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MEETING OF THE

**REGIONAL TRANSIT TECHNICAL
ADVISORY COMMITTEE**

**Wednesday, October 5, 2016
10:00 a.m. – 11:45 a.m.**

SCAG Los Angeles Main Office

818 W. 7th Street, 12th Floor,
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If members of the public wish to review the attachments or have any questions on any of the agenda items, please contact Matt Gleason at (213) 236-1832 or gleason@scag.ca.gov.

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**REGIONAL TRANSIT TECHNICAL ADVISORY COMMITTEE
AGENDA
October 5, 2016**

5.0 INFORMATION ITEMS

5.1	<u>Trends in the SCAG Region 2005-2015</u> <i>(Philip Law, Manager of Transit and Rail SCAG)</i>	30	68
5.2	<u>Imperial Valley College/San Diego State Transit Shuttle Analysis</u> <i>(Steve Fox, SCAG)</i>	30	89
5.3	<u>FY2013-14 Transit System Performance Report</u> <i>(Matt Gleason, SCAG)</i>	30	120

6.0 STAFF UPDATE

6.1	<u>FTA Transit Asset Management Final Rulemaking</u>	5
6.2	<u>RTTAC Chairperson Selection Discussion</u>	5

ADJOURNMENT

The next Regional Transit Technical Advisory Committee meeting is tentatively scheduled for November 30, 2016.

* Attachment under separate cover

Regional Transit Technical Advisory Committee (RTTAC)
of the
Southern California Association of Governments

June 29, 2016

Minutes

THE FOLLOWING MINUTES ARE A SUMMARY OF ACTIONS TAKEN BY THE REGIONAL TRANSIT TECHNICAL ADVISORY COMMITTEE (RTTAC). AN AUDIO RECORDING OF THE MEETING IS AVAILABLE FOR LISTENING IN SCAG'S OFFICE.

The Regional Transit Technical Advisory Committee held its meeting at SCAG's Downtown Los Angeles Office. The meeting was called to order by Philip Law, Acting Chair.

Members Present:

Kirk Schneider	Caltrans District 7
Joyce Rooney	Redondo Beach Transit
Eric Hoch	Santa Monica Big Blue Bus

Video Conference:

Gary Hewitt	Orange County Transportation Authority
Claire Johnson-Winegar	Gold Coast Transit
Dietter Aragon	Antelope Valley Transit Authority
Victor Cuate	Omnitrans

Teleconference:

Shirley Hsiao	Long Beach Transit
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SCAG Staff:

Philip Law	Joseph Briglio
Matthew Gleason	Naresh Amatya
Stephen Fox	Sarah Jepson
Arnold San Miguel	David Salgado
Evan Finlay	

1.0 CALL TO ORDER

Philip Law, Acting Chair, called the meeting to order at 10:07 a.m.

2.0 PUBLIC COMMENT PERIOD

No members of the public requested to comment.

3.0 CONSENT CALENDAR

3.1 Approval Item

3.1.1 Minutes of the March 30, 2016 Regional Transit TAC Meeting

The Consent Calendar was approved by consensus.

4.0 RECEIVE AND FILE

4.1 Caltrans Section 5304 Sustainable Transportation Planning Grants

5.0 INFORMATION ITEMS

5.1 2017 Active Transportation Program Regional Guidelines

Sarah Jepson, SCAG Active Transportation and Special Programs Manager, provided an update on the Active Transportation Program Regional Guidelines. Ms. Jepson stated the Regional Guidelines outline the process and criteria for selecting the projects that will be awarded funding through SCAG’s regional share of the Active Transportation Program (ATP). It was noted there are three different funding programs within the ATP for which \$240 million will be awarded in the current cycle. Further, 50% of the funding is awarded through a statewide competition, 10% is awarded to small urban and rural areas (awarded by the state), and 40% will be awarded by Metropolitan Planning Organizations. SCAG’s share is approximately \$50 million. Funding awarded in the current cycle will be available in fiscal years 2019-2020 and 2020-2021.

The goals of the program include increasing biking and walking trips, increase safety, ensure disadvantaged communities fully share in the benefits, provide a broad spectrum of projects and enhance public health and achieve greenhouse gas reduction goals. Additionally, three different project types are available for funding; planning, non-infrastructure (education, encouragement and enforcement programs) and infrastructure (bike lanes, cycle tracks, crosswalks).

Ms. Jepson noted a call for projects will be announced for Planning and Capacity projects for new applicants only. Total funding available is \$2.5 million and projects under \$200,000 are sought. Eligible projects include First-Last Mile, Education and Encouragement campaigns and Open Streets and Demonstration projects. Next steps include finalizing the details for the Planning and Capacity call for proposals and preparing the application. The call for proposals date is tentatively scheduled for September 29, 2016 pending approval from the Regional Council. Recommendations will be brought to the Regional Council for approval February 2017 and to the California Transportation Commission March 2017. All interested entities are encouraged to submit proposals.

David Salgado, SCAG, asked if “new applicants” are required to be completely new to the process or can previous applicants resubmit proposals. Ms. Jepson responded that new applicants are those who have not been successful in either the statewide or regional funding process.

Joyce Rooney, Redondo Beach Transit, asked if bus stop improvements or those that connect to bike and pedestrian facilities are eligible for funding. Ms. Jepson responded that the infrastructure needs to directly support bike and pedestrian activities. Bus stop benches would not be eligible but bike racks and its associated infrastructure are eligible.

5.2 Santa Monica's Big Blue Bus Service Restructuring

Eric Hoch, Santa Monica's Big Blue Bus, reported on their bus service restructuring. Mr. Hoch stated the restructuring effort can be viewed as an Expo Line integration plan as light rail service has been extended to Santa Monica. It was noted the goals of the plan are to create a dense grid of north-south services, to have all routes connect to at least one Expo line station, to reduce service duplication, to improve speed and reliability and increase service on major corridors. Service modifications include six new routes implemented and three enhanced rapid corridors (Rapid 3 on Lincoln Blvd., Rapid 7 on Pico Blvd. and Rapid 12 on Westwood & Overland Blvd. serving UCLA.) In addition, seven routes were significantly changed, either shortened rerouted or extended. Four routes were eliminated and service to Santa Monica College and UCLA were enhanced.

Mr. Hoch noted the changes were implemented in four stages as all at once change proved impractical. Overall the plan results in an 11% increase in service hours. Further, the base cash fare was increased January 2016 to fund the service increases. In addition to the service changes 230 new bus stops were installed and 250 stops removed. Routes will be re-examined one year after implementation to determine effectiveness and efficiency. Additionally, a late night demand service is available on Friday and Saturday nights where riders can utilize a taxi service for a fixed fee to complete their trip to or from the Expo line. To incentivize transit use a buy one get one free transit pass program is being offered to riders as well as a TAP card value match.

Kirk Schneider, Caltrans, asked if there was an opportunity to provide early input into the Expo stations design as bus service could be better integrated into the facility layout. Mr. Hoch agreed that early input on bus service integration would benefit the process and subsequent service.

Joyce Rooney, Redondo Beach Transit, asked if the program to provide matching value on TAP cards adds to the same card or is a separate card issued. Mr. Hoch responded that value is added to the passenger's existing card.

