

*Collecting Data:
Technologies and Partnerships*

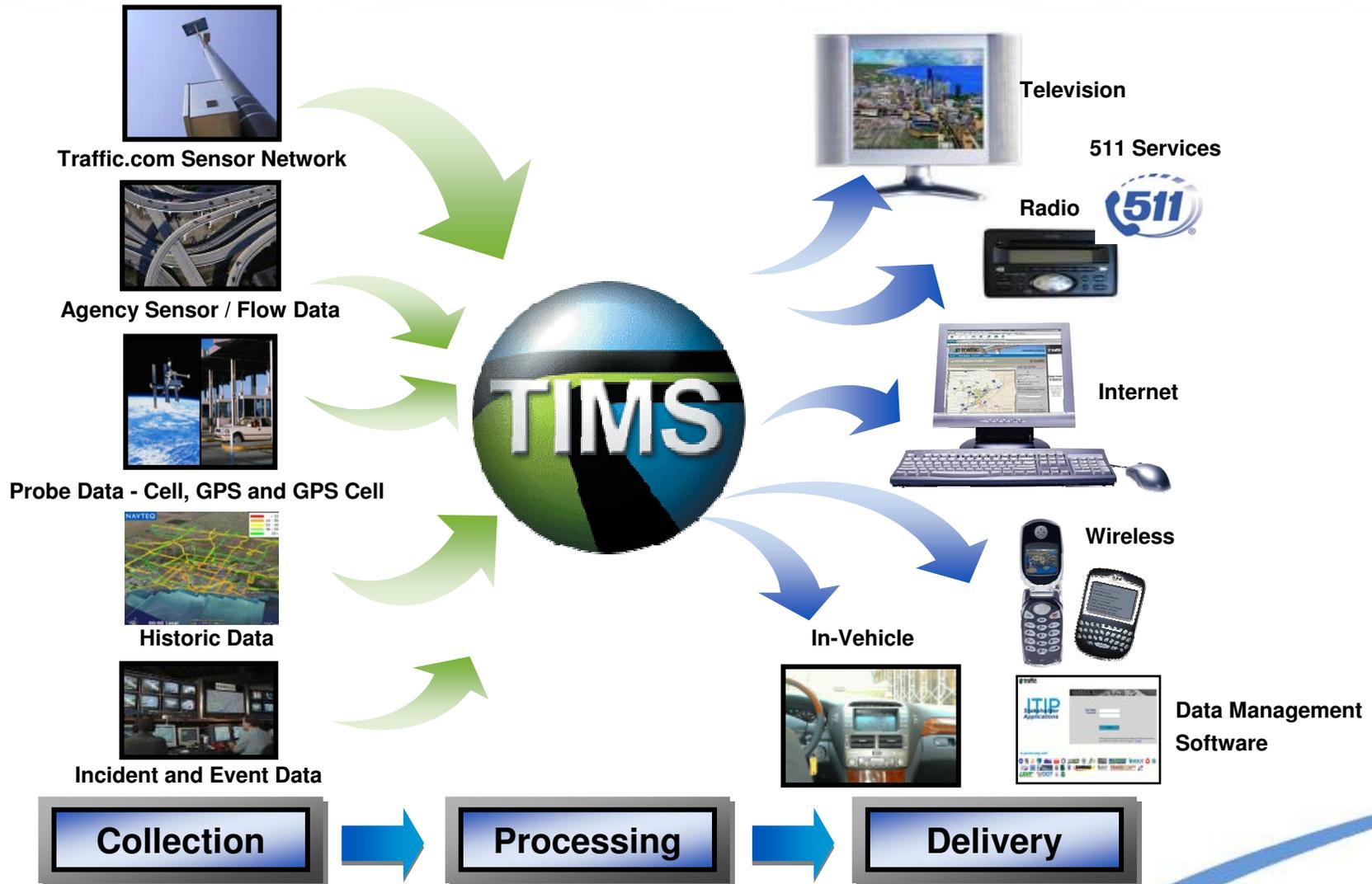
California 511

October 28, 2008

Collecting Data: Overview

- Technologies
 - Gather from different sources
 - Process and improve data quality
- Partnerships
 - Connected Traveler (CCIT/Caltrans)
 - Los Angeles/Inland Empire (District 8)
 - Sacramento (District 3)
 - San Diego (SANDAG/ District 11)
 - San Jose (District 4)
 - San Francisco (District 4)
- Delivery of Data Services
 - Real time
 - Archived

Technology Leadership: End-to-End Solution



Collection - Sources

Comprehensive Traffic Flow Data Solution

- NAVTEQ's Sensor Network
 - Owns and operates over 2,500 center lane miles of sensors providing volume, speed, classification and density
- Agency Data
 - Agency data is processed through the TIMS engine to clean the data.
- Probes (Cell and GPS)
 - Extends the sensor network with coverage and accuracy. Tens of millions of GPS data points/day.
- NAVTEQ Operations Centers- Three in California
- Historic Data
 - Augments real-time traffic data with a nationwide historic traffic model covering 900,000 miles



Traffic.com sensor



Collection

NAVTEQ Sensors

- Lane-by-lane data
- Data collected every 60 seconds
- Lane by lane average speed, volume, lane occupancy, & vehicle classification
- Up to four vehicle classifications
 - Non-commercial
 - Single-unit commercial
 - Single-trailer commercial
 - Multi-trailer commercial
- Technology
 - Solar Powered
 - Wireless Communications
 - Modular Components
 - Non-Intrusive
 - Covers All Lanes
 - High Reliability

