California Statewide Freight Forecasting Model

Updates and Enhancements

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SCAG MODELING TASK FORCE

March 27, 2019
What is the CSFFM? California Statewide Freight Forecasting Model

*A commodity-based model*

Forecasts the *flow of commodities by mode* as a function of *employment*, *establishment*, *land use* variables based on *disaggregated FAF zones*, and applied on *integrated CSTDM and FAF transportation network*.

Based on the **FAF 4.4** database, with base year **2015**

<table>
<thead>
<tr>
<th>CSFFM Commodity Group</th>
<th>CSFFM Commodity Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1 Agriculture products</td>
<td>G10 Nonmetal mineral products</td>
</tr>
<tr>
<td>G2 Wood, printed products</td>
<td>G11 Metal manufactured products</td>
</tr>
<tr>
<td>G4 Fuel and oil products</td>
<td>G12 Waste material</td>
</tr>
<tr>
<td>G5 Gravel/ sand and non metallic minerals</td>
<td>G13 Electronics</td>
</tr>
<tr>
<td>G7 Food, beverage, tobacco products</td>
<td>G14 Transportation equipment</td>
</tr>
<tr>
<td>G8 Manufactured products</td>
<td>G15 Logs</td>
</tr>
<tr>
<td>G9 Chemical/ pharmaceutical products</td>
<td>G3 Crude petroleum</td>
</tr>
<tr>
<td></td>
<td>G6 Coal / metallic minerals</td>
</tr>
</tbody>
</table>
Level 1: Network and TAZs

- 93,000 nodes
- 253,000 links
- Multi-modal

- 5454 TAZs
- 51 External Gates
Level 2: FAZs

- 97 CSFFM FAZs
- Defined at county and sub-county levels
- Aggregation of CSTDM TAZs
- Conforms to Caltrans District and CARB Air Basin boundaries
- Max. employment of 500K per zone
Transport Logistic Nodes

Northern California

Southern California

Truck/Rail
## Gateways

<table>
<thead>
<tr>
<th>No</th>
<th>Seaport</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Port of San Diego</td>
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<td>3</td>
<td>Port of Redwood City</td>
</tr>
<tr>
<td>4</td>
<td>Port of Humboldt</td>
</tr>
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<td>5</td>
<td>Port of Oakland</td>
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<td>6</td>
<td>Port of Richmond</td>
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<td>7</td>
<td>Port Hueneme</td>
</tr>
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<td>8</td>
<td>Port of Los Angeles</td>
</tr>
<tr>
<td>9</td>
<td>Port of Long Beach</td>
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<td>10</td>
<td>Port of Stockton</td>
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<table>
<thead>
<tr>
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<tr>
<td>2</td>
<td>San Francisco International</td>
</tr>
<tr>
<td>3</td>
<td>Oakland International</td>
</tr>
<tr>
<td>4</td>
<td>Fresno International</td>
</tr>
<tr>
<td>5</td>
<td>Los Angeles International</td>
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<tr>
<td>6</td>
<td>Long Beach Airport</td>
</tr>
<tr>
<td>7</td>
<td>Ontario International</td>
</tr>
<tr>
<td>8</td>
<td>March ARB</td>
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</table>

