Activity-Based Model Applications

Activity-Based Modelling Symposium

Research Centre for Integrated Transport and Innovation (rCITI)
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Applications

- Pricing
- Transit
- Travel Demand Management
- Project Comparison
- Equity
- Environment
- Emergency Evacuation

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Early Application Results (Portland 1998)

Effect of Change in Auto Variable Costs (AVC)			Double AVC all times of day		Double AVC in peak periods	
Purp	**Mode**	**Time of day**	**% chg Tours**	**% chg Miles**	**% chg Tours**	**% chg Miles**
Work						
	All	All	-0.8	-9.4	-0.6	-5.5
	SOV	All	-5.8	-14.6		
		AM peak			-5.9	-13.1
		Off-peak			+1.0	0.0
Maint	SOV	All	-8.7	-21.5	-1.2	-3.6
Discr			-10.7	-23.1	-1.3	-3.2

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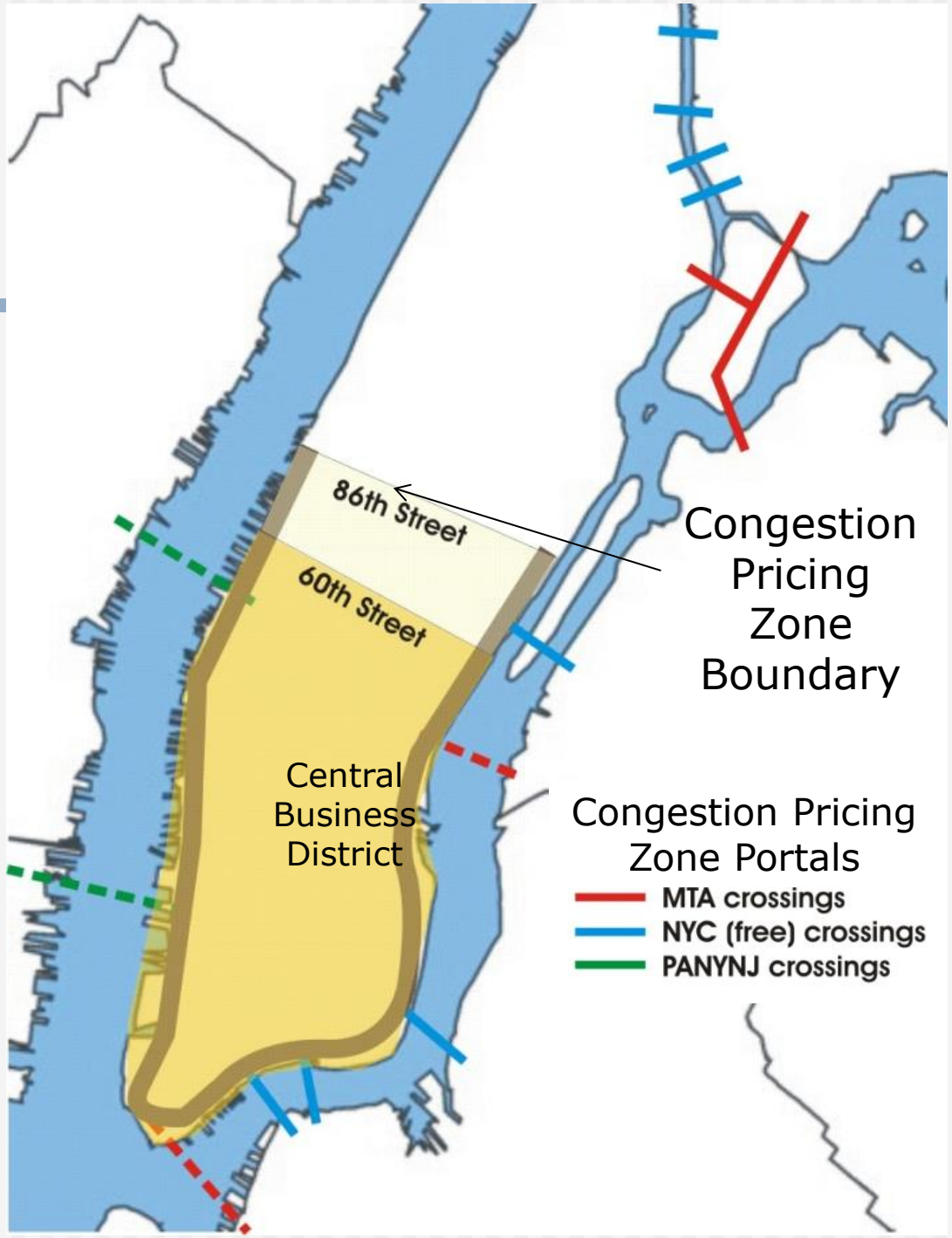
Example: Manhattan Congestion Pricing Study



"Who pays?" and "How much?"

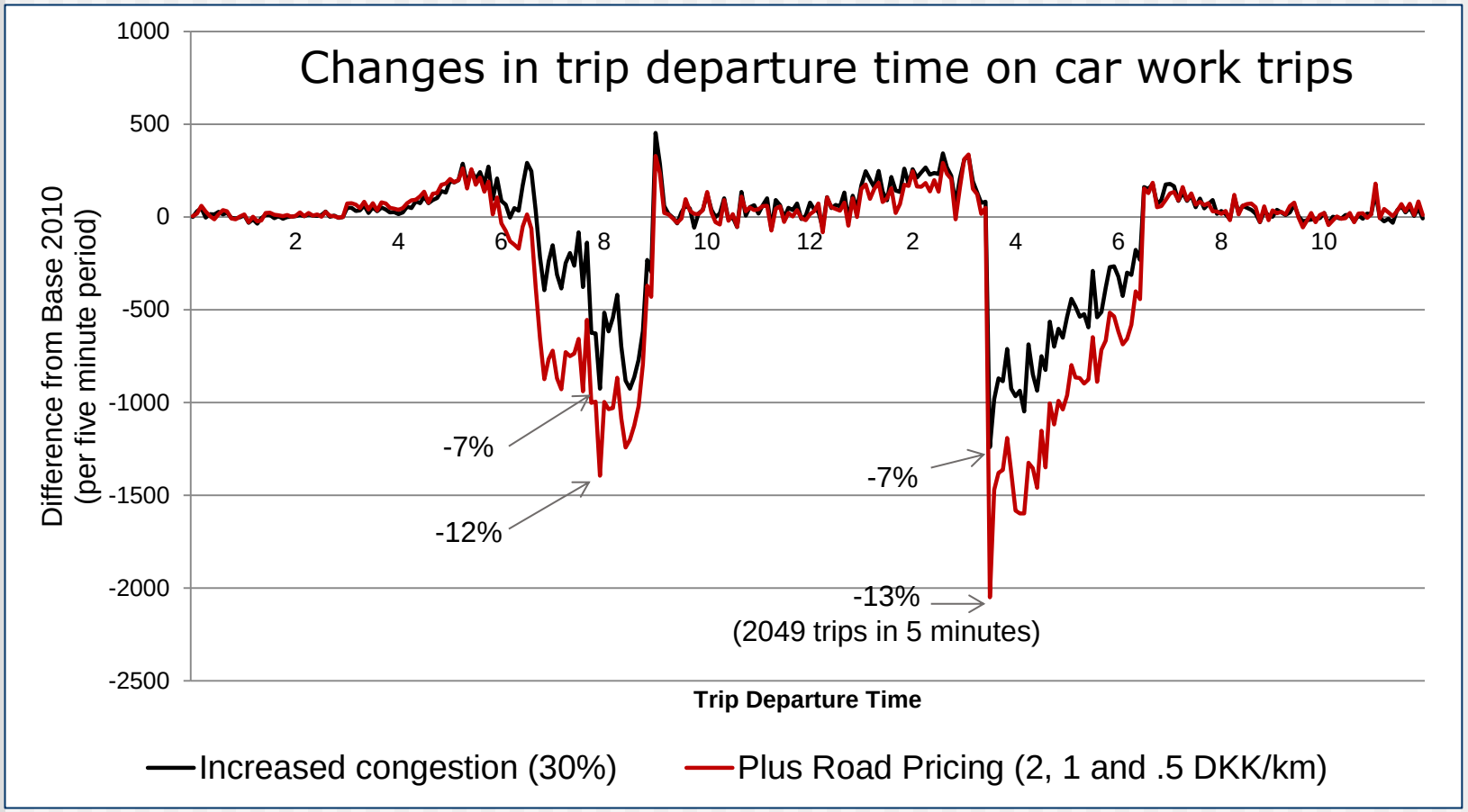
Type of Driver/ Group	Level of Discount
Taxi, Transit	FREE
Commercial Vehicles, Shuttles	FLEET
Rental Cars & Car Sharing	FLEET
Toll-payer 'Fee'-bate	$1 off
Low-Income (Lifeline Value)	50% off
Disabled Drivers	50% off
Zone Residents	50% off
Low-Emission Vehicles	-
HOV/Carpool	-

