Caltrans District 7
Los Angeles Regional Transportation Management Center (LARTMC)

“Innovative Technologies at Work”
The LARTMC – What is It?

• The LARTMC is a high-technology facility designed solely for purposes of managing traffic within the highly congested LA and Ventura County regions.

• The LARTMC serves forty three (43) distinct government functions and was designed with the technologies to support joint operations and act as the center for Intelligent Transportation Systems (ITS) and Emergency Response operations for the next 30 years.
The LARTMC systems assist nearly 9.6 million people living in LA alone, not to mention the 20 million people living in the Southern California, a great deal of which travel to LA each day.

Motorists are assisted through:

- Roadway congestion monitoring on 525 miles of mainline roadway
- Real-time information posted to nearly 20 real-time traffic websites – 24x7
- Real-time traffic and video displayed on television stations daily
- Display or real-time incident and travel time messages on nearly 109 changeable message signs daily
- Prompt motorist aid as well as incident detection, verification and clearance both improving travel flows and reducing secondary incidents
Agencies Involved

- Caltrans
- CHP
- METRO
- LADOT
- DGS
Vendors/Contractors Involved

- Delcan
- AT&T
- DMJM H&N
- Electrosonic
- Rosstown Electrical & Data, Inc
- Swinerton Incorporated
LARTMC Technologies and Innovations

- Audio/Visual System
- Advanced Transportation Management System (ATMS) Software
- Real Time Traffic Data Portals
- ITS Fiber Optic Field Communications
LARTMC Audio Visual System

Twelve 84” Dual Bulb Digital Light projection (DLP) displays

Two 10-Line, 40-character Electronic Message Boards (EMB)

Twelve 50” Digital Light Projection (DLP) display cubes
The ATMS software:

- Monitors over 525 miles of monitored freeway and highway
- 1,280 Traffic Monitoring Stations (TMS)
- Over 10,000 Inductive Loop sensors

Real-Time ATMS Map displaying 1280 vehicle detector stations
The ATMS Controls the following field devices:

- 109 Changeable Message Signs
- 960 Ramp Metering Systems
- 15 Highway Advisory Radio Stations
- 350 Closed Circuit television (CCTV) Cameras
ATMS Software Features

- Regional Integration
- Browse Edit
- Reports
- Advanced Management Functions
- Travel Time
- Field Device Control
- Traffic Data
- Map Overview
- Regional Integration
ATMS “Base Map”

- **Map of Region**
  - Depicts Roadways
    - Freeways, State Highways, Major & Minor Arterials
  - Shows Field Element Locations & Status
    - Induction Loops, Ramp Meters, CMS, CCTV, HAR & Beacons
- **Overview of All ATMS Operations**
  - Freeway Congestion
  - Ramp Metering Operations
  - Current and Scheduled Planned Event Operations
Functionality of Base Map

- Map Manipulation
  - Multiple Pan & Zoom Options
  - Map Overview
  - New Map
  - Legend
- Control of Map Layers
  - Automatic “Decluttering”
  - User Controllable Views
ATMS Software

- Map Overview
- Traffic Data
- Field Device Control
- Travel Time
- Advanced Management Functions
- Reports
- Browse Edit
- Regional Integration

- Roadway Monitoring
- VDS/TMS Data
VDS Data Dialogue

30 Second Loop Data
- Volume
- Occupancy
- Estimated Speed

Accumulated Loop Volumes (5, 15 min)

Loop Status

Loop Location

Station Totals
# Multiple Station Data Display

## Adjacent VDS Data / 30-Second Volume

**Freeway:** I210 W  
**Data at:** Jun 15, 2005 15:58:30

<table>
<thead>
<tr>
<th>Lane</th>
<th>GRAND 2</th>
<th>GRAND 1</th>
<th>CITRUS</th>
<th>AZUSA 2</th>
<th>AZUSA 1</th>
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<tr>
<td></td>
<td>Speed</td>
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<td>70</td>
<td>54</td>
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<tr>
<td>Average: Total</td>
<td>65.0</td>
<td>63.9</td>
<td>69.9</td>
<td>69.1</td>
<td>65.6</td>
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<tr>
<td>Status:</td>
<td>14.0</td>
<td>12.8</td>
<td>11.0</td>
<td>12.2</td>
<td>12.0</td>
</tr>
</tbody>
</table>

