	136.2	136.3	136	135.3	134.9	136
2002	135.1	135.1	135.4	135.8	135.8	135.8	136	136.3	136.4	136	136	135.9	135.8
2003	136.2	136.6	136.8	136.8	136.9	137	137.5	137.8	138.8	139	139.2	139.1	137.6
2004					148.5(148.6(149.2(150.8(
2004	140.5	142	144	146.3	P)	P)	P)	P)					
P : Prelimina					,	,	,	,	on.				

5 Series Id: WPU115

Source http://www.bls.gov/ppi/

Not Seasonally Adjusted Group: Machinery and equipment

Item: Electronic computers and computer equipment

Base Date: 9812

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
1994	193.5	191.6	192.6	191.4	190.5	190.1	188.8	187.6	187.8	185	182.9	183	188.7	
1995	181.1	178.4	176.9	177.3	176.1	174.2	173.1	170.2	168.7	168	166.4	165.8	173	
1996	163.1	159.5	157.5	153.4	152.2	150.5	148.7	148	146.9	145	142.9	140.7	150.7	
1997	139.6	138	136.7	135.1	130.9	129.3	127.9	126.3	125	124	122.4	121.6	129.7	
1998	118.9	116.1	113.8	110.9	109.4	108.6	107.3	105	104.4	102	101.8	100	108.2	
1999	97.9	97.3	96.7	95	94.5	94	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	85.3	85.1	85.2	85	84.2	86.3	
2001	01 82.9 81.7 80.5 80.4 80 79.1 78.6 76.1 76.1 75.6 75 74.6 78.4													
2002	72.6	71.5	71	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	57.4(P)	57.2(P)	56.7(P)	56.5(P)						
P : Prelimina	arv All index	es are sub	iect to re	vision fo	ur mont	ns after	original	publicati	on		-			

6 Series Id: ECU11061I

Source http://www.bls.gov/ncs/ect/home.htm

Not Seasonally Adjusted

compensation: Total compensation

ownership: Civilian

periodicity: Index number

group: All workers, excluding sales occupations

Year	Qtr1	Qtr2	Qtr3	Qtr4	Annu
					al
1994	121.6	122.4	123.7		
1995	125.2	125.9	126.9	127.5	
1996	128.6	129.4	130.5	131.2	
1997	132.1	133	134.2	135.3	
1998	136.4	137.4	138.8	139.5	
1999	140.5	141.7	143.2	144.5	
2000	146.3	147.7	149.4	150.5	
2001	152.5	153.8	155.6	156.8	
2002	158.4	159.7	161.3	162.2	
2003	164.6	165.9	167.7	168.6	
2004	170.8				

Source http://www.bls.gov/cpi/home.htm

7 Series Id: CUUR0000SA0

Not Seasonally Adjusted Area: U.S. city average

Item: All items

Base Period: 1982-84=100

Dase Felloc	1. 1902-04-1	00													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	HALF1	HALF2
1994	146.2	146.7	147.2	147.4	147.5	148	148.4	149	149.4	150	149.7	149.7	148.2	147.2	149.3
1995	150.3	150.9	151.4	151.9	152.2	152.5	152.5	152.9	153.2	154	153.6	153.5	152.4	151.5	153.2
1996	154.4	154.9	155.7	156.3	156.6	156.7	157	157.3	157.8	158	158.6	158.6	156.9	155.8	157.9
1997	159.1	159.6	160	160.2	160.1	160.3	160.5	160.8	161.2	162	161.5	161.3	160.5	159.9	161.2
1998	161.6	161.9	162.2	162.5	162.8	163	163.2	163.4	163.6	164	164	163.9	163	162.3	163.7
1999	164.3	164.5	165	166.2	166.2	166.2	166.7	167.1	167.9	168	168.3	168.3	166.6	165.4	167.8
2000	168.8	169.8	171.2	171.3	171.5	172.4	172.8	172.8	173.7	174	174.1	174	172.2	170.8	173.6
2001	175.1	175.8	176.2	176.9	177.7	178	177.5	177.5	178.3	178	177.4	176.7	177.1	176.6	177.5
2002	177.1	177.8	178.8	179.8	179.8	179.9	180.1	180.7	181	181	181.3	180.9	179.9	178.9	180.9
2003	181.7	183.1	184.2	183.8	183.5	183.7	183.9	184.6	185.2	185	184.5	184.3	184	183.3	184.6
2004	185.2	186.2	187.4	188	189.1	189.7	189.4	189.5						187.6	

