# Two Use Cases of StreetLight: Screenline Counts and External LM Travel

Modeling Task Force Meeting

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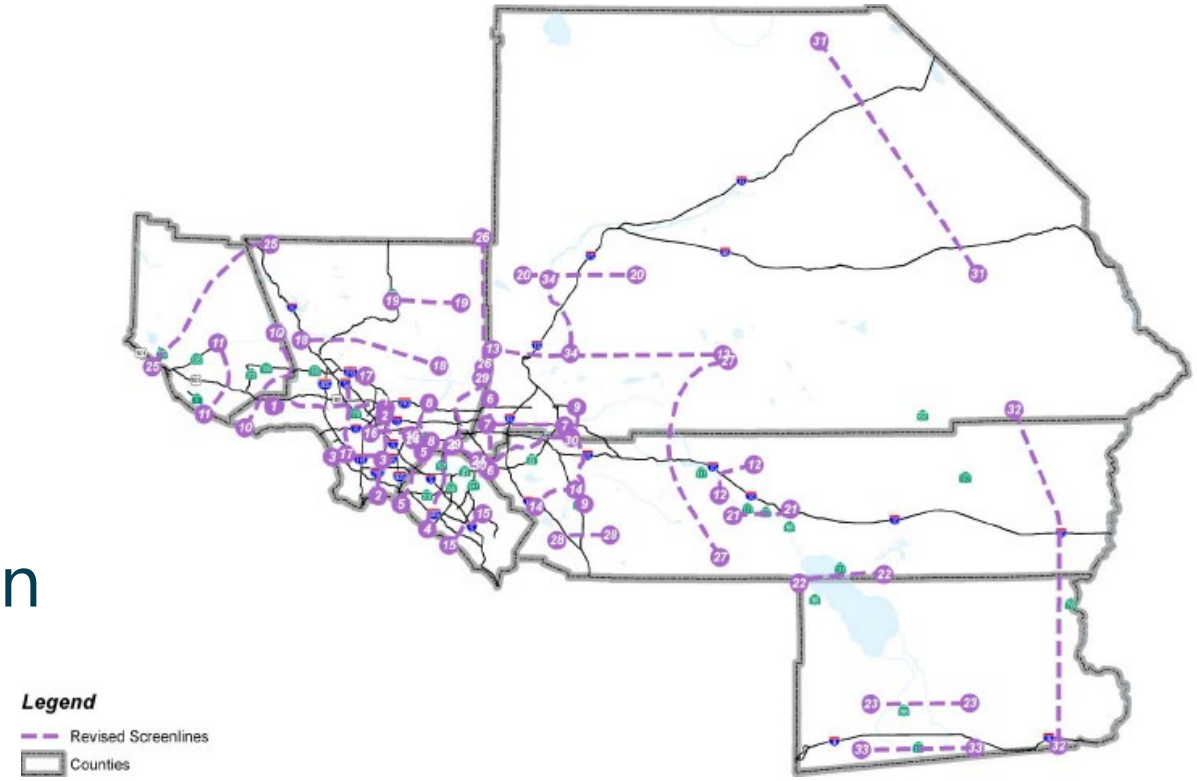
# Background

- A one-year regional subscription to the StreetLight InSight platform
  - 1/11/2021 to 1/10/2022
  - Multi-mode tier (Car, Truck, Bus, Rail, Bicycle, Pedestrian)
  - Unlimited queries and analyses
  - Modeling Staff downloaded hundreds of data sets for modeling and planning
    - AADT, OD, Zone Activity, Segment Analysis, Top Routes, etc.
- Plus, additional data services as per customer specifications
  - OD trips by TNC at the level of 4,109 TAZs
  - OD trips by Light Duty at the level of 4,109 TAZs
    - Light Duty: delivery, transportation, commercial fleet vehicles under 10K lb.
  - OD tours for external travel
  - Truck parking dwell time analysis

# CASE 1. SCREENLINE COUNTS

# Introduction

- Base year model validation:
  - estimated vs observed
- Screenlines: imaginary lines across roadways
  - 35 screenlines on 700+ locations of freeways and non-freeways
- Traffic counts available in the region
  - Freeways: rich (PeMS, Caltrans)
  - Non-freeways: poor (county/city traffic counts available but limited in time/space coverages)