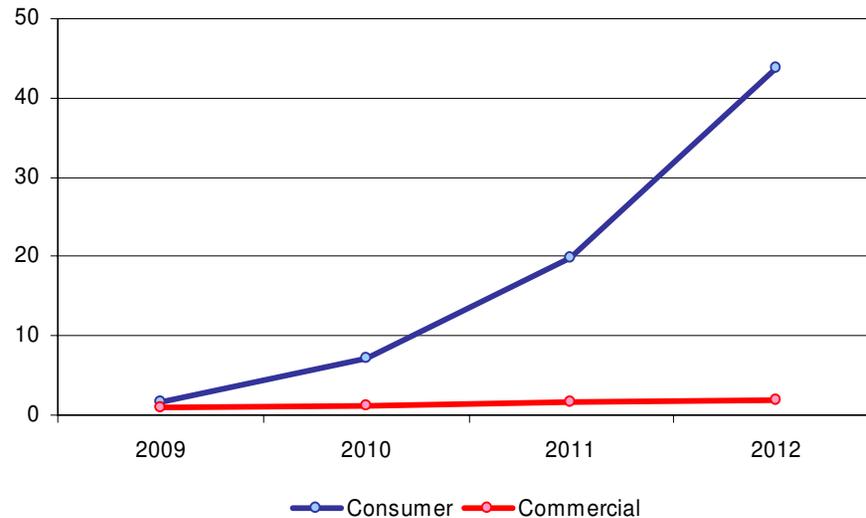


NAVTEQ Sensor

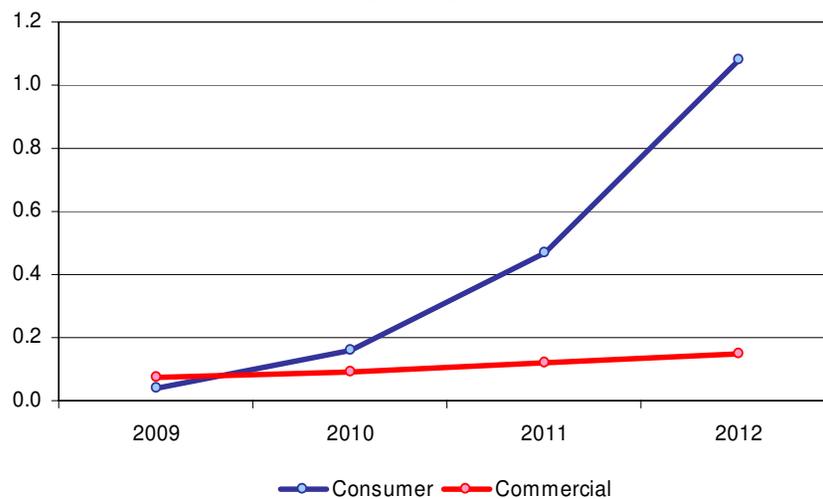
Collection

GPS Data

Number of Probes (million)



Points per Day (billion)



NAVTEQ is uniquely positioned to source consumer probe data

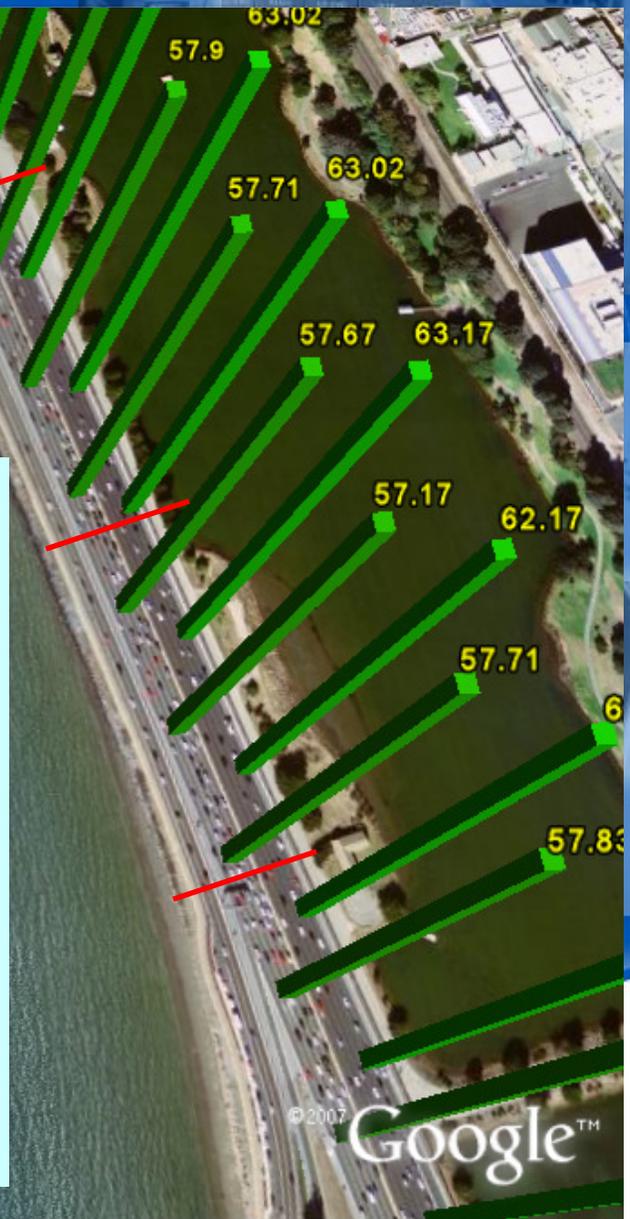
- Supplier to wireless carriers, and car and device manufacturers
- Nokia relationship
- Map and traffic products

Collection

Nokia Phones



- Two coordinated programs
 - Contract with US Department of Transportation, Caltrans, and Univ. of California
 - Advanced technology development
 - Special focus on ensuring privacy
 - Commercial deployment
 - Alpha and beta tests in Q4 2008
 - Commercial launch in Q1 2009