Helps minimize administrative impacts for businesses, and keeps industry moving

Would require documentation of inability to take transit

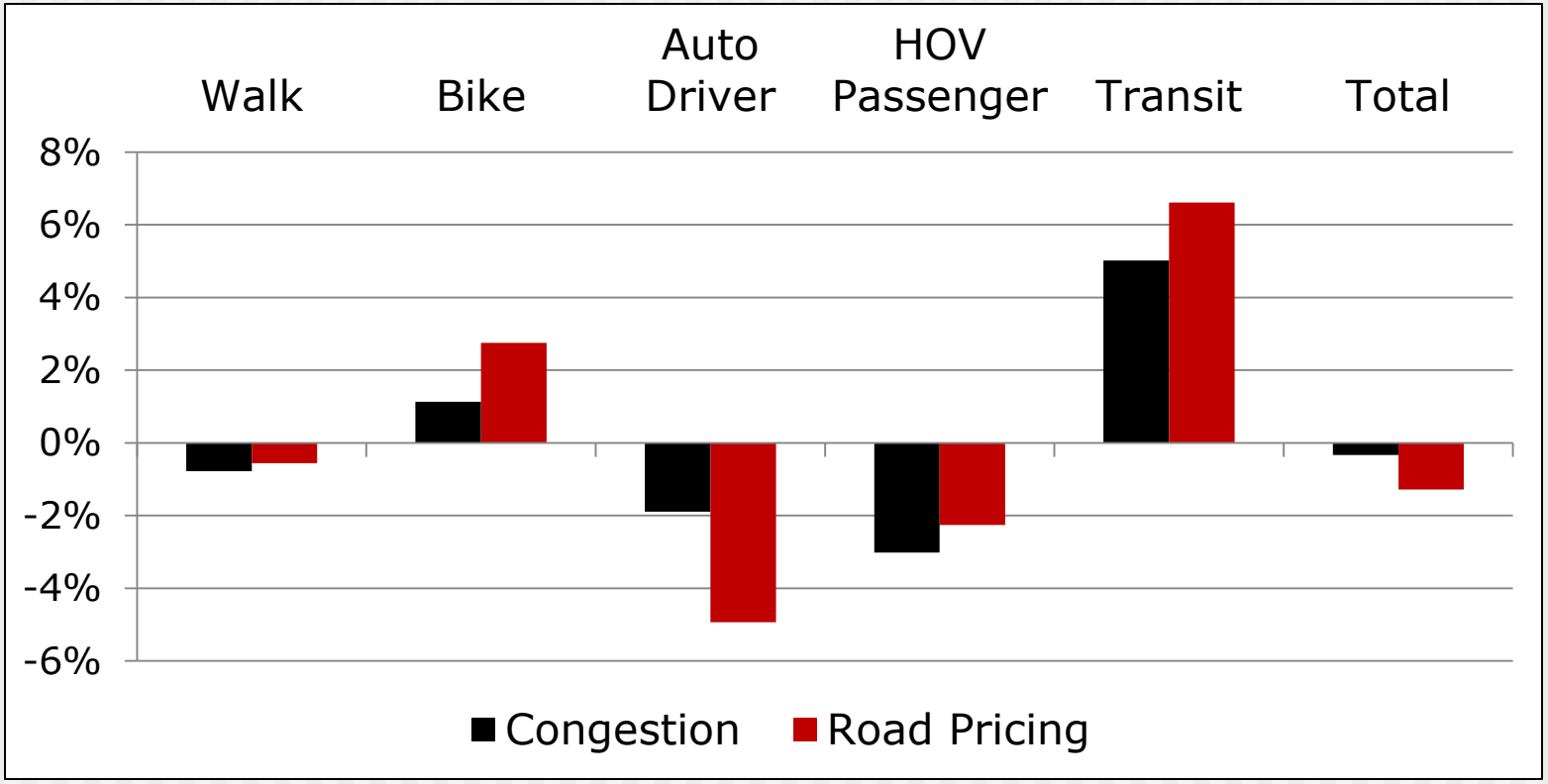
May be accompanied by investment in Means-Based Fare Assistance Program