- **Speed:** MPH  
- **Vol:** Veh / 30Sec

**OK**
ATMS Software

- Map Overview
- Traffic Data
- Field Device Control
- Travel Time
- Advanced Management Functions
- Reports
- Browse Edit
- Regional Integration

- CMS
- CCTV
- HAR
- RMS
Device Control

- Changeable Message Signs
  - Operational Status
  - Manual User Control
  - System Scheduled
- RMS
  - Operational Status (Mode, Rate)
  - Central Algorithm Configuration (SWARM)
- HAR & Beacons
  - Operational Status
- CCTV
  - Camera Selection (point and click)
  - Pan / Tilt / Zoom / Iris
  - Video Wall Control
  - Video Snapshot Configuration
## Field Devices - Icon Display

<table>
<thead>
<tr>
<th>Legend</th>
<th>Name</th>
<th>Visible</th>
<th>Control</th>
<th>Default</th>
<th>Display</th>
<th>Filter</th>
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<tr>
<td></td>
<td>Changeable Message Signs (CMS)</td>
<td></td>
<td></td>
<td>Default</td>
<td>0.6</td>
<td>Normal</td>
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<tr>
<td></td>
<td>CCTV</td>
<td></td>
<td></td>
<td>Default</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>HAR</td>
<td></td>
<td>On</td>
<td></td>
<td>0.5</td>
<td></td>
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<td></td>
<td>Vehicle Detector Stations (VDS)</td>
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<td>RMS, OnRamp Metered</td>
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<td></td>
<td>Default</td>
<td>0.2</td>
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<td></td>
<td>OnRamp, Unmetered</td>
<td></td>
<td></td>
<td>Default</td>
<td>0.2</td>
<td></td>
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<td></td>
<td>OffRamp</td>
<td></td>
<td></td>
<td>Default</td>
<td>0.2</td>
<td></td>
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</table>

[All On][All Off][Default][OK]
CMS System Schedule

Start Time: Tue 15:00  Duration: 6 hr 0 min

End Time: Tue 21:00

A message is scheduled for this sign.
# CMS Message History

<table>
<thead>
<tr>
<th>Location</th>
<th>Cross Street</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Start</th>
<th>End</th>
<th>Duration</th>
<th>Operator</th>
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</thead>
<tbody>
<tr>
<td>81</td>
<td>I210 W</td>
<td>TESTING 1</td>
<td>TESTING 2</td>
<td>2005.06.23 16:37</td>
<td>2005.06.23 16:39</td>
<td>00:01</td>
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<td>TESTING 2</td>
<td>2005.06.23 16:39</td>
<td>2005.06.23 16:39</td>
<td>00:00</td>
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<td>TEST</td>
<td>TEST</td>
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<td>00:00</td>
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<tr>
<td>81</td>
<td>I210 W</td>
<td>A TEST MESSAGE</td>
<td></td>
<td>2005.06.24 08:56</td>
<td>2005.06.24 08:56</td>
<td>00:00</td>
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<tr>
<td>81</td>
<td>I210 W</td>
<td>PHASE 1 MESSAGE</td>
<td></td>
<td>2005.06.24 08:58</td>
<td>2005.06.24 08:59</td>
<td>00:00</td>
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<td>I210 W</td>
<td>2 PHASE PART 1</td>
<td>2 PHASE PART 2</td>
<td>2005.06.24 08:59</td>
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<td>00:00</td>
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<td>SCHEDULED 2 PHASE - PART 1</td>
<td>SCHEDULED PHASE - PART 2</td>
<td>2005.06.24 09:07</td>
<td>2005.06.24 09:07</td>
<td>00:00</td>
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<td>TESTING AAA</td>
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<td>2005.06.27 11:48</td>
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<td>01:35</td>
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<td>TEST AMBER ALERT</td>
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### CMS Message Library

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<td></td>
<td>-</td>
<td>TEST LINE 2</td>
<td>TEST LINE 4</td>
<td></td>
<td></td>
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<td>2</td>
<td>CONGESTION</td>
<td>CONGESTION AHEAD</td>
<td></td>
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<td>3</td>
<td>WINDY</td>
<td>GUSTY WINDS AHEAD</td>
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<td>4</td>
<td>DUSTY</td>
<td>POOR VISIBILITY AHEAD</td>
<td></td>
<td>2005.11.15 10:51</td>
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Ramp Metering

• Manual Control
  • Traditional Time of Day & Local Responsive
  • Controller Memory Configuration

