Presentation Topics

1. Context
2. Gate Down Time Analysis
3. Local Traffic Analysis
4. Next Steps
Blended System Planning Process

- **Capacity Analysis**
- **Service Plan / Operations Considerations Analysis**
- **Grade Crossing & Traffic Analysis**

- **Service Plan Options**
  - **Infrastructure Need**
  - **Fleet Need**
  - **Revenue / Cost**

- **Decision-Making Matrix**
- **Blended System Alternatives**
- **Design & Environmental Review**
Purpose

40 At-grade Crossings*

Considerations
- Train Operations
- Traffic Circulation
- Safety
- Regulatory/Agency practice & guidance

Tool Box
- Grade Separations
- Street Closures
- At-grade Crossing Upgrades
- IT Traffic Management
- Train Operations Management

* Note: Grade separations not required by law if operating speeds do not exceed 125mph
Goals

• Understand potential impact of blended system on gate down time
• Understand potential impact of changed gate down time on local traffic
• Inform future decisions about at-grade crossing improvements
Gate Downtime Analysis
Framework

- Analysis Tool: TrainOps (LTK, Engineering)
- Inputs
  - Electrified system with advanced signal system
  - Prototypical schedules
  - Long middle passing track option
- Analyzed scenarios at 40 at-grade crossings
  - Today: Caltrain diesel (5 trains/ph/pd)
  - Electrified future scenarios:
    - 6 Caltrain trains/ph/pd (“6/0”)
    - 6 Caltrain trains/ph/pd + 2 HSR trains/ph/pd (“6/2”)
    - 6 Caltrain trains/ph/pd + 4 HSR trains/ph/pd (“6/4”)

Gate Down Time Variables

- Increased train service does not necessarily equal increased gate down time

- Interplay of key factors
  - More trains increase gate down time
  - Advanced signal system decreases gate down time
    - Double gate action removal
    - Gate efficiency/consistency
  - Overlapping 2+ train events at crossing decreases gate down time

- Net result at each crossing: varying gate down time (increase/decrease)
Example: Double Gate Action Removed

<table>
<thead>
<tr>
<th>North Lane (Burlingame)</th>
<th>Today</th>
<th>6/0</th>
<th>6/2</th>
<th>6/4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11.0</td>
<td>9.5</td>
<td>12.0</td>
<td>14.0</td>
</tr>
</tbody>
</table>

- Today gate down time: 11 out of 60 minutes
- From Today to 6/0
  - More train events
  - Double gate removal
  - Net decrease in gate down time
- From 6/0 to 6/2 and 6/4
  - More train events
  - Net increase in gate down time
Example: Gate Efficiency/Consistency

<table>
<thead>
<tr>
<th>Glenwood Ave. (Menlo Park)</th>
<th>Today</th>
<th>6/0</th>
<th>6/2</th>
<th>6/4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9.5</td>
<td>9.0</td>
<td>11.0</td>
<td>14.5</td>
</tr>
</tbody>
</table>

(Approximate Minutes / AM Peak Hour)

- Today gate down time: 9.5 out of 60 minutes (worst peak hour)
- From Today to 6/0
  - More train events
  - Gate down time efficiency/consistency
  - Net decrease in gate downtime
- From 6/0 to 6/2 and 6/4
  - More train events
  - Net increase in gate downtime
Example: Multiple Trains Crossing

<table>
<thead>
<tr>
<th></th>
<th>Today</th>
<th>6/0</th>
<th>6/2</th>
<th>6/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Approximate Minutes / AM Peak Hour)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Center St. (Millbrae)</td>
<td>11.5</td>
<td>8.5</td>
<td>10.5</td>
<td>14.0</td>
</tr>
</tbody>
</table>

- **Today gate down time:** 11.5 out of 60 minutes (worst peak hour)
- **From Today to 6/0**
  - More train events
  - Multiple trains crossing at the same time
  - Net decrease in gate downtime
- **From 6/0 to 6/2 and 6/4**
  - More train events
  - Net increase in gate downtime
Important Notes

• Evaluation focuses on the worse peak hour for each crossing
• Increased train service does not necessarily equal proportional increase in gate down time
• Gate downtime impacts vary by crossing
• Model results have limited application
• Gate downtime results reflect order-of-magnitude
Local Traffic Analysis
Scope

• Scope revised from 80 total to 5 sample

• Usefulness of full analysis questionable
  – Prototypical train schedule
  – Unacceptable future traffic conditions
  – Traffic model limitations

• Examine a few to see what we might learn
Scope, cont.

