

# Board of Supervisors Workshop

## *Level of Service and the County's Travel Demand Model*



**OCTOBER 28, 2016**  
**1:00 – 4:00 PM**

# Purpose



**On August 30, 2016, the Board directed staff to:**

**“Conduct Board workshops to address the traffic and circulation issues underlying Measure E”**

# Agenda



- **Overview of TDM (Kimley-Horn)**
- **Overview of Major CIP/TIM Fee Program**
- **Detailed discussion on LOS calculations (DKS Associates & Caltrans)**
  - US 50 at the County Line
  - Volumes and Speed Data
- **Public Comments received**
- **Questions & Comments**

# Agency Staff



- **El Dorado County**
  - Steve Pedretti, P.E. – CDA Director
  - Shawna Purvines – CDA Interim Assistant Director
  - Claudia Wade, P.E. – Senior Civil Engineer
  - Natalie Porter, P.E., T.E. – Traffic Engineer
  - Katie Jackson, P.E. – Transportation Planner
  
- **Caltrans**
  - Andrew Brandt, P.E. – Deputy District Director for Maintenance and Traffic Operations

# Kimley Horn – Mike Schmitt

## Firm Qualifications

- Founded in 1967 originally as a transportation firm
- More than 2,800 employees nationwide
- ENR Top 100 Design Firm
- Fortune Magazine Top 100 Places to Work

## Mike Schmitt, AICP CTP, PTP, Senior Project Manager

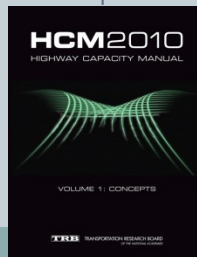
- Over 25 years of transportation planning experience
- Certified expert in transportation planning by both APA and TPCB
- National academies research experience
- Project manager for the El Dorado County Travel Demand Model Update

**Kimley»Horn**

# Kittelson & Associates – Mike Aronson

## Firm Qualifications

- Specializes in transportation
- Primary authors of national references
  - *Highway Capacity Manual*
  - *Highway Safety Manual*
- Long-time support to El Dorado County
  - Peer review of development
  - Corridor safety (Green Valley Road)



## Mike Aronson, P.E., Principal Engineer

- Over 30 years experience
- Travel forecasting, area wide analysis, traffic operations
- El Dorado County – Completed earlier version of model and deficiency analysis



# DKS Associates – John Long

## Firm Qualifications

- National firm specializing in transportation engineering and planning
- Over the last 27 years, has worked for every city and county in the greater Sacramento region and has not worked for any private developers

## John Long, P.E., T.E., Principal

- 40 years of experience
- Developed regional travel demand models throughout US including SACOG (SACMET and SACSIM)
- Prepared traffic impact fee programs, CIPs and General Plan Updates for numerous counties and cities

**DKS**

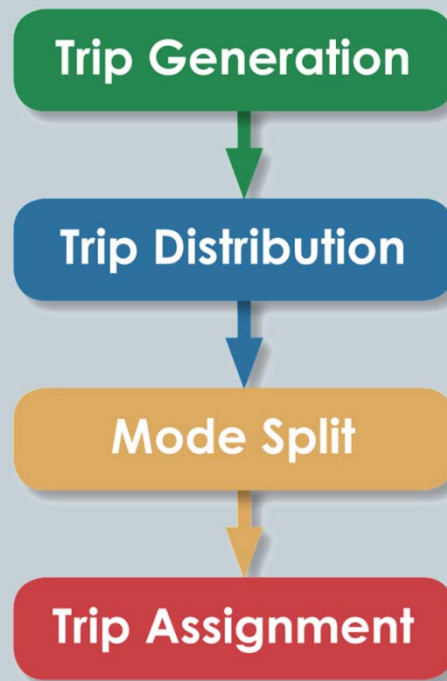
# What is a Travel Demand Model?

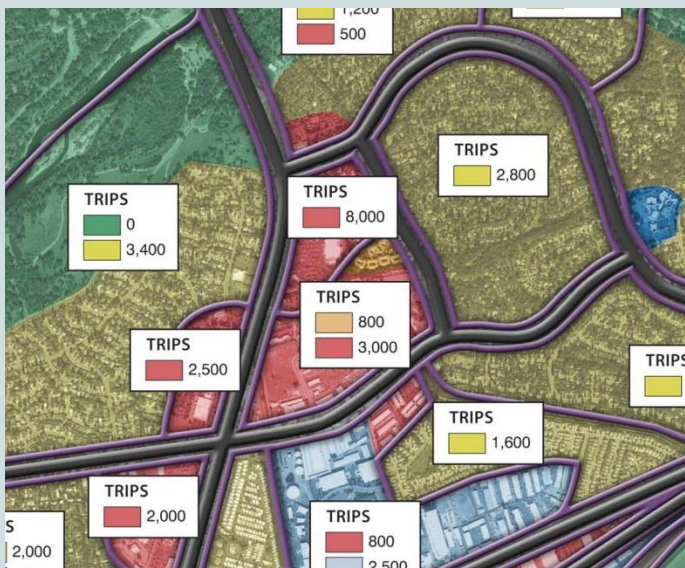


- **Forecasts trips onto transportation facilities, roadways, highways, etc.**
- **Tool used by most public agencies**
- **Part of the planning process**
- **CEQA Support**
- **Fair Share for Impact Fees (AB 1600)**
- **TDM does NOT calculate LOS**