© Cubounter (Unit Coot Flores of	IDAS	Lifetime*	Capita	l Cost	Adjusted	O&M (Cost	Adjusted	Pagarintian.
<u>ਊ</u> Subsystem/Unit Cost Element	No.^	(years)			From Date			From Date	
Roadside Telecommunications (RS-TC)									
1 DS0 Communication Line	TC001	10	0.5	0.9		0.6	1.2		56Kbps capacity. Leased with typical distance from terminus to terminus is 8-15 miles, but most of the cost is not distance sensitive.
1 DS1 Communication Line	TC002	20	0.5	0.9		4.7	8.2		1.544Mbps capacity (T1 line). Leased with typical distance from terminus to terminus is 8-15 miles, but most of the cost is not distance sensitive.
1 DS3 Communication Line	TC003	20	2.8	4.7	1995	23	69		44.736 Mbps capacity (T3 line). Leased with typical distance from terminus to terminus is 8-15 miles, but most of the cost is not distance sensitive.
1 ISP Service Fee	TC007					0.18	0.6	2002	Monthly service fee ranges from \$15 per month for regular dial-up service to \$50 per month for DSL.
1 Direct Bury Armor Encased Fiber Cable			5	6	1999	0.0	2	1999	Cost is per mile. Includes cable and installation.
Conduit Design and Installation - Corridor		20	50	65	2003	0.0	12	1999	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
1									would cost significantly less if implemented in conjunction with a construction project.
1 Twisted Pair Installation		20	1	1	1999	0.0	12	1999	Cost is per mile.
Fiber Optic Cable Installation		20	20	50	2003	0.0	12	1999	Cost is per mile for cable and in-ground installation. Cost would be significantly less for an aerial installation. In-ground installation would cost
1	1								significantly less if implemented in conjunction with a construction project.
1 Cellular Communication			0.		1999	0.3	0.4	1999	Cost is for one unit.
1 900 MHz Spread Spectrum Radio		10	8.		1999	0.14	0.4	1999	Cost is per link.
1 Microwave Communication		10	9.8	19.6	2002	0.5	1	2002	Cost is per link. Cost could be higher depending on tower/antenna installation.
1 Wireless Communications, Low Usage	TC004					0.12	0.2	2003	125 Kbytes/month available usage (non-continuous use).
1 Wireless Communications, Medium Usage	TC005					0.6	0.7	1995	1,000 Kbytes/month available usage (non-continuous use).
Wireless Communications, High Usage	TC006	20	0.5	0.9		1.2	1.8		3,000 Kbytes/month available usage (non-continuous use).
1 Call Box	<u> </u>	10	4	5.8	2002	0.6	i 7	1999	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	3	8		0.4	0.6		Double set (4 loops) with controller, power, etc.
2 Inductive Loop Surveillance at Intersection		5	9	16		0.9	1.5		Four legs, 2 lanes/approach.
2 Machine Vision Sensor on Corridor		10	21.7	29		0.2	0.4	2003	One sensor both directions of travel. Does not include installation.
2 Machine Vision Sensor at Intersection		10	20	25.7	2003	0.2	0.5	2003	Four-way intersection, one camera per approach. Does not include installation.
Passive Acoustic Sensor on Corridor									Cost range is for a single sensor covering up to 5 lanes. Low cost is for basic sensor, which consists of the sensor, mounting kit, junction box, &
			3.6	7.9	2002	0.2	0.4	1998	cabinet termination card. High cost includes basic sensor with solar and wireless option. This option consists of an antenna, solar charger, battery, &
2									panel, and wireless base station, which will handle up to 8 sensors. Capital costs do not include installation or mounting structure.
2 Passive Acoustic Sensor at Intersection			5	14		0.2	0.4	2002	Four sensors, 4 leg intersection.
2 Remote Traffic Microwave Sensor on Corridor	<u> </u>	10	3.2			0.1		2001	One sensor both directions of travel. Includes installation.
2 Remote Traffic Microwave Sensor at Intersection	<u> </u>	10	1		2001	0.1	1	2001	Four sensors, 4 leg intersection. Includes installation.
2 Infrared Sensor Active	<u> </u>		5.6		2000				Sensors detects movement in two directions and determines vehicle speed, classification, and lane position.
2 Infrared Sensor Passive			0.7	1.2					Sensor covers one lane and detects vehicle count, volume, and classification.
2 CCTV Video Camera	RS007	10	7.5	17		1.4	2.3	2001	Cost includes color video camera with pan, tilt, and zoom (PTZ), and installation.
CCTV Video Camera Tower	RS008	20	4	12	2003				Low cost is for a 35 ft. tower. High cost is for 90 ft. tower. Includes foundation, pole, conduit, and labor.
Pedestrian Detection Microwave			0.	6	2001				Cost is per device. Typical deployment consists of 2 devices per crosswalk for detection of pedestrian in crosswalk. Can be used for detection of
2					200.				pedestrian at the curbside.
Pedestrian Detection Infrared			0.3	0.5	2002				Cost is per device. Does not included installation. Typical deployment consists of 2 devices per crosswalk for detection of pedestrian at the sidewalk.
2	<u> </u>		0.0	0.0	2002				Can be used for detection of pedestrian in the crosswalk.
Environmental Sensing Station (Weather Station)		25							Environmental Sensing Station (ESS), also known as a weather station, consists of pavement temperature sensor, subsurface temperature sensor,
			00	50	0000	4.0		0000	precipitation sensor (type & rate), wind sensor (speed & direction), air temperature and humidity sensors, visibility sensors, and remote processing unit
			30	50	2003	1.9	4.1	2003	(RPU). ESS provide condition data and are basic components of larger Road Weather Information Systems (see RWIS under TMC subsystem). RPU
									replaced every 5 years at \$6.4K. O&M includes calibration, equipment repairs, and replacement of damaged equipment. O&M costs could be higher in
Troffic Comoro for Rad Light Dunning	1	-							state provided maintenance. 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
Traffic Camera for Red Light Running	1								Low capital raing is for a 35-nim wet time carriera, winch includes installation or the carriera (325%) and associated equipment (e.g., pole, toop detectors, cabinet foundation). High capital range is for digital camera, which includes a total of 2 cameras for a 3-lane approach. O&M cost is for one
Enforcement	1		71	128	2001	57	7	2001	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
2	1								35-min wet intri carrier be ryear. Note, most prisorcions contact with a violators. RLR system. The vendor receives compensation from fines charged to violators.
Lowering System	 	20							Cost includes the lowering system and the pole (pole height ranging 40 feet to 70 feet). Installation costs not included. The lowering system is
20	1		8	10.5	2003				mechanically operated; requires routine lubrication.
Portable Speed Monitoring System	1	15							Trailer mounted two-digit dynamic message sign, radar gun, computer; powered by generator or operates off of solar power; and requires minimal
Stable opeca Monitoling System	1	13	4.9	14.7	2002				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
2	1		4.5	17.7	2002				operations and maintenance work. The system undertained a venicle's speed with the radial guir and displays the current speed, in rear-time, and also stores the speeds in a computer for further analysis.
Portable Traffic Management System	 								This portable unit collects traffic data, communicates with a central control facility, and displays real time traffic information to travelers. The system
. S. abio Traino Management Oystoni	1		80	100	2003				includes a trailer mounted dynamic message sign and mast equipped with a PTZ video camera, sensors, and wireless communications. Cost will vary
2	1		30	.50					depending on the type and number of traffic sensors installed.
*	1	1							paperiang on the type and named of dume deriver initialies.

