

TRANSPORTATION PLANNING WORKSHOP



Data's Relationship to Good Planning

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Division of Transportation System Information
September 2012

Presentation Outline

- **Data – Information**
- **Who is TSI**
- **Key TSI Service Areas**
- **Open Discussion**

What is Data?

- **Raw observation, measurement or fact**
- **Events, transactions, observations, building blocks to support automation**

What is Information?

- **Trends, patterns, and judgments**
- **Data processed to meet quality and timeliness needs of customers**
- **Transformed data**

This is Data!

TABLE 1

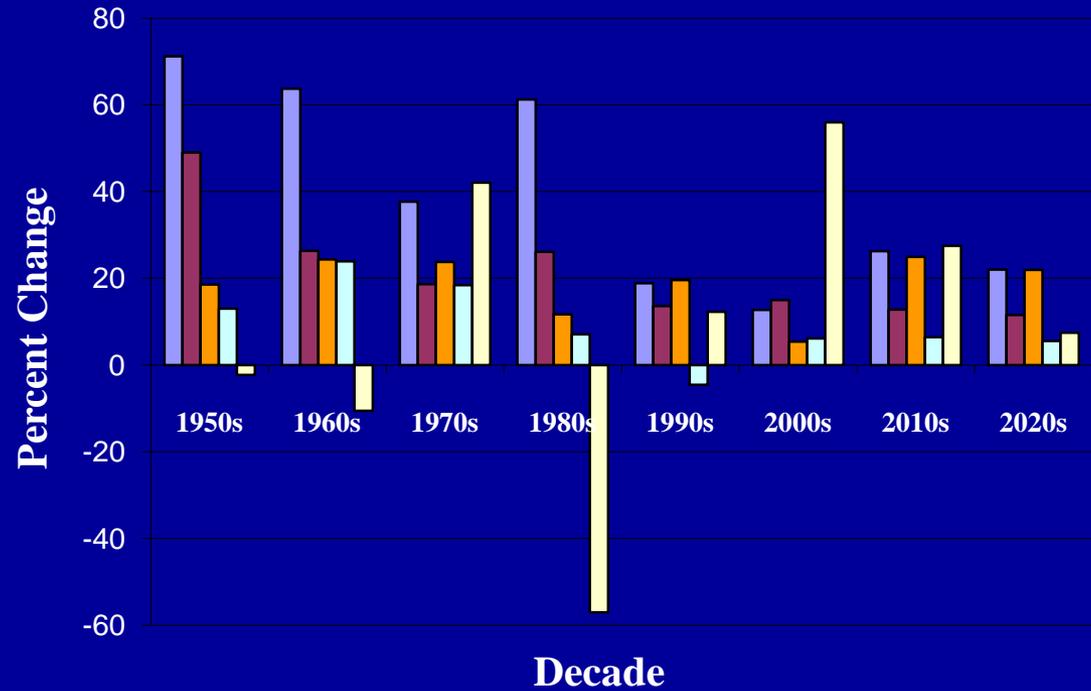
2010 MAINTAINED ROAD MILES AND ESTIMATED ANNUAL VEHICLE MILES OF TRAVEL (AVMT) BY TYPE OF JURISDICTION

<u>JURISDICTION</u>	<u>TOTAL MAINTAINED MILES</u>	<u>LANE MILES</u>	<u>TOTAL ANNUAL VEHICLE MILES OF TRAVEL (AVMT) (IN MILLIONS)</u>
CITY STREETS	75207.83	170554.55	115190.06
COUNTY ROADS	65166.36	132803.81	31413.55
STATE HIGHWAYS	15159.72	50462.05	180259.22
FEDERAL AGENCIES	13536.75	27073.96	656.83
ARMY CORPS OF ENGINEERS	95.00	190.00	7.09
BUREAU OF INDIAN AFFAIRS	675.60	1351.20	15.20
DEPARTMENT OF DEFENSE	8.30	16.60	11.39
NATIONAL PARK SERVICE	1501.90	3013.05	187.86
US BUREAU OF RECLAMATION	26.50	44.20	0.92
US FISH & WILDLIFE SERVICE	133.94	267.88	2.55
US FOREST SERVICE	8651.86	17303.71	119.51
U.S. ARMY	992.09	1984.18	176.52
U.S. AIR FORCE	334.95	669.90	20.43
U.S. BUREAU OF LAND MANAGEMENT	233.33	466.66	0.85
U.S. NAVY	323.97	647.94	63.05
U.S. MARINE CORPS	559.32	1118.64	51.44
OTHER STATE AGENCIES	3028.55	6057.10	113.11
STATE DEPT OF WATER RESOURCES	1.02	2.04	0.66
STATE FORESTRY SERVICES	273.85	547.70	1.00
STATE PARK SERVICE	2753.68	5507.36	111.45
OTHER LOCAL AGENCIES	0.40	0.80	0.18
PORT OF OAKLAND			
OTHER AGENCIES	39.05	89.14	137.34
GOLDEN GATE BRIDGE	3.38	15.86	93.94
INDIAN TRIBAL NATION	26.50	53.00	0.58
SAN DIEGO UNIFIED PORT DISTRICT	0.87	2.08	0.26
UNIVERSITY OF CALIFORNIA	8.30	18.20	42.57
TOTAL	172138.66	387041.42	327770.29

Source: 2010 California Public Road Data

This is Information!

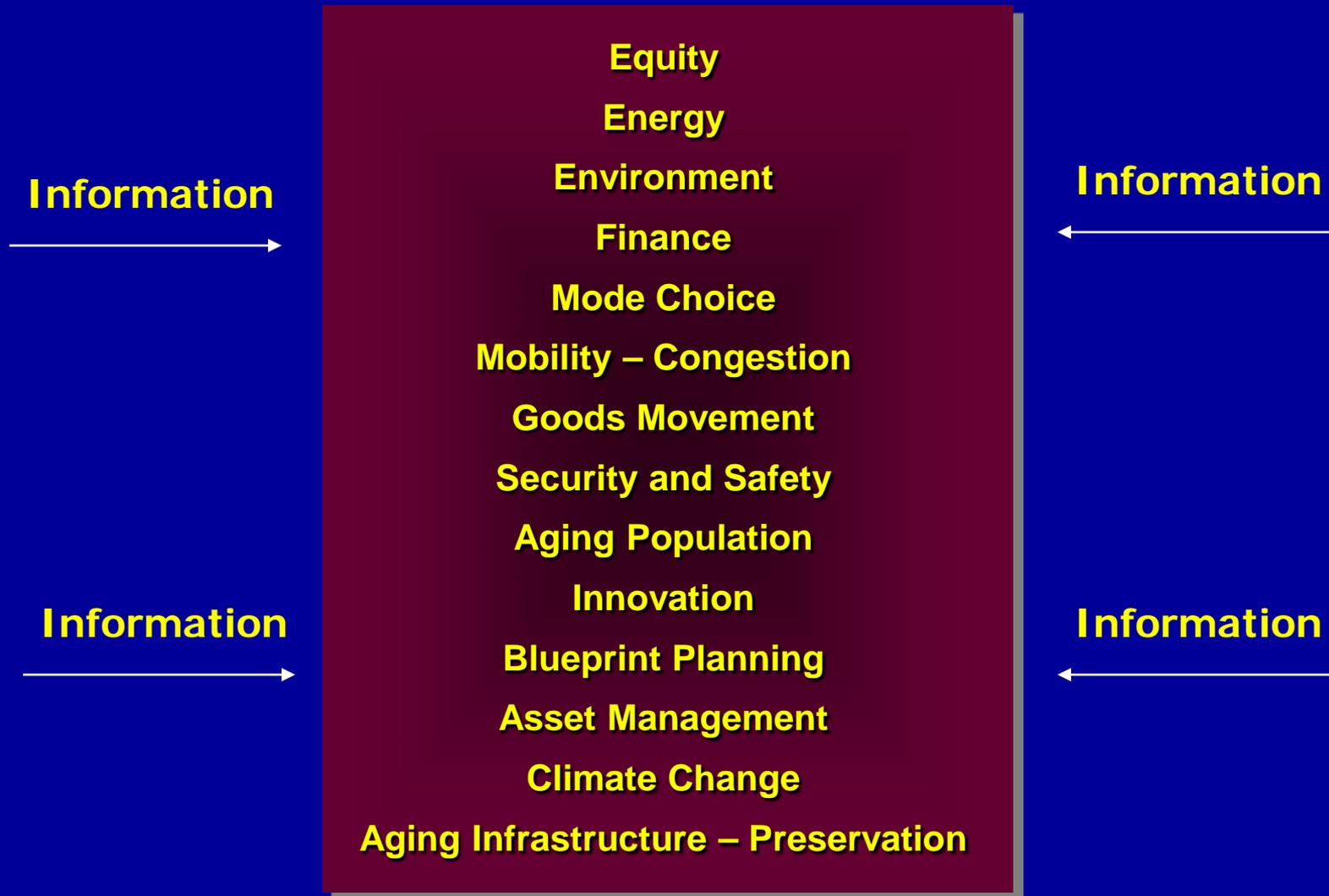
Socioeconomic Factors Impact on Vehicle Miles Traveled