# 2016 Base Year for 2020 RTP

- One-day field traffic counts
  - Tu, We or Th in 2017 Spring and Fall
  - Excl. holidays, days after holidays, bad weather and spring break
  - Tube and Wavetronix

| Month | Tube Data Collection | Wavetronix Data Collection |
|---|---|---|
| February | 25 | NA |
| March | 76 | NA |
| April | 180 | NA |
| May | 110 | NA |
| June | 21 | 6 |
| September | 98 | 12 |
| October | 2 | 20 |
| November | 8 | 34 |

- Shortcomings
  - Expensive (~$120 per Tube; ~$1000 per Wavetronix)
  - Difficult to install equipment; slow permit process
  - Requires annual and seasonal adjustments
  - Hard to justify that one-day counts represent annual average

# 2019 Base Year for 2024 RTP

We identified 10 different cases to guess screenline link volumes:

- Facility types: freeway (FT<40) vs arterial (FT>=40)
- AADT sources: Caltrans AADT vs StreetLight AADT
- Directional and ML/HV distribution: PeMS vs StreetLight
- LM/HDT vehicle classification: Caltrans Truck % vs 2017 Tube field counts
- Conversion of AADT to weekday ADT: StreetLight Index

| Method | SCRL Links | Link Dir | Facility Type | AADT Source | Lane Distribution | L/M/H HDT Percentages | WKDY Factor |
|---|---|---|---|---|---|---|---|
| 1 | 68 | 1 | Freeway (ML Only) | 2019 Caltrans AADT | 2019 SCAG PeMS ADT for WKDY | 2019 Caltrans Axle-Based Truck % | 2019 StreetLight Index by ADAY and WKDY for Auto and Truck |
| 2 | 28 | 1 | Freeway (ML Only) | 2019 Caltrans AADT | 2019 StreetLight Index for WKDY | 2019 Caltrans Axle-Based Truck % | 2019 StreetLight Index by ADAY and WKDY for Auto and Truck |
| 3 | 136 | 1 | Freeway (ML + HV) | 2019 Caltrans AADT | 2019 SCAG PeMS ADT for WKDY | 2019 Caltrans Axle-Based Truck % | 2019 StreetLight Index by ADAY and WKDY for Auto and Truck |
| 4 | 8 | 1 | Freeway (ML + HV) | 2019 Caltrans AADT | Others** | 2019 Caltrans Axle-Based Truck % | 2019 StreetLight Index by ADAY and WKDY for Auto and Truck |
| 5 | 6 | 1 | Arterial | 2019 Caltrans AADT | 2019 StreetLight Index for WKDY | 2019 Caltrans Axle-Based Truck % | 2019 StreetLight Index by ADAY and WKDY for Auto and Truck |
| 6 | 24 | 0 | Arterial | 2019 Caltrans AADT | No need | 2019 Caltrans Axle-Based Truck % | 2019 StreetLight Index by ADAY and WKDY for Auto and Truck |
| 7 | 3 | 0 | Arterial | 2019 Caltrans AADT | No need | 2017 NDS Tube 13 FHWA Classification | 2019 StreetLight Index by ADAY and WKDY for Auto and Truck |
| 8 | 17 | 1 | Arterial | 2019 StreetLight AADT | No need | 2017 NDS Tube 13 FHWA Classification | 2019 StreetLight Index by ADAY and WKDY for Auto and Truck |
| 9 | 423 | 0 | Arterial | 2019 StreetLight AADT | No need | 2017 NDS Tube 13 FHWA Classification | 2019 StreetLight Index by ADAY and WKDY for Auto and Truck |
| special | 4 | | Arterial | 2019 StreetLight AADT | | | |
| | 717 | | | | | | |