• Multiple “Automated” Modes
  • 3 Central Algorithms
    • Swarm 1 - Adaptive System-wide
    • Swarm 2a - Headway-based local responsive
    • Swarm 2b - Density-based local responsive
Flow of RMS Windows

1. Select Metering Mode
   - MODE: Local TOD/LMR
   - Manual
   - SWARM

2. Configure SWARM Control
   - MANUAL RATE:
     - 13 vpm/lane
     - 12 vpm/lane
     - 3 vpm/lane

3. Metering Rate Statistics
   - SWARM 1 Details
   - SWARM 2a Details
   - SWARM 2b Details

4. Configure Controller Memory

5. RMS Loop Enable/Disable

- Minimum Rate Control
  - TOD Absolute Minimum
  - TOD Absolute Maximum
- Default Rate Control
  - TOD Strategy
  - Only during TOD
  - Anytime

- SWARM Startup Strategy
  - Only during TOD
  - Anytime

- Memory Page
- Tables
- Insert/Append/Edit

- Platooning Plans
- CRVOL Plans
- TOD Holiday
- TOD Table
- All Memory

- Flow of RMS Windows

[Diagram]
Ramp Metering Control

RMS 1288

Jun 15, 2005 7:15 PM

Data at: Jun 15, 2005 18:14:30

RMS ID: 716612
MS ID: 1288
County: Los Angeles
Location: I210 W
Postmile: 40.26
Cross Street: CITRUS
LDS ID: 715515
Status: Good

Metering Status: Not Currently Metering
Metering Mode: Local: TOD
Metering Rate: Off
Controller Override: None
% Violations: 0
Metered Lanes: 2
Ramp Lanes: 2
HOV Lane Location: None
Platoon Meter Ramp: No

Select Metering Mode
Configure SWARM Control
Metering Rate Statistics
Configure Controller Memory
Loop Enable/Disable...

Freeze Data

RMS Type: OR

<table>
<thead>
<tr>
<th>Loop Type</th>
<th>Accumulated Volume</th>
<th>30 Second Data</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>15 Min</td>
<td>5 Min</td>
</tr>
<tr>
<td>OR</td>
<td>116</td>
<td>37</td>
</tr>
<tr>
<td>PA</td>
<td>116</td>
<td>37</td>
</tr>
<tr>
<td>DM</td>
<td>118</td>
<td>36</td>
</tr>
<tr>
<td>QU</td>
<td>106</td>
<td>32</td>
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</table>

Zoom to Area OK
CCTV Interface

Video Wall Control
HAR & Beacon Control

- Notepad serves as a place for users to record HAR use and beacon use
- Programmatic interface to HAR under development
Electronic Message Board (EMB) - EMB CMS (for LARTMC)
Agenda

- Map Overview
- Traffic Data
- Field Device Control
- Advanced Management Functions
- Reports
- Browse Edit
- Regional Integration

- Signing Configuration
- Signing Scheduler
- Target Selection
Congestion Signing Configuration

Global Congestion Signing Configuration

<table>
<thead>
<tr>
<th>CMS</th>
<th>Location</th>
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<th>Status</th>
<th>Congestion Signing</th>
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<tr>
<td>1</td>
<td>I-405 N</td>
<td>105TH ST</td>
<td>Good</td>
<td>Active</td>
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<td>2</td>
<td>I-405 N</td>
<td>MANHATTAN BLVD</td>
<td>Good</td>
<td>Active</td>
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<tr>
<td>3</td>
<td>I-10 E</td>
<td>DORCHESTER AVE</td>
<td>Good</td>
<td>Active</td>
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<tr>
<td>4</td>
<td>SR-101 W</td>
<td>W/O CENTRAL AVE</td>
<td>Good</td>
<td>Active</td>
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<tr>
<td>5</td>
<td>I-10 S</td>
<td>MOTOR AVE</td>
<td>Good</td>
<td>Active</td>
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<td>6</td>
<td>I-10 S</td>
<td>E/O WASHINGTON BLVD</td>
<td>Good</td>
<td>Active</td>
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<td>7</td>
<td>SR-101 S</td>
<td>WHITSETT AVE</td>
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<td>8</td>
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<td>W/O WOODMAN AVE</td>
<td>Good</td>
<td>Active</td>
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<td>9</td>
<td>E N</td>
<td>GATE AVE</td>
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<td>Active</td>
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<td>E 10 S</td>
<td>NINTH ST</td>
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<td>11</td>
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<td>INDIA ST</td>
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<td>E/O BROADWAY</td>
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<td>EXPOSITION</td>
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<td>25</td>
<td>E N</td>
<td>W/O PIONEER BLVD</td>
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<td>W/O NATIONAL BLVD</td>
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<td>E/O ROBERTSON</td>
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<td>I-405 S</td>
<td>VAN GOREY ST</td>
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<td>30</td>
<td>I-10 S</td>
<td>CITY TERRACE G/C</td>
<td>Good</td>
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<td>31</td>
<td>I-10 S</td>
<td>MARKET ST</td>
<td>Good</td>
<td>Active</td>
</tr>
</tbody>
</table>