- Vehicle Miles Traveled
- Population
- Per Capita Personal Income
- Vehicles Per Person
- Fuel Cost Per Mile

Source: 2008 California Motor Vehicle Stock, Travel and Fuel Forecast, Figure-4, page 9

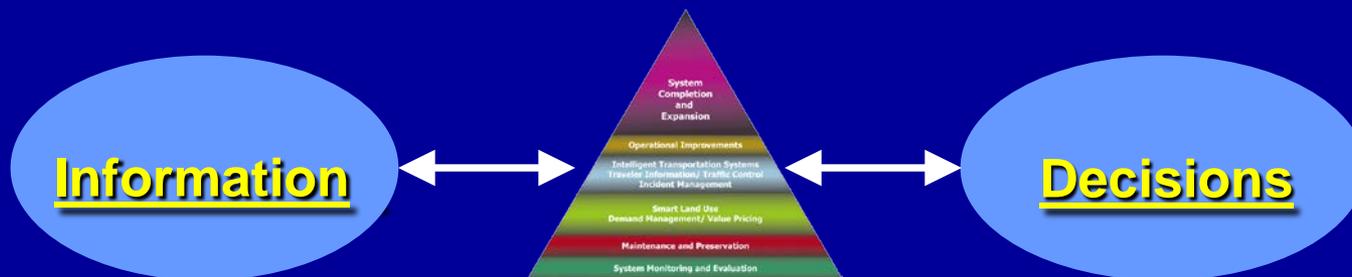
Critical Transportation Decision Areas



Division of Transportation System Information

WHO ARE WE?

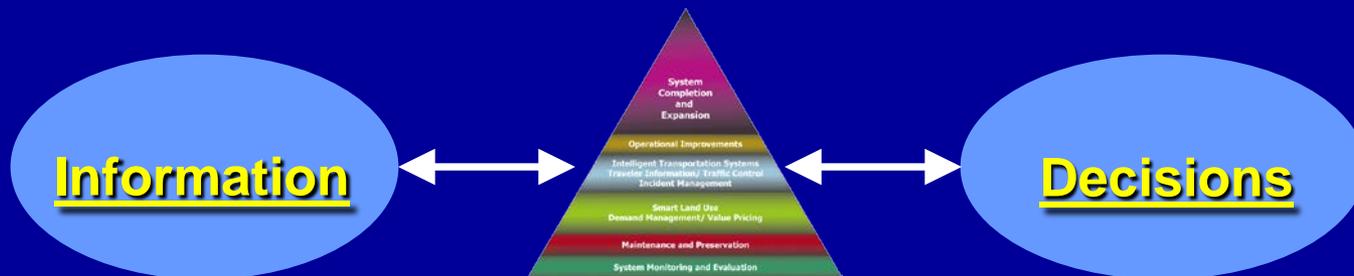
- Analysts
- Engineers
- Modelers
- Planners
- Researchers
- Technicians



Division of Transportation System Information

WHAT WE DO?

- Collect, report, manage, and analyze data
- Monitor and forecast conditions and trends
- Develop spatial data for analysis
- Provide data governance to enable data sharing
- Our FOCUS - the right and consistent quality information to support decision making



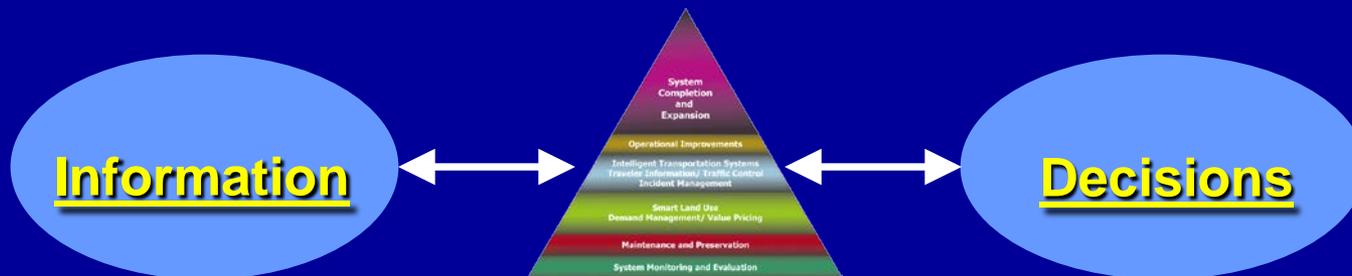
Division of Transportation System Information - Organization

TSI reports to the Deputy Director for Planning and Modal Programs

Travel Forecasting and Analysis

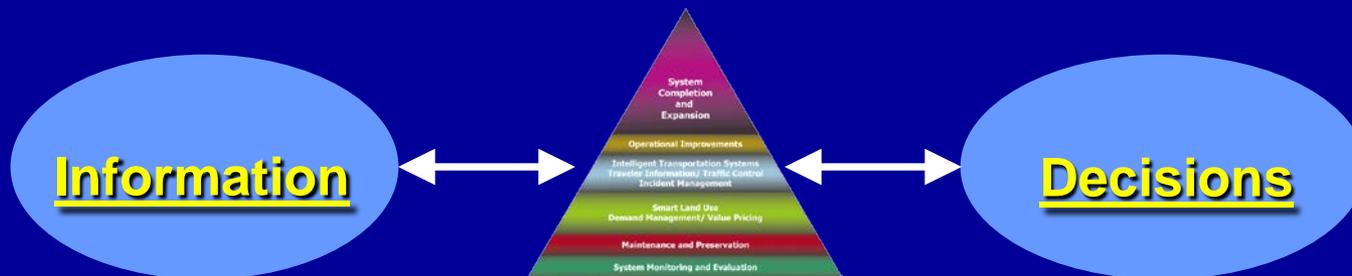
Data Analysis and Geospatial Information Systems

Highway System Information and Performance



Key TSI Service Areas

- **GIS (Geospatial Information Systems)**
- **Transportation System Attributes**
- **Highway Systems Designations**
- **Transportation Modeling**
- **Travel Survey Services**
- **Federal Reporting (performance and fiscal)**
- **Data Governance**



Geospatial Information Systems (GIS)

- **A computer-based data analysis and manipulation system that links planning and statistical data to a geographic location**
- **Much more than just a mapping tool, it is a complete information management system**
- **Links a geographic location with attribute data stored in relational data bases**
- **Facilitates integrating data and creating information - geographically**