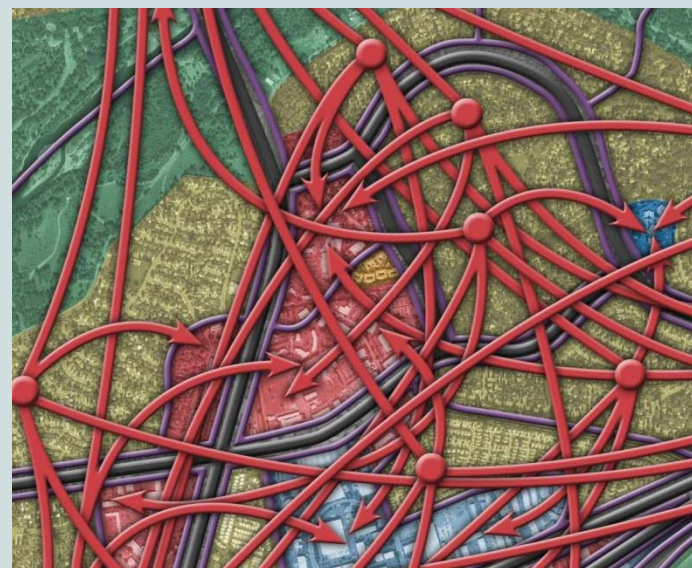


# “Four Step” Model

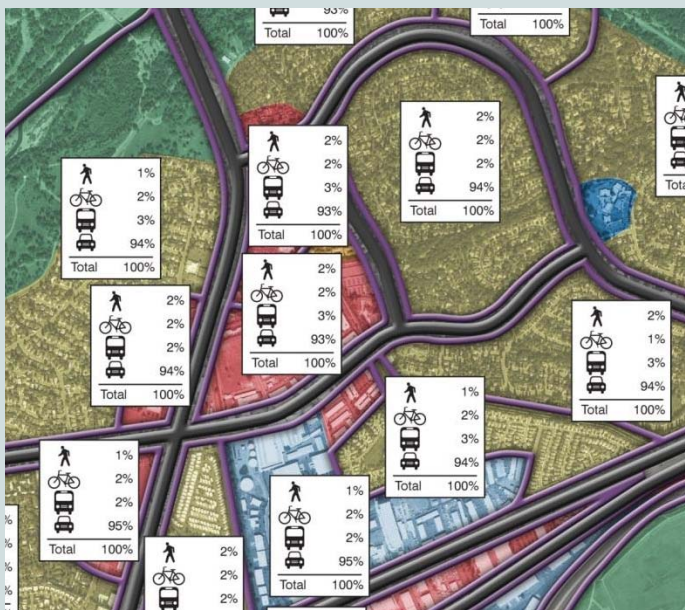




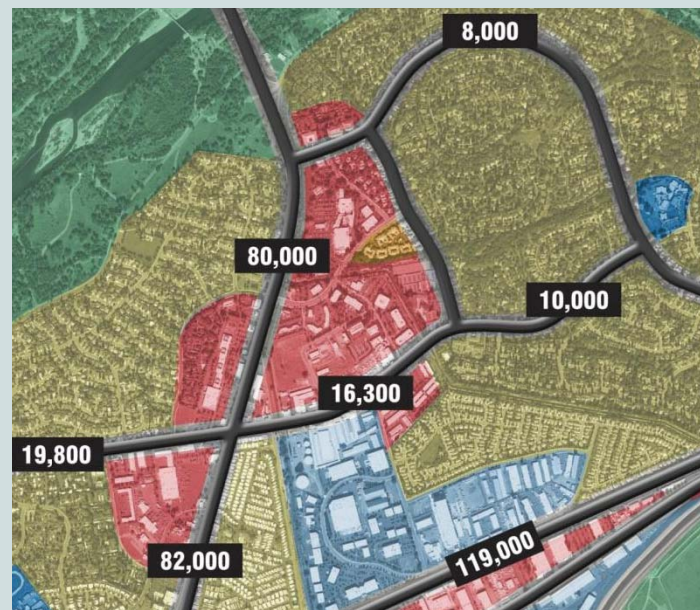
**Trip Generation**



**Trip Distribution**

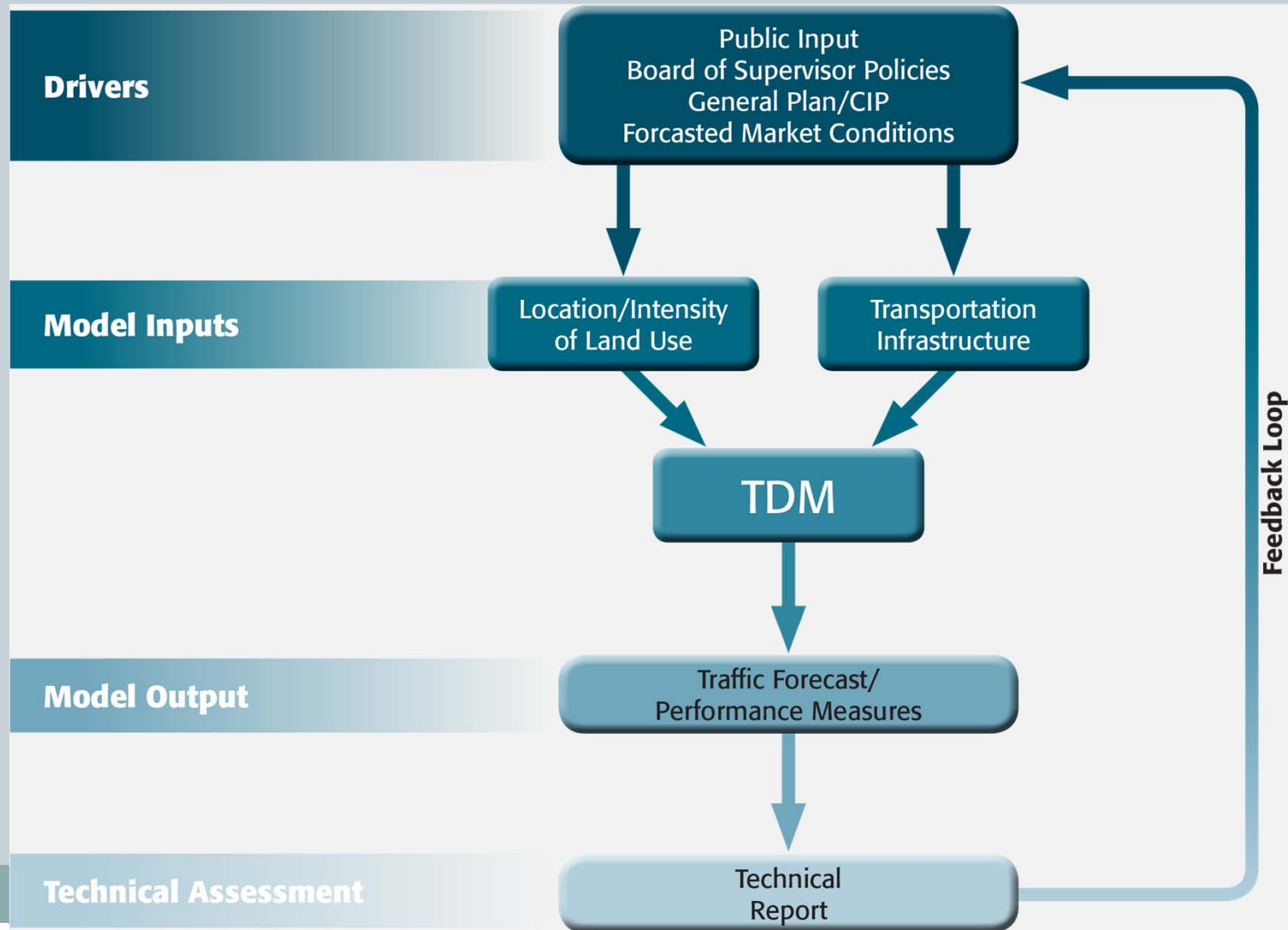


**Mode Split**

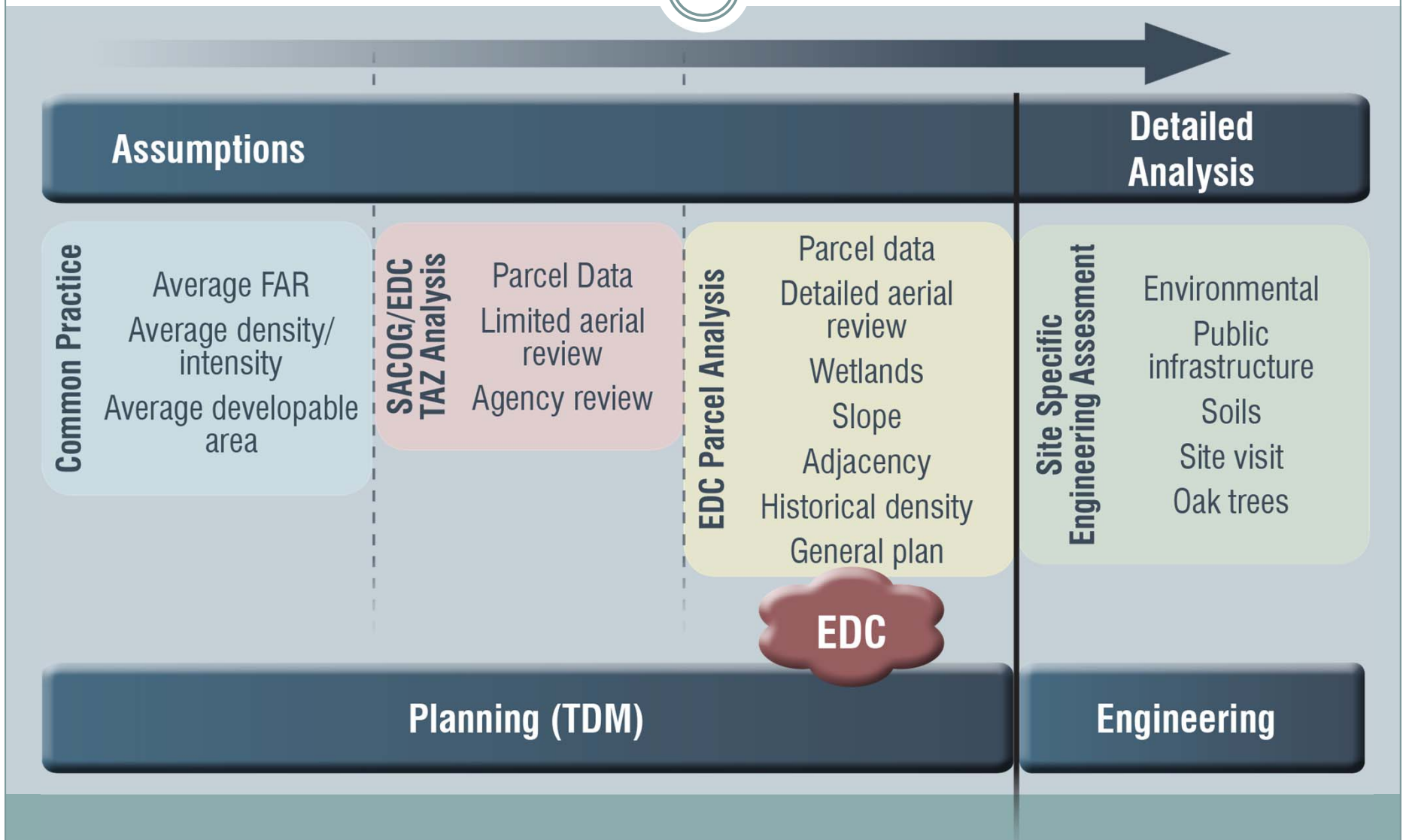


**Trip Assignment**

# TDM and Planning Process



# TDM Land Use

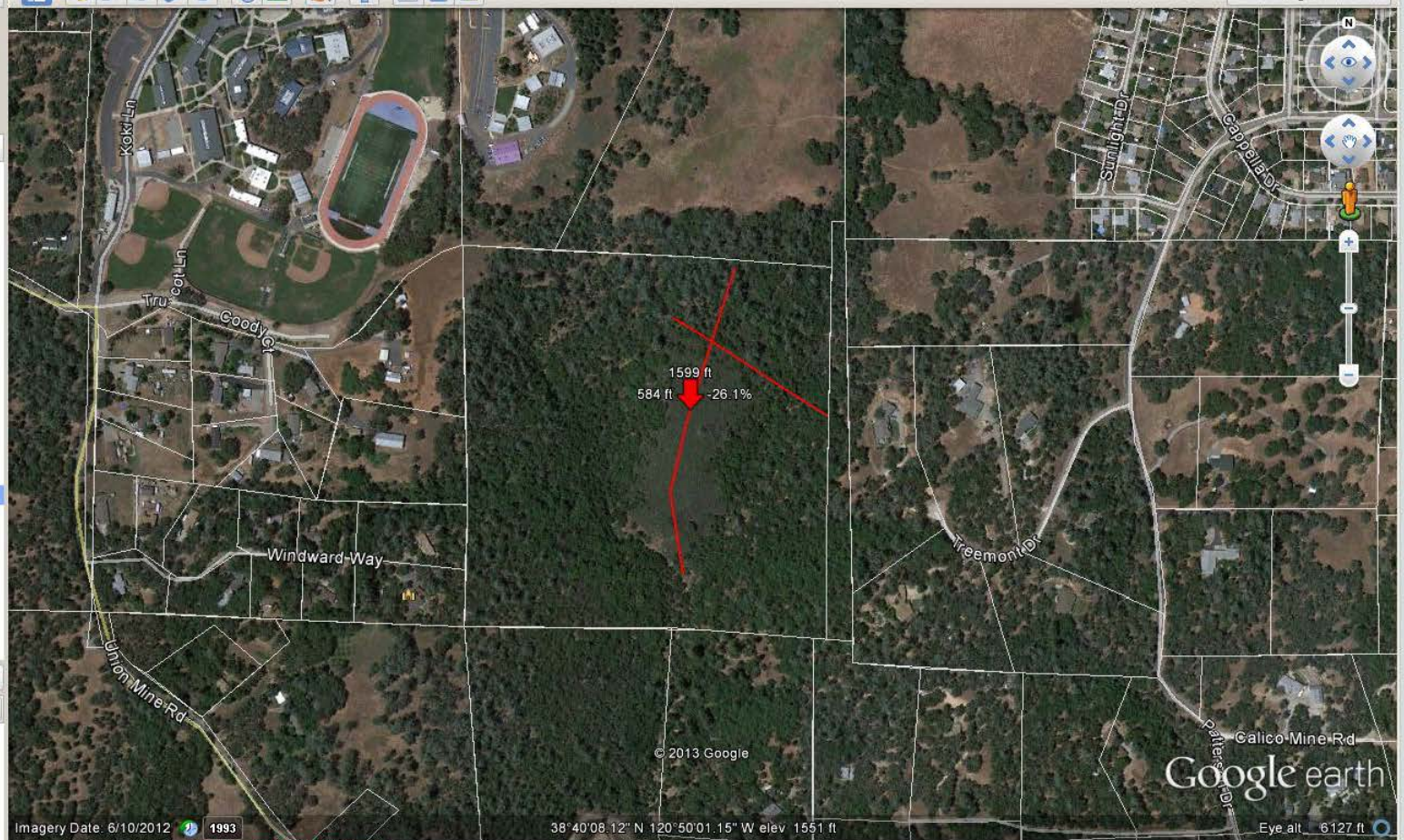


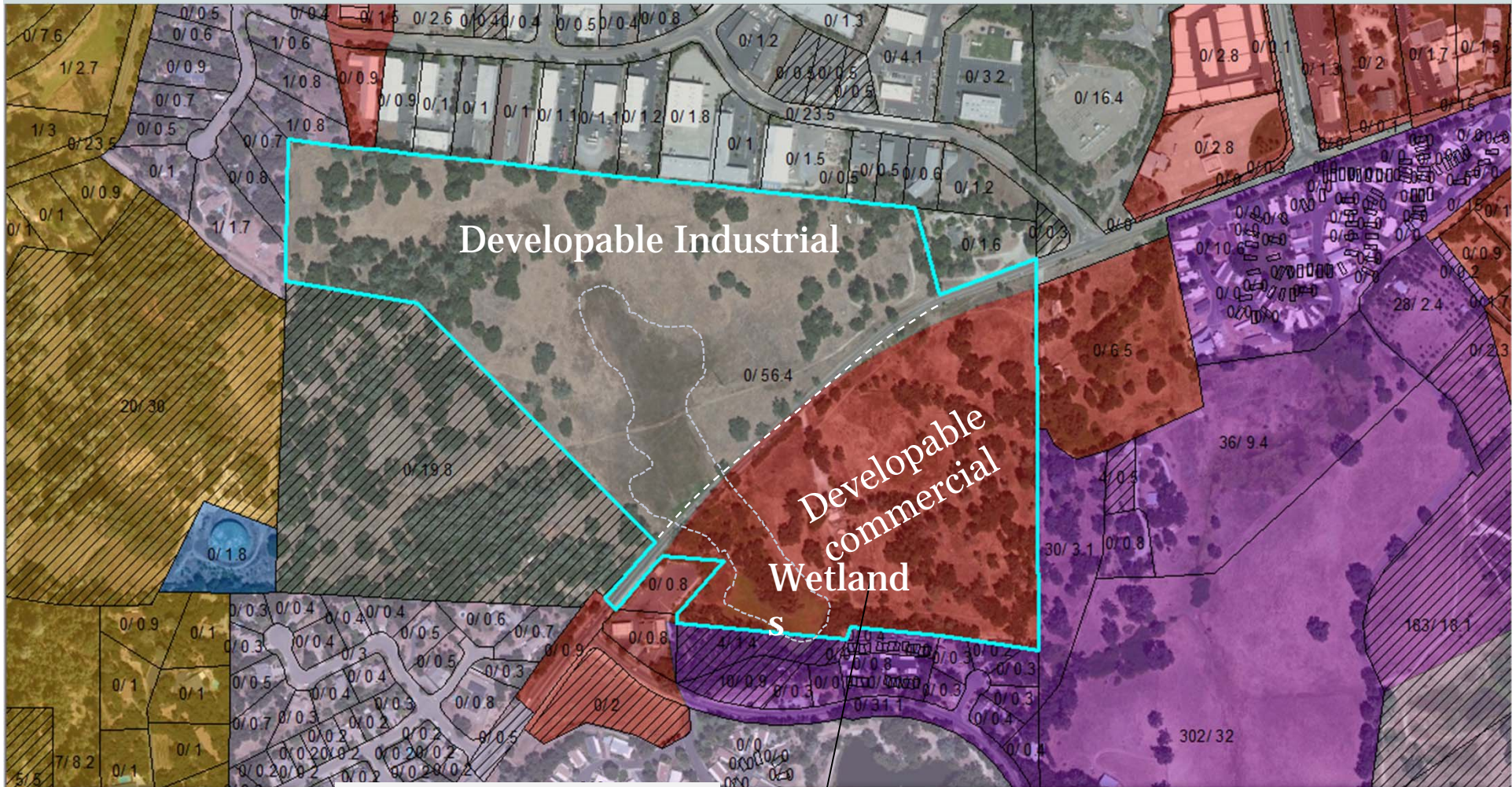
Places

- My Places
- Sightseeing
  - Select this Folder and click on the 'Play' button below, to start the tour.
- Line Measure
- Line Measure
- Polygon Measure
- Path Measure
- Path Measure
- Path Measure
- Path Measure
- Path Measure
- Polygon Measure
- Placerville, CA 95667, USA
- Path Measure
- El Dorado Hills, CA, USA
- Temporary Places
- Profile A
- Profile B

Layers Earth Gallery >>

- Primary Database
- Earth Pro (US)
- Borders and Labels
- Places
- Photos
- Roads
- 3D Buildings
- Ocean
- Weather
- Gallery
- Global Awareness
- More
- Terrain





Table

parwdata\_Intersect\_08\_SACOG5

FLAG	USECDT	USECDCL	LIVING	PARCEL_A	U1_LUD	U1_DU	U1_COVER	CTA_NOTES	SLOPE	WET/ND	Density	PD_POLI	AG_PO	GP_POLICY	HIST_DENST	U2_DU	U2_LU	U2_COVER	C_S
K	1	DEV	RES	56.44	1	0	40	P05-0004 A/OD/I	0	1	0.02	0	0	0	0	0	C	17	

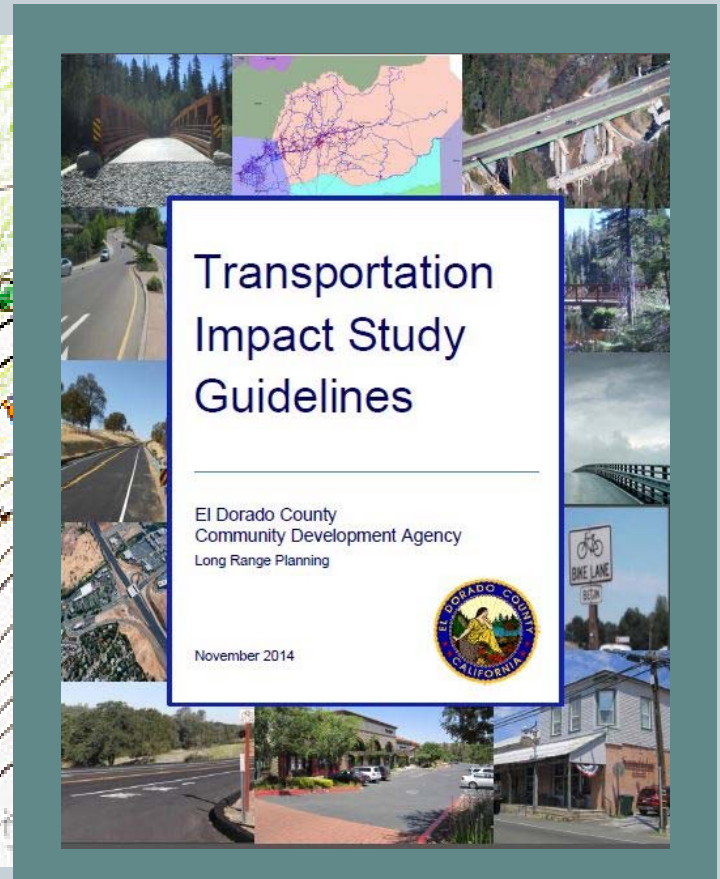
Industrial land use

Commercial land use

Flagged for correction

Only 57% developable (43% to ROW and wetlands)

# Site Specific Analysis



# KHA Public and Agency Involvement



- BOS Presentations previous to project
- BOS Land Use – 4/16/12
- Engineering Subcommittee – 6/27/12
- Public Meeting – 6/28/12
- BOS TAZ – 7/24/12
- Training Workshop – 1/28/13
- EDC Staff Workshop – 2/21/13
- BOS Overview – 4/1/13
- Agency Meeting – 6/13/13
- BOS TDM Workshop – 2/14/14