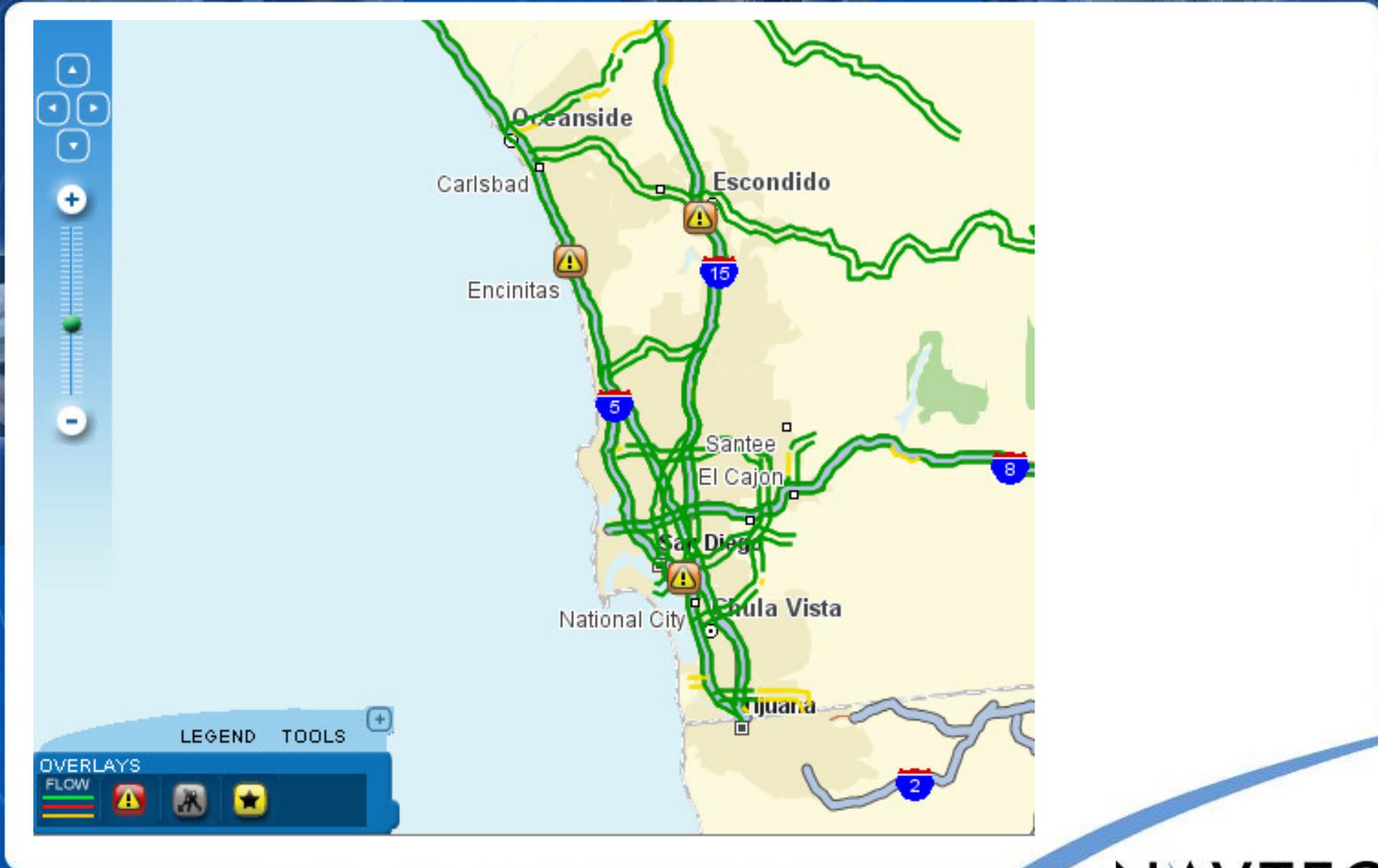
Collection

Comparison of GPS Probe Data

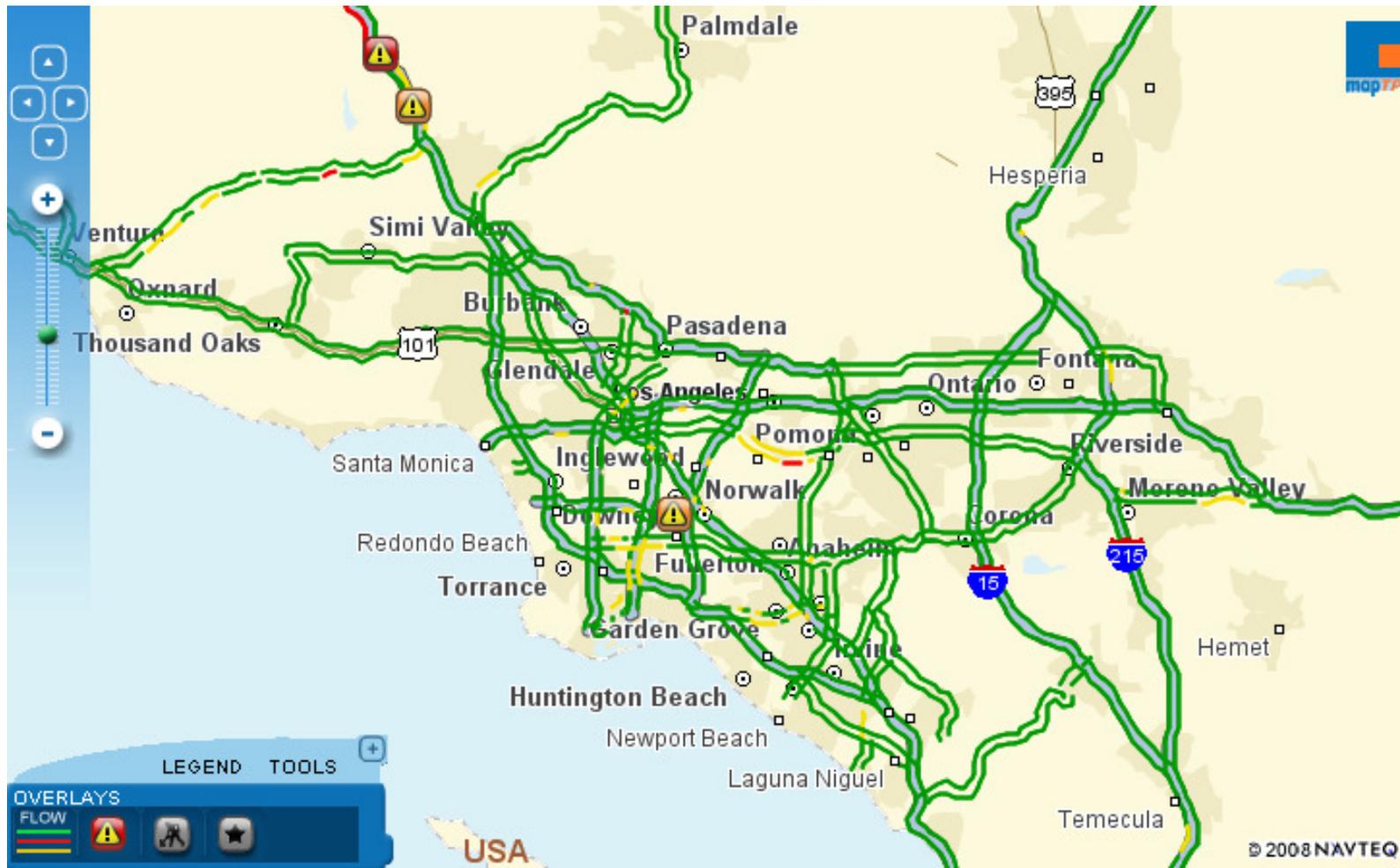
Not all probes are created equal

	Commercial Probe	Consumer Applications	Automotive Applications
Available today	●	●	●
Sequence of probes in each report	●	●	●
High Volume	●	●	●
Consumer Driving Patterns - Road Class	●	●	●
Consumer Driving Patterns - Time-of-Day	●	●	●
Highly accurate position (map-matching)	●	●	●
Advanced content	●	●	●