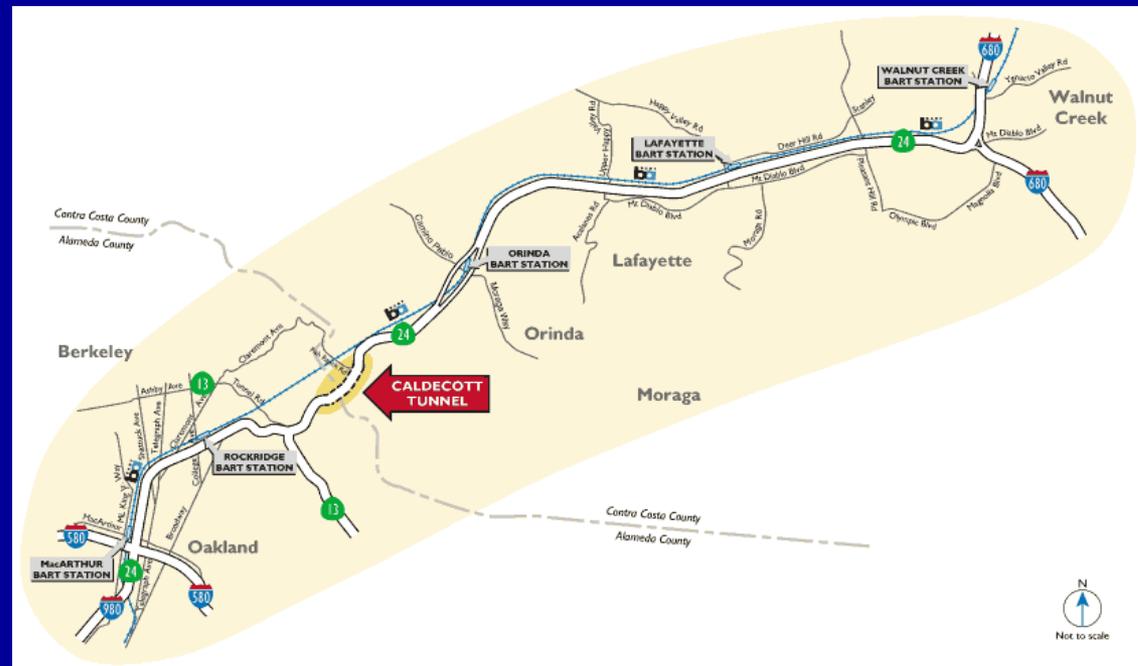
Managing Location Based Information

- 90% of Department data is spatial context

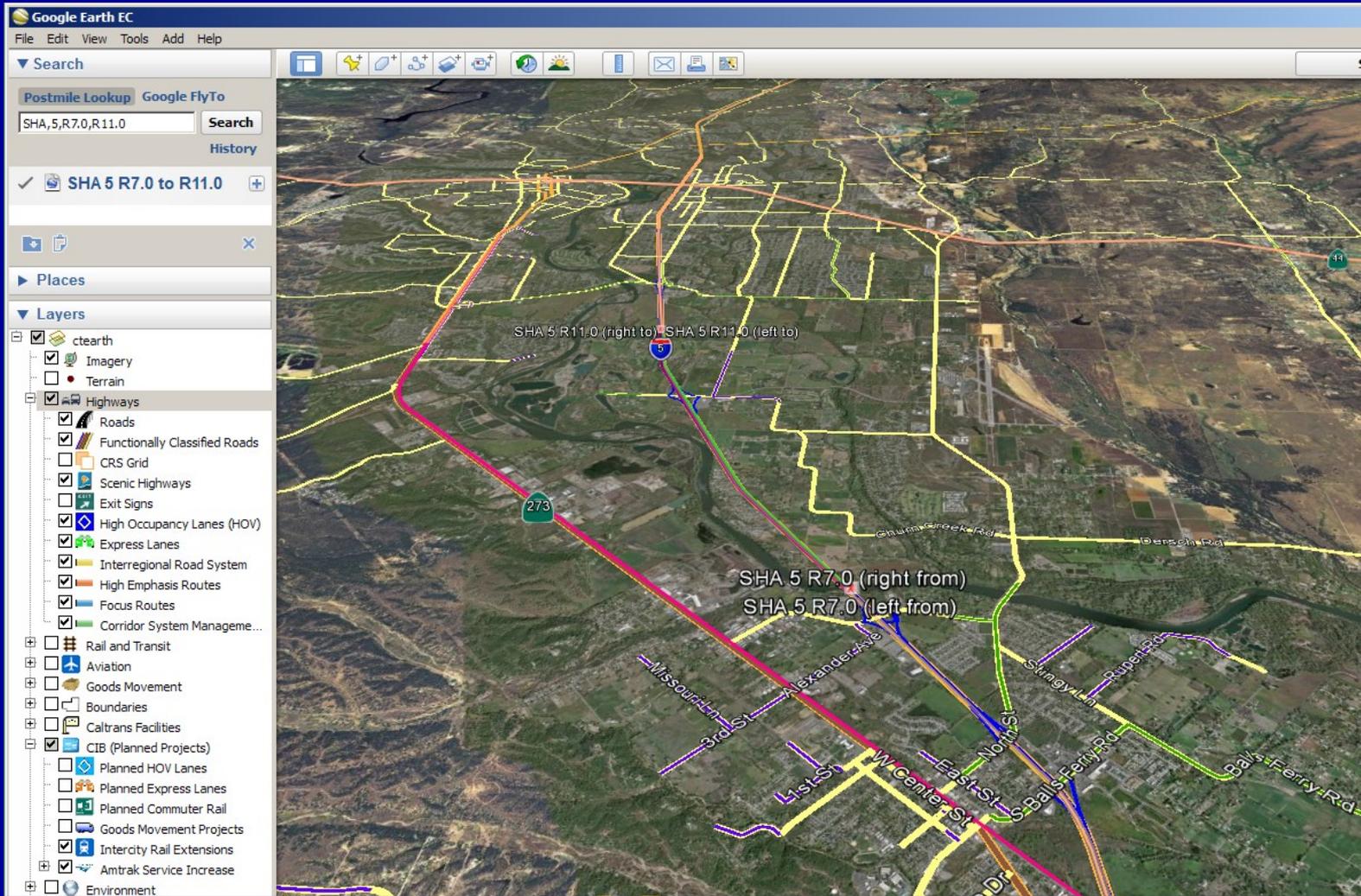
GIS integrates

- Assets
- Events
- Plans

With Location



Caltrans Google Earth Enterprise



Caltrans Google Maps Enterprise

Caltrans InterRegional Blueprint - Beta

Table of Contents

- Existing System
 - State Highways
 - Linear Reference System
 - Inter Regional Road System
 - High Emphasis Routes
 - CSMP
 - Focus Routes
 - HOV Lanes
 - Express Lanes
 - Park and Rides
 - Amtrak
 - Rail Routes
 - Bus Routes
 - Stations
 - Comuter Rail
 - Light Rail
 - Good Routes - Rail
 - Major Gateways
 - Point of Entry

Layer Description

Hover over a layer name for a description

Map Tools

Fly To Location GO

Post Mile Lookup

PM Click PM Point PM Line

Find PM Point

Postmile Click

Clear Map

Lat/Long

Activate

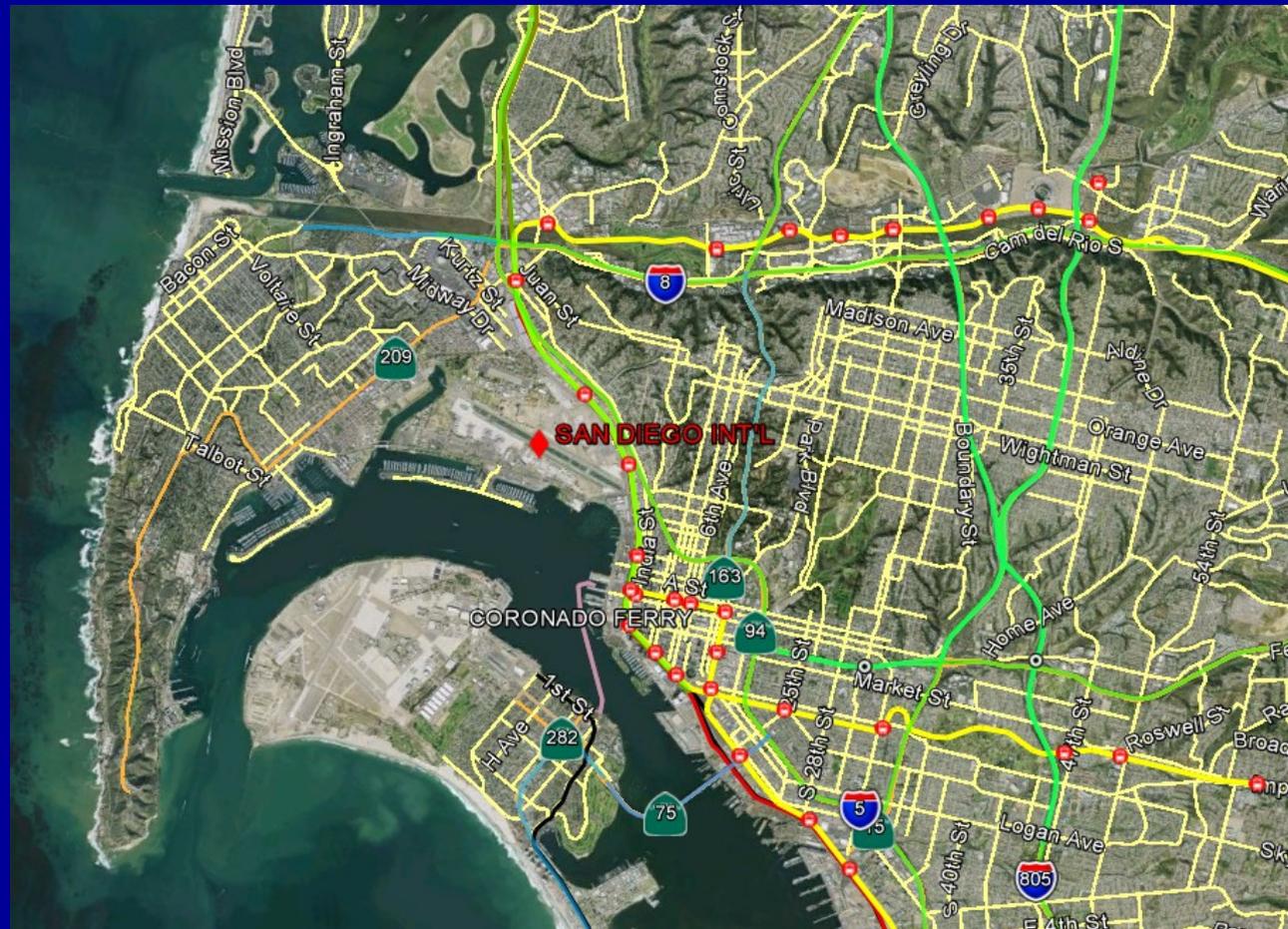
Lat:
Long:

Measure

Measure Clear

Feet: 0
Acres: 0

CT Earth (Dept.) & Caltrans Earth (Public)



<http://onramp/tsi/odagis/gis/services/googleearth/googleearth.php>

GIS Data Library

Key building block for data integration, analysis, communication, and visualization

- **Transportation**
- **Other Infrastructure**
- **Physical Environment**
- **Cultural Geography**
- **Political and Administrative Boundaries**
- **Imagery**

<http://www.dot.ca.gov/hq/tsip/gis/datalibrary/gisdatalibrary.html>

Highway System Information

- **Post Miles – Location on the roads**
- **Shoulder to Shoulder – Describes the roads features**
- **Collision Statistics and Analysis**
- **Highway System Designation**
- **California Road System**

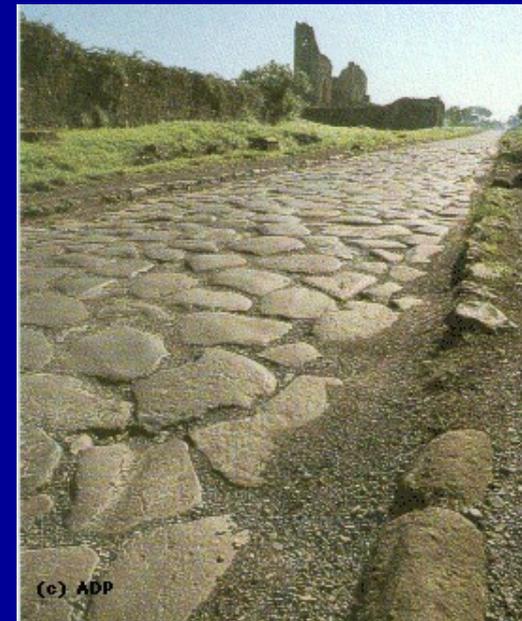
Post Miles

- **How far to go**
 - traveler information
- **Location, location,...**
- **Manage road system**
- **First used by Romans**

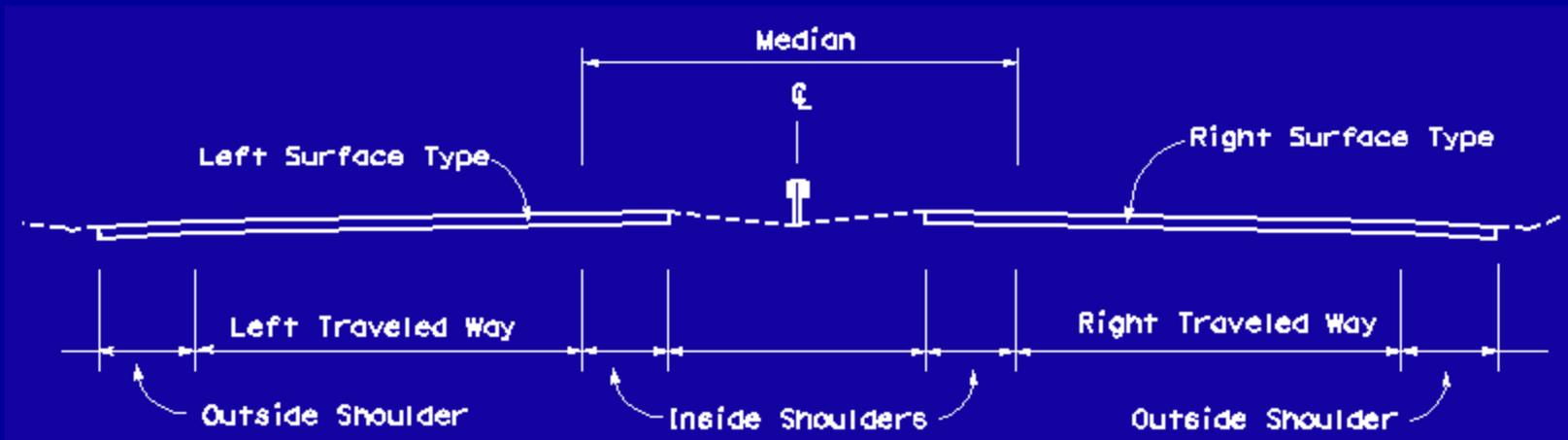
**Roman Post
Mile Marker**



Road to Coliseum



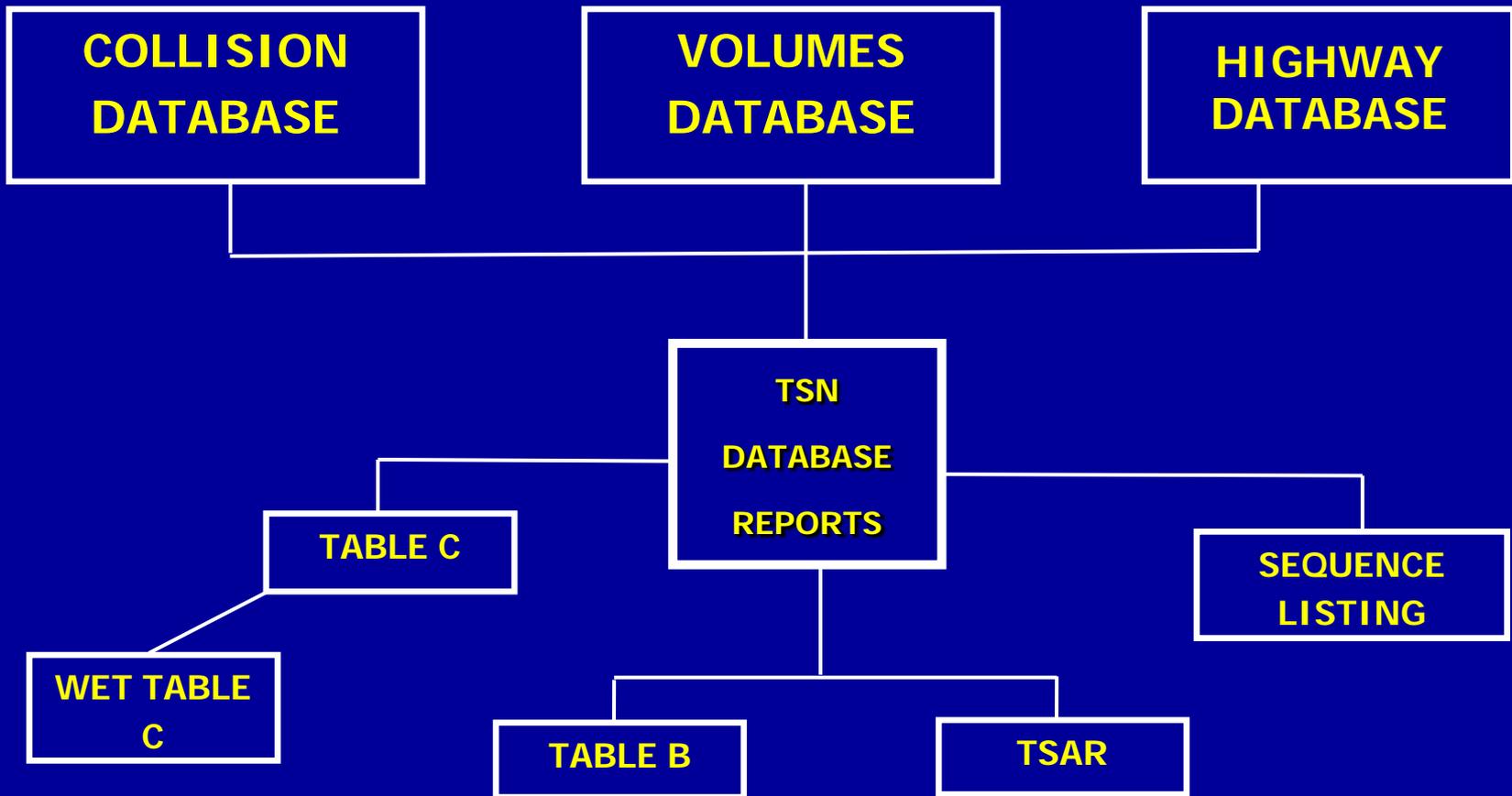
Shoulder to Shoulder



- **District, County, Route, PM**
- **Highway Group** (e.g., 6F, 4E, 2C)
- **Design Speed**