Select All
Deselect All
Activate
Deactivate
Select Targets...
Sample Travel Time Message

CMS 11
Aug 22, 2005
5:57 PM

Multiple CMS
Single CMS Detail

CMS DETAILS

CMS ID: 11
County: Los Angeles
Location: SR60 E
Cross Street: INDIANA ST
Postmile: 1.92
Type: MODEL 500
Status: Good

Proposed:
Send >>
Blank >>
Reset >>

Current: TT_MGR
TRAVEL TO
RTE 605.. 14 MIN
RTE 57.. 45 MIN

EDIT

2 Phase
1 Phase

Display Time: 2 Seconds
Immediate
Schedule

Phase 1
Phase 2

OK

Zoom to Area

Preview
Clear
History
Library
Agenda

- Map Overview
- Traffic Data
- Field Device Control
- Travel Time
- Advanced Management Functions
  - SWARM
  - Incident Detection
  - Event Management
- Reports
- Browse Edit
- Regional Integration
System Wide Adaptive Ramp Metering

- Develops metering rates based on real time conditions
- SWARM 1 - Network
  - Looks at the complete system
  - Forecasts traffic conditions x minutes into the future
  - Changes metering rates now to avoid predicted future problems
- SWARM 2
  - Looks at local traffic conditions near ramp
  - Based on current data
  - SWARM 2a - Headway (time between vehicles)
  - SWARM 2b - Storage
SWARM 1

Bottlenecks

Forecasting (Kalman Filter)

Metering Rate Apportionment

Dynamic Saturation Density
SWARM 1 VDS Locations

Upstream Mainline VDS

Downstream Mainline Bottleneck VDS

Selected Metered On Ramp

Metering rates are determined based on conditions at downstream bottlenecks
Configure SWARM Control

Set controls that govern how SWARM rates are determined and implemented.
# Metering rate statistics

**RMS ID:** 716612
**MS ID:** 1288
**County:** Los Angeles
**Location:** 1210 W
**Postmile:** 40.25
**Cross Street:** CITRUS
**LUS ID:** 715515
**Status:** Good

**Metering Status:** Not Currently Metering
**Metering Mode:** Local: TOD
**Metering Rate:** Off
**Controller Override:** None
**% Violations:** 0
**Metered Lanes:** 2
**Ramp Lanes:** 2
**HOV Lane Location:** None
**Meter Head Location:** Both
**Platoon Meter Ramp:** No

<table>
<thead>
<tr>
<th>RATE (veh/min)</th>
<th>Metering Mode</th>
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<tbody>
<tr>
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</table>

**Time-of-Day Rate:** Off

- **SWARM1 (Network) Rate:** 30
- **SWARM2a (Headway) Rate:** 30
- **SWARM2b (Storage) Rate:** 30
- **Absolute Minimum Rate:** 6
- **Absolute Maximum Rate:** 30

[OK]
Automatic Incident Detection

- Uses API D: All Purpose Incident Detection algorithm
- Algorithm considers Prevailing Congestion Levels
- Algorithm Tuned for Each Mainline VDS
- Operator “Alarmed” for Potential Incident
APID

• Compare upstream and downstream stations for differences in occupancy
• Test individual stations for rates of increase and decrease in occupancy
• Test upstream stations for extraordinary increases in occupancy

Upstream detector: rising occupancy, falling speed

Downstream detector: extraordinary decreases in occupancy, rising speed

Traffic flow
Event Management

- Multiple Types of “Events”
  - Incidents (Manual or Automatic)
  - Emergency Closures
  - Special Events
- Response Plan Generation
  - Automatically Generated
  - Manually Generated
Event Details

Event ID: 97171
Event Type: Incident
County: LA
Route: 2 E
At: R18.91 HOLLY DR
Roadway Type: ML
Event State: Confirmed

Last Update at: 07/07 17:48

BACKGROUND INFORMATION
Source: Operator/CCTV
Weather Condition: No Factor
Field Command Post:
Field CP Phone Number:

CAD #:
CAD Code:

ATTRIBUTES
Incident Type: Collision
Vehicles: 2: passenger car.
Injuries: 0:
Fatalities: 0:
Caltrans Property Damage...