<table>
<thead>
<tr>
<th>No</th>
<th>Airport</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>Fresno International</td>
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<td>Los Angeles International</td>
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<td>6</td>
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<tr>
<td>7</td>
<td>Ontario International</td>
</tr>
<tr>
<td>8</td>
<td>March ARB</td>
</tr>
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<table>
<thead>
<tr>
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<th>Land port</th>
<th>State</th>
<th>Land Port</th>
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<tbody>
<tr>
<td>1</td>
<td>Tecate</td>
<td>California</td>
<td>truck/rail</td>
</tr>
<tr>
<td>2</td>
<td>Calexico</td>
<td>California</td>
<td>truck/rail</td>
</tr>
<tr>
<td>3</td>
<td>Calexico-East</td>
<td>California</td>
<td>truck/rail</td>
</tr>
<tr>
<td>4</td>
<td>San Ysidro</td>
<td>California</td>
<td>Rail</td>
</tr>
<tr>
<td>5</td>
<td>Douglas</td>
<td>Arizona</td>
<td>truck/rail</td>
</tr>
<tr>
<td>6</td>
<td>Naco</td>
<td>Arizona</td>
<td>truck/rail</td>
</tr>
<tr>
<td>7</td>
<td>San Luis</td>
<td>Arizona</td>
<td>truck/rail</td>
</tr>
<tr>
<td>8</td>
<td>Nogales</td>
<td>Arizona</td>
<td>truck/rail</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>Truck port</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Otay Mesa</td>
<td>California</td>
</tr>
<tr>
<td>2</td>
<td>Andrade</td>
<td>California</td>
</tr>
<tr>
<td>3</td>
<td>San Ysidro</td>
<td>California</td>
</tr>
<tr>
<td>4</td>
<td>Lukeville</td>
<td>Arizona</td>
</tr>
<tr>
<td>5</td>
<td>Sasabe</td>
<td>Arizona</td>
</tr>
</tbody>
</table>
California Statewide Freight Forecasting Model Update Overview

Substantially update CSFFM - new datasets
- CA-VIUS, GPS O-D, FAF 4, truck traffic counts

Replace long & short distance truck models in CSTDM
- CSFFM freight & non-freight truck models

New base and future year forecasts

Fully integrate CSFFM within CSTDM

Enhanced usability and training materials
Primary CSFFM Applications

**Land use scenarios**
- Population
- Employment by industry
- Agriculture harvest

**Corridor analyses**
- Capacity expansion
- New facility
- Network performance
- Truck route users

**Air quality analysis**
- GHG
- PM

**Mode shift analyses**
- Trucking cost/toll/fuel prices
- Rail network access/rates

**Economic/Industry analyses**
- Regional Commodity flow
- Ports’ traffic
- Import/export distribution
CSFFM Performance Metrics

Regional goods movement trends
  ◦ by mode
  ◦ by truck class
  ◦ by tonnage

VMT
  ◦ by origin zone
  ◦ by industry (commodity)
  ◦ by truck size
  ◦ with/without through trips
  ◦ by speed bin
  ◦ by trip length

VHT by industry for each origin

Link level truck traffic volumes

Speed profile trends (by type)

Truck route utilizations

Toll revenue

V/C, LOS, delay

Basic GHG estimation

Domestic vs. import / export share
<table>
<thead>
<tr>
<th>Types of projects</th>
<th>Throughput</th>
<th>Travel time Network speed</th>
<th>Reliability</th>
<th>Congest. reduction/mitigation</th>
<th>VMT &amp; AQ impacts</th>
<th>Bottleneck relief</th>
<th>Safety</th>
<th>Multimodal strategy</th>
<th>Intero-regional benefits</th>
<th>Economic and job growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corridor and freeway-freeway interchange studies</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Provide inputs for traffic Microsim</td>
<td>Provide inputs for Safety Analysis</td>
<td>Yes (rail, water, air)</td>
<td>Yes[1]</td>
<td>As model inputs</td>
</tr>
<tr>
<td>*Geographic detail: multiple interchanges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truck lanes (climbing, freight corridor, truck toll)</td>
<td>Yes- allows for cutom truck-only max speeds</td>
<td>Yes</td>
<td>No</td>
<td>Yes (not sensitive to grades)</td>
<td>Yes</td>
<td>Provide inputs for traffic Microsim</td>
<td>Provide inputs for Safety Analysis</td>
<td>No</td>
<td>Yes</td>
<td>As model inputs</td>
</tr>
<tr>
<td>*Geographic detail: Should be for at least an entire corridor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truck efficiency (platooning)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Provide inputs for traffic Microsim</td>
<td>Provide inputs for Safety Analysis</td>
<td>Possibly only for large-scale deployment</td>
<td>Yes</td>
<td>As model inputs</td>
</tr>
<tr>
<td>*Geographic detail: Minimal level is urban corridor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land use policies</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Provide inputs for traffic Microsim</td>
<td>Provide inputs for Safety Analysis</td>
<td>Yes</td>
<td>Yes</td>
<td>As model inputs</td>
</tr>
</tbody>
</table>

