Arterial Operations Program: Past, Present, Future

Institute of Transportation Engineers
San Francisco Bay Area Section
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Metropolitan Transportation Commission (MTC)
Metropolitan Transportation Commission (MTC)

- Metropolitan Planning Organization (MPO)
- Governed by 21-member board
- Responsibilities include:
  - Planning
  - Coordination
  - Funding
  - Operations

San Francisco Bay Area:
- 9 Counties, 101 Cities
- 6,500 lane-miles (state highway system)
- 43,000 lane-miles (local streets/roads system)
- 10,000 traffic signals (estimated)
Arterial Operations Program Elements

- **Technical Assistance Program**
  - Annual grant program that provides consultant technical assistance to Bay Area agencies; consultant services are procured and administered by MTC
  - To help agencies improve multimodal mobility and safety along major corridors through signal coordination and other operational improvement projects

- **Arterial Operations Committee**
  - Comprised of State/County/Local transportation engineers & planners, consultants, equipment vendors; meetings held bi-monthly
  - Forum for sharing information, developing solutions to shared issues, and guiding the overall Program

- **Technology Transfer Seminars**
  - Free, half-day seminars on a variety of topics of interest to Bay Area traffic engineers, planners, consultants, with technical presentations by topic experts
  - Seminars conducted once a year
Program Benefits

- Supports Future Connected Vehicle Technologies
- Provides Transit Benefits through TSP
- Provides Effective Multi-jurisdictional Coordination
- Accommodates Traffic Diversion from Freeways
- Produces High-Performing, Cost-effective Results
- Reduces GHG Emissions
- Plan meets and exceeds target; reduces per-capita emissions of CO₂ by 18 percent (by 2040).
Is the Arterial Operations Program within MTC’s Purview?

Per Agency Strategic Plan (2006), programs that would be considered “regional” and within MTC’s purview:

- **Programs that address multi-modal or cross-boundary transportation issues** –
  Arterial improvement projects (e.g., signal coordination and transit signal priority) improve conditions for all modes and along corridors that cross multiple jurisdictions.

- **Programs that have significant impacts on the overall performance of the regional transportation system** –
  Arterials can be considered the foundation of the region’s transportation system, as they serve as important conduits to freeways -- all trips begin and end on a local arterial.

- **Programs that support regional economic development** –
  Arterials provide access to large employment centers, as vehicles access these centers from the freeways or other arterials.

- **Programs that provide unique regional leadership** –
  MTC is uniquely positioned to bring regional consistency, uniformity, effective coordination, and objectivity when implementing projects along arterials that cross multiple city/county boundaries.
## Technical Assistance Program History

<table>
<thead>
<tr>
<th>PROGRAM</th>
<th>TYPES OF PROJECTS</th>
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| Traffic Engineering Technical Assistance Program (TETAP) | Various projects:  
  • Signal timing coordination  
  • Traffic studies: feasibility studies, bike/pedestrian safety studies  
  • Miscellaneous services: ConOps, design, etc. |
| Regional Signal Timing Program (RSTP)        | Signal timing coordination projects only:  
  • Time-of-day (TOD) plans for weekday conditions                                      |
| Program for Arterial System Synchronization (PASS) | Signal timing coordination projects only:  
  • TOD plans for weekday conditions  
  • TOD plans for weekend conditions  
  • Flush plans  |
| Next Generation Arterial Operations Program (NG-AOP) | Projects using low-cost advanced technologies:  
  • Adaptive signal control systems  
  • Transit signal priority  
  • Traffic monitoring using travel time readers |

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<thead>
<tr>
<th>FY94</th>
<th>FY95</th>
<th>FY96</th>
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- **TETAP (15 yrs)**
- **RSTP (7 yrs)**
- **PASS (6 yrs)**
- **NG-AOP**
PASS Funding Distribution by County

Percentage of Signals Coordinated under PASS
FY 2010/11 - FY 2014/15

- Alameda 24%
- Contra Costa 24%
- Marin 8%
- Napa 2%
- San Francisco 0%
- San Mateo 12%
- Sonoma 5%
- Solano 3%
- Santa Clara 22%
- Sonoma 5%
- Solano 3%
- Santa Clara 22%
- Sonoma 5%
- Solano 3%
- Santa Clara 22%
Top 10 Recipients of PASS Funding

PASS
FY2010/11 to FY2014/15

# OF SIGNALS

Walnut Creek 193
Santa Clara County 180
Concord 133
Oakland 95
San Rafael 77
Santa Rosa 73
South SF 67
Palo Alto area 65
Caltrans 59
Livermore 58
PASS Benefit/Cost Summary

