Project #8 (95-08)
Traveler Information Services (TIS)

APPENDICES

Appendix A

Public Agency and Private Sector Points of Contact

Table 1 - POCs for Coalition Public Agencies
Sorted by Agency Name

NAME	ORGANIZATION	PHONE (V) FAX (F)	#8 Goals	#8 Inv.
David Willis	AAA Foundation for Traffic Safety 1440 New York Ave., N.W., Ste. 1050, Wash., D.C. 20005 (Manager)	202/638-5944 (V) 202/638-5943 (F)	X (will not particip ate)	X (will not particip ate)
Susan Perry	American Bus Assoc., 1100 New York Ave. N.W., Ste 1050, Washington, D.C. 20009 (Senior VP)	202/842-1645 (V) 202-842-0850 (F)		
Robert Pritchard	American Trucking Association Foundation 660 Rosevelt Avenue, Pawtucket, RI 02860 (Director)	401/722-7800 (V) 401/722-0109 (F)		
David Carol	AMTRAK (NECIP) 455 Boston Post Road Old Saybrook, CT 06475 (Project Director, Government Affairs)	203/395-3015 (V) 203/395-3017 (F)	✔	✔ (n/a)
William Stoeckert	Connecticut DOT 2800 Berlin Turnpike, Newington, CT 06131-7546 (Manager) Decker is POC for SR/T	203/594-2630 (V) 203/594-2655 (F)		
Hal Decker	Connecticut DOT 2800 Berlin Turnpike, Newington, CT 06131-7546 (Manager) Decker is POC for SR/T Stoeckert is POC for TIS	203/594-2630 (V) 203/594-2655 (F)		
Felicia Young	D.C. Dept of Public Works 2000 14th Street, N.W. Wash., D.C. 20002 John Payne is POC	202/939-8115 (V) (F)	✔	✔
Sherri Alston	D.C.Dept Public Work 2000 14th Street, N.W. Wash., D.C. 20002 (Administrator) John Payne is POC	202/939-8012 (V) 202/939-7179 (F)	✔	✔
Alan Cherrin	Delaware Turnpike Authority 1200 Whitaker Road, Newark, DE 19702 (Deputy Turnpike Administrator)	302/368-6880 (V) 302/368-6922 (F)	✔	✔
Robert Parke	Delaware DOT 1200 Whitaker Road, Newark, DE 19720 (Deputy Director, Hwy. Operations)	302/368-6868 (V) 302/368-6922 (F)	✔	✔
Stephen Moore	Delaware River & Bay Authority P.O. Box 71, New Castle DE 19270 (Maintenance Superintendent)	302/571-6362 (V) 302/571-6367 (F)	✔	✔
Rick Volk	Delaware River and Bay Authority PO Box 71, New Castle, DE 19720 (Dir. of Engineer)	302/571-6309 (V) 302/571-6391 (F)	✔	✔
Steve Joachim	Delaware River Port Authority P.O. Box 1949, Camden, NJ 08101 (Director, Mgt. Info. Services & Project Cntl)	609/963-6420 X2372 (V) 609/541-6379 (F)	✔	✔

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Sorted by Agency Name

NAME	ORGANIZATION	PHONE (V) FAX (F)	#8 Goals	#8 Inv.
Pete Ward #	Edgecomb Metals Company 555 State Road, Bensalem, PA 19020, (Dir. Transpor.)	215/245-3387 (V) 215/245-3261 (F)	X (will not participate)	X (will not participate)
Carl Gottschall	Federal Highway Administration 300 S. New Street, Room 2101 Dover, Delaware 19904-6728 (Field Ops. Engineer)	302/734-1946 (V) 302/734-3066 (F)	✔	✔ (n/a)
Mike Halladay	Federal Highway Administration 400 7th Street, S.W. Washington, D.C. 20590 (Highway Engineer)	202/366-6503 (V) 202/366-8712 (F)	✔	✔ (n/a)
John McDade #	Federal Highway Administration, Region 2 Leo W. O'Brien Building, Room 719, Clinton Avenue & North Pearl Street, Albany, NY 12207 (Urban Mobility Specialist)	518/472-6476 (V) 518/472-3616 (F)	✔	✔ (n/a)
James Robinson #	Federal Highway Administration, Region 3 10 South Howard St., Ste. 4000, Baltimore, MD 21201 (Urban Mobility Engineer)	410/962-3815 (V) 410/962-4586 (F)	✔	✔ (n/a)
James McQueen	Federal Railroad Administration 400 Seventh Street, S.W. Wash. D.C. 20590 (Associate Administrator)	202/366-9660 (V) 202/366-0646 (F)	✔	✔ (n/a)
Peter Montague	Federal Railroad Administration 400 Seventh Street, S.W. Wash. D.C.20590 (Chief)	202/366-0686 (V) 202/366-0646 (F)	✔ (n/a)	✔ (n/a)
John Garrity	Federal Transit Admin. 1760 Market Street, Ste. 500 Philadelphia, PA 19103 (Transportation Program Specialist)	215/656-6900 (V) 215/656-7260 (F)	✔ (n/a)	✔ (n/a)
Jim Constantino	ITS America 400 Virginia Avenue, S.W., Ste. 800 Washington, D.C. 20024-2730 (Exec. Dir.)	202/484-4847 (V) 202/484-3483 (F)	✔	✔ (n/a)
Jonathan Slevin	ITS America 400 Virginia Ave., S.W., Ste. 800, Washington, D.C. 20024-2730	202/484-4893 (V) 202/484-3483 (F)	✔	✔ (n/a)
Gordon Fink *	ITS America 400 Virginia Ave., S.W., Ste. 800, Washington, D.C. 20024-2730	202/484-4132 (V)	✔	✔ (n/a)
Tim Bolton	Maine DOT State House Station 16 Augusta, ME 04333-0016 (with Gid Picher)	207/287-2827 (V) 207/287-2896 (F)	✔	✔
Chip Gechel	Maine DOT Bldg. State House Station 16, Child Street Augusta, ME 04333-0016 (with Gid Picher)	207/287-2680(V) 207/287-2896(F)	✔	✔
Gid Picher	Maine DOT Bldg. State House Station 16, Child Street, Augusta, ME 04333-0016 (Director)	207/287-2680 (V) 207/287-2896 (F)	✔	✔
Peggy Trueworty	Maine Turnpike Authority 430 Riverside Street, Portland, ME 04103 (Director)	207/871-7771 (V) 207/871-7739 (F)	✔	✔

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Sorted by Agency Name

NAME	ORGANIZATION	PHONE (V) FAX (F)	#8 Goals	#8 Inv.
Steve Kuciemba	Maryland SHA 7491 Connelley Drive, Hanover, MD 21076 (Section Chief)	410/787-5884 (V) 410/553-6399 (F)	✔	✔
Barry King	Maryland SHA, 7491 Connelley Drive, Hanover, MD 21076 (Chief)	410/787-5804 (V) 410/553-6399 (F)	✔	
Howard Moore #	Maryland Transportation Authority P.O. Bo x 766, Perryville, MD 21903 (Asst. Adminstrator)	410/575-6518 (V) 410/575-7095 (F)	✔	✔
Steven Pepin	Mass Exec. Off. of Transportation and Construction 10 Park Plaza, Room 4150, Boston, MA 02116-3973 (Transp. Program Planner) Steven is with trans planning dept., planning and Mass Hgwy report ot Exec. Office.; Mass Turnpike is separate agency; Steven is trying to locate Mass TPK POC;	617/973-8051 (V) 617/973-8035 (F)		
Laurinda Bedingfield	Mass Hwy Dept 10 Park Plaza, Boston, MA 02116-3973 (Commissioner)	617/9737811 (V) 617/973-8040 (F)		
Sergiu Luchian	Mass Hwy Dept One South Sation, Boston, MA 10211 (Project Engineer)	617/951-6146 (V) 617/439-0672 (F)		
Gene Bergoffen	National Private Truck Council 1320 Braddock Place, Ste 720 Alexandria, VA 22314 (E xecutive Vice President)	703/683-1300 (V) 703/683-1217 (F)	✔	✔ (n/a)
John Clements	New Hampshire DOT P.O. Bo X 483, Concord, NH 03302 (Director Operations Division) Pat Morris or Bob Liford are additional POCs	603/271-3736 (V) 603/271-3914 (F)	✔	✔
Christine Cox *	New Jersey DOT 1035 Parkway Avenue, Trenton, NJ 08625 ( )	690/530-4278 (V)	✔	✔ (left blank)
Dennis Keck	New Jersey DOT 1035 Parkway Avenue, Trenton, NJ 08625 (Assistant Commissioner)	609/530-2087 (V) 609/530-2092 (F)	✔	✔ (left blank)
Roy Gustavson	New Jersey DOT 1035 Parkway Avenue Trenton, NJ 08625 (Manager) POC is Kurt Aufschneider and James Pivovan	609/530-2600 (V) 609/5304567 (F) 609/866-4980	✔	✔ (left blank)
Sharon Landers	New Jersey DOT 1035Parkway Avenue, Trenton, NJ 08625 (Deputy Commissioner)	609/530-2002 (V) 609/530-3894 (F)	✔	✔ (left blank)
Charles McManus Arnold Mercer	New Jersey Highway Authority P.O. Box 5050, Woodbridge, NJ 07095 (Chief Engineer) Mercer is POC	908/442-8600 X6461 (V) 908/442-1480 (F)	✔	✔

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Sorted by Agency Name

NAME	ORGANIZATION	PHONE (V) FAX (F)	#8 Goals	#8 Inv.
George Zilocchi	New Jersey Highway Authority PO Box 5050, Woodbridge, NJ 07095 (Deputy Exec. Dir.)	908/442-8600 x6535 (V) 908/442-1686 (F)	✔	✔
Robert Dale	New Jersey Turnpike Authority Director of Operations P.O. Bo x 1121, New Brunswick, NJ 08903 (Mgr. Operations Division)	908/247-0900 x5401 (V) 908/247-1434 (F)	✔	✔
Raman Patel #	New York City DOT 34-02 Queens Blvd., Long Island City, NY 11101 (Chief, Systems Engineering Div.)	718/786-2442 (V) 718/937-6807 (F)	✔	✔
Steven Galgano	New York City DOT 34-02 Queens Blvd., Long Island City, NY 11101 (Deputy Asst. Commissioner)	718/786-2772 (V) 718/472-9312 (F)	✔	✔
Henry Peyrebrune #	New York State DOT State Campus Bldg 5, Room 312 1220 Washington Ave., Albany, NY 12232 (Director)	518/457-6422 (V) 518/457-1780 (F)		
Thomas Werner # Ed Roberts Mark Kehrli	New York State DOT State Campus Bldg. 5, Room 312,1220 Washington Avenue, Albany, NY 12232 (Director) POC for #8 TIS back week of 11/21 POC for #3 goals #3 Inventory	518/457-6438 (V) 518/457-1780 (F) 518-457-1232		
Rich Newhouse	New York State Thruway Traffic System Manager 333 SouthBroadway Tarrytown, NY 10591 John Hsu Suggested will call re: NY State Thruway - URS Study (downstate NY, I-84)	914/524-0252 (V)		
Donald Hubicki	New York State Thruway Authority 200 Southern Blvd., Albany, NY 12209	518/436-2756 (V) 518/436-3068 (F)		
Tim Scanlon	PA Turnpike Commission Route 283 & Eisenhower Blvd., Highspine, PA 17034 (Deputy Exec. Dir., Marketing)	717/939-9551 x5590 (V) 717/986-9645 (F)	✔	✔
Dennis Lebo	PennDOT, Central Office Transp & Safety Bldg, Rm 1200 Harrisburg, PA 17120 (Asst. to Deputy Secretary) Jim Arey is POC Also Steve Koser-RWIS&ITS	717/783--9776 (V) 717/787-5491 717/787-6284 717/787-3393	✔	✔
Doug May	PennDOT, District 6 200 Radnor-Chester Road, St. Davids, PA 19087 (Project Coord.)	215/768-3053 (V)	✔	✔
Harvey Knauer #	PennDOT, District 6 200 Radnor-Chester Road, St. Davids, PA 19087 (Project Coord.)	215/964-6537 (V) 215/964-6668 (F)	✔	✔
Thomas Hannon	Port Authority NY & NJ One World Trade Center - 64 East New York, NY 10048 (Chief)	212/435-2859 (V) 212/435-5298 (F)	✔	✔

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NAME	ORGANIZATION	PHONE (V) FAX (F)	#8 Goals	#8 Inv.
Paul Carris	Port Authority NY/NJ One World Trade Center, 68 East New York, NY 10048 (Mgr. of Client Services)	212/435-7853 (V) 212/435-7211 (F)	✔	✔
Rich Roberts	Port Authority of NY/NJ One World Trade Center, 64 East, New York, NY 10048 (Chief Transp Planning & Policy)	212/435-2859 (V) 212/435-529 (F)	✔	✔
Cynthia Levesque	Rhode Island DOT 2 Capitol Hill, Providence, RI 02903 (Chief)	401/277-1362 (V) 401/277-3905 (F)	✔	✔
Paul Annarummo	Rhode Island DOT 370 State Office Building, 2 Capitol Hill, Providence, RI 02903-1124 (Managing Engineer)	401/277-2694 (V) 401/277-6038 (F)	✔	✔
Bernie Waggenblast #	TRANSCOM 111 Pavonia Avenue, Jersey City, NJ 07310 (Operations Manager)	201/963-4033 (V) 201/963-7488 (F)	site visit	site visit
Matthew Edelman #	TRANSCOM 111 Pavonia Blvd., Jersey City, NJ (General Manager)	201/963-4033 (V) 201/963-7488 (F)	site visit	site visit
Phil Leshinsky	Triborough Bridge & Tunnel 10 Columbus Circle - 26th Floor, New York, NY 10015 (Director for Administration)	212/468-2340 (V) 212/468-8505 (F)	✔	✔
Larry Yermack #	Triborough Bridge and Tunnel Authority 10 Columbus Circle, 26th Floor, New York, NY 10019 (Chief Financial Officer)	212/468-2376 (V) 212/468-8505 (F)	✔	✔ (n/a)
Frank Pentti	USDOT Office of Intermodalism 400 Seventh Street, S.W. ,Ste. 10200 Wash. D.C. 20590 (Deputy Director)	202/366-5781 (V) 202/366-7952 (F)	✔	✔ (n/a)
Susan Gaskins	USDOT Office of Intermodalism 400 Seventh St., S.W., Ste. 10200 Washington, D.C. 20590 (Transportation Specialist)	202/366-8015 (V) 202/366-7952 (F)	✔	✔ (n/a)
Jeff Squires	Vermont DOT 133 State Street, Montpelier, VT 05602 (Asst. Commissioner) David Ross 802/828-2724- no TIS,SR/T	802/828-3441 (V) 802/828-3983 (F)		
Charles Hall #	Virginia DOT 1401 E. Broad Street, Richmond, VA 23219 (Asst. State Traffic Engineer)	804/786-6777 (V) 804/255-4978 (F)	✔	✔

Note: # indicates questionnaire was hand delivered, otherwise it was mailed. * indicates contact person for the indicated agency/organization

Table 2 - POCs for Non-Coalition Public Agencies
Sorted by Agency Name

NAME	ORGANIZATION	PHONE (V) FAX (F)	#8 Goals	#8 Inv.
AOL America On-Line	AOL ATTN: New Information Providers 8619 Westwood Center Drive Vienna, VA 22182-2285	703/448-8700 (V)		
Steven Tocco	Boston Logan Airport 10 Park Plaza Boston, MA 02116	617/973-5560 (V)		
Ray Carroll	MD Mass Transit Administration (MTA) 300 West Lexington Street Baltimore, MD 21201-3415 Note - light rail to BWI, AVI/AVL buses	410/333-3430 (V)		
Ted Mathison	MD Aviation Administration P.O. Box 8766 BWI Airport, MD 21240-0766 POC is Richard Keene	410/859-7100 (V) 410/859-7033(V)		
Tom Pierce	MD Department of Tourism	410/333-6611 x107 (V) 410/333-6643 (F)		
Gene Donaldson	Montgomery County Government IVHS Project Coordinator Division of Traffic Engineering Department of Transportation 101 Monroe Street, 11th Floor Rockville, MD 20850	301/217-2190 (V)	✔	✔ (site visit)
John Wilkins	New Jersey Transit NJ Transit Headquarters One Penn Plaza East Newark, NJ 07105-2246 Jim Kemp is POC	201/491-7797 (V) 201/491-7861	✔	✔
Mary-Rose Loney John Hanssens	Philadelphia International Airport Division of Aviation Terminal E Philadelphia, PA 19153 Coordinator of Public Information Bob Cusick is another POC	215/937-1930 (V) Johns # is 215/937-6840	✔	✔ (site visit)
David Plavin	Port Authority of NY & NJ Director of Aviation 1 World Trade Center 65 West New York, NY 10048 Dan Muscatello is POC Joann Breslin is POC for kiosks	212/435-3622 (V) 212/435-3718 212/435-4874	✔	✔
Rich Bickel	Southeastern Pennsylvania Transportation Authority (SEPTA) Planning & Development 8411 Chestnut Street Philadelphia, PA 19107 John Bukowski, System Eng. #3 POC Joe Derbyschire #3 POC for John Jim Byrd, Dir. of Cust. Serv. #8 POC	215/580-7990 buses, light rail, commuter rail 215/580-7619 215/580-7099 215/580-7850	✔	✔

Table 2 - POCs for Non-Coalition Public Agencies
Sorted by Agency Name

NAME	ORGANIZATION	PHONE (V) FAX (F)	#8 Goals	#8 Inv.
Meri- German weather	Virginia Department of Tourism Community Services Manager 901 East Byrd Street Richmond, 23219	804/371-8160(V) 804/786-2051 main 804/786-1919 (F)		
Jim Wilding Diane Jemmott (replaces Jim while out of country) Tara Hamilton Howard Stone Bill Lebegern	Washington Metropolitan Airport Authorities General Manager 44 Canal Center Plaza Alexandria, VA 22314-1562 Director of Public Relations - IEN contacted Community Relations/Affairs Transportation Planner-Tara said talk with	703/739-8600 (V) 703/739-8370 703/739-8383 703/419-8119		
John Hsu	Westchester County DPW Director of Traffic Engineering & Highway Safety County Office Building, Romm 400 148 Martine Ave. White Plains, NY 10601	914/285-2555		

Table 3 - POCs for Private Sector

Sorted by Company Name

Company	Contact	Address Phone/Fax
AAA's Travel Match Express	David Willis Executive Director	1440 New York Avenue, NW Suite 201 Washington, DC 20005 (202) 638-5944 P (202) 638-5943 F
America On-Line	AOL ATTN: New Information Providers	8619 Westwood Center Drive Vienna, VA 22182-2285 703/448-8700 (V)
AT&T	Raymond Bolduc	Crawfords Corner Rd. Holmdel, NJ 07733 (908) 949-6489 P (908) 949-8569 F
Bell Atlantic	Phil Caffey	One Bell Atlantic Parkway Suite 3C Philadelphia, PA 19102
Cablevision Systems	Charles Dolan Chairman & CEO	One Media Crossways Woodbury, NY 11797 (516) 364-8450 P (516) 364-6279 F
CellularOne	Paul Tobin President	100 Lowder Brook Drive Westwood, MA 02090 (617) 462-4000 P (617) 462-5071 F
Conrail	Paige Kane Executive Director, State and Local Affairs	303 Congress Street Suite 600 Boston, MA 02110 (617) 783-6200 P (617) 783-6215 F
Continental Cable	Will Richmond Director, New Business Development	The Pilot House Lewis Wharf Boston, MA 02110 (617) 742-9500 P
Delta	Dan Doggendorf Manager, Passenger Assistance	Department 976 Hartfield AIA Atlanta, GA 30320 (404) 715-5966 P (404) 715-2233 F
Discover America	David Loy	(800) 354-9243 P
Federal Express	Dennis Jones Senior VP, Information and Technology	2005 Corporate Avenue Memphis, TN 38132 (901) 369-3600 P (901) 332-7718 F
General Motors	William Spreitzer North American Operations, Research & Development	30100 Mound Road, Building 1-13 Warren, MI 48090 (810) 986-2916 P
Geotek	William Opet VP, Marketing	20 Craig Drive Montvale, NJ 07645 (201) 930-9305 P
Greyhound	Craig Lentsch President	PO Box 660606 Dallas, TX 75266-0606, or 15110 North Dallas Parkway Dallas, TX 75248 (214) 789-7000 P
GTE Mobilnet's *MAP	Ronald P. Grawert President	245 Perimeter Center Parkway Atlanta, GA 30346 (404) 391-8000 P

Table 3 - POCs for Private Sector
Sorted by Company Name

Company	Contact	Address Phone/Fax
IBM's InTouch	Denos Gazis Assistant Director, Research Center	PO Box 218 Yorktown Heights, NY 10598 (914) 945-2176 P (914) 945-3688 F
Inflight Phone		
Metro Traffic	Shane Cappola Vice President	681 Fifth Avenue 10th Floor New York, NY 10021 (212) 832-9500 P (212) 832-3333 F
Metropolitan Fiber Systems	Kevin J. O'Hara President, Development	Westmont, IL (708)
Motorola	Alan Kirson	4000 Commercial Avenue Northbrook, IL 60062 (708) 205-2859 P (708) 205-2890 F
Motorola's Arrow and Envoy	John Plungis, VP and Director, IVHS Systems	4100 Commonwealth Avenue Northbrook, IL 60662 (708) 205-3450 P (708) 205-2890 F
National Private Truck Council	Gene Bergoffen Executive Vice President	1320 Braddock Place Suite 720 Alexandria, VA 22314 (703) 683-1300 P (703) 683-1217 F
NavTek	Dianne McQuarrie Manager, Business Development	740 East Arques Avenue Sunnyvale, CA 94086-3833 (408) 737-3200 P (408) 736-3734 F
New England Cable News	Philip S. Balboni General Manager	160 Wells Avenue Newton, MA 02159 630-5010 P 630-5057 F
Nextel Communications	Kevin Gavin VP, Marketing and Product Development	3675 Mt. Diablo Boulevard Suite 330 Lafayette, CA 94549 (510) 299-2900 P
Nippondenso America	Miyoke Homma IVHS Coordinator	PO Box 5133 Southfield, MI 48086-5133 (810) 350-7649 P (810) 350-7774 F
NYNEX	Thomas Tauke EVP of Government Affairs	1300 I Street, NW Suite 400 W Washington, DC 20005
Personal Travel Technologies	Gary Richman	(516) 745-1234 x 711
Prodigy	Barbara Bellafiore Sanden GM - News, Sports and Information	445 Hamilton Avenue White Plains, NY 10601 (914) 448-8405 P (914) 448-8198 F
Shadow Traffic	Fred Bennett VP, Operations	201 Route 17 North 9th Floor Rutherford, NJ 07070 (201) 939-1888 P (201) 939-1043 F

Table 3 - POCs for Private Sector
Sorted by Company Name

Company	Contact	Address Phone/Fax
Siemen's AliScout	John C. Hare Vice President, Industrial and Public Affairs	701 Pennsylvania Avenue, NW #720 Washington, DC 20004 (202) 434-4812 P (202) 737-5403 F
Southern NE Telephone	Stan Kapinos Staff Assistant for Electronic Products	545 Long Wharf Drive 2nd Floor New Haven, CT 06511 (203) 771-8885 P (203) 562-1999 F
Sprint	John Stoddart	9350 Metcalf Overland Park, KS 66212
Sumitomo Electric USA	Ted Fujita Senior Vice President	551 Madison Avenue New York, NY 10022 (212) 305-6444 P (212) 308-6575 F
Telecommunicat-ions, Inc. (TCI)	Jerry Gaines SVP, Telephony Services	Terrace Tower II 5619 DTC Parkway Englewood, CO 80111-3000 (303) 267-5500 P
Time Warner Cable	Barry Rosenblum President	120 East 23rd Street New York, NY 10010 (212) 598-5200 P (212) 420-4803 F
TRAFFAX Traffic Network	Brian Freeman CEO	300 Bridge Street New Cumberland, PA 17070 (717) 774-8150 P (717) 774-8160 F
Trafficmaster	John Abbott Commercial Director	Marlborough Court Sunrise Parkway Linfood Wood Milton Keynes Bucks MK14 6DX ENGLAND (44) 908 200 330 P
Trailways	James Jalbert President	PO Box 190 Dover, NH 03820 (603) 749-2301 P (603) 749-6821 F
Trimble Navigation	Jim Maresca Program Manager, Transit Systems	Building No. 3 PO Box 3642 Sunnyvale, CA 94088-3642 (408) 481-2264 P (408) 991-7717 F
UPS	Kevin Sondrup	340 MacArthur Boulevard Mahwah, NJ 07431
USAir	Robert Hazel Assistant Vice President, Properties	2345 Crystal Drive Arlington, VA 22227 (703) 418-5984 P (703) 418-5979 F
Wayfinder's Telemap	Charles Savage President	747 Chestnut Ridge Road Chestnut Ridge, NY 10977 (914) 356-7200 P (914) 356-7291 F
Zexel's Navmate	Hidekazu "Al" Oshizawa Project Manager	265 Santa Ana Court Sunnyvale, CA 94086 (408) 738-4250 P (408) 738-4302 F

Appendix B

Existing TIS Systems Survey Questionaire

Traveler Information Services
Project #8 Overview

The Traveler Information Services (TIS) project is designed to make traffic and transit data available corridor-wide in vehicles, at home, at the workplace, at public kiosks, at stations and intermodal transfer points that will improve the efficiency, safety and comfort of travel. The range of information may include transportation conditions and advisories, alternative routes and modes, route guidance, parking, weather, emergency services, trip planning, ridematching, lodging, restaurants, special events, tourist attractions and various other types of traveler services.

Project Objective

The objective of this project is to provide transportation users in the Northeast Corridor with pre-trip and en-route information that will enable then to efficiently utilize the transportation system. To achieve this objective requires data acquisition from all sources along the corridor; aggregation, fusion, and processing of the data into a usable format and dissemination to the public. The dissemination of traveler information is likely to involve traditional VMS/HAR output devices as well as public kiosks, telephone touch tone menus, in-vehicle monitors/radios, faxes, pagers, cable or regular TV, hand-helds, lap tops, computer bulletin boards, e-mail, the Internet, the media, and many more creative technologies. A final objective of this project is to determine appropriate public and private sector roles in TIS systems.

Surveillance Requirements/Technology (SR/T)
Project #3 Overview

Corridor-Wide advanced traffic management and traveler information begins with the collection and interpretation of traffic surveillance information. Without reliable, credible, and real-time traffic surveillance there will be no way to provide accurate traveler information or to draw valid conclusions on which to make correct traffic management decisions. The Surveillance Requirements/Technology project is aimed at providing this foundation. While the development of cost-effective area-wide traffic surveillance technologies and applications is one of the foremost goals of the national IVHS program, perhaps the sternest test will be the development and deployment of a system in the I-95 Corridor, given the many jurisdictions and vast volumes of traffic which will be involved.

Project Objective

The objective of this project is to develop and plan for implementation of a Corridor-Wide traffic surveillance system which will incorporate state-of-the-art technologies in a series of cost-effective applications valid for the next two decades. The system should provide a platform through which advanced surveillance technologies can be developed, tested, and deployed, and upon which private sector initiatives can be integrated with government-operated systems. This project will fully utilize ongoing surveillance technology evaluations being conducted by FHWA and Individual Coalition members.

Traveler Information Services (TIS), Project #8
I-95 Corridor Coalition

Questionnaire
for
Existing Systems Inventory

NOTE: In the interest of saving you time, if you have recently been surveyed on ATIS or you have documentation that answers similar previously asked questions, you may choose not to fill out the survey, but rather submit copies of relevant documentation.