# What is Validation?



- **Techniques for determining the model is reasonably accurate**
- **Simply**
  - TDM forecasts 2010 volumes
  - Obtain actual 2010 traffic counts
  - Compare the two using statistical methods
- **If valid in 2010, assumed to be valid for future**

# Validation Criteria Sources



U.S. Department of Transportation  
**Federal Highway  
Administration**



**NCHRP**

**NATIONAL  
COOPERATIVE  
HIGHWAY  
RESEARCH  
PROGRAM**

# Model Validation Criteria



Validation Criteria	Question	Pass or Fail?
Correlation coefficient	Is the model a good predictor in total?	<PASS>
Percent Error	Do we have the right amount of total traffic on roadways?	<PASS>
Percent root mean square error (RMSE)	Are total model errors within a reasonable range?	<PASS>
Screenline Analysis	Are the traffic flows between areas reasonable?	<PASS>
Roadway Link Validation	Are individual roadway volumes reasonable?	<PASS>
Peak Period Validation	Considers just the highest 4 hour periods.	<PASS>
Peak Hour Validation	Considers just the highest 1 hour periods.	<PASS>
Dynamic Validation	Is the model sensitive to change?	<PASS>

# Model Peer Review and Acceptance

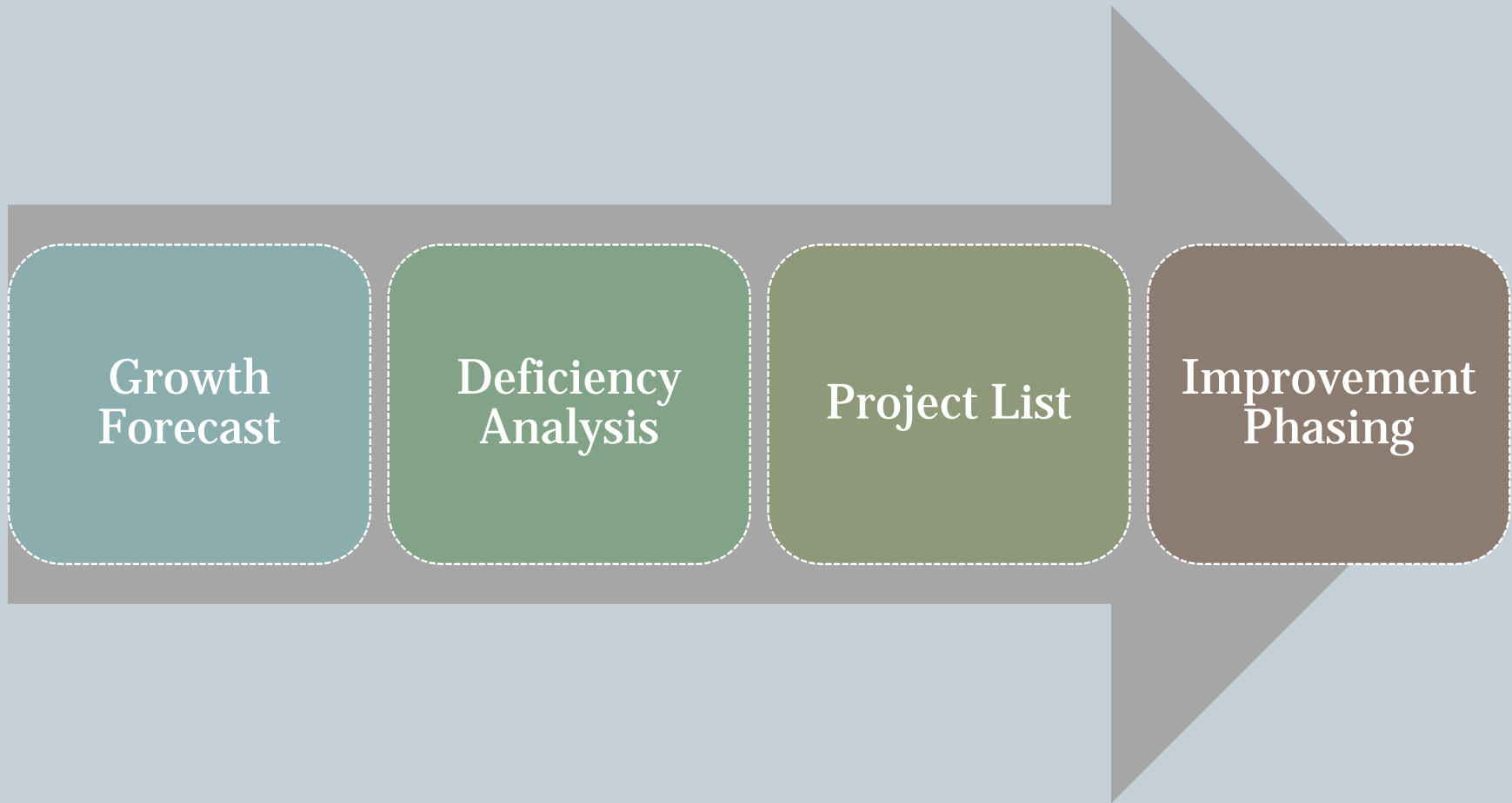


## **Kittelson Peer Review**

- Land Use Summary Check;
- External traffic growth assumption check;
- Trip Purpose and Trip Generation check (productions and attractions);
- Verify person trip vs. vehicle trip Origin-Destination (OD) matrix;
- 5-D Application assessment;
- Zone connector checks;
- Check/verify network coding conventions – check against County’s CIP list;
- Check logical link volume growth;
- Volume comparisons for key facilities relative to past forecasts; and,
- Check and verify static validation statistics (if available and documented);



