Topics

• Big Data Overview
• Sample Questions
• Proposed Approach
• Project Timeline
What is Big Data

• Archival location data from mobile devices

• Provides true origin-destination data passively and anonymously
Sources of Big Data

- Cellular Data
- GPS Data
- App-Based
Benefits of Big Data

• Observed origin-destination data – not from a model or survey
• Relatively low cost for large sample
• Continuous passive data collection
• Customization and flexibility
• Can supplement with other data sources
Limitations of Big Data

• Sample of data (sample size and potential bias issues)
• Vehicle trips vs. person trips (carpool/buses)
• Spatial resolution (20 to 30 meter)
• Inferred using machine learning
• Have to define what a trip and purpose is
• Reliance on census or survey data for demographics
Why use Big Data

Traffic Model

Cell Phone

Cell phone distribution captures long distance trips to/from mall

Cell phone distribution captures trips to/from high income residential areas
Recent Big Data Enhancements

- Increased GPS sample size
- Person trips
- 20-25% of the population
- Includes when device is at rest
- Resident, worker, visitor classification
- Trip purpose, home/work location, demographic data based on home
What questions do you want answered?

- Sebastopol pass-through travel
- Cloverdale and Petaluma - interested in interchanges with neighboring counties
- To/from Marin/San Francisco
- Others?
### Who comes in to/out of an area?

#### AM Peak Period Trips into Marin County

<table>
<thead>
<tr>
<th>Location</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Clara</td>
<td>1%</td>
</tr>
<tr>
<td>South Alameda</td>
<td>2%</td>
</tr>
<tr>
<td>San Mateo</td>
<td>3%</td>
</tr>
<tr>
<td>San Francisco</td>
<td>24%</td>
</tr>
<tr>
<td>North Alameda</td>
<td>13%</td>
</tr>
<tr>
<td>East Contra Costa</td>
<td>7%</td>
</tr>
<tr>
<td>West Contra Costa</td>
<td>14%</td>
</tr>
<tr>
<td>Solano</td>
<td>5%</td>
</tr>
<tr>
<td>Napa</td>
<td>3%</td>
</tr>
<tr>
<td>Sonoma</td>
<td>28%</td>
</tr>
</tbody>
</table>

#### Where do Marin County residents work?

<table>
<thead>
<tr>
<th>Location</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marin County</td>
<td>57%</td>
</tr>
<tr>
<td>San Francisco</td>
<td>28%</td>
</tr>
<tr>
<td>South San Francisco/Peninsula</td>
<td>2.5%</td>
</tr>
<tr>
<td>Petaluma</td>
<td>2.4%</td>
</tr>
<tr>
<td>Santa Rosa</td>
<td>2.3%</td>
</tr>
<tr>
<td>Berkeley</td>
<td>2.0%</td>
</tr>
<tr>
<td>Oakland</td>
<td>1.9%</td>
</tr>
<tr>
<td>Vallejo/American Canyon</td>
<td>1.5%</td>
</tr>
<tr>
<td>Richmond/San Pablo</td>
<td>1.4%</td>
</tr>
<tr>
<td>Napa</td>
<td>0.7%</td>
</tr>
<tr>
<td>Sonoma</td>
<td>0.4%</td>
</tr>
</tbody>
</table>
Who are the users of a facility?

- San Francisco County: 16%
- Sonoma County: 6%
- San Mateo County: 3%
- Contra Costa County: 2%
- Alameda County: 2%
- Napa County: 1%
- Marin County: 69%
- Novato Area: 31%
- San Rafael Area: 33%
- Sausalito Area: 5%
- West Marin County: 0%

Trip Types on US 101 at Corte Madera Creek:
- Internal Trips: 48%
- Inter-County Trips: 41%
- Pass-Through Trips: 11%

Top 3 Pass-Through Movements:
- Sonoma to San Francisco: 58%
- Sonoma to San Mateo: 17%
- Napa to San Francisco: 12%
How are people accessing the freeway?

AM Peak Period

- Route 1: 55%
- Route 2: 30%
- Route 3: 12%
- Route 4: 3%

Source: Fehr & Peers
Where is tourism activity occurring?

APPLE HILL ORIGIN AND DESTINATION DATA: SEPTEMBER - OCTOBER 2014
What is the average trip length?

Average Daily Trip Length

• 17% longer than Bay Area Average
Proposed Approach

• Traffic Count Collection

• 3 Types of Cuebiq Mobile Device Data (O-D, Middle Filter, and Home/Work)

• Census and CHTS Data

Location-Based Services Data

Our Location-Based Services data comes from smartphone apps that track devices’ locations to provide specific services. These services include weather forecasts, shopping deals, restaurant reviews, and more. We get location data from hundreds of different apps.
Traffic Count Collection

- 20 total locations
- All major county gateways
- Plus intra-county locations

Will look at available data, collect new data, and factor
Available Traffic Count Data

Think about bypass roads or other congested facilities

- Missing
- From County
- From Other Study
- Available Data
Mobile Device Data

- Origin and destination analysis
- Home and work analysis
- “Middle Filter” analysis at traffic count locations
- Trip lengths
- Trip purposes
- Demographic data of roadway users

Weekdays vs. Weekends for All Zones

<table>
<thead>
<tr>
<th>Specific Dates</th>
<th>Edit</th>
<th>Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Days</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Day Types

<table>
<thead>
<tr>
<th>Day Types</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Day</td>
<td></td>
</tr>
<tr>
<td>Average Weekday</td>
<td></td>
</tr>
<tr>
<td>Average Weekend Day</td>
<td></td>
</tr>
<tr>
<td>Average Friday</td>
<td></td>
</tr>
</tbody>
</table>

Day Parts

<table>
<thead>
<tr>
<th>Day Parts</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All Day:</td>
<td>12am - 12am</td>
</tr>
<tr>
<td>Early AM:</td>
<td>12am - 6am</td>
</tr>
<tr>
<td>Peak AM:</td>
<td>6am - 10am</td>
</tr>
<tr>
<td>Mid-Day:</td>
<td>10am - 3pm</td>
</tr>
<tr>
<td>Peak PM:</td>
<td>3pm - 7pm</td>
</tr>
<tr>
<td>Late PM:</td>
<td>7pm - 12am</td>
</tr>
</tbody>
</table>
Zone System

- Bay Area
- Select surrounding counties
- 115 zones + 20 count locations
- 5+ zones in each city
- Less detail for non-O-D metrics

Think about special generators: SSU, JC, Airports, Hospitals, etc.
Data Period

Primary Data Period

• March 2017 through May 2017 (pre-fire when school is in session)

Two Additional Periods (fewer zones)

• March 2018 through May 2018 (Post-Fire)
• June 2017 to Mid-August 2017 (Summer)

OR

• December 2016 through February 2017 (Winter)

Model update to 2015 conditions – but benefits of obtaining more recent travel behavior data
Project Timeline

- Finish in 2019
- Big Data Study First – draft report in May
- Then Model Update and Enhancements – completed in October
- Report – draft in November
- Present Finding – December 2019?