Philip Law, SCAG staff, asked if companies such as Uber and Lyft were considered for the late night demand service. Mr. Hoch responded that the desire for a fixed fee for riders was not conducive to the ride sharing companies' format.

5.3 FY 2013-14 Transit System Performance Report

Matt Gleason, SCAG staff, reported on findings from the FY 2013-2014 Transit System Performance Report. Mr. Gleason noted the region is complex with 100 transit providers including 70 fixed route providers. Additionally, governance continues to evolve including a merger between Victor Valley Transit and Barstow Transit as well as new service in the Heritage Valley. It was noted per capita trip consumption grew in the mid 2000s then declined following the great recession. In

recent years it has increased to near 1991 levels. Average trip lengths have been growing particularly for demand response. The region's overall performance is competitive compared with other regions employing bus and light rail.

Mr. Gleason noted the goals of the System Performance Report are to provide a high level overall framework for understanding the region's transit investments, as a resource for policy makers, as a benchmarking resource for operators, and to facilitate MAP-21 and FAST Act provisions. Mr. Gleason reviewed the findings noting total regional service hours was greater than 20 million reflecting growth in light rail and demand response. Per capita trips are up slightly. Per capita passenger miles remain unchanged and total trips are greater than 700 million. There has been growth in both total passenger miles travelled and per capita passenger miles travelled. Further, 73% of transit service is provided by bus, 6% by rail and 20% by demand response. It was noted the next steps include updating the non-NTD data sources, analyze data at the market sector level and look at current year measures instead of operator profiles which would facilitate better benchmarking.

Gary Hewitt, OCTA, stated there is an inherent delay in NTD data reporting and noted data from a recent report on the first quarter of 2016 reflecting declining fixed route bus ridership both regionally and nationally. Mr. Hewitt noted declining bus ridership including an 8% decline for Long Beach Transit, 8% decline at LA Metro, 10% at OCTA, Santa Monica Big Blue Bus declined 13%, Norwalk Transit 12.6%, and Omnitrans declined 11%. Mr. Hewitt suggested that a standing agenda item on this trend may be useful and asked if there is any data that can be accessed that would help transit operators better understand the dynamics behind this trend so policy makers can be notified in a timely manner.

Mr. Gleason responded that the next iteration of the report will integrate monthly reporting through summer 2016.

6.0 **STAFF UPDATE**

6.1 FTA/FHWA Metropolitan Planning Final Rulemaking

Matt Gleason, SCAG staff, provided an update on FTA/FHWA Metropolitan Planning Final Rulemaking. Mr. Gleason stated on May 27, 2016 the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) jointly put forth a Final Rule on new statewide and Nonmetropolitan Transportation Planning and Metropolitan Transportation Planning. The Final Rule is intended to implement the changes to statewide and regional planning mandated by MAP-21 and the FAST Act. It was noted the rulemaking sets out the process by which MPO's will coordinate with transit operators in setting performance measures and performance targets for the metropolitan planning process. It establishes timelines by which the state has to establish performance targets which is one year after the adoption of the rule.

Additionally, it establishes a timeline by which MPO's have to incorporate those targets and performance measures into their plans and programs. Further, any statewide program enacted within two years of the adoption of the final rule would be required to be consistent with and incorporate those performance targets.

Philip Law, SCAG staff, further noted transit agencies would need to establish a Public Transportation Agency Safety Plan which must include performance targets. This is to be done within one year of the effective date of the final rule. Additionally, once rulemaking is put forth on state of good repair transit agencies would have two years to establish a Transit Asset Management Plan which also must include performance targets. Subsequently, MPOs would establish performance targets and coordinate with public transit operators.

6.2 RTTAC Chairperson Selection Discussion

Matt Gleason, SCAG staff, stated current committee Chairperson, Wayne Wassell, has served the committee well for years and it is felt this would be an appropriate time to rotate the committee chairmanship. Committee members who are interested in serving as Chair are welcome to notify staff of their interest.

ADJOURNMENT

The meeting adjourned at 11:31 a.m.

REPORT

DATE: October 5, 2016

TO: Regional Transit Technical Advisory Committee

FROM: Matt Gleason, Senior Regional Planner, 213-236-1832 gleason@scag.ca.gov

SUBJECT: Caltrans Section 5304 Sustainable Transportation Planning Grants

EXECUTIVE SUMMARY:

A key aspect of the Transit / Rail department’s annual work effort is the management and oversight of Caltrans Sustainable Communities planning grants. Typically in previous fiscal years, local agencies applied to Caltrans as a subrecipient, and SCAG served as the recipient, due to the agency’s executed master funds transfer agreement. Attached is a matrix overview of the grant projects completed in Fiscal Year 2015-16.

BACKGROUND:

A key aspect of the Transit / Rail department’s annual work effort is the management and oversight of Caltrans Sustainable Communities planning grants. In previous fiscal years, local agencies typically applied to Caltrans as a subrecipient, and SCAG served as the recipient, due to the agency’s executed master funds transfer agreement with the Caltrans Headquarters Office of Regional and Interagency Planning (ORIP). Attached is a matrix overview of the grant projects completed in Fiscal Year 2015-16.

Sustainable Communities Grants.

Sustainable Communities grants are funded by the Federal Transit Administration (FTA) Section 5304 and State Highway Account funds. This grant program replaced the Statewide Urban Transit Planning Studies, Rural or Urban Transit Planning Studies, and Transit Planning Student Internship programs in FY 2014-15. The studies in the completed projects were primarily funded through the older programs.

The Sustainable Communities Grants fund transportation planning projects that achieve the Caltrans Mission and Grant Program Overarching Objectives, identify and address mobility deficiencies in the multimodal transportation system, encourage stakeholder collaboration, involve active public engagement, integrate Smart Mobility 2010 concepts, and ultimately result in programmed system improvements.

Caltrans recently released the FY 2017-18 Sustainable Transportation Planning Grant Application Guide (<http://www.dot.ca.gov/hq/tpp/grants/GrantGuideFY2017-18.pdf>). A total of \$9.3 million is available for transportation planning projects statewide. Grant applications are due Friday, November 4, 2016 by 5 PM. Appropriate District staff are listed in the Grant Application Guide to contact if there are any questions about developing a competitive grant application.

Eligible primary applicants include Metropolitan Planning Organizations, Regional Transportation Planning Agencies, cities and counties, transit agencies, and Native American Tribal Governments.



REPORT

Example Project Types, as identified by Caltrans, include:

- Studies that advances a community’s effort to reduce transportation related greenhouse gases
- Studies that assist transportation agencies in creating sustainable communities
- Studies that advances a community’s effort to address the impacts of climate change and sea level rise
- Community to school studies or safe routes to school studies or plans
- Jobs and affordable housing proximity studies
- Context-sensitive streetscapes or town center plans
- Complete street plans
- Bike and pedestrian safety enhancement plans
- Traffic calming and safety enhancement plans
- Corridor enhancement studies
- Health equity transportation studies
- Climate change adaptation plans for transportation facilities
- Transit planning surveys and research
- Identification of policies, strategies, and programs to preserve transit facilities and optimize transit infrastructure
- Studies that evaluate accessibility and connectivity of the multimodal transportation network
- Short-range transit development plans
- Transit marketing plans
- Social service improvement studies
- Student Internships (Only for Rural Agencies)
- Studies that address environmental justice issues in a transportation related context

Attached is a matrix containing an overview of the grant projects completed in Fiscal Year 2015-16.