[1] a notable area of strength relative to regional models
CSFFM 3.0 Architecture

1. Disaggregated Input Data Prep
   - Prepare employment, GDP, agriculture data tables

2a. Non-freight Trucks Generation
   - Domestic flows

2b. Commodity Generation (Tons)
   - Total Demand, Import / Export

3. Mode Split
   - Truck only, Rail only
   - Rail-Truck, Air-Truck
   - Water, Pipeline

4. Transhipment
   - Split multiple modes into mode segments

5a. Seasonality
5b. Tons to Trucks conversion

6. Disaggregation
   - Disaggregate FAZs to 5454 TAZs

7. CSTDM Integrated Assignment
   - Traffic Assignment for Each Peak Period

FAZ/TAZ
- Average daily Productions/Attractions
- Domestic flows

TAZs
- Domestic flows by CG

FAZs & Gateways
- annual Productions/Attractions
- Domestic flows
- Annual Import / Export
- OD flows by CG

FAZ, Gateway & TLN OD Flows
- Rail-Truck, Air-Truck, Truck only, Rail only, Water only & Pipeline by CG

FAZ, Gateway & TLN OD Flows
- Truck, Rail and Air segments by CG

FAZ, Gateway & TLN OD Flows
- Seasonal and Average Daily Flows by 3 Truck Class and CG

Network Link Flows
- Average Daily Truck Flows at TAZs by Truck Class and CG

Network Link Flows
- Truck link flows by Truck Classes by Time Period

FAZ: Freight Analysis Zones, OD: Origin-Destination, CG: Commodity Group, TLN: Transportation Logistic Node
Disaggregated Input Data Preparation

2015 Base Year Data

- **CSTDM TAZ level data**
  - Population
  - Employment (8 groups)

- **Census/Other public data**
  - Establishments and employments
  - Refineries production
  - Manufacturing GDP
  - Acreage of harvested land
  - Tonnage of livestock

- InfoUSA establishment database
  - 105,020 Establishments with 10+ employees with NAICS codes 11-49 in CA

- Fuel price
- Trucking cost
- Import/export data at each gateway
- Truck GPS data
- Rail waybill
Disaggregated Input Data Preparation

Using establishments by their industry codes to disaggregate CSTDM basic Employments into 3 digit NAICS categories

* Source: InfoUSA Establishment database 2017
Disaggregated Input Data Preparation

Assumptions/implementation:

1. CSTDM Employment

2. Applied base year 2015 Ratio

3. Generate Detail employment projection
Freight Module Update

FAF 4.4 database with 2015 estimates
- 9 new FAF zones outside California
- Total trip generation parameters updated
- Direct demand model coefficients updated
- Import/export distribution ratios updated
Freight Module Update

Reasonable Consistency with Regional Truck models

- Future: total import/export is estimated based on economic factors and production/consumption equations.
- Users can modify allocations to each port
Scenario Development Tool
Scenario Development Tool
Non-Freight Truck

**Definition:** Non-freight trucks are NOT included in FAF database

**FACT:** 40-60% of truck VMTs are non-freight trucks
- Municipality, service, maintenance, construction, local deliveries, moving, emergency response, empty trucks

Non-freight trucks are needed for:
- Complete truck flow assignments, model validation, VMT calculation, air quality analysis
Non-Freight Trucks

Average weekday non-freight trips (partial)

TAMS database Jan-July 2017
Identified by body classification
Non-freight Trucks

An **implementable** model with available resources; a **functional, policy sensitive** model

**Assumption/Process:**

1. Truck OD table from GPS sample is expanded to match the counts ➔ *This is ALL truck flows*

2. FAF truck OD table is subtracted ➔ *This is all non-FAF trucks including empties and service trucks*

3. The Non-Freight OD table is used to estimate trip generation rates based on employment and population

4. Use GPS data sample as seed for trip distribution
Module Split Module

Value of time (VOT) in mode choice models

- VOT for different cargo
- VOT for vehicle carry the cargo

1) Stated preference survey
2) Relative to value of cargo

- No available data, assumption $1/\text{h}$
- It is included in the constant of the cost for each commodity

\[
Utility_{i,j,m} = \text{Constant}_m + \text{CostCoeff} \times (\text{fixed cost}_m + \text{VarCost}_{i,j,m}) + \text{TimeCoeff} \times (\text{fixed time}_m + \text{varTime}_{i,j,m}) \times \text{VOT}
\]
Module Split Module