Construction Zone
Major Media Coverage
Politically Sensitive
Evacuate Area
Gawking

BLOCKAGE PATTERN
Lane Type: LS
Lane Status: Clear

Mainline
RS
Clear
Blocked
Response Plan Generation

• Expert System Generated
  • Rules-based system for generating responses to a complex set of conditions
  • Provides a scaleable, adaptable solution
  • Developed utilizing agency expertise for operational responses
  • Aids operators in management of complex events
  • Standardized responses

• Operator Scripted
Response Plan Elements

Freeway CMS
- Selects which signs to use
- Determines exact message content

HAR notepad
- Record which HAR is used and message content

Operator Actions
- Request Sigalert
- Issue Traffic Advisory
- Advise TMT Leader
- Notify Headquarters Communications
- Advise Maintenance

ATMS Response Plan
- Recommend to Dispatch FSP
- Contact TMC Senior and Lead Officer
- Notify Duty Officer
- Advise Local Agencies
- Advise Adjacent Districts

ATIS Advisories to Web Page
- Interface to output advisories to WEB Page
AMBER alert

Can select all signs and send messages with single mouse click
Agenda

1. Regional Integration
2. Browse Edit
3. Traffic Data
4. Field Device Control
5. Travel Time
6. Advanced Management Functions
7. Reports
8. Map Overview

Regional Integration
Types of Traffic Data Reports (36 total reports)

- Traffic Data Reports
- Traffic Data Plots
- System Performance Reports
- Special Applications Reports
- Ramp Metering Reports

Five Years if data is stored on a 4 Terabyte RAID system
## Sample Report Output

**Traffic Data Report**

**30 Second Loop Data**

**From:** 07-19-2005  
**To:** 07-19-2005

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## Sample Special Applications Report: CMS Message Approval

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|        |            |                 |                   |                  | S 605 CARPOOL LN |               |          | shello      |
|        |            |                 |                   |                  | LINE 2
|        |            |                 |                   |                  | CLOSE AT PBEK   |               |          |             |
|        |            |                 |                   |                  | LINE 3
|        |            |                 |                   |                  | LINE 4
|        |            |                 |                   |                  | LINE 5
|        |            |                 |                   |                  | LINE 6
|        | 07-02-2005 | 14:32:06        | 15:04:54          | 00:32:48         | LINE 1
|        |            |                 |                   |                  | S 605 CARPOOL LN |               |          | @Hello      |
|        |            |                 |                   |                  | LINE 2
|        |            |                 |                   |                  | CLOSE AT PBEK   |               |          |             |
|        |            |                 |                   |                  | LINE 3
|        |            |                 |                   |                  | LINE 4
|        |            |                 |                   |                  | LINE 5
|        |            |                 |                   |                  | LINE 6
| 74     | 07-02-2005 | 15:04:54        | 09:00:51          | 17:55:57         | LINE 1
|        |            |                 |                   |                  | ARRIVE ALIVE    |               |          | shello      |
|        |            |                 |                   |                  | LINE 2
|        |            |                 |                   |                  | DON'T DRINK     |               |          |             |
|        |            |                 |                   |                  | LINE 3
|        |            |                 |                   |                  | AND DRIVE       |               |          |             |
|        |            |                 |                   |                  | LINE 4
|        |            |                 |                   |                  | LINE 5
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|        |            |                 |                   |                  | LINE 2
|        |            |                 |                   |                  | DON'T DRINK     |               |          |             |
|        |            |                 |                   |                  | LINE 3
|        |            |                 |                   |                  | AND DRIVE       |               |          |             |
|        |            |                 |                   |                  | LINE 4
|        |            |                 |                   |                  | LINE 5
|        |            |                 |                   |                  | LINE 6

California Department of Transportation - District 7
Agenda

- Map Overview
- Traffic Data
- Field Device Control
- Travel Time
- Advanced Management Functions
- Reports
- Browse Edit
- Regional Integration
Browser and Editor