ATTACHMENT:

Attachment A: Caltrans Section 5304 Sustainable Transportation Planning Completed Grants

Caltrans Section 5304 Sustainable Transportation Planning Completed Grants Fiscal Year 2015-16

OWP - Number	Project Title	Subrecipient	Project Description	SCAG Project Manager (Contact for further information)
145.02566.01	RCTC Rising Stars Transit Internship Program	Riverside County Transportation Commission	Multiyear student internship project.	Matt Gleason
145.02568.01	Long Beach Transit Internship	Long Beach Transit	Multiyear student internship project.	Matt Gleason
145.02571.01	Regional Transit Center Feasibility Study	Long Beach Transit	Building upon a Comprehensive Operations Analysis (COA) completed in 2004, this analysis sought to provide LBT with more detailed information to help in determining what would be needed to establish a second transportation hub in the northern and eastern portions of the LBT service area. It included an analysis of current and projected ridership demand, physical site analysis of potential locations, a conceptual site plan, and a compatibility analysis to confirm the potential locations' appropriateness given surrounding land uses.	Matt Gleason
145.03169.01	Riverside Reconnects	City of Riverside	Riverside Reconnects is a modern streetcar feasibility study for the City of Riverside. In addition to recommending a route alignment and estimating ridership, the study aimed to estimate real estate value capture and appreciation, and recommend a funding and implementation plan for the streetcar.	Stephen Fox
145.03173.01	Thousand Oaks Transit Master Plan	City of Thousand Oaks	This project produced a master planning document for Thousand Oaks Transit, consisting of a route analysis, a capital investment plan, a marketing plan, and an analysis of latent demand.	Matt Gleason
145.03249.01	SANBAG: Advanced Regional Rail Integrated Vision - East (The ARRIVE Corridor)	San Bernardino Association of Governments	The SANBAG ARRIVE project sought to provide recommendations and an action plan on how to make the six Metrolink San Bernardino Line stations within San Bernardino County in to TOD/activity center districts over time, rather than remain functioning as mere bedroom communities where the huge majority of boardings are destined for downtown Los Angeles work trips.	Stephen Fox
145.03254.01	Omnitrans Transit Planning and Development Services Student Internship (FY14)	Omnitrans	Multiyear student internship project.	Matt Gleason

Transit Performance Measures in California



MTI Report 12-58



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The Institute receives oversight from an internationally respected Board of Trustees whose members represent all major surface transportation modes. MTI's focus on policy and management resulted from a Board assessment of the industry's unmet needs and led directly to the choice of the San José State University College of Business as the Institute's home. The Board provides policy direction, assists with needs assessment, and connects the Institute and its programs with the international transportation community.

MTI's transportation policy work is centered on three primary responsibilities:

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MTI works to provide policy-oriented research for all levels of government and the private sector to foster the development of optimum surface transportation systems. Research areas include: transportation security; planning and policy development; interrelationships among transportation, land use, and the environment; transportation finance; and collaborative labor-management relations. Certified Research Associates conduct the research. Certification requires an advanced degree, generally a Ph.D., a record of academic publications, and professional references. Research projects culminate in a peer-reviewed publication, available both in hardcopy and on TransWeb, the MTI website (<http://transweb.sjsu.edu>).

Education

The educational goal of the Institute is to provide graduate-level education to students seeking a career in the development and operation of surface transportation programs. MTI, through San José State University, offers an AACSB-accredited Master of Science in Transportation Management and a graduate Certificate in Transportation Management that serve to prepare the nation's transportation managers for the 21st century. The master's degree is the highest conferred by the California State University system. With the active assistance of the California

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Information and Technology Transfer

MTI promotes the availability of completed research to professional organizations and journals and works to integrate the research findings into the graduate education program. In addition to publishing the studies, the Institute also sponsors symposia to disseminate research results to transportation professionals and encourages Research Associates to present their findings at conferences. The World in Motion, MTI's quarterly newsletter, covers innovation in the Institute's research and education programs. MTI's extensive collection of transportation-related publications is integrated into San José State University's world-class Martin Luther King, Jr. Library.

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REPORT 12-58

TRANSIT PERFORMANCE MEASURES IN CALIFORNIA

Caroline Rodier, Ph.D.
Emily Issac

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EXECUTIVE SUMMARY

This research is the result of a California Department of Transportation request to assess the most commonly available transit performance measures in California. Caltrans wanted to understand the transit performance measures currently used by Metropolitan Planning Organizations (MPOs) and transit agencies to help develop its own. In sum, this report serves as a summary reference guide to help Caltrans understand the numerous and diverse performance measures used by MPOs and transit agencies in California.

The first phase of this research involved a review of the available transit performance measure guidance publications. The goal was to identify a complete framework (categories, example metrics, and data) within which to organize this review of California agency measures. The investigators found the Transportation Research Board's TCRP Report 88, *A Guidebook for Developing a Transit Performance-Measurement System* (TCRP, 2003)¹ to be consistent with and more comprehensive than other more recent and older published guidance documents. Researchers identified the following key transit performance measures for use in this report:

- Service Availability: Ease of transit access based on where (service coverage and/or stop accessibility), how often (frequency), and how long (hours of service) service is provided.
- Service Delivery: Quality of passengers' day-to-day experiences using transit, such as service reliability, quality of customer service, and passenger comfort.
- Safety and Security: Likelihood that an accident will occur involving passengers or that a passenger will become the victim of a crime while using transit. Examples include the rate of accidents per specified distance, the injury accidents per passenger-miles, and quantity of safety devices and personnel.
- Community Impact: Quality-of-life impacts on the communities served by transit such as mobility, job access, economic growth and productivity, personal finances, pollution reductions, and equitability of transit service.
- Financial Performance: How efficiently agencies use resources to meet travel demand within their budget constraints.
- Agency Administration: Administrative efficiency, including employee productivity, employee relations, workdays lost due to injury, and efficiency of service delivery (i.e., vehicle miles per employee or cost of administrative staff to operations staff).

Major sources of data for these performance measures include the following:

- In-house: Data that transit agencies normally have on hand through good record-keeping – for example, schedule data, system maps, service design standards, dispatch logs, maintenance records, operations logs, accident and incident records, financial data, fleet data, employee records, and complaint records.

- National Transit Database (NTD): Primary source for data, information, and statistics on the U.S. transit systems. Reporting required by those receiving Urbanized Area Formula Program (Section 5307) or Rural Area Formula Program (Section 5311) grants. Data examples include service area, agency information, fleet information, capital and operating funds, costs and expenses, maintenance, safety, service provided and consumed, and energy consumption.
- Other local, state, and federal agencies: Information on external factors that help evaluate the quality and location of transit service: demographic data, traffic data, GIS data, and transportation planning models.

Automated systems: Technology that improves data accuracy and completeness, timeliness of reporting, and data collection costs: automatic vehicle location (AVL), train control systems, automatic passenger counters (APC), and electronic fareboxes.