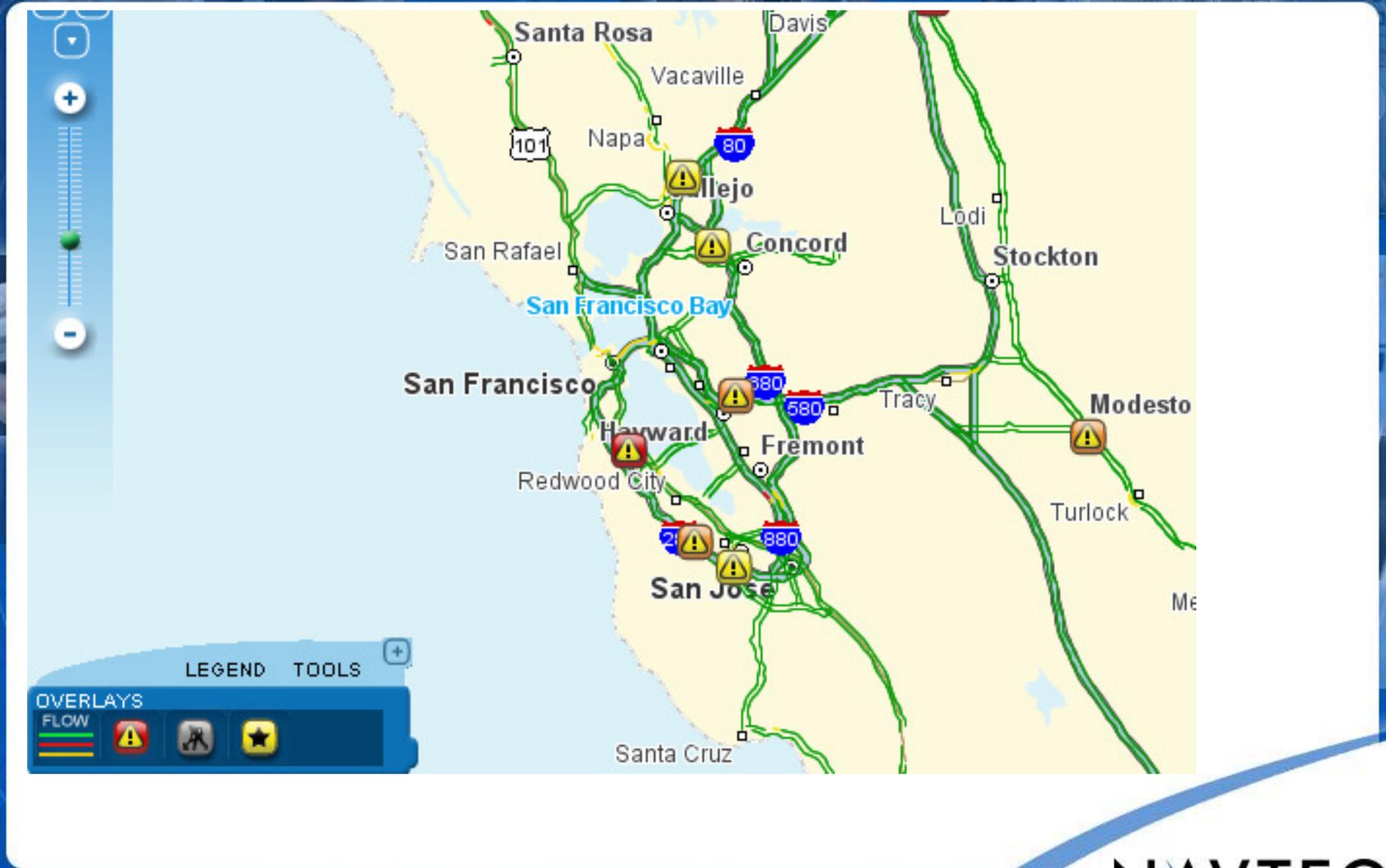
San Diego Area Traffic Map



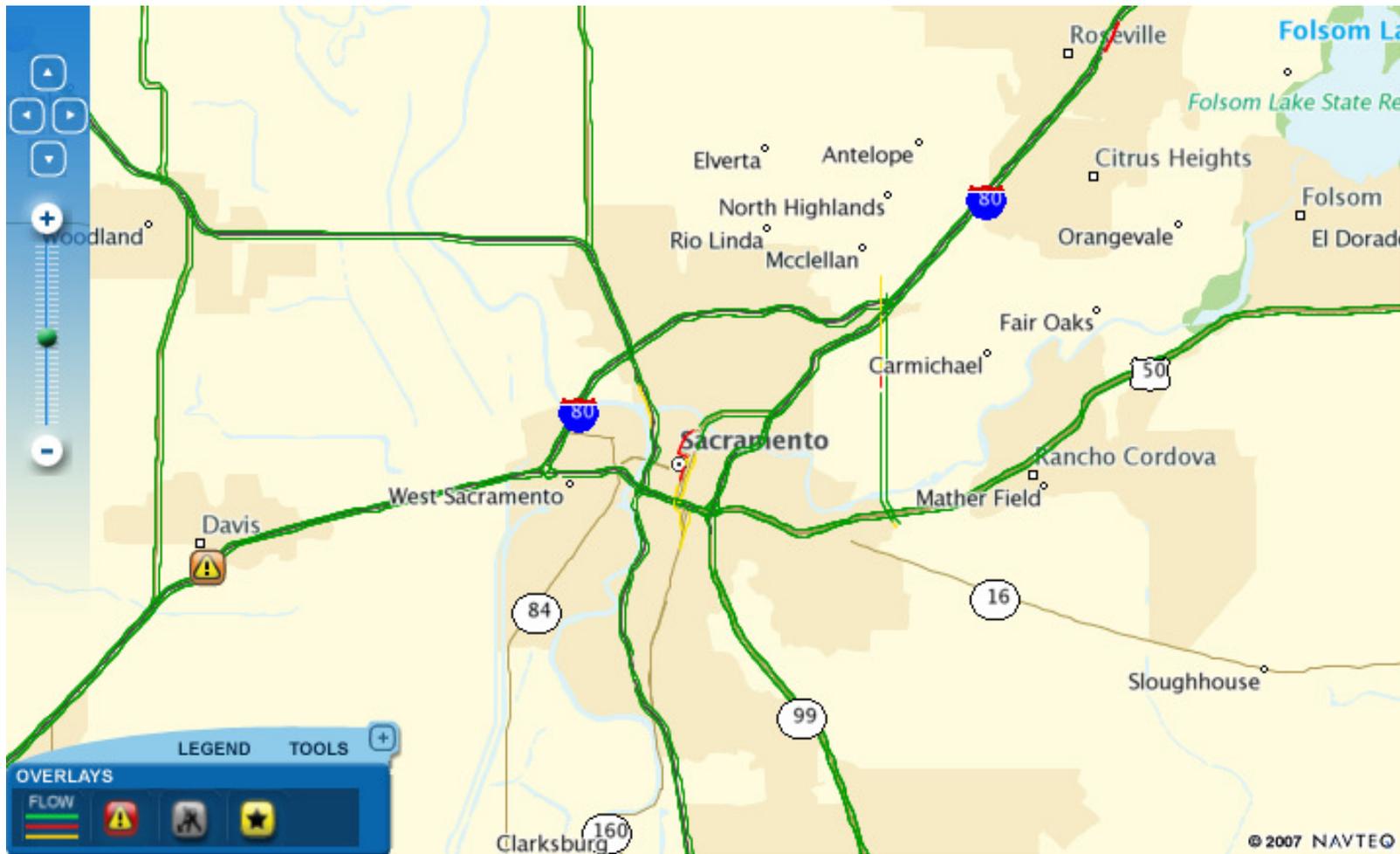
Los Angeles Area Traffic Map



San Francisco Area Traffic Map



Sacramento Area Traffic Map



Processing: HTTM (Hierarchical Travel Time Model)

- Incorporate all data sources
 - Fixed Sensors
 - Probe (fleet and GPS cell)
 - Probe Sequences (previous probe combined with current probe)
 - Incident Data
 - Historical Data
- Optimizes calculation cycles
 - Data feed synchronization
- Weighs data sources on a continuous basis
 - Distance decay
 - Time decay
- Confidence calculation