Subsystem Function (Section 1985)	6	IDAS	Lifetime*	Capita	I Cost	Adjusted	O&M	Cost	Adjusted	
2 Intel Signed Septem LAA	<u>ਊ</u> Subsystem/Unit Cost Element	_								Description
Stand Controller Usurand & Signal Control Stand Contro										
Signal Control (1997) 1997	2 Linked Signal System LAN	RS002	20		56	1995				This element provides the connections to the linked signal system.
Security Company 190 190 201 2 2 2 190		RS003	20							
2 Small Programmer (Fish Secretary 1994 1996 201) 8 2 195 195 195 195 195 195 195 195 195 195				8	15	2003	0.2	0.5	2001	
Secretary Secr	Traffic Signal			90	108	2001	22	2.8	1999	
2 Secretario (1985) 2 4 1995	2									
Soundation Signal Precomption Priority 2					6		0.04	0.2		
2 Ramp Meter		RS005	10	2	4	1995				
3 Software for Lane Control (Sales 1951 20 86 50 1956 18 20 1956 18 19	Roadside Signal Preemption/Priority				5.5	2003				Does not include installation costs. Complement to transit (or emergency vehicle) on-board Signal Preemption/Priority Emitter.
2 End control Galtes	2 Ramp Meter	RS006	5				1.2	2.8		
Automatic Arti-Ling System Short span 12 23 1996 1.8 1.8 1996 1.8 1.8 1996 1.8								5		
Automatic Anti-cing System Short span 12 23 1998 1.8 1999 1.8 199					120					
23 1998 1.8 1998 1.8 1998 1.8 1998 1.8 1998 1.8 1998 1.8 1998 1.8 1998 1.8 1999 1.4 27.3 1.4 27.3 1.4 2.4		RS009		5	6	1995	0.5	0.6	1995	
Automatic Anti-iring System Long Span 12 46 486 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1999 1.4 27.3 1999 1999 1999 1.4 27.3 1999 1999 1999 1999 1.4 27.3 1999 1999 1999 1.4 27.3 1999 1999 1999 1.4 27.3 1999 1999 1.4 27.3 1999 1999 1999 1.4 27.3 1999 1999 1999 1.4 27.3 1999 1999 1999 1.4 27.3 1999 1999 1999 1999 1999 1999 1999 19	Automatic Anti-icing System Short span		12		_			_		
Automatic Anti-siring System. Long Span 12				23	3	1998	1.8	3		
Adaptive replaced very 5 years at cost of \$3.0f. For a long span system ranging from 320 feet to greater than 1/2 mile. OAM includes system randinance, utilities, materials, and allow The high OAM cost is for a much larger system; hence, the need for a greater amount of materials. Roadside Information (RS-I) 20	2									
Roadside Information (RS-1) 2 Roadside Information (RS-1) 2 Roadside Information (RS-1) 2 Roadside Information (RS-1) 3 Roadside Message Sign RS-01 20 40 60 1996 2 3 1995 Fixed message board for HOV and HOT lanes. 4 Wireline to Roadside Message Sign RS-01 20 6 8 1995 Wereline to VMS: 05 mile upstation; 4 Variable Message Sign RS-01 20 2 25 120 2003 U. 24 6 2002 Lov capital costs for smaller VMS: Installed ation parterial. High capital costs for full matrix, LED, 3-line, waik-in VMS installed on freeway. Cost of include installation of installation of include installation of include installation of installation of include installation of include installation of include installation of include installation of installatio	Automatic Anti-icing System Long Span		12						4000	
Roadside Information (RS-I) Roadside Message Sign RS010 20 40 60 1995 2 3 1995 Fixed message board for HOV and HOT lanes.				46	458	1999	1.4	27.3		
2	2									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.
1 Wireline to Roadside Message Sign R5013 20 48 120 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.4 6 2003 2.5		D0040	00	40		4005	ما	2	4005	Et al annual hard facility and UST have
Variable Message Sign					90			3		
Variable Message Sign Tower R5016 20 25 120 2003 1.1 1.9 2000 Trailer mounted VMS (3-line, 8" character display), includes trailer, solar or dissel powered. Highway Advisory Radio R5017 20 15 31 2001 0.6 1 2001 Capital cost is for a small structure for arterials. High capital cost is for a larger structure spanning 3-4 lanes. VMS tower structure requires min maintenance. Highway Advisory Radio R5017 20 15 31 2001 0.6 1 2001 Capital cost is for a lowest HAR. Includes processor, antenna, transmitters, battery back-up, cabinet, rack mounting, lighting, mounts, connectors, cabinet, and license fees. Super HAR costs an additional SE-10K (gare antenna). Primary use of the super HAR is to gain a stronger signal. 2 Highway Advisory Radio Sign 10 5 9 2003 0.25 2003 0.25 2003 0.5 to for a HAR sign with fashing beacons. Includes societ of entroller. 2 Roadside P70be Beacon R5020 5 5 8 2001 0.5 0.8 2001 0.5 0.8 2001 Two-way device (per location). LED Count-down Signal 0.0 0.0 0.42 2001 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0					0	1995				
2 Variable Message Sign - Portable	2	K5015	20	48	120	2003	2.4	6		not include installation.
Highway Advisory Radio RS017 20 15 31 2001 0.6 1 2001	Variable Message Sign Tower	RS016	20	25	120	2003				
2 History Advisory Radio Sign 10 6 5 9 2003 0.25 2003 Cost is for 4 ARR sign will hashing beacons, includes cost of the controller. Beacon RS02 5 6 8 2001 0.5 0.8 2001 Two-way device (per location). 2 Elb Count-down Signal 10 0.306 0.424 2001 Cost is range from low (two 1241-inch dual housing unit) to high (16X18-mol 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-wart IED bulbs, which require replacement approximately every 5-7 years. Pedestrian Crossing Illumination System 5 27.5 42 2003 2.6 4 2001 Two-way device (per location). 2 Variable Speed Display Sign 2 27.5 42 2003 2.6 4 2001 Two-way device (per location). 2 Variable Speed Display Sign 2 27.5 42 2003 2.6 4 2001 Two-way device (per location). 2 Variable Speed Display Sign 3.5 4.7 2001 Two-way device (per location). 2 Rail Crossing (R-RC) 2 Rail Crossing 4-Quad Gate, Signals RS021 20 92 104 1995 0.82 0.82 1995 Train detector crossing (R-RC) 2 Rail Crossing Controller RS022 20 13 17 1995 0.82 0.8 1995 Train detector crossing frain Detector RS022 10 20 1994 1995 1 12 1995 Train detector crossing (RM) 2 Rail Crossing Pedestrian Warning Signal, Gates RS024 10 20 1995 Train detector crossing (RM) 2 Rail Crossing Pedestrian Warning Signal, Gates RS024 10 20 1995 Two representations of the inches for the controller (IIC) to wayside interface equipment (WIE). Assume two track crossing in the part of the controller (IIC) to wayside interface equipment (WIE). Assume two track crossing in the part of the controller (IIC) to wayside interface controller (IIC). 2 Rail Crossing Pedestrian Warning Signal, Gates RS024 10 20 1995 Fedestrian warning signal and gates. 2 Rail Crossing Pedestrian Warning Signal, Gates RS024 20 1995 Two representations of the variable speed in the face controller (IIC). 2 Rail Crossing Pedestrian Warning Signal, Gates RS024 10 10 10 10 11 1995 Two representations and the variable speed in the face controller (IIC). 3 Database and Software	2 Variable Message Sign - Portable		14	21	25	2002	1.1	1.9	2000	Trailer mounted VMS (3-line, 8" character display); includes trailer, solar or diesel powered.
Pedestrian Crossing Illumination System 10 10 10 10 10 10 10 1	Highway Advisory Radio	RS017	20	45	0.4	0004	0.0		0004	Capital cost is for a 10-watt HAR. Includes processor, antenna, transmitters, battery back-up, cabinet, rack mounting, lighting, mounts, connectors,
Roadside Probe Beacon RS02 5 5 8 2001 0.5 0.8 2001 Two-way device (per location)	1 1			15	31	2001	0.6	1	2001	cable, and license fee. Super HAR costs an additional \$9-10K (larger antenna). Primary use of the super HAR is to gain a stronger signal.
LED Count-down Signal LED Count-down Signal Legislation Signal indicates time remaining for pedestrian to cross, and a walk or don't walk icon. Count-down signals use low 8-wait LED bulbs, which require replacement approximately every 5-7 years. The capital cost range includes cost of equipment and installation. Equipment includes fixtures - 4 lamps per lane - for a three lane crosswalk, controller, pole, and push button activator. Installation is estimated at 150 - 200 % of the total equipment cost. Approximately every 5-7 years. The capital cost range includes cost of equipment and installation. Equipment includes fixtures - 4 lamps per lane - for a three lane crosswalk, controller, pole, and push button activator. Installation is estimated at 150 - 200 % of the total equipment cost. Approximately every 5-7 years. The capital cost range includes cost of equipment and installation. Equipment includes fixtures - 4 lamps per lane - for a three lane crosswalk, controller, pole, and push button activator. Installation is estimated at 150 - 200 % of the total equipment cost. Approximately every 5-7 years. The capital cost range includes cost of equipment and installation. Equipment includes intered at 150 - 200 % of the total equipment cost. Approximately every 5-7 years. The capital cost range includes cost of equipment and installation is estimated at 150 - 200 % of the total equipment cost. Capital cost would be greater if the system included automated activation of the in-payment equipment cost. Low range is for a variable speed limit display system. High range includes static speed sign, speed detector (redar), and display system. Delta in payment equipment (will be payment equipment (will be payment equipment	2 Highway Advisory Radio Sign		10	5	9			5		Cost is for a HAR sign with flashing beacons. Includes cost of the controller.