- **No. of Lanes**
- **Surface Type**
- **Shoulder Width**

Collision Statistics and Analysis

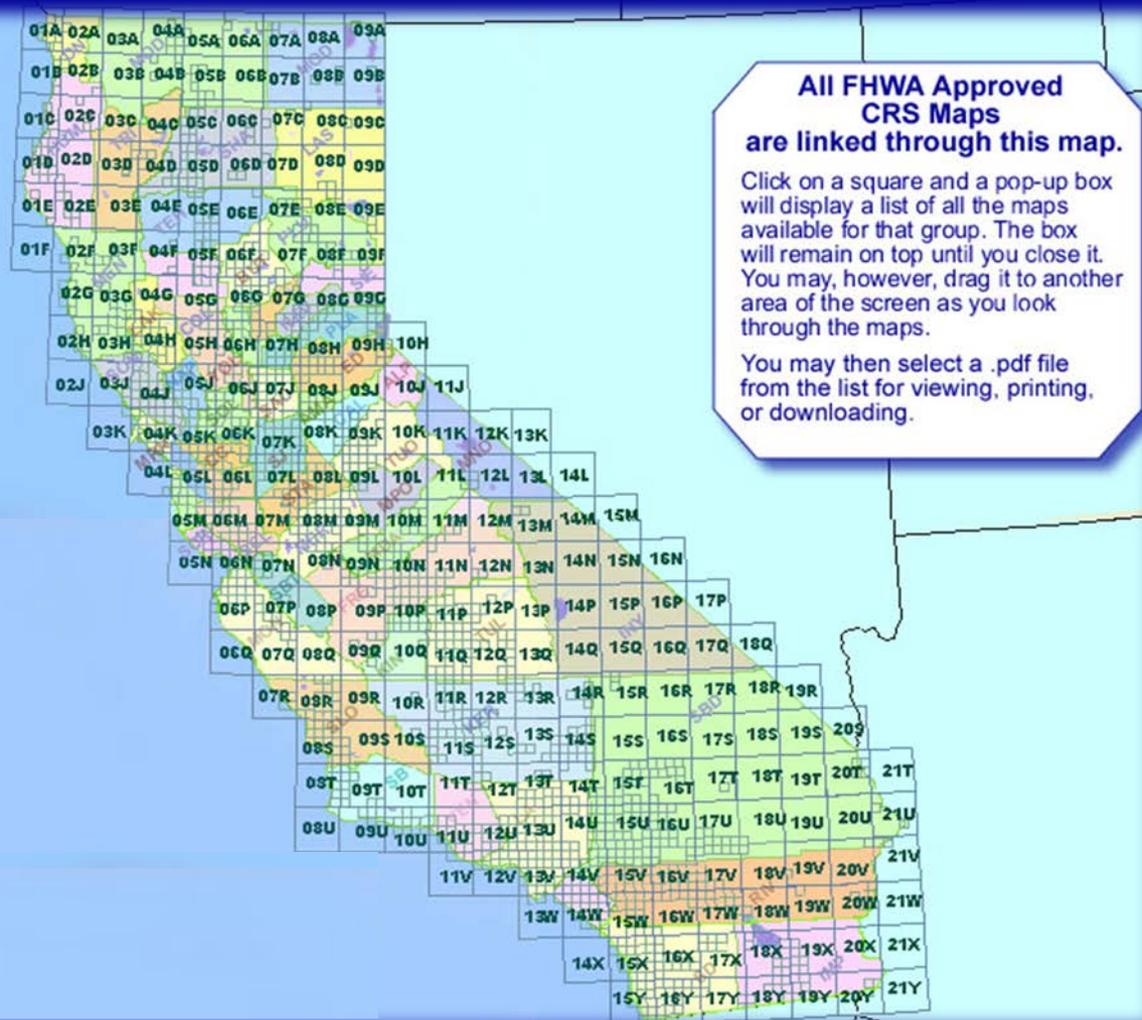


All this gives you rates, trends, hot spots, reports, and helps set priorities.

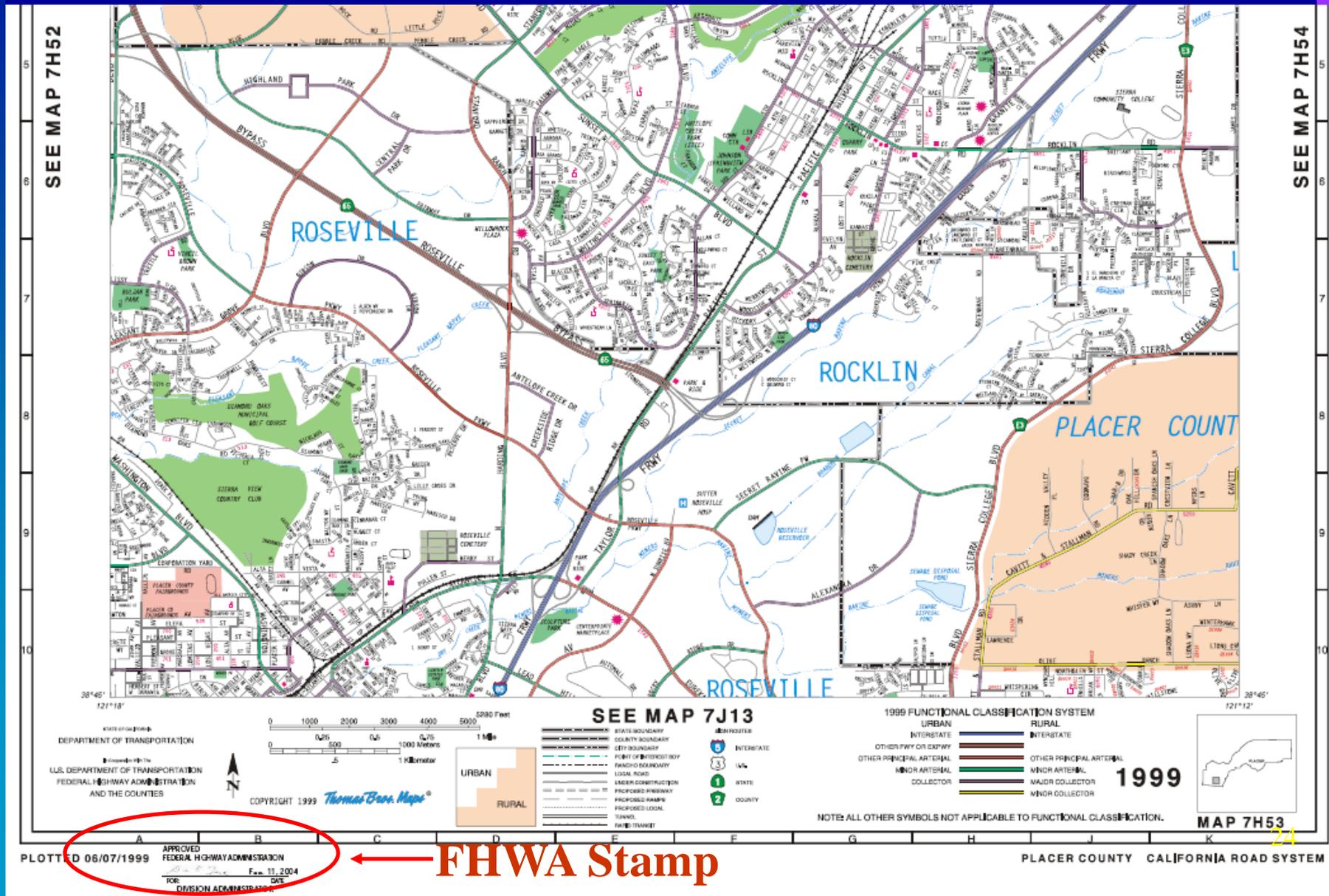
Highway System Designation

- **Ensure the connectivity, integrity, continuity and functionality of the highway system and of the California Road System.**
- **Provide system designation information to the MPOs and local agencies.**
- **Answer questions: Is the route on the National Highway System or part of the Strategic Highway Network? What is the functional classification (arterial, etc.)?**

California Road System (CRS Maps)

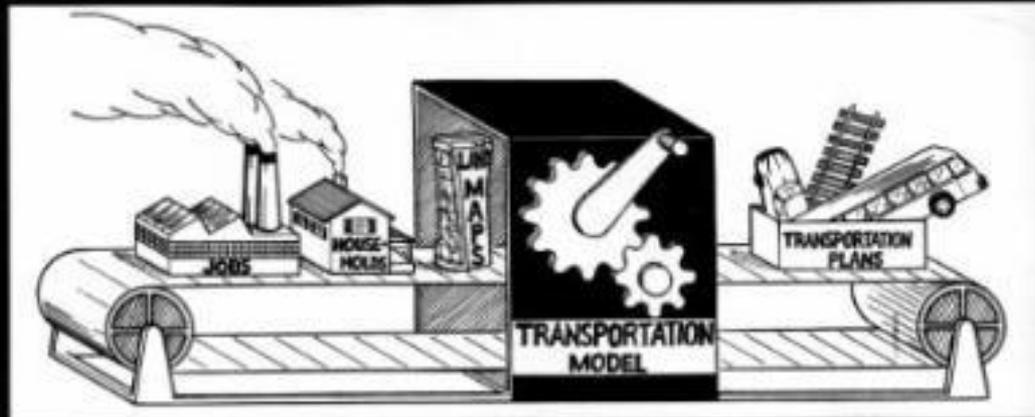


CRS Maps Document Functional Classification



Transportation Modeling

**Inside the
Blackbox:**



**Making Transportation Models
Work For Livable Communities**

Why Do We Model and Forecast Travel?