- Allows user to view information from the database
- Filters can be used to narrow the number of records to be viewed
- Users with proper access privileges may edit information
LARTMC Traffic Data Portal

- Numerous other agencies and information service providers receive data from Caltrans via the TMC systems
- RIITS is the key traffic information data portal system, whose equipment is housed at the LARTMC

RIITS
Regional Integration of ITS Projects
Los Angeles County
Agency recipients

All Regional Freeway, Arterial, Bus, Rail, and Emergency Response data
RIITS - Los Angeles Real Time Traffic - Microsoft Internet Explorer

RIITS - Los Angeles County
Regional Integration of Intelligent Transportation Systems

Zoom Control
Map Legend

Map

Freeways
City Streets

FREeways Speeds
0 - 10 mph
20 - 30 mph
30 - 40 mph
40 - 50 mph
50 - 60 mph
60 - 70 mph
70 - 80 mph
80 - 90 mph
90 - 100 mph
100 - 110 mph
110 - 120 mph
120 - 130 mph
130 - 140 mph
140 - 150 mph
150 - 160 mph
160 - 170 mph
170 - 180 mph
180 - 190 mph
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260 - 270 mph
270 - 280 mph
280 - 290 mph
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300 - 310 mph
310 - 320 mph
320 - 330 mph
330 - 340 mph
340 - 350 mph
350 - 360 mph
360 - 370 mph
370 - 380 mph
380 - 390 mph
390 - 400 mph
400 - 410 mph
410 - 420 mph
420 - 430 mph
430 - 440 mph
440 - 450 mph
450 - 460 mph
460 - 470 mph
470 - 480 mph
480 - 490 mph
490 - 500 mph

City Street Speeds
0 - 10 mph
10 - 20 mph
20 - 30 mph
30 - 40 mph
40 - 50 mph
50 - 60 mph
60 - 70 mph
70 - 80 mph
80 - 90 mph
90 - 100 mph
100 - 110 mph
110 - 120 mph
120 - 130 mph
130 - 140 mph
140 - 150 mph
150 - 160 mph
160 - 170 mph
170 - 180 mph
180 - 190 mph
190 - 200 mph
200 - 210 mph
210 - 220 mph
220 - 230 mph
230 - 240 mph
240 - 250 mph
250 - 260 mph
260 - 270 mph
270 - 280 mph
280 - 290 mph
290 - 300 mph
300 - 310 mph
310 - 320 mph
320 - 330 mph
330 - 340 mph
340 - 350 mph
350 - 360 mph
360 - 370 mph
370 - 380 mph
380 - 390 mph
390 - 400 mph
400 - 410 mph
410 - 420 mph
420 - 430 mph
430 - 440 mph
440 - 450 mph
450 - 460 mph
460 - 470 mph
470 - 480 mph
480 - 490 mph
490 - 500 mph

RIITS - Caltrans D7
Camera #531

RIITS - Caltrans D7
Sign #862

High Winds
RTE 118 THRU

Started at 11/02/2004 07:18 AM
210 West @ WHEATLAND

Avg. Speed: 60 mph
HOV: 66 mph

I-10 West @ TEMPLE CITY
Current Information Service Providers

- ClearChannel (Airwatch)
- Eeminder
- Fox-TV
- Inrix
- KABC-TV
- KKTV Fox-11
- KCOP UPN-13
- Traffic.com
- Jaytu Technologies (Sigalert.com)
- Traveler Advisory News Network
- TrafficGauge, Inc.
- Westwood One
LARTMC Communications Technologies

- Synchronous Optical Network (SONET) for data
- Fiber Optic multiplexer video transmission system (analog video with digital transmission over fiber)
- Next Generation (2.5G) mobile telephone
  - GPRS and CDMA2000
  - Used for communications with certain CMS, VDS and RMS (Construction Zones)
Current Communications Network

Two Parts:

- Data Subsystem
  - Fiber Optic SONET Ring Backbone
  - Data nodes with D4 channel banks act as field data concentrators

- Video Subsystem
  - Video nodes with digital fiber multiplexers act as field video site concentrators
  - Communication hubs are secondary concentration and testing points
Existing ITS Infrastructure

Los Angeles and Ventura County Urban Freeway
Traffic Congestion
Relief Management System (TCRM)
Advanced Transportation Management Systems (ATMS)
(Existing)

Dark Blue represents existing fiber optic cable plant
Data Subsystem
SONET Node/Hub Locations
Video Subsystem
The End