Pedestrian Crossing Illumination System Fedestrian Crossing Illumination Illumination System Fedestrian Crossing Illumination I	2 Roadside Probe Beacon	RS020	5	5	8	2001	0.5	0.8	2001	Two-way device (per location).
Pedestrian Crossing Illumination System 5 27.5 42 2003 2.6 4 2001 The capital cost range includes cost frage includes cost of equipment and installation. Equipment toxic strange includes cost of equipment and installation. Equipment toxic strange includes cost of equipment and installation. Equipment toxic strange includes cost of equipment and installation. Equipment toxic strange includes cost of equipment and installation. Equipment toxic strange includes cost of equipment and installation. Equipment toxic strange includes static speed at 150 - 200 % of the total equipment cost. Capital cost would be greater if the system included automated activation of the in-pavement lighting system. OSM is approximately 10% of the equipment cost. 2 Variable Speed Display Sign Roadside Rail Crossing (R-RC) 2 Rail Crossing 4-Quad Gate, Signals RS021 20 92 104 1995 0.62 0.82 1995 0.62 0.82 1995 0.82 1995 0.82 1995 0.82 0.88 1995 0.80 0.80 1995 0.80 1	LED Count-down Signal		10	0.306	0.424	2001				
2 Variable Speed Display Sign 3.5 4.7 2001 controller, pole, and push button activator. Installation is estimated at 150 - 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 3.5 4.7 2001 Lovarage is for a variable speed limit display system. High range includes static speed sign, speed detector (radar), and display system. Roadsfide Rail Crossing (RRC) 2 Rail Crossing Train Detector RS022 20 13 17 1995 0.62 0.82 1995 Train detector circuitry and communication line from intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two track crossing with wo 0.5 mile communication lines. 2 Rail Crossing Pedestrian Warning Signal, Gates RS024 20 8 12 1995 0.2 0.2 1995 Intelligent interface controller (IIC). 2 Rail Crossing Trapped Vehicle Detector RS025 10 20 24 1995 1 1.2 1995 Entrapped Vehicle detection camera, with poles and controller. Parking Management (PM) 2 Entrance/Exit Ramp Meters 10 2 4 1995 0.2 0.4 1995 Entrapped Vehicle detection camera, with poles and controllers. 2 Tag Readers 10 10 2 4 1995 0.2 0.4 1995 Radders support electronic payment scheme. O&M costs based on annual service contract. 2 Parking Monitoring System 10 19 42 1998 Includes installation, detectors, and controllers. 3 Database and Software for Billing & Pricing 10 10 2 5 5 2001 0.2 0.5 2001 Readers (per lane). O&M is estimated at 10% of capital cost. 5 Dot Not Readers (Per lane). O&M is estimated at 10% of capital cost. 5 Dot Not Readers (Per lane). O&M is estimated at 10% of capital cost. 5 Dot Not Readers (Per lane). O&M is estimated at 10% of capital cost. 6 Dot Not Readers (Per lane). O&M is estimated at 10% of capital cost. 7 Dot Plaza (IP). 2 Electronic Toll Collection Software TP003 10 5 10 1995 Includes	2			0.300	0.424	2001				
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Variable Speed Display Sign 3.5 4.7 2001 Low range is for a variable speed limit display system. High range includes static speed sign, speed detector (radar), and display system.				27.5	42	2003	2.6	4		
Roadside Rail Crossing (R-RC) 2 Rail Crossing 4-Quad Gate, Signals RS021 20 92 104 1995 3.4 3.9 1995 Gates and signals. Rail Crossing Train Detector RS022 20 13 17 1995 0.62 0.82 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 6 8 1995 0.3 0.4 1995 Intelligent interface controller (IIC). 2 Rail Crossing Pedestrian Warning Signal, Gates RS024 20 8 12 1995 0.2 0.2 1995 Pedestrian warning signal and gates. 2 Rail Crossing Trapped Vehicle Detector RS025 10 20 24 1995 1 1.2 1995 Entrapped vehicle detection camera, with poles and controller. Parking Management (PM) 2 Entrance/Exit Ramp Meters 10 2 4 1995 0.2 0.4 1995 Readers support electronic payment scheme. O&M costs based on annual service contract. 3 Database and Software for Billing & Pricinc 10 19 42 1998 Includes installation, detectors, and controllers. Toil Plaza (TP) 2 Electronic Toil Reader TP001 10 2 5 2001 0.2 0.5 2001 Readers (per lane). O&M is estimated at 10% of capital cost. 1 High-Speed Camera TP003 10 5 10 1995 Includes institudes and database. 1 Includes institutions of camera/2 lanes. 3 Electronic Toil Collection Software TP003 10 5 10 1995 Includes COTS software and database.	2			0.5		2024				
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Rail Crossing Train Detector RS022 20 13 17 1995 0.62 0.82 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 6 8 1995 0.3 0.4 1995 Intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two track crossing with two 0.5 mile communication lines. Intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two track crossing with two 0.5 mile communication lines. Intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two track crossing with two 0.5 mile communication line from intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two track crossing with two 0.5 mile communication line from intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two track crossing with two 0.5 mile communication line from intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two track crossing with two 0.5 mile communication lines. Intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two track crossing with two 0.5 mile communication lines. Intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two crossing with two 0.5 mile communication lines. Intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two crossing with two 0.5 mile communication lines. Intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two crossing with two 0.5 mile communication lines. Intelligent interface controller (IIC) to wayside interface equipment (WIE). Assume two controllers. Intelligent interface controller (IIC) to wayside interface equipment (WIE). Intelligent interface controller (IIC) to wayside interface controller (IIC) to wayside interface controller (IIC) to wayside interf		D0004	00	00	404	4005	2.4	2.0	4005	Outcombined
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Rail Crossing Pedestrian Warning Signal, Gates RS024 20 8 12 1995 0.2 0.2 1995 Pedestrian warning signal and gates. RRicham Signal Crossing Trapped Vehicle Detector RS025 10 20 24 1995 1 1.2 1995 Entrapped vehicle detection camera, with poles and controller. Parking Management (PM) 2 Entrance/Exit Ramp Meters 10 2 4 1995 0.2 0.4 1995 Ramp meters are used to detect and count vehicles entering/existing the parking facility. O&M costs based on annual service contract. 2 Tag Readers 10 2 4 1995 0.2 0.4 1995 Readers support electronic payment scheme. O&M costs based on annual service contract. 3 Database and Software for Billing & Pricinc 10 10 19 42 1998 Database system contract includes installation, detectors, and controllers. Toll Plaza (TP) 2 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. 2 High-Speed Camera TP002 10 7 10 2003 0.4 0.8 1995 Cost includes 1 camera/2 lanes. 3 Electronic Toll Collection Software TP003 10 5 10 1995 Includes COTS software and database.	2 Dell Consider Controller	DCOCC	40	_	0	1005	0.0	0.4	1005	<u> </u>
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2 Tag Readers 10 2 4 1995 0.2 0.4 1995 Readers support electronic payment scheme. O&M costs based on annual service contract. 3 Database and Software for Billing & Pricinc 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 19 42 1998 Includes installation, detectors, and controllers. Toll Plaza (TP) 2 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. 3 Electronic Toll Collection Software TP003 10 5 10 1995 Includes COTS software and database.			10	2	Λ	1995	0.21	0.4	1995	Ramn meters are used to detect and count vehicles entering/existing the parking facility. O&M costs based on appual service contract
3 Database and Software for Billing & Pricinc 10 10 15 1995 1 2 1995 Database system contains parking pricing structure and availability. O&M costs based on annual service contract. Includes installation, detectors, and controllers. Toll Plaza (TP) Electronic Toll Reader TP001 TP002 TP002 TP003					4					
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2 High-Speed Camera TP002 10 7 10 2003 0.4 0.8 1995 Cost includes 1 camera/2 lanes. 3 Electronic Toll Collection Software TP003 10 5 10 1995 Includes COTS software and database.		TP001	10	2	5	2001	0.2	0.5	2001	Readers (per lane). O&M is estimated at 10% of capital cost.
3 Electronic Toll Collection Software TP003 10 5 10 1995 Includes COTS software and database.		TP002		7	10					
4 Electronic Toll Collection Structure TP004 20 11 16 1995 Mainline structure	3 Electronic Toll Collection Software			_						Includes COTS software and database.
TELOGRAPHIC FOR CONCOUNT OF CONCOUNTS	4 Electronic Toll Collection Structure	TP004	20	11	16	1995				Mainline structure.