- Develop an Excel tool to evaluate various cost functions
- Increase model stability by identifying minimum economic distance for each commodity for each mode
Module Split Module

G1- Mode Share by Distance (mi)

G5- Mode Share by Distance (mi)
Module Split Module

G9- Mode Share by Distance (mi)

G13- Mode Share by Distance (mi)
Transshipment Module

An inverse optimization model:

Step 1                         Step 2                               Step 3                                 Step 4

Modifications:

- POLA/POLB: share of on-dock rail, near-dock rail terminals and truck-only modes are user inputs

- New option: user can overwrite model estimated shares by local data

<table>
<thead>
<tr>
<th>Flow</th>
<th>2015 (TEU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-Dock</td>
<td></td>
</tr>
<tr>
<td>Total On-dock</td>
<td>2,227,203</td>
</tr>
<tr>
<td>% of Total Throughput</td>
<td>26.20%</td>
</tr>
<tr>
<td><strong>Total Off-Dock</strong></td>
<td><strong>692,974</strong></td>
</tr>
<tr>
<td>% of Total Throughput</td>
<td>8.20%</td>
</tr>
<tr>
<td>Total On &amp; Off-dock *</td>
<td></td>
</tr>
<tr>
<td>Total*</td>
<td>2,920,177</td>
</tr>
<tr>
<td>% of Total Throughput</td>
<td><strong>34.40%</strong></td>
</tr>
<tr>
<td>Total **</td>
<td>8,495,592</td>
</tr>
</tbody>
</table>
# Tons to Trucks (GVW)

<table>
<thead>
<tr>
<th>FHWA Class</th>
<th>Light</th>
<th>Medium 1</th>
<th>Medium 2</th>
<th>Heavy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Axles 4 tires</td>
<td>Class 3</td>
<td>36%</td>
<td>53%</td>
<td>9%</td>
</tr>
<tr>
<td><em>(Not included)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Axles 6 tires</td>
<td>Class 5</td>
<td>18%</td>
<td>61%</td>
<td>17%</td>
</tr>
<tr>
<td>3 Axles – Single unit</td>
<td>Class 6</td>
<td>2%</td>
<td>9%</td>
<td>12%</td>
</tr>
<tr>
<td>4 Axles – Single unit</td>
<td>Class 7</td>
<td>0%</td>
<td>0%</td>
<td>7%</td>
</tr>
<tr>
<td>3/4 Axles Single trailer</td>
<td>Class 8</td>
<td>1%</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>5 Axles Single trailer</td>
<td>Class 9</td>
<td>0%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>6+ Axles Single trailer</td>
<td>Class 10</td>
<td>0%</td>
<td>1%</td>
<td>3%</td>
</tr>
<tr>
<td>5 Axles Multi trailer</td>
<td>Class 11</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
</tr>
<tr>
<td>6 Axles Multi trailer</td>
<td>Class 12</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>7+ Axles Multi trailer</td>
<td>Class 13</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

* Source: CA-VIUS 2017

- **Light trucks** (8,500 to 14,000 lbs.)
- **Medium 1 trucks** (14,000 to 26,000 lbs.)
- **Medium 2 trucks** (26,000 to 33,000 lbs.)
- **Heavy trucks** (>33,000 lbs.)