# LM Screenline Validation on Arterials (2016 vs 2019)

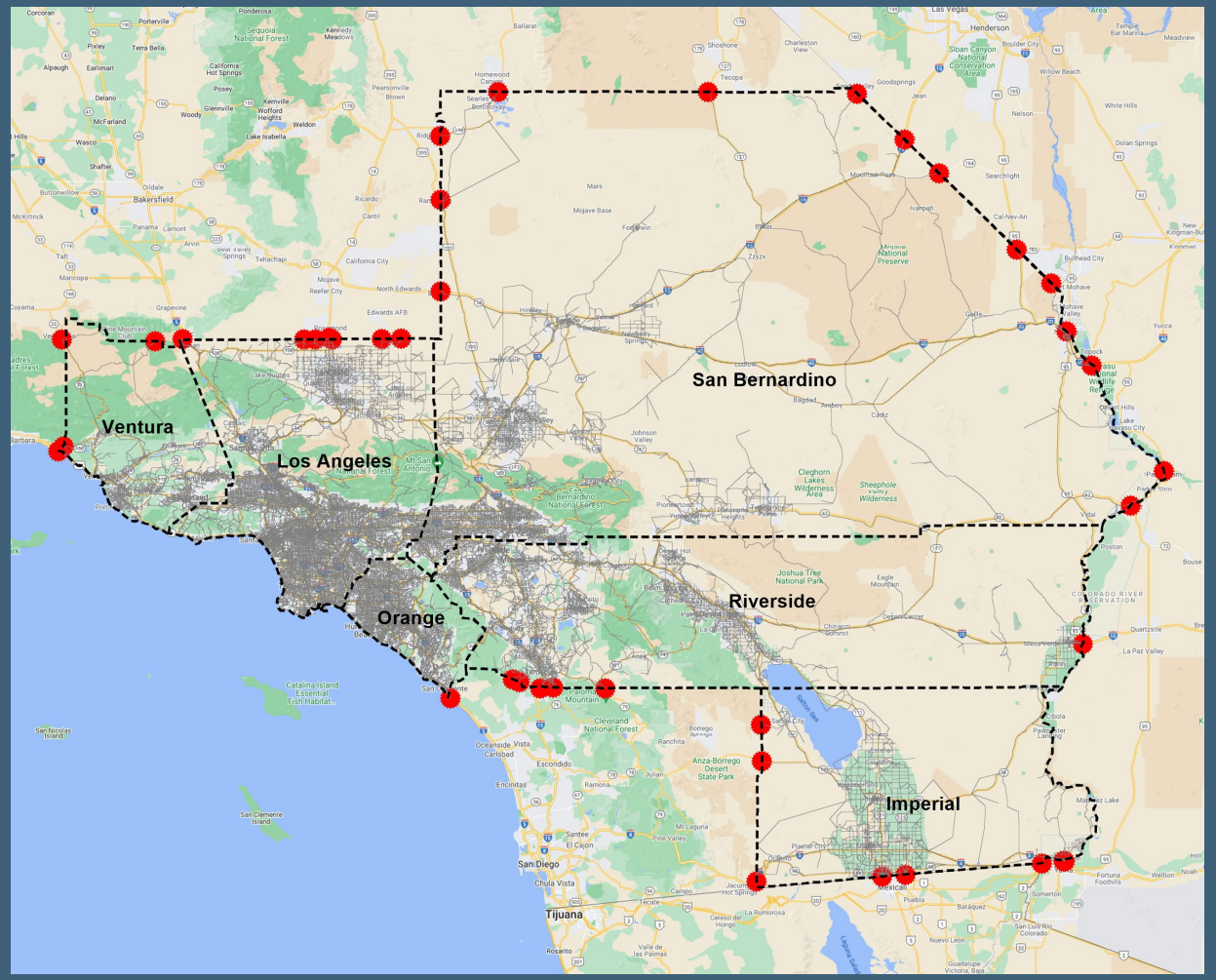
| Facility Type | 2016 LM | | | | 2019 LM | | | |
|---|---|---|---|---|---|---|---|---|
| | Model | Count | Ratio | RMSE | Model | Count | Ratio | RMSE |
| Principal Arterial | 6,035,602 | 4,976,164 | 1.21 | 46 | 6,226,243 | 5,434,680 | 1.15 | 50 |
| Minor Arterial | 3,045,350 | 2,582,401 | 1.18 | 55 | 2,898,390 | 2,751,596 | 1.05 | 59 |
| Major Collector | 484,006 | 519,754 | 0.93 | 82 | 478,296 | 586,700 | 0.82 | 78 |
| Minor Collector | 13,466 | 9,334 | 1.44 | 154 | 10,929 | 8,593 | 1.27 | 59 |

- Currently, we are calibrating the 2019 model. Meanwhile, we will continue to review screenline counts for both freeways and arterials.
- As we are also updating the HDT model, the HDT screenline validation result will be available later.