lude		IDAS	Lifetime*		I Cost	Adjusted	O&M	Cost	Adjusted	Description
	Subsystem/Unit Cost Element	No.^	(years)	Low	High	From Date	Low	High	From Date	Description
	emote Location (RM)									
2	CTV Camera	RM001	7	2.1	5	2003	0.1	0.25		Interior fixed mount camera for security. Low cost represents black & white pan/tilt/zoom (PTZ). High cost represents color PTZ. Does not include installation.
	tegration of Camera with Existing Systems	RM002	10	2	2.5	1995				Per location.
	formational Kiosk	RM003	7	11	24	2001	1.1	4.5		Includes hardware, enclosure, installation, modem server, and map software.
	tegration of Kiosk with Existing Systems	RM004	7	2.2	27.5	1995				Software costs are for COTS (low) and developed/outdoor (high).
	osk Upgrade for Interactive Usage	RM005	5	5	8	1995	0.5	0.8		Interactive information display interface (upgrade from existing interface).
	osk Software Upgrade for Interactive Usage	RM006	5	10	12	1995				Software is COTS.
	ransit Status Information Sigr	D14007	10	30	32	2002	4.5	4.0	4005	A LED display installed at transit terminal that provides status information on transit arrival. Cost depends on quality, size, and controller capabilities.
	mart Card Vending Machine oftware, Integration for Smart Card Vendinc	RM007 RM008	5 20	30	32	1995 1995	1.5	1.6		Ticket vending machine for smart card. Software is COTS.
	mergency Response Center (ER)	KIVIUUO	20	ા	<u> </u>	1995				Soliwate is COTS.
	asic Facilities, Comm for Large Area	EM006		436	65	1995	436	655	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.
Ba 4	asic Facilities, Comm for Medium Area	EM007		349	92	1995	436	524	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	asic Facilities, Comm for Small Area	EM008		308	55	1995	436	458		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.
	mergency Response Hardware	EM001	5	6	9	2003	0.12	0.18		Includes 3 workstations. O&M is estimated at 2% of capital cost.
	mergency Response Software	EM002	10	70	150	1995	0.5	3.5		Includes emergency response plans database, vehicle tracking software, and real time traffic coordination.
	mergency Response Labor	EM003					66	217		Description is based on 1995 data: Two people. Salary costs are fully loaded including salary, overtime, overhead, benefits, etc.
	mergency Management Communications	EM004	20	5	10	1995	2.5	5		Shared database between 4 sites. Cost is per site; software is COTS.
	ardware, Software Upgrade for E-911 and	EM005	10	105 0.8	180	1995	0.09	2.5		Data communications translation software, E911 interface software, processor, and 3 workstations.
	00 MHz. 2-way Radio		5	0.8	1.6	2001	0.09	0.12	2001	Cost is per radio.
	mergency Vehicle On-Board (EV)	EV001	10	0.3	0	1995	0.0	12	1995	Emergency vehicle communications. Cost is per vehicle.
	gnal Preemption/Priority Emitter	EVUUI	10	0.5	2.1	2003	0.0	12		Emergiency vernice communications. Cost is per vernice. Data-encoded emitter, nanually initiated. Complement to Roadside Signal Preemption/Priority (see Roadside Control subsystem).
	formation Service Provider (ISP)			0.5	2.1	2003				bata-encoded emitter, manually initiated. Complement to Roadside Signal Preemption/Priority (see Roadside Control subsystem).
	asic Facilities, Comm for Large Area	IS019		436	65	1995	436	655	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.
Ba 4	asic Facilities, Comm for Medium Area	IS020		349	92	1995	436	524	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.
Ba 4	asic Facilities, Comm for Small Area	IS021		305		1995	436	458		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 Inf	formation Service Provider Hardware	IS001	5	26	35	2003	0.5	0.7	2003	Includes 2 servers and 5 workstations. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.
	ystems Integration	IS017	20	89	109	1998				Integration with other systems.
	formation Service Provider Software	IS002	20	276	551	1995	13.8	27.6		Includes database software (COTS) and traffic analysis software.
	ap Database Software	IS003	2	15	30	2003				Software is COTS.
I	formation Service Provider Labor	IS004				I	230	329	1995	Description is based on 1995 data: 2 Staff @ 50K to 75K and 1 staff @ 75K to 100K. Salary cost are fully loaded prices and include base salary,
6		100								overtime, overhead, benefits, etc.
	M Subcarrier Lease	IS005		40	40	2002	113	226	1995	Cost is per year.
	ardware Upgrade for Interactive Information	IS006	5	12	16	2003	0.24	0.32	2003	Includes 1 server and 2 workstations. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.
	oftware Upgrade for Interactive Information	IS007 IS008	20	251	501	1995	13	25		Trip planning software (includes some development costs).
6				054	504	4005	131	197		Description is based on 1995 data: 1 Staff @ 50K to 75K for two shifts. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
	oftware Upgrade for Route Guidance	IS009	20	251	501	1995	13	25		Route selection software. Software is COTS.
	ap Database Upgrade for Route Guidance	IS010	<u>2</u> 5	100	201 10	1995 2003	0.16	0.0		Map database software upgrade.
	ardware Upgrade for Emergency Route Planning oftware Upgrade for Emergency Route Planning	IS011 IS012	<u>5</u> 	50	100	1995	2.5	0.2		Includes 1 server. O&M is estimated at 2%; could be higher for responsive and preventative maintenance. Route guidance software. Software is COTS.
	ardware Upgrade for Emergency Route Planning ardware Upgrade for Dynamic Ridesharing	IS012	5	4	100	2003	0.08	0.12		Includes 2 workstations. O&M is estimated at 2%; could be higher for responsive and preventative maintenance.
	oftware Upgrade for Dynamic Ridesharing	IS013	20	99	197	1998	5	10		includes 2 workstations. Oow its estimated at 2%, could be higher for responsive and preventative maintenance. Software includes some development cost.
	dded Labor for Dynamic Ridesharing	IS014	20	33	197	1090	131	197	1995	Description is based on 1995 data: 1 Staff @ 50K to 75K for two shifts. Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
7 Lia	ability Insurance for Dynamic Ridesharing	IS016				İ	60	121	1995	Description is based on 1995 data: 50K to 100K per year.
3 Sc	oftware Upgrade for Probe Information	IS018	20	251	501	1995	13	25	1995	Software includes COTS and some development cost.