Next, investigators examined the use of performance measures in recent reports and publications by the four major California metropolitan planning organizations (MPOs). The MPOs include:

- Southern California Association of Governments (SCAG);
- San Diego Association of Governments (SANDAG);
- Sacramento Area Council of Governments (SACOG);
- San Francisco Bay Area Metropolitan Transportation Commission (MTC).

The measures provided by these MPOs provide the most comprehensive and consistent source of transit performance measure data in California. In other words, these measures are available for a majority of the population of California and, as a result, Caltrans may be particularly interested in these measures as they consider the availability of data and the development of measures for the State of California.

The MPOs studied in this report together evaluate 40 different measures. Nearly half of the performance measures collected by the MPOs measure financial performance.

- Service Availability: All MPOs measured service availability – coverage by SANDAG, SCAG, and SACOG, frequency by SCAG and SANDAG, hours of service by SANDAG and SCAG, and stop accessibility by SANDAG stop accessibility.
- Service Delivery: SANDAG used several measures of service delivery, including missed trips, on-time performance, and passenger load, as well as a measure of passenger environment. SCAG used relative measures of auto and transit travel time.
- Community Impact: All MPOs measured community impacts. SANDAG used demographic data to evaluate service to low-income, elderly, and disabled populations; SCAG, SANDAG, and SACOG examined travel times and/or distance between

origin and destination locations; and SACOG included service equitability.

- Maintenance: SCAG examined the average age of the transit fleet.
- Financial Performance: All MPOs conducted numerous measures of financial performance – including ridership, productivity, cost-effectiveness, and cost-efficiency.
- Agency Administration: MTC included an administrative performance measure.

The last step of this project was to evaluate the most recent transit agency planning documents in California, based on an internet search. Investigators reviewed documents from 26 transit agencies, which, in total, included 231 performance measures. Researchers found that the most frequently measured category was financial and, within that category, that the top three measures were farebox recovery, passenger trips per vehicle revenue or service hours, and cost per vehicle revenue or service hour. Delivery was the next most frequent performance measure category, and its top measures were on-time performance, responsiveness to calls, number of complaints, and missed trips. Safety measures, such as accidents, crime, and injuries, were also evaluated by some agencies. Less frequently evaluated measures include availability, maintenance, and administrative measures.

Not surprisingly, it appears that when agencies have data they use that data to measure transit performance. The data mandated for National Transit Data, especially financial data, are commonly used to evaluate transit performance by both MPOs and transit agencies. Performance measures also seem to align with agency goals. Transit agency measures tend to focus more on issues related to customer service, whereas MPOs measures focus more on overall scope, location, quality, and equitability of transit service.

I. INTRODUCTION

This research is the result of a California Department of Transportation's (Caltrans) request to assess the most commonly available transit performance measures in California. Caltrans wanted to understand performance measures and data used by Metropolitan Planning Organizations (MPOs) and transit agencies to help them develop statewide transit performance measures. In sum, this report serves as a summary reference guide to help Caltrans understand the numerous and diverse performance measures used by MPOs and transit agencies in California. The report consists of three key elements:

1. A review of the available literature to identify a complete framework of the types of transit performance measures available for the purpose of organizing transit performance measures produced by California agencies and the sources of data available to calculate these measures.
2. A discussion of the latest transit performance measures for the four largest MPOs in California (San Francisco Bay Area, Los Angeles, San Diego, and Sacramento). Investigators paid special attention to the transit performance measures used by these MPOs, because these measures are available for the majority of California's population.
3. A summary of transit measures from 26 local transit agencies in the State of California based on a search of the internet for transit-planning documents.

II. LITERATURE REVIEW

Investigators reviewed the literature to develop a framework for organizing the numerous and diverse transit performance measures produced by California agencies. To this end, researchers searched the internet for sources that provided comprehensive transit performance frameworks. Research on new specific performance measures is outside of the scope of this project. Investigators found that the Transportation Research Board's TCRP Report 88, *A Guidebook for Developing a Transit Performance-Measurement System*² (hereafter TCRP Report 88) was consistent with frameworks in other publications and the most comprehensive work on the topic. As a result, that report is a major source for this literature review. The review included guidance from the Florida Department of Transportation,³ *Best Practices in Evaluating Transit Performance* from the Colorado Department of Transportation,⁴ a TRB conference report on the use of performance measures,⁵ and a report on digital software tools for analyzing the National Transit Database.⁶

TCRP Report 88 identifies and provides a detailed summary of over 400 transit performance measures. The report narrows down its index of the 400 transit performance measures by providing recommended core performance measures and categories specific to fixed-route and demand-response services. As presented in section 2.2, these core performance measures and their categories have been adapted for the purposes of this report to provide a framework with which to organize the performance measures used by California agencies.

Based on the reviewed literature, the following sections provide guidance to agencies on the major data sources from which transit agencies can calculate performance metrics (section 2.1) and the major categories under which recommended performance measures and metrics fall (section 2.2). Note that these sections are drawn from TCRP 88 unless otherwise specified.

DATA SOURCES

TCRP Report 88 describes the major data sources from which transit agencies can access the data required to calculate various performance measures. These sources include:

- In-house data;
- National Transit Database;
- Other local, state, and federal agencies;
- Automated systems;
- Manual data collection;
- Surveys; and
- Safety reviews.

In-house data refer to the data that transit agencies normally have on hand through good record-keeping, such as operation logs and fleet data. Measures calculated using in-house data are attractive to many transit agencies because they require little investment of staff time or resources. Examples of in-house data include:

- Schedule data;
- System maps;
- Service design standards;
- Demand-responsive service dispatch logs;
- Maintenance records;
- Operations logs;
- Accident and incident records;
- Financial data;
- Fleet data;
- Employee records; and
- Complaint records.

The National Transit Database (NTD) is the primary source for data, information, and statistics on U.S. transit systems. Appendix A includes a description of the specific data contained in the NTD database. Congress uses the NTD to determine the annual allocation of federal transit funds. Any transit agency, state, or MPO that receives the Urbanized Area Formula Program (Section 5307) or Rural Area Formula Program (Section 5311) grants must report annual data to the NTD.⁷ NTD includes “in-house” data on financial and service information from public transportation agencies. Financial data must be reported annually using accrual accounting and the Uniform System of Accounts. Under accrual accounting, agencies (1) record revenues when they earn them, regardless of whether they actually receive the revenue in the same fiscal year and (2) record expenses as soon as they owe an entity, whether or not they actually pay the funds for that expense within the same fiscal year (p. 31).⁸ Financial data includes revenue (“the total amount of money earned during a transit agency’s fiscal year,” p. 28) and expenses (“the costs an agency incurs to provide transit services,” p. 28).⁹ Service data provides insight into the effectiveness and productivity of a transit agency (for example, all miles and hours vehicles travel). It is mandated that almost all service data collected is completely accurate and cannot be estimated.