Copenhagen:
Congestion and Road Pricing



Copenhagen:
Congestion and Road Pricing

Percent change in trips on work tours



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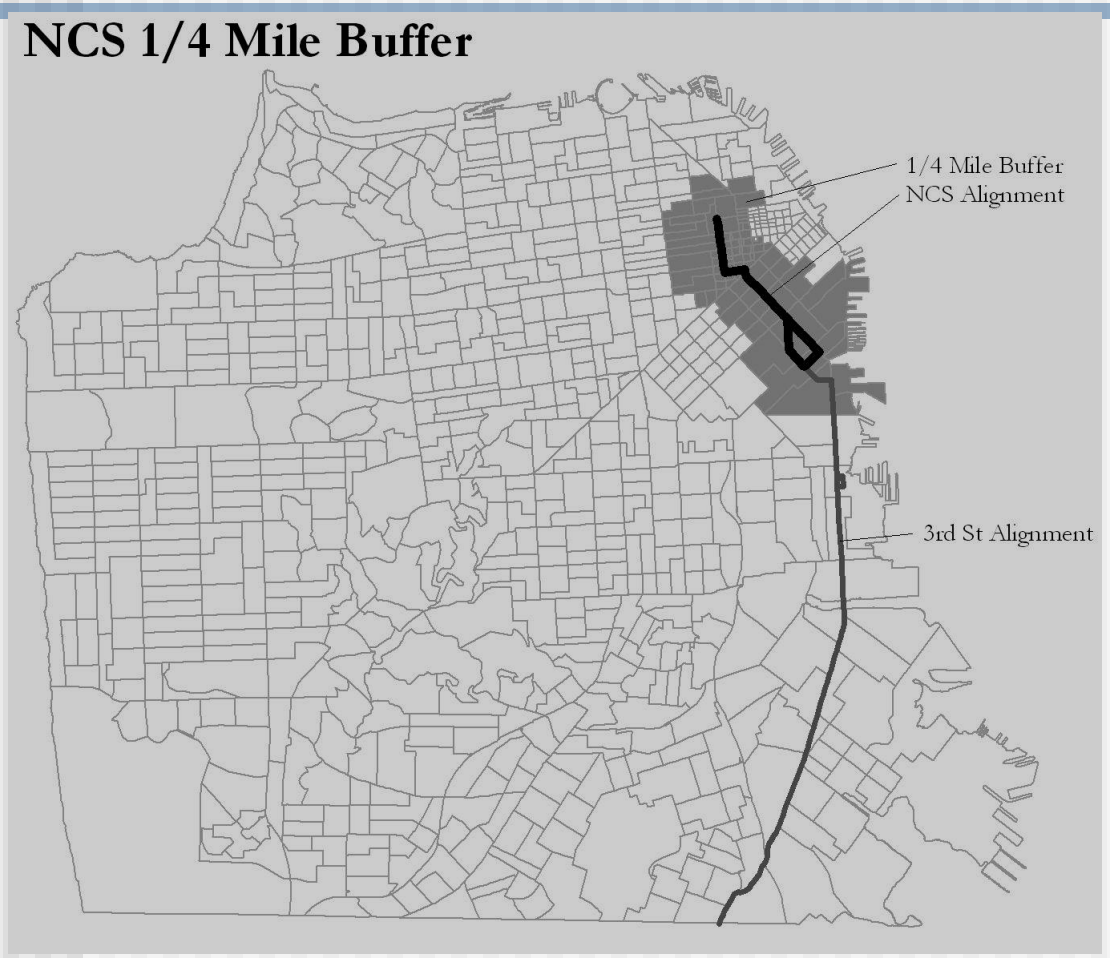
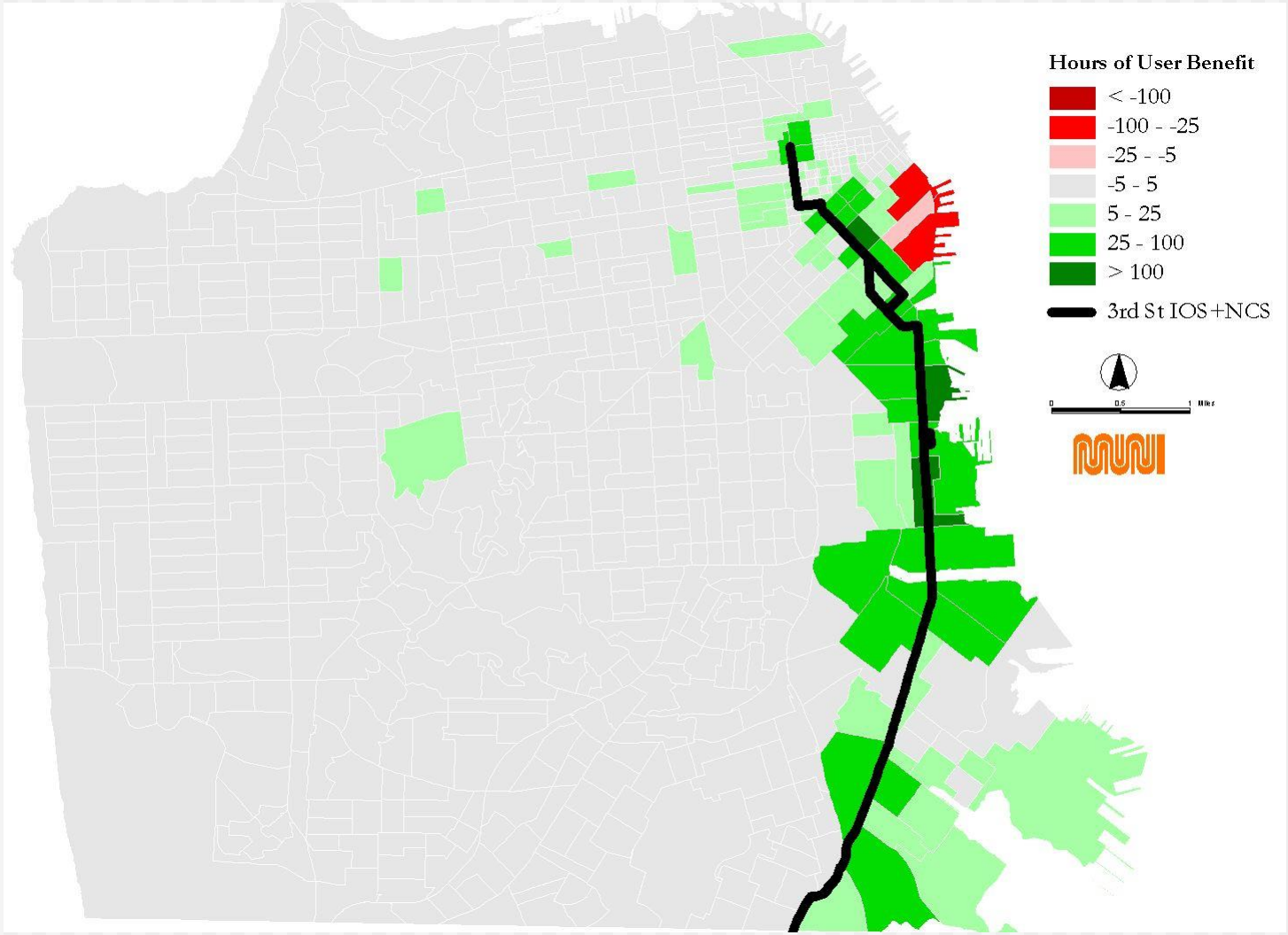
Transit Application: SF Muni Central Subway