# TIM Fee Improvement Needs

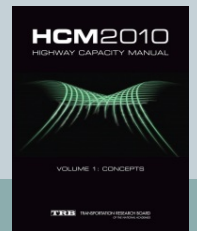




# Level of Service (LOS) Thresholds

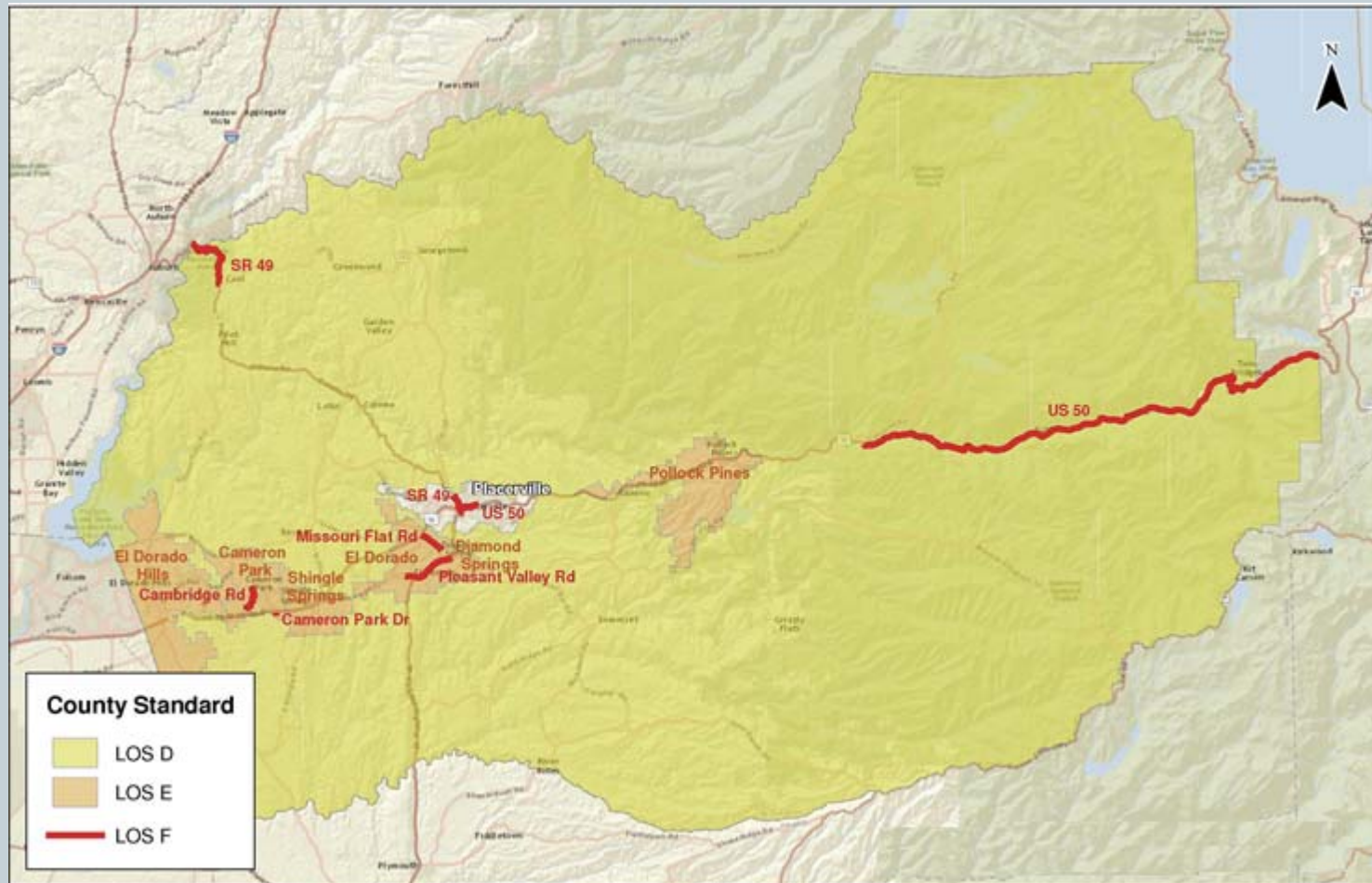


- **LOS thresholds in General Plan Policy TC-Xd**
- **LOS determination based on 2010 Highway Capacity Manual (HCM)**
  - Specific thresholds and LOS methods for each type of road – freeways, rural roads, arterials and collectors
- **Highway Capacity Manual**
  - Standard reference in all 50 states and other countries
  - Published by the Transportation Research Board (TRB) – part of the National Academy of Sciences
    - ✦ **Mission:** To provide leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multi-modal.
  - First published in 1950, the 2010 HCM is the fifth edition
  - Dr. Richard Dowling, of Kittelson & Associates, was the TRB Committee Chair overseeing the research and publication of the HCM





# Compare Forecasts to LOS Standards



# TIM Fee Project List



## Capacity Projects

- Local roadway widening
- Auxiliary lanes
- Interchange improvements
- Parallel capacity projects (e.g., Saratoga Way)

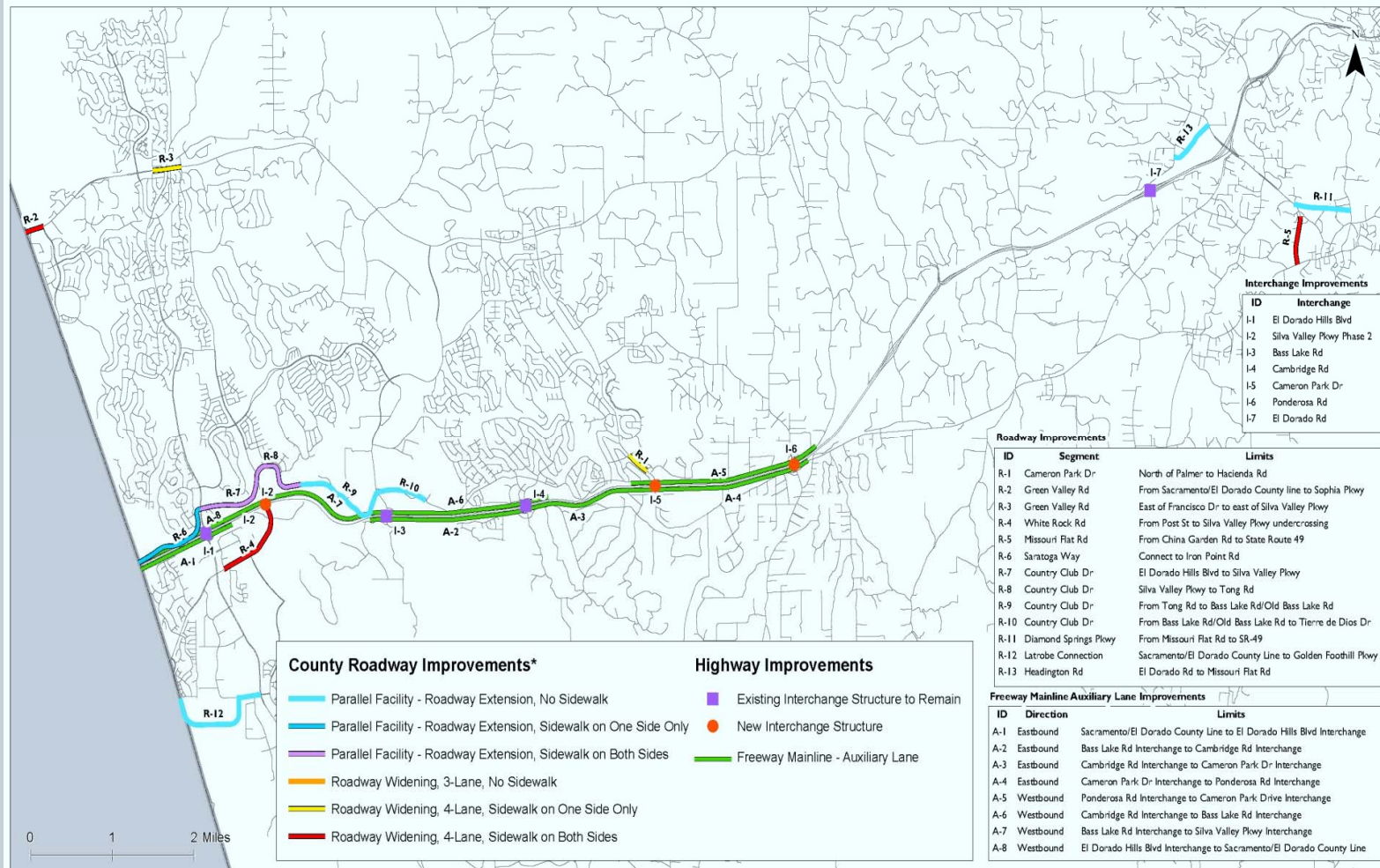
## Reimbursement Obligations

- Constructed projects (e.g., Silva Valley Parkway Interchange)