- **Provide background information for local, regional and statewide planning**
- **Determine impacts to the transportation system from land use**
- **Assist in the development of capital improvement projects**
- **Determine Air Quality Conformity and Assess Green House Gas Reduction Strategies**

What Information Do Transportation Models Require?

- **Demographics**
 - Population
 - Households
 - Employment
 - Income
- **Land Use**
 - General Plans
- **Trip Information**
 - Mode
 - Purpose
 - Length
 - Number of trips
 - Vehicle Occupancy
- **Transportation Network**
 - Streets, Roads, Highways
 - Mass Transit Routes
 - Rail: light, intercity, high-speed

California Household Travel Survey

- **Statewide survey performed once every ten years**
- **Provides detailed information about household socioeconomic characteristics and travel behavior**
 - **Approximately 57,000 travel surveys covering 58 counties**

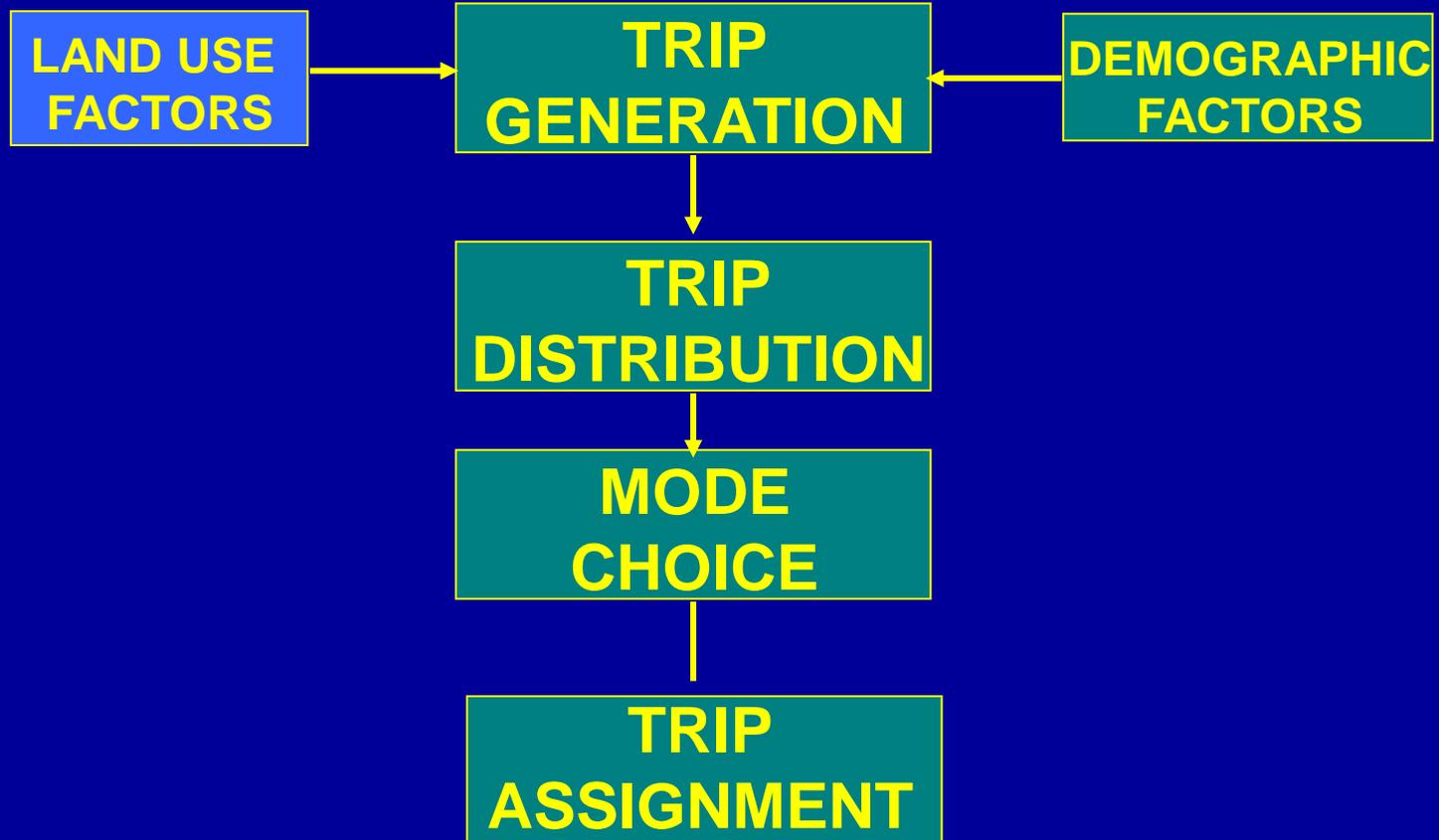
California Household Travel Survey

- **Support travel demand models to respond to SB 375 and SB 391**
 - **Regional and interregional**
 - **Travel data for 4-step and activity models**
- **Utilize latest data collection technology and survey design methodologies**
 - **Global Positioning Systems (GPS)**
 - **On Board Diagnostics (OBD) data collection**
 - **Hard to reach populations**

California Household Travel Survey

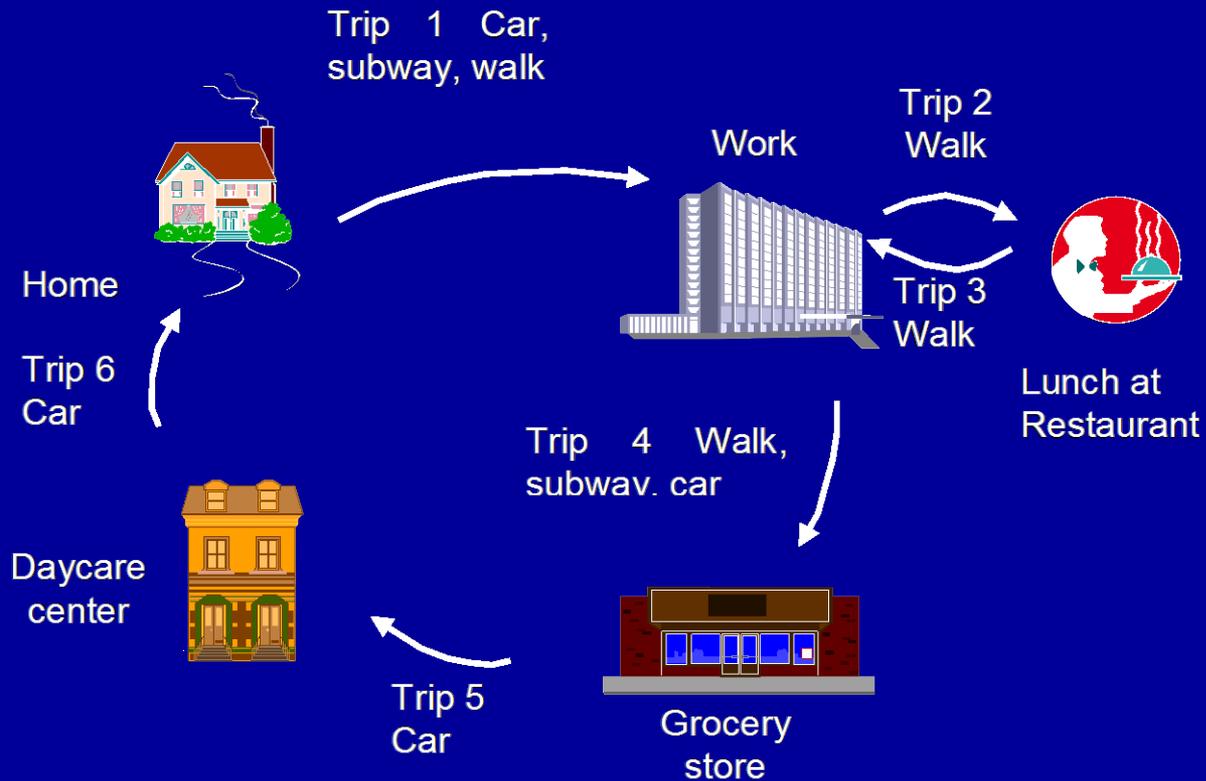
- **Multi-agency partnership**
 - State agency and MPO steering committee
 - State agency and MPO funded - \$11.6 million
- **Contract with NuStats and SRBI**
- **Caltrans contact – Vahid Nowshiravan**