CONTACT PERSON

Name: _____ Title: _____

Address: _____

Telephone/Fax: _____

If you disseminate traveler information only via HAR, VMS, or by Telephone check the boxes below and stop here. You are finished with this Section. Go to the Goals Questionnaire. ☐ VMS only ☐ HAR only ☐ Telephone; specify #(s):_____

Traveler Information User Services	Service Exists Today or In Future	Name of System Providing Service	Geographical Scope of User Service (e.g. Rt 97 or city of Greenbelt)	PreTrip, EnRoute or Both (P, E or B)	Output Device (enter code)	TIS Users (enter code)	Communication Link Type from System to User (enter code)	Frequency of Update (Seconds, Minutes, Hours, Days, etc.)	Accuracy & Performance (High, Medium, or Low)	Cost to Maintain (High, Medium, or Low)
Example -- Function A	*Today*	*MAGIC*	*Greenbelt*	*P*	*9*	*3*	*4*	*1/minute*	*High, Low*	*High*
Road and Traffic Information										
Real-Time Incident/Congestion Summaries										
Construction Summaries										
Real-time Link Status (speeds, volumes)										
Traveler Advisories (e.g. variable speed limits, dangerous road conditions)										
Alternate Routes										
Parking Locations										
Parking Availability (Real-Time)										
Road Weather Conditions (temp., precip., rain, snow, ice)										
Road Specific Environmental Conditions (carbon monoxide, nitrous oxide, particulates)										
Trip Plans given Origin and Destination										
Route Guidance										
Others, please specify										

Traveler Information User Services	Service Exists Today or In Future	Name of System Providing Service	Geographical Scope of User Service (e.g. Rt 97 or city of Greenbelt)	PreTrip, EnRoute or Both (P, E or B)	Output Device (enter code)	TIS Users (enter code)	Communication Link Type from System to User (enter code)	Frequency of Update (Seconds, Minutes, Hours, Days, etc.)	Accuracy & Perform-ance (High, Medium, or Low)	Cost to Maintain (High, Medium, or Low)
Transit and Modal Information										
Static Data (Schedule/Route/Fare) - Bus										
- Air										
- Train										
- Subway										
- Ship										
Real-Time Status Data (e.g. location) - Bus										
- Air										
- Train										
- Subway										
- Ship										
ParaTransit Services (e.g. car/vanpooling, ridesharing, taxis, subscription buses)										
Ride-Matching Services										
Trip Plans (specify modes, and how user can tailor, e.g. least costly, quickest, etc.)										
Others, please specify										
Traveler Services Information										
Lodging Information (locations, reservations)										
Food/Dining and Gas Information (locations, reservations, hours of operation)										
Parking Information (locations and availability)										
Special Events/Attractions (concerts, tourist attractions, sporting and cultural events)										
Safety Information (hospitals, emergency telephone, repair shops and police locations)										
Regional Weather Conditions (temp., precip., rain, snow, ice)										
Regional Environmental Conditions (carbon monoxide, nitrous oxide, particulates)										
Others, please specify										

Additional Questions

1. Are Commercial Traffic Reporting Companies (e.g. Metro or Shadow Traffic) used? ☐ yes ☐ no
   If so, are they a data recipient or data provider or your TIS data? (check all that apply)
   Name of Commercial TIS(s) Used: _____ ☐ Recipient ☐ Provider

2. For computer or TV access to TIS related data, is access to image provided? ☐ yes ☐ no
   If no, are there plans to provide this service? ☐ yes ☐ no When? _____
   If yes, is image data continuous or snapshot? ☐ continuous ☐ snapshot

3. Is the traveler information that is "pushed-out" (e.g. in-vehicle incident summaries) disseminated continuously, event-based or on a fixed scheduled? This does not apply to traveler information that is accessed by user requests (e.g. telephone, or bulletin board). (check all that apply) ☐ Continuous ☐ Event-based ☐ On a Fixed Schedule

4. Are commercial databases used (relational or otherwise)? ☐ yes ☐ no If yes, which one? _____

5. Are Geographical Information Systems (GIS) used? ☐ yes ☐ no If yes, which one? _____

6. Are digital maps used? ☐ yes ☐ no If yes, which one? _____

7. What Operating System is used the most? ☐ Unix ☐ DOS ☐ O/S 2 ☐ DEC VMS ☐ Other:_____

8. What hardware, software or communication standards are used? Please Explain. _____

9. How is the geographical/spatial data referenced to the earth's surface? (check all that apply) ☐ By link ☐ By x,y
   If by link, how fine are the links or close are the nodes? _____

10. Do any TIS services provided by your agency generate revenue? ☐ yes ☐ no If yes, please explain. _____

11. Have any special Institutional arrangements been made with your agency? ☐ yes ☐ no If yes, please explain. _____

12. What types of Institutional issues cause your agency the greatest concern and for what reasons? Please explain. _____

13. Has your jurisdiction recently developed an IVHS Strategic or Master Plan? ☐ yes ☐ no If yes, please supply documents.

That completes the TIS Existing Systems survey. The Goals Survey is next. Thank you for your time.

Table 1 - TIS Output Devices (use all that apply)

TIS Output Device	Code ID
Variable Message Sign (VMS)	1
Highway Advisory Radio (HAR)	2
CB/Amateur Radio	3
In-Vehicle Monitors/Displays	4
Faxes	5
Pagers	6
Public Kiosks	7
Cable or Regular TV using Images	8
Cable or Regular TV using Teletext	9
Interfaces to Public Radio Stations	10
Hand-Held Devices or Lap Top Computers	11
Telephone access using Phone Menus (Press 1 to hear traffic, ...)	12
Dial-In Computer Bulletin Boards (e.g. Prodigy, America Online)	13
Internet Accessed Information (e.g. Mosaic)	14
Commercial Traffic Reporting Agencies (Metro or Shadow Traffic)	15
Others, please specify	16

NOTE: For Table 3, Devices 1-13, please specify details (e.g. product vendor, product name).

Table 2 - User Classes

User Class	Code ID
Public Agencies	1
Employers	2
Commercial Vehicles	3
Intermodal Operators	4
Private Companies (Resellers)	5
Intercity Commuters	6
Travelers/Tourists	7
Police & Emergency	8
Others, please specify	9

Table 3 - Communication Link Type

Communication Link Type	Code ID
Wired Communication Links	
Synchronous Optical Network Standard (SONET)	1
Fiber Optic	2
Leased Telephone Line	3
Public Telephone Line	4
Dial-In Modem	5
Internet	6
Other	7
Wireless Communication Links	
Cellular Digitized Packet Data (CDPD)	8
Radio Data System (RDS)	9
FM Subcarrier	10
Microwave	11
Others, please specify	12

Questions on Public/Private Partnerships

This questionnaire is designed to gain your perspectives on using public/private partnerships and privatization to provide or fund traveler information services.

1. What are your definitions of public/private partnerships that might be suitable for providing traveler information services?

2. What do you or would you expect from public/private partnerships that provide traveler information services? For example, sharing of cost, profit, risk; liability; technology transfer; ownership of assets. Anything else?

3. How willing is your agency to see portions of traveler information functions privatized? Please explain why or why not.

4. Does your agency have any existing public/private partnerships providing traveler information services? Please describe.

5. Is your agency planning any public/private partnerships to provide traveler information services? Please describe.

Appendix C - Public Agency Survey Results

Agency	Traveler Info User Services	T/F	Service Name	Area Coverage	P/E/B	Output Dev Code	User Class	Comm Type	Rate	Satisfaction	Cost
Conn DOT											
	R/T Incident/Cong Summ	E				12					
	Construction Summ	E				12					
DC DPW											
	Road and Traffic Info										
	R/T Incident/Cong Summ	E				10,12					
	Construction Summ	F				2,10, 12					
	Road Weather Conditions	E				10, 12					
Del DOT											
	Road and Traffic Info										
	Construction Summ	T		195,295,495	E	1,2	3,6, 7		As needed	H	H
	Alternate Routes	T		Along coastal	E	1,2	3,6, 7		As needed	H	H
DRBA											
		T				3					
DRPA	none										
Maine DOT											
	Road and Traffic Info										
	Construction Summ	T		Statewide	B	1,16,5 ,12	1,4, 6,8	4	Week / Month	M	L
	Traveler Advisories	T			B	1,5,16	1,4, 6,8	4	As needed	H	M

	Alternate Routes	T			B	1,5,16	1,4, 6,8	4	As needed	H	M
	Road Weather Conditions	T		Statewide	B	16,12		4	1/hour	H	M
Maine TA											
	Road and Traffic Info										
	Construction Summ	T		Corridor	B	12	3,6, 7	4	1/week	H	L
	Traveler Advisories	T	VMS	Along Pike	E	1	3,7	Manu al	1/day	H	M
	Road Weather Conditions	T		Along Pike	B	12	3,7, 6	4	As needed	H	L
	R/T Incident/Cong Summ	E				12					
	Traveler Services Info										
	Parking Info	T		Along Pike	B	16	6			H	L
	Regional Weather Conditions	T		Regional	B	12	3,7, 6,5	4	3/day	H	L
MD SHA											
	Road and Traffic Info										
	R/T Incident/Cong Summ	E				1,2, 7, 12					
	Construction Summ	E				1,2, 7, 12					
	Road Weather Conditions	E				1,2, 7, 12					
MD TA											
	Road and Traffic Info										
	Construction Summ	T		Facility	B	7,10	1,6, 7	7	1/week	H	L
	Construction Summ	F				7					

	Traveler Advisories	T		Facility	E	1,2,7, 10	1,6, 7		1/hour	H	M
	Road Weather Conditions	T		Facility	E	1,2,7, 10	1,3, 5,7		1/hour	H	M
	Route Guidance	T		All US	B	7	3,6, 7			H	L
	Route Guidance	F				7					
	Traveler Services Info										
	Lodging Info	T		All US	B	7	3,6, 7			H	L
	Lodging Info	F				7					
	Food/Dining and Gas Info	T		All US	B	7	3,6, 7			H	L
	Food/Dining and Gas Info	F				7					
	Parking Info	T		All US	B	7	3,6, 7			H	L
	Special Events	T		All US	B	7	3,6, 7			H	L
	Safety Info	T		All US	B	7	3,6, 7			H	L
	Regional Weather Conditions	T		All US	B	7	3,6, 7			H	L
	Regional Env. Conditions	T		All US	B	7	3,6, 7			H	L

Mont TMC											
	Road and Traffic Info										
	R/T Incident/Cong Summ	T		I-270	B	2,5,8,9,10,15	1,6,7,8				
	R/T Incident/Cong Summ	F		I-270		13,14,12					
	Construction Summ	T		I-270	B	2,5,8,9,10,15					
	Road Weather Conditions	F		I-270		13,14,12					
	Road Weather Conditions	T		I-270	B	2,5,8,9,10,15	1,6,7,8				
	Transit and Modal Info										
	R/T Status Data-Bus	T		Rockville	B	8	4,6				
NH DOT											
	Road and Traffic Info										
	R/T Incident/Cong Summ	E				12					
	Construction Summ	E				12					
	Road Weather Conditions	E				12					
NJ DOT											
	Road and Traffic Info										
	R/T Incident/Cong Summ	E				12					
	Construction Summ	E				12					

	Road Weather Conditions	E				12					
NJ Transit											
	Transit and Modal Info										
	Static Data-Bus	T	NJT	NJ State	B	12	6,7	4		H	H
	Static Data-Train	T	NJT	NJ State	B	12	6,7	4		H	H
	Static Data-Subway	T	NJT	NJ State	B	12	6,7	4		H	H
	R/T Status Data-Bus	F	NJT	NJ State	B	12,1,7,14	6,7	4,8,1	Seconds	H	M
	R/T Status Data-Train	F	NJT	NJ State	B	12,1,7,14	6,7	4,8,1	Seconds	H	M
	R/T Status Data-Subway	F	NJT	NJ State	B	12,1,7	6,7	4,8,1	Seconds	H	M
	Trip Plans	F	NJT	NJ State	B	12,7,14	6,7	4,1	Seconds	H	M
	Traveler Services Info										
	Parking Info	T/.F	NJT	NJ State	B	12,1,7,14	6,7	4,8	Seconds	H	M
NJHA											
	Road and Traffic Info										
	R/T Incident/Cong Summ	T		GSP	B	1,12	7	4	1/hour	M	L
	Construction Summ	T		GSP	P	1,5	1	4	1/week	H	L
	Traveler Services Info										
	Special Events	T		GSP	E	1	6,7			H	M
NJTA											
	Road and Traffic Info										

	Construction Summ, Road Weather, Incidents	T	NJTA	MP 0-122	P	12			1/week	H	M
	Traveler Advisories	T	NJTA	MP 0-122	E	1	9		1/min	H	H
	Alternate Routes	T	NJTA	MP 0-122	E	2	9	4	1/10 min	H	H
	Trip Plans	T	NJTA	MP 0-122	P	12	9	4	As req	H	H
	Route Guidance	T	NJTA	MP 0-122	E	1	9		1/10 min	H	H
NY DOT											
	Road and Traffic Info										
	R/T Incident/Cong Summ	T				1,2:P, 13					
	Construction	T				12					
	R/T Link Stus (VTIP)	T				13					
PA NY&NJ											
	Road and Traffic Info										
	Construction Summ	T	TRANSCOM	NY-NJ-CONN	P	5	1,2, 3,4, 5	3	1/week	H	L
	Traveler Advisories	T	TRANSCOM	NY-NJ-CONN	B	1,2,7, 10	1,2, 3,4, 5	3	10-15 min	M	L
	Transit and Modal Info										
	Static Data-Bus	T	Kiosks								
	Static Data-Train	T	Kiosks								
	Static Data-Subway	T	Kiosks								
	Static Data-Ship	T	Kiosks								
	R/T Status Data-Train	T	Metrovision								
	ParaTransit Services	T	Kiosks		P	7	7			H	L

	Ride-Matching Services	T	Kiosks		P	7	7			H	L
	Traveler Services Info										
	Lodging Info	T	Kiosks		P	7	7			H	L
	Food/Dining and Gas Info	T	Kiosks		P	7	7			H	L
Penn DOT											
	Road and Traffic Info										
	R/T Incident/Cong Summ	T	TIMS	76&676 and I95-CBD	E	1	7,8	3	As needed	H	H
	Construction Summ	T	TIMS	76&676 and I95-CBD	P	5,12	9,Media	4	1/week	H	H
	Traveler Advisories	T	TIMS	I95-CBD	E	1	7,8	3	needed	H	H

	Transit and Modal Info										
	ParaTransit Services	T	DVRPC	county	P	16	2,6	4	needed	H	L
Penn TC											
	Road and Traffic Info										
	R/T Incident/Cong Summ	T		All PTC Tpike	P	5,12	3,6, Media	4	As needed	H	L
	R/T Incident/Cong Summ	F				13					
	Construction Summ	T		All PTC Tpike	P	1,2,5, 12,15, Press	1,5, 8	2:8 5,15: 4 1:coax	As needed	H	L
	Road Weather Conditions	T	800-692-7299	All PTC Tpike	B	12	3,6, 7,8	12	1/4 hour	H	L
	Road Weather Condition	F	Service Plaza,LEDs								
	Traveler Services Info										
	Lodging Info	F	Traveler Board	All PTC Tpike	P	Board, 7	3,6, 7		As needed	H	L
	Regional Weather Conditions	T		All PTC Tpike	B	12	3,6, 7,8	12	1/4 hour	H	L
Phil Int Air											
	Road and Traffic Info										
	R/T Incident/Cong Summ	T	HAR			2			As needed		

	Construction Summ	T	HAR			2			As needed		
	Parking Locations	T	HAR			2			As needed		
	Parking Availability	T	HAR			2			As needed		
	Road Weather Conditions	T	HAR			2					
	Transit and Modal Info										
	Static Data-Bus	T/F	LED		P	16	1	5			
	Static Data-Air	T									
	Static Data-Train	T	LED								
	R/T Status Data-Air	T									
	R/T Status Data-Train	F									
	Traveler Services Info										
	Lodging Info	T				7	7				
RI DOT											
	Road and Traffic Info										
	R/T Incident/Cong Summ	T	Pub Info	Area	B	5,6,10,12,15	1 to 9	2	1/day	M	M
	R/T Incident/Cong Summ	F				13					
	Construction Summ	T	Pub Info	Area	B	5,6, 10,12, 15	1 to 9	2	1/day	M	M
	Construction Summ	F				13					

	R/T Link Status	T	Pub Info	Area	B	5,6,10,12,15	1 to 9	2	1/day	M	M
	Traveler Advisories	T	Pub Info	Area	B	5,6,10,12,15	1 to 9	2	1/day	M	M
	Traveler Advisories	F				13					
	Alternate Routes	T	Pub Info	Area	B	5,6,10,12,15	1 to 9	2	1/day	M	M
	Alternate Routes	F				13					
	Parking Locations	T	Pub Info	Area	B	5,6,10,12,15	1 to 9	2	1/day	M	M
	Transit and Modal Info										
	Static Data-Bus	T			P	12	7	4		L	L
	Static Data-Train	T			P	12	7	4		L	L
	Traveler Services Info										
	Special Events	T			B	10,12,15	1 to 9	4	Days	M	M
SEPTA											
	Transit and Modal Info										
	Static Data-Bus	T	SEPTA	5 County	P	12	6,7	4	3/year	H	H
	Static Data-Train	T	SEPTA	5 County	P	12,14	6,7	4,6	2/year	H	H
	Static Data-Subway	T	SEPTA	5 County	P	12	6,7	4	3/year	H	H

	R/T Status Data-Bus	F		5 County							
	R/T Status Data-Train	F		5 County							
	R/T Status Data-Subway	F		5 County							
	Trip Plans	T	SEPTA	5 County	P		6,7	4		H	H
SmartRoute											
	Road and Traffic Info										
	R/T Incident/Cong Summ	T	SmarTraveler	Eastern MA	B	6,7,8, 10,12	1,3, 5,7	4		H	M
	Construction Summ	T	SmarTraveler	Eastern MA	B	6,7,8, 10,12	1,3, 5,7			H	L
	R/T Link Status	T	SmarTraveler	Eastern MA	B	6,7,8, 10,12	1,3, 5,7			H	M
	Traveler Advisories	T	SmarTraveler	Eastern MA	B	6,7,8, 10,12	1,3, 5,7			H	M
	Alternate Routes	T	SmarTraveler	Eastern MA	B	6,7,8, 10,12	1,3, 5,7			H	L
	Road Weather Conditions	T	SmarTraveler	Eastern MA	B	6,7,8, 10,12	1,3, 5,7			H	L
	Transit and Modal Info										
	Static Data-Bus	F	SmarTraveler								
	Static Data-Air	F	SmarTraveler								
	Static Data-Train	F	SmarTraveler								
	Static Data-Subway	F	SmarTraveler								
	Static Data-Ship	T	SmarTraveler	Eastern MA	P	5,12,8	7	3,4,5, 11	Min	M	M
	R/T Status Data-Bus	T	SmarTraveler	Eastern MA	P	5,12,8	7	3,4,5, 11	Min	M	M
	R/T Status Data-Air	F	SmarTraveler								

	R/T Status Data-Train	T	SmarTraveler	Eastern MA	P	5,12,8	7	3,4,5,11	Min	M	M
	R/T Status Data-Subway	T	SmarTraveler	Eastern MA	P	5,12,8	7	3,4,5,11	Min	M	M
	R/T Status Data-Ship	T	SmarTraveler	Eastern MA	P	5,12,8	7	3,4,5,11	Min	M	M
	Traveler Services Info										
	Special Events	T	SmarTraveler	Eastern MA	P	5,12,8	7	3,4,5,11	Days	H	L
TBTA	none										
VA Dept of Tourism											
	Road and Traffic Info										
	Construction Summ	T				13					
	Traveler Advisories	T				13					
	Travel Services Info										
	Lodging Info	T				13					
	Food/Dining and Gas Info	T				13					
VDOT											
	Road and Traffic Info										
	Construction Summ	T		Statewide	P	12, 16-Press	1 to 9		1/week	L	L
Vermont											
	Road and Traffic Info										
	Road Weather Conditions	E				12					

Agency	Traffic Report Co.(Rec/Pro)	Access TIS image	Dissemination Freq	Database	GIS	Dig. Maps	O/S	Ref by link/x,y	Gen. revenue	Inst. Arr.	Travel Info Hotline
Amtrak											1-800-USA-RAIL
DC DPW											301-718-4949 or 202-244-9594
Del DOT		No	Event-based	No	No	No			No	No	
Del R&B Auth	Yes/Rec	No	Event-based	No	No	No			No		
DRPA	Yes/Rec	No	Event-based	Yes	No	No	DOS		Yes	No	
Maine DOT											207/287-2171 or 207/287-3427
Maine TA	No	No	Event-based	No	No	No	DOS		No	Yes	1-800-675-PIKE
MD SHA											410/333-1215 or 800/543-2515 or 800/327-3125 or 410/575-6540

Md TA	Yes(Rec)	No	Event-based	No							
Mont TMC	Yes(Rec)	Yes	Continuous	Yes	Yes	No	Unix	x,y	No	Yes	
NH DOT	No	No		No	No	No	VMS		No	No	603-271-6900
NJ Transit	Yes(Rec)	No	Event-based	Yes	Yes	Yes	VMS	link	No	No	
NJHA	No			No	No	No			No		
NJTA	Yes(Rec)	No		No	Yes	Yes	VMS		No	No	1-800-33-NJTPK or 908-PARKWAY
NY DOT											516/952-2044 or 800-ROADWORK
PA NY&NJ	Yes(Rec)	No	Event-based	No	No	No			Yes		
Penn DOT	Yes(Rec)	No	Event-based	No	No	No	DOS	Link	No	Yes	
Penn TC	Yes(Rec)	No	Event-based	No	Yes	No	IBM mainframe		Yes	Yes	717-939-9551
RI DOT	No	No	Event-based	No	No	No			No	No	401-277-2468 or 401-738-1211
SEPTA	Yes(Rec)	No		No	No	No			No		215-580-7800

SmartRoute	No	Yes	Continuous	Yes	No	Yes	Unix,DOS	x,y	Yes	Yes		617-374-1234		
TBTA	Yes(Rec)	No	Event-based						No					
Vermont DOT												800/ICY-ROAD		
VDOT	Yes(Rec)	Yes				Yes			No	No		1-800-367-ROAD		

Appendix D

Private Sector Questionnaire

Loral Aerosys
I-95 Corridor Coalition
Transportation Information Services
Public Private Partnership Questionnaire

October 31, 1994

Our primary purpose in this questionnaire is to establish the potential for public/private partnerships in the development, implementation and/or operation of new technoIogy TIS systems. To begin, let me list some Transportation Information Services to establish what they are.

- pre-trip telephone service;
- pre-trip radio/TV information;
- enroute electronic signage;
- in vehicle computer mapping system;
- in vehicle highway advisory radio system;
- in vehicle telephone;
- in vehicle fax;
- dedicated cable TV channels ;
- interactive kiosks;
- in vehicle Global Positioning System devices;
- hand held computers.
- CB radio
- on-line computer services
- dial in computer services

II. Current Situation:

2. Do you think any of these services are effective? Which ones?

3. Do you believe that personal and/or commercial travel could be improved through the use of these services along the I-95 Corridor? If so, which ones?

4. Does your company currently have any role in the TIS business?

A. IF YES:

- What type of service or product?
- In what geographical location?
- Is your company a user of this **service?**
- What specific information do you use?
- Is your company a technical systems developer?
- Do you provide TIS to others? If so, what information do you provide?
- Is your company a reseller of these services?
- Do you buy or sell advertisements on these services?
- Would you be willing to provide information and documentation about your products?

(CONTINUE TO QUESTION 5)

B. IF NO:

Are you considering any of these services for the future?

IF YES,
Which ones?

IF NOT,
What are the impediments to your interest?

(CONTINUE TO QUESTION 12)

5. Is your experience with TIS satisfactory technically[3]

6, Who are your users?

7. Do you charge for the service, or is it provided as an incentive for other services?

IF THEY CHARGE: (IF NOT, SKIP TO QUESTION 11)

8. How do you currently charge?

9. Is your experience with TIS satisfactory financially?

10. Do your customers resell the service?

11. Do you use a surveillance system? If so, what kind?

cellular call in;

cameras;

aerial;

911;

human observers;

other.

A. IF YES,

11.1 Are you satisfied with the surveillance system?

11.2 Would you be willing to share or sell raw surveillance data with the agencies along the corridor?

III. Future Projections:

12 Are you planning to expand your current services?

A. IF YES:

· geographically?

- into other technologies?
- into other markets?
- packaged with other services?
- would you consider including advertising?
- what information would you like to add to your services?

B. IF NO:

why not?

- technically difficult?
- financially unrewarding?
- regulatory impediments?
- haven't considered the possibility?
- other?

V. Interest in Partnering with the Public Sector:

13 Does your company have a product which might improve Transportation Information Services on I-95?

14: Who in your company is responsible for this product development?

15. Would you consider partnering with public sector? What are the major pros and cons?

A. IF YES, (IF NO CONTINUE **TO 18)**

16. With whom?

17. On what projects?

18. Do you have any experience with partnering?

B. IF YES, (IF NOT CONTINUE TO 21)

19. What has your experience been?

- positive points:
- negative points:

20. What is your company's role in the partnership?

IF NO, AND CONTINUATION FOR YES GROUP

2 1 Which of the following factors would improve public/private partnership possibilities? If several, please rank them.

- A clear role for each sector;
- A clearer definition of the market;
- Technological improvements;
  - in data collection
  - data processing
  - communications systems and information dissemination
- Better technical compatibility among systems;
- Streamlining decision-making;
- Better return on investment;
- Other.

IF NOT INTERESTED IN FUTURE TIS DEVELOPMENT, TERMINATE HERE WITH THANKS.

22. Is part of your business strategy to develop TIS products?

- for profit
- for your employees
- for marketing purposes; e.g. to enhance other existing products
- for public benefit
- a combination of the above

23. Are you interested in the efforts of the I-95 Coalition to further develop possibilities in this area.

22. Would you support standardization of technical specifications for TIS along the I-95 Corridor?

23. Would you wish to participate in this effort?

24 Is there a particular product or application the Coalition could help you develop?

IF' YES, (IF NO, CONTINUE TO QUESTION 26)

25. Is this product intended for:

- the consumer market
- your own employees
- commercial users
- wholesalers
- advertisers

26. Have you conducted any market research into TIS services? Would you be willing to share its general results with the Coaiition?

27. Have you considered products or services which would provide information on how to use mass transit, Amtrak, airport transportation, or how to switch from one mode to another?

27A. Have you considered products or services which would provide information to fleet operations for freight transportation?

IF YES, (IF NO, CONTINUE TO QUESTION 30)

28. Have you assessed the size of the market for this product?

29. Have you prepared a product development budget and return on investment projection?

30. Is your company affected by the Clean Air Act?

IF YES, (IF NO, CONTINUE TO QUESTION 32)

31. Are you under any pressure to encourage

- ride sharing,
- van pooling
- transit use?

32 Would your company be interested in participating in a multi-year research and development process for TIS on the I-95 Corridor? IF YES, Is there anyone other than yourself we follow up with?

Name:
Address:

Phone:
Fax:

33. As a personal matter, which TIS services would you use to plan travel throughout the corridor?

- airport access information
- airline arrival and departures
- highway traffic information
- construction locations
- routing instructions

- transit information
- rail information
- tourist information
- other

Thank you for taking the time to answer our questions. Would you like to receive a copy of results when they are available? Please check the address on this cover letter to make sure it accurate.

END

Appendix E

Corridor TIS Projects

This appendix includes two tables. Table E-1 provides a list ofATIS projects within the I-95 Corridor. This material is a summary of information contained in the IVHS Projects in the I-95 Corridor report, dated June 27, 1995. Table E-2 provides a list of ATIS projects in the U.S., but outside of the Corridor.