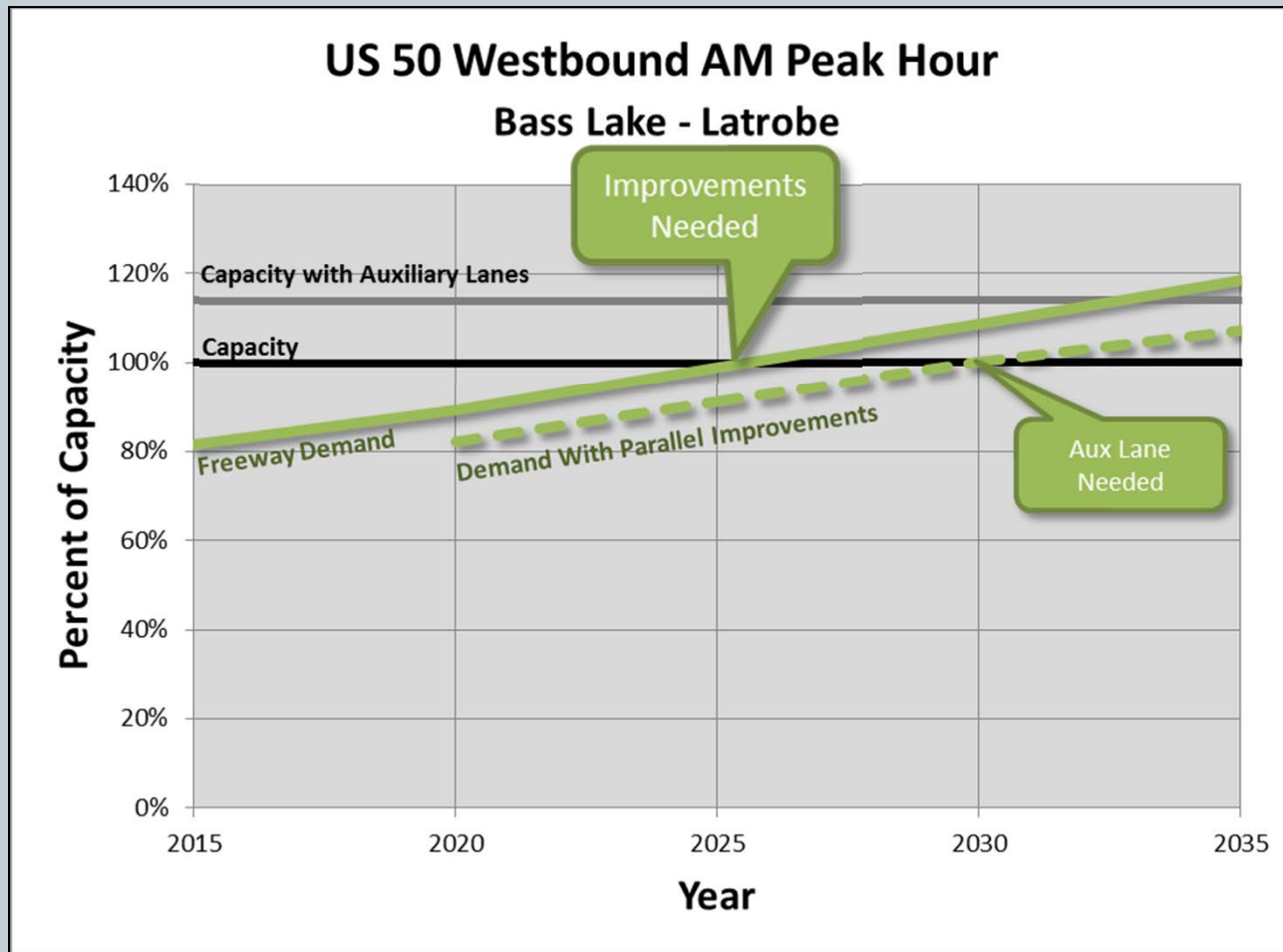
## Other Program Costs

- Bridge replacement grant match funds
- Intersection improvements
- Transit capital improvements
- Program administration

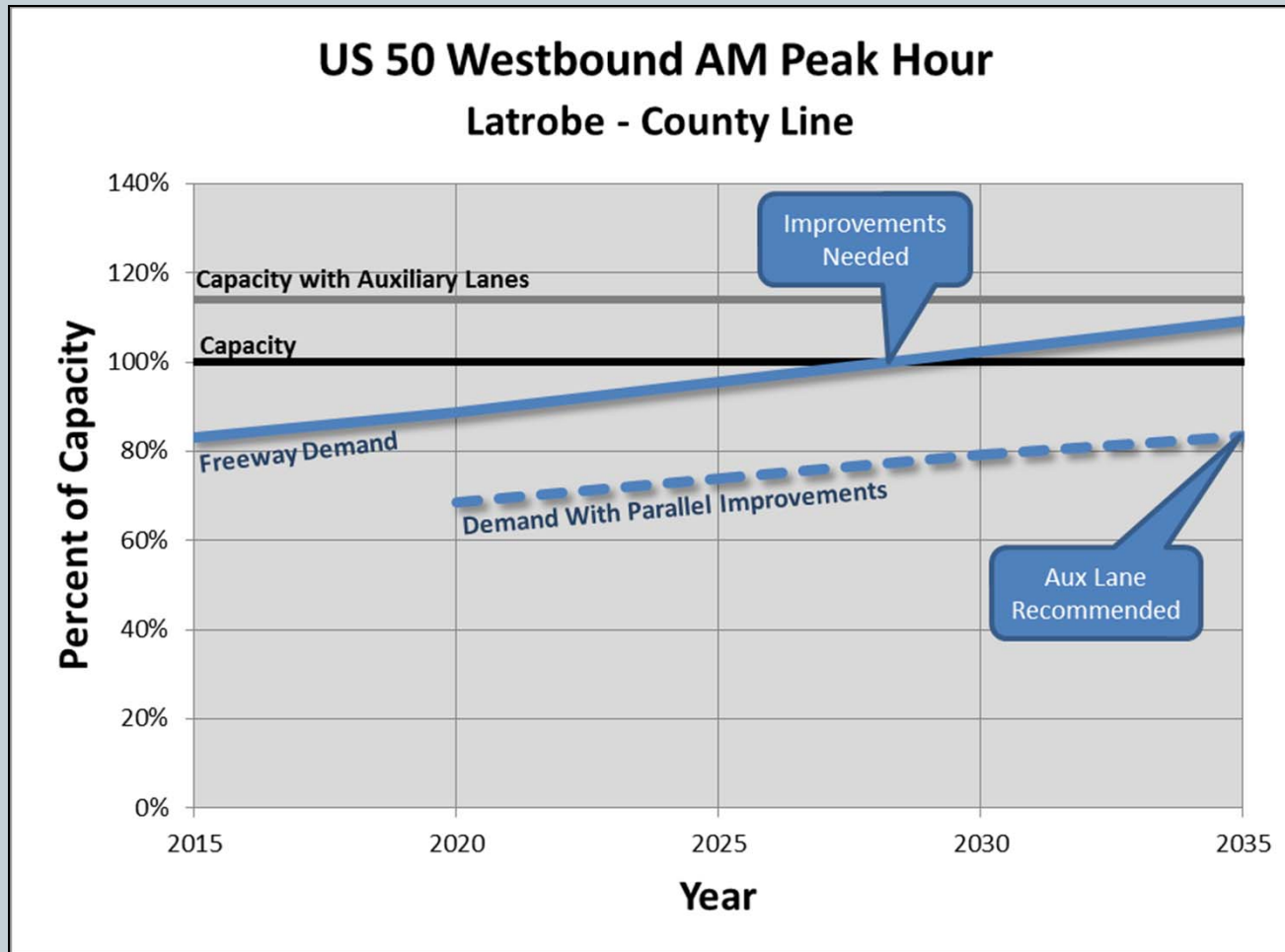
# TIM Fee Project Locations



# Phasing of Improvements



# Phasing of Improvements



# Highway 50 Level of Service



- **John Long, P.E., T.E., Principal - DKS**
- **Andrew Brandt, P.E., Deputy District Director for Maintenance and Traffic Operations – Caltrans**



# Caltrans Traffic Data



- For decades, Caltrans has relied on traffic census program:
  - Typically each location counted every 3 years with sample counts throughout year to estimate volumes
  - “Peak hour” represents **estimate** of heaviest traffic flow
  - For urban and suburban areas, the peak hour normally occurs on weekdays between 7 to 9 AM or 5 to 7 PM.
  - On roads with large seasonal fluctuations in traffic, the peak hour is the hour near the maximum for the year but excluding a few (30 to 50 hours)
- Over the last 10 years, Caltrans has worked hard at implementing a large number of permanent count stations that can provide year-round traffic volume and speed data
- Caltrans has a permanent count station at the County Line

# Existing Traffic Data – US 50 at County Line



- County line permanent count station provides traffic count and speed data by travel direction by 5 minute periods for 24-7 and 365 days
- Based on County policy, counts should reflect “typical weekday” conditions
- Best practice for a typical weekday is:
  - Tuesday, Wednesday, Thursday
  - With schools in session and away from holidays
  - March, April, May, September and October
- Data from County Line was compiled for those days in 2010 and 2015



# Caltrans PeMS Volume & Speed Data

US 50 - Westbound AM Peak Hour

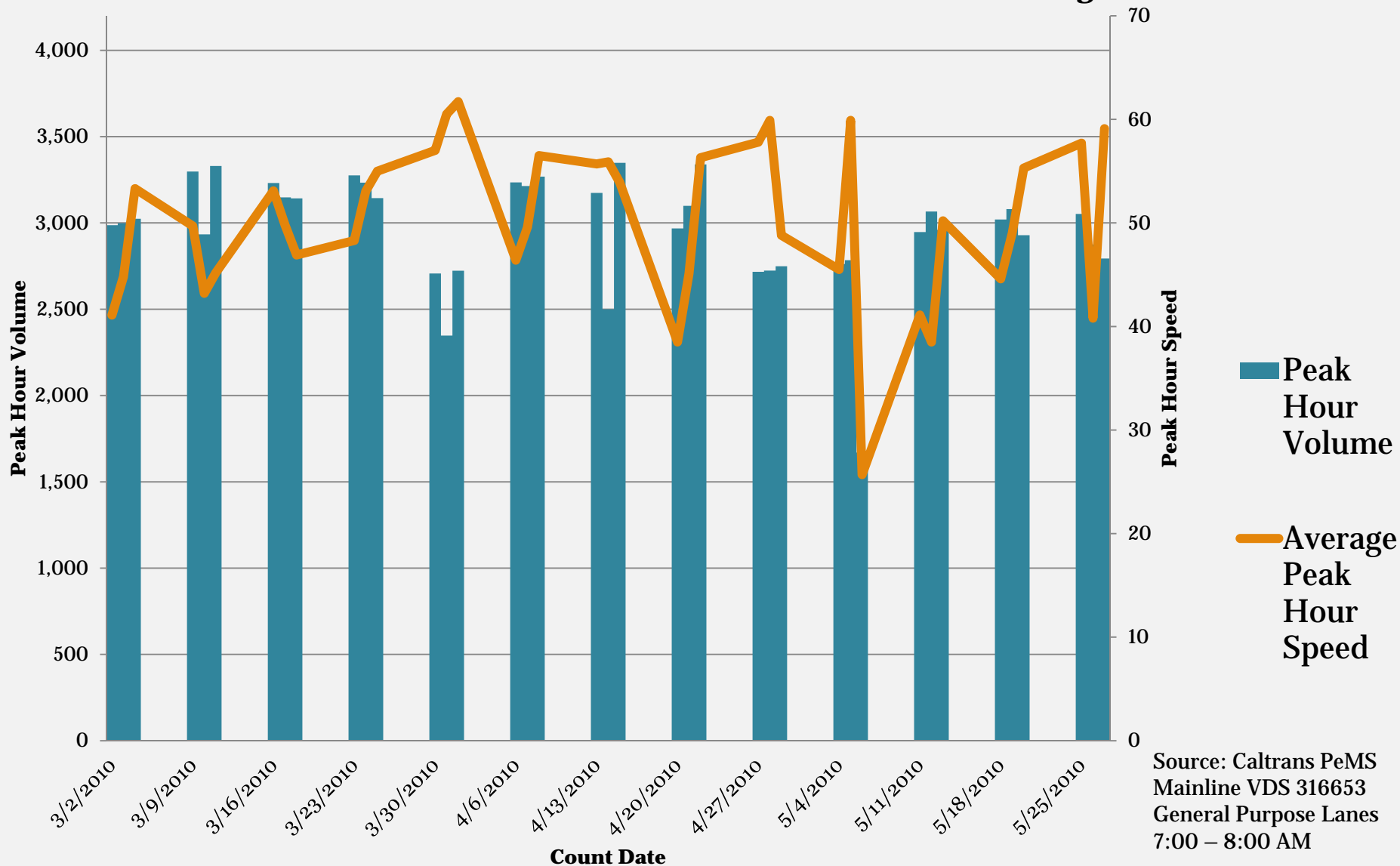
At the County Line

Spring 2010

**Average Volume – 3,038 vph<sup>1</sup>**

**Average Speed - 50 mph<sup>1</sup>**

**Average LOS - LOS C**



Source: Caltrans PeMS  
Mainline VDS 316653  
General Purpose Lanes  
7:00 – 8:00 AM