### Considerations:
- Consistency with SCAG HDT
- Consistency with ARB AQ tools
Tons to Trucks Conversion

- The commodity flow OD tables are estimated in average annual tonnage
  - FAF and CFS are estimated annually

- The tonnages are distributed to average annual weekday

- The average weekday tonnages are distributed to 4 vehicle classes based on distance between origin and destination TAZs

- VMT for each vehicle class from CA-VIUS is used to guide the vehicle allocations for each distance bin
VMT Distribution by Commodity - Longer TLD

California VMT Distribution by Commodity - Agriculture products

California VMT Distribution by Commodity - Food, beverage, tobacco products

California VMT Distribution by Commodity - Gravel, Sand and nonmetallic minerals

California VMT Distribution by Commodity - Manufactured products
VMT Distribution by Commodity - Shorter TLD

California VMT Distribution by Commodity: Nonmetal mineral

California VMT Distribution by Commodity: Logs

California VMT Distribution by Commodity: Electronics

California VMT Distribution by Commodity: Chemical / Pharmaceutical
## Payloads Distribution

### Distance Bin

<table>
<thead>
<tr>
<th>MIN</th>
<th>MAX</th>
<th>Light</th>
<th>Medium1</th>
<th>Medium2</th>
<th>Heavy</th>
<th>sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>50</td>
<td>0.9%</td>
<td>9.0%</td>
<td>8.8%</td>
<td>81.3%</td>
<td>100%</td>
</tr>
<tr>
<td>50</td>
<td>100</td>
<td>0.5%</td>
<td>5.0%</td>
<td>2.6%</td>
<td>91.9%</td>
<td>100%</td>
</tr>
<tr>
<td>100</td>
<td>200</td>
<td>0.6%</td>
<td>3.0%</td>
<td>2.8%</td>
<td>93.6%</td>
<td>100%</td>
</tr>
<tr>
<td>200</td>
<td>500</td>
<td>0.3%</td>
<td>2.0%</td>
<td>2.2%</td>
<td>95.5%</td>
<td>100%</td>
</tr>
<tr>
<td>500</td>
<td>Or more</td>
<td>0.3%</td>
<td>2.0%</td>
<td>2.2%</td>
<td>95.5%</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Commodity Groups

<table>
<thead>
<tr>
<th>Commodity Groups</th>
<th>Light</th>
<th>Medium1</th>
<th>Medium2</th>
<th>Heavy</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1 Agriculture products</td>
<td>3,320</td>
<td>5,902</td>
<td>14,618</td>
<td>40,653</td>
</tr>
<tr>
<td>G2 Wood, printed products</td>
<td>1,585</td>
<td>5,569</td>
<td>9,757</td>
<td>38,711</td>
</tr>
<tr>
<td>G4 Fuel and oil products</td>
<td>1,189</td>
<td>4,355</td>
<td>10,066</td>
<td>36,822</td>
</tr>
<tr>
<td>G5 Gravel/ sand and non metallic minerals</td>
<td>2,235</td>
<td>5,679</td>
<td>18,394</td>
<td>46,112</td>
</tr>
<tr>
<td>G7 Food, beverage, tobacco products</td>
<td>2,479</td>
<td>5,236</td>
<td>12,266</td>
<td>38,500</td>
</tr>
<tr>
<td>G8 Manufactured products</td>
<td>2,361</td>
<td>4,711</td>
<td>9,354</td>
<td>34,209</td>
</tr>
<tr>
<td>G9 Chemical/ pharmaceutical products</td>
<td>2,364</td>
<td>3,609</td>
<td>12,933</td>
<td>37,348</td>
</tr>
<tr>
<td>G10 Nonmetal mineral products</td>
<td>2,235</td>
<td>4,834</td>
<td>18,394</td>
<td>46,648</td>
</tr>
<tr>
<td>G11 Metal manufactured products</td>
<td>2,822</td>
<td>5,489</td>
<td>12,980</td>
<td>36,338</td>
</tr>
<tr>
<td>G12 Waste material</td>
<td>1,961</td>
<td>4,552</td>
<td>10,503</td>
<td>35,360</td>
</tr>
<tr>
<td>G13 Electronics</td>
<td>995</td>
<td>3,334</td>
<td>11,126</td>
<td>20,792</td>
</tr>
<tr>
<td>G14 Transportation equipment</td>
<td>2,705</td>
<td>4,600</td>
<td>10,803</td>
<td>37,836</td>
</tr>
<tr>
<td>G15 Logs</td>
<td>2,364</td>
<td>5,788</td>
<td>12,393</td>
<td>41,333</td>
</tr>
</tbody>
</table>
Time of Day Distribution