# CASE 2. EXTERNAL LM TRAVEL

# Introduction

- 40 external cordons
  - Santa Barbara (3); Kern (11); Inyo (2); Nevada (5); Arizona (7); Mexico (3); San Diego (9)
- ~8% of total LM VMT
- SCAG's LM External Model requires:
  - Cordon traffic counts
  - Observed OD matrices

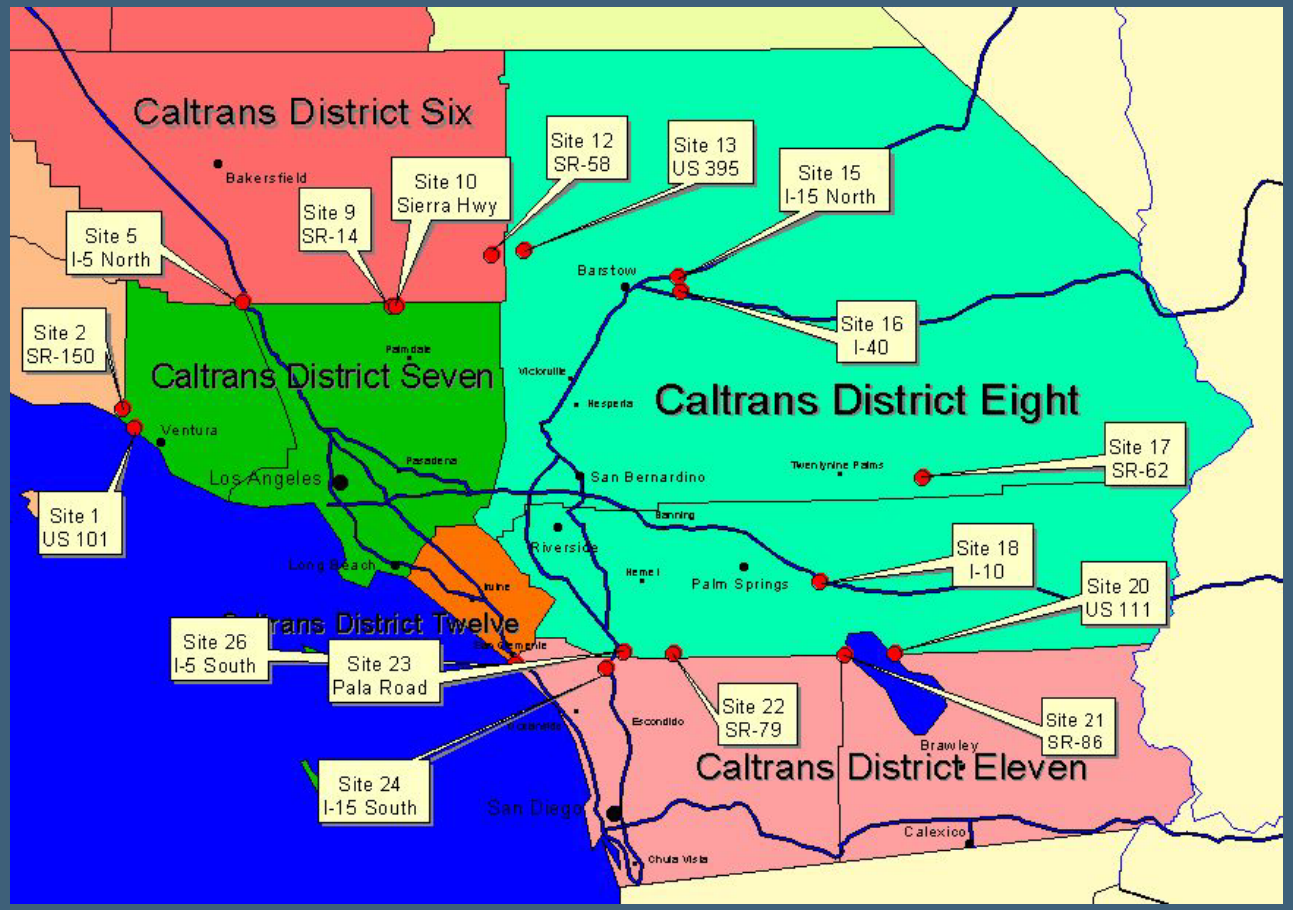


# Cordon Traffic Counts

- Freeway cordons (23 locations)
  - Caltrans AADT
  - LM/HDT vehicle classification: Caltrans Truck %
  - Conversion of AADT to Weekday ADT: StreetLight Index
- Arterial cordons (17 locations)
  - StreetLight AADT
  - LM/HDT vehicle classification: 2017 SCAG field traffic counts by Tube (13 FHWA vehicle classification)
  - Conversion of AADT to Weekday ADT: StreetLight Index