Four-Step Travel Demand Model



Activity Tour Based Modeling

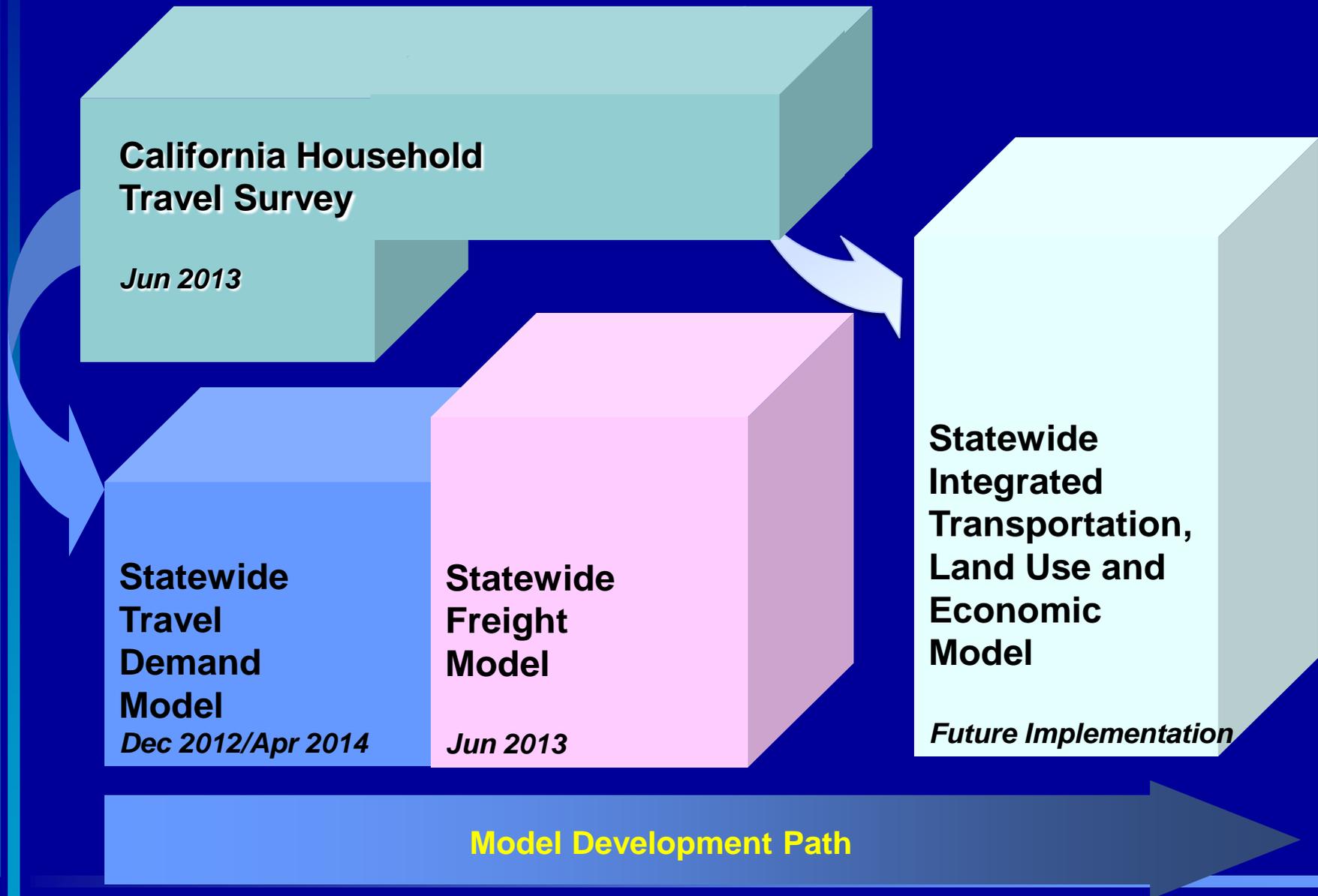
Example of Trips on a Travel Day



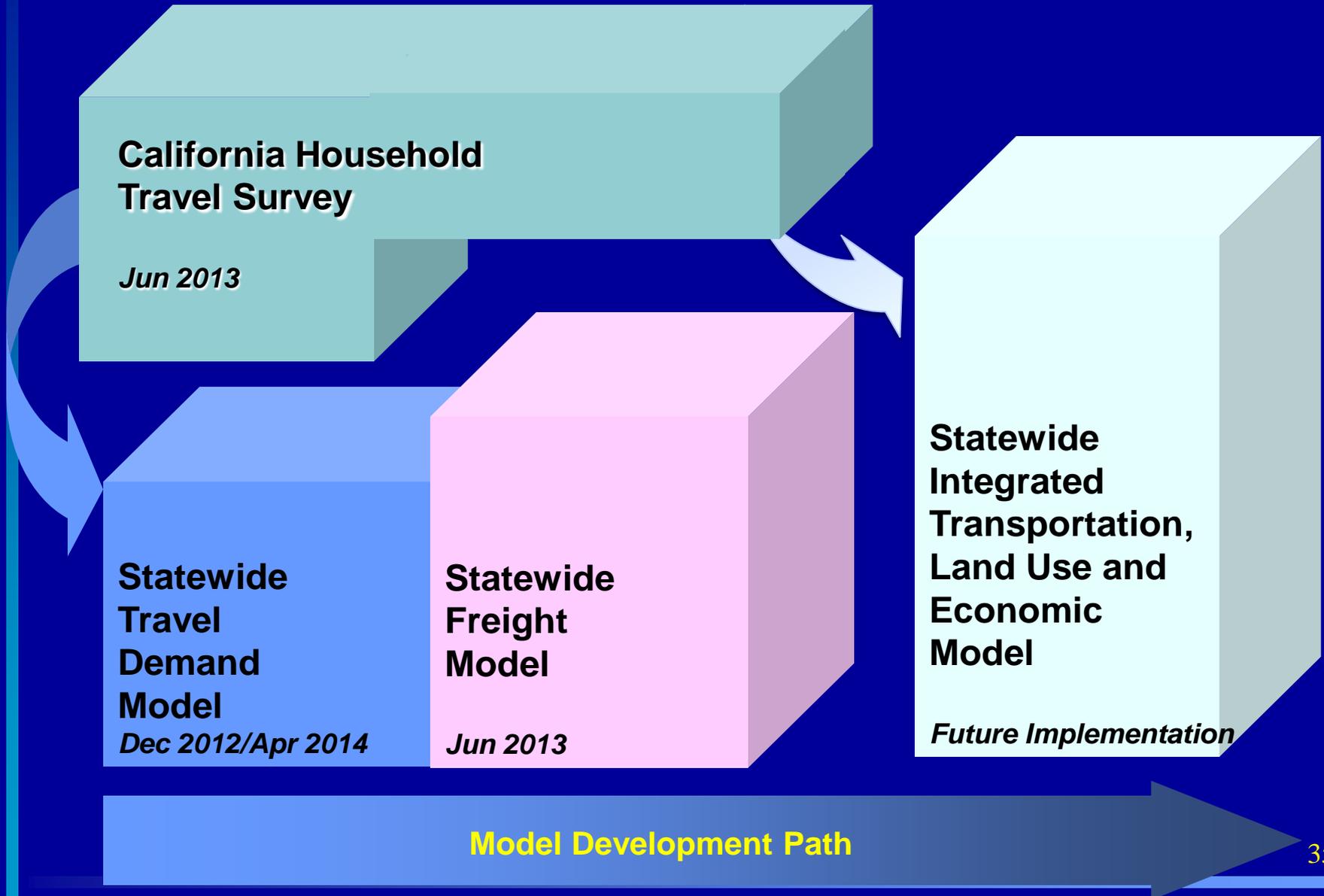
FHWA'S 2009 National Household Travel Survey

