



# ***2006 GIS-T Symposium Columbus Ohio***

## ***Caltrans Linear Referencing System: Lessons Learned***

**March 28, 2006**

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**California Department of Transportation (Caltrans)**



## *California's Transportation System*

- ④ 15,000 miles of state highway (comprised of 48,000 lane-miles), including freeways, expressways, and two-lane highways
- ④ 150,000 centerline miles of local streets and roads (comprised of about 300,000 lane-miles), including major arterials, collector roads, and local access streets
- ④ Statewide railway network, used for both inter-city passenger rail and freight transport
- ④ International trade goods movement gateways including sea ports, airports, and border crossings
- ④ Extensive transit systems, comprised of commuter rail, urban rail, and bus lines



## Caltrans Postmile System

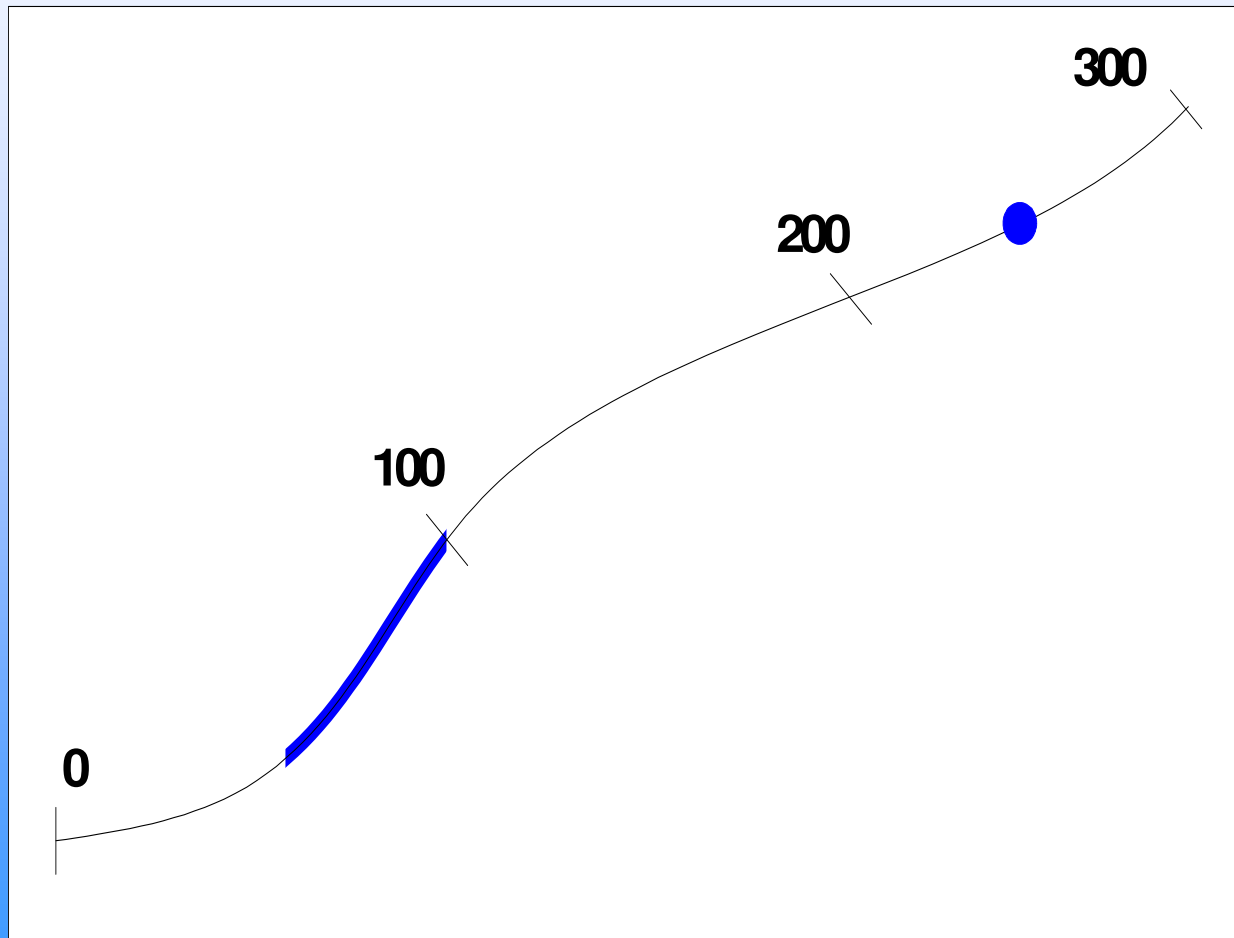


●	Ventura BI OH
●	Bridge 00-0000
●	405 LA 32 <u>48</u>





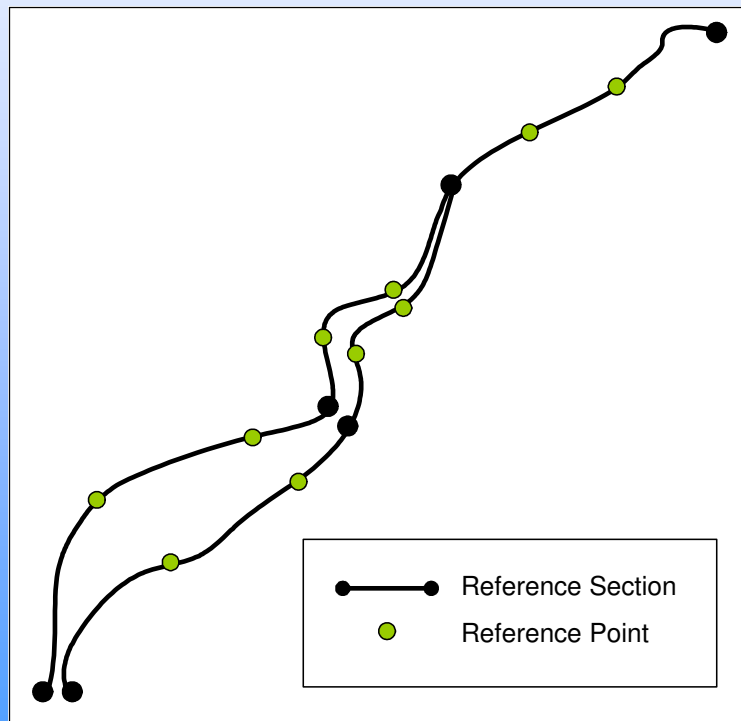
## *Linear Referencing System (LRS)*



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## *Application Architecture*



- ④ LRS Data Model
- ④ TeleAtlas North America
- ④ SDE/Oracle Geodatabase
- ④ End-to-End Carriage Ways
- ④ Postmile Reference Sections
- ④ Calibration Points
- ④ Application Code



## *ArcGIS 9.x Postmile Toolbar*

### Validation Wizard Features

Identifies invalid postmiles for editing

Offers candidates for invalid or ambiguous postmiles

Revalidates data records after editing

Generates and displays spatial data in ArcMap 9

### Query Tool Features

Allows user to select locations on or near a state highway

Determines nearest postmile value to selected location

Produces results in a spatial data layer



## *Legacy Application Upgrade*

- ⓐ Platform (Desktop - Desktop)
- ⓐ Software (ArcView 3.x - ArcGIS 9.x)
- ⓐ Code (Avenue - VB/Java/SOAP web services)
- ⓐ Line Work (TIGER - TANA)
- ⓐ Data Structure (Shape Files - Geodatabase)