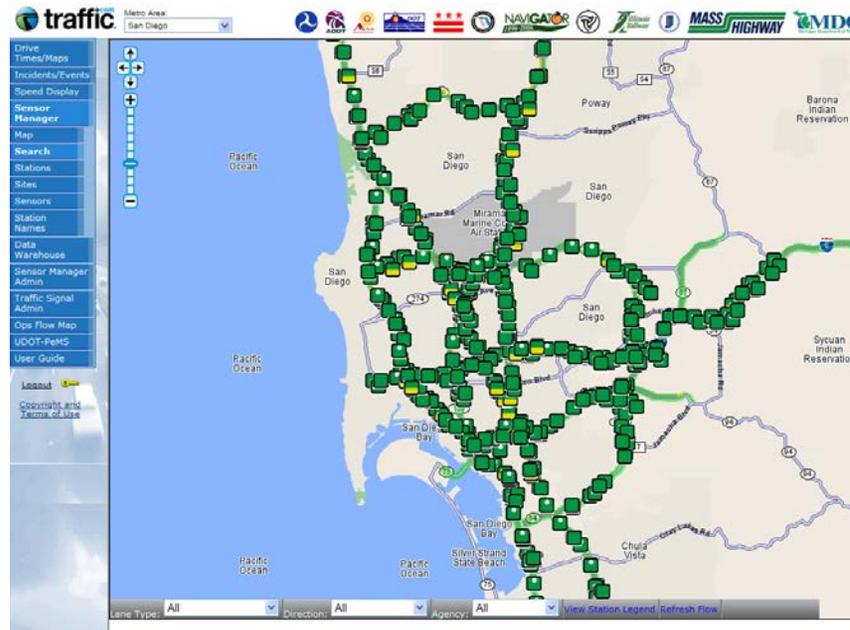
Delivery

Sensor Manager

Operations and Traffic Management

Stakeholder access to real-time, digital sensor data

- Region-wide Map
- Individual Sensor Access
- Lane-by-lane Data
- Speed, Volume and Lane Occupancy



Station CA015006[15196]. I-15 - 0.81 Mile North of Market Street - Milepost 2.7

Live Update | [Update Data Now](#) | [Go To Info Page \(close this window\)](#) | [Close this window](#)

Time	Int	Ln #	Direction	Lane Pos	Lane Type	Speed	Volume	Occupancy	Class1	Class2	Class3	Class4	Sensor	Device	Stat
1:31:30 PM	60	1	North	RIGHT	THRU	61	16	2.4%	16	0	0	0	64929	1	A
1:31:30 PM	60	1	North	CENTER	THRU	65	22	5.2%	21	1	0	0	64929	2	A
1:31:30 PM	60	1	North	LEFT	THRU	67	14	2.4%	14	0	0	0	64929	3	A
1:31:30 PM	60	1	South	RIGHT	THRU	60	8	1.6%	8	0	0	0	64929	4	A
1:31:30 PM	60	1	South	CENTER	THRU	55	11	2.0%	11	0	0	0	64929	5	A
1:31:30 PM	60	1	South	LEFT	THRU	65	4	0.6%	4	0	0	0	64929	6	A

Operations and Traffic Management

Stakeholder/Broadcasters access to incidents and events

- Web-based tool
- Incidents and events
- Archived

Filter By Criticality **3 CONST** | Display Zones | Short Description | [Create Report](#)

Enable Full Filtering | [Stop Refresh](#) | 26 secs

Alert

08:42 2 : Weather - The National Weather Service has issued a fire weather watch - a slightly less serious status than a red flag warning - for mountain, forest and valley areas of Southern California from 10pm Tuesday until 10pm Thursday, October 22 - due to the expected return of Santa Ana winds

Los Angeles Co. Frwys & Hwys

Time	CRT	Type	Dir	Description
13:34	KEYR	SB		101 Ventura Frwy: from 23/Thousand Oaks Frwy to I-405. : 25min (+1) avg speed 62mph from Ventura to 110/Pasadena/Harbor Frwy. : 10min (+1) avg speed 61mph Cahuenga Pass : 4min avg speed 62mph
13:34	KEYR	NB		110 Frwy: from I-405 to I-10. : 14min (+2) avg speed 55mph
13:34	KEYR	EB		134 Ventura Frwy: between 170 and I-210 : 14min (+1) avg speed 62mph between 170 and I-5 : 6min avg speed 64mph
13:34	KEYR	WB		134 Ventura Frwy: between I-210 and 170 : 13min avg speed 64mph between I-5 and 170 : 5min avg speed 65mph
09:25	3	CONST		134 Ventura Frwy: between Harvey Dr and San Fernando Rd - landscaping and irrigation work - scheduled 8am-4pm - expect intermittent lane blockages daily through winter of 2008
13:24	2	VFR		210 Frwy: past Towne Av - earlier vehicle fire is clear
10:09	3	CONST		57 Orange Frwy: between Tonner Canyon Rd and 60 Pomona Frwy - roving work crew - until 3pm
13:21	2	EB		60 Pomona Frwy: 5min Azusa Av to Brea Canyon Rd , avg speed 54mph
13:34	KEYR	WB		I-10 San Bernardino Frwy: from 210/57 to I-605. : 11min avg speed 64mph from I-605 to I-710 : 10min (+1) avg speed 64mph
13:24	2	ACC		I-10 San Bernardino Frwy: Del Mar Av on ramp - accident
10:12	0	CONST		I-105 Glenn Anderson Frwy: is closed between Sepulveda Blvd (LAX) and Nash St due to roving work crew - until 3pm ALTERNATE: SB Sepulveda Blvd, turn left on E!
13:34	KEYR	EB		I-105 Glenn Anderson Frwy: between I-405 and I-605 : 19min (+4) avg speed 49mph
13:34	KEYR	WB		I-105 Glenn Anderson Frwy: from I-605 to LAX. : 14min (+1) avg speed 61mph
13:34	KEYR	WB		I-105 Glenn Anderson Frwy: between I-605 and Sepulveda Blvd : 17min (+1) avg speed 60mph between I-605 and I-405 : 16min (+1) avg speed 59mph
13:34	KEYR	NB		I-405 San Diego Frwy: from I-110/Harbor Frwy to I-105/Century Freeway. : 10min (+1) avg speed 57mph from I-605 to 110 : 13min (+1) avg speed 61mph
13:34	KEYR	SB		I-405 San Diego Frwy: Sepulveda Pass : 7min (+1) avg speed 59mph
13:26	2	ACC		I-405 San Diego Frwy: at Crenshaw Blvd - accident
13:34	KEYR	NB		I-5 Frwy: from 91 thru the East LA Interchange : 20min (+3) avg speed 57mph
10:08	3	CONST		I-5 Frwy: in both directions between Artesia Blvd/Knott Av (#117) and Indiana St(#131) - roving work crew blocking 1 lane - until 2:30pm
13:34	KEYR	NB		I-605 San Gabriel River Frwy: from I-405 to I-5. : 12min (+1) avg speed 60mph
13:34	KEYR	NB		I-605 San Gabriel River Frwy: between I-405 and I-210 : 29min (+3) avg speed 58mph between I-405 and I-5 : 12min (+1) avg speed 60mph between I-5 and I-10 : 12min (+2) avg speed 56mph
13:13	2	ACC		I-605 San Gabriel River Frwy: ramp to NB I-5 Frwy - accident
13:34	KEYR	SB		I-605 San Gabriel River Frwy: from I-210 to I-5. : 18min (+3) avg speed 56mph
13:34	KEYR	SB		I-605 San Gabriel River Frwy: between I-210 and I-405 : 29min (+3) avg speed 58mph between I-10 and I-5 : 13min (+3) avg speed 53mph between I-5 and I-405 : 12min (+1) avg speed 61mph
13:34	KEYR	NB		I-710 Long Beach Frwy: from I-405 to I-5 : 13min (+1) avg speed 59mph