San Francisco Municipal Railway

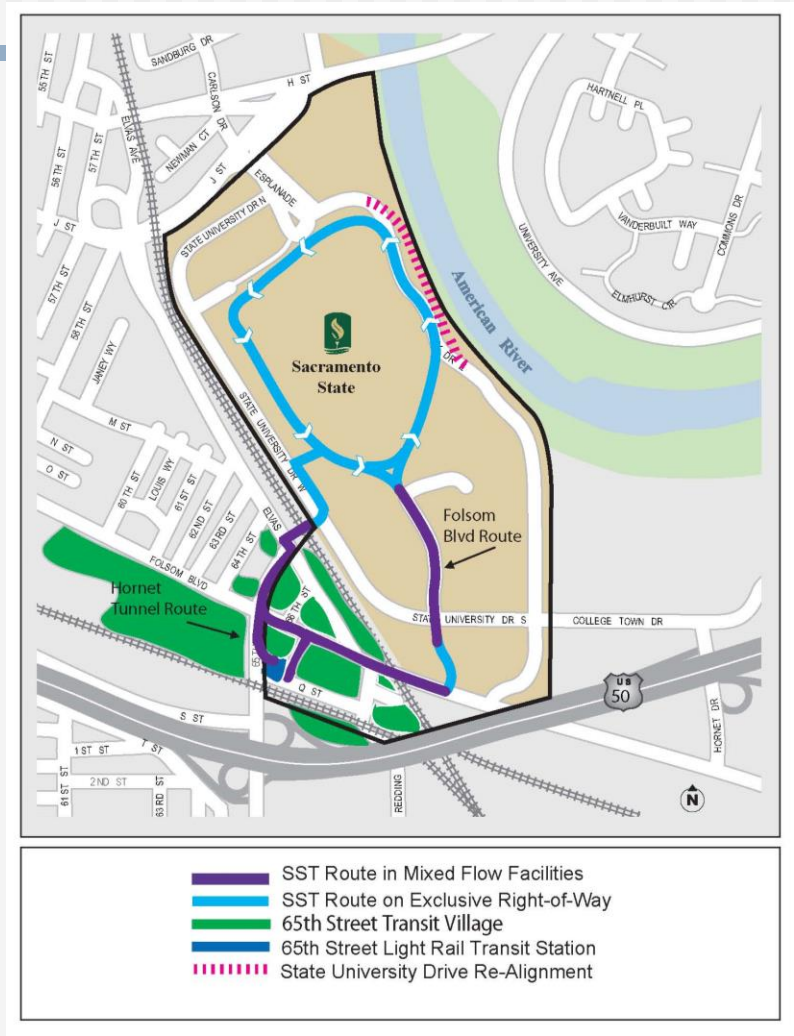
- 1.4 miles connecting South of Market to Chinatown
- Third Street LRT 7.1 mile surface line (IOS = Baseline)

Work Tour: Destination-Based User Benefit

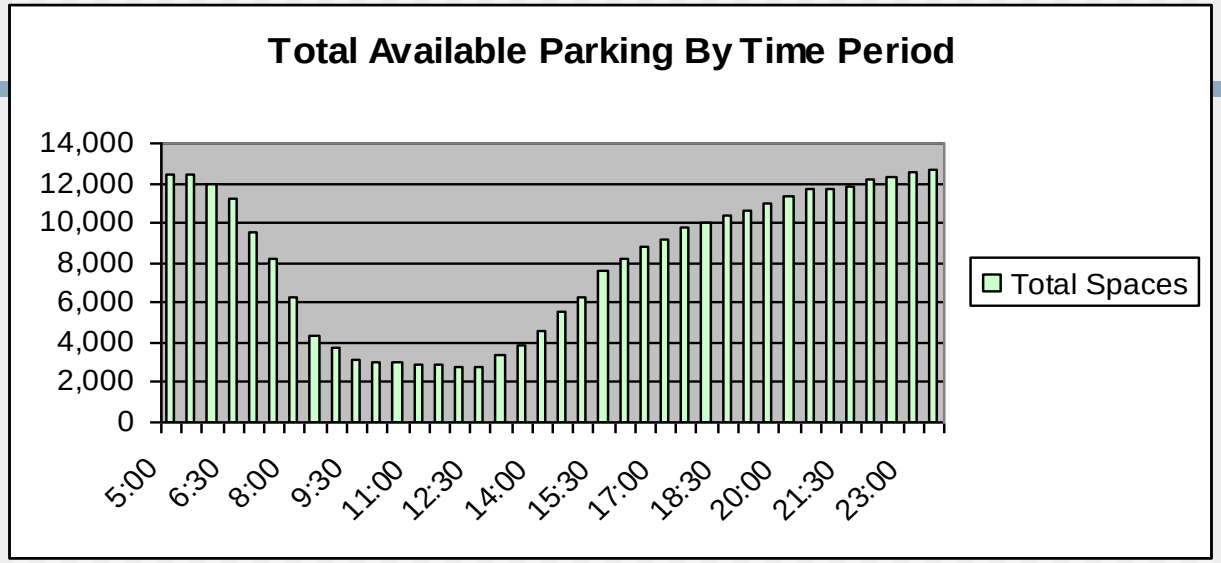


Sacramento State BRT Project

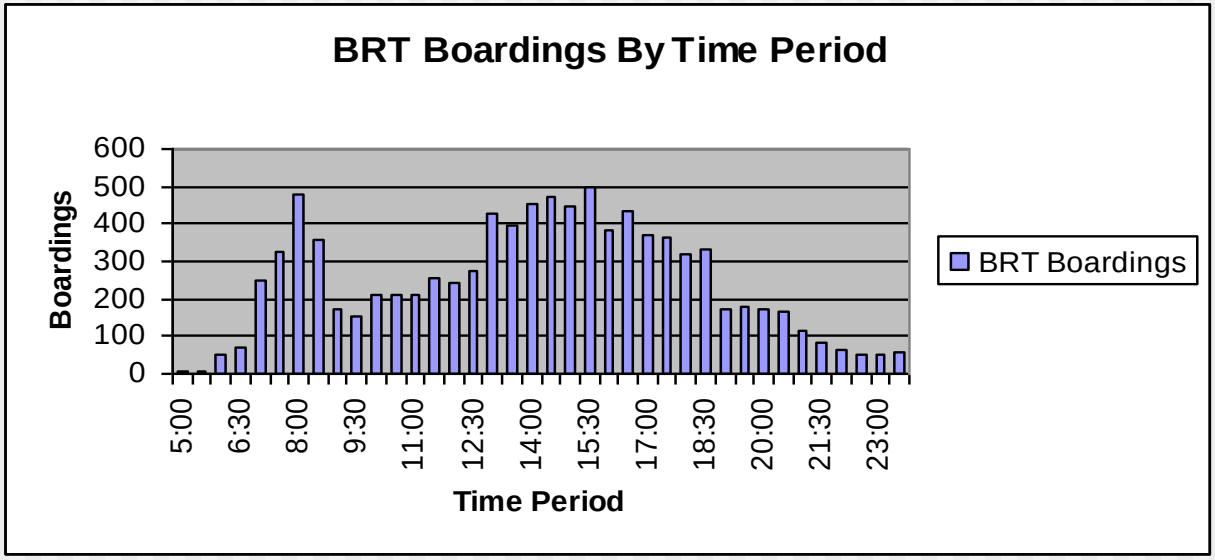
- AB model used to simulate campus arrivals and departures by ½ hour time periods