# Observed OD Matrices (Old)

- In 2002 and 2003, SCAG conducted a regional cordon survey to estimate the observed OD distribution of external trips.
  - Didn't cover Imperial County and Mojave desert areas
  - Limited to the 17 busiest cordons
- *It is time to update!*



# Observed OD Matrices (New)

- First, we tried to collect external OD trips passing through external cordons from/to internal CSAs directly from the StreetLight InSight platform.
  - By default, in-platform trips break when a device does not move more than five meters in five minutes.
- In SCAG's regional model, external LM trips are considered as long-distance travel and should not include intermediate short stops, such as stopping for meal or rest.
  - StreetLight chained multiple trips if there is less than 90 mins and 1 kilometer b/w consecutive trip stops.

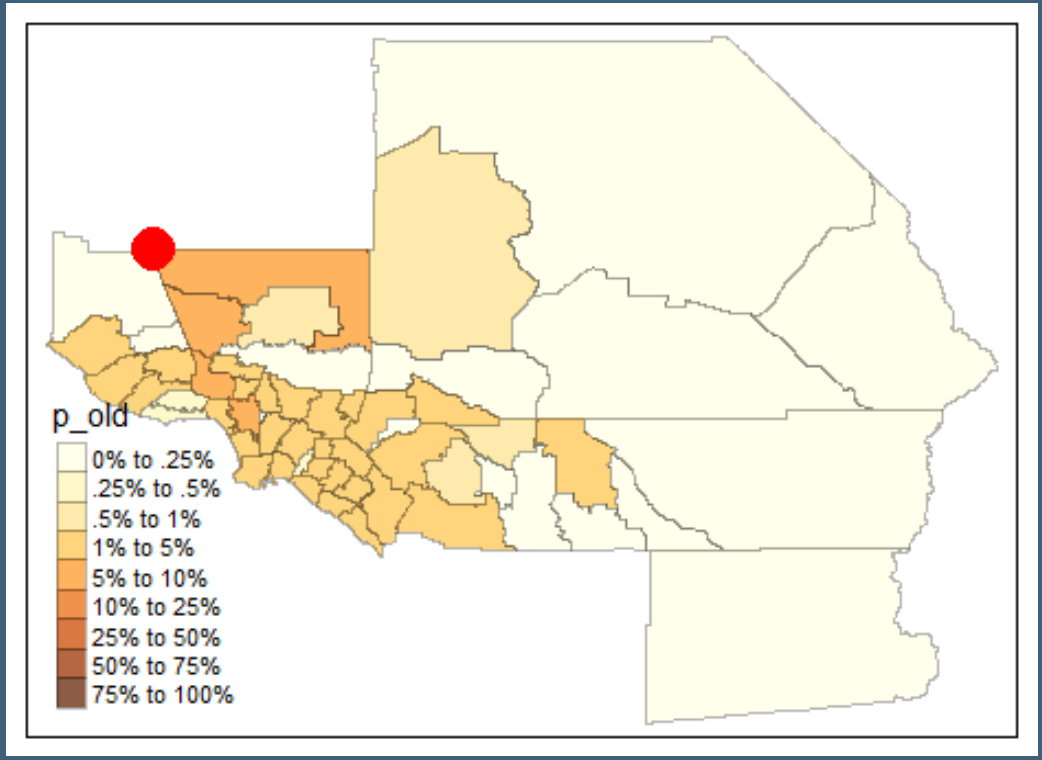
# Further Revision

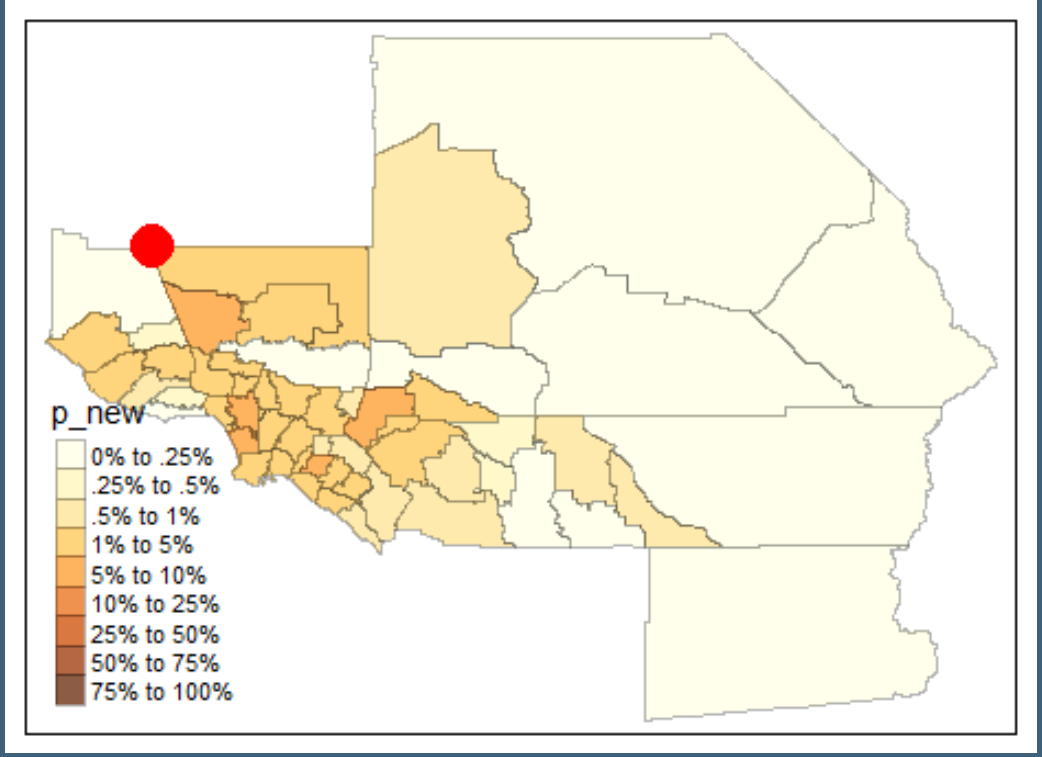
- Carefully review and revise the StreetLight external OD tours at the RSA level
  - Exclude I-X, X-I and X-X trips going out of and returning the region
  - Exclude X-X trips traveling between the same cordon
  - Exclude X-X trips traveling between nearby cordons
  - For some cordons, we observe a big difference b/w the regional cordon survey and the StreetLight tour data.
    - For cordons with less than 5K traffic volumes, follow the StreetLight OD patterns without any adjustment
    - For cordons with more than 5K traffic volume, adjust the StreetLight tour data based on the cordon survey result