PASS Benefit/Cost Ratios
FY2010/11 to FY2014/15

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Benefit/Cost Ratio</th>
<th># of Signals</th>
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<tbody>
<tr>
<td>FY10/11</td>
<td>$1,250,000</td>
<td>80:1</td>
</tr>
<tr>
<td>FY11/12</td>
<td>$1,250,000</td>
<td>61:1</td>
</tr>
<tr>
<td>FY12/13</td>
<td>$1,250,000</td>
<td>54:1</td>
</tr>
<tr>
<td>FY13/14</td>
<td>$2,000,000</td>
<td>67:1</td>
</tr>
<tr>
<td>FY14/15</td>
<td>$1,250,000</td>
<td>41:1</td>
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Benefit/Cost Summary

- FY10/11: $1,250,000, Benefit/Cost Ratio 80:1
- FY11/12: $1,250,000, Benefit/Cost Ratio 61:1
- FY12/13: $1,250,000, Benefit/Cost Ratio 54:1
- FY13/14: $2,000,000, Benefit/Cost Ratio 67:1
- FY14/15: $1,250,000, Benefit/Cost Ratio 41:1

# of Signals for each fiscal year:
- FY10/11: 80:1
- FY11/12: 61:1
- FY12/13: 54:1
- FY13/14: 67:1
- FY14/15: 41:1
NextGen-Arterial Operations Program (NG-AOP)

- Launched in FY2014/15
- Builds on the success of PASS
- Implements low-cost, advanced technologies:
  - Adaptive Signal Control Systems
  - Transit Signal Priority
  - Real-time Traffic Monitoring
  - Queue-jump Lanes
  - Other Innovative Strategies
# NG-AOP Projects

<table>
<thead>
<tr>
<th>PROJECT SPONSOR/EST. COST</th>
<th>OTHER STAKEHOLDER</th>
<th>CORRIDOR</th>
<th>LIMITS</th>
<th>PROJECT</th>
</tr>
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<tbody>
<tr>
<td>AC Transit/ $5.5M</td>
<td>San Leandro Hayward Union City County of Alameda Caltrans</td>
<td>Hesperian Blvd.</td>
<td>13 miles 34 signals (ASCS/TSP) 27 signals (TSP)</td>
<td>• Adaptive Signal Control System • Transit Signal Priority</td>
</tr>
<tr>
<td>LAVTA/ $1.5M</td>
<td>Dublin</td>
<td>Dublin Blvd.</td>
<td>3 miles 16 signals</td>
<td>• Adaptive Signal Control System • Bicycle detection • Queue jump lanes</td>
</tr>
<tr>
<td>Fremont/ $1.0M</td>
<td>Caltrans</td>
<td>Fremont Blvd.</td>
<td>2.2 miles 9 signals</td>
<td>• Adaptive Signal Control System</td>
</tr>
<tr>
<td>County of Santa Clara/ $0.75M</td>
<td>n/a</td>
<td>County Expressways</td>
<td>62 miles 8 expressways</td>
<td>• Travel time monitoring • Predictive signal timing</td>
</tr>
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**General Scope of Work:**
- Conduct Systems Engineering analysis
- Procure system
- Deploy system
- Evaluate system performance
NextNextGen-Arterial Operations Program (NNG-AOP)

- Implement Connected Vehicle Pilot Projects

- Connected Vehicle Technology:
  - Provides wireless connectivity between vehicles, infrastructure, and mobile devices (e.g., smart phones)
  - Provides safety warnings that alert drivers of potentially dangerous conditions (e.g., impending collisions, icy roads, dangerous curves, etc.) — before the driver is aware of them.
Benefits of Connected Vehicle Technology

- **Safety**
  - 80%

- **Mobility**
  - 30%

- **Traffic Data & Traveler Information**
  - $

- **Environment**
  - 15%

Wireless Connectivity (DSRC, wi-fi, cellular)

DSRC = Dedicated Short-Range Communication
Example Connected Vehicle Pilot Projects

Eco-Approach and Departure at Signalized Intersections

Presents information to drivers about traffic signal timing; allowing drivers to adapt their speed so they pass the signal on green or decrease speed to stop in the most eco-friendly way possible.

Eco-Traffic Signal Priority

Gives priority to transit vehicles approaching a traffic signal, taking into account its location, speed, type, schedule, and number of passengers. Priority based on real-time traffic and emissions data to produce the lowest emissions.
Arterial Operations Program (of the Future)

- PASS
- NG-AOP
- TOD
- ASCS
- CV
- Beyond NNG-AOP
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