Temporal Analysis of BRT Parking and Boardings



- Model tracks time in ½ hour periods



- Parking constraints and policies affect transit ridership

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Travel Demand Management

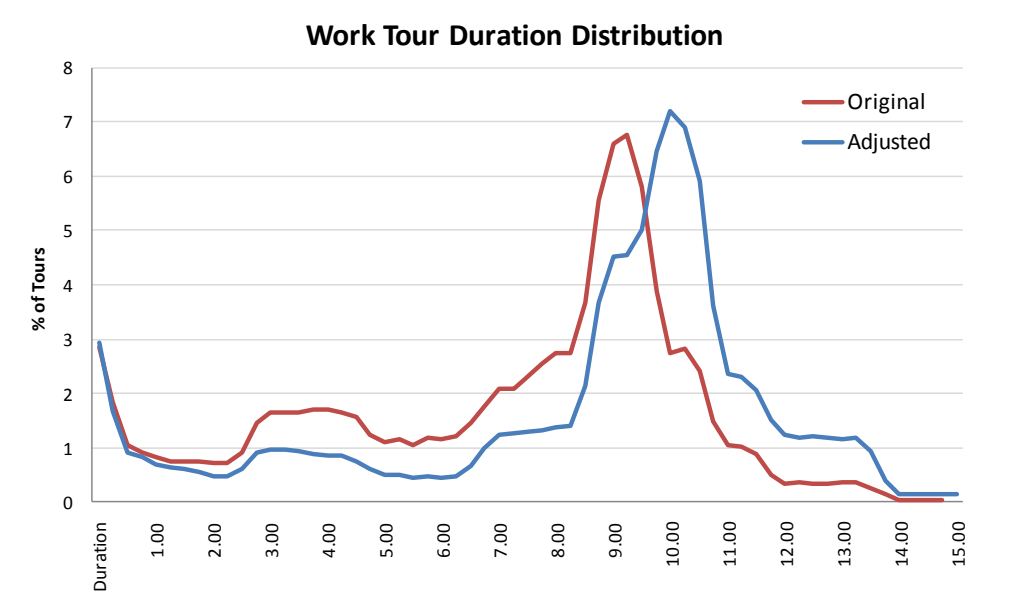
- Strategies to change travel behavior in order to reduce congestion and improve mobility
  - Telecommuting\Work-at-home
  - Flexible work schedules (off-peak)
  - Rideshare programs
- Scenario-based approaches necessary
  - Model system captures the effects of TDM policy outcomes
  - Cannot identify which policies will affect flexible work schedules
  - But can estimate the impact on transportation system performance of shift from a 5-day 8-hour work week to a 4-day 9+ hour work week

TDM Analysis: Burlington, VT

- "Flexible Schedule" scenario
- Asserted assumptions about:
  - Fewer individual work activities
  - Longer individual work durations
  - Aggregate work durations constant
- Target: Fulltime Workers

Tours by Purpose (Fulltime Workers)

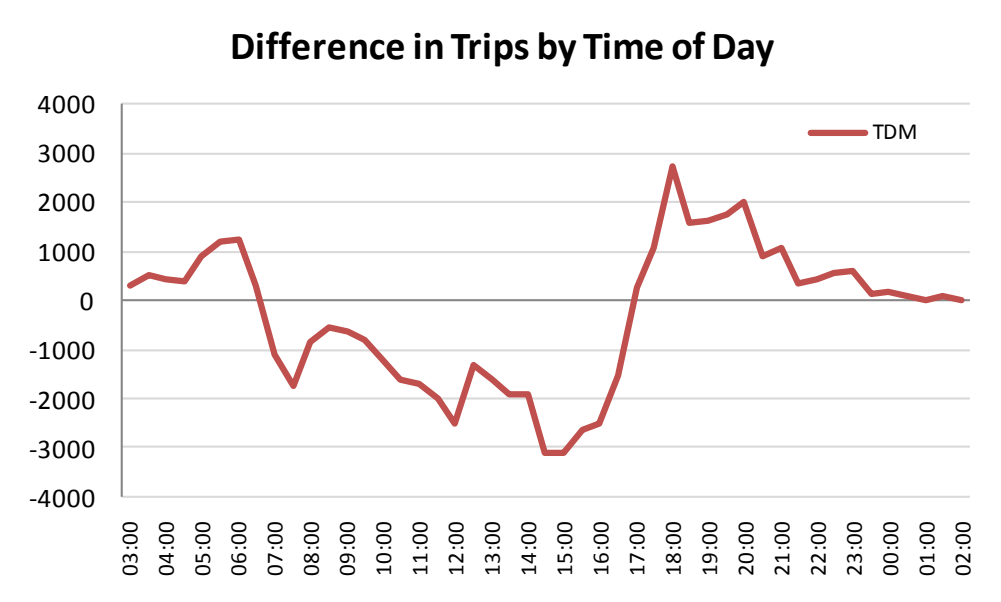
	Original	Adjusted	Adj/Orig
Work	94,408	78,472	0.83
School	115	140	1.22
Escort	8,070	9,023	1.12
Pers Bus	13,519	16,848	1.25
Shop	10,531	12,938	1.23
Meal	3,817	3,842	1.01
Soc/Rec	13,076	14,360	1.10
Workbased	27,949	23,211	0.83
Total	171,485	158,834	0.93

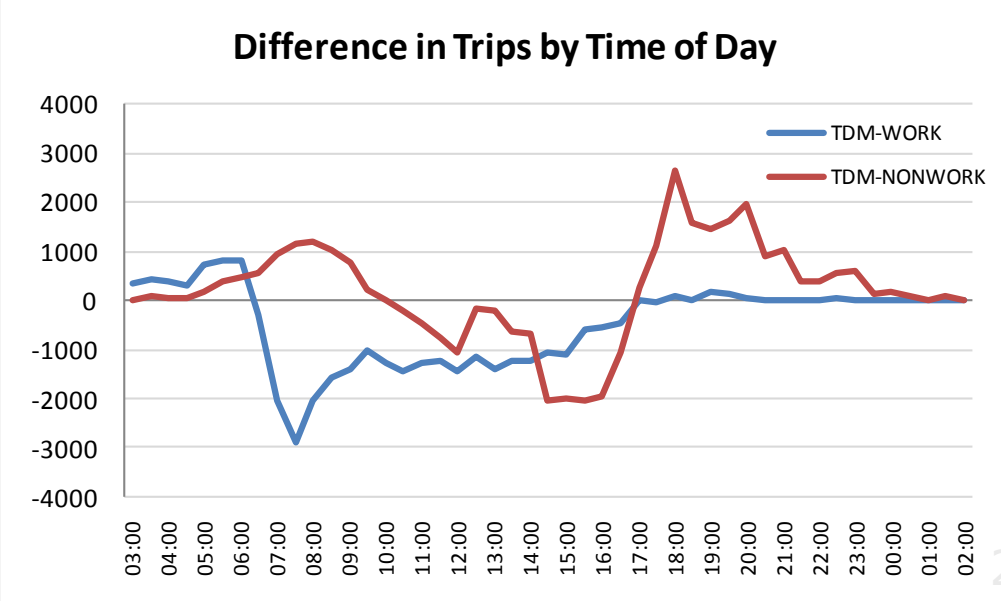


TDM: Demand Impacts

- ~4% Reduction in overall trips
- Reduced peak period and midday travel
- More early AM travel and evening travel

- Fewer, and earlier, work trips
- More nonwork trips in morning and evening with fewer in midday





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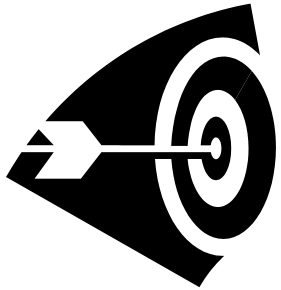
MTC Project evaluation
for SF Bay Area long range planning

- MTC is Bay Area MPO
- AB model used for benefit-cost analysis of 100 most expensive projects (75% of costs)
- Qualitative targets assessment used for all 1000 considered projects
  - Included some aspects not measured well by AB model



Targets Assessment

Assessed qualitatively using target scores (max score of +10).