- Sample intersection selection
  - From each of 3 counties in peninsula rail corridor
  - Pre-empted and non pre-empted intersections
  - Within and outside of assumed passing track location

- Simulated scenarios
  - 2035 traffic condition
  - Today’s Caltrain service
  - Electrified 6/0, 6/2, 6/4 services
2035 Future Traffic

- Unacceptable future traffic conditions (without service change)
- < 80 seconds of delay/vehicle is excessive

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Average Delay (sec per vehicle) / LOS</th>
<th>2035 No Service Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing AM Peak</td>
<td>PM Peak</td>
</tr>
<tr>
<td>16th Street/7th Street/Mississippi Street</td>
<td>41.7 / D</td>
<td>35.2 / D</td>
</tr>
<tr>
<td>25th Avenue/El Camino Real</td>
<td>18.8 / B</td>
<td>23.3 / C</td>
</tr>
<tr>
<td>Broadway/El Camino Real</td>
<td>22.8 / C</td>
<td>26.1 / C</td>
</tr>
<tr>
<td>Churchill Avenue/Alma Street</td>
<td>49.9 / D</td>
<td>71.1 / E</td>
</tr>
</tbody>
</table>
Delay Variables

- Increased train service does not necessarily increase in delay

- Interplay of key factors
  - # of gate events
  - Average gate down time/event

- Net result at each crossing: varying delay (increase/decrease)
Example: Pre-empted Intersection

- Gates communicate with intersection signal
- Varying changes in gate down time/event for 6/0, 6/2, 6/4
- Driving factor: Increased gate events increase delay

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Average Delay (sec per vehicle)</th>
<th>Change in Average Delay 2035 Service Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM Peak Hour</td>
<td>49.9</td>
<td>+4.2</td>
</tr>
<tr>
<td>Churchill Avenue/Alma Street</td>
<td>103.2</td>
<td>+1.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+8.4</td>
</tr>
</tbody>
</table>
Example: Pre-empted Intersection

- Gates communicate with intersection signal
- Located within passing track
- Average gate down time/event is similar 6/0, 6/2, 6/4
- Increased gate events increase delay (6/0, 6/2)
- Passing tracks allow more trains w/o increasing gate events (6/4)

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Average Delay (sec per vehicle)</th>
<th>Change in Average Delay 2035 Service Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM Peak Hour 25th Avenue/Delaware Street</td>
<td>Existing: 10.2</td>
<td>2035 No Service Change: 12.4</td>
</tr>
</tbody>
</table>
Example: Pre-empted Intersection

- Gates communicate with intersection signal
- Decrease in average gate down time/event decrease delay (6/0, 6/2)
- Increase in gate events and average gate time/event increase delay (6/4)

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Average Delay (sec per vehicle)</th>
<th>Change in Average Delay 2035 Service Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing</td>
<td>2035 No Service Change</td>
</tr>
<tr>
<td>PM Peak Hour 16th Street/7th Street/Mississippi Street</td>
<td>35.2</td>
<td>283.6</td>
</tr>
</tbody>
</table>
Example: Non Pre-empted Intersection

- Gates do not communicate with intersection signal
- No change to delay (6/0, 6/2, 6/4)
- Model evaluates one intersection in isolation
- Model does not see impacts to neighboring intersections

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Average Delay (sec per vehicle)</th>
<th>Change in Average Delay 2035 Service Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM Peak Hour Broadway/El Camino Real</td>
<td>Existing 22.8</td>
<td>2035 No Service Change 47.9</td>
</tr>
</tbody>
</table>
Important Notes

• Results from sample analysis inconclusive

• Additional analysis needed
  – Blended system planning and EIS/EIR (TBD)

• Lessons learned
  – Schedule
  – Future traffic condition
  – Traffic modeling tool
Next Steps (Finalize Report)
Finalize Report

- Release Draft Report: May 29th
- End of comment period: June 14th
- Final Report: end of June