<sup>1</sup>Averages do not include outliers.  
14-1054 6G 33 of 57

# Caltrans PeMS Volume & Speed Data

## US 50 - Westbound AM Peak Hour

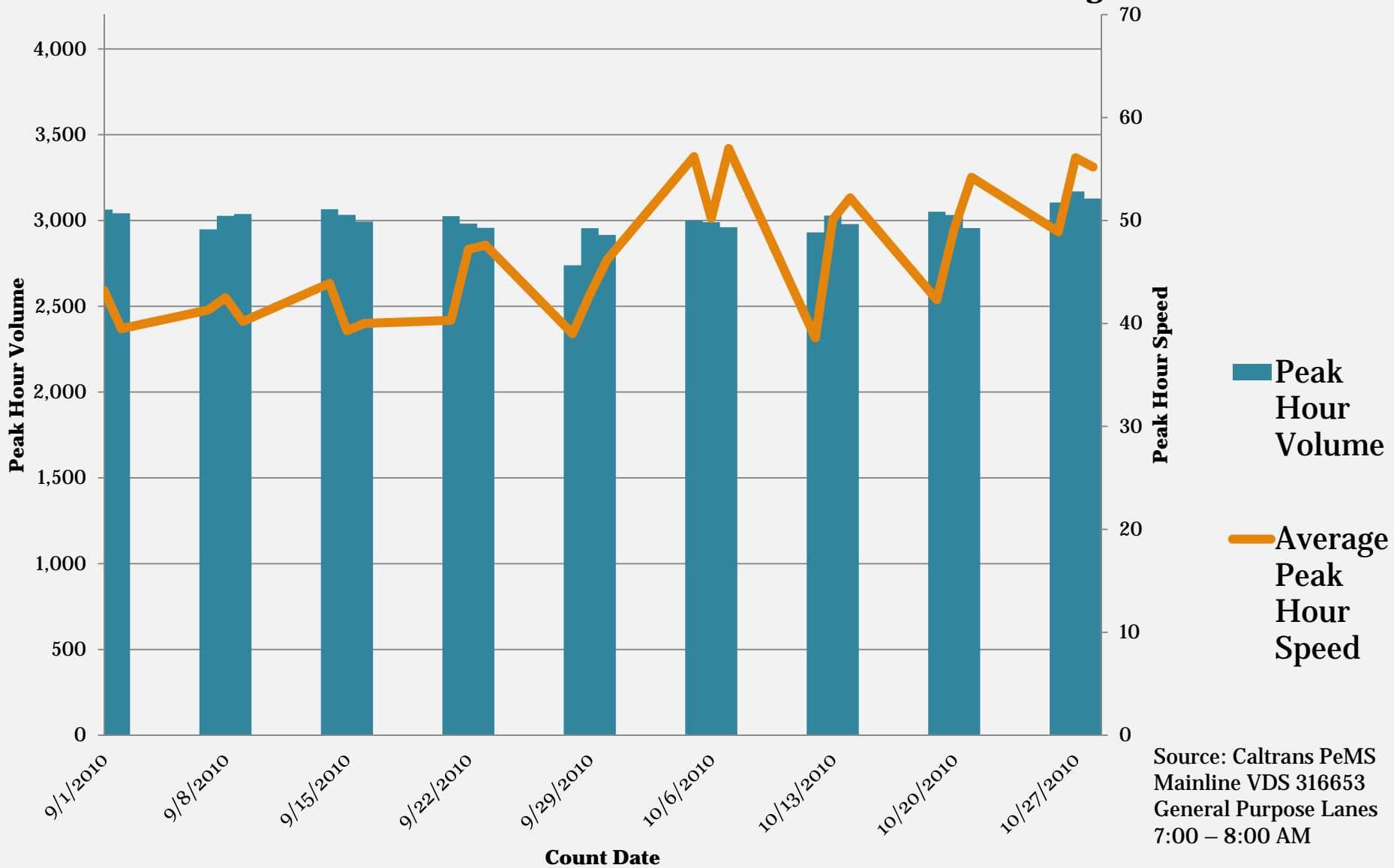
### At the County Line

### Fall 2010

**Average Volume - 3,004 vph**

**Average Speed - 46 mph**

**Average LOS - LOS C**



# Caltrans PeMS Volume & Speed Data

US 50 - Westbound AM Peak Hour

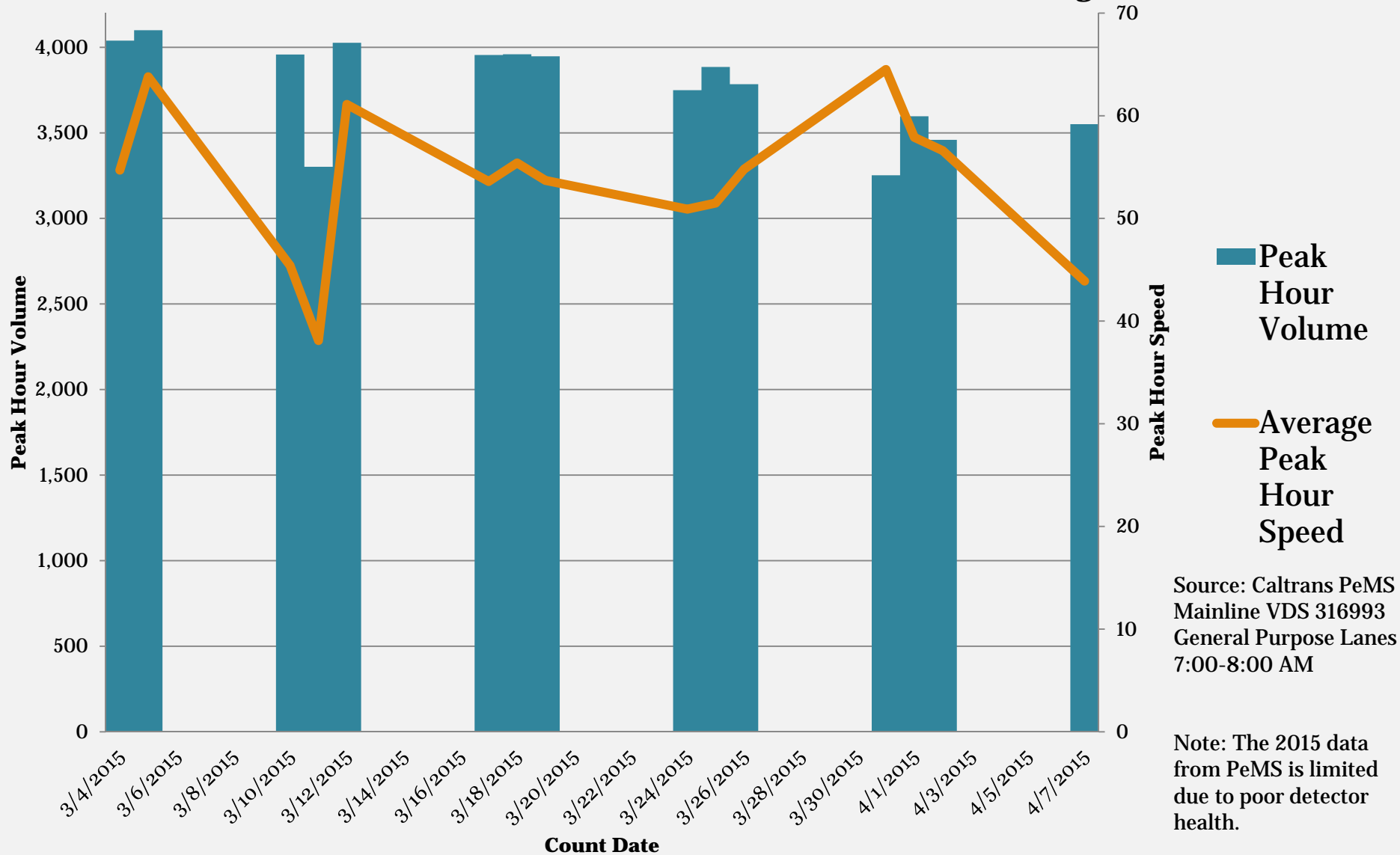
At the County Line

Spring 2015

**Average Volume - 3,930 vph<sup>1</sup>**

**Average Speed - 55 mph<sup>1</sup>**

**Average LOS - LOS E**



Source: Caltrans PeMS  
Mainline VDS 316993  
General Purpose Lanes  
7:00-8:00 AM

Note: The 2015 data  
from PeMS is limited  
due to poor detector  
health.