1. Climate Protection
2. Adequate Housing
3. Particulate Matter
4. Collisions
5. Active Transportation
6. Open Space
7. Equitable Access
8. Economic Vitality
9. Non-Auto Mode Share/VMT
10. State of Good Repair

Benefit-Cost Assessment

Assessed quantitatively using MTC Travel Model One.

BENEFITS

- Travel time (including recurring & non-recurring delay)
- Travel cost (auto operating/ownership, parking)
- Emissions (CO_2, $PM_{2.5}$, ROG, NO_x)
- Collisions (fatalities, injuries, property damage)
- Health impacts due to active transport
- Noise

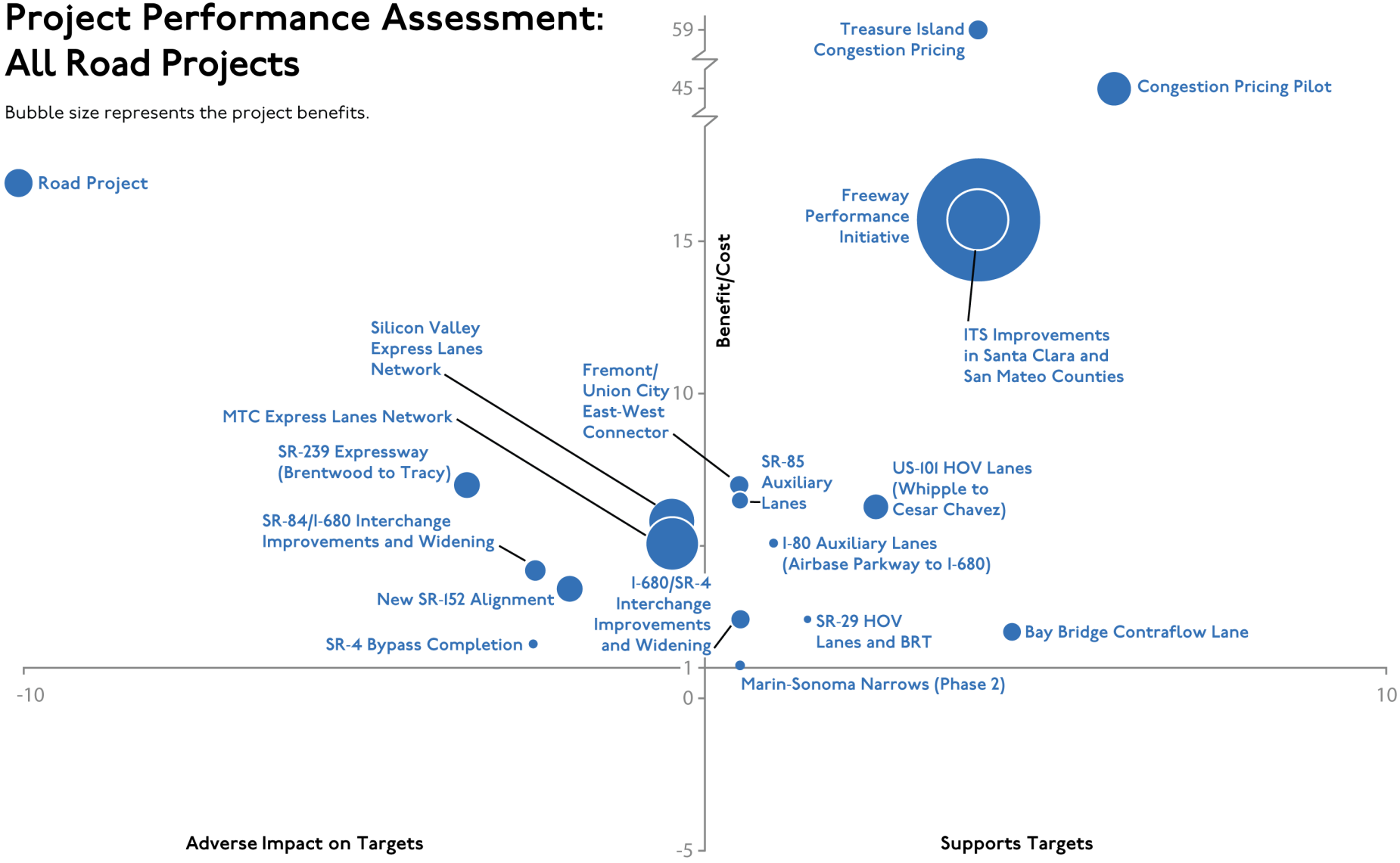
COSTS