- ⓐ Data Access (Prepared Files - Database Connect)



## *Web-Based Application*

Making dynamic segmentation “dynamic” to  
unleash enterprise transportation data





# Validate Postmile Point Event

California Home Monday, March 13, 2006

Welcome to *California*

Postmile Services - BETA Version\*

Caltrans Home


Validate PM Point

Validate PM Line

Find PM

Convert XY to PM

Send Feedback



search

My CA This Site

Validate PM Point

Route 5

County SAC-Sacramento

Postmile 6.13

[Click here to validate the above postmile.](#)

Is Valid? true

Map Satellite Hybrid

Postmile:  
SAC 5 6.13

Lambert Rd

Map data © 2005 Tele Atlas - Terms of Use

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# Validate Postmile Linear Event

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Welcome to **California**

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Postmile Services - BETA Version\* search

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[Validate PM Line](#)

[Find PM](#)

[Convert XY to PM](#)

[Send Feedback](#)

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**Validate PM Line**

Route: 5

County1: SAC-Sacramento

Postmile1: 6.12

County2: SAC-Sacramento

Postmile2: 8.45

[Click here to validate the above postmile pair.](#)

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# Find Postmile

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Welcome to **California**

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**Postmile Services - BETA Version\*** search

My CA  This Site

**Find PM**

Click on a route to display the postmile

Map | Satellite | Hybrid

Postmile:  
SAC 50 R0.789

Map data ©2006 Google, Imagery ©2006 Google, Street View™





# Convert X/Y to Postmile

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Welcome to *California*

Postmile Services - BETA Version\*

My CA  This Site

**Convert X/Y to PM**

X

Y

[Click here to get the closest postmile to the above coordinates.](#)