Table E-I. Current TIS and Related Projects in the I-95 Corridor

Project	Agency	Description
MTA Smart Bus	Baltimore Mass Transit Administrations, FTA	Ref. 1, Page 1.
HAR Operational Test	Connecticut DOT	Ref. 1, Page 2
Hartford VMS	Connecticut DOT	Ref. 1, Page 2
I-84 VMS	Connecticut DOT	Ref. 1, Page 3
I-91, I-95 and Parkway VMS	Connecticut DOT	Ref. 1, Page 3
In-vehicle Traveler Assistance	Connecticut DOT	Ref. 1, Page 4
Rideworks Vans Traffic Reporting (Fairfield County and New Haven)	Connecticut DOT	Ref. 1, Page 5
VMS	Connecticut DOT	Ref. 1, Page 8
Variable Message Sign System	Delaware DOT, Delaware Turnpike	Ref. 1, Page 10
Highway Advisory Radio	Delaware Turnpike	Ref. 1, Page 12
Dulles Area Traveler Information System (DATIS)	Dulles Area Transportation Association	Ref. 1, Page 13 Final design report was prepared and proposed for an operational test. Funding was not available.
Coordinated VMS/HAR Strategy	I-95 Corridor Coalition	Ref. 1, Page 15
Traveler Information System	I-95 Corridor Coalition	Ref. 1, Page 17
Variable Message Sign Study	Maine Turnpike Authority	Ref. 1, Page 18
Travelers Advisory Radio	Maryland State Highway Administration	Ref. 1, Page 22-23
Variable Message Signs	Maryland State Highway Administration	Ref. 1, Page 24-25
Boston SmartTraveler & Evaluation	Massachusetts Highway Department	Ref. 1, Page 28
Electronic Visitor Information System	Massachusetts Turnpike Authority	Ref. 1, Page 29

Table E-1. Current TIS and Related Projects In the I-95 Corridor

Project	Agency	Description
Lincoln-Franconia Highway Advisory Radio	New Hampshire Department of Resources and Economic Development	Ref. 1, Page 31
Lincoln-Franconia IM-93-3	New Hampshire DOT	Ref. 1, Page 31
Nashua Highway Advisory Radio Stations	New Hampshire DOT	Ref. 1, Page 32
I-280 Motorist Information and Incident management System	New Jersey DOT	Ref. 1, Page 34
I-287 HOV Incident Management and Motorist Information System	New Jersey DOT	Ref. 1, Page 34
I-80 HOV Incident Management and Motorist Information System	New Jersey DOT	Ref. 1, Page 35
MAGIC	New Jersey DOT	Ref. 1, Page 35-37
Route 1 Early Action Motorist Information System	New Jersey DOT	Ref. 1, Page 37
New Jersey Regional Traffic Information Center (RTIC)	New Jersey DOT	This project involves the conceptual design of a Regional Traffic Information Center for New Jersey. The purpose of this study is to design an automated facility which will allow the individual IVHS implementations of various public agencies in N.J. to be coordinated. The goal is to provide "seamless boundaries" to the traveler and to maximize coordination between agencies.
Trans-Hudson Motorist Information System	New Jersey DOT	Ref. 1, Page 44
Bridge Crossing Motorist Information System	New Jersey DOT, DE Port Authority, Burlington Co. Bridge Co.	Ref. 1, Page 45
Early Action Traffic Information System (Routes 9, 18, I-78)	New Jersey DOT, New Jersey Highway Authority	Ref. 1, Page 45
Garden State Art Center Variable Message Sign	New Jersey Highway Authority	Ref. 1, Page 53
VMS	New Jersey Highway Authority	Ref. 1, Page 59-61
Highway Advisory Radio	New Jersey Turnpike Authority	Ref. 1, Page 63
Variable Message Signs - Planned	New Jersey Turnpike Authority	Ref. 1, Page 65

Table E-1. Current TIS and Related Projects in the I-95 Corridor

Project	Agency	Description
Existing Facilities	New Jersey Turnpike Authority	At the northern end (ATSCS) between interchange 8A to Route 46 of NJ Turnpike, there are 130 speed limit warning signs. In addition, the system includes a large network of VMSs (100+) and incident warning signs. At the southern portion of the system, similar incident warning and speed limit signs exist, which are controlled via leased phone circuits and/or wireless radio. Has a toll-free Highway Advisory Telephone (HAT) number (1-800-33NJTPK) that provides information of traffic conditions of a number of locations, updated three times a day or whenever needed.
Traveler Information System Test	New York City Metropolitan Transportation Authority	Ref. 1, Page 68
Cross Westchester Expressway HAR	New York State DOT	Ref. 1, Page 69
INFORM	New York State DOT	Ref. 1, Page 71
Project Northstar	New York State DOT	Ref. 1, Page 72 This is an advanced traveler information, advisory, and emergency notification and security service being designed and tested by NYNEX Venture Company in collaboration with other private companies, state and local agencies, and a university. This service has been tested in the New York City metropolitan area with the use of cellular telephony, global positioning system (GPS) technology, and a geographical informational system (GIS). Plans are underway to continue this test for the purpose of evaluating the costs and benefits associated with low-cost FM subcarrier communication technology and a portable digital assistant and speech synthesizer. The trial involves 200 vehicles. Personalized traffic incident alerts will be delivered via the cellular telephone network or other commercial communication technology. Northstar is currently on-hold. Decision has not made whether to go forward with the FOT. No work has even begun outside of what was done in the demonstration project.

Table E-I. Current ***TIS*** and ***Related Projects in the I-95 Corridor***

Project	Agency	Description
INFORM-VTIP (Visual Traffic Information Project)	New York State DOT	VTIP is a natural outgrowth of the INFORM system. This IBM microcomputer-based system attempts to disseminate pre-trip planning information about traffic conditions to people via cable TV, radio, and other service organizations. VTIP can display the real-time speed information with color graphics and automatically transfers information to other locations through modems.
Variable Message Signs	New York State DOT	Ref. 1, Page 74
I-81 Weather Advisory	New York State DOT	I-81 is a heavily traveled highway facility that runs north-south through New York from Pennsylvania to the Canadian border. The section between the cities if Syracuse and Watertown parallels the eastern shore of Lake Ontario and is subject to extreme weather conditions, in particular sudden "lake effect" snow storms. VMSs will be installed at key sites along I-81 to advise motorists of inclement weather conditions and other traffic information. (Expected completion: fall, 1995).
I-81 Special Event Signing	New York State DOT	A VMS is being installed on I-81 in the City of Syracuse in the vicinity of the exit for the On-Center convention facilities. The sign will direct motorists along preferred routes during special events. (Expected completion: summer, 1994).
HAR - Tapan Zee Bridge	New York State Thruway Authority	Ref. 1, Page 76
VMS - Westchester and Rockland	New York State Thruway Authority	Ref. 1, Page 77
Motorist Information Services	Pennsylvania Turnpike Commission	Ref. 1, Page 83
Truckers Bulletin Board	Pennsylvania Turnpike Commission	Ref. 1, Page 83
Airport Public Information Kiosk System	Port Authority and New York & New Jersey	Ref. 1, Page 84
VMS	Port Authority and New York & New Jersey	Ref. 1, Page 87-88, 90, 93
Newark Airport HAR	Port Authority and New York & New Jersey	Ref. 1, Page 90
Advanced Ridesharing and Traveler Information System (ARTIS)	PRTC, NVA Planning Dist, Virginia DOT	Ref. 1, Page 94
Atlantic City Expressway and Rt. 30/40/322 Corridor Motorist Information	South Jersey Transportation Authoritv. New Jersey DOT, NJHA	Ref. 1, Page 96

Table ***E-1. Current TIS and Related Projects in the I-95 Corridor***

Project	Agency	Descrlptlon
TRANSCOM	Inter-agency Coalition	TRANSCOM does not directly own any field equipment. It receives information from and also monitors some equipment owned by the member agencies. It serves as a transportation information clearinghouse; collects information relevant to vehicular and transit travel conditions and disseminate that information among its member agencies. This information again are disseminated through a pager network of over 100 participants., and through member agencies VMS and HAR. Currentlv, it has access to 5 HAR and over 100 VMSs.
Trucker Information Program	TRANSCOM	Ref. 1, Page 101
HAR	TRANSCOM	Ref. 1 Page 99, 101
VMS	TRANSCOM	Ref. 1, Page 100, 102
Hampton Roads Traffic Information Hotline	Virginia DOT	Ref. 1, Page 106
Highway Surveillance Television Broadcast	Virginia DOT	Ref. 1 Page 106
I-64 Traffic Management System	Virginia DOT	Ref. 1 Page 107
I-66, 95, 395 Traffic Management System	Virginia DOT	Ref. 1, Page 107
I-66 Joint Operations Center	Virginia DOT, Fairfax County	Ref. 1, Page 110

E-2. ATIS Projects Outside the I-95 Corridor

Project	Agency	Description
TravInfo	Oakland MTC	This system will compile available and relevant data on current congestion and other conditions on the region's transit and roadway systems, integrate the data into a useful format and disseminate the data and information throughout the Bay Area using a public/private partnership.
Traffic modeling to support ATIS	FHWA, Univ. of TX	A dynamic traffic assignment/simulation model is being developed that takes into account the diversion strategies for in-vehicle ATIS route guidance system.
Houston Smart Commuter	FHWA, FTA, TX DOT, TTI	Real-time traffic and transit information service is being developed. Planning works including market potential studies are currently underway.
FM/SCA prototype for traffic information broadcast	FHWA, MITRE	Design, development, and testing of a prototype system to broadcast traffic information to mobile receivers via Subsidiary Communications Authorizations (SCA) Traffic Information Channel. This system will allow the use of commercial FM broadcast stations' subcarriers to transmit traffic and other data at rates higher than previously achieved. The data rate for this system will be adequate to support broadcast of individual link travel times.
Traffic Management Information and Fleet Operation Coordination	FHWA, Caltrans	This study develops concept and design for a real-time information service provided to travelers. The information will be provided at transfer centers, bus stops, and on transit vehicles. The Anaheim ATMS has been selected as a testbed.
Transit Network Route Decision Aid	FTA, Univ. of Ml	This study develops specifications for designing, implementing, and evaluating a computerized information system to aid telephone operators to rapidly identify useful itineraries for passengers in a mass transit system.
Bellevue Smart Traveler	FTA, WA DOT, Bellevue TMA, City of Bellevue, Univ. of WA	This project aims at making ridesharing more attractive by using mobile communications in an effort to increase usage of HOV facilities. A prototype interactive computer information center is being tested. The center will provide transit information and rideshare matching.
California Smart Traveler	FTA, Caltrans	An audiotext/videotext-based ATIS in suburban areas will be tested. The system will allow residential and business owners to connect to remote computer systems to exchange timely transportation information. This study aims at using high technology to transit, paratransit, and ridesharing.
DIRECT	FHWA, Ml DOT, Others	The scope of this effort includes deployment and evaluation of several low-cost methods to communicate advisory information to motorists. A TMC will collect traffic data and disseminate the information to travelers.
Global Positioning System (GPS)	RSPA, Volpe	Developing a matrix that will display intermodal GPS requirements for vehicle position location.

E-2. ATIS Projects Outside the I-95 Corridor

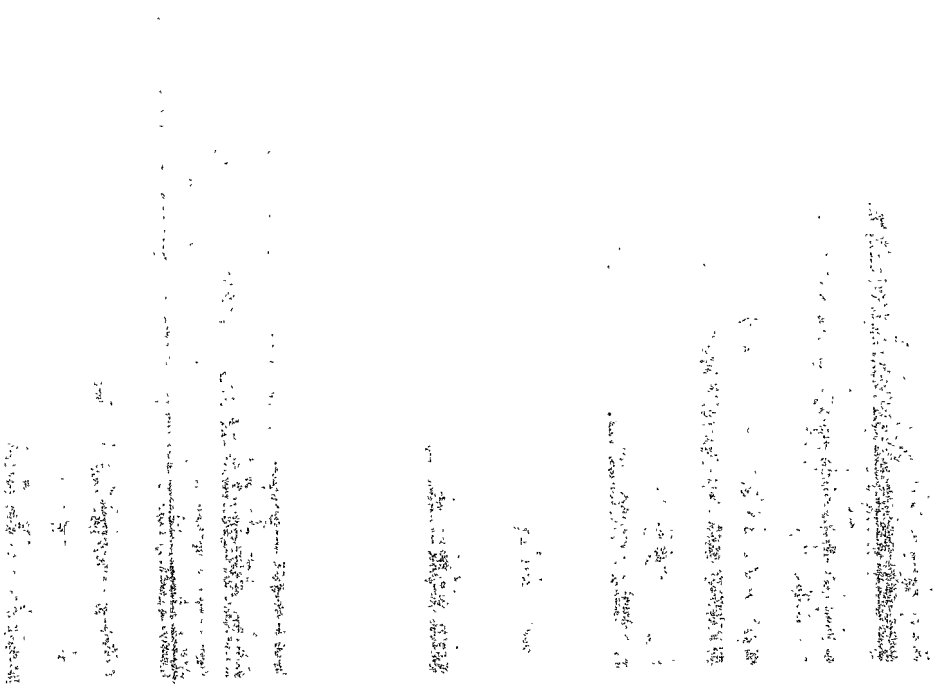
Project	Agency	Description
ADVANCE	Chicago	This evaluates performance of a large-scale route guidance system. Vehicles equipped with navigation and route-guidance systems will serve as probes, providing travel time data to a TMC. This information will be disseminated to equipped vehicles for use in developing a preferred route.
FAST-TRAC	Oakland County, MI	This includes both ATMS and ATIS. Vehicles will be equipped with the Siemens Ali-Scout Route Guidance System. Real-time traffic data will be exchanged through infrared beacons installed at critical intersections. Early results indicate increased efficiency and safety.
Pathfinder	Los Angeles	A traffic control center provides up-to-date traffic information to drivers of 25 equipped cars. The information is presented to the driver in the form of an electronic map on a screen or digital voice.
TravTek	FHWA, Florida DOT, City of Orlando, GM, AAA	A TMC receives traffic congestion information from various sources and disseminates information to 100 specially equipped test vehicles via digital data radio broadcasts. The in-vehicle equipment can provide route guidance, yellow page information, and tourist information.
Detroit Transportation Center Transit Information	FHWA, FTA, Detroit DOT	MI DOT's Detroit Freeway Operation Center collects traffic information from sensors. The real-time traffic data will be provided to the dispatch centers of public transit agencies,
Rural Application of ATIS	FHWA, JHK	This project identifies the needs and functional requirements for ATIS services in rural and suburban areas. It examines a broad range of rural environments, categories of travelers, ATIS applications, and communication technologies. One or two ATIS prototypes will be developed and tested. Findings of the study indicate that the information needs during the phase of a trip when faced with a problem, and during the pre-trip planning phase are the most important.
Human Factors in ATIS and CVO Design Evolution	FHWA, Battelle	This R&D project addresses the impact of driver interfaces, information type, behavioral factors, etc., on the development of different information subsystems. The product of this research will be human factors design guidelines for in-vehicle ATIS and CVO.
Bus Transit Travel Time Information System Test	CO DOT, Others	This evaluates the impact of real-time travel information presented through video-display terminals and other means at key locations, including Denver International Airport.

E-2. ATIS Projects Outside the I-95 Corridor

Project	Agency	Description
Travlink - Minnesota Guidestar	MN DOT, US West, Others	This evaluates real-time transit schedule and traffic information provided through a combination of kiosks and audiotexts/videotexts at home, at work, while shopping, and in transit stations. Eighty Metropolitan Transit Commission buses will be equipped with automatic vehicle location (AVL) units. Transit operators receive data from AVL devices and use it to improve the efficiency of fleet operations. Concept definition and preliminary design has been completed as of April, 1994.
Genesis - Minnesota Guidestar	MN DOT, BRW, Battelle, JHK, Loral, SAIC	It evaluates an advanced portable digital personal communications device to provide comprehensive real-time travel data. Initially, three types of personal communications devices (PCDs) are being evaluated: an alphanumeric pager, a notebook computer and a personal digital assistant. Detailed system design has been completed as of March 1994..
San Francisco Bay Area Intermodal Traveler Information System Test, 'TIS'	Bay Area *Ad Hoc* IVHS Committee	This project evaluates a comprehensive, multi-modal, region-wide ATIS collecting, integrating, and disseminating transportation information.
Traffic Reporter	Univ. of WA	It is a real-time, PC-based ATIS. Real-time freeway traffic data at the TMC is fed into a Traffic Reporter. It computes speeds and travel times from the traffic information. This information then can be retrieved by any PC connected with a modem, and running Windows.
International Traveler Information Interchange Standard (ITIS)	ENTERPRISE (FHWA, Several state DOTs, and Canadian agencies)	Developing generic, non-proprietary protocols for traveler information dissemination and exchange of ATIS applications.
TRiMS	City of Menlo Park, ETAK, RIDES, MTC	The design incorporates a geographically organized database and software that can be accessed by users thorough PCs to assist in trip planning. The information includes: transit routes, schedules, fares, ride-matching information, and other useful information.
Traffic Info Center, Tampa Bay	Florida DOT, University of South Florida	The Traffic Information Center will access information from the various traffic control centers and probe vehicles, and disseminating to public via Cable TV, Metro Traffic Control, radio and TV stations, Bay Area Commuter Services, GTE MobileNet, VMS and HAR. An early deployment study for the same has been completed. Implementation has not started yet.

E-2. ATIS Projects Outside the I-95 Corridor

Project	Agency	Description
ATHENA	City of Ontario, CA	ATHENA, an Advanced Traveler Information System, uses concepts from both the French MINITEL on-line information system and the German FOCCS "smart bus" system to improve the mobility, accessibility and quality of life of residents of urban, suburban and rural communities, at a low-cost to taxpayers. A major feature of ATHENA is the use of the local and regional telephone network to provide low-cost, door-to-door transportation services in lowdensitv areas. The Citv of Ontario will start testing ATHENA-in 1995.



Appendix F

TIS Goals Questionaire

Traveler Information Services (TIS), Project #8
I-95 Corridor Coalition

Questionnaire for I-95 Corridor TIS Goals

NOTE: In the interest of saving you time, if you have recently been surveyed on ATIS or you have documentation that answers similar previously asked questions, you may choose not to fill out the survey, but rather submit copies of relevant documentation.

CONTACT PERSON

Name: _____ Title: _____

Address: _____

Telephone/Fax: _____

Please complete the cells in the matrix below. For each cell, identify the level of priority your agency would associate with providing that capability in the future or continuing to provide that capability if it exists today.

Traveler Information User Services	Priority		
	Low	Medium	High
Example - Function A	☐	☐	☐
Road and Traffic Information	☐	☐	☐
Real-Time Incident/Congestion Summaries	☐	☐	☐
Construction Summaries	☐	☐	☐
Real-time Link Status (speeds, volumes)	☐	☐	☐
Traveler Advisories (e.g. variable speed limits, dangerous road conditions)	☐	☐	☐
Alternate Routes	☐	☐	☐
Parking Locations	☐	☐	☐
Parking Availability (Real-Time)	☐	☐	☐
Road Weather Conditions (temp., precip., rain, snow, ice)	☐	☐	☐
Road Specific Environmental Conditions (carbon monoxide, nitrous oxide, particulates)	☐	☐	☐
Trip Plans given Origin and Destination	☐	☐	☐
Route Guidance	☐	☐	☐
Others, please specify	☐	☐	☐

Traveler Information User Services	Priority		
	Low	Medium	High
Transit and Modal Information	☐	☐	☐
Static Data (Schedule/Route/Fare) - Bus	☐	☐	☐
- Air	☐	☐	☐
- Train	☐	☐	☐
- Subway	☐	☐	☐
- Ship	☐	☐	☐
Real-Time Status Data (e.g. location) - Bus	☐	☐	☐
- Air	☐	☐	☐
- Train	☐	☐	☐
- Subway	☐	☐	☐
- Ship	☐	☐	☐
ParaTransit Services (e.g. car/vanpooling, ridesharing, taxis, subscription buses)	☐	☐	☐
Ride-Matching Services	☐	☐	☐
Trip Plans (specify modes, and how user can tailor, e.g. least costly, quickest, etc.)	☐	☐	☐
Others, please specify	☐	☐	☐
Traveler Services Information	☐	☐	☐
Lodging Information (locations, reservations)	☐	☐	☐
Food/Dining and Gas Information (locations, reservations, hours of operation)	☐	☐	☐
Parking Information (locations and availability)	☐	☐	☐
Special Events/Attractions (concerts, tourist attractions, sporting and cultural events)	☐	☐	☐
Safety Information (hospitals, emergency telephone, repair shops and police locations)	☐	☐	☐
Regional Weather Conditions (temp., precip., rain, snow, ice)	☐	☐	☐
Regional Environmental Conditions (carbon monoxide, nitrous oxide, particulates)	☐	☐	☐
Others, please specify	☐	☐	☐

Please complete the cells in the matrix below. For each cell, identify the level of priority your agency would associate with providing that capability in the future or continuing to provide that capability if it exists today. Then supply the target year you see most desirable for its attainment.

TIS Output Device	Priority			Target Year
	Low	Medium	High	
Variable Message Sign (VMS)	☐	☐	☐	
Highway Advisory Radio (HAR)	☐	☐	☐	
CB/Amateur Radio	☐	☐	☐	
In-Vehicle Monitors/Displays	☐	☐	☐	
Faxes	☐	☐	☐	
Pagers	☐	☐	☐	
Public Kiosks	☐	☐	☐	
Cable or Regular TV using Images	☐	☐	☐	
Cable or Regular TV using Teletext	☐	☐	☐	
Interfaces to Public Radio Stations	☐	☐	☐	
Hand-Held Devices or Lap Top Computers	☐	☐	☐	
Telephone access using Phone Menus (Press 1 to hear traffic, ...)	☐	☐	☐	
Dial-In Computer Bulletin Boards (e.g. Prodigy, America Online)	☐	☐	☐	
Internet Accessed Information (e.g. Mosaic)	☐	☐	☐	
Commercial Traffic Reporting Agencies (Metro or Shadow Traffic)	☐	☐	☐	
Others, please specify				

Please complete the cells in the matrix below. For each cell, identify the level of priority your agency would associate with providing that capability in the future or continuing to provide that capability if it exists today. Then supply the target year you see most desirable for its attainment.

Strawman Goals for Corridor TIS	Priority		
	Low	Medium	High
Enhance urban and interurban corridor road travel by providing timely, accurate and corridor-wide access to information on road conditions, including congestion, accidents, construction, alternate routes, link speeds, route guidance, trip plans and road-related weather conditions.	❒	❒	❒
Enhance modal and intermodal travel by providing timely, accurate and corridor-wide access to information on urban mass transit (urban bus, ferry, subway, light rail, commuter rail and personalized public transportation) and intercity mass transit (interurban air, ship, rail, and bus), including schedules, routes, fares, alternate modes, intermodal connections and real-time status/locations.	❒	❒	❒
Increase the availability of traveler information by providing timely, accurate and corridor-wide access to traveler information services, including regional weather and environmental conditions, and lodging, restaurants, parking, and gas station locations and hours of operation.	❒	❒	❒
Enhance the safety of travelers by providing timely, accurate and corridor-wide access to public safety information including emergency telephone, police, repair shops, and medical facility locations.	❒	❒	❒
Improve environmental quality in the Corridor by reducing air pollution through minimizing peak period congestion, encouraging car pooling, increasing bus and transit ridership, and increasing the ease of transfers between modes.	❒	❒	❒
Increase tourism by providing access to information on historic sites, attractions, parks and recreational facilities, cultural and arts activities, and educational institutions.	❒	❒	❒
Contribute to and organize revenue generating schemes to supplement Corridor TIS funding, such as privatizing parts of the TIS system, advertising, equipment rentals (e.g., in commercial vehicles), and ticket sales.	❒	❒	❒
Promote TIS and induce its use to demonstrate to the public the benefits of using an ATIS.	❒	❒	❒
Others (if applicable, provide additional and/or revised goals)	❒	❒	❒

Appendix G

TIS Product and Service Providers in North America and Sleeted European Vendors

TIS Related Product Vendors in North America and Selected Vendors in Europe'

TIS Service Category	Vendor	Product'	Description
Travel and Traffic Information Providers	AAA	Travel Match Express	Kiosks providing local travel information and point-to-point driving directions
	Autotalk, Inc	(TV Broadcast)	Broadcasts traffic information on TV SAP channels
		Autotalk in-vehicle decoder	Delivers information through car radio
	Cue Network Corporation	TrafficAlert	Segment-specific real-time traffic information service that uses a Sharp Wizard personal organizer and Cue Network receiver
		(Paging/messaging service)	Uses subcarriers from 410 FM radio stations to reach 100,000 subscribers
		FaxForward	Fax store and forward service
		TruckTrack	GPS tracking system
		ACCQPOINT	A Differential GPS location service
	E-Fax Communications, Inc.	(Fax services)	Fax broadcast, fax-on-request and fax mail services
	Metro Dynamics, Inc.	(Commuter information distribution)	Under development - information dissemination using Desktop computer and telecommunications
	Metro Traffic Control	(Provides real-time information)	Provides information for radio/TV broadcast
	NYNEX Travelers Assurance Services	(Travel services)	Services through customer service centers using Differential GPS, cellular radio and digital maps
	Roadirector	Roadirector	Personalized traffic information and route-guidance service, using alphanumeric pagers
	S-Cubed	(Internet info dissemination)	Disseminate freeway traffic info through WWW
	Shadow Information Services	Shadow Traf/Fax	Freeway map available via fax, pinpointing major traffic delays

1 Most of the information is extracted from ***The International IVHS Index 1994/1995. Waters Information Services. NY 10012, 1994.***

2 Names within parenthesis represent generic class of product and not the product name.

TIS Related Product Vendors in North America and Selected Vendors in Europe

TIS Service Category	Vendor	Product	Description
Travel and Traffic Information Providers (CONT.)	Shadow Information Services (CONT.)	Shadow Commuter	Current traffic information through computer terminals in parking garages and building lobbies provides
		Shadow Park Net	Area-specific reports from low-frequency radio-transmitter located inside parking structure via car radio
		Shadow Audiotex and operator-assisted traffic services	Freeway-specific traffic information through telephone
	SmartRoute Systems	SmartTraveler	Provides real-time traffic and transit information through telephone audidotex system
	Westinghouse Electric Corporation	SmartTrack	Provides interactive real-time interfaces to telephone information centers, kiosks, PC and videotex terminals
	Automobile Association - AA (UK)	Roadwatch	Traffic information broadcasting service for the U.K.
		Automaps	Digital map providers
		Milemaster	PC-based route, time and mileage system for U.K. and Europe
	ERIC (Netherlands)	(Traveler information)	Provides road traveler information between European countries
	RAI (Italy)	(Traffic information)	Traffic information collection and dissemination
	Trafficmaster plc (UK)	(In-vehicle system)	In-vehicle traffic speed and information system
Navigation & Route Planning	ALK Associates, Inc.	PC*MILER	Displays route and mileage information, estimates costs and transit times
	Alpine Electronics Research	(In-vehicle navigation)	In-vehicle navigation - under development
	American Technologies	AUTONAV	In-vehicle Navigation software, using GPS data
	Amerigon Inc.	(Vehicle navigation)	Voice interactive vehicle navigation system
	Automap Inc.	Automap Pro	Windows software for route planning, schedule optimization and database mapping
		Automap Street	Windows software for city level mapping
		Automap Road Atlas	Route planning software

TIS Related Product Vendors in North America and Selected Vendors in Europe

TIS Service Category	Vendor	Product	Description
Navigation & Route Planning (CONT.)	Berkeley Speech Technologies, Inc.	BeSTspeech T-T-S	Converts ASCII text input into speech output, available in a numbe of languages
	Canada Post Corporation (Canada)	Geopostal databases	Over 200 cities on a structured geographic database
		Geopostai applications	Route optimization for letter carriers and delivery trucks
		(GPS)	GPS of vehicle tracking
	Computmap Traffic Research & Engineering (Canada)	Route planning system	Personalized, dynamic route selection using shortest distance
	Easy Street Software, Inc.	(Routing and scheduling software)	Paratransit and taxi markets
	GeoSystems	Voyager	Automated travel planning system that provides route maps and description of facilities along the route
		Geolocate	Core mapping, locating and directional software
	GYRATION, Inc.	(Gyroscope)	Low-cost navigational gyroscope
	Magnavox Electronic Systems Company	(Navigation)	Dead reckoning navigational system
		(GPS)	GPS
	Motorola, Inc.	(In-vehicle navigation)	Incorporates dead reckoning/map matching and GPS positioning
	News Electronic Data	Taxi	Software travel package containing street maps, pathfinding capabilities and hotel/restaurant information
	Personal travel Technologies, Inc.	Personal Travel Guide (PTG)	Personal navigation and travel information system (non-real-time)
		P>NAV	Real-time navigation system
	Siemens Automotive	Ali-Scout	Infrastructure-reliant in-vehicle navigation system with real-time traffic information capability
	Trimble Navigation, Ltd.	Scout GPS	Hand-held, 14-ounce GPS receiver powered by 4 AA batteries, with Thomas Brothers mapping system
	Ultradata Corporation	(Travel databases)	A line of hand-held travel-related databases
	Wayfinder, Inc.	Telemap	Automated information services providing directions utilizing a process which uses telephone numbers to identify origins and destinations