- Capital costs
- Net operating and maintenance (O&M) costs

Source: MTC

Project Performance Assessment: All Road Projects

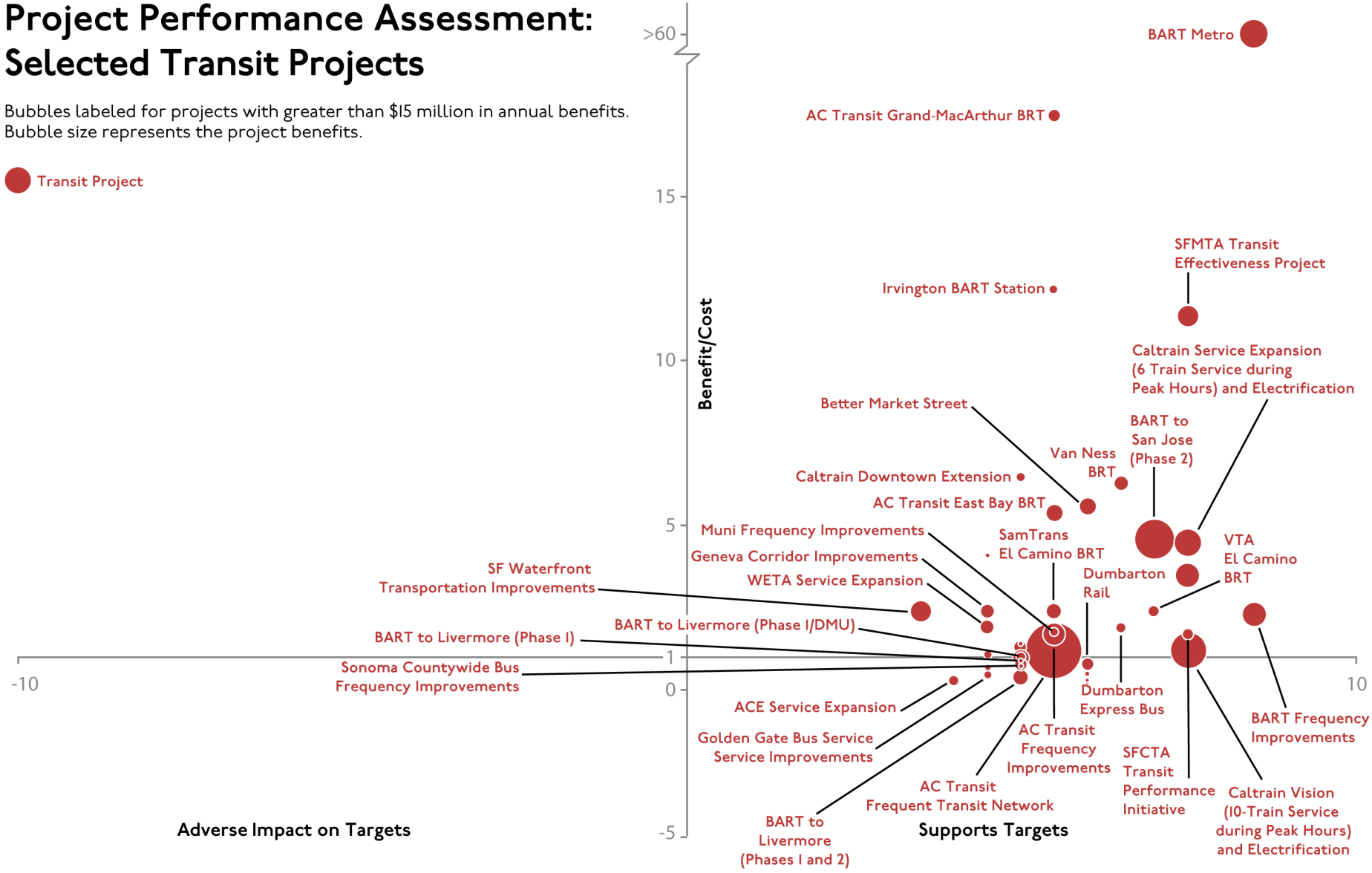
Bubble size represents the project benefits.



Source: MTC

Project Performance Assessment: Selected Transit Projects

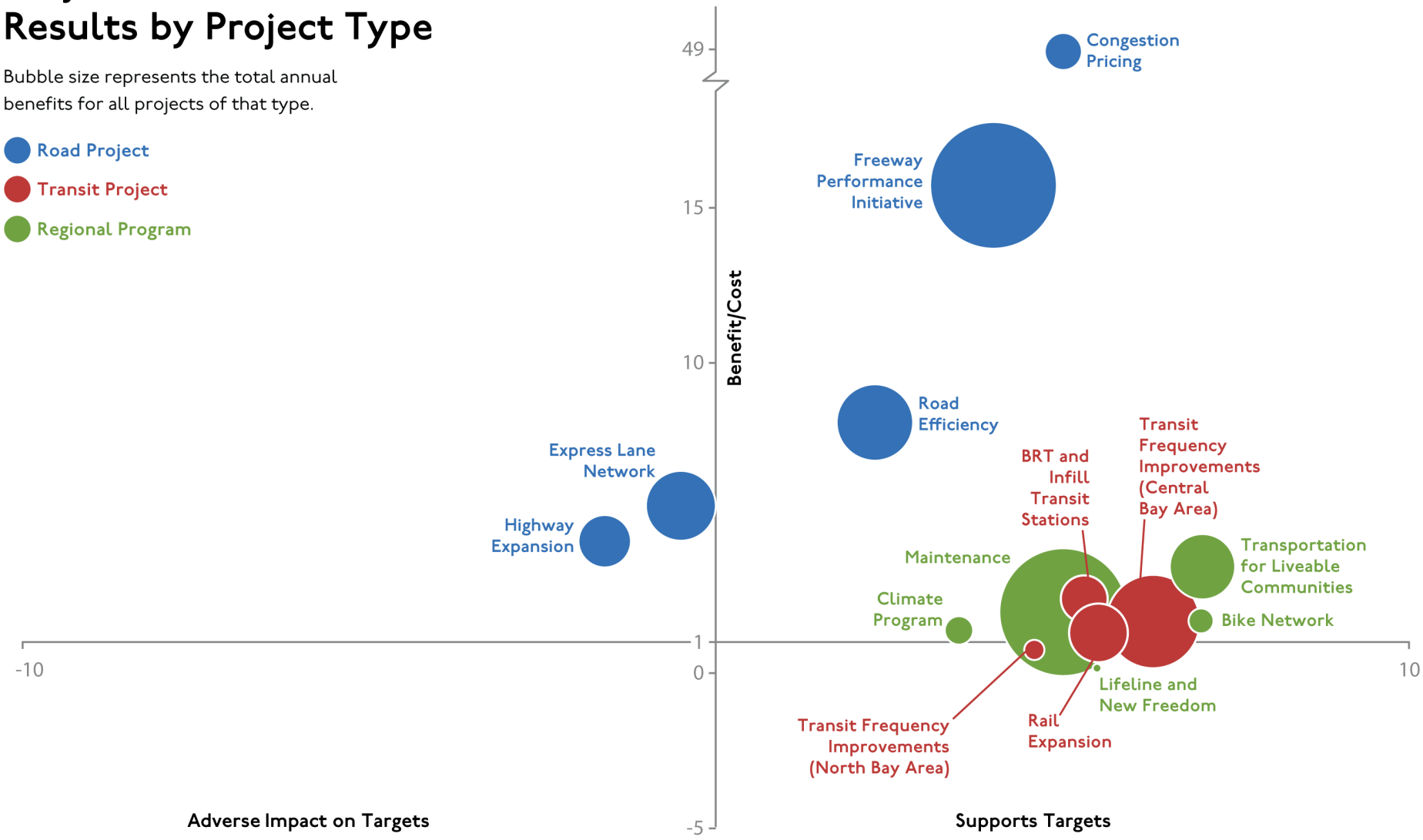
Bubbles labeled for projects with greater than $15 million in annual benefits.
Bubble size represents the project benefits.



Source: MTC

Project Performance Assessment: Results by Project Type

Bubble size represents the total annual benefits for all projects of that type.