- **Nation's inventory of personal travel conducted at least once every ten years**
- **Travel surveys in California– 3,000**
- **Caltrans purchased an additional 18,000 add-on surveys to gain a better understanding of biking and walking behavior**
- **NHTS will be used to validate data collected in the CHTS**

Statewide Model Framework



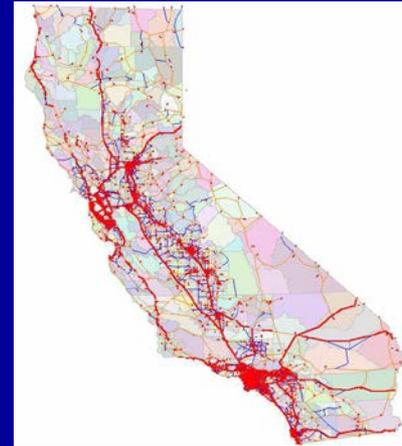
Statewide Model Framework



Micro Simulation Modeling

- **Provides more detailed information than Macro Modeling**
 - Total hours of delay
 - Average speed
 - Queue length
 - Merge diverse issues
 - And other operation characteristics

Comparison



Micro Modeling (Simulation)

Macro Modeling (Travel Demand)

Traffic Signals
Ramp Meters
Auxiliary Lanes
Round-a-bouts

Socioeconomic Factors
20 Year Forecast
Blueprint Plans
Network Level

Scale: Project

Scale: State and Regional

Web-Based Training

The image displays two screenshots of a web-based training interface for simulation modeling.

The left screenshot, titled "Roadway network", shows a list of parameters for a roadway network. The parameters include:

- Number of lanes
 - Lane drop
 - Lane gain
- Lane width
- Speed limit
- Horizontal alignment
 - Curve link
- Vertical alignment
 - Grade
- Lane restriction
 - HOV lane
 - HOV entrances or exits
 - truck lanes
- On-ramps and off-ramps
- Bus stops
- Road surface
- Median barriers, shoulders

The right screenshot, titled "Static assignment in travel demand modeling", shows three graphs comparing "Reality" and "Assignment Assumption" for different variables:

- Speed (u):** The graph shows Speed (u) on the y-axis and Flow on the x-axis. The "Reality" curve shows a sharp drop in speed as flow increases, while the "Assignment Assumption" curve shows a more gradual decline.
- Travel Time (1/u):** The graph shows Travel Time (1/u) on the y-axis and Flow on the x-axis. The "Reality" curve shows a sharp increase in travel time as flow increases, while the "Assignment Assumption" curve shows a more gradual increase.
- Travel time:** The graph shows Travel time on the y-axis and Flow on the x-axis. The "Reality" curve shows a sharp increase in travel time as flow increases, while the "Assignment Assumption" curve shows a more gradual increase.

The "Assignment Assumption" is noted as being "correct only for hourly flows".

- Travel Simulation Modeling
- Travel Demand Modeling (Four-Step and Activity-Based)
- Transit Modeling

Federal Reporting

The Federal Government determines the budget for future transportation allocations base of these Reports.

Highway Performance Monitoring System - HPMS

- Federally mandated inventory system and planning tool, designed to assess the nation's highway system
- Federally required for local funding allocations
- Vehicle miles traveled (VMT) used by EPA for air quality conformity tracking

Section 500 – Fiscal Reporting

- Federally reported income and expenditures for state and local roads

Data is published in the FHWA Highway Statistics

What Is Data Governance?

The formal orchestration of people, processes, and technology to enable an organization to leverage data as an enterprise asset

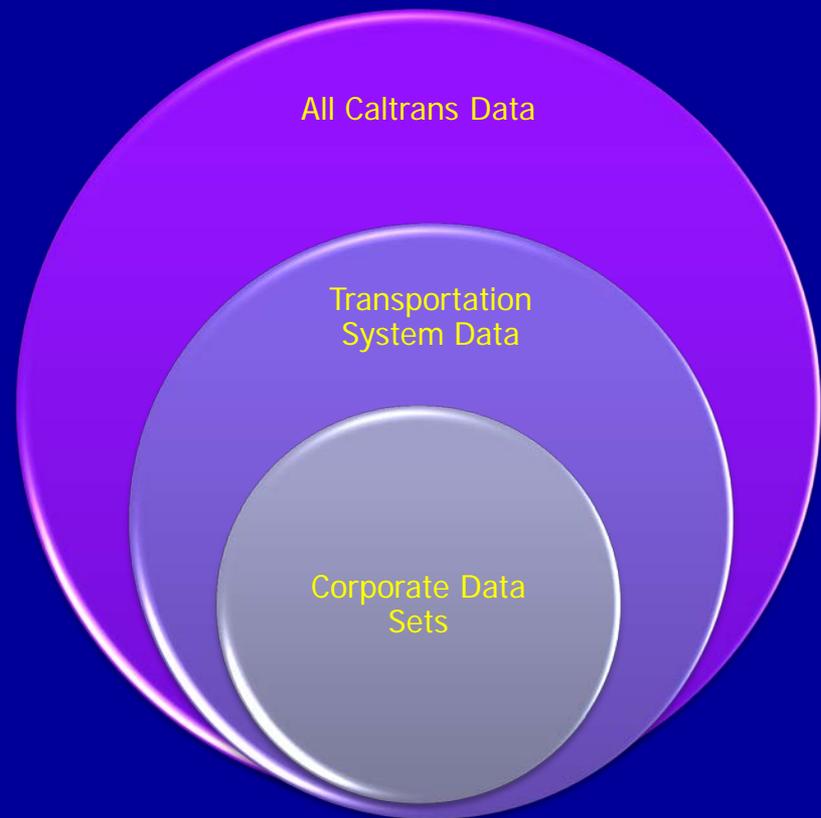
The structure to ensure the quality, availability, integrity, security, and usability of data within an organization

How an organization decides how to decide

Management is the decisions you make.
Governance is the structure for making them.

Governing Transportation System Data

- All Caltrans Data
- Transportation System Data is data related to the transportation system managed by Caltrans, including the definition, condition, or performance of all modes of the physical transportation system.
- Corporate Data Sets are a subset of transportation system data; it spans multiple business functions.



Transportation System Data Governance Board

Executive Sponsor: Kome Ajise

**Chairperson: James Appleton, Acting Chief, Division of Transportation System
Information**

**Terry Abbott, Chief,
Division of Design**

**Ed Lamkin, District 2 for
Division of Traffic Operations**

**Tony Tavares, Chief,
Division of Maintenance**

**Jay Norvell, Chief,
Division of Environmental Analysis**

**Jane Perez, Chief,
Division of Mass Transportation**

**Mark Weaver, District 4 for
Division of Right of Way**

**Gary Cathey, Chief,
Division of Aeronautics**

**Bill Mosby, Acting Chief,
Division of Transportation Planning**

**Bill Bronte, Chief
Division of Rail**

**Doug Kempster, Chief,
Division of Information Technology**

**Lori Guinan, District 6
Deputy District Director, Administration**

**Bill Figge, District 11 Deputy District
Director, Planning and Local Assistance**

**Steve Price, District 5 Deputy District
Director, Maintenance and Operations**

TSI Relevance

- **Connects data consumers with data producers**
- **Develop tools to analyze and interpret data**
- **Transform data into information**
- **Integrate information to create knowledge**
- **Provides data governance**
- **Strengthens informed decisions**

Contacts

TSI Intranet Site - <http://onramp/tsi/>

TSI Internet Site - <http://www.dot.ca.gov/hq/tsip/>

GIS Data Maintenance

Keith Chervunkong @ 916-654-5192

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Section 500 Reporting

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Contacts (cont.)

Highway System Designation

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Highway Performance Monitoring System

Brian Domsic @ 916-653-3272

Micro and Macro Modeling and California Statewide Freight Model

Doug MacIvor @ 916-654-4853

California Household Travel Survey

Vahid Nowshiravan @ 916-654-5089

Contacts (cont.)

National Household Travel Survey

Leonard Seitz @ 916-654-2610

Census Transportation Planning Package and American Communities Survey

Diana Portillo @ 916-653-3182

National Household Travel Survey

<http://www.fhwa.dot.gov/policy/ohpi/nhts/aboutnhts.cfm>

American Community Surveys (ACS) – US Census Bureau

<http://www.fhwa.dot.gov/planning/census/acs.htm>

Contacts (cont.)

Census Transportation Planning Package (CTPP) – US DOT/AASHTO

<http://www.fhwa.dot.gov/ctpp/>

California Statewide Travel Demand Model

Chad Baker @ 916-654-2940

Web-Based Training

Diane Jacobs @213-897-9626

Transportation System Data Governance

Mike Yee @ 916-654-5552