TIS Related Product Vendors *in North America and Selected Vendors in Europe*

TIS Service Category	Vendor	Product	Description
Navigation & Route Planning (CONT.)	Zexel USA Corporation	Navmate	in-vehicle navigation and route guidance system
	Copilot GmbH and Co KG (Germany)	Copilot in-vehicle Navigation	- Route guidance, based on Euro-Scout system - Traffic information
	Indikta Display System (UK)	(Supporting equipment)	- in-vehicle and desktop RDS decoders. - Visual display and speech output receivers and decoders
	Motorola (UK)	(In-vehicle navigation)	In-vehicle navigation system
		(Communications)	- RF Data communications equipment
	Philips Car Systems (Germany)	Carin	Navigation system
		(Others)	- Mobile information systems - RDS-Traff ic Message Channel car stereo products
	Philips Electronics (Netherlands)	SOCRATES	in-car equipment (using cellular radio to link) to provide traffic information, dynamic route guidance, parking information, etc.
	PTV (Germany)	INTERTOUR	Route planning software for multi-drop pickup delivery services
		INTERLOAD	Rote planning software for long haul intermodal trip
		MAP&GUIDE	Windows-based GIS
	Robert Bosch GmbH (Germany)	Traveler RDS-TMC	RDS - Traffic message channel receiver
		Travelpilot	Autonomous in-vehicle electronic map system
		Berlin	Car radio with optional in-vehicle navigation system
	SAGEM (France)	HOROSEM	Pay and display parking meter operated by smart card payment
		SAGACE	Driver information system with map display.
		GARMINAT	in-vehicle traffic information and route guidance system
	Siemens AG (Germany)	EURO-SCOUT	In-vehicle route guidance system

TIS Related Product Vendors in North America and Selected Vendors in Europe

TIS Service Category	Vendor	Product	Description
Navigation & Route Planning (CONT.)	Volvo AB (Germany)	DYNAGUIDE	Navigation and traffic information system
		RDS-TMC	Radio Data System - Traffic Message Channel
		MOBILGUIDE	Fleet tracking, communications and management system
Map Database	Canada Post Corporation	*Discussed earlier*	
	DeLorme	MapExpert	Desktop mapping system
		StreetAtlas USA	CD-ROM map database of the U.S.
		XMap	Geographic and map information management system
		GPS Mapkit	Links a map database to a GPS receiver
		(Tracking)	Real-time tracking system designed for fleet management
	Etak, Inc.	EtakMap	Map databases for entire U.S., metro areas of Asia and Europe
		Etak Development Tools	Collection of C-language libraries
		(Navigation software)	Dead reckoning/map matching and other features
		(Yellow pages)	Yellow pages
	Geographic Data Technology, Inc. (GDT)	Dynamap family of products	Addressed street database
		Matchmaker/2000	Address geocoding software
	Geospan Corporation	GeoVista databases	Under development - will contain both street data and images
	GeoSystems	*Discussed earlier*	
	Graphic Data System Corp.	Dynamic Segmentation	GIS product that allows development of ad hoc graphics showing network attributes
		Dynamic Graphics	A real-time graphical display of monitored events
	Horizons Technology, Inc.	SureIMaps	CD-ROM based product that allows customers to create a custom raster maps
	IBM Corp.	(GIS Services)	Services include data conversion, client server network integration, application development

TIS Related Product Vendors in North America and Selected ***Vendors In Europe***

TIS Service Category	Vendor	Product	Description
Map Database (CONT.)	Kinesix Corp.	SAMMI - GUI	X-Windows-based video graphic objects and communication for real-time command and control systems
	MapFrame Corp.	WV	GIS software for mobile, pen-based computers
	Mapinfo	MapInfo	GIS package for DOS, Windows and Macintosh
		Maps&Data	Windows mapping package, including maps ranging from world view to zip code level
		MapBasis	Programming tool for customization of MapInfo
		Streetinfo	Digital database, and also available on CD-ROM - includes street, town boundaries and address for all U.S. counties. Also, available for Canada
		(Maps)	U.S. and Mexican highway maps, New York Cii premium map
	NavTech	Detailed city database	Detailed information on city and street names, block by block addressing, road classes, turn restrictions and other elements for a number of U.S. cities
		North American highway system database	Connects all city databases and provide inter-town coverage
		Core navigation software	Assists in the development of prototypes and navigation systems using database
		European navigable map databases	Databases for European automotive and non-automotive community
	Pacific0	(Maps)	Digitized maps on CD-ROM, compatible with most GPS
	Roadnet Technologies, inc.	ROADNET Highway Plus	All major roads for the U.S. and detailed streets for major metropolitan areas
		ROADNET city Streets	Enhanced TIGER information, with road classification, address, zip codes etc.
	Spatial Data Services, Inc.	CustomMaps	Trip routing automated map production with route highlights and narrative descriptions
		MapStation	Windows map display system for vehicle tracking
		North American Geographic Database	Political, hydro, road network data for U.S., Canada and Mexico

TIS Related Product Vendors in North America and Selected Vendors in Europe

TIS Service Category	Vendor	Product	Description
Map Database (CONT.)	Spatial Data Services, Inc. - Cont.	North American Transportation Network	Proprietary digital transportation model
	Surveys, Mapping and Remote Sensing Sector - SMRSS (Canada)	(Transportation database}	Under development - cleaned and structured national coverage of Canadian road network
	Teranet Land Information Services, Inc. (Canada)	(Maps)	Digital property mapping in Ontario, property legal description and municipal address
	Thomas Bros. Maps	(Maps and services)	Digital mapping products and services
	U.S. Geological Survey	Maps)	Digital maps include geographic names, elevation, planimetric, land use and land cover
Comm.	Alcatel Contracting (NA), Inc.	(Telecommunication)	Turnkey telecommunication systems
		(Cables)	Copper ad Fiberoptic cables
	American Mobile Satellite Corp. (AMSC)	Skycell fleet management products and services	includes Skycell personal communicator notebook PC for fleet drivers
		(Voice/Data communication)	Will provide mobile communications services (MSS) using three satellites
	Ameritech	(Connectivity)	Analog and digital circuit connectivity at variety of speeds
		(Cellular communications)	Cellular communications
	Andrew Corp.	(Cables)	Radiating coaxial cables (leaky feeders)
		(Communications)	Distributed communications systems
	Aptek Communications Products	Aptek Personal services Communicator (PSC)	Rugged wireless computer terminals, land line, RF and cellular models. Integrates voice, video and fax
	ARDIS Co.	ARDIS	Wireless network service developed specifically for data transmission
	AT&T Network Systems	(Communication)	End-to-end fiberoptic communications infrastructure
	Bell Atlantic Corp.	(Communication)	Fiberoptic and wireless communications networks
	Bell Canada (Canada)	(Communication)	Wireline and cellular communications

TIS Related Product Vendors in North America and Selected Vendors in Europe

TIS Service Category	Vendor	Product	Description
Comm.	Broadband Networks, Inc.	(Electronics)	- Fiberoptic transmission and switching electronics - Laser and LED devices used in conjunction with AM and FM modulation techniques
	C-Cor Electronics	(Cables)	Digital fiberoptic, analog fiberoptic, CATV coax, multichannel transmission systems
	Carbn Telecom Systems	(Conduit and accessories)	Light Guide System (LGS), fiberoptic cable management product etc.
	CellPort Labs, Inc.	Universal Wireless Interface	Under beta test - works with analog/.digital cellular, PCS and wireless terminals
	Coded Communications	(Electronics)	- IQModem - LANMARC 5000 (combined GPS receiver and modem) - NC5000 Network Controller - CMX-1000 and CMX-4500 mobile terminals
	COMSAT Corp.	(Communication)	Satellite-based position determination and mobile communication terminal
		(Differential GPS)	Corrections using Inmarsat-C messaging service
	Cue Network Corporation	*Discussed* earlier	
	Cylink Corporation	(Spread spectrum radios)	Provides point-to-point and point-to-multipoint connections over distances up to 30 miles
	Dataradio Corp.	(Products)	- Dataradio Advanced Radio Modem (ARM) - Connectivity Over Radio (COR) and Vehicular Information Series (VIS) product lines
	Delco Electronics	(RDS receiver)	Radio Data System (RDS) receiver
	Differential Corrections, Inc.	(Information dissemination)	Technology for broadcasting and receiving real-time information and/or Differential GPS over FM subcarrier on the RDS protocol
	Digital Recorders, Inc.	(HAR)	HAR and solar-powered mobile HAR
		TRACKCOM and TRANSITCCM	Digital recorders providing terminal and on-board vehicle information

TIS Related Product Vendors In North America and Selected Vendors in Europe

TIS Service Category	Vendor	Product	Description
Comm.	Dorn & Margolin, Inc.	(Antennas)	Antennas for GPS, cellular & PCs communication, ETC, TMS, Sign post systems
	E-Systems, Inc.	AVSATCOM	Satellite-based communication system capable of providing data communication between a central facility and mobile assets
		(Antennas)	GPS Antennas
		AccuTrans	Automated transit information system
	E.F. Johnson Company	(Radio products)	Two-way radio systems, handheld radios, radio infrastructure products
	ELDEC Corporation	Telephonic Gatelink	Wireless high-speed infrared data communications link
		(Switches)	Electronic proximity switches
	Electronic Design Company	(Video transmission)	Video and CCTV transmission - wireless and over fiberoptic/copper
	Engineering Research Associates (ERA)	E-CAPS	Geolocation System
		Diversity	Wireless products
	Ericsson GE Mobile Communications, Inc.	(Communications)	- Land mobile radio and cellular systems - Two-way voice and data RF systems
	Fiberlign	(Transmission equipment)	Fiberoptic video, voice and data transmission equipment
	Force, Inc.	(Communications)	- Video, audio and data fiberoptic links - High speed transmission products
	The George-Ingraham Corp.	(Communications product)	Multicell conduits for fiberoptic
	Geotek	(GPS receiver)	GPS receiver
		(Data terminal)	Wireless data terminal with AVL
	Globalstar	Globalstar	A Loral consortium project under development - Wireless communication using low-orbit satellites
	GTE	(Communications)	- Wireless/wireline network communications for voice and data - CDPD services

TIS Related Product Vendors in North America and Selected Vendors in Europe

TIS Service Category	Vendor	Product	Description
Comm (CONT.)	Hughes Aircraft Company	Spread Spectrum Network Radio (SSNR)	Wireless connectivity between central facility and field sites
	Industrial Computer Systems	Dynamic Dispatch V	In-vehicle terminal
		Asset Tracking System	Tracking system
	International Fiber System	(Fiberoptic products)	- Fiberoptic video transmitters and receivers - Fiberoptic RS-232 networks
	Meridian Technologies Inc.	(fiberoptic)	Bi-directional fiberoptic video, audio data systems for long distance transmission
	Meteor Communications Corp.	(Communications)	Two-way packet data radio, networks, systems
	Modulation Sciences, Inc.	Data Sidekick and SCA Data Receiver,	Allows transmission 4800 bps data streams via FM broadcast signals
		TV sidekick	Processor for TV SAP channel
		RDS-1	Converts an IBM-compatible PC into an RDS/RBDS generator
		RDS Data Receiver	Standalone RDS/RBDS data receiver with onboard data processing and filtering
	Motorola, Inc.	(Paging)	Paging technology
		(Communications)	RF data communications infrastructure and subscriber equipment
		(In-vehicle navigation)	Prototype in-vehicle navigation/route guidance system
		(Other)	Voice synthesis and speech recognition technology
		Iridium	Under development - Wireless communication using low-orbit satellites
	National Semiconductor	(Communications)	- Wireless systems - Data communications systems - Video compression and storage/transmission
	N Systems Inc.	(Microwave equipment)	- Transmission antennas for ground-based and airborne operation - Steerable microwave receive antenna systems

TIS Related Product Vendors in North America and Selected Vendors in Europe

TIS Service Category	Vendor	Product	Description
Comm (CONT.)	OMNI	(Construction supplies)	Multi-conduit systems
	Opcom, Inc.	(Fiberoptic)	Fiberoptic backbone system
	Optelcom, Inc.	(Fiberoptic)	Multi-channel video systems, transmission systems, multiplexers and modems
	Orbital Communications Corp.	(Communications)	Under development - Wireless 2-way communication using low-orbit satellites
	Pinpoint Communications, Inc.	ARRAY	Wireless data network integrating AVL and high-speed mobile data communications, designed to provide location-specific information and routing
	RAM Mobile Data	(Communications)	Wireless data communication networks
	Regional Communications, Inc.	(Communication)	Wireless communications products
	Roadwide Corp.	(Communications)	Roadway to vehicle communications systems and technology with smartt databases
	Scientific-Atlanta, Inc.	(Terminal)	TerraStar C satellite terminal
	Sieko Communications Systems, Inc.	(Communications)	High speed data systems (HSDS) for the delivery of data to vehicles using FM subcarrier transmissions systems
	Siecor Corp.	(Fiberoptic hardware)	Fiberoptic cables, connector, and hardware
	Sumitimo Electric USA, Inc.	SUMINET	Analog and digital video/data fiberoptic transmission equipment
		ViewPlex	Video signal multiplexer
		(LAN)	FDDI LAN
		(In-vehicle Navigation)	Navigation and route planning system
	Thaw Associates	Opcom	Multi-protocol fiber optic backbone multiplexer
		Radiant	Fiberoptic short-haul video modems
		Broadband Networks	Broadband, long-haul video

TIS Related Product Vendors in North America and Selected Vendors in Europe

TIS Service Category	Vendor	Product	Description
Comm (CONT.)	TMI Communications	MSAT	Under development - Mobile satellite communication network
	Trontech inc.	(Amplifiers)	- RF/microwave amplifiers - Low-noise linear amplifiers - Amplifier based multi-function packages
	U.S. Commlink	(Communications and Networks)	- Wide area networks (WANs) - Spread spectrum radio - GPS - Microwave transmission products
	U.S. Signal Corp.	(Transmission)	Analog and digital video/data transmission systems via f iberoptics
	U.S. West Communications	(Videotex/Audiotex)	Videotex and audiotex services for ATIS applications
Variable Message Signs	AGS Group	(Various)	- VMSs - Electronic parking systems - Interactive video kiosks
	American Electronic Sign	(Electronic Signs)	- VMSs - Variable speed limit signs
	American Signal Company	(Electronic Signs)	VMSs
	Daktronics	(Electronic Signs)	VMSs
	Fiberoptic Display Systems, inc.	(Electronic Signs)	Fiberoptic VMSs, blankout signs, radar-activated signs
	interplex Solar, inc.	(Electronic Signs)	LED signs
	Lake Technology Products, inc.	(Electronic Signs)	VMSs
	McCain Traffic Supply, Inc.	(Electronic Signs)	VMSs
	Peek Traffic Corp.	(Electronic Signs)	VMSs
	Signalization of Montreal, inc.	AESCO	VMSs
	Skyline Products, inc.	(Electronic Signs)	VMSs
	Summum Signs, Inc.	(Electronic Signs)	VMSs
	Tele-spot Systems	(Electronic Signs)	VMSs, speed limit signs, blankout signs, lane control signals

Appendix H - Data Dictionary

H.1 Overview

This section lists data flows and entities in the data dictionary for the defined subsystems of the CTIS. The data dictionary includes all of the entities in the subsystem context diagrams and Level 1 decompositions as well as other defined entities that have been determined to be necessary for modeling, defining and prototyping the i-95 CTIS. The listing provided here is a subset of the complete data dictionary that includes only those entities that have been defined and/or decomposed into primitive elements.

H.2 Format

The format of an entry in the data dictionary listing and a description of the contents follows. The ouput was generated using the MacAnalyst™ & MacDesigner™ system analysis and software design tool.[1]

Name: entity-name
Composition: entity-composition
Definition: entity-definition
References: entity-references

(a) Name :

The entity name may only consist of alphanumeric characters and the following symbols: -, _, $, ., '

(b) Composition:

The composition allows the entity to be defined as a data structure. The composition is derived from the specification of a context-free grammar in Backus-Naur Form. An element can be defined in one of the following ways:

1) a sequence of elements
<a>+<b>+...<c>

2) one of a group of elements
[<a>|<b>|...|<c>]

3) a repeated sequence of an element
{<a>}

4) one or more elements of a group
(<a>, <b>, . . . <c>)

5) a primitive.

(c) Definition:

The definition field consists of text input for defining an entity.

(d) References:

Entries that have corresponding objects in the combined Data and Control Flow Diagrams are marked with type of entity and the name of the analysis (flow) document in which they appear. When the reference field is blank, it indicates that the data appeared only in the composition of other high-level data, but not in the Data Flow Diagrams.

1 MacAnalyst & MacDesigner are trademarks of Excel Software. (c) Copyright 1985-1993 Excel Software. All rights reserved. Versions 4.0 and 4.1 of the software were used.

ANALYSIS (PROCESS) document-name
ANALYSIS (STORE) document-name
ANALYSIS (EXTERNAL) document-name
ANALYSIS (FLOW) document-name

A PROCESS represents a software process in the data flow diagrams.
A STORE represents a data base table or an alternative persistent store of data. Alternative stores may be operating system files, shared memory, or special knowledge base formats. These alternative stores are reresented in the DFDs with asterisks.
An EXTERNAL represents an entity that is external to the subsystem being analyzed.
A FLOW is a data or control flow (composite or primitive) whose origin or destination is a process.

H.3 Data Dictionary Listing

NAME ad-hoc-Requests
COMPOSITION
DEFINITION
REFERENCES

NAME AddressedReport
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “DisseminationApplica”

NAME Add-Data-Request
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “ QueryRequestManager"

NAME Add-Data-Response
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “ QueryRequestManager"

NAME AirQuality
COMPOSITION
DEFINITION
REFERENCES

NAME AlightingPassengersData
COMPOSITION NoOfAlightingPassengers+
ArrivalTime+
StationLocation
DEFINITION This data will provide estimated traffic demand around the transfer loactions with the arruvals of transits.
REFERENCES ANALYSIS(FLOW) “tis.dfd” “TIS”
ANALYSIS(FLOW) “tis.dfd” “Communications”

NAME AlternateModes
COMPOSITION
DEFINITION
REFERENCES

NAME AlternateRouteRecommendation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TripGuidance"

NAME AlternateRoutes
COMPOSITION
DEFINITION
REFERENCES

NAME AlternativeRouteRecommendation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "CentralizedTripGuida"

NAME ApplicationDataStore
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(STORE) "tis.dfd" "ReportGenerator"

NAME ApplicationDestination
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME ApplicationInterfaceProcess
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "ApplicationRouting"

NAME ApplicationRequestReject
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME ApplicationResourceStore
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(STORE) "tis.dfd" "DataDistribution"
ANALYSIS(STORE) "tis.dfd" "ApplicationRouting"

NAME ApplicationRouting
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "DataDistribution"

NAME ApplicationSearchRequest
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME ApplicationSelector
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) 'tis.dfd" "ApplicationRouting"

NAME App_Add_Confirm
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME App_Confirmation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME App_Diss_Request
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DataDistribution"
ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"
ANALYSIS(FLOW) "tis.dfd" "CorridorTIS"
ANALYSIS(FLOW) "tis.dfd" "DisseminationApplica"

NAME App_Diss_Response
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DataDistribution"
ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"
ANALYSIS(FLOW) "tis.dfd" "CorridorTIS"
ANALYSIS(FLOW) "tis.dfd" "DisseminationApplica"

NAME App_Informaion
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DataDistribution"
ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME App_info_Request
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DataDistribution"
ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME App_ReportHeader
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ReportGenerator"

NAME App_ReportHeaderRequest
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ReportGenerator"

NAME ArrivalTime
COMPOSITION
DEFINITION
REFERENCES

NAME Attractions
COMPOSITION
DEFINITION
REFERENCES

NAME AudibleManeuverInstructions
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TripGuidance"

NAME AudioInformationRecorder
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "DisseminationApplica"

NAME AverageDelay
COMPOSITION
DEFINITION
REFERENCES

NAME Billing
COMPOSITION
DEFINITION Payment information for CTIS usage.
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DisseminationApplica"
ANALYSIS(FLOW) "tis.dfd" "TIS"

NAME BillProcessing
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "DisseminationApplica"

NAME BoundaryDataRequest
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME BoundaryDataResponse
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME BoundaryProcess
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "ApplicationRouting"
ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME Call-InTelephoneProcessor
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "DisseminationApplica"

NAME CandidateTripPlans
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TripPlanning"
ANALYSIS(FLOW) "tis.dfd" "UserTripPlanningInte"

NAME Capacity
COMPOSITION
DEFINITION
REFERENCES

NAME Cause
COMPOSITION
DEFINITION
REFERENCES

NAME CentralizedTripGuidance
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "TripGuidance"

NAME CloudyCondition
COMPOSITION
DEFINITION
REFERENCES

NAME CommercialTrafficReportingFirms
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(EXTERNAL) "tis.dfd" "TIS"

NAME CommonServices
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) 'tis.dfd" "CorridorATIS"
ANALYSIS(FLOW) "tis.dfd" "Communications"

NAME CommStatus
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "CorridorTIS"

NAME CommunicationInterface
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "Communications"

NAME CommunicationManager
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "Communications"

NAME Communications
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "CorridorATIS"

NAME ConfigurationDataStore
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(STORE) "tis.dfd" "DataDistribution"
ANALYSIS(STORE) "tis.dfd" "QueryRequestManager"
ANALYSIS(STORE) "tis.dfd" "ApplicationRouting"

NAME ConfirmBoundary
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME ConfirmValidity
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" " QueryRequestManager"

NAME ConstructionEvents
COMPOSITION Incident-ID+
EventName+
ConstructionType+
Location+
StartTime+
EndTime
DEFINITION
REFERENCES

NAME ConstructionType
COMPOSITION
DEFINITION
REFERENCES

NAME Control
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" "Communications"

NAME CorridorTlS
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) " tis.dfd" "TIS"

NAME CostConstraints
COMPOSITION
DEFINITION
REFERENCES

NAME CTlSPartners
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(EXTERNAL) "tis.dfd" "TIS"

NAME CTlSPartnersInfoRequest
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" " CorridorATIS"

NAME CTlSResponses
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TripGuidance"
ANALYSIS(FLOW) " tis.dfd" "TripPlanning"
ANALYSIS(FLOW) "tis.dfd" "UserTripPlanninglnte"
ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME CulturalandArts
COMPOSITION
DEFINITION
REFERENCES

NAME Current-O-D-Matrix
COMPOSITION
DEFINITION
REFERENCES

NAME Data
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" "DataManagement"
ANALYSIS(FLOW) "tisdfd" "DataDistribution"

NAME DataDistribution
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) 'tis.dfd" "CorridorATIS"

NAME DataIngestManager
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) " tis.dfd" "DataManagement"

NAME DataManagement
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "CorridorATIS"

NAME DataMonitoringGUI
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) " tis.dfd" "DataManagement"

NAME DataRequest
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" "CorridorATIS"
ANALYSIS(FLOW) " tis.dfd" "DataManagement"
ANALYSIS(FLOW) "tis.dfd" "TripPlanning"
ANALYSIS(FLOW) 'tis.dfd" "UserTripPlanningInte"
ANALYSIS(FLOW) " tis.dfd" "DataDistribution"

NAME DataResponse
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TripPlanning"
ANALYSIS(FLOW) "tis.dfd" "UserTripPlanningInte"

NAME DataTranslationConversion
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "DataManagement"

NAME Date
COMPOSITION
DEFINITION
REFERENCES

NAME DBMSServer
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “DataManagement”

NAME Delay
COMPOSITION
DEFINITION
REFERENCES

NAME DepartureTime
COMPOSITION
DEFINITION
REFERENCES

NAME Description
COMPOSITION
DEFINITION
REFERENCES

NAME Destination
COMPOSITION
DEFINITION
REFERENCES

NAME DetermineValidity
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “QueryRequestManager"

NAME Direction
COMPOSITION
DEFINITION
REFERENCES

NAME DisseminationApplications
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “ CorridorATIS”

NAME EducationalInstituions
COMPOSITION
DEFINITION
REFERENCES

NAME EmergencyServicesInformation
COMPOSITION Police+
Hospital+
ServiceStation
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “TIS”
ANALYSIS(FLOW) “tis.dfd” “ CorridorATIS”
ANALYSIS(FLOW) “tis.dfd” “Communications”

NAME EmergencyServicesRequired
COMPOSITION
DEFINITION
REFERENCES

NAME End-UserDissemination
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "DisseminationApplica"

NAME EndCoordinates
COMPOSITION
DEFINITION
REFERENCES

NAME EndTime
COMPOSITION
DEFINITION
REFERENCES

NAME EstimatedDuration
COMPOSITION
DEFINITION
REFERENCES

NAME EventCharacteristics
COMPOSITION
DEFINITION
REFERENCES

NAME EventData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(STORE) "tis.dfd" "TripPlanning"

NAME EventIncidentReport
COMPOSITION EventPlansStatus+
IncidentDataLogs
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DisseminationApplica"

NAME EventName
COMPOSITION
DEFINITION
REFERENCES

NAME EventPlansStatus
COMPOSITION SpecialEvents+
ConstructionEvents
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"

NAME ExtendedReportResponse
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ReportGenerator"

NAME ExternalDatabases
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(EXTERNAL) "tisdfd" "TIS"

NAME FailureNotice
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"
ANALYSIS(FLOW) " tis.dfd" "DataManagement"

NAME FaxedReport
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tisdfd" "DisseminationApplica"

NAME Fetivals
COMPOSITION
DEFINITION
REFERENCES

NAME Fleet Data
COMPOSITION Vehcile-ID+
VehcileClass+
Date+
Route-ID+
TrvaleTime+
Location+
Speed+
NumberStops+
AverageDelay+
WeatherandEnvironmentalData+
IncidentDataLogs
DEFINITION
REFERENCES ANALYSIS(FLOW) 'tis.dfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"

NAME FormattedData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" "DataManagement"
ANALYSIS(FLOW) " tis.dfd" " Communications"

NAME FormattedMessage
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" "CorridorATIS"
ANALYSIS(FLOW) " tis.dfd" "DataManagement"
ANALYSIS(FLOW) "tis.dfd" "Communications"

NAME Formatting
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) " tis.dfd" "DisseminationApplica"

NAME FrontEndProcessing
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) " tis.dfd" "CentralizedTripGuida"
ANALYSIS(PROCESS) " tis.dfd" "On-BoardTripGuidance"

NAME GuidanceInstructions
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) " tis.dfd" "CentralizedTripGuida"
ANALYSIS(PROCESS) "tis.dfd" "On-BoardTripGuidance"

NAME Historic-O-D-Mattix
COMPOSITION
DEFINITION
REFERENCES

NAME HistoricalSites
COMPOSITION
DEFINITION
REFERENCES

NAME HistoricalTrafficData
COMPOSITION
DEFINITION
REFERENCES

NAME Hospital
COMPOSITION
DEFINITION
REFERENCES

NAME Incident-Alert
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" "DataManagement"

NAME Incident-ID
COMPOSITION
DEFINITION
REFERENCES

NAME IncidentClassification
COMPOSITION
DEFINITION
REFERENCES

NAME IncidentDataLogs
COMPOSITION Location+
Name+
Incident-ID+
StartTime+
EndTime+
EstimatedDuration+
Delay+
Cause+
Description+
IncidentClassification+

LanesBlocked+
Severity+
IncidentStatus
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"

NAME IncidentStatus
COMPOSITION
DEFINITION
REFERENCES

NAME InformationRequestHandler
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" " QueryRequestManager"

NAME InformationRequests
COMPOSITION
DEFINITION These are the ad hoc requests for data from the CTIS Partners to CTIS.
REFERENCES ANALYSIS(FLOW) " tis.dfd" "Communications"
ANALYSIS(FLOW) " tis.dfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "CorridorTIS"
ANALYSIS(FLOW) "tis.dfd" " QueryRequestManager"

NAME InformationResponseHandler
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" " QueryRequestManager"

NAME IntegratedDataResponse
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "UserTripPlanninglnte"