The NTD is open to the public and available to transit agencies to measure the internal efficiency and effectiveness (i.e., passengers per revenue hour, passengers per vehicle mile, farebox recovery ratio, and cost per passenger).¹⁰ Due to its uniformity, data from the

NTD is useful for comparing performance across different transit agencies. Examples of the kind of data available from the NTD include:

- Service area characteristics (e.g., area and population);
- Agency type;
- Number of vehicles operated in annual maximum service;
- Sources of, and uses for, capital funds;
- Sources of, and uses for, operating funds;
- Labor hours and cost data;
- Overall agency income and expenses;
- Fleet information;
- Rail and maintenance infrastructure data;
- Directional route miles by bus facility type;
- Safety and security incidents;
- Amount of service provided (e.g., vehicle miles, vehicle hours, and service days);
- Amount of service consumed (e.g., unlinked trips and passenger miles [PM]); and
- Energy consumption.

The Lehman Center for Transportation Research at Florida International University developed software for the Florida DOT to assist in analyzing NTD data and to help select and compare peer agencies.¹¹

Other local, state, and federal agencies can supply information on external factors that help evaluate the quality and location of transit service. This data include:

- *Demographic data* that typically include employment, population, and housing. Analysts use this data to calculate performance measures related to the number of people by attributes (e.g., income and ethnicity) by type of location (e.g., medical, employment, and education). The U.S. Census Bureau, MPOs, and/or city planning departments typically produce this data. Data from the census and transportation demand models can have relatively small units of analysis. Analysts will typically aggregate this data to different geographic scales, which include and exclude areas with and without transit service. One example is the number of people by attribute of interest (e.g., low-income or environmental justice) located within a quarter mile of a bus stop.

- *Traffic data*, often available from local public works departments and state Department of Transportations (DOTs), include daily traffic volumes, traffic speeds, sidewalk inventories, traffic signal timing information, and the number of lanes provided on the streets. Local planning, community development, and public works departments may also have information on sidewalk inventory and peak-period traffic volumes. These data are useful for measures that include mobility, travel time, pedestrian and bicycle access to transit stops, and vehicle and person capacity of transit operations.
- *GIS Data* are often available from planning organizations that already use GIS software in their operations. These data are useful for spatially analyzing data for measures of service coverage, route coverage, and service density. Analysts use GIS data, for example, to calculate actual walking paths to transit stops.
- *Transportation planning models* (or travel demand models) typically use demographic and transportation data to forecast future travel patterns and demand. These models estimate the relative quantity and quality (i.e., travel time and cost) of transit and auto travel between specific areas of interest, and region-wide. This is another approach to evaluating the quality of transit service in a region. Such transit performance measures would use model data for a current calibrated base year. Similar measures are used to evaluate the future expected performance of regional transportation plans.

Automated systems help improve data accuracy and completeness, timeliness of reporting, and data collection costs.

- *Automatic Vehicle Location (AVL)* equipment tracks the real-time locations of AVL-equipped buses for dispatching. AVL collects and stores data about bus arrival and departure times at specified locations. Comparisons between scheduled and actual arrival and departure times can provide data for on-time performance measures.
- *Train Control Systems* maintain safe separations between trains, and provide data similar to that obtained from bus AVL systems. For instance, automatic train control systems that govern when doors open and close are coordinated with fixed- and moving-block signal systems to provide detailed dwell-time information.
- *Automatic Passenger Counters (APC)* automate the collection of passenger boarding and alighting data so that the number of people getting on and off at individual stops can be recorded. Useful data gathered through APC systems include:
 - Stop, route, and system-level ridership;
 - Maximum passenger loads and their locations;
 - How long standing loads occur during a trip; and
 - How often loads exceed a pre-determined level.

- *Electronic Fareboxes* can provide information on ridership and trip patterns by recording passenger boardings and linked trips (trips involving one or more transfers). If integrated with an AVL system, magnetic fare cards or “smart cards” generate data on individuals’ transit travel. Electronic fareboxes that require an operator to press a button on the farebox as each passenger boards can result in errors if, for example, the operator fails to register a boarding, or presses the wrong button.

Manual Data Collection typically includes information on ridership and schedule reliability. Information collected may be less expensive to collect compared to that from automated systems, and is often sufficient for a small transit agency’s purposes. While manual data collection is typically accurate, a limited number of collected samples can cause sampling errors wherein data collected on one day is not representative of conditions in general. The TCRP 88 report identifies three main types of manual data collectors:

- *Bus operators* record the number of people getting on and off at a particular location. This is typical for demand-responsive systems and for smaller fixed-route systems.
- *Traffic checkers* are staff that either ride transit vehicles or stand at a location and record data such as arrival times, passenger boarding and alighting volumes, passenger loads, and dwell times. Medium and large fixed-route systems may use traffic checkers.
- *Field supervisors* record the arrival time of transit vehicles to calculate on-time performance and headway regularity.

Customer Satisfaction Surveys help transit agencies identify customer needs and preferences. They are also used to evaluate how well the transit service meets these needs and preferences, and where improvements can be made.

Safety Reviews of vehicle maintenance are important to identify safety problems before they result in an incident.

Passenger Environment Surveys track the cleanliness and ride comfort of transit.

PERFORMANCE MEASURES

The performance measures listed in the tables below are from the TCRP Report 88’s set of recommended core performance measures for fixed-route services (Chapter Five, p. 110).¹² This set represents recommended measures that all transit agencies, at a minimum, would ideally measure to cover all perspectives on their performance. The TCRP Report 88 divides these recommended measures into seven categories. The categories are as follows:

1. Service Availability
2. Service Delivery

3. Safety and Security
4. Community Impact
5. Maintenance
6. Financial Performance
7. Agency Administration

Information on each measure's metrics and data requirements are from the individual performance measure descriptions offered in Chapter 6 of the Guidebook. The page number next to each measure in the table indicates the page of the Guidebook on which a detailed description of the measure can be found. The letter superscripts indicate which of the four California MPOs examined in this report use the same measures in their own performance monitoring programs. The four MPOs examined are the Southern California Association of Governments (SCAG); the San Diego Association of Governments (SANDAG); the Sacramento Area Council of Governments (SACOG); and the San Francisco Bay Area Metropolitan Transportation Commission (MTC). The last column of the chart indicates the data source for the measure, based on the major types of data sources identified by the TCRP Report 88 on pages 130-140.¹³

Service availability measures assess the ease with which passengers can use transit services based on where (service coverage and/or stop accessibility), how often (frequency), and how long (hours of service) service is provided. Service availability is a very important measure because transit is only an option if it is easily available to passengers. Service availability measures typically require in-house data, such a trip schedule, hours of operation, and transit stop locations, along with GIS software for information on walking paths to transit stops and information on the number of streets and intersections within an area.