Map  Satellite  Hybrid

Postmile:  
SAC 275 0.704

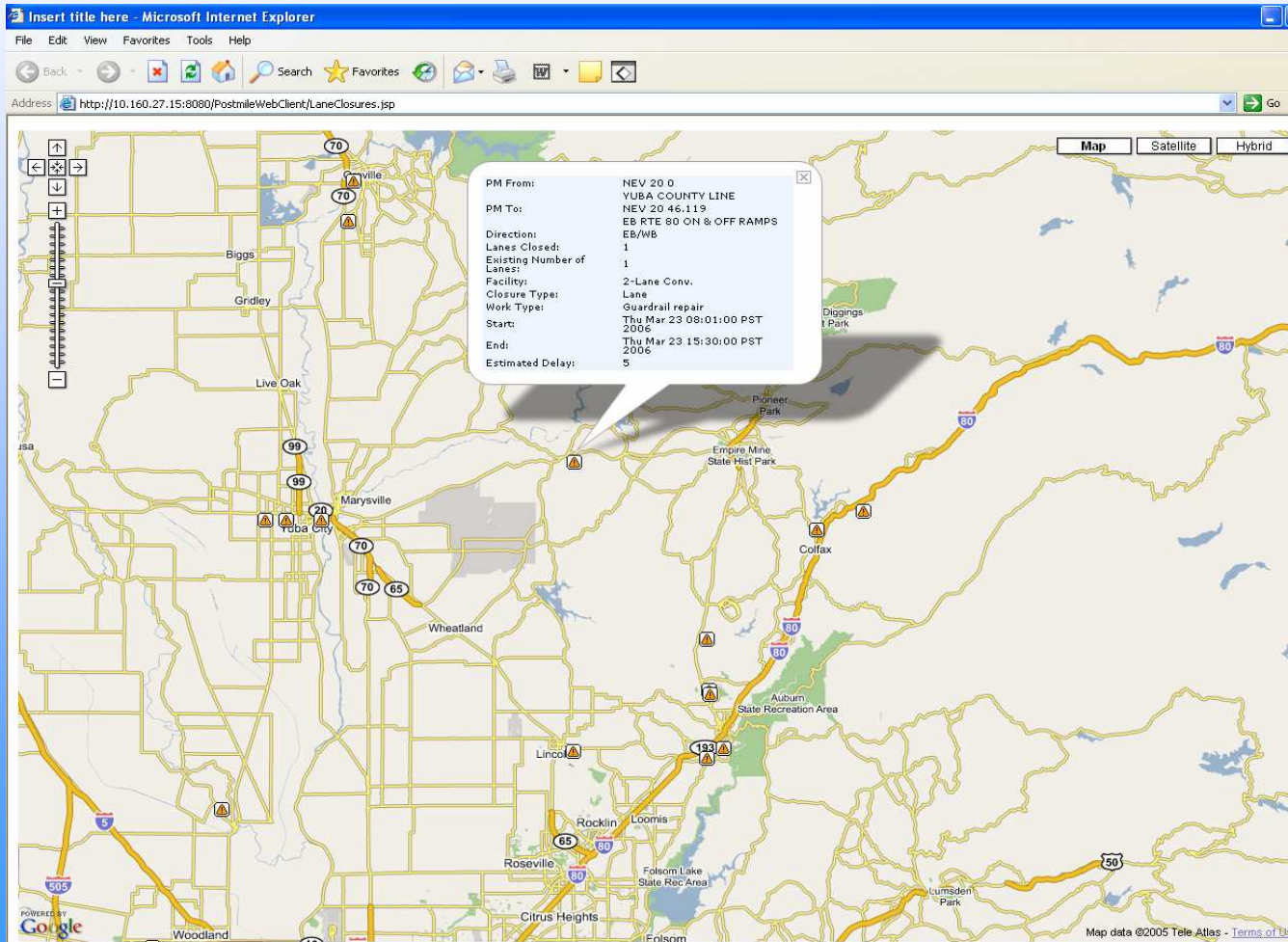
Sacramento

A satellite map of Sacramento, California, with a red pin marking the location of Postmile SAC 275 0.704. The map shows major roads like Sacramento Ave, 5th St, 7th St, 9th St, 11th St, 13th St, 15th St, 17th St, 19th St, 21st St, 23rd St, 25th St, 27th St, 29th St, 31st St, 33rd St, 35th St, 37th St, 39th St, 41st St, 43rd St, 45th St, and 47th St. Major highways like SR 99, SR 160, SR 16, SR 80, and SR 50 are also visible. The Sacramento River is on the left. The map includes a search bar, a search button, and radio buttons for 'Map', 'Satellite', and 'Hybrid'. A 'Postmile' popup window shows 'SAC 275 0.704'. The Caltrans logo is in the bottom left corner of the map area. Small text at the bottom right of the map area reads 'Map data ©2005 Tele Atlas Terms of Use'.

Caltrans



# Lane Closures





# State Highway Inventory

[Caltrans Home](#)


[Lookup State Highway Inventory Segment By Postmile](#)

[Lookup State Highway Inventory Segments By Begin/End Postmile](#)

[Find State Highway Inventory Segment](#)

[Lookup State Highway Inventory Segment By X,Y](#)

[Send Feedback](#)



State Highway Inventory - GIS Services - BETA Version

My CA  This Site

Lookup State Highway Inventory Segment by Postmile

Route:

County:

Postmile:

[Click here to lookup the SHI Segment for the above postmile.](#)

Postmile From: SAC 5 30.499

Postmile To: SAC 5 32.733

Segment Length: 2.2

[System Indicators](#) [Grade](#) [Traffic Volumes](#) [Safety](#) [Roadway](#)



## *Lessons Learned*

- ④ Web-based application provides flexibility, enhanced functionality, and extensive customer base
- ④ Single geodatabase provides quicker development and reduced development/maintenance costs
- ④ Vision/requirements limited by prior application
- ④ Initial use of non-standard IT framework increased development time and limited IT support
- ④ Data calibration should have begun at project start
- ④ Change control process is complex



## *For More Information*

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