# Additional Processes

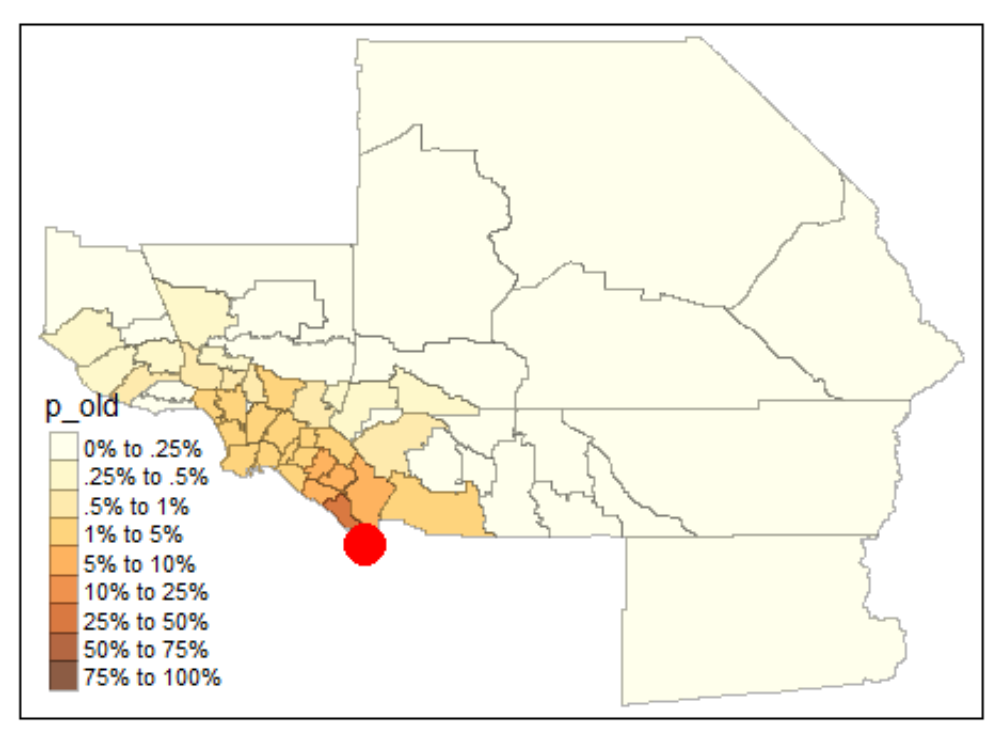
- Construct a 96x96 matrix (56 RSAs+40 Cordons) based on the above revision
- Expand to a 409x409 matrix (369 CSAs+40 Cordons) based on the StreetLight tour data
- Expand to a 4149x4149 matrix (4109 TAZs+40 Cordons) based on population and employment
- Split into 5 time periods based on StreetLight's hourly distribution for each cordon
- Split into 3 auto modes (DA, SR2, SR3+) based on the existing external OD matrices

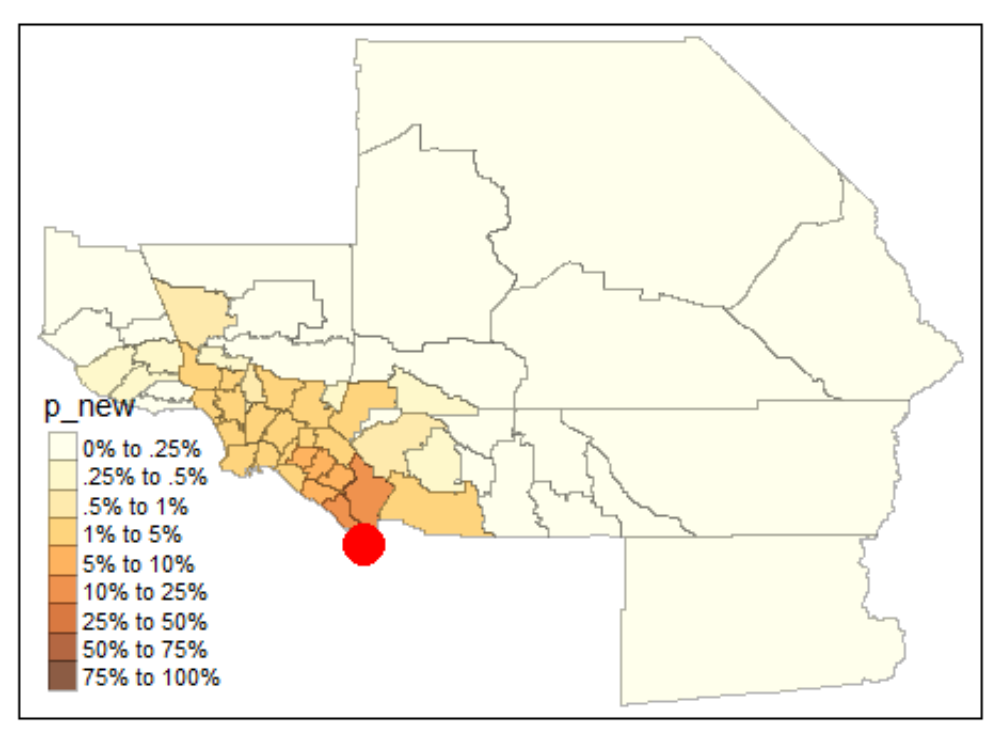
# X-I OD by DA for AM at Cordon 4114 on I-5 North (Old vs New)



# X-I OD by DA for AM at Cordon 4149 on I-5 South (Old vs New)



# THANK YOU!

**For more information, please contact Kihong Kim (kimk@scag.ca.gov)**