NAME Inter-regionalTIClnfo
COMPOSITION TIC-ID+
EventPlansStatus+
IncidentDataLogs+
ModalTravelTimeComparison+
WeatherandEnvironmentallnfo+
TrafficForecasts+
StaticNetworkData+
StaticTransitData
DEFINITION Incident and event data are part of this data bundle. However, real-time traffic, road and transit information are not part of this.
REFERENCES ANALYSIS(FLOW) " tis.dfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"
ANALYSIS(FLOW) "tis.dfd" "DataDistribution"
ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"
ANALYSIS(FLOW) "tis.dfd" "CorridorTIS"

NAME InterfaceData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" "ApplicationRouting"

NAME ISPDissemination
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “DisseminationApplica”

NAME LanesBlocked
COMPOSITION
DEFINITION
REFERENCES

NAME Length
COMPOSITION
DEFINITION
REFERENCES

NAME Link-ID
COMPOSITION
DEFINITION
REFERENCES

NAME LinkData
COMPOSITION Link-ID+
LinkName+
StreetName+
LinkType+
Length+
LOS+
Direction+
SpeedLimit+
LinkTravelTime+
StartCoordinates+
EndCoordinates+
LinkGeometrics+
Speed+
Volume+
Occupancy+
TrafficRestrictions
DEFINITION This is real-time link traffic data.
REFERENCES

NAME LinkGeometrics
COMPOSITION
DEFINITION
REFERENCES

NAME LinkName
COMPOSITION
DEFINITION
REFERENCES

NAME LinkTravelTime
COMPOSITION Link-ID+
Direction+
TravelTime
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “CorridorATIS”
ANALYSIS(FLOW) “tis.dfd” “TIS”

NAME LinkType
COMPOSITION
DEFINITION
REFERENCES

NAME Location
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “CentralizedTripGuida”

NAME LocationDetermination
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tisdfd” “CentralizedTtipGuida”
ANALYSIS(PROCESS) “tis.dfd” “On-BoardTripGuidance"

NAME LOS
COMPOSITION
DEFINITION
REFERENCES

NAME LotName
COMPOSITION
DEFINITION
REFERENCES

NAME LotOccupancy
COMPOSITION
DEFINITION
REFERENCES

NAME ManageTravelerInformation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “DataDistribution”

NAME ManageTravelerRequests
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “ManageTravelerInform”

NAME ManeuverInstructions
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “CentralizedTripGuida”
ANALYSIS(FLOW) “tis.dfd” “On-BoardTripGuidance”

NAME MapData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “On-BoardTripGuidance”
ANALYSIS(STORE) “tis.dfd” “TripGuidance”

NAME MessageAccumulator
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “Communications”

NAME MessageConversion
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tisdfd" "Communications"

NAME MessageInput
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "Communications"

NAME **MessageOutput**
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "Communications"

NAME MessageTranslation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "Communications"

NAME ModalPreferences
COMPOSITION
DEFINITION
REFERENCES

NAME ModalTravelTrmeComparison
COMPOSITION Origin+
Destination+
TransportationMode+
TravelTime
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TIS"
ANALYSIS(FLOW) 'tis.dfd" "CorridorATIS"

NAME Name
COMPOSITION
DEFINITION
REFERENCES

NAME NavigationReadings
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "CentralizedTripGuida"

NAME No-ConfirmBoundary
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME Non-CorridorTIC
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(EXTERNAL) "tis.dfd" "TIS"

NAME NoOfAlightingPassengers
COMPOSITION
DEFINITION
REFERENCES

NAME NumberStops
COMPOSITION
DEFINITION
REFERENCES

NAME Occupancy
COMPOSITION
DEFINITION
REFERENCES

NAME On-boardData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(STORE) 'tis.dfd" "On-BoardTripGuidance"

NAME On-BoardTripGuidance
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "TripGuidance"

NAME Origin
COMPOSITION
DEFINITION
REFERENCES

NAME PackagedData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"
ANALYSIS(FLOW) "tis.dfd" "DataDistribution"
ANALYSIS(FLOW) "tis.dfd" "DisseminationApplica"

NAME PagerReport
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tisdfd" "DisseminationApplica"

NAME ParkingData
COMPOSITION Parkinglot-ID+
LotName+
Location+
Capacity+
LotOccupancy
DEFINITION
REFERENCES ANALYSIS(FLOW) "tisdfd" "TIS"
ANALYSIS(FLOW) " tis.dfd" "CorridorATIS"

NAME ParkingLot-ID
COMPOSITION
DEFINITION
REFERENCES

NAME ParkingLotStatus
COMPOSITION
DEFINITION
REFERENCES

NAME ParksandRecreation
COMPOSITION
DEFINITION
REFERENCES

NAME PassengerLoading
COMPOSITION
DEFINITION
REFERENCES

NAME PaymentInformation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DisseminationApplica"
ANALYSIS(FLOW) "tis.dfd" "DataDistribution"
ANALYSIS(FLOW) "tis.dfd" "ManageTravelerInform"

NAME PDAReport
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DisseminationApplica"

NAME Police
COMPOSITION
DEFINITION
REFERENCES

NAME PrecipitationLevel
COMPOSITION
DEFINITION
REFERENCES

NAME Precipitation-Type
COMPOSITION
DEFINITION
REFERENCES

NAME PresenterAck
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ReportGenerator"

NAME ProcessRequest
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" " QueryRequestManager"

NAME Process-Request
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "QueryRequestManager
ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME ProvideTravelerUserInterface
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "ManageTravelerInform"

NAME PublicEventLookup
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “TripPlanning”

NAME PublicServicesLookup
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “TripPlanning”

NAME QueryRequestManager
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “DataDistribution”

NAME RawMapData
COMPOSITION
DEFINITION
REFERENCES

NAME Real-TimeTrafficandRoadInfo
COMPOSITION Real-TimeTrafficData+
RoadConditionData
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “TIS”
ANALYSIS(FLOW) ‘tis.dfd” “CorridorATIS”

NAME Real-TimeTraff icandTransitData
COMPOSITION Real-TimeTrafficData+
Real-TimeTransitInfo
DEFINITION
REFERENCES ANALYSIS(STORE) “tis.dfd” “TripGuidance”
ANALYSIS(STORE) “tis.dfd” “DisseminationApplica”
ANALYSIS(STORE) “tis.dfd” “TripPlanning”
ANALYSIS(STORE) “tis.dfd” “CentralizedTripGuida”
ANALYSIS(FLOW) “tisdfd” “CentralizedTripGuida”

NAME Real-TimeTrafficData
COMPOSITION LinkData+
TravelAdvisory+
SuggestedRoutes+
AlternateRoutes+
AlternateModes
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “CentralizedTripGuida”
ANALYSIS(STORE) “tis.dfd” “CentralizedTripGuida”

NAME Real-TimeTransitInfo
COMPOSITION TransitLocation+
TransitArrivalEstimate+
PassengerLoading+
ParkingLotStatus
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “TIS”
ANALYSIS(FLOW) “tis.dfd” “CorridorATIS”

NAME ReportData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tisdfd” “ReportGenerator”

NAME ReportGenerator
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “ tis.dfd” “DataDistribution”

NAME ReportManagementAssessment
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tisdfd” “ReportGenerator’

NAME ReportPresenter
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “ReportGenerator”

NAME ReportRequest
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) ‘tis.dfd” “DataDistribution”
ANALYSIS(FLOW) “tis.dfd” “ReportGenerator"

NAME ReportResponse
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tisdfd” “DataDistribution”
ANALYSIS(FLOW) “tisdfd” “ApplicationRouting”
ANALYSIS(FLOW) “tis.dfd” “ReportGenerator”

NAME ReportSchedule
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “DisseminationApplica”

NAME ReportScheduler
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tisdfd” “ ReportGenerator"

NAME RequestedData
COMPOSITION
DEFINITION These are the data flow from the CTIS to the external entities, based on scheduled or ad-hoc requests.
REFERENCES ANALYSIS(FLOW) “tis.dfd” “ CorridorATIS”
ANALYSIS(FLOW) “tis.dfd” “TIS”
ANALYSIS(FLOW) “ tis.dfd” “DataManagement”
ANALYSIS(FLOW) “tis.dfd” “DataDistribution”
ANALYSIS(FLOW) “tis.dfd” “ReportGenerator”
ANALYSIS(FLOW) “ tis.dfd” “TripPlanning”
ANALYSIS(FLOW) “tis.dfd” “UserTripPlanningInte”

NAME RequestforValidation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" "DataDistribution"
ANALYSIS(FLOW) "tis.dfd" "QueryRequestManager"

NAME RequestResponse
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DataDistribution"
ANALYSIS(FLOW) " tis.dfd" "ApplicationRouting"
ANALYSIS(FLOW) "tis.dfd" "CorridorTIS"
ANALYSIS(FLOW) " tis.dfd" "Communications"
ANALYSIS(FLOW) " tis.dfd" "TripPlanning"
ANALYSIS(FLOW) " tis.dfd" "UserTripPlanningInte"
ANALYSIS(FLOW) "tis.dfd" "TripGuidance"
ANALYSIS(FLOW) "tis.dfd" "CentralizedTripGuida"
ANALYSIS(FLOW) "tis.dfd" " On-BoardTripGuidance"

NAME Request-To-Validate
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" " QueryRequestManager'

NAME Request-Validity
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "QueryRequestManager

NAME Resorts
COMPOSITION
DEFINITION
REFERENCES

NAME Response
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DataDistribution"
ANALYSIS(FLOW) " tis.dfd" "QueryRequestManager'

NAME RoadConditionData
COMPOSITION Link-ID+
LinkName+
StreetName+
SurfaceCondition+
SutfaceTemperature+
PrecipitationType+
PrecipitationLevel
DEFINITION
REFERENCES ANALYSIS(FLOW) "tisdfd" "CorridorATIS"

NAME RoadGeometrics
COMPOSITION
DEFINITION
REFERENCES

NAME RoadNetworkTopology
COMPOSITION
DEFINITION
REFERENCES

NAME RoadRoutePlanner
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “TripPlanning”

NAME RoadTrafficStatusLookup
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “TripPlanning”

NAME RoadwayandTransitData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(STORE) “tis.dfd” “TripGuidance”
ANALYSIS(STORE) “tis.dfd” “DisseminationApplica”
ANALYSIS(STORE) “tisdfd” “TripPlanning”
ANALYSIS(STORE) “tis.dfd” “CentralizedTripGuida”
ANALYSIS(FLOW) “tis.dfd” “CentralizedTripGuida”

NAME RoadwayData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “CentralizedTripGuida”
ANALYSIS(STORE)“ tis.dfd” “TripPlanning”

NAME Route-ID
COMPOSITION
DEFINITION
REFERENCES

NAME RoutePreferences
COMPOSITION
DEFINITION
REFERENCES

NAME Routes
COMPOSITION
DEFINITION
REFERENCES

NAME RouteSelectionParameters
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” ‘TripPlanning”
ANALYSIS(FLOW) “tis.dfd” “UserTripPlanningInte”

NAME RoutesofInterest
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “DisseminationApplica”

NAME ServicesData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(STORE) “tis.dfd” “TripPlanning”

NAME ServiceStation
COMPOSITION
DEFINITION
REFERENCES

NAME Seventy
COMPOSITION
DEFINITION
REFERENCES

NAME SpecialAcc,essRequirements
COMPOSITION
DEFINITION
REFERENCES

NAME SpecialEvents
COMPOSITION Incident-ID+
EventName+
SpecialEventType+
Location+
StartTime+
EndTime+
EventCharacteristics+
TrafficImpact+
TransitImpact+
EmergencyServicesRequired
DEFINITION
REFERENCES

NAME SpecialEventType
COMPOSITION
DEFINITION
REFERENCES

NAME Speed
COMPOSITION
DEFINITION
REFERENCES

NAME SpeedLimit
COMPOSITION
DEFINITION
REFERENCES

NAME StartCoordinates
COMPOSITION
DEFINITION
REFERENCES

NAME StartTime
COMPOSITION
DEFINITION
REFERENCES

NAME StaticNetworkData
COMPOSITION RoadNetworkTopology+
RoadGeometrics+
RawMapData+
HistorkalTrafficData
DEFINITION
REFERENCES ANALYSIS(FLOW) "tisdfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"

NAME StaticTransitData
COMPOSITION TransitSchedule+
TransitRoutes+
TransitFare+
TransitUsage+
TransitCapacity
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"
ANALYSIS(FLOW) 'tisdfd" "TIS"

NAME Stationlocation
COMPOSITION
DEFINITION
REFERENCES

NAME Status
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "Communications"

NAME StreetName
COMPOSITION
DEFINITION
REFERENCES

NAME Subscriber
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(STORE) "tis.dfd" "DisseminationApplica"

NAME SubscriberData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tisdfd" "DisseminationApplica"
ANALYSIS(STORE) "tis.dfd" "DisseminationApplica"

NAME SubscriberInformation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DisseminationApplica"

NAME SubscriberInformationProcessing
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "DisseminationApplica"

NAME SuggestedModes
COMPOSITION
DEFINITION
REFERENCES

NAME SuggestedRoutes
COMPOSITION
DEFINITION
REFERENCES

NAME SurfaceCondition
COMPOSITION
DEFINITION
REFERENCES

NAME SurfaceTemperature
COMPOSITION
DEFINITION
REFERENCES

NAME TavelerDataStore
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(STORE) " tis.dfd" "ManageTravelerInform"

NAME TelephoneAudioReport
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" "DisseminationApplica"

NAME Temperature
COMPOSITION
DEFINITION
REFERENCES

NAME TextInformationRecorder
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) " tis.dfd" "DisseminationApplica"

NAME TIC-ID
COMPOSITION
DEFINITION
REFERENCES

NAME TISData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(STORE) "tis.dfd" "DataManagement"
ANALYSIS(STORE) "tis.dfd" "ReportGenerator"

NAME TOCs
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(EXTERNAL) "tis.dfd" "TIS"

NAME TrafficConditionRequest
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ManageTravelerInform"

NAME Traff icDemandsTrends
COMPOSITION Current-O-D-Matrix+
Historic-O-D-Matrix
DEFINITION These O-D data are derived from travlers trip planning data.
REFERENCES ANALYSIS(FLOW) 'tis.dfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"

NAME TrafficForecasts
COMPOSITION
DEFINITION Future LinkData. Composition is similar to LinkData.
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"

NAME TrafficImpact
COMPOSITION
DEFINITION
REFERENCES

NAME TrafficInitiatedNotification
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) 'tis.dfd" "DisseminationApplica"

NAME TrafficReportScheduler
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "DisseminationApplica"

NAME TrafficRestrictions
COMPOSITION
DEFINITION
REFERENCES

NAME TrafficTransitStatusLookup
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "DisseminationApplica"

NAME TransferSchedules
COMPOSITION
DEFINITION
REFERENCES

NAME TransitArrivalEstimate
COMPOSITION
DEFINITION
REFERENCES

NAME TransitCapacity
COMPOSITION
DEFINITION
REFERENCES

NAME Transitconditions
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ManageTravelerInform"

NAME TransitDemandsTrends
COMPOSITION Current-O-D-Matrix+
Historic-Od-Matrix
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"

NAME TransitDispatchCenters
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(EXTERNAL) "tis.dfd" "TIS"

NAME TransitFare
COMPOSITION
DEFINITION
REFERENCES

NAME TransitImpact
COMPOSITION
DEFINITION
REFERENCES

NAME TransitInfo
COMPOSITION Real-TimeTransitInfo+
StaticTransitData
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "Communications"

NAME Transitlocation
COMPOSITION
DEFINITION
REFERENCES

NAME TransitPlanner
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "TripPlanning"

NAME TransitRoutes
COMPOSITION
DEFINITION
REFERENCES

NAME TransitSchedule
COMPOSITION
DEFINITION
REFERENCES

NAME TransitUsage
COMPOSITION
DEFINITION
REFERENCES

NAME TransportationMode
COMPOSITION
DEFINITION
REFERENCES

NAME TravelAdvisory
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" " CorridorATIS"
ANALYSIS(FLOW) "tis.dfd" "DataDistribution"
ANALYSIS(FLOW) "tis.dfd" "TIS"

NAME TravelAlerts
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tisdfd" "DataDistribution"
ANALYSIS(FLOW) " tis.dfd" "DataManagement"
ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"

NAME TravelData-In
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" "ManageTravelerInform"

NAME TravelerInformationManager
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "ManageTravelerInform"

NAME TravelerServicesInformation
COMPOSITION SpecialEvents+
Attractions+
HistoticalSites+
Fetivals+
ParksandRecreation+
CulturalandArts+
EducationalInstituions+
Resorts
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"

NAME TravelerTripPlanningRequest
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ManageTravelerInform"

NAME TravelerTripPlanningResponse
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ManageTravelerInform"

NAME TravelInformation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "ApplicationRouting"

NAME TravelInsttuctionGenerator
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "TripPlanning"

NAME TravelInstructions
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" 'TripPlanning"
ANALYSIS(FLOW) " tis.dfd" "UserTrfpPlanningInte"

NAME TravelTime
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" "DataDistribution"
ANALYSIS(FLOW) "tis.dfd" "ManageTravelerInform

NAME TripConfirmation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DataDistribution"
ANALYSIS(FLOW) "tis.dfd" "ManageTravelerInform"

NAME TripGuidance
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" " CorridorATIS"

NAME TripItineraries
COMPOSITION Origin+
Destination+
SuggestedRoutes+
SuggestedModes+
TransferSchedules
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"

NAME TripPlanandQueries
COMPOSITION TripPlanRequests+
ad-hoc-Requests
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "CorridorATIS"
ANALYSIS(FLOW) "tis.dfd" "Communications"

NAME TripPlanning
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tisdfd" "CorridorATIS"

NAME TripPlanningData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "On-BoardTripGuidance"

NAME TripPlanningParameters
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “TripPlanning”
ANALYSIS(FLOW) “tis.dfd” “UserTripPlanningInte”

NAME TripPlanningResponse
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “DataDistribution”
ANALYSIS(FLOW) “tis.dfd” “ManageTravelerInform

NAME TripPlanRequests
COMPOSITION Origin+
Destination+
DepartureTime+
ArrivalTime+
ModalPreferences+
RoutePreferences+
CostConstraints+
WalkingConstraints+
SpecialAccessRequirements
DEFINITION
REFERENCES

NAME TripRequest
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “DataDistribution”
ANALYSIS(FLOW) “tis.dfd” “ManageTravelerInform”

NAME TrvaleTime
COMPOSITION
DEFINITION
REFERENCES

NAME UserInformationIntegrator
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “tis.dfd” “UserTripPlanningInte”

NAME UserRequest
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) “tis.dfd” “TripGuidance”
ANALYSIS(FLOW) “ tis.dfd”“On-BoardTripGuidance”
ANALYSIS(FLOW) “ tis.dfd” “DisseminationApplica”
ANALYSIS(FLOW) “ tis.dfd” “TripPlanning”
ANALYSIS(FLOW) “ tis.dfd” “UserTripPlanningInte”
ANALYSIS(FLOW) “tis.dfd” “DataDistribution”
ANALYSIS(FLOW) “tis.dfd” “QueryRequestManager”
ANALYSIS(FLOW) “tis.dfd” “CorridorTIS”
ANALYSIS(FLOW) “tis.dfd” “ApplicationRouting”

NAME UserRequestProcessor
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) “ tis.dfd” “UserTripPlanningInte”

NAME UserRequestResponseFormulation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tisdfd" " UserTripPlanningInte"

NAME Users
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(EXTERNAL) "tisdfd" "TIS"

NAME UserSelectedRoute
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "CentralizedTripGuida"
ANALYSIS(FLOW) "tisdfd" "TripPlanning"
ANALYSIS(FLOW) "tis.dfd" "UserTripPlanningInte"

NAME UserTrafficReportQuery
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "DisseminationApplica"

NAME UserTripPlanningInterface
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tisdfd" "TripPlanning"

NAME VAR-Data
COMPOSITION
DEFINITION This can be any value-added data prepared by CTIS partners, such as ISPs. The data can be historic/ real-time/predicted and relate to traffic/roadway/weather etc.
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TIS"
ANALYSIS(FLOW) " tis.dfd" "CorridorATIS"

NAME Vehcile-ID
COMPOSITION
DEFINITION
REFERENCES

NAME VehcileClass
COMPOSITION
DEFINITION
REFERENCES

NAME VehicleFleetDatabase
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(STORE) "tisdfd" "CentralizedTripGuida"

NAME VehicleInformation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tisdfd" "CentralizedTripGuida"

NAME Visibility
COMPOSITION
DEFINITION
REFERENCES

NAME Volume
COMPOSITION
DEFINITION
REFERENCES

NAME WalkingConstraints
COMPOSITION
DEFINITION
REFERENCES

NAME Weather-Alert
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) " tis.dfd" "DataManagement"

NAME WeatherandEnvironmentalData
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(STORE) " tis.dfd" "TripPlanning"

NAME WeatherandEnvironmentalInfo
COMPOSITION Location+
Data+
Temperature+
CloudyCondition+
Visibility+
PrecipitationType+
PrecipitationLevel+
AirQuality
DEFINITION
REFERENCES ANALYSIS(FLOW) "tis.dfd" "TIS"
ANALYSIS(FLOW) "tis.dfd" "ConidorATIS"

NAME WeatherandEnvironmentalLookup
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(PROCESS) "tis.dfd" "TripPlanning"

NAME YellowPageInformation
COMPOSITION
DEFINITION
REFERENCES ANALYSIS(FLOW) "tisdfd" "DataDistribution"
ANALYSIS(FLOW) " tis.dfd" "ManageTravelerInform"

Appendix I - Database Schema

Appendix I

1.0 Database Design Overview

During this task, database elements which together form the database schema have been defined based on the input data, output data, and individual subsystem data processing requirements. Relational Data Modeling techniques have been used to develop and illustrate the types of data maintained and the interconnections between the data. The format of the data has also been identified.

Each type of database data has a distinct purpose (e.g. to convey information about a roadway link). The importance of these data structures is magnified, because in addition to being used by the CTIS system itself, they may impact all external systems that supply or receive CTIS data. Compatibility concerns dictate that these outside systems must supply the data either in the format designed for CTIS, or in a format that can be translated by the CTIS into a CTIS format. Similarly, output from the CTIS to outside systems must be in a form that is understood directly by those systems or in a form that can be translated by those systems.

2.0 Relational Data Modeling

The CTIS database descriptions are presented in the form of Entity-Relationship Diagrams (ERD). The Entity-Relationship approach to data description was introduced by P.P. Chen in 1976. Since that time, it has been widely accepted as a standard for relational database design and description. The following sections describe the Entity-Relationship Notation that will be used in this document.

2.1 Entity Notation

During relation database design, data is analyzed and defined in the form of entities. An entity is a person, place or thing about which information in the database is maintained. An entity corresponds closely to a concrete real-world object or idea. A traffic data , parking data, and subscriber data are objects and therefore are entities in the CTIS database.

An entity set is a group of similar entities. All entities of the same type belong to the same entity set. For instance, the data entity set would consist of an entity for each type of data requested such as subscriber data, traffic data, and parking data.

Entities have attributes that describe the pieces of data that comprise the entity. An attribute is a characteristic of an entity. The attributes of an traffic data entity include the equipment ID, link ID, star-l time, end time, traffic count, speed, density, queue length, and delay.

An entity must contain at least one attribute or a combination of attributes that will uniquely identify that entity from other entities in the same entity set. This unique attribute or combination of attributes is called a primary key. The primary key of a traffic data entity is the equipment ID. Each sensor collecting traffic data information is assigned a unique equipment ID. There maybe several thousand sensors collecting traffic data at the same time , but each individual sensor can be distinguished from another by examining the equipment ID.

2.2 Relationship Notation

Entities are related to each other in the same way that the associated real world objects are related. An entity may be related to one or more entities. For example, a relationship exists between point of interest data and link, because point of interest data may be located on a defined link. Relationships can be categorized as one of three types. These three types of relationships include one-to-one, one-to-many and many-to-many.

Entities and relationships are presented graphically in an ERD. Entities are represented by rectangles and relationships by diamonds. Relationship diamonds are connected by lines to the corresponding entities. These lines are labeled with “1” or “m” to indicate whether the relationship is “one-to” or “many-to” for the given entity.

A one-to-one relationship exists if an entity in one entity set is associated with only one entity in the second entity set and an entity in the second entity set is associated with at most one entity in the first entity set. For example, a HAZMAT vehicle will have a manifest describing its cargo and that manifest will be associated with only that vehicle. Therefore, a one-to-one relationship exists between a vehicle and a manifest. Figure 2-13 illustrates this one-to-one relationship.

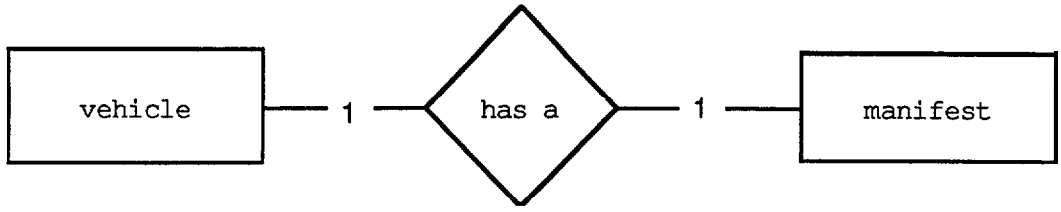


Figure 2- 13. One-to-One Relationship Example

A one-to-many relationship exists if an entity in one entity set is associated with zero, one, or more entities in the second entity set , and an entity in the second entity set is related to at most one entity in the first entity set. An incident and the location type of that incident have a one-to-m

any relationship. Many incidents occur on freeways or on-ramps. An incident pertains to only one incident type. Therefore, the incident and location-type entities have a one-to-many relationship. Figure 2-14 illustrates this one-to-many relationship.

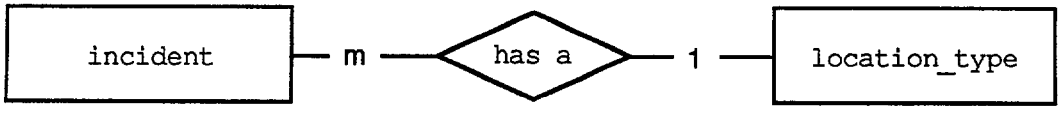


Figure 2- 14. One-to-Many Relationship Example

A many-to-many relationship exists if an entity in one entity set is associated with zero, one or more entities in the second entity set, and an entity in the second entity set is related to zero, one, or more entities in the first entity set. The entities vehicle and route have a many-to-many relationship. A vehicle can travel on many different routes to get to its final destination and additionally routes can contain many different vehicles. Therefore, the vehicle and route entities have a many-to-many relationship. Figure 2-15 illustrates this many-to-many relationship.

Figure 2- 15. Many-to-Many Relationship Example

2.3 Normalization

Normalization is a technique for developing and evaluating data models in which data redundancy is minimized and consistency is maximized. There are many forms or levels of normalization. The following is a brief description of each type of normalization:

First Normal Form: The relationship between the primary key of a table and each of the other columns must be one-to-one. In addition, a given column may not contain more than one piece of information.

Second Normal Form: The relationship between any portion of the primary key of a table and each of the other columns must not be one-to-one. That is, every field that is not part of the primary key must depend on the entire primary key.

Third Normal Form: The relationship between any two non-primary key columns of a table, excepting alternate key columns, must not be one-to-one. That is, columns which are not primary or alternate keys may not depend on another column which is not a primary or alternate key.

Third Normal Form is a process whii strives to devebp data structures that:

a. Minimize redundancy by not storing data in multiple locations.

b. Eliminate update anomalies that may result if data stored redundantly is not updated in all locations.