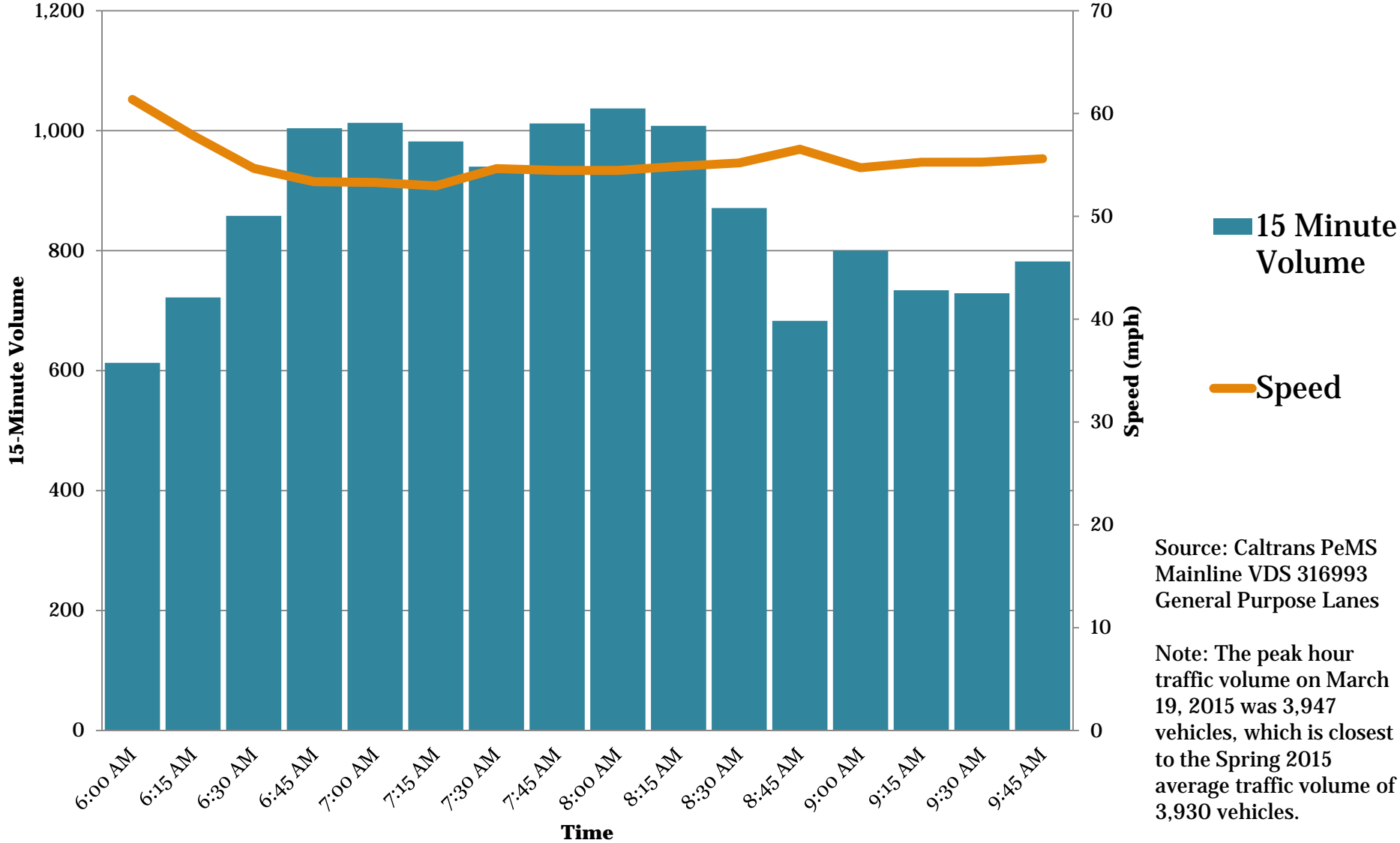
<sup>1</sup>Averages do not include outliers.

# Caltrans PeMS Volume & Speed Data

## US 50 - Westbound AM Peak Hour

### At the County Line

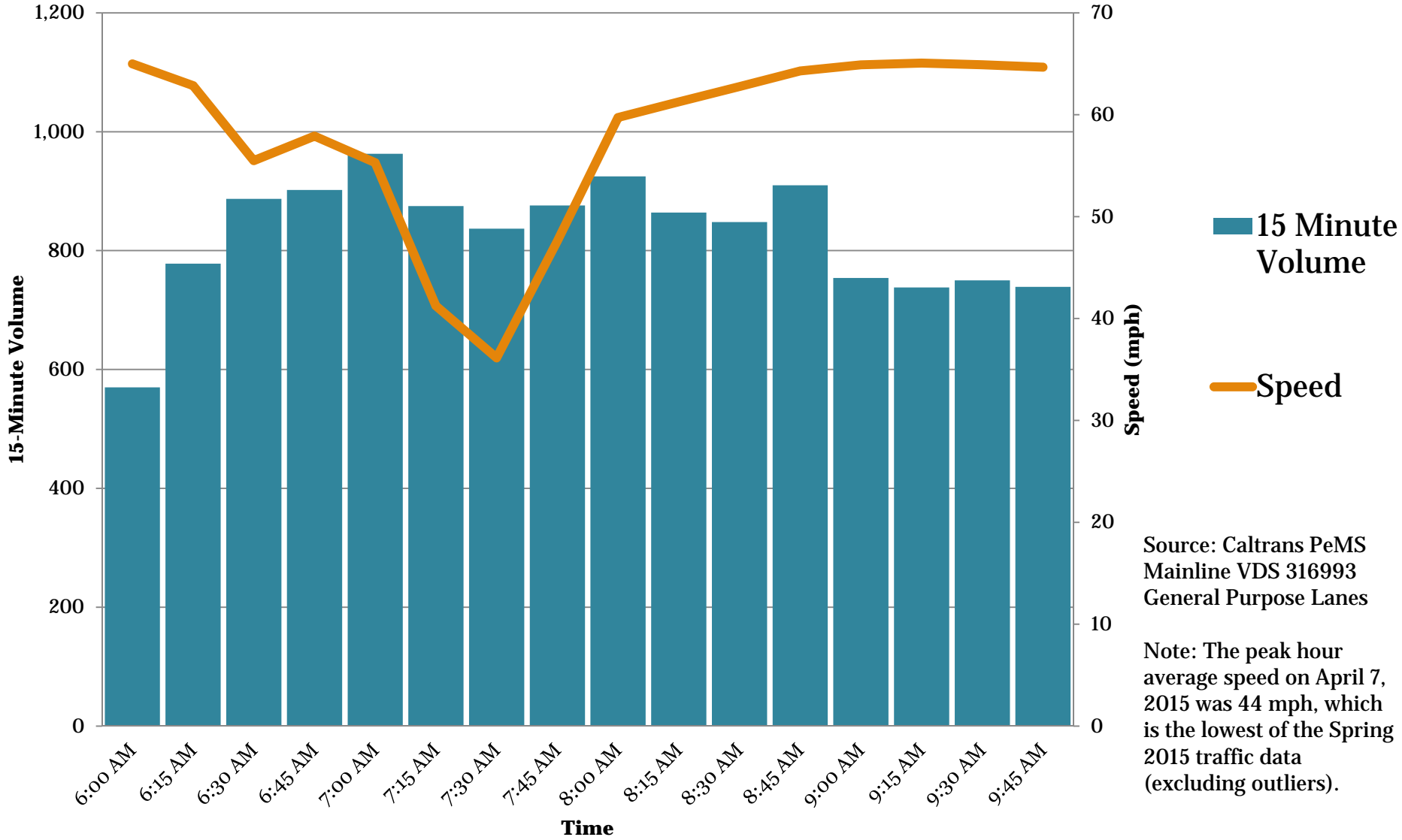
#### Average Day - March 19, 2015



Source: Caltrans PeMS  
Mainline VDS 316993  
General Purpose Lanes

Note: The peak hour traffic volume on March 19, 2015 was 3,947 vehicles, which is closest to the Spring 2015 average traffic volume of 3,930 vehicles.

**Caltrans PeMS Volume & Speed Data**  
**US 50 - Westbound AM Peak Hour**  
**At the County Line**  
**Lowest Peak Hour Speed- April 7, 2015**



Source: Caltrans PeMS  
 Mainline VDS 316993  
 General Purpose Lanes

Note: The peak hour average speed on April 7, 2015 was 44 mph, which is the lowest of the Spring 2015 traffic data (excluding outliers).

# Existing Traffic Data – US 50 at County Line



- Data from County Line count station for typical weekdays indicate typical fluctuation of volumes and speeds

## AM Peak Hour Westbound Traffic Data

Year	Avg. Volume	Avg. Speed	Avg. LOS
2010	3,000 vph	46-50	C
2015	3,900 vph	55 mph	E

- Data from County Line count station is consistent with calculated levels of service using Highway Capacity Manual (HCM) and observed conditions

# Caltrans Volumes from 2014 TCR/CSMP



- Caltrans reports a volume of 4,590 for peak hour at the County line
- Peak hour volume of 4,590 is higher than PeMS count data from County line station - for multiple “typical weekdays”
- Volume is thus not appropriate for use in the TIM Fee Nexus Study

# Caltrans Participation



- Peer Review of TDM resulting in its acceptance
- Review of assumptions for existing and future LOS
- Provided volume data used for Highway 50 for existing conditions used for the Major CIP and TIM Fee Update

**July 5, 2016 Caltrans letter to El Dorado County related to the Major CIP and TIM Fee Update states:**

**“We agree with the traffic analysis methodology, traffic analysis assumptions, and associated analysis results for US 50 for the existing and future scenarios.”**

\*\*Important to note that Caltrans is involved with project-level studies from the County, including all relevant development projects and County CIP projects. The County and Caltrans will continue to coordinate.



Level of Service on  
U.S. Highway 50  
at the El Dorado County  
Line

# Volume Data used in CSMPs/TCRs

- Traffic volumes used in CSMPs/TCRs are from traffic counts provided by the Caltrans Traffic Census Program: <http://www.dot.ca.gov/trafficops/census/>
  - Both AADT and Peak Hour Volumes are used
  - Highest volume within freeway segments are reported and used for analysis
- These volumes are used because:
  - Volumes are provided for all Freeways/Highways in the State
  - Eliminates ambiguity of selecting an applicable volume for analysis
  - Volumes are available to the public

# Volume Data used in CSMPs/TCRs

## The Peak Hour Volumes from the Volumes Book

- Provides an estimate of the "peak hour" traffic at all points on the state highway system.
- This value is useful to traffic engineers in estimating the amount of congestion experienced, and shows how near to capacity the highway is operating
- A few hours each year are higher than the "peak hour", but not many.
- In urban and suburban areas, the peak hour normally occurs every weekday, and 200 or more hours will all be about the same.
- On roads with large seasonal fluctuations in traffic, the peak hour is the hour near the maximum for the year but excluding a few (30 to 50 hours) that are exceedingly high and are not typical of the frequency of the high hours occurring during the season.

# Volume Data used in CSMPs/TCRs

## AADT from the Volumes Book

- Annual average daily traffic is the total volume for the year divided by 365 days.
- Very few locations in California are actually counted continuously.
- Traffic Counting is generally performed by electronic counting instruments moved from location throughout the State in a program of continuous traffic count sampling.
- The resulting counts are adjusted to an estimate of annual average daily traffic by compensating for seasonal influence, weekly variation and other variables which may be present.
- Annual ADT is necessary for presenting a statewide picture of traffic flow, evaluating traffic trends, computing accident rates, planning and designing highways and other purposes.

# Other Data used in CSMPs/TCRs

- Directional Splits (D%) are also provided by the Caltrans Traffic Census Program
  - Not enough data for every segment so the D% from the nearest segment is used
  - In some cases where no data is available, the highest D% within the peak period from PeMS is used
- PeMS data is used for:
  - Daily and Peak Hour Delay
  - Daily and Peak Hour Vehicle Miles Traveled
  - Bottleneck Data
  - Average Peak Hour Speeds

# Level of Service Calculations in CSMPs/TCRs

- Highway Capacity Manual 2010 is used
  - Level of Service defined by Density, not Speed
- Uniform process for every highway/freeway segment
- The analysis does not specify direction (EB/WB)
- In this case, the volumes book peak hour volumes and directional split were high, leading to a directional peak hour volume that was higher than observed counts.