Los Angeles Co.

07:09	2	GAME		Staples Center: L.A. Clippers vs. Phoenix Suns - 7:30pm
07:35	3	CONST		Long Beach: The Pacific Coast Hwy in both directions between the San Gabriel River and Ultimo Av - repaving one lane gets by - scheduled 9am-3pm
06:37	3	CONST		Palmdale: Hwy-138 Palmdale Blvd at 47th St East - scheduled construction of a roundabout intersection - expected to last through Spring of 2009 - a roundabout is a circular intersection, which provides continuous traffic operations with no stop signs or traffic signals - expect intermittent lane closures DETOUR: will be posted
06:26	3	CONST		Topanga Canyon: NB Topanga Canyon Blvd at Old Topanga Canyon Rd - construction - scheduled 10am-3pm - one way traffic control on scene
08:19	3	EVENT		Universal Studios: Halloween Horror Nights - Please visit www.halloweenhorror nights.com for time and date details

Operations and Traffic Management

Agency access to real-time speed data by roadway and direction

- Speed data
- Aggregated by direction and lane type
- View of individual lanes
- Ability to see speeds below user selected threshold

SPEED DISPLAY (San Francisco)						22 Oct 2008 7:34 AM Age=0:24					
Filters:	Metros	San Francisco	States	All	Lanes	All	Agencies	All	Status	ACTIVE	
Routes						I-680:NB			I-680:SB		
	<input checked="" type="checkbox"/>	Bay Bridge	Route Monitored Point Group	Thru	Exit	Route Monitored Point Group	Thru	HOV	Exit		
	<input checked="" type="checkbox"/>	Capital City Frwy/BUS. I-80	E CAPITOL EXPY	52		I-80 E	52				
	<input checked="" type="checkbox"/>	Dumbarton Bridge	ALUM ROCK AVE	52		From Jct I-680/I-80 To Gold Hill Rd	NA				
	<input checked="" type="checkbox"/>	Golden Gate Bridge	MCKEE RD	54		From Gold Hill Rd To Gold Hill Rd	NA				
	<input checked="" type="checkbox"/>	Hwy-1	BERRYESSA RD	53		GOLD HILL RD	67				
	<input checked="" type="checkbox"/>	Hwy-1	HOSTETTER RD	56		MARSHVIEW RD	57				
	<input checked="" type="checkbox"/>	Hwy-101	N CAPITOL AVE	56		PARISH RD	NA				
	<input checked="" type="checkbox"/>	Hwy-13	MONTAGUE EXPY	60		PARISH RD	NA				
	<input checked="" type="checkbox"/>	Hwy-160	CA-237 E	57		PARISH RD	64				
	<input checked="" type="checkbox"/>	Hwy-17	CA-237 W	57		LAKE HERMAN RD	57				
	<input checked="" type="checkbox"/>	Hwy-237	CA-237 E-I-680 N Ramp	57		From Lake Herman Rd To Industrial Wy	NA				
			JACKLIN RD	56		From Industrial Wy To Bravshore Rd	59				
			From Scott Creek Rd To Mission Blvd (Milpitas)	NA		INDUSTRIAL WAY	67				
			SCOTT CREEK RD	57		BAYSHORE RD	61				

Delivery

Agency Planning and Operations

Planning and Operations

Agency access to archived sensor and incident traffic data

- Raw Data
 - 1 min. data by lane
- Historical data
- Incidents & events
- Reports
- Select Station
- Date Range
 - Start Date
 - End Date
- Aggregate Time
 - 24 hour
 - 1 hour
 - 15 minute
 - 5 minute
- Format
 - HTML
 - Excel