© Cubouatam/Unit Coat Floreant	IDAS	Lifetime*	Capita	al Cost	Adjusted	O&M	Cost	Adjusted	Description
<u>ਊ</u> Subsystem/Unit Cost Element	No.^	(years)			From Date	Low	High	From Date	Description
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 10-15% of the capital cost.
Basic Facilities, Comm for Medium Area	TM041		34	192	1995	436	524	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 10-15% of the capital cost.
Basic Facilities, Comm for Small Area	TM042		30)55	1995	436	458	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 10-15% of the capital cost.
5 Hardware for Signal Control	TM001	5	18.5	28.5	2003	9	10.5	2003	Includes I server and multiple workstations. O&M includes responsive and preventative maintenance.
Software, Integration for Signal Control	TM006	5	105	150	2003	15	50	2003	Software and integration for a large urban area. Cost would be lower (approx.\$10,500) for a few arterial intersections. O&M includes software upgrades, revisions, and expansion of the system.
Labor for Signal Control	TM002					525		2001	Description is based on 2001 data: Costs include labor for operations (2 @ 50% of the time, at 100K), transportation engineer (1 at 50% of the time, at 100K), update timing plans (2K per system per month for every 10 systems), and signal maintenance technician (2 @ 75K). Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Hardware, Software for Traffic Surveillance	TM003	20	135			6.8	8.3	1995	Processor and software.
3 Integration for Traffic Surveillance	TM032	20	226		1995	11.3	13.8	1995	Integration with other systems.
5 Hardware for Freeway Control	TM004	5	6		2003	0.3	0.45	2003	Includes 3 workstations. O&M estimated at 5% of capital cost.
3 Software, Integration for Freeway Contro	TM007	5	171	209	2002				Software and integration, installation and 1 year maintenance. Software is off-the-shelf technology and unit cost does not reflect product development
Labor for Freeway Control	TM005					243	297	2001	Description is based on 2001 data: Labor for operations (2 @ 50% of 100K) and maintenance technicians (2 @ 75K). Salary cost are fully loaded prices including base salary, overtime, overhead, benefits, etc.
5 Hardware for Lane Control	TM008	5	2	3	2003	0.1	0.15	2003	Includes 1 workstation and 19" monitor. O&M estimated at 5% of capital cost.
Software, Integration for Lane Control 3	TM009	10	226	276	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					97	119	2001	Description is based on 2001 data: Labor for 2 operators @ 50% of 100K.
Software, Integration for Regional Contro	TM011	10	296	395	1998				Software and integration, installation and 1 year maintenance. Integration with other TMC's. Software is COTS.
Real-time, Traffic Adaptive Signal Control System		10	113	141	2001	1	9	2001	The costs range is based on commercially available packages, which run on a centralized computer. The high capital cost includes software package for graphical user interface and incident management.
Labor for Regional Control	TM012					194	237	2001	Description is based on 2001 data: Labor for operators (2 @ 50% of 100K), transportation engineer (1 @ 50% of 100K), and maintenance contract. Salary costs are fully loaded prices including base salary, overtime, overhead, benefits, etc.
5 Video Monitors, Wall for Incident Detection	TM013	15	57	103	2003	3	5	2003	Video wall and monitors. O&M estimated at 5% of capital cost.
5 Hardware for Incident Detection	TM014	5	43		2003	2.15	2.85	2003	Includes 4 servers, 5 workstations, and 2 laser printers. O&M estimated at 5% of capital cost; could be higher for responsive and preventative
3 Integration for Incident Detectior	TM025	20	90		1995	4.5	5.5	1995	Integration with other systems.
3 Software for Incident Detection	TM015	5	86	105	2002	4.3	5.2	2002	Software is COTS and includes development cost. O&M is estimated at 5% of capital.
6 Labor for Incident Detection	TM016					680	831	2001	Description is based on 2001 data: Labor for operators (4 @ 100K and 1 manager @ 150K) and 2 maintenance techs @ 75K.
5 Video Monitor for Incident Response	TM017	5	0.6		2003				Includes 1 19" monitor.
5 Hardware for Incident Response	TM018	5	2		2003	0.1	0.15	2003	Includes 1 workstation. O&M estimated at 5% of capital cost.
3 Integration for Incident Response	TM026	20	180		1995				Integration with other systems.
3 Software for Incident Response	TM019	2	14	17	1995	0.677	0.827	1995	Software is COTS.
6 Labor for Incident Response	TM020	5	14	1 1	2001	97	119	2001	Description is based on 2001 data: Labor for incident management coordinator (1 @ 100K).
2 Automated Incident Investigation System	TM021	5	2		2001	0.1	0.15	2003	Includes workstation, tripod, monopole antenna, Auto Integration, and AutoCAD software. Includes 1 workstation. O&M estimated at 5% of capital cost.
5 Hardware for Traffic Information Dissemination 3 Software for Traffic Information Dissemination	TM021	5	18			0.1	1.1	1995	Includes I workstation. Osivi estimated at 5% of capital cost. Software is COTS.
3 Integration for Traffic Information Dissemination	TM023	20	85			4.5	5.5	1995	Solivate is 60 To. Integration with other systems.
6 Labor for Traffic Information Dissemination	TM024	20	00	104	2000	97	119	2001	Description is based on 2001 data: Labor for 1 operator @ 100K. Salary costs are fully loaded and include base salary, overtime, overhead, benefits,
3 Software for Dynamic Electronic Tolls	TM027	5	23	28	1995	1.1	1.4	1995	Includes software installation and 1 year maintenance. Software is COTS.
3 Integration for Dynamic Electronic Tolls	TM028	20	90		1995	4.5	5.5	1995	Integration with other systems.
5 Hardware for Probe Information Collection	TM033	3	2		2003	0.1	0.15	2003	Includes 1 workstation. O&M estimated at 5% of capital cost.
3 Software for Probe Information Collection	TM034	5	18			1.8	2.2	1995	Includes software installation and 1 year maintenance. Software is COTS.
3 Integration for Probe Information Collection	TM035	20	135			14	17	1995	Integration with other systems.
Labor for Probe Information Collection	TM036					49	59	2001	Description is based on 2001 data: Labor for 1 operator (4 hours per day @ 100K/year). Salary costs are fully loaded prices and include base salary, overtime, overhead, benefits, etc.
3 Software for Rail Crossing Monitor	TM037	5	18		1995	1.8	2.2	1995	Includes software installation and 1 year maintenance. Software is COTS.
3 Integration for Rail Crossing Monitor	TM038	20	90	110	1995				Integration with other systems.
Labor for Rail Crossing Monitor	TM039					49	59	2001	Description is based on 2001 data: Operators (1 @ 50% of 100K). Salary costs are fully loaded prices including base salary, overtime, overhead, benefits, etc.
Road Weather Information System (RWIS)		25	1	4	1998	0.3	2	2001	Description is based on unadjusted data values: 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 (\$10K.\$50K) should be added to \$25K listed here in order to cost out the entire system. CPU replaced every 5 years at a cost of \$4K. O&M costs range includes communication, and optional weather forecast/meteorological service.