Table 1. Service Availability

Measure	Metrics	Data Requirements	Data Source
Service Coverage (p. 180)	% area served by transit ^{abc}	Transit stop locations Walking paths to transit stops	In-house GIS software
Frequency (p. 186)	Transit vehicles per hour ^{ac} Time intervals between transit vehicles (headway) ^{ac}	Scheduled Headways	In-house
Hours of Service (p. 187)	How long service is provided during a day, measured by LOS threshold (for example, A=19-24 hours/day, B=17-18 hours/day, C=14-16 hours/day, D=12-13 hours/day, E=4-11 hours/day, F=0-3 hours/day) ^c	Hours of operation	In-house

Table 1, continued

Measure	Metrics	Data Requirements	Data Source
Stop Accessibility (p. 184) (how easily pedestrians/ bicyclists can access a transit stop from locations in the stop's vicinity)	Pedestrian level of service Bicycle level of service Street crossing difficulty ^c % stops/stations ADA accessible ^c % of park-and-ride-lot spaces filled Network Connectivity Index: number of links (i.e., street segments between intersections), divided by number of nodes (i.e., intersections) in a roadway system	Traffic volumes Pedestrian/bicycle facility type/ width and distance between the facility and general traffic Detailed evaluation of conditions at/near a given stop (e.g., grades, lateral clearances, surface hardness, etc.) Number of parking spaces and counts in transit lots Information on the number of streets and intersections within an area	Local roadway agency or windshield survey; Outsourced evaluation; In-house information; Local roadway agency

SANDAG=a, SACOG=b, SCAG=c, MTC=d; Source: TCRP Report 88.

Service delivery measures evaluate the quality of passengers' day-to-day experiences using transit, such as service reliability, the quality of customer service from agency staff, and passenger comfort. Simple service delivery measures (number of missed trips, complaint rate, and customer response time) require only good record-keeping on the part of the transit agency, such as regularly updated incident and compliance logs. However, most measures tend to require large amounts of data, such as extensive manual or automated data collections and customer satisfaction or passenger environment surveys. For instance, to evaluate the rate at which transit vehicles depart or arrive at a location on time requires either field surveys by traffic checkers or automatic vehicle location data.

Table 2. Service Delivery

Measure	Metric	Data Requirements	Data Source
Missed Trips (p. 211)	Number of trips removed from the daily schedule ^a	Schedule Incidents/dispatch logs	In-house
Complaint rate (p. 218)	The number of passenger complaints or compliments per unit of time, passengers, or trips	Service hours Boardings, passengers Documented complaints and compliments	In-house
Route directness (p. 265)	Ratio of route length to the shortest-path length Additional travel time/ distance compared to an auto making the same trip Number of deviations	Transit travel time Auto travel time Number of deviations Productivity Distance between route and deviation target Population and employment	GIS software, In-house, Traffic Data

Table 2, continued

Measure	Metric	Data Requirements	Data Source
On-time performance (p. 206)	% transit vehicles departing or arriving at a location on time ^a	Field surveys or AVL data	Manual Data Collection, AVL Data
Customer response time (p. 221)	How quickly, customer inquiries are addressed	Date and time of inquiry and response	In-house Data
Passenger load (p. 230)	Passengers per seat ^a	Passenger counts	Manual Data Collection or APC data, In-house Data
	Number of passengers at the maximum load point	Number of seats provided	
	%/number of trips with standees		
	Maximum number of standees PMT (passenger miles traveled) per seat miles		
	Area per passenger	Passenger counts Vehicle dimensions	Manual Data Collection or APC data, In-house Data
Reliability factor (p. 264)	% trips or travel time is no more than X% higher than average	Standing time duration	Manual Data Collection or APC data, In-house Data
		Time information	
Reliability factor (p. 264)	% trips or travel time is no more than X% higher than average	Travel time/speed surveys or AVL data.	Manual Data Collection or AVL data
Transit/auto travel Time (p. 263)	Transit travel times vs. auto travel times ^c	Transit travel times (schedule data, AVL data, or field checks), auto travel times	In-house or AVL or Manual Data collection, Transportation Planning Models
Number of fare media sales outlets (p. 201)	% of daily trips made via fare card (e.g. MetroCard) purchased out-of-system	Records of sales outlets for transit fare media	In-house
		Information that tracks fare card serial numbers and use	
Customer satisfaction (p. 227)	An overall rating of customer satisfaction with a transit agency's service (i.e., % customers "very satisfied")	Market research based on statistically appropriate sampling plans, questionnaires, and analysis designs	Customer Satisfaction Surveys
Headway regularity (p. 209)	Service regularity: % of headways deviate no more than a specified amount of the scheduled.	Field surveys (e.g., by traffic checkers) or AVL data.	Manual Data Collection or AVL data
Passenger environment (p. 225)	An overall rating of potential passenger satisfaction while riding transit, based on evaluations of cleanliness, customer information, equipment, and operators	Trained checkers sent to collect data; customer surveys on their perceptions of the various categories and indicators.	Manual Data Collection Customer Satisfaction Passenger Environment Survey
Customer loyalty (p. 229)	% "secure" or "vulnerable" transit customers, based on a customer loyalty score	Customer ratings of overall satisfaction, likelihood to continue use and to recommend	Customer Satisfaction Surveys

SANDAG=a, SACOG=b, SCAG=c, MTC=d; Source: TCRP Report 88.

Safety and security measures rate the likelihood that an accident will occur involving passengers or that a passenger will become the victim of a crime while using transit. Some examples of safety and security measures include the rate of accidents per specified distance and the injury accidents per passenger-miles. These measures only require in-house data, such as accident records and driver logs, and data recorded to the NTD, such as fatalities, injuries, and property damage. Transit agencies should note that comparisons of safety and security measures across different agencies might be difficult due to differences in reporting methods. Investigators found that safety and security measures were not represented in MPO data reviewed for this report, but that they are collected relatively frequently by transit agencies within MPO regions.

Table 3. Safety and Security

Measure	Metric	Data Requirement	Data Source
Accident rate (p. 276)	Number of accidents per specified distance or time	Accident records	In-house Data
		Odometers	
		Driver logs	
Incidents of vandalism (p. 287)	Total number of cited criminal activity directed against transit property	Police reports	In-house Data
		Repair records	
Crime rate (p. 284)	Number of crimes against passengers, agency staff, or transit property per year	Crime reports	In-house Data
Number of vehicles with specified safety devices (p. 286)	Absolute number or % of vehicles equipped with specified safety devices such as security cameras, intercom systems, emergency alarms, and/or AVL equipment	Number of vehicles with specified devices	In-house Data
		Total number of vehicles in fleet	
Passenger safety (p. 277)	Fatal accidents per PMT/VMT (vehicle miles traveled)	Recorded data on fatalities, injuries, and property damage	NTD
	Injury accidents per passenger-miles/VMT Property-damage-only accidents per PMT/VMT		
	Response time	Incident/accident reports from law enforcement and the state department of motor vehicles	Other local and state agencies
	Incident/accident durations		
Police officers per transit vehicle (p. 285)	On-board police officers or security staff per transit vehicle	Number of transit police officers, number of transit vehicles	In-house Data

Source: TCRP Report 88.

Community impact measures deal with quality-of-life impacts on the communities served by transit – such as mobility, job access, economic growth and productivity, personal finances (i.e., savings that individuals derive from choosing to use transit instead of driving), and pollution reductions. Community impact measures also evaluate how equitably transit services are distributed to communities throughout the region. Many community impact measures require access to data from MPOs or city planning departments, such as demographic data on car ownership or per-mile cost of operating an automobile. These

measures likely require the use of GIS software and/or data from a regional transportation-planning model. The TCRP 88 strongly advises transit agencies to work in coordination with the local MPOs when developing community impact measures, and evaluating community impact measures annually or in association with a particular major transit project.