# Level of Service Calculations in CSMPs/TCRs

- Caltrans is looking to update the LOS methodology for future planning documents
  - Possibly incorporating some of the methodology El Dorado County CIP/TIM analysis
- Based on updated PeMS Volumes, U.S 50 currently operates at LOS E

# Future

- Senate Bill 743 - Caltrans is shifting its focus for our Local Development-Intergovernmental Review program from auto delay based metrics to those focused on reducing Vehicle Miles Traveled (VMT).
- Technical comments may still be provided related to Level of Service on the State Highway System for documents shared with us for our review, but our primary focus of letters and requested mitigation will be to reduce project generated VMT



# Why doesn't public perception match the technical calculations?

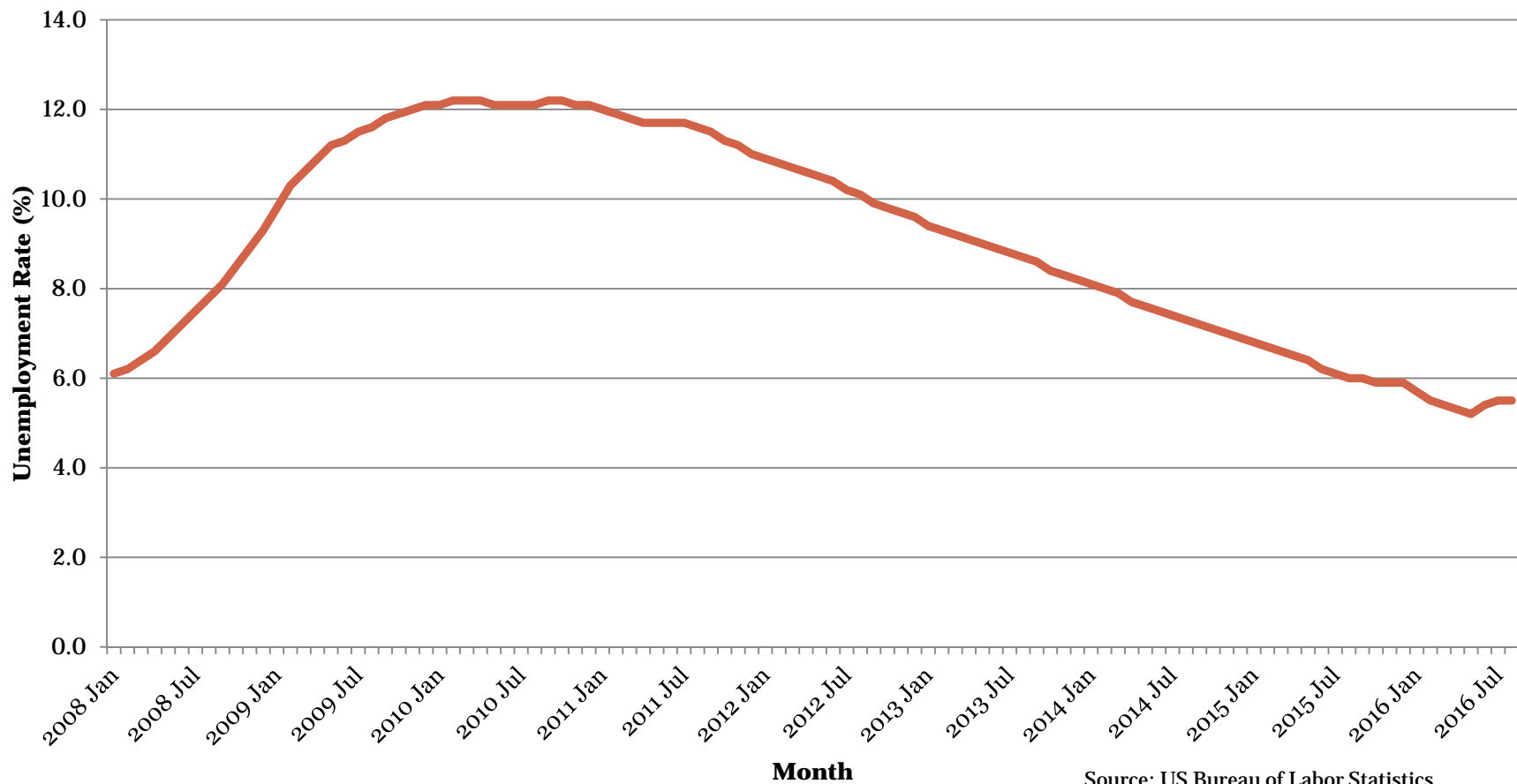


- People tend to remember the worst days
- Fluctuations in traffic volumes & speed
  - Incidents, work zones, weather, school schedules, special events, seasonal attractions, heavy vehicles, platooning, etc.
- Level of Service is calculated for the entire hour, not for a single point in time
- American Society of Civil Engineers (ASCE) research shows that certain LOS grades are difficult for the general public to identify and
- Perception varies from person to person

# Why have traffic levels increased?



## El Dorado County Unemployment Rate

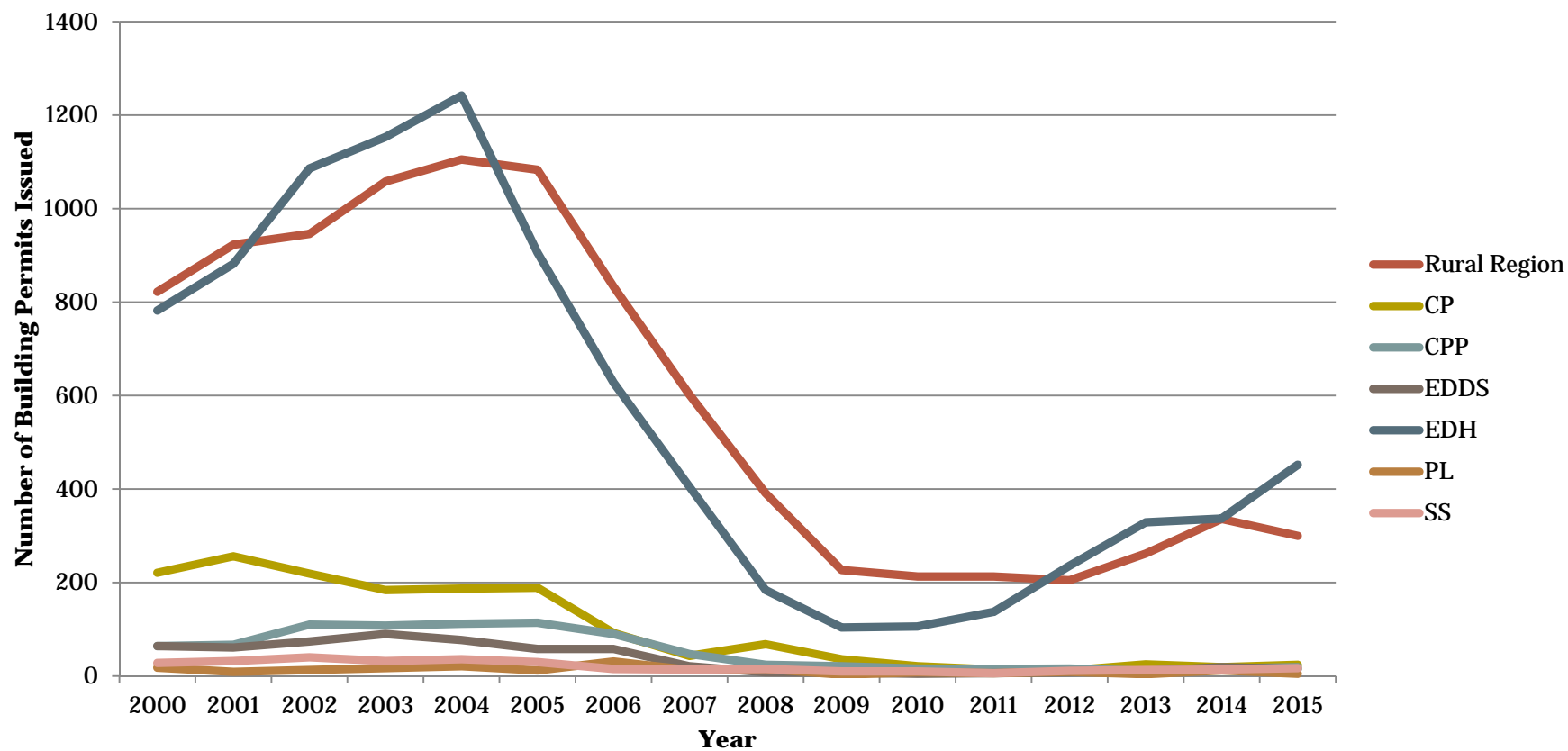


Source: US Bureau of Labor Statistics

# Why have traffic levels increased?



## Residential Building Permits Issued per Year By Community Region



# What is the County doing to prevent LOS F at the County Line?



## Recent Projects

- 2010 – HOV Lanes
- 2011 – El Dorado Hills Blvd Interchange Improvements
- 2016 – Silva Valley Pkwy Interchange
- 2016 – Carson Crossing Drive

## Future Projects

- Adjust ramp metering rate (Caltrans)
- Saratoga Way Extension
- White Rock Road Widening
- Auxiliary lanes on US 50
- Green Valley Road Widening (City of Folsom)

# What is the County doing to prevent LOS F and improve roads throughout the County?



## Traffic Operations

- Annual Traffic Count Program
- Intersection Needs Prioritization Process
- Regular TDM Updates
- Annual and Major Updates to CIP and TIM Fee Program
- CIP Projects
  - 24 projects in Construction
  - 31 projects in Planning, Design, or ROW Phases

## Other Monitoring Programs

- Pavement Management Program
- Annual Accident Location Survey
- Traffic Advisory Committee
- Maintenance Requests

# General Plan Assumptions



On page 5 under the **PLAN ASSUMPTIONS** of the *2004 El Dorado County General Plan A Plan for Managed Growth and Open Roads; A Plan for Quality Neighborhoods and Traffic Relief*, assumption #7 Traffic Level of Service states:

“In determining what levels of growth-related traffic are acceptable, the Plan balances a number of competing considerations. If the County sized its roadways solely to guarantee the smooth flow of traffic during limited peak periods in which commuter trips push traffic to maximum levels, one result would be the need to modify many rural two-lane roads by adding new lanes, thereby reducing the rural character of the affected adjacent lands. Such modifications would also entail enormous expense, while generating benefits only realized during limited periods. In addition, County revenue financing mechanisms, such as user fees in the form of gasoline tax or a road benefit assessment, are limited. In light of these considerations, the Plan has been designed to match any increases in the size of roadways to those necessary to meet the Level of Service and concurrency policies included in the Transportation and Circulation Element.”

# Public Workshop on October 10, 2016



- A public workshop was held at the El Dorado Hills Fire station on October 10, 2016 at 6:30 PM
- It was well attended with approximately 30 members of the public, three Board members, a Caltrans Deputy Director, three consultants, and six County staff members
- A power point presentation similar to this one was made by County staff, Caltrans and the consultants
- Comments and questions were encouraged
- County staff received one comment card that evening, five comment letters and a copy of the video of the meeting was requested and subsequently provided
- The response to the comments received is attached to the staff report

## Some common public questions or comments



- What was the purpose of this workshop?
- What is the Level of Service on Highway 50?
- Why isn't Level of Service based on speed?
- Why is the unemployment rate unlikely to drop significantly in the future?
- What is the funding for the current year Capital Improvement Projects?
- Why does the County only use “typical days” for data collection?
- How does the County address traffic that is not within their control, such as Folsom's contribution on Highway 50?
- Do any jurisdictions build roadways for accidents?



ANY  
QUESTIONS?