Subsystem/Unit Cost Element	IDAS	Lifetime*		al Cost			Cost	Adjusted	Description
	No.^	(years)	Low	High	From Date	Low	High	From Date	
Transit Management Center (TR)	T ===							•	
Basic Facilities, Comm for Large Area	TR014		43	865	1995	436	655	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		34	192	1995	436	524	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		30)55	1995	436	458	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	9	2003	0.12	0.18	2003	Includes 3 workstations. O&M estimated at 2% of capital cost.
Transit Center Software, Integration	TR002	20							Includes vehicle tracking & scheduling, database & information storage, schedule adjustment software, real time travel information software, and
3 4 Transit Center Additional Building Space	TR003	20	817	1725	1995	6	12 10		integration. Software is COTS. Description is based on 1995 data: Additional space required for ITS technology - \$12-\$18 / sq.ft, 500 sq.ft
6 Transit Center Additional Building Space	TR003	1				66		1995	Description is based on 1995 data. Additional space required on 115 technology - \$12-\$\text{io} 18 ag.t, 500 \$\frac{1}{2}\text{i}, 500 \$\frac{1}\text{i}, 500 \$\frac{1}{2}\text{i}, 500 \$\frac{1}{2}\text{i}, 500 \$\frac{1}{2}\text{i}, 500 \$\frac{1}{2}\text{i}
3 Upgrade for Auto. Scheduling, Run Cutting, or	TR004	20	20	40	1995	0.4		1995	Description is based on 1939 data. Labor for 3 start @ 75h. Salary Cost are tally loaded prices including base salary, overtime, overtime, bernellis, Processor/software upgrade, installation and 1 yr, maintenance (for processor). Software is COTS.
	TR003	20	226			0.4	0.0	1995	Processorsorium are upgrade, installation and i yr. maintenance (for processor). Software is COTS. Integration with other systems.
3 Integration for Auto. Scheduling, Run Cutting, or			220	501	1995				
Further Software Upgrade for E-Fare Payment	TR013	20	40			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						Vehicle location interface.
5 Video Monitors for Security System	TR008	5	3		2003	0.06			Five per site. O&M estimated at 2% of capital cost.
5 Hardware for Security System	TR009	5	14			0.28	0.38	2003	Includes 1 server and 3 workstations. O&M estimated at 2% of capital cost; could be higher for preventative and responsive maintenance.
3 Integration of Security System with Existing	TR010	20	251	501	1995				Integration with other systems.
6 Labor for Security System	TR011					266	325	1995	Description is based on 1995 data: Labor for 3 staff @ 75K each. Salary cost are fully loaded prices including base salary, overtime, overhead,
Toll Administration (TA)									
5 Toll Administration Hardware	TA001	5	4			0.2			Includes 2 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			0.005		1995	On-board schedule processor and database.
1 Cell Based Communication Equipment	TV002	10	0.14	0.24	1995	0.0071	0.0118	1995	Cell-based radio with data capacity.
GPS/DGPS for Vehicle Location	TV003	10	0.5	2	2002	0.01	0.039	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 annu-
2			0.5		2002	0.01	0.039	2002	telecom service fees.
2 Signal Preemption Processor	TV004	10	0.2		1995	0.005	0.008	1995	On-board schedule processor and database. Complement to IDAS elements RS004 and RS005.
2 Signal Preemption/Priority Emitter			0.5	2.1	2003				Data-encoded emitter; manually initiated. Complement to Roadside Signal Preemption/Priority (see Roadside Control subsystem).
2 Preemption/Priority Transponder			0.	07	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	0.12	1995	0.002	0.002	1995	On-board processor for trip reporting and data storage.
2 Security Package	TV006	10	3.4	6	1995	0.17	0.21	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	0.6	1.2	1995	0.03	0.06	1995	On-board flex fare system DBX processor, on-board farebox, and smart card reader.
Automatic Passenger Counting System		10							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 alo
2			1	10	2003				installation. Cost is per vehicle and includes installation.
Commercial Vehicle Administration (CA)									
5 Commercial Vehicle Admin Hardware	CA001	5	6	9	2003	0.12	0.18	2003	Includes 3 workstations. O&M estimated at 2% of capital cost.
3 Commercial Vehicle Admin Software, Integration	CA002	20	201			4	4.4	1995	Includes processor and integration. Software is COTS.
Commercial Vehicle Admin Labor	CA003		201		1000				Description is based on 1995 data: Labor for 4 staff @ 75K (average). Salary costs are fully loaded prices including base salary, overtime, overhead
6	0,1000					270	330	2003	benefits, etc.
3 Software Upgrade for Electronic Credential	CA004	20	60	140	1995	1.2	2.8	1995	Electronic credentials purchase software, database and management for post-trip processing & E-credentials.
3 Software Upgrade for Inter-Agency Info Exchange	CA005	20	20			0.4		1995	Processor and integration add-on. Software is COTS.
6 Added Labor for Inter-Agency Info Exchange	CA006	20	20	70	1000	88			Description is based on 1995 data: Labor for 1 staff @ 75K (average). Salary cost are fully loaded prices including base salary, overtime, benefits, e
3 Software Upgrade for Safety Administration	CA007	20	40	80	1995	0.8			Database add-on, software, and integration. Software is COTS.
Commercial Vehicle Check Station (CC)	0/1007		70	- 00	1000	0.0	1.0	1000	Establica da Gri, Goriware, and integration. Contware to GOTO.
4 Check Station Structure	CC001	20	55	82	1995				Roadside structure - mainline w/ lane indicator signals.
2 Signal Board	CC001	10	8			0.8	1.2	1995	Roadside sinculie - manime whane indicator signals. Roadside signal board.
2 Signal Indicator	CC002	20	4			0.0		1995	Notatione signal robaru. Signal indicator system.
2 Roadside Beacon	CC003	10	4			0.2		1995	Signal mulication system: Roadside beacon used for electronic screening (not included in roadside subsystem). Beacon repair/replacement.
1 Wireline to Roadside Beacon	CC004	20	9			0.4	0.0	1990	Dedicated wireline communication from beacon to roadside (1 mile upstream).
3 Check Station Software, Integration	CC005	20	180						Deducated whether communication from beacon to roadside (1 mile upsideam). Software, processor and integration.
5 Check Station Hardware	CC007	5	2		2003	0.04	0.06	2003	Soliware, processor and minetgration. Includes 1 workstation. O&M estimated at 2% of capital cost.
Safety and Fitness Electronic Records (SAFER)	00007	J J	_	Ŭ					includes in winstation. Own estimated at 2% of capital cost. Includes portable computer with printer and wireless internet modern to download, record, and upload carrier safety database records at field location.
			4.9	6.1	1999	0.29	0.43	1999	induces portable computer with printer and wheless internet modern to download, record, and upload carrier salety database records at field location for check stations.
5 Data Mailbox	00000	40	4-	74	1005	0.4	2.5	1005	
1 Detection System	CC008	10	47		1995	2.4 0.8	3.5	1995	Commercial vehicle communication interface and communication device (cell based radio).
3 Software Upgrade for Safety Inspection	CC009		40						Safety-database add-on, and result writing to vehicle tag processor add-on. Software is COTS.
2 Handheld Safety Devices	CC010		2		1995	0.2	0.4		For commercial vehicle inspection. The devices either measure data themselves or read data from the vehicle. Three per location.
3 Software Upgrade for Citation and Accident	CC011	20	20			1	2	1995	Software add- on for recording of citation and accident information to the commercial vehicle.
3 Weigh-In-Motion Facility	CC012	10	14			1.4		1995	Includes WIM fixed load cell and interface to roadside facility. Software is COTS.
1 Wireline to Weigh-In-Motion Facility	CC013	10	1	2	1995	0.1	0.2	1995	Wireline communication (local line).