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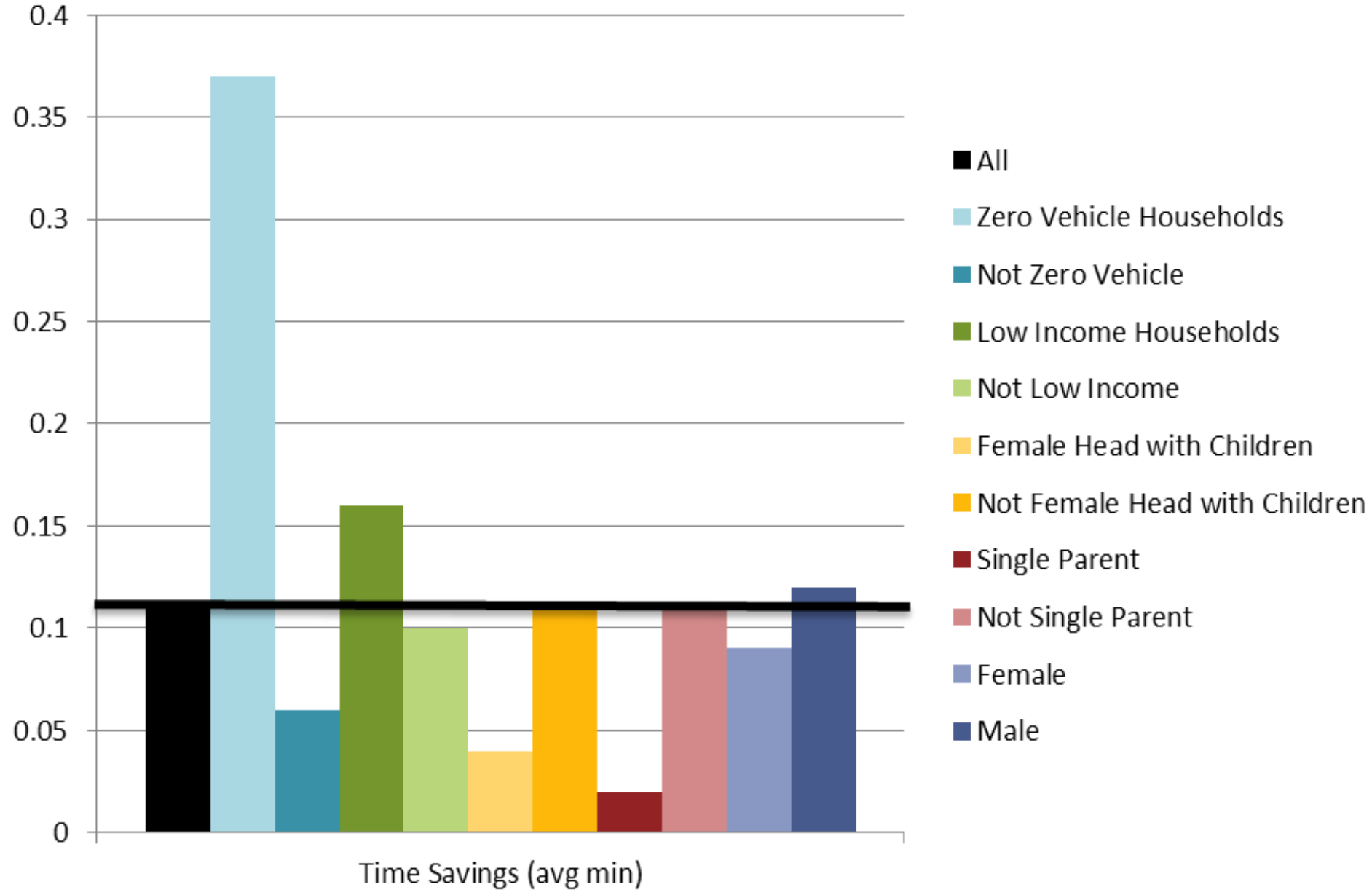
SF Transportation Plan: Travel time savings



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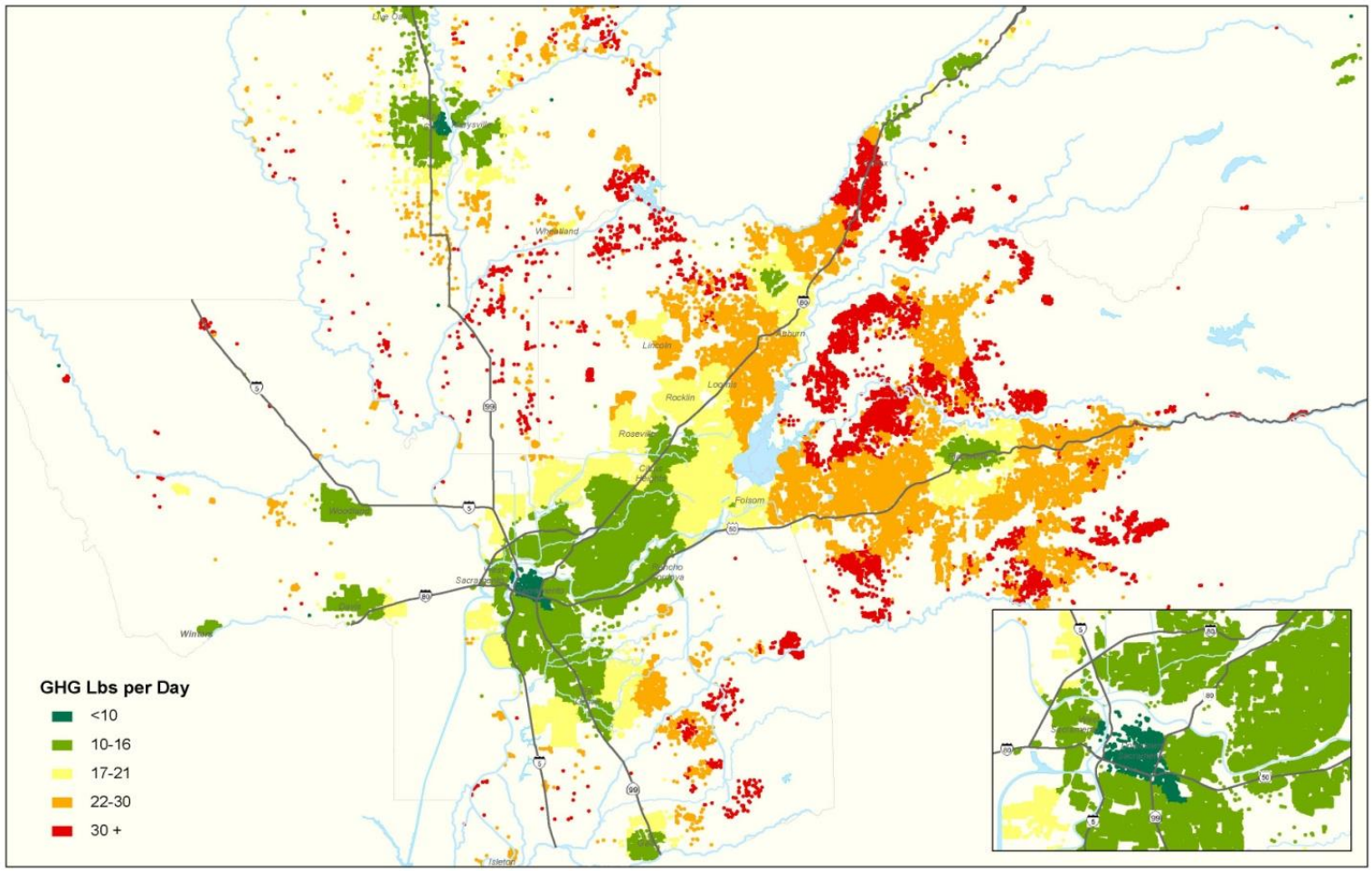
Greenhouse gas estimates by residence parcel -- Sacramento Area Council of Governments



AB Model Systems: 1993-2013

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Evacuation Modeling:
Persons "Not at Home" by TAZ and Hour

Atlanta Regional Commission