Table 4. Community Impact

Measure	Metric	Data Requirement	Data Source
Personal economic impact (p. 249)	% of household income used for transit	Average incomes Average trips by mode	Census data, travel demand models
	Difference in transit and automobile out-of-pocket costs	Average parking costs by area	
	Average fare	Transit fare	
	Average system user cost per trip	Roadway toll Cost of operating a car	
Demographics (p. 240)	% households without cars	Demographic information for certain areas	Census data
	% population too young to drive	Information on the areas served by transit agency	
	% population with incomes under \$X ^a		
	% elderly/disabled ^a		
Communications (p. 251) (How well transit agencies communicate)	Number of residents with positive transit perceptions and with knowledge of transit service	Community transit perceptions/knowledge Number of brochures in alternative formats/languages	Surveys, In-house data
	Information provision for persons with disabilities and non-English speakers	Employee skills including languages	

Table 4, continued

Measure	Metric	Data Requirement	Data Source	
Mobility (p. 236) (The degree of ease of travel between origins and destinations)	Origin-destination travel times	Travel time, speed, and VMT data by origin and destination	Surveys (O-D, home interview, roadside), In-house data, Traffic data	
	Average speed ^{a c} or travel time			
	VMT ^b by congestion level			
	Relative delay rate			
	Roadway LOS or v/c ratios			
	Corridor mobility/travel index			
	Reliability			
	Congestion burden index	% of workforce driving to work	Travel time/speed studies	Census Data, Traffic data from local roadway agency
			Free-flow/acceptable-flow rates	
			VMT or PMT for freeways/arterials	
	Transportation choice ratio	Hourly miles of transit service	NTD, Federal Highway Administration	
		Number of lane-miles of highways/arterials		
Service equity (p. 244)	Examining those who benefit from the project or service and those who are worse off (at the micro-level) ^b	Households with no autos Population with physical disabilities, low-income single parents, people too young or old to drive, unemployed adults, and recent immigrants	GIS software, Labor statistics, Census, National Transportation Surveys, Focus groups, Interviews	
Community economic impact (p. 247)	% state/regional gross product by transit	Number of direct jobs in the transit industry in the area	In-house data, MPOs, State and local taxing authorities	
	Expenditures by mode, tax revenues from transit	Estimated roadway onstruction project costs		
	Cost of vehicle accidents	Tax revenue that is dedicated to transit		
	Highway capacity			
	Parking spaces in the absence of transit			

Table 4, continued

Measure	Metric	Data Requirement	Data Source
Environmental Impact (p. 256)	Transit-related air/water pollution per VMT/1,000 boardings/capita	Emissions for transit vehicles	Transit vehicle manufacturer
	Air quality at transit stops/stations/terminals vs. air quality in other areas	Emission rates for current model year compared with the fleet average	Other agencies, i.e., MPOs or planning; GIS
	Air/water pollution reduced with transit	Air quality at transit stops, stations, and terminals	
	Surface area covered by transit facilities	Residents and workers near transit	
	% population exposed to X% pollution		
Visual impact (p. 258)	"Legibility:" the ease with which a landscape's parts can be recognized and organized into a coherent pattern	Residents' perceptions and preferences	Surveys, case studies, sketches, GIS, virtual models
		Visual simulation	
		Photo-realism	

SANDAG=a, SACOG=b, SCAG=c, MTC=d; Source: TCRP Report 88.

Maintenance measures assess the quality and maintenance of an agency's vehicles, and how that quality and maintenance impacts passenger satisfaction with transit services. Maintenance measures help maintenance staff to run the maintenance department as efficiently as possible. These measures typically only require in-house data, such as maintenance records, fleet information, vehicle model information, and financial and operating data.

Table 5. Maintenance

Measure	Metric	Data Requirements	Data Source
Road calls (p. 289)	The number of unplanned revenue service road calls per specified distance or time	Maintenance records, vehicle miles	In-house
Average spare ratio vs. scheduled spare ratio (p. 294)	The % of the spare fleet actually available to substitute for other vehicles	Number of vehicles in maximum service, total fleet size;	NTD; In-house
		Number of vehicles available service/day	
Fleet cleaning (p. 292)	% of fleet cleaned daily	Records of the number of vehicles cleaned each day or after trip, fleet size	In-house
Maintenance work orders (p. 291)	Total work orders per bus model/ to model buses; total orders/ total buses.	Maintenance records for each bus	In-house

Table 5, continued

Measure	Metric	Data Requirements	Data Source
Fleet Age (p. 216, 295, 296)	Average life of vehicle	Average lifespan of vehicle components by vehicle model	In-house
	Average age of vehicle		
	Average age of the transit fleet ^c	Date of component installation by vehicle Age of each vehicle in the fleet	
Maintenance effectiveness (p. 321)	Mechanics per 1,000 revenue miles, open maintenance work orders, repeat repairs/breakdown per month, total labor hours spent on preventive maintenance vs. total labor hours	Financial and operating data	In-house
Fleet maintenance performance (p. 320)	VMT per gallon; maintenance labor cost/ VMT, material cost/ VMT, consumables cost/VMT, cost/VMT per bus model vs. fleet, and labor costs vs. material costs; average consumables cost/ bus model vs. fleet; value of parts/month vs. inventory	Financial and operating data; fleet data; energy consumption data	In-house; NTB

SANDAG=a, SACOG=b, SCAG=c, MTC=d; Source: TCRP Report 88.

Financial performance measures evaluate how efficiently agencies use resources to meet travel demand within their budget constraints. Financial performance measures are the most widely used measures of transit agencies, due in part to NTD reporting requirements – which require transit agencies to annually report data on measures such as ridership, farebox recovery ratio, and cost per revenue mile. However, many of the recommended financial performance measures require more complex data than that reported to the NTD, such as measures of ridership, which require automatic passenger counters or manual data collection on passenger boardings. While each transit agency must evaluate its financial performance, the TCRP 88 encourages agencies to quantify how much transit service benefits the community.

Table 6. Financial Performance

Measure	Metric	Data Requirements	Data Source
Ridership (p. 301)	Monthly system-wide boardings	APC/AVL data	APC/AVL Data, Manual Data Collection
	Daily linked trips ^{b c}	Scheduling dispatch reports Driver logs	
Productivity (p. 314)	Total passengers divided by total revenue or service hours ^{a b c d}	Driver logs	AVL, Manual Data Collection
		AVL equipment	
		Scheduling software	
Cost-effectiveness (p. 312)	Farebox recovery ratio ^{a b c d}	Financial and operating data	NTD
	Operating ratio		
	Cost per passenger/PM ^{c d}		
	Subsidy per passenger/PM		
	Revenue per passenger/PM		
	Cost per capita		
Cost-efficiency (p. 307)	Cost per vehicle hour ^{c d}	Financial and operating statistics	NTD
	Cost per vehicle mile		
	Cost per vehicle trip ^c		
Energy consumption (p. 306)	Gallons of fuel per vehicle revenue mile	Financial and operating data	NTD
	Electricity consumed per vehicle revenue mile	Energy Consumption	
Risk management (p. 325)	Vehicle liability losses	Financial and insurance records	In-house data
	General liability losses		
	Property losses		
	Workers compensation payments		

SANDAG=a, SACOG=b, SCAG=c, MTC=d; Source: TCRP Report 88.