Average annual daily flows to CSTDM peak periods
- AM period: 6 am - 10 am
- Midday period: 10 am - 3 pm
- PM period: 3 pm - 7 pm
- Night period: 7 pm - 6 am

Probe data and available counts will be used to developed daily distribution
- Trips longer than one period will only be assigned based on the “start time” of the trip
Freight Truck Disaggregation

- Freight flows are estimated in two levels due to lack of required data at CSTDM TAZs
- Total commodity flows and share of each mode will be estimated at 97 FAZs, gateways, and TLNs
- Only Truck matrices will be disaggregated from 97 FAZs to 5454 TAZs
Disaggregation Module

Disaggregate truck matrices from 97 FAZs to 5454 TAZs

1. Disaggregated employment data (module 1) used to develop simple trip production and trip attraction regression equations for each CG (at FAZ level)

2. These equations are applied to TAZs and estimate trip production and attraction for each commodity at each TAZ

3. Allocate FAZ truck flows based on proportional share of each TAZ

Average annual daily flows to time periods
CSFFM 3.0 Architecture

1. Disaggregated Input Data Prep
   - FAZ/TAZ: Prepare employment, GDP, agriculture data tables

2a. Non-freight Trucks Generation
- Domestic flows

2b. Commodity Generation (Tons)
- Total Demand, Import/Export
- Average daily Productions/Attractions
- Domestic flows

3. Mode Split
- Truck only, Rail only
- Rail-Truck, Air-Truck
- Water, Pipeline
- Rail-Truck, Air-Truck, Truck only, Rail only, Water only & Pipeline by CG

4. Transshipment
- Split multiple modes into mode segments

5a. Seasonality
- 5b. Tons to Trucks conversion

6. Disaggregation
- Disaggregate FAZs to 5454 TAZs

7. CSTDM Integrated Assignment
- Traffic Assignment for Each Peak Period
- Seasonal and Average Daily Flows by 3 Truck Class and CG

Network Link Flows
- Average Daily Truck Flows at TAZs by Truck Class and CG
- Truck link flows by Truck Classes by Time Period

FAZ: Freight Analysis Zones, OD: Origin-Destination, CG: Commodity Group, TLN: Transportation Logistic Node
Supplement data – Establishments

Outbound trips by TAZ | Total Freight Employment
Supplement data – Establishments
Inbound trips by TAZ | Agriculture Employment
Supplement data – GPS ODs

Probe data visualization

[gis.fehrpeers.com/BrandonDataViz/CSFFM/OD_Flows/]

1,083 Medium Trips
93 Heavy Trips
From: 198 To: 164
Supplement data – GPS Routes

**Bench March:** Probe data

**Benefit:**
- Large sample
- Continuous historic data

**Application:**
- Route distribution
- OD distribution

**Limitations:**
- Under-representation of short-haul trips
- Under-representation of owner-operator trucks
Supplement data – GPS Distribution
Port Of Oakland

StreetLight data 2017
Supplement data – GPS Distribution

Port Of Los Angeles

StreetLight data 2017
Supplement data – GPS Speed

Travel time validation

- NPMRDS truck travel time data for 2015 is processed.
- The data is summarized and available on California Congestion Analysis Online Tool for detail review.
Comprehensive Count Data Base

- Mostly 2015, few from 2016
- 652 directional locations on state Highways
- Axle based classified counts
- Use VIUS survey to convert counts to GVW classes
Final Steps

Finalize base year updates

Static Validation
- Truck Trip Distribution
- Highway Network Assignment
- Travel Time

Dynamic Validation/Sensitivity analysis
- Land Use Test
- Highway Network Modification Test
- Mode Shift Test
Highway Network Assignment Validation

Static validation:
- Validation spreadsheet tool
- Over 400 Links are selected
- A set of 25+ screen lines are defined
Validation Screenlines
California Statewide Freight Forecasting Model

Updates and Enhancements

Fatemeh Ranaiefar, PhD