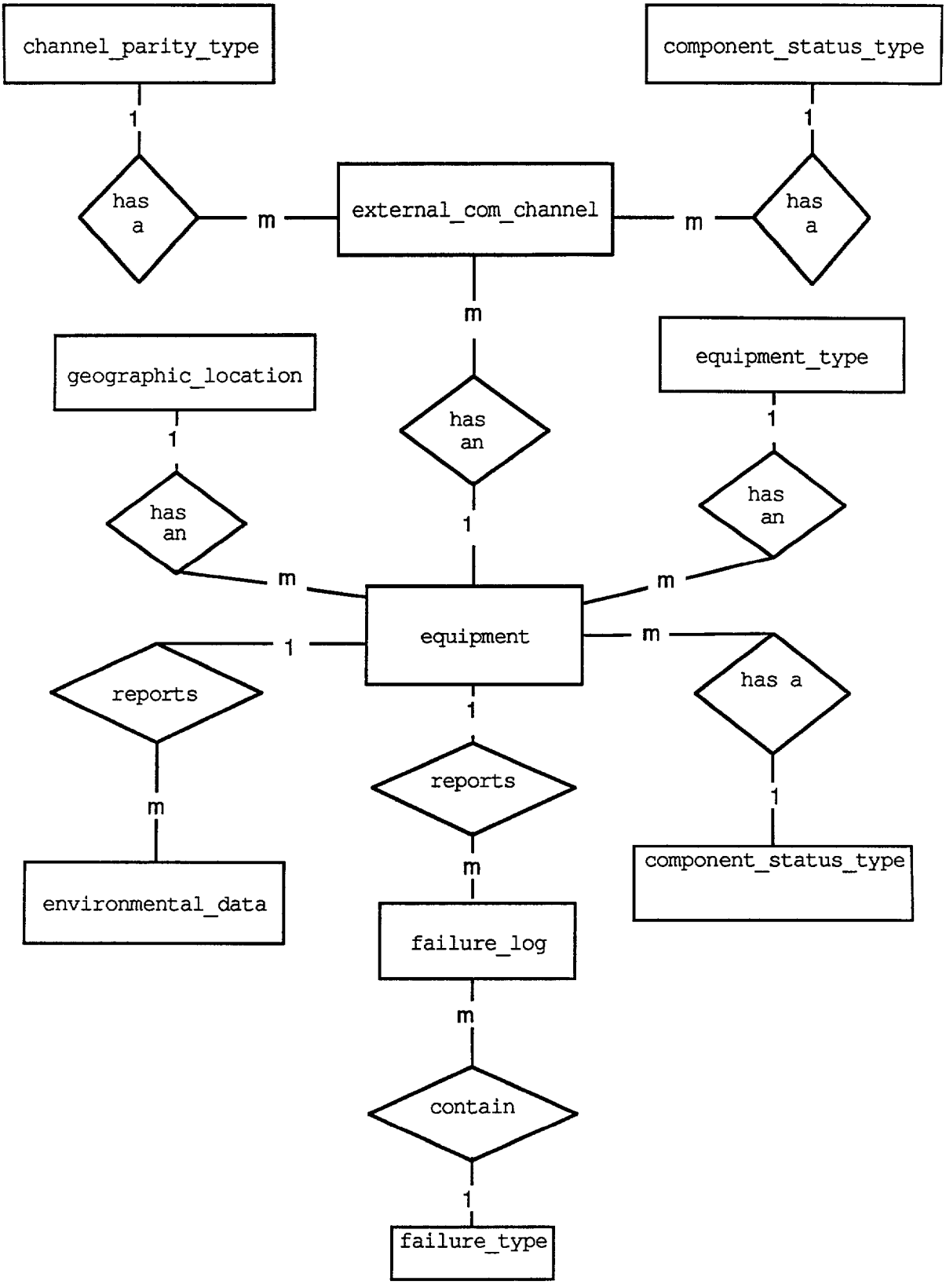
c. Ensure that the maintenance and retrieval of data is simplified by minimizing redundancy and by allowing a column to contain only one piece of information.

A design is considered to be in Third Normal Form if it meets the rules for First, Second and Third Normal form. The CTIS database design is initially intended to be in Third Normal Form. During implementation it may be necessary to denormalize portions of the database for performance reasons. Each case will be evaluated on an individual basis.

3.0 CTIS Database Design

During the CTIS database design process, many entities, attributes, and relationships have been defined. All of these entities, attributes, and relationships can not be physically managed in one ERD. Therefore, several ERDs have been developed. The ERDs are arranged so thant any two diagrams have the fewest number of entities in common. For example, the ERDs containing the incident entity are decomposed into the Incident and Incident Type ERDs. The incident entity appears in both of the diagrams. The double lined rectangle with an associated name and number indicates an entity that explodes to a sub diagram called a subordinate child ERD. Each ERD will be followed by a description of each of the entities on the diagram.

3.1 Equipment Entity Relationship Diagram



Equipment Entity Relationship Diagram

The following is a list of these entities and their descriptions that are represented in the Equipment Entity-Relationship Diagram:

- channel_parity_type

The channel_parity_type entity describes channel parity type codes. Examples are odd, even, none parity. The channel parity types are referenced in the external corn-channel entity.

- component_status_type

The component_status_type entity describes component status type codes. Examples are online, offline, down or test mode. The component status types are referenced in the external-corn-channel and equipment entities.

- environmental_data

The environmental_data entity contains pollution information that is received from sensors in the field. Sensor readings could include carbon monoxide, nitrous oxide, hydro carbon, air quality, and noise levels.

- equipment

The equipment entity contains equipment description information. The types of information maintained include model number, serial number, bar code number, last service date, owner, location, installation date, status, and manufacturer date. This entity also contains equipment classification types such as computer equipment, modems, etc.

- equipment_type

The equipment_type entity describes equipment type codes. Examples are computer hardware, modems, etc. The equipment types are referenced in the equipment entity.

- external_com_channel

The external_com_channel entity will contain the channel definitions to all the external data sources that the CTIS must interface with.

- failure-_log

The failure_log entity tracks all system failures. System failures include equipment, hardware, software and database failures.

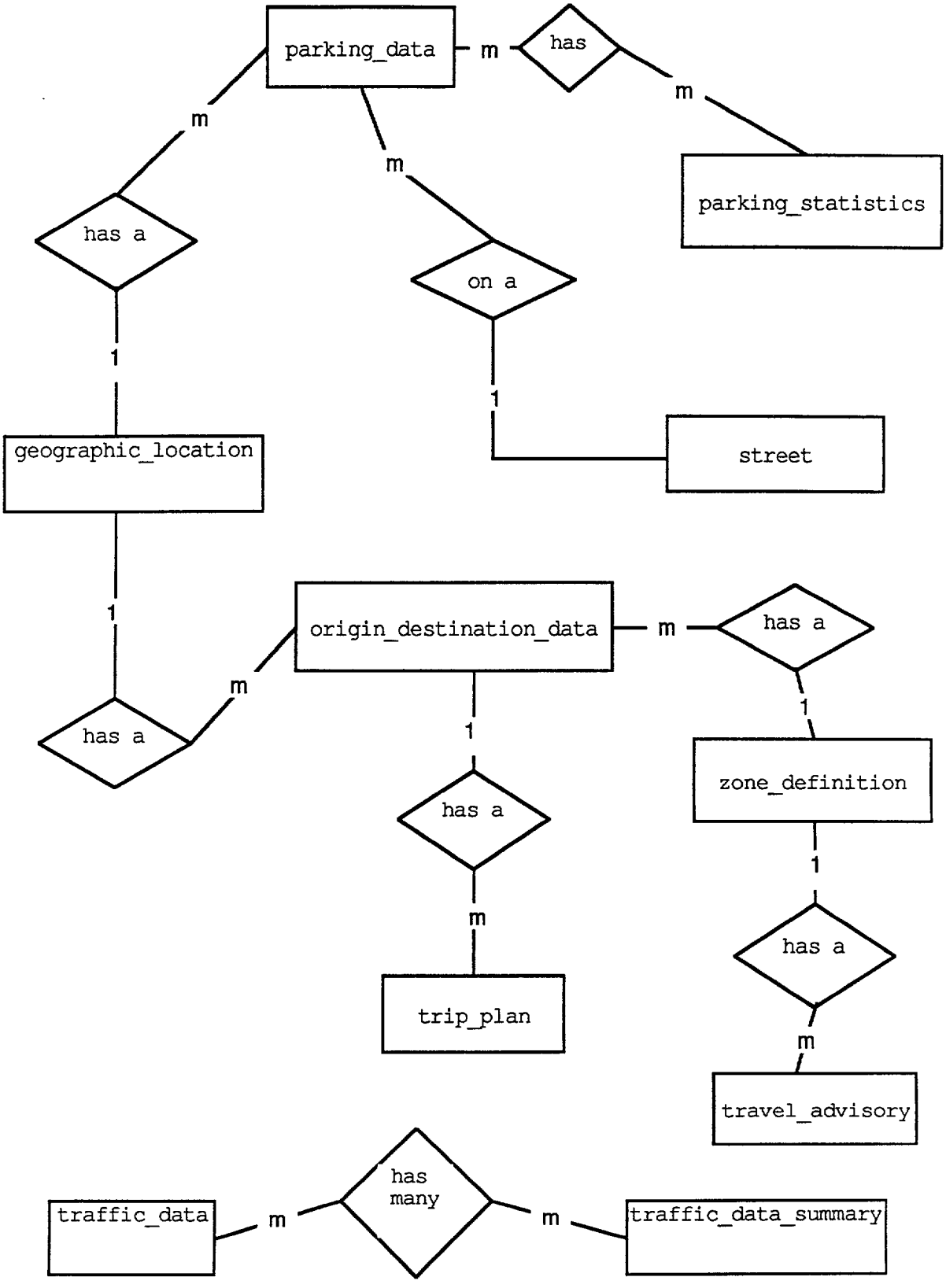
- failure_type

The failure_type entity describes failure type codes. Examples of failure types include hardware, database, operating system, and CTIS software. The failure types are referenced in the failure log entity.

- geographic_location

The geographic_location entity contains the longitude and latitude used by the GIS. This allows for the mapping of traffic data and other layered information to be displayed on a map.

3.2 Travel Entity Relationship Diagram



Travel Entity Relationship Diagram

The following is a list of these entities and their descriptions that are represented in the Travel Entity-Relationship Diagram:

- geographic_location
The geographic_location entity contains the longitude and latitudeused by the GIS. This allows for the mapping of traffic data and other layered information to be displayed on a map.

- origin_destination_data
The origin_destination_data entity maintains origin-destination data for trip plans and the travelled zones.

- parking_data
The parking_data entity maintains parking availability data including the parking lot name and cost.

- parking_statistics
The parking_statistics entity contains the number of available open parking spaces at a referenced date-time.

- street
The street entity will contain street names for all defined links and intersections.

- traffic_data
The traffic_data entity will contain near real time sensor readings. The types of information maintained include traffic counts during a specific time, traffic density and speed, etc.

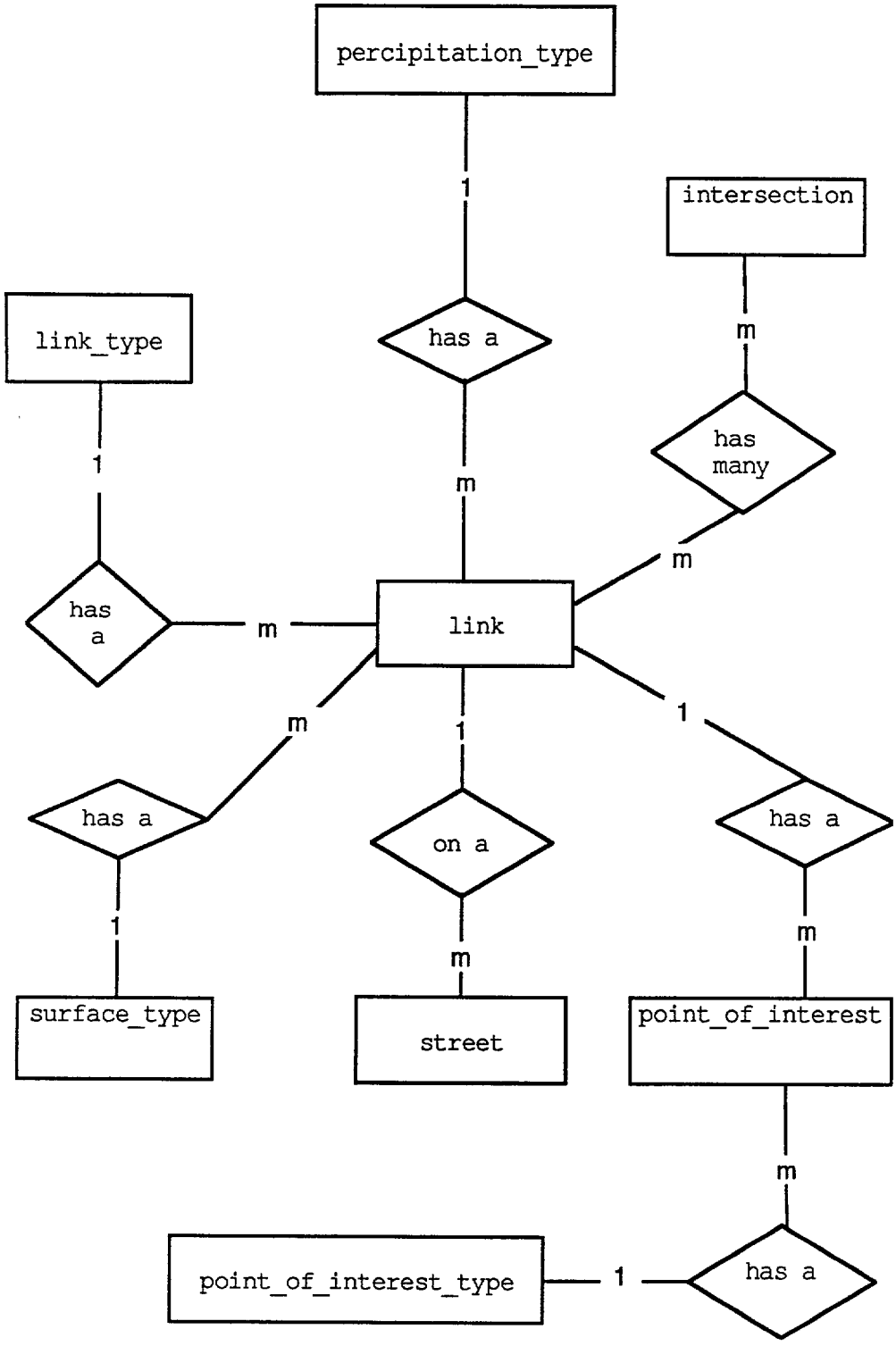
- traffic_data_summary
The traffic_data_summary entity contains traffic summaries for sensor equipment. The summaries are computed at predetermined time intervals for each sensor and the computed traffic averages will be maintained.

- travel_advisory
The travel_advisory entity will contain traveler advisory information.

- trip_plan
The trip_plan entity maintains trip plan information from the field.

- zone_definition
The zone_definition entity contains the boundaries defining a specific area .

3.3 Link Entity Relationship Diagram



Link Entity Relationship Diagram

The following is a list of these entities and their descriptions that are represented in the Link Entity-Relationship Diagram:

- intersection

The intersection entity contains traffic intersection location.

- link

The link entity contains the definition of links that are defined for streets and highways. Link lengths are defined in the GIS. The types of information maintained include street id, number of lanes and shoulders, location, traffic statistics, weather statistics, link direction, etc.

- link_type

The link_type entity describes link type codes. Examples of link types include freeway, arterial, ramp, etc. The link types are referenced in the link entity.

- percipitation_type

The percipitation_type entity describes percipitation type codes. Examples are rain, snow, fog, etc. Percipitation types are referenced in the link entity.

- point_of_interest

The point_of_interest entity contains location, contact information, and interest information on a specific link.

- point_of_interest_type

The point_of_interest_type entity describes point of interest type codes. Examples of point of interest types include restaurants, shopping mails, landmarks, etc. Point of interest types are referenced in the point-of-interest entity.

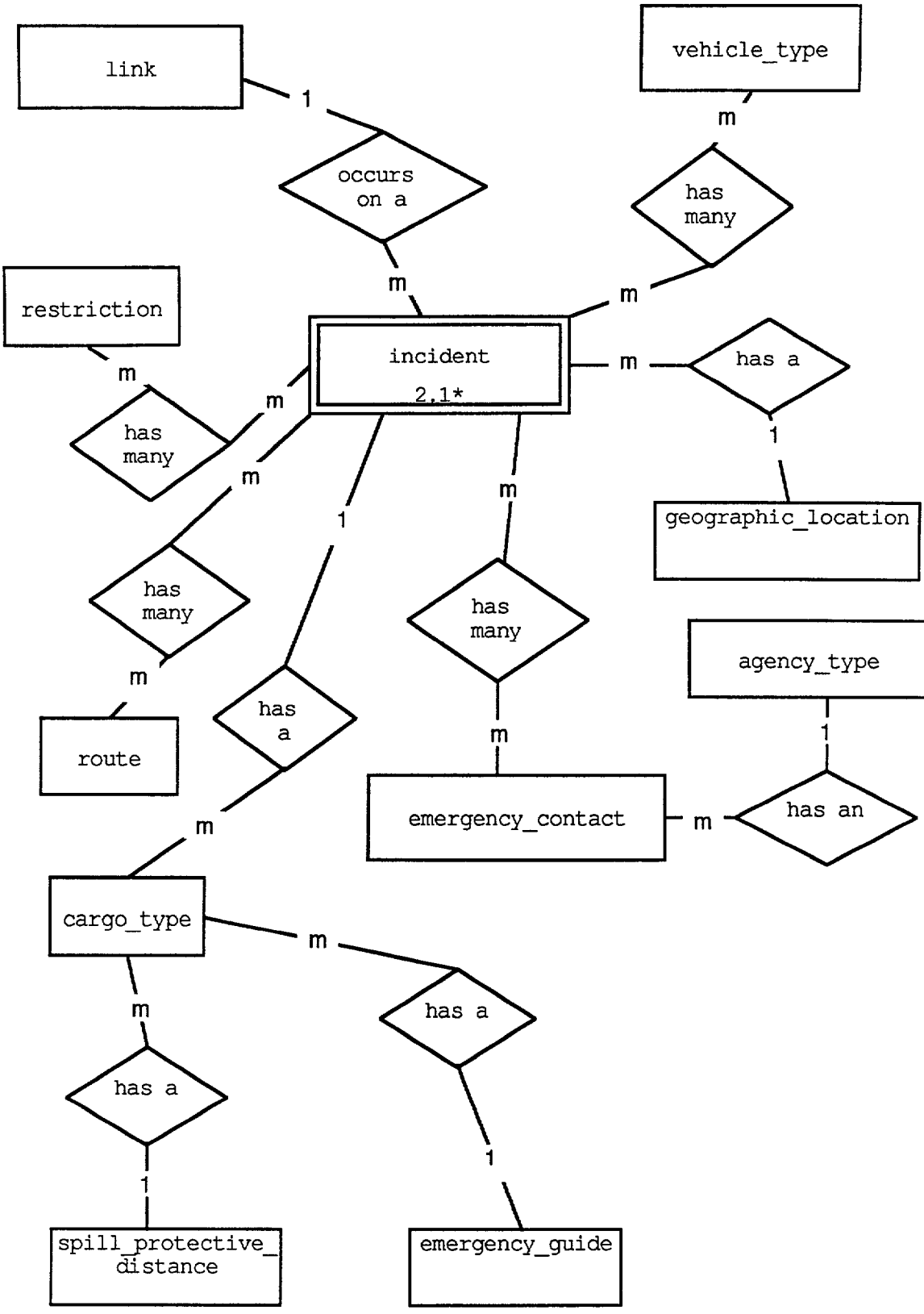
- street

The street entity will contain street names for ail defined links and intersections.

- surface_type

The surface_type entity describes surface type codes. Examples are wet, icy, dry, etc. Surface types are referenced in the link entity.

3.4 incident Entity Relationship Diagrams



Incident Entity Relationship Diagram

The following is a list of entities and descriptions that are represented in the Incident Entity-Relationship Diagram:

- agency_type
The agency_type entity describes agency type codes. Examples are police, ambulances, state officials, etc. The agency types are referenced in the emergency contact entity.

- emergency_contact
The emergency_contact entity contains information needed for contacting the appropriate rescue team.

- emergency_guide
The emergency_guide entity contains the DOT emergency response guide number and the emergency action steps needed to handle incidents involving hazardous materials.

- geographic_location
The geographic_location entity contains the longitude and latitudeused by the GIS. This allows for the mapping of traffic data and other layered information to be displayed on a map.

- incident
The incident entity tracks the incidents and planned incidents as they occour and their current status.

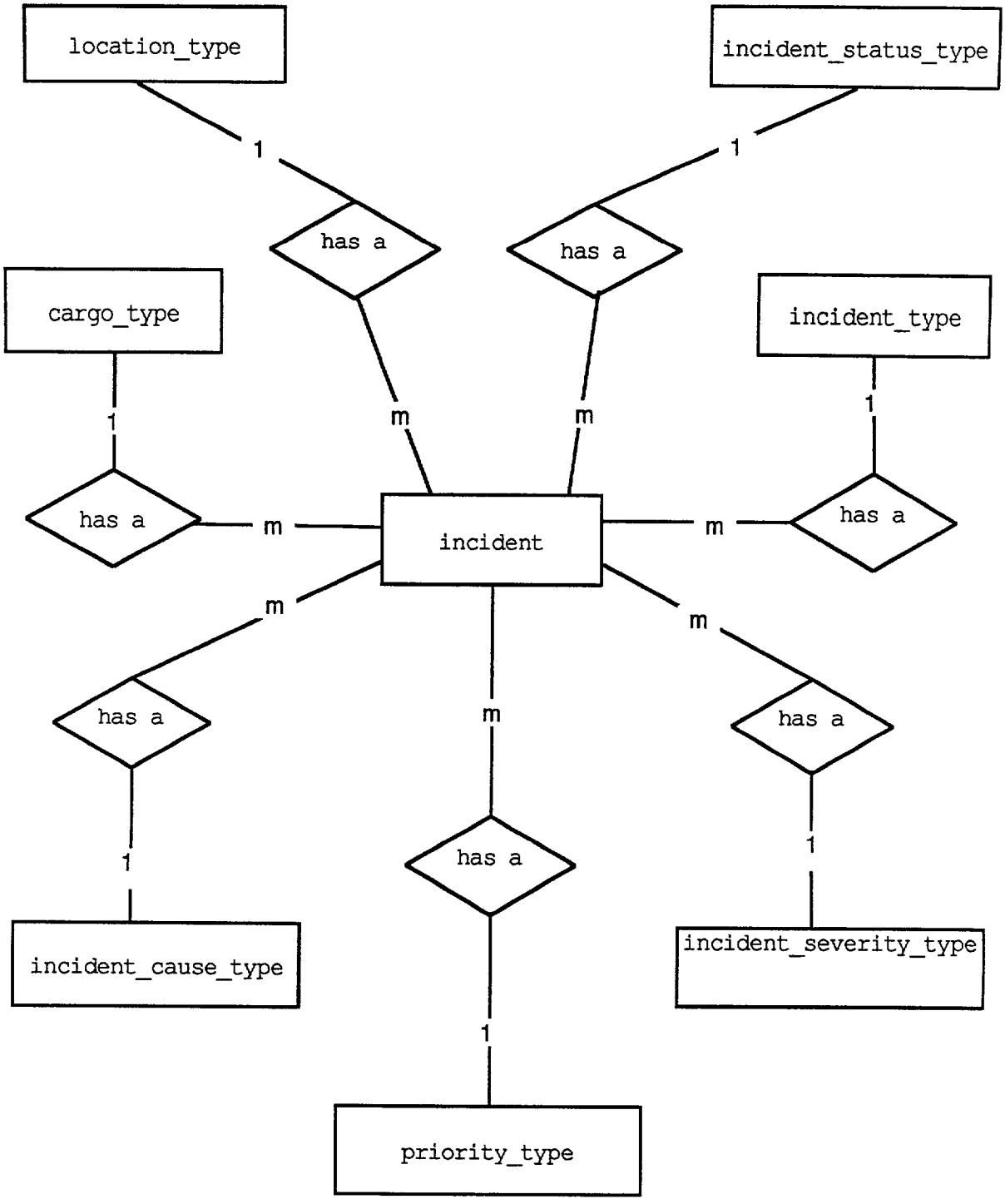
- link
The link entity contains the definition of links that are defined for streets and highways. Link lengths are defined in the GIS. The types of information maintained include street id, number of lanes and shoulders, location, traffic statistics, weather statistics, link direction, etc.

- route
The route entity contains recommended travel strategies or detours between origin and destination points.

- spill_protective_distance
The spill_protective_distance entity maintains for a hazardous material, the initial isolation and protective action distance needed for an accident.

- vehicle_type
The vehicle_type entity describe vehicle type codes. The vehicle types are referenced in the vehicle entity.

3.5 Incident Types Entity Relationship Diagram



Incident Types Relationship Diagram

The following is a list of entities and descriptions that are represented in the Incident Entity-Relationship Diagram:

- cargo_type

The cargo_type entity describes cargo type codes. Examples are chemicals, gasses, oils, etc. Cargo types are referenced in the incident entity.

- incident

The incident entity tracks the incidents and planned incidents as they occour and their current status.

- incident_cause_type

The incident_cause_type entity describes incident cause codes. Examples are weather conditions, vehicles, etc. Incident cause types are referenced in the incident entity.

- incident_severity_type

The incident_severity_type entity describes incident severity codes. Examples are none, minor, major. The incident severity types are referenced in the incident entity.

- incident_status_type

The incident_status_type entity describes incident status codes. Examples are planned, ongoing, completed: The incident status types are referenced in the incident entity.

- incident_type

The incident_type entity describes incident type codes. Examples of incident type codes include accident, staled vehicle, cargo spill, environmental condition, and construction. Incident types are referenced in the incident entity.

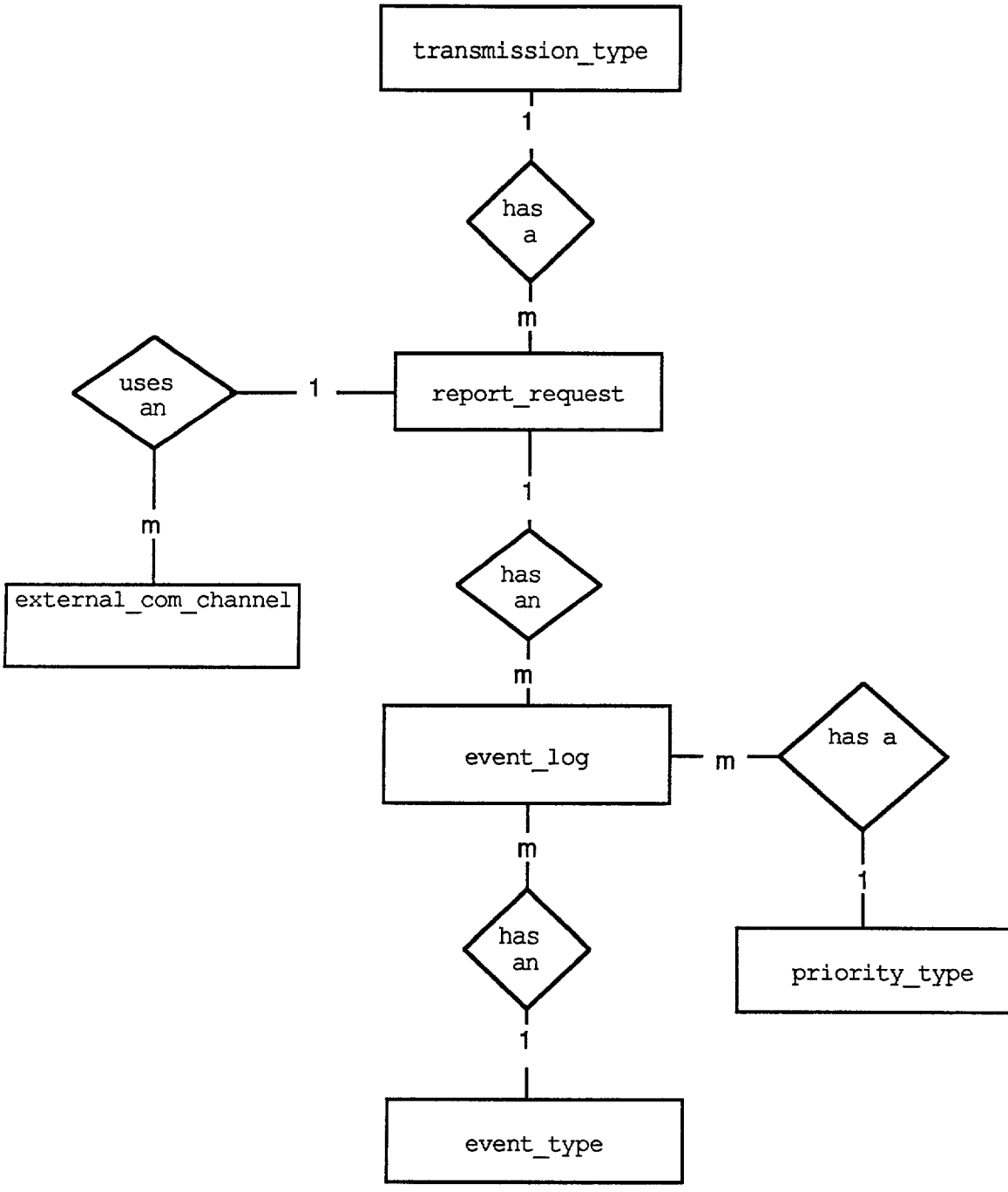
- location_type

The location_type entity describes location type codes. Examples of location types are freeway, main lane, freeway shoulder, freeway median, on-ramp, off-ramp, service road, etc. Location types are referenced in the incident entity.