Aggregated Station Data 280840 - 0.153 Miles South of Washington St - 15208											New Selection			
Day	Date	Time	Interval (min)	Direction	# of Lanes	Avg Spd (mph)	Total Vol	Occ	Class 1	Class 2	Class 3	Class 4	Total Readings (Volume)	Valid Readings (Volume)
WED	10/01/2008	00:00:00	60	N	6	72.69	750	0.58	720	17	6	7	360	360
WED	10/01/2008	00:00:00	60	S	6	67.69	957	1.25	710	242	1	4	360	360
WED	10/01/2008	01:00:00	60	N	6	65.93	434	0.35	419	7	3	5	360	360
WED	10/01/2008	01:00:00	60	S	6	66.38	567	0.75	396	165	2	4	360	360
WED	10/01/2008	02:00:00	60	N	6	67.72	309	0.25	298	3	4	4	360	360
WED	10/01/2008	02:00:00	60	S	6	66.71	449	0.6	315	128	0	6	360	360
WED	10/01/2008	03:00:00	60	N	6	66.58	273	0.22	260	6	4	3	360	360
WED	10/01/2008	03:00:00	60	S	6	66.4	357	0.5	235	109	9	4	360	360
WED	10/01/2008	04:00:00	60	N	6	64.14	544	0.45	526	12	3	3	360	360
WED	10/01/2008	04:00:00	60	S	6	67.06	632	0.9	403	212	7	10	360	360
WED	10/01/2008	05:00:00	60	N	6	66.44	1562	1.34	1503	42	13	4	360	360
WED	10/01/2008	05:00:00	60	S	6	66.85	1548	2.17	1069	454	14	11	360	360
WED	10/01/2008	06:00:00	60	N	6	67.6	3924	3.33	3813	82	23	6	360	360
WED	10/01/2008	06:00:00	60	S	6	68.21	3572	4.89	2603	940	20	9	360	360
WED	10/01/2008	07:00:00	60	N	6	67.38	7087	5.86	6904	144	29	10	360	360
WED	10/01/2008	07:00:00	60	S	6	68.46	6954	9.28	5445	1454	42	13	360	360
WED	10/01/2008	08:00:00	60	N	6	68.82	6301	5.13	6149	118	24	10	360	360
WED	10/01/2008	08:00:00	60	S	6	49.34	7414	19.38	4084	3076	216	38	360	360
WED	10/01/2008	09:00:00	60	N	6	65.98	5032	4.28	4861	139	27	5	360	360
WED	10/01/2008	09:00:00	60	S	6	69.52	5772	7.77	4311	1402	41	18	360	360
WED	10/01/2008	10:00:00	60	N	6	66.03	4390	3.74	4244	113	29	4	360	360
WED	10/01/2008	10:00:00	60	S	6	70.06	4620	6.36	3229	1334	39	18	360	360
WED	10/01/2008	11:00:00	60	N	6	68.29	4176	3.48	4045	103	22	6	360	360
WED	10/01/2008	11:00:00	60	S	6	69.49	4853	6.69	3336	1450	54	13	360	360
WED	10/01/2008	12:00:00	60	N	6	68.92	4159	3.4	4044	84	30	1	360	360
WED	10/01/2008	12:00:00	60	S	6	69.5	4409	7.16	3063	1283	48	15	306	306
WED	10/01/2008	13:00:00	60	N	6	69.44	4504	3.66	4375	104	22	3	360	360
WED	10/01/2008	13:00:00	60	S	6	69.28	4954	6.84	3342	1553	47	12	360	360
WED	10/01/2008	14:00:00	60	N	6	67.89	4936	4.17	4810	90	31	5	354	354

Station

Station ID:

OR

Station Description:

Date

Start Date: / /

End Date: / /

Output

Aggregate Time:

Format:

Delivery

Stakeholder: Archived Data - Reports

- Daily Agency and NAVTEQ Sensor Data Reports
 - 5-minute reports by lane
 - 15-minute reports aggregated by direction
 - 1-hour reports aggregated by direction
 - Data quality reports
- Monthly Agency and NAVTEQ Sensor Data Reports
 - Traffic Monitoring Reports (HPMS Format)
 - Performance Measure Reports
- Station Reports
 - Agency and NAVTEQ Station information in a single file

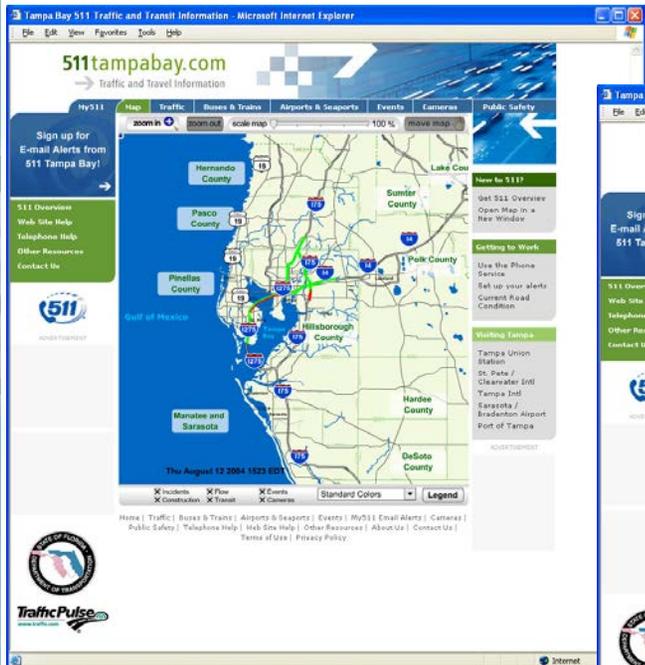


NAVTEQ

Delivery

Tampa Bay 511 Example

Home Page



Flow Maps



Email Alerts



How NAVTEQ Can Help

- **511 Services: Free or Customized**
 - Interactive voice system
 - Web Site
 - Personalized routes and alerts
- **Traffic Data Services**
 - Expand Sensor coverage
 - Expand Agency data and/or fill gaps
 - Operate and maintain system
- **Data Management Systems**
 - Real-time monitoring systems
 - Archive database
 - Data quality tools
- **License Incident and Probe Data**
 - Support operations
 - Traveler information
 - 511 Services

NAVTEQ Fast Facts

- NAVTEQ creates digital maps and map content that power navigation and location-based services solutions around the world.
- Traffic.com is owned by NAVTEQ, which gives us access to worldwide resources.
- NAVTEQ/Traffic.com is the only provider of one stop, end-to-end traffic solutions to customers and commuters.
- NAVTEQ is the largest provider of in-vehicle mapping/traffic to automotive manufacturers.
- NAVTEQ was founded in 1985 and has approximately 3,400 employees located in 144 offices and in 28 countries.
- Nokia's acquisition of NAVTEQ/Traffic.com gives us the ability to leverage cell phone technology for traffic information.
- Nokia is the world's largest cell phone manufacturer.





A NAVTEQ/NOKIA Company
Successful Public Data
Services

www.traffic.com