Subsystem/Unit Cost Element	IDAS No.^	Lifetime* (years)			Adjusted From Date		Cost	Adjusted From Date	Description
Commercial Vehicle On-Board (CV)	INO."	(years)	LOW	nigii	II IOIII Date	LOW	l Lidu	i roin pate	
Electronic ID Tag	CV001	10	0.52	0.9	1995	0.01	0.018	1995	Includes ID tag, additional software & processing, and database storage. Software is COTS.
Communication Equipment	CV002	10	1.1	2.1		0.0071		1995	Commercial vehicle communication interface and communication device (cell-based radio).
Central Processor and Storage	CV002	10	0.2	0.4		0.005		1995	Equipment on board for the processing and storage of cargo material.
GPS/DGPS	CV003	10		0.4		0.003			Equipment of notation. Capital cost depends on features of unit. O&M cost (estimated at 2% of capital) is for unit maintenance and does not
			0.5	1.8		0.01	0.035	2002	include annual telecom service fees.
Driver and Vehicle Safety Sensors, Software	CV005	10	0.9	1.8	1995	0.03	0.06	1995	Additional software and processor for warning indicator and audio system interface, and onboard sensors for engine/vehicle and driver. Software
Cargo Monitoring Sensors and Gauges	CV006	10	0.14	0.28	1995	0.014	0.028	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. is for passive, and high is for active E-seal.
Electronic Cargo Seal Reusable			0.034	0.43	2002				Cost for a reusable radio frequency identification (RFID) E-seal that provides a complete and accurate audit trail of seal status during transport. L
Autonomous Tracking Unit			0.35	0.8	2003	0.144	0.42	2003	for passive, and high is for active E-seal. Depending on the vendor, some E-seals may incur a monthly service charge. Chassis or container mounted unit that tracks location and condition of assets (cost for on-board sensors not included). Higher priced units provigreater 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.
Fleet Management Center (FM)	L =1.10.5 :								
Fleet Center Hardware	FM001	5	6	9		0.12	0.18	2003	Costs include 3 workstations. O&M estimated at 2% of capital cost.
Fleet Center Software, Integration	FM002	20	216	501	1995				Includes processor and integration. Software is COTS.
Fleet Center Labor	FM003					443	542	1995	Description is based on 1995 data: Labor for 5 staff @ 75K. Salary costs are fully loaded prices including base salary, overtime, overhead, bene
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. Softworts.
Software for Tracking and Scheduling	FM005	20	40	100	1995	4	10	1995	Vehicle tracking and scheduling. Software is COTS.
Vehicle Location Interface	FM006	20	10	15					Vehicle location interface from FMS to TMS.
Software Upgrade for Fleet Maintenance	FM007	20	20	40		0.4	0.8	1995	Vertical recapor/software upgrade to add capability to automatically generate preventative maintenance schedules from vehicle mileage data. Software
Integration for Fleet Maintenance	FM008	20	100	201		2		1995	Integration with other systems.
Software Upgrade for HAZMAT Management	FM009	20	20	40		0.4		1995	Integration with other systems. Vehicle tracking & scheduling enhancement. Software is COTS.
				3		• • • •			
Hardware Upgrade for HAZMAT Management	FM010	5	2	3	2003	0.04	0.06	2003	Includes 1 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 re is equipped with additional security features.
Vehicle On-Board (VS)									
Communication Equipment	VS001	7	0.2	0.4		0.004		1995	Wireless data transceiver.
In-Vehicle Display	VS002	7	0.04	0.1		0.001		1995	In-vehicle display/warning interface. Software is COTS.
In-Vehicle Signing System	VS003	7	0.13	0.32		0.002		1995	Interface to active tag reader, processor for active tag decode, and display device for messages.
GPS/DGPS	VS004	7	0.2	0.4		0.004	0.01	1995	Global Positioning System/Differential Global Positioning Systems.
GIS Software	VS005	7	0.2	0.3					Geographical Information System (GIS) software for performing route planning.
Route Guidance Processor	VS006	7	0.08	0.12		0.002		1995	Limited processor for route guidance functionality.
Sensors for Lateral Control	VS007	7	0.6	0.9	1995	0.013	0.018	1995	Includes lane sensors in vehicle and lateral sensors MMW radar.
Electronic Toll Equipment	VS008	7	0.03	0.1	1995				Active tag interface and debit/credit card interface.
Mayday Sensor and Processor	VS009	7	0.12	0.5	1995	0.002	0.01	1995	Collision detector sensor and interface for Mayday processor. Software is COTS.
Sensors for Longitudinal Contro	VS010	7	0.2	0.4	1995	0.005	0.01	1995	Longitudinal sensors MMW radar.
Advanced Steering Control	VS011	7	0.4	0.5	1995	0.008	0.01	1995	Advanced steering control ("hands off" driving). Software is COTS.
Advanced Cruise Control	VS012	7	0.12	0.24		0.002		1995	Adaptive cruise control (automatic breaking and accelerating).
Intersection Collision Avoidance Processor,	VS013	7							Software/processor for infrastructure transmitted information, interface to in-vehicle signing and audio system, software and processor to link to
Software	100.0	'	0.22	0.44	1995	0.005	0.009	1995	longitudinal and lateral vehicle control modules based on input signal from vehicle intersection collision warning equipment package. Software is
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
	VS014			2.5	2003	0.1	0.125	2003	
Driver and Vehicle Safety Monitoring System	V3013	7	0.53	1	1995	0.026	0.05	1995	Description is based on 1995 data: Safety collection processor and software, driver condition sensors, six vehicle condition sensors (@ \$50 each vehicle data storage. Software is COTS.
Pre-Crash Safety System	VS016	7	0.9	1.7	1995	0.03	0.05	1995	Vehicle condition sensors, vehicle performance sensors, software/processor, interface, pre-crash safety systems deployment actuators. Software
Software, Processor for Probe Vehicle	VS020	7	0.05			0.001		1995	Software and processor for communication to roadside infrastructure, signal generator, message generator. Software is COTS.
Toll Tag/Transponder		5	0.0		2003	0.001	0.000		Most toll tags/transponders costs approx. \$25. Some toll agencies require users to pay a refundable deposit in lieu of purchasing a tag. The use
In-Vehicle Navigation System	-	7	2.		1998				charged the cost of the tag if the tag is lost. COTS product that includes in-vehicle display and supporting software.
Personal Devices (PD)			Z.		1990				19010 product that modules inventible display and supporting software.
	I DD CC.	7	0.0	0.1	2004	0.004	0.000	2004	Description of states are intended and ON antimotod at 20% of control
Basic PDA	PD001		0.2	0.4		0.004		2001	Personal digital assistant. O&M estimated at 2% of capital.
Advanced PDA for Route Guidance, Interactive	PD002	7	0.4	0.6		0.01			Personal digital assistant with advanced capabilities (route guidance, interactive).
Modem Interface, Antenna for PDA	PD003	7	0.14	0.2		0.003		1995	Modem interface and separate antenna for wireless capability.
PDA with Wireless Modem	<u> </u>	2	0.2	0.6		0.11		2001	Personal digital assistant with wireless modem. O&M based on monthly subscriber rate plans of 50 Kbytes (low) and 150 Kbytes (high).
					2001	0.003	0.004	2001	
GPS/DGPS GIS Software	PD005 PD006	7	0.14	0.17 0.15		0.005		1995	GPS/DGPS. O&M estimated at 2% of capital cost. Additional GIS/GUI capability.

Reference Notes

ITS unit costs data is now available in two formats: unadjusted and adjusted. Please read the information below. Comments and feedback are encouraged. Send correspondence to Barbara Staples at bstaples@mitretek.org.

This Excel file contains 4 worksheets:

- --Equipment List Not Adjusted this is the cost data with the dollar year for capital and O&M cost identified. The header on this worksheet is "ITS Unit Costs Database (as of 30 September 2004)." This page is formatted to print a total of 6 pages.
- --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 2003 for each series is provided. This page is formatted to print a total of 8 pages.
- --Equipment List Adjusted 2003 this is the adjusted cost data. The header for this worksheet is "ITS Unit Costs Database (in 2003 dollars) As of September 30, 2004." This page is formatted to print a total of 6 pages. 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 2003 dollars. The index is representative of the ITS element. For example, the first element in Roadside Telecommunications, DS0 Communication Line, is tagged with Index 1. Index 1 is WPU1176 and is applied to communications and related equipment. The capital cost range is an adjusted value and was adjusted from 1995 (see column labeled "Adjusted From Date"). The O&M costs are 2003 values obtained in Mitretek's analysis (as such, no adjustment needed).
- -- Reference Notes this worksheet.

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.