- priority_type

The priority_type entity describes priority type codes. Examples are immediate, routine, etc. Priority types are referenced in the incident entity.

3.6 Event Log Entity Relationship Diagram



Event Log Entity Relationship Diagram

The following is a list of these entities and their descriptions that are represented in the Event Log Entity-Relationship Diagram:

- event_log

The event_log entity contains information pertaining to events that are tracked the the CTIS. Events include hardware/software failures, incidents, construction, etc.

- event_type

The event_type entity will describes event type codes. Examples are hardware, software, construction, accidents, etc. Event types are referenced in the event-log entity.

- external_com_channel

The external_com_channel entity will describes external communication connections.

- geographic_location

The geographic_location entity contains the longitude and latitude used by the GIS. This allows for the mapping of traffic data and other layered information to be displayed on a map.

- priority_type

The priority-type entity describes priority type codes. Examples are immediate, routine, etc. Priority types are referenced in the incident entity.

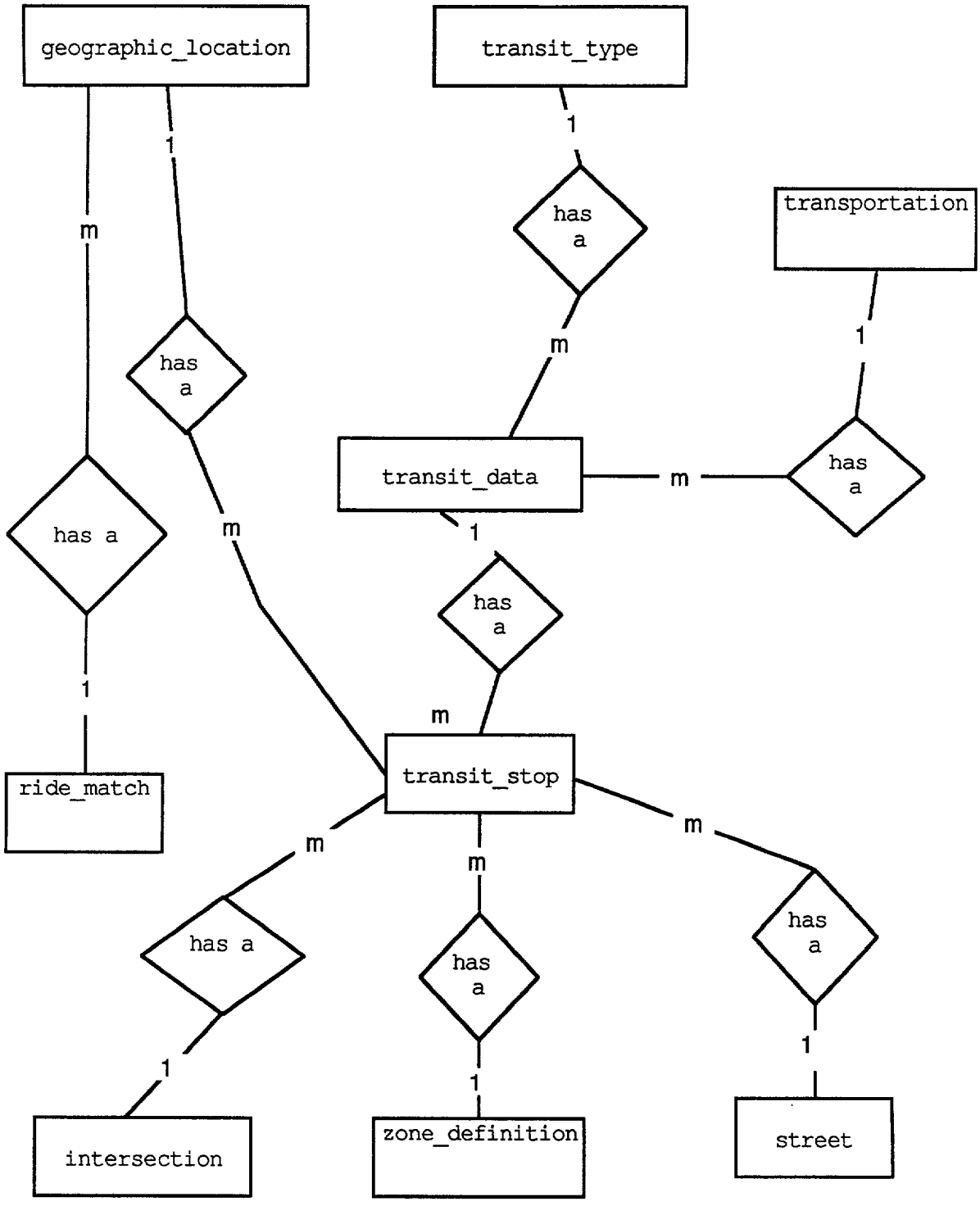
- report_request

The report_request entity stores requests for data and/or reports from external sources.

- transmission_type

The transmission_type entity describes transmission type codes. Examples are modem, fax, ftp, etc. Transmission types are referenced in the report-request entity.

3.7 Transit Entity Relationship Diagram



Transit Entity Relationship Diagram

The following is a list of these entities and their descriptions that are represented in the Transit Entity-Relationship Diagram:

- geographic_location

The geographic_location entity contains the longitude and latitude used by the GIS. This allows for the mapping of traffic data and other layered information to be displayed on a map.

- intersection

The intersection entity contains traffic intersection location.

- ride_match

The ride_match entity contains ride matching information.

- street

The street entity will contain street names for all defined links and intersections.

- transit_data

The transit_data entity maintains transit information including location stop time and route ids.

- transit_stop

The transit_stop entity contains transit stop information.

- transit_type

The transit_type entity describes transit type codes. Examples of transit types include bus, train, monorail. The transit types are referenced in the transit-data entity.

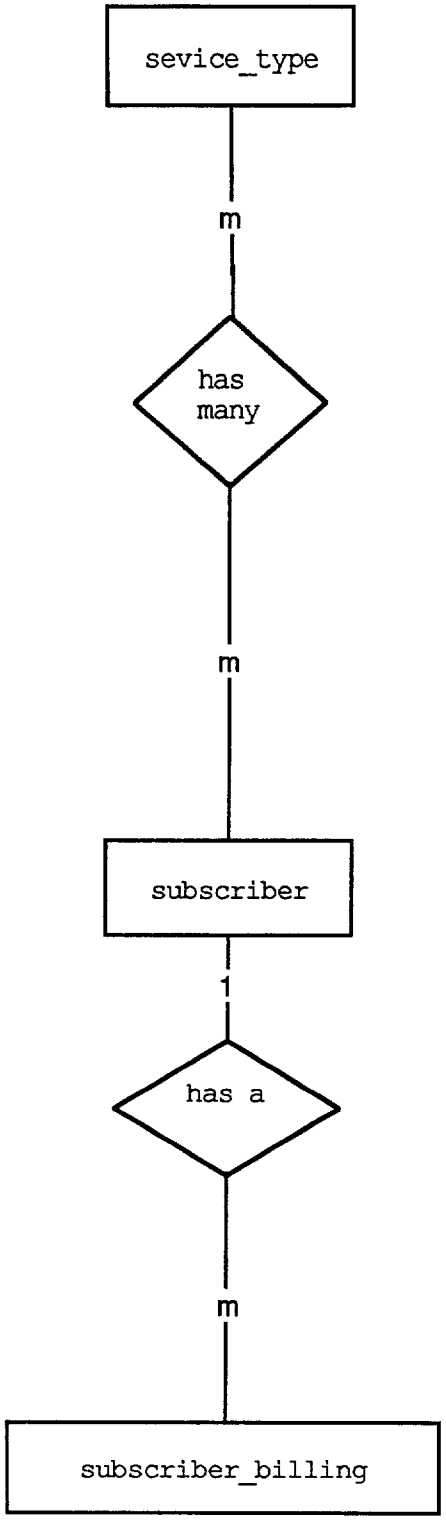
- transportation

The transportation entity contains transportation information.

- zone_definition

The zone_definition entity defines zones.

3.8 Subscriber Entity Relationship Diagram



Subscriber Entity Relationship Diagram

The following is a list of these entities and their descriptions that are represented in the Subscriber Entity-Relationship Diagram:

- service_type

The service_type entity contains service code definitions and billing amount.

- subscriber

The subscriber entity contains subscriber information.

- subscriber_billing

The subscriber_billing entity contains subscriber billing information.

4.0 CTIS Database Schema Definition

The attributes that comprise the entities on the CTIS ERDs are described below. Entity names are in bold. Attributes for a given entity are listed immediatly following the entity name. Primary keys are denoted by an "*" and foreign keys are denoted by "#".

ATIS DATARASE SCHEMA

agency_type		
*agy_agency_code	code	Agency code
agy_agency_name	description	Agency name
cargo_type		
*cgo_cargo_id	id	Cargo Id number
cgo_cargo_code	chemnum	Cargo type code or DOT chemical Id number
cgo_cargo_chem_name	chemname	Cargo chemical name
#cgo_emergency_response_id	emergencyid	**DOT** emergency response guide Id number (Refer to emergency-guide entity) If code is not a chemical then this field will be none.
channel_parity_type		
* chp_parity_code	code	Channel panty type code
chp_parity_code_descrip	description	Channel parity type code description (eg. odd, even, none)
component_status_type		
* cst_component_status_code	code	Channel status code for equipment and channels
cst_component_status_descrip	description	Channel status code description (eg. Online, Offline, Down)
emergency_contact		
* emc_contact_id	id	Emergency contact Id number
emc_agency_code	code	Agency code (Refer to agency-type entity)
emc_site_address	address	Emergency contact site address
emc_site_city	city	Emergency contact site city
emc_site_state	state	Emergency contact site state
emc_site_zip	zip	Emergency contact site zipcode
emc_site_county	county	Emergency contact site county
emc_telephone	phonenum	Emergency contact telephone number
emc_contact_person	name	Emergency contact person name
emergency_guide		
*emg_emergency_response_id	emergencyid	DOT emergency response guide number

emg_emergency_guide_text	emguide	Text on emergency action steps and potential hazards
environmental_data		
*env_equipment_id	id	Equipment Id number
*env_reading_date	datetime	Date and time of reading from the equipment
env_air_quality_reading	envreading	Air quality derived from environmental sensor readings
env_carbon_monoxide_reading	envreading	CO reading in parts per million
env_nitrous_oxide_reading	envreading	N20 reading in parts per million
env_hydra_carbon_reading	envreading	Hydrocarbon reading in parts per million
env_noise_reading	envreading	Noise level in decibels
equ_in_lnk		
*eil_equ_equipment_id	id	Equipment Id number
*eil_lnk_link_id	id	Link Id number
equipment		
*equ_equipment_id	id	Equipment Id number
#equ_equipment_code	code	Equipment code (Refer to equipment-type entity)
#equ_link_id	id	Link Id number (Refer to link entity)
#equ_intersection_id	id	Intersection Id number (Refer to intersection entity)
equ_model_num	modelnum	Model number
#equ_location_name	locname	Equipment location name (Refer to geographic-location entity)
equ_manufacturer_date	datetime	Date manufacturered
equ_modification_date	datetime	Date modified
equ_service_date	datetime	Date serviced
equ_installation_date	datetime	Date installed
equ_purchase_date	datetime	Date purchased
equ_mean_time_failure	days	Mean time between failures in days
equ_mean_time_maintenance	days	Mean time between maintenance in days
equ_owner	owner	Equipment owner
#equ_component_status_code	code	Equipment status (Refer to component-status-type entity)
equ_serial_num	serial	Equipment serial number
equ_bar_code_num	barcode	Equipment bar code number
equipment_type		
*eqt_equipment_code	code	Equipment type code

eqt_equipment_code_descrip	description	Equipment type code description
event_log		
*evl_event_id	id	Event Id number
evl_component_id	component	Event component id such as request id, equipment id, or incident id)
#evl_event_code	code	Event code (Refer to event-type entity)
evl_event_source	source	Event Source
evl_event_destination	destname	Event destination
evl_event_date	datetime	Event date and time
evl_priority_code	priority	Event priority code (Refer to priority-type entity)
evl_event_message	message	Event message
event_type		
*evt_event_code	code	Event type code
evt_event_code_descrip	description	Event type code description
external_com_channel		
*ecc_external_channel_id	id	External channel Id number
ecc_channel_name	channame	Channel name
ecc_port_name	portname	Port name
ecc_node_name	nodename	Node name
ecc_data_rate	datarate	Channel data rate (bits/second)
#ecc_parity_code	code	Parity code (Refer to channelparity-type entity)
ecc_data_bit	bitnum	Number of data bits
ecc_stop_bit	bitnum	Number of stop bits
ecc_time_out	timeout	Time out in seconds of seconds
ecc_failure_num	failnum	Number of failures
ecc_retry_num	retrynum	Number of retries if failure
#ecc_component_status_code	code	Status of channel (Refer to the component-status-type entity)
#ecc_equipment_id	id	Equipment Id number (Refer to the equipment entity)
failure_log		
*fal_failure_log_date	datetime	Entry time of failure into database
*fal_equipment_id	id	Equipment Id number (Refer to the equipment entity)
#fal_failure_code	code	Failure type classification (Refer to failure-type entity)

fal_error_message	emnsg	Failure message
fal_ack_date	datetime	User time acknowledged
failure_type		
*fal_failure_code	code	Failure log type code
fal_failure_code_descrip	description	Failure log type code description (eg. Sybase, Unix, ATMS software, etc.)
geographic_location		
*geo_location_name	bcname	Location name
geo_latitude	latitude	Latitude
geo_longitude	longitude	Longitude
incident		
*inc_incident_id	id	Incident Id number
#inc_incident_code	code	Incident type code (Refer to incident-type entity)
#inc_location_name	locname	Incident Location Name (Refer to geographic-location entity)
#inc_location_code	code	Location code (Refer to location-type entity)
#inc_link_id	id	Link Id number (Refer to link entity)
#inc_severity_code	code	Incident severity code (Refer to incident-severity-type entity)
#inc_priority_code	code	Incident priority code (Refer to priority-type entity)
#inc_incident_cause_code	code	Cause code (Refer to incident-cause-type entity)
inc_duration_estimate	minutes	Estimate duration time in minutes
inc_duration_actual	minutes	Actual duration time in minutes
inc_blocked_lane_num	blocked	Number of lanes blocked
inc_blocked_shoulder_num	blocked	Number of shoulders blocked
inc_saturated_volume_percent	percent	Saturated volume percentage
inc_incident_start_date	datetime	Time incident began
inc_incident_end_date	datetime	Time incident ended
inc_db_received_date	datetime	Entry time in database
#inc_incident_status_code	code	Incident status code (Refer to incident-status-type entity)
inc_property_damage_flag	boolean	Property damage (F-False T-True)
inc_injury_flag	boolean	Injuries (F-False T-True)
inc_fatility_flag	boolean	Fatilities (F-False T-True)
inc_hazmat_cargo_flag	boolean	Hazmat involved (F-False T-True)

#inc_cargo_id	id	Cargo id number (Refer to cargo-type entity)
inc_detection_source	detsource	Equipment-id, agency-code, or phone caller
inc_confidence_level	conlevel	Degree of "correctness"
inc_state	state	Reporting state
inc_comments	text	Incident or event comments

inc_has_emc

*#ihe_inc_incident_id	id	Incident Id number (Refer to incident entity)
*#ihe_emc_contact_id	id	Emergency contact Id number (Refer to emergency-contact entity)

inc_has_rec

*#i hr_i nc_incident_id	id	Incident Id number (Refer to incident entity)
*#ihr_rec_restriction_code	code	Incident and event restriction code (Refer to restriction entity)

inc_has_rou

*#iho_inc_incident_id	id	incident id number (Refer to incident entity)
*#iho_rou_route_id	code	Alternate route id numbers for an incident (Refer to route entity)

inc_has_vet

* #ihv_inc_incident_id	id	Incident Id number (Refer to incident entity)
*#ihv_veh_vehicle_code	code	Vehicle code (Refer to vehicle-type entity)

incident_cause_type

*ict_incident_cause_code	code	Incident cause type code
ict_incident_cause_type_descrip	description	Incident Cause type code description

incident_severity_type

*ist_severity_code	code	Incident severity code
ist_severity_code_descrip	description	Incident severity code Description (eg. None, Minor, major)

incident_status_type

*ist_incident_status_code	code	Incident current status type code
ist_incident_status_code_descrip	description	Incident current status type code description (eg. Planned, Ongoing, Completed)
incident_type		
*idt_incident_code	code	Incident code
idt_incident_code_descrip	description	Incident type code description (e.g. Accident, stalled vehicle, cargo spill, construction, environmental condition)
int_has_Ink		
*#ihl_int_intersection_id	id	Intersection Id number (Refer to intersection entity)
*#ihl_lnk_link_id	id	Link Id number (Refer to link entity)
intersection		
*int_intersection_id	id	Intersection Id number
#int_location_name	locname	intersection location name (Refer to geographic-location entity)
link		
*lnk_link_id	id	Link Id number
lnk_street_id	id	Street name Id number
lnk_lane_num	ianenum	Number of lanes
lnk_shoulder_t_turn	shouldernum	Number of shoulders
#lnk_link_code	code	Link type code (Refer to link-type entity)
lnk_link_capacity	capacity	Link capacity
lnk_mile_begin	miles	Beginning mile marker
lnk_mile_end	miles	Ending mile marker
lnk_link_length	feet	Link length in feet
lnk_link_latitude_begin	latitude	Beginning link latitude
lnk_link_longitude_begin	longitude	Beginning link longitude
lnk_link_latitude_end	latitude	Ending link latitude
lnk_link_longitude_end	longitude	Ending link longitude
lnk_link_direction	direction	Direction (N, NE, NW . ..)
lnk_speed_limit	speed	Speed limit
lnk_travel_time	traveltime	Current travel time (Secs)
lnk_default_inc_latitude	latitude	Default incident latitude
lnk_default_inc_longitude	longitude	Default incident longitude
lnk_incident_probability	probability	Probability of an incident
lnk_avg_traffic_count	traffic	Average traffic count
lnk_avg_speed	speed	Average speed (miles per hour)
lnk_avg_density	density	Average density

lnk_avg_queue_length	carqueue	Average number of cars in line waiting
lnk_avg_delay	minutes	Average delay in minutes
lnk_avg_temperature	envreading	Average temperature
#lnk_avg_precipitation_code	code	Average precipitation (Refer to percipitation-type entity)
lnk_avg_barometric_pressure	envreading	Average barometric pressure
lnk_avg_humidity	envreading	Average humidity
#lnk_avg_surface_code	code	Average surface conditions (Refer to surface-type entity)
lnk_avg_air_quality_reading	envreading	Average air quality reading
lnk_level_of_service	servlevel	Level of service

link_type

*lkt_link_code	code	Link type code
lkt_link_code_descrip	description	Link type code description (eg. ramp, freeway, etc)

location_type

*loc_location_code	code	Location type code
loc_location_code_descrip	description	Location type code description (eg. Freeway, main lane, on-ramp, freeway shoulder, freeway median, off-ramp, service road, etc.)

origin_destination_data

*odd_od_id	id	Origin destination Id number
#odd_origin_name	locname	Origin name (Refer to geographic-location entity)
odd_destination_name	locname	Destination name
odd_travel_plan	travelplan	Travel plan details
#odd_zone_id	id	Zone Id number (Refer to zone-definition entity)
odd_time_of_day	datetime	Time of day for this origin destination plan
odd_receipt_date	datetime	Time this travel plan was entered into system

parking_data

*pkd_parktng_id	id	Parking Id number
#pdk_parking_name	locname	Parking name (Refer to geographic-location entity)
#pdk_street_id	id	Street Id number (Refer to street entity)
pdk_parking_code	code	Parking code (Refer to parking-type entity)
pdk_capacity	capacity	Number of parking stalls
pdk_parking_cost	parkcost	Parking cost in dollars/hour

parking_statistics		
*#pks_parking_id	id	Parking Id number
*pks_reference_date	datetime	Parking information reference date
pks_utilization	utilization	Percentage of parking lot used
pks_available_spaces	spaces	Number of available spaces
parking_type		
pat_parking_code	code	Parking code
pat_parking_code_descrip	description	Parking type code description (ie. garage, metered, vallet, etc.)
point_of_interest		
*poi_point_interest_id	id	Point of interest Id number
#poi_point_interest_code	code	Point of interest code (Refer to point-of-interest-type entity)
#poi_link_id	id	Point of interest link Id (Refer to the link entity)
#poi_location_name	locname	Point of interest location name (Refer to the geographic-location entity)
poi_site_address	address	Emergency contact site address
poi_site_city	city	Emergency contact site city
poi_site_state	state	Emergency contact site state
poi_site_zip	zip	Emergency contact site zipcode
poi_site_county	county	Emergency contact site county
poi_telephone	phonenum	Point of interest telephone number
poi_contact_person	name	Point of interest contact person
poi_information	text	Special point of interset information
point_of_interest_type		
*pit_point_interest_code	code	Point of interest type code
pit_point_interest_code_descrip	description	Point of interest type code description
precipitation_type		
*pet_precipitation_code	code	Percipitation type code
pet_precipitation_descrip	description	Percipitation type code description (eg. rain, snow, fog)

priority_type		
*prt_priority_code	code	Incident priority type code
prt_priority_code_descrip	description	Incident priority type code description (eg. Immediate, Routine)

ride_match		
*rim_ride_match_id	id	Ride Match Id number
rim_first_name	name	Ride Match first name
rim_last_name	name	Ride Match last name
rim_home_address	address	Person's home address
rim_home_city	city	Person's home city
rim_home_state	state	Person's home state
rim_home_zip	zip	Person's home zip code
rim_home_phone	phonenum	Person's home phone
rim_home_intersection_id	intersection	Person's home intersection Id number
rim_work_phone	phonenum	Person's work phone
rim_work_address	address	Person's work address
rim_work_city	city	Person's work city
rim_work_state	state	Person's work state
rim_work_zip	zip	Person's work zip code
rim_origin	locname	Person's origin (Refer to geographic-location entity)
rim_destination	locaname	Person's destination (Refer to geographic-location entity)
rim_travel_method	method	Travel method Monday through Friday
rim_travel_distance	miles	Travel distance in miles
rim_travel_concerns	comment	Travel wncems

report_request		
*rer_report_id	id	Report Id number
rer_event_id	id	Event Id number
rer_request_received_date	datetime	Date entered into system
rer_report_name	reportname	Report name
rer_request_source	reqsource	Request source which can be TMC, agency etc.
#rer_transmission_code	code	Transmission code (Refer to transmission-type entity)
rer_requestor_telephone	phonenum	Telephone number of person requesting the report
rer_requestor_first_name	name	First name of person requesting the report
rer_requestor_last_name	name	Last name of person requesting the report
rer_ip_address	ipaddress	Internet protocol address
rer_fax_num	phonenum	Fax number
rer_modem_num	phonenum	Modem number
#rer_external_channel_id	id	External channel Id number (Refer to external-corn-channel entity)

restriction_type		
*ret_restriction_code	code	Restriction type code
ret_restriction_code_descrip	description	Restriction type code description (eg. vehicle type, weight, height, length, number of axles, number of tires)
route		
*rou_route_id	id	Route Id number
rou_origin_name	locname	Origin name
rou_destination_name	locname	Destination name
rou_route_plan	travelplan	Description of the route plan
#rou_incident_id	id	Incident id (Refer to incident entity)
service_type		
*set_service_code	code	Service type code
set_service_code_descrip	description	Service type code description
set_billing_amount	money	Service billing amount
set_billing_unit	unit	Service billing units
spill_protective_distance		
* spd_cargo_id	id	Cargo Id number
spd_chemical_amount	weight	Chemical amount for isolation and downwind anaylsis
spd_small_isolation_footage	feet	Isolation footage in all directions.
spd_small_downwind_protect_mile	miles	Downwind protection in miles
spd_large_isolation_footage	feet	Isolation footage in all directions.
spd_large_downwind_protect_mile	miles	Downwind protection in miles
street		
*str_street_id	id	Street Id number
str_street_name	street	Street name
str_route_number	routenum	Street route number
subscriber		
*sub_subscriber_id	id	Subscriber Id number
sub_subscriber_address	address	Subscriber address
sub_subscriber_city	city	Subscriber city
sub_subscriber_state	state	Subscriber state
sub_subscriber_zip	zip	Subscriber zip code
sub_subscriber_phone	phonenum	Subscriber phone number

sub_subscriber_fax	phonenum	Subscriber fax number
sub_has_set		
*#shs_sub_subscriber_id	id	Subscriber Id number (Refer to subscriber entity)
*#shs_sub_service_code	code	Subscriber code (Refer to sevice_type entity)
subscriber_billing		
*#sui_subscriber_id	id	Subscriber Id number (Refer to subscriber entity)
*sui_billing_date	datetime	Billing date and time
sui_amount	money	Billing amount
#sui_service_code	code	Service code for billing (Refer to service type entity)
sui_start_date	datetime	Service start date and time
sui_end_date	datetime	Service end date and time
surface-type		
*sut_surface_code	code	Surface type code
sut_surface_descrip	description	Surface type code description (eg. wet, icy, dry)
traffic_data		
*trd_equipment_id	id	Equipment Id number
*trd_start_date	datetime	Start time for collecting traffic count
trd_end_date	datetime	End time for collecting traffic count
trd_traffic_count	traffic	traffic count for a specific time period
t rd_speed	speed	Average speed
#trd_vehicle_code	code	Vehicle type code (Refer to vehicle-type entity)
trd_density	density	Traffic density
trd_queue_length	carqueue	Average number of cars in line waiting
trd_delay	minutes	Average delay in minutes
trd_segment_id	id	Segment Id number
traffic_data_summary		
*tds_equipment_id	id	Equipment Id number
*tds-start-date	datetime	Start time for traffic summary
tds_end_date	datetime	End time for traffic summary
tds_traffic_count	traffic	Traffic count for a specific time period
tds_speed	speed	Average speed
tds_density	density	Traffic density

tds_queue_length	carqueue	Average number of cars in line waiting
tds_delay	minutes	Average delay in minutes

transportation

*tra_transit_id	id	Transit Id number
tra_transit_name	name	Transit name
#tra_transit_code	code	Transit code
tra_transit_phone	phonenum	Transit phone number
tra_transit_location	locname	Transit location or area

transit_data

*trd_transit_id	id	Transit Id number
*trd_direction	direction	Transit direction
*trd_transit_code	code	Transit code (Refer to transit-type entity)
* trd_stop_name	stopname	Transit stop location name
*trd_stop_time	datetime	Transit stop location time
*trd_day_schedule	schedule	Transit stop day schedule (ie. rush hour, non-rush hour, express etc.)

transit_stop

*trs_stop_name	stopname	Transit stop name
#trs_street_id	street	Street Id number (Refer to street entity)
#trs_intersection_id	id	Intersection Id number (Refer to intersection entity)
#trs_zone_id	id	Zone Id number (Refer to zone-definition entity)
#trs_location_name	locname	Geographic location name (Refer to greographic-location entity)

transit_type

*trt_transit_code	code	Transit type code
trt_transit_code_descrip	description	Transit type code description (bus, ferry, train , etc.)

transmission_type

*trt_transmission_code	**code**	Transmission **type code**
trt_transmission_code_descrip	**description**	**Transmission type code description (eg. Modem, Fax, ftp)**

travel_advisory

tra_travel_advisory_id	id	Travel advisory Id number
#tra_zone_id	id	Zone or area Id number

tra_source	detsource	Travel advisory source of information
tra_travel_advisory_date	datetime	Travel advisory date and time
tra_advisory	text	Advisory information

trip_plan

*trp_trip_plan_id	id	Vehicle trip plan Id number
trp_travel_plan	travelplan	Travel plan characteristics
trp_receipt_date	datetime	Trip plan receipt date
trp_origin_start_date	datetime	Trip plan origin start date
trp_destination_end_date	datetime	Trip plan destination end date
trp_od_id	id	Trip plan origin and destination Id number

vehicle_type

*vet_vehicle_code	code	Vehicle type code
vet_vehicle_subtype_code	subcode	Vehicle subtype code
vet_vehicle_descrip	description	Vehicle description

weather_data

*wed_source	detsource	Weather data information source
*wed_received_date	datetime	Date and time the weather data was received
wed_temperature	envreading	Temperature
#wed_percipitation_code	code	Percipitation code (Refer to percipitation-type entity)
wed_barometric_pressure	envreading	Barometric pressure
wed_humidity	envreadi ng	Humidity
#wed_surface_code	code	Surface conditions (Refer to surface-type entity)
wed_coefficient_of_friction	friction	Coefficient of friction
wed_accumulation	accum	Accumulation of snow/rain in inches
wed_visability	feet	Visability
wed_state	state	State for which the weather data was collected
#wed_zone_id	id	Zone Id number (Refer to zone-definition entity)

zone_definition

*zod_zone_id	id	Zone Id number (Refer to GIS DB)

Appendix J - Requirements Traceability

APPENDIX J
REQUIREMENTS TRACEABILITY

The following table indicates how the requirements (indicated as Column 1) identified in the requirements analysis are met by the design. Columns 2 through 8 denote the CTIS subsystems, and Column 9 denotes the overall design goals. X indicates the fulfillment of the requirements.

Requirements (1)	Communications (2)	Data Management (3)	Common Services (4)	Data Distribution (5)	Trip Planning (6)	Trip Guidance (7)	Dissemination Applications (8)	Overall Design (9)
TI 1				X	X	X	X	
TI 1.1				X	X			
TI 1.2				X	X	X	X	
TI 1.2.1				X	X	X	X	
TI 1.2.2				X	X	X	X	
TI 1.2.3				X	X	X	X	
TI 1.2.4				X	X	X	X	
TI 2				X	X	X	X	
TI 2.1				X	X	X	X	
TI 3				X	X	X	X	
TI 3.1				X	X	X	X	
TI 4				X	X	X	X	
TI 5				X	X	X	X	
TI 5.1				X	X	X	X	
TI 5.2				X	X		X	
TI 5.3				X	X	X	X	
TI 6				X	X	X		
TI 6.1				X	X	X		
TI 6.2				X	X	X		
TI 6.3				X	X	X		
TI 6.4				X		X		
TI 6.5				X	X	X		
TI 7				X	X	X	X	
TI 7.1				X	X	X		
TI 8				X	X	X		
TI 8.1				X	X	X		

Requirements (1)	Communications (2)	Data Management (3)	Common Services (4)	Data Distribution (5)	Trip Planning (6)	Trip Guidance (7)	Dissemination Applications (8)	Overall Design (9)
TI 9.1				X	X	X		
TI 10				X	X	X	X	
TI 11				X	X		X	
TI 11.1				X	X		X	
TI 11.2.1				X	X		X	
TI 11.2.2				X	X		X	
TI 11.2.3				X	X		X	
TI 11.2.4				X	X		X	
TI 11.3				X	X		X	
TI 11.3.1				X	X		X	
TI 11.3.2				X	X		X	
TI 11.3.3				X	X		X	
TI 12				X	X	X	X	
TI 12.1				X	X	X	X	
TI 12.2				X	X	X	X	
TI 13				X	X	X		
TI 13.1				X	X	X		
TI 13.2				X	X	X		
TI 13.3				X	X	X		
TI 14				X	X		X	
TI 14.1				X	X		X	
TI 14.2				X	X		X	
TI 14.2.1				X	X		X	
TI 14.2.2				X	X		X	
TI 14.2.3				X	X		X	
TI 14.2.4				X	X		X	
TI 14.3				X	X		X	
TI 14.4				X	X		X	
TI 15				X	X			
TI 15.1				X	X			
TI 15.2				X	X			
TI 16				X	X			
TI 16.1				X	X			

Requirements (1)	Communications (2)	Data Management (3)	Common Services (4)	Data Distribution (5)	Trip Planning (6)	Trip Guidance (7)	Dissemination Applications (8)	Overall Design (9)
TI 16.1.2				X	X			
TI 16.1.3				X	X			
TI 16.1.4				X	X			
TI 17				X	X			
TI 17.1				X	X			
TI 17.2				X	X			
TI 17.3				X	X	X		
TI 18				X	X	X		
TI 19				X	X	X		
TI 20				X	X	X		
TI 20.1				X	X	X		
TI 21				X	X	X		
TI 22				X	X	X		
TI 23				X	X	X		
TI 23.1				X	X	X		
TI 24				X	X	X		
TI 24.1				X	X	X		
TI 25				X	X	X		
TI 26				X	X	X		
TI 27				X	X	X		
TI 28				X	X	X		
TI 29				X	X	X		
TI 30				X	X	X		
TI 31				X	X	X		
TI 32				X	X	X		
TI 33				X	X			
TI 33.1				X	X			
TI 33.1.1				X	X			
TI 33.1.2				X	X			
TI 33.1.3				X	X			
TI 33.1.4				X	X			
TI 33.2				X	X			
TI 33.2.1				X	X			

Requirements (1)	Communications (2)	Data Management (3)	Common Services (4)	Data Distribution (5)	Trip Planning (6)	Trip Guidance (7)	Dissemination Applications (8)	Overall Design (9)
TI 33.2.3				X	X			
TI 33.2.4				X	X			
TI 33.2.5				X	X			
TI 33.2.6				X	X			
TI 33.2.7				X	X			
TI 33.2.8				X	X			
TI 33.2.9				X	X			
TI 33.2.10				X	X			
TI 34				X	X			
TI 35				X	X	X		
TI 35.1				X	X	X		
TI 35.1.1				X	X	X		
TI 35.1.2				X	X	X		
TI 35.2				X	X	X		
TI 35.3				X	X	X		
TI 35.4				X				
COMM 1	X			X				
COMM 2	X			X				
COMM 3	X			X				
COMM 4	X			X				
COMM 5	X			X				
COMM 6	X			X				
COMM 6.1	X			X				
COMM 6.2	X			X				
COMM 6.3	X							
COMM 6.4	X							
COMM 6.5	X							
DB 1		X		X	X			
DB 1.1		X						
DB 1.1.1		X	X					
DB 1.1.2		X						
DB 1.2	X	X		X				
DB 1.2.1	X	X						

Requirements (1)	Communications (2)	Data Management (3)	Common Services (4)	Data Distribution (5)	Trip Planning (6)	Trip Guidance (7)	Dissemination Applications (8)	Overall Design (9)
DB 1.3		X						
DB 1.3.1		X						
DB 1.4		X						
DB 1.4.1		X						
DB 1.4.2		X						
DB 2		X						
DB 2.1		X						
DB 2.2		X						
DB 2.3		X						
DB 2.4		X	X					
DB 3		X						
DB 3.1		X						
DB 3.2		X	X					
DB 3.3		X						
DB 3.4		X						
DB 4		X						
DB 4.1		X	X					
DB 4.2		X						
DB 4.3		X						
DB 4.4		X						
DB 4.5		X						
DB 4.6		X						
DB 4.6.1		X						
DB 4.6.2		X						
DB 4.6.3		X						
DB 4.7		X						
DB 4.7.1		X						
DB 4.7.2		X						
DB 5		X						
DB 5.1		X						
DB 5.2		X						
DB 5.2.1		X						
DB 6		X	X					

Requirements (1)	Communications (2)	Data Management (3)	Common Services (4)	Data Distribution (5)	Trip Planning (6)	Trip Guidance (7)	Dissemination Applications (8)	Overall Design (9)
DB 6.2		X	X					
DB 6.3		X	X					
DB 7		X	X					
DB 8		X	X					
DB 8.1		X	X					
DB 8.2		X	X					
DB 9		X	X					
DB 10		X	X					
DB 11		X	X					
DB 12		X	X					
DB 13		X	X					
DB 14		X						
DB 15		X	X					
DB 16		X						
IF 1.1	X		X					
IF 1.2	X							
IF 1.3	X	X						
IF 1.4	X		X	X				
IF 1.5	X			X				
IF 2.1	X		X					
IF 2.2	X							
IF 2.3	X	X						
IF 2.4	X			X				
IF 2.5	X			X				
IF 3.1	X		X					
IF 3.2	X							
IF 3.3	X	X						
IF 3.4	X			X				
IF 4.1	X		X					
IF 4.2	X							
IF 4.3	X	X						
IF 5.1	X		X					
IF 5.2	X							

Requirements (1)	Communications (2)	Data Management (3)	Common Services (4)	Data Distribution (5)	Trip Planning (6)	Trip Guidance (7)	Dissemination Applications (8)	Overall Design (9)
IF 5.4	X			X				
IF 5.5	X							
HW 1								X
HW 2								X
HW 3	X							
HW 4								X
HW 5								X
HW 6	X							
SW 1								X
SW 2								X
SW 3								X
SW 4								X
SW 5								X
SW 6			X					
SW 7								X
SW 8								X
SW 9								X
SW 10								X
SW 11								X
OI 1			X					
OI 2			X					
FT 1								X
FT 2								X
FT 3		X						
FT 4			X					
FT 5								X
FT 6	X							
FT 7								X
PERF 1								X
PERF 2								X
PERF 3								X
PERF 4								X
PERF 5								X

APPENDIX K- END-USER DEVICE FUNCTIONAL SPECIFICATIONS

APPENDIX K- END-USER DEVICE FUNCTIONAL SPECIFICATIONS

This section specifies all of the functional requirements that need to be satisfied with respect to end user devices identified in the CTIS. The Regional Traveler Information Center (RTIC) architecture identifies a series of traveler information receivers. These range from end user portable, wireless devices to fixed devices such as VMS, HAR and audio text-based telephone access devices.

The specification description follows a structured format and, where applicable, provides a graphical user interface guideline. It is important to keep in mind that the GUI examples depicted here are merely to be used as a guideline in the actual implementation stage. While there are a variety of graphical user interface standards that can be applied to this type of information receiver technology, this functional specification attempts to identify the basic requirements that need to be satisfied, in order to provide a full range of information services to the end user.

800 Audiotext

The relevant features a basic audio text (800 telephone) system that would provide traveler information to the general public shall contain the following features, as a minimum:

- provide general traffic conditions within the City with respect to congestion and route diversions.
- provide interactive response to specific area queries with respect to traveler information.
- provide up to the minute accident/incident information.
- provide construction maintenance schedule/information for the particular time of the day.

+ provide basic routing information once source and destination is identified.

+ provide specific transit anomalies and stop/arrival time information for specific locations.

+ provide approximate travel time information for specific links within a transit network.

Apart from all of the above core requirements, specific audio text systems deployed in high congestion environments will provide additional information to supplement the specific environment, i.e. electronic yellow page information.

Effectively the type of media that shall be available to the end user is:

- audio telephone information.

+ text information (limited).

The frequency of updates of traveler information in an audio text subsystem shall be, as a minimum:

+ one minute to five minute updates.

+ shall provide up to ten minute updates of scheduled and unscheduled maintenance and construction information.

+ shall provide minimum of five minute updates of major congestion on freeway sections and on arterials in and within a city environment.

+ region-wide updates should be, as a minimum, every five to ten minutes on conditions within travel region,

+ with respect to weather information and road conditions, minimum update requirement shall be approximately five to ten minutes.

The audio text systems sphere of influence is varied according to the deployment environment, i.e., in some deployment environments the 800 numbers would provide information to wide areas of coverage while in a densely populated city environment there would be specific 800 numbers for different areas within the Metropolitan Region.

The end user interface for the general public l-800 audio text system is essentially a telephone handset, including cellular phones.

Interactive TV

Interactive television is a new technology that may become more pervasive in the near future with the advent of cable and satellite communications providing extremely large amounts of bandwidth for the transmission of video, text, graphics, images and sound. Hence, interactive television becomes an attractive information dissemination method that can provide valuable traveler information in a timely manner.

At a minimum, the following capabilities shall be present in an interactive television dissemination system:

- real-time traffic/congestion information that is city and region specific.
- interactive route selection and route guidance capability.
- real-time information regarding incidents, accidents and other such events.
- interactive query capability with respect to scheduled construction and maintenance events.
- interactive query capability of parking availability.
- interactive query with respect to electronic yellow pages.
- electronic function related to purchasing tickets for travel purposes.

Since the bandwidth available on interactive TV dissemination method is extensive, all types of media can be accommodated within any one interactive session. This would include as a minimum:

+ live video.
+ interactive text.
+ sound.
+ images and animation.

Interactive TV offers the capability to query the traveler information database for real-time information. Therefore, the update frequency of the real-time data needs to be quite frequent, in order to facilitate multiple queries at any one time. As a minimum, the design guideline for updates shall be the following:

+ traffic conditions - 1 to 5 minute updates.
+ incident/accident information - 1 to 5 minute updates.
+ parking information - 5 to 30 minute updates.
+ route guidance information - 5 to 10 minute updates.

Again, the type of information that is queried will have different update frequencies to reflect its dynamic real-time nature.

Since interactive television information is transmitted over cable networks and satellite networks, theoretically the sphere of influence could be of the whole Corridor as well as the various regions and individual cities within the I-95 Coalition.

With the availability of such extensive bandwidth, end users would be able to obtain information on a microscopic scale as well as on a macroscopic inter-regional scale.

In-Vehicle Devices

Due to new technology in the automotive, electronic industry, a growing range of in-vehicle computer/display system are becoming increasingly available. A key function of this in-vehicle computer system would be obtaining traveler information in a timely manner. While there will be a phased implementation of the functions over the next few years with respect to capabilities within in-vehicle systems, they would all need to provide a core set of features that would satisfy end user requirements for updating traveler information within a typical regional traveler information center.

The following are the features of an in-vehicle receiver:

+ the in-vehicle system must be developed and perceived as being safe to the traveling public.

+ for message displays to be fully assimilated, they should be legible at a glance to ensure driver safety and to minimize distractions.

+ menu structures should be user friendly; information should be placed in a consistent manner on various screens; and related information should be grouped together.

+ repeat keys for voice messages and large user-friendly bush buttons for control.

+ voice messages would be more useful and less distracted if the system receives them automatically without hands-on operation.

+ provide routing support for either:

  local route selection/route guidance capability;

  central guidance selection capability.

Apart from the above co-functions that need to be available for in-vehicle receivers of traveler information, other enhanced features such as a heads-up display and voice response systems would be emerging technology in the near future.

In-vehicle traveler information receivers shall contain the following media access capabilities:

+ text.

+ graphics/maps.

+ audio receivers.

+ analog/digital cellular telephone receiver.

The update frequency of data for in-vehicle subsystems would depend on the infrastructure used for communications to the mobile units. The update frequency shall, as a minimum be:

+ one-way communication systems:

  · 1 to 10 Minute Updates:

  • paging subsystems;

  · radio data broadcast systems:

  • digital audio broadcast systems;

+ two way communication systems.

  · 20 Second to 5 Minute Updates:

  · radio packet data subsystems, i.e., RAM;

  • CDPD;

- cellular PCS systems;
- private radio networks.

Typically, for in-vehicle systems, this sphere of influence would be local to the following components:

+ digital packet radio base cellular communications coverage.
+ wide area coverages in paging, digital audio broadcast and fm subcarrier technologies (one-way communication subsystems).

Therefore the range of communications would vary from local street/arterial and freeway environments to city wide and region wide data access capability which would be based on the technology used by the ISP for communications.

Handheld Devices (PDAs, PCSs)

Typical handheld computers and personal digital assistance carried by end user general public will be capable of receiving traveler information among other features. This will be a component of a range of services that would be available to them in the near future. As a minimum, the handheld devices shall be able to receive the following information:

+ local traffic condition status, i.e., congestion condition, etc..
+ local transit schedule information, i.e., bus stop, transit information, etc..
+ accurate current weather and road condition information.
+ electronic yellow page information for local areas.
+ basic route selection capability.

+ capability to communicate through a wireless medium such as one-way (broadcast) or interactive two-way communication systems.

+ light portable rechargeable easy to use hardware.

+ a simple straight forward graphical user interface for ease of use.

Apart from all of the above core functionality, enhanced functions such as accurate, personalized accident/incident information as well as scheduled maintenance and construction information shall be provided. Other relevant information such as special event information pertinent to routes selected shall be available.

Typical media that needs to be available for handheld PDA/PCS systems would include as a minimum:

+ text.

+ audio.

+ graphics/maps, etc.

It is envisaged that in the future, integration of computer graphics, computer telephony and television would be fully realized to provide multi-media handheld receivers that would be capable of receiving a wide range of information in a real-time environment.

The update frequency of the data for PDAs, handhelds and PCSs would be similar to in-vehicle devices. The update frequency shall, as a minimum be:

+ one-way communication systems:

  · 1 to 10 Minute Updates:

  . paging subsystems;

- radio data broadcast systems;
- digital audio broadcast systems;

+ two way communication systems.

- 20 Second to 5 Minute Updates:
- radio packet data subsystems, i.e., RAM;
- CDPD;
- cellular PCS systems;
- private radio networks.

The handhelds/PDAs and PCSs would have some form of wireless communications, similar to the in-vehicle mobile systems. Therefore, the sphere of influence would depend on the type of communications used, i.e., one-way broadcast-type communications to two-way interactive dynamic communications. With respect to the regional traveler information centers, it is possible to provide local traffic/traveler information as well as electronic yellow pages and weather information pertaining to specific cities in a microscopic scale and region-wide traveler information in a macroscopic scale by using the various types of wireless communication capabilities.

Laptops/Desktops

The desktops/notebooks and laptop-type hardware systems environment would typically contain extremely high computing power which can be made use of extensively in obtaining detailed real-time traveler information from CTIS. The basic set of features that needs to be available in a desktop/notebook-type environment would contain, as a minimum the following:

+ capability to obtain real-time traffic condition information for the region as well as the specific city or corridor, by using a wireless receiver in the chassis (e.g., PCMCIA card, radio modem).

+ obtain real-time multi-modal transit information such as schedules and dynamic transit status.

+ real-time incident/accident and other unscheduled event information for the overall region as well as specific routes selected.

+ electronic yellow pages with dynamic updates.

+ capacity to provide real-time parking information with respect to specific locations and the status of freeway/urban network traffic and road network.

+ speech recognition/audio text to speech translation-type functions.

+ the system should exhibit open, fully distributed architecture to allow for changes and updates to such services in the near future.

As a minimum, the media types that need to be available within the desktop/notebook/laptop environment should include, as a minimum:

+ text.

+ graphics.

+ live video.

+ sound.

+ images.

+ computer telephony.

A full range of multi-media capability shall be available for this type of technology to receive traveler information from CTIS.

The communication infrastructure would define the bandwidth available for transmission of information from the RTIC to information dissemination environments such as desktops and

notebooks. For land line links it shall be possible to provide real-time live video as well as dynamic traffic information, while for wireless remote communications environments, it shall be capable of obtaining information at a more infrequent pace.

The update frequency will rely heavily on the type of communication infrastructure that shall be part of the network to the desktop/notebook environment:

+ land line two-way links - 20 seconds to 5 minutes.

+ wireless links:

  broadcast - 1 minute to 5 minutes;

  two-way - 2 minutes to 10 minutes.

Since desktop/notebooks are virtually capable of processing information as much as network nodes, the coverage of receiving traveler information would be extensive. The system shall be capable of receiving specific traveler information pertaining to a city or corridor or a set of arterial networks, as well as specific roadway segments. The information/communication processing capabilities of desktop/notebook environments are extremely powerful to provide accessibility to virtually all of the information that would be available on the CTIS.

On-Line Service Providers and the Internet

When considering on-line services as a capability to obtain real-time traveler information, the core features that shall be available would, as a minimum be:

+ specific access to local/urban and metropolitan area-wide traffic information.

+ specific queries on traffic congestion and diversions of road networks.

+ real-time accident/incident information from various RTICs.

+ real-time weather and road condition information.

+ real-time parking and other transportation service information.

+ transit schedules and travel time information.

+ area-wide traffic information and congestion status.

+ electronic yellow page information with specific query capabilities.

+ personal services which would provide route selection, mute guidance and navigation capability.

The media type that shall be available for on-line services:

+ text.

+ hypertext with on-line access to databases.

+ graphics.

+ MPEG compressed live video.

+ sound.

+ imagers and photographs, i.e., GIF-type environments.

Most of the multi-media capabilities within certain restrictions would be available for on-line services in the near future.

Electronic commerce services would also be provided for on-line users of traveler information. This would include access to financial institutions and similar environments.

The on-line services information dissemination capability will provide real-time traffic and traveler information on a frequent basis that would be pertinent to the end-user. The frequency at which data such as text and images shall be available would range from:

+ 30 seconds to 1 minutes updates for real-time traffic information.
+ 1 to 5 minute updates for related congestion information and accident information.
+ 5 to 30 minute updates for weather and road conditions and electronic yellow page information, etc.

The sphere of influence of traveler information being accessed through on-line services would range from the local to Nation-wide.

Kiosks

Kiosk represent a very powerful method by which traveler information can be disseminated to the end user in a variety of environments such as public places, i.e., malls, parks, office towers, etc. Kiosks can also be used in public rest areas within freeway and arterial networks to provide the real-time traveler information such as route selection, route guidance, as well as traffic conditions and congestion information. As a minimum the core features that a traveler information kiosk would exhibit include:

+ real-time traffic and road conditions.
+ real-time accident/incident information.
+ schedule construction/maintenance information.
+ electronic yellow page information.
+ parking and fuel services, etc.
+ real-time road conditions and weather conditions for the traveler.

+ interactive route selection capability.

+ route guidance in the form of printed maps and instruction sets.

Apart from the above mentioned features, typical kiosks that provide traveler information also include regional information such as locations of hospitals, police stations and other public places as well as parks and recreation information.

A full function kiosk environment is capable of providing traveler information data in the following media:

+ text.

+ hypertext with linked database information.

+ audio output with text to speech and speech recognition capabilities.

+ video/imaging capability.

+ photographs and directions using graphical map displays.

+ electronic telephony.

Apart from all of the above media capabilities, it is also possible to provide Mayday and emergency service information.

Electronic kiosks are capable of providing traffic information updates on the following:

+ 30 seconds to 5 minute updates for real-time traffic information.

+ real-time information on accident and incident.

+ 5 minute and 30 minute updates on weather and road condition information.

+ 30 minutes updates on international and national traveler information weather services.

Typically, kiosks are used for traveler information services related to a specific corridor or a highway section or within an immediate urban arterial network. Many kiosk vendors, however, are set up similar to on-line service providers and could potentially provide service from the local, to the corridor, to the national level.

Fax

The essential features that are exhibited in a typical fax system used for traveler information shall contain:

+ real-time traffic conditions within a Metropolitan environment.

+ specific accidents/incidents within a corridor or section of roadway as well as within a city, county or state boundary.

+ overall traffic congestion information on major freeways and arterials within the city.

+ general traffic conditions and weather information related to travelers on a region-wide basis.

+ major unscheduled and scheduled events that impact traffic and traveler information.

+ major changes to schedule, transit/airline scheduled information.

Supported media types include:

+ text.

+ graphics.

The update frequency of a fax subsystem used for traveler information system shall contain, depending on the type of data, the following:

+ 5 to 30 minute updates on general traffic conditions.

+ real-time accident congestion information on arterials and freeways.

+ scheduled maintenance and construction information on a 5 minute update basis.

Typically, fax subsystems used for traveler information dissemination would provide information related to a particular zone or a metropolitan area and surrounding freeways and arterial networks.

Broadcast Radio/TV

Broadcast television is a technology that would expand in the future with the advent of cable and satellite communications providing extremely large amounts of bandwidth for the transmission of video, text, graphics. Broadcast television becomes an attractive information dissemination method that can provide valuable traveler information in a timely manner.

The following capabilities shall be present in a broadcast television dissemination system:

+ real-time traffic/congestion information that is city specific and region specific.

+ real-time information regarding incidents, accidents and other such events.

Since the bandwidth available on broadcast TV is extensive, all types of media can be accommodated. This would include as a minimum:

+ live video.

• text.

+ images and animation.

Update frequency of the following functions are:

+ traffic conditions - 1 to 5 minute update.

+ incident/accident information - 4 to 5 minute update.

+ parking information - 5 to 30 minute update.

The sphere of influence of traveler information being accessed through broadcast TV is typically limited to a major metropolitan area. Satellite and cable TV, however, could support more inter-regional, corridor and nationwide services.

Variable Message Signs

The basic features of a changeable message sign and/or variable message sign subsystem consists of textual information in a fixed length character format and in some cases, capability of displaying full matrix graphics. The core features of changeable message signs, defined for roadway use, shall contain the following:

+ minimum two lines of 20 character text format.

+ variable character height, depending on location/environment of the sign.

+ variable colors used for different highway/artetial/utility roads consistent with the Regions sign standards.

+ a local sign controller integrated with the sign display for flexibility.

+ typically the communications between the sign/controller and remote central control computer system consists of serial RS 232 and/or twisted pair.

The basic media type available for VMS shall be:

+ Alphanumeric Text.

+ Bit Map Graphics.

The frequency of updates for Variable Message Signs used for Traveler Information shall be as a minimum:

+ 1 to 5 minute updates for traffic condition.

+ immediate (<29 seconds) update of actual or other incidents.

The area of influence of CMS/VMS signs shall be:

+ immediate corridor area

+ arterial network area

+ local Metropolitan area

Highway Advisory Radio

Highway Advisory Radio is a simple, practical, traveler information dissemination method that is widely used in many areas such as arterial networks, air transportation facilities as well as in specific corridor management systems. The technology currently used for this dissemination method is AM radio transmission channel dedicated for traveler information services. An end user would receive this information via their standard AM radio receiver in the vehicle. The basic features that constitute this capability shall include, as a minimum:

+ recorded audio text information.

+ the recorded information shall be programmable for different times of day.

+ the traveler information broadcast radio frequency shall be identified clearly by Signs and other means within the area of operation.

- capability for HAR information to be provided by different sources by time of day.
- highway advisory radio information shall contain specific diversions as well as incident/accident information on a periodic basis.
- HAR information shall contain traveler information such as airline schedules and parking information where applicable.
- capability of multiple HAR subsystems to co-exist within the same regional area.
- capability of both high power and low power transmitters to be able to provide identical information.
- capable of long message time (up to 25 minutes).
- ability to concatenate stored message segments in different sequences to form a long message.
- ability to store a large number of standard messages.

The basic media type provided by highway advisory radio shall be:

+ audio broadcast:
  - stored message segments;
  - live messages broadcast.

The frequency of information typically updated in a highway advisory radio system is consistent with the environment which it is deployed.

In a corridor/freeway environment, the advisory would be updated anywhere between:

- 5 minutes to 20 minutes;

+ every half hour.

In an airport environment information maybe updated every 5 minutes, as a minimum. Schedule information and location information is provided every 10 minutes.

A parking advisory station would update information every two minutes.

Typically highway advisory radio systems consist of either:

+ low power transmitter systems.

+ high power transmitter systems.

Low power HAR systems are accurate and can be deployed in a geographical area which would cover 2 to 8 square miles or the length of a corridor. The low powered transmitter is mobile and can be redeployed relatively easy. This capability facilitates corridor/freeway traveler information management systems where specific areas can be covered for short periods of time.

High power HAR systems are used in urban and city environments where they would cover a large area within a Metropolitan area. Typically, high power transmitter systems would cover approximately 10 to 15 square miles, depending on the density of buildings within the environment. These high powered transmitter systems are situated in fixed locations and cannot be moved easily. They do have the capability to penetrate walls and underground areas to some extent which is useful in parking environments.