Agency administration measures indicate levels of administrative efficiency by evaluating employee productivity, employee relations, workdays lost due to injury, and efficiency of service delivery (i.e., vehicle miles per employee or cost of administrative staff to operations staff). Analysts calculate these measures with in-house data, such as financial, operating, and administrative records. While agency administration measures do not measure the system's ability to meet the needs of its customers, these measures succeed in determining how well an agency utilizes its resources to provide transit service.

Table 7. Agency Administration

Measure	Metric	Data Requirements	Data Source
% Positive Drug/Alcohol Tests (p. 278)	% positive drug/alcohol tests from agency staff in positions that can directly impact the safety of passengers and other employees	The number of people tested and the number of positive tests	Random drug testing
Employee productivity (p. 323)	Staff tardiness rate Staff absenteeism rate Pay-to-platform hours Total regular and overtime hours per month Overtime per person per week % overtime labor hours paid due to absences and backlogged work orders	Employee timecard information	In-house data
Employee relations (p. 324)	Staff turnover rate Number of employee suggestions/implemented Number/% employees trained Employee satisfaction	Employment records Suggestion program records Employee skills database	In-house data, Survey
Administrative performance (p. 319)	VMT/hours per employee ^d Cost/number of administrative staff to operations staff Labor hours per vehicle hour Passenger trips per employee	Access to a transit system's financial, operating and administrative records	In-house Data

SANDAG=a, SACOG=b, SCAG=c, MTC=d; Source: TCRP Report 88.

III. CALIFORNIA METROPOLITAN PLANNING ORGANIZATIONS

Researchers examined the use of performance measures by the four major California metropolitan planning organizations (MPOs) as part of this project, based on information from recent reports and publications found on MPO websites, which are made available to the public. The investigators reviewed system performance reports, regional and metropolitan transportation plans, and coordinated plans. This section presents findings from four major MPOs in California currently using performance measures as part of their transportation planning process. These MPOs include:

- Southern California Association of Governments (SCAG);
- San Diego Association of Governments (SANDAG);
- Sacramento Area Council of Governments (SACOG);
- San Francisco Bay Area Metropolitan Transportation Commission (MTC).

The measures provided by these MPOs provide the most comprehensive and consistent source of transit performance measure data in California. In other words, these measures are available for a majority of the population of California and, as a result, Caltrans may be particularly interested in these measures as it considers the availability of data and the development of measures for the State of California.

GENERAL FINDINGS

The MPOs studied in this report together evaluate 40 different measures as tabulated in Table 8. Nearly half of the performance measures collected by the MPOs measure financial performance. Financial performance is the only category of performance for which MPOs can collect uniform data on the transit agencies within their regions. Federal and state law requires that transit agencies report financial and operating information in order to apportion funding. Therefore, not only is financial and operating information easily accessible due to this reporting requirement, it is also uniform across the thousands of transit agencies in the country.

Table 8. Consolidated MPO Measures and Metrics by MPO

Category	Measure	Metrics	MPOs
Service Availability	Service Coverage	% transit-supportive area served by transit	SANDAG, SCAG, SACOG
		% jobs/housing/population with transit access	
		% new jobs near high-frequency transit	SACOG
		% new homes near high-frequency transit	
	Frequency	Time intervals between transit vehicles (headway)	SCAG
		% stops that have transit service within a specified timeframe(s)	SANDAG
	Hours of Service	Minimum headways at or below an established threshold	
How long service is provided during a day, measured by LOS threshold (for example, A=19-24 hours/day, B=17-18 hours/day, C=14-16 hours/day, D=12-13 hours/day, E=4-11 hours/day, F=0-3 hours/day) ^{a c}		SANDAG, SCAG	
Stop Accessibility	Walking distance to bus stop	SANDAG	
	% stops/stations ADA accessible		
Service Delivery	Missed Trips	Number of trips removed from the daily schedule	SANDAG
		% trips completed	
	On-Time Performance	% transit vehicles departing or arriving at a location on time	SANDAG
		% ADA trips with pickup in schedule window	
	Passenger Load	Average % seats occupied	SANDAG
	Transit-Auto Travel Time	Transit travel times vs. auto travel times	SCAG
Overall transit travel times vs. overall travel time by auto			
Passenger Environment	Occupancy on board vehicles by distance, speed, fare, and type of service	SANDAG	
Community Impact	Demographics	Number of return trips provided per week to destinations from rural villages	SANDAG
		% bus stops and transit stations fully accessible to disabled populations in the region	
	Mobility	Average speed	SCAG, SANDAG
	Service Equitability	% minority and low-income census tracts with transit service vs. average level of service and amenities provided in nonminority census tracts	SANDAG
		Total homes in environmental justice areas near high-frequency transit	SACOG
Maintenance	Vehicle Age	The average age of the transit fleet	SCAG

Table 8, continued

Category	Measure	Metrics	MPOs
Financial Performance	Ridership	Total transit person trips	SCAG, SACOG
		Total daily trips	
		Per capita trips	
		% of weekday commute travel by transit	SACOG
	Productivity	Total passengers/boardings per total revenue/service hours	SCAG, SANDAG, SACOG, MTC
		Passengers per Vehicle Revenue Mile	SCAG, MTC
	Cost-effectiveness	Farebox recovery ratio	SCAG, SANDAG, SACOG, MTC
		Cost per passenger/PM	SCAG, MTC
	Cost-efficiency	Cost per vehicle hour	SCAG, MTC
		Cost per vehicle mile	SCAG
Cost per vehicle trip		SCAG	
Administration	Administrative performance	Revenue-vehicle hours per employee equivalent	MTC

SANDAG=a, SACOG=b, SCAG=c, MTC=d

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS (SCAG)

SCAG encompasses six counties (Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura) and 191 cities in an area of more than 38,000 square miles. It divides its performance measurement into two levels of analysis – the regional level, and the agency level. Stakeholders in the Regional Transit Technical Advisory Committee identified regional-level measures, and the High-Speed Rail and Transit Subcommittee reviewed these measures;¹⁴ see Table 9. The California Transportation Commission's 2010 *Regional Transportation Plan Guidelines* and the *TCRP Report 88: A Guidebook for Developing a Transit Performance Measurement System*¹⁵ were used as sources to identify agency-level performance measures.

Table 9. SCAG Regional-Level Performance Analysis

Performance Measure	Metric
Ridership	Total Trips
	Per Capita Trips*
Service	Route Miles
	Vehicle Revenue Hours
	Vehicle Revenue Miles
Productivity	Passengers per Vehicle Revenue Hour
	Passengers per Vehicle Revenue Mile

Table 9, continued

Performance Measure	Metric
Costs	Cost per Vehicle Revenue Hour
	Cost per Passenger Trip
	Cost per PM

**Per Capita Trips are a key transit performance measure at SCAG because it indicates changes in transit demand that account for population growth. Source: SCAG, Transit System Performance Report – Fiscal Year 2011-12 (2015).*

SCAG analyzes regional metrics, which use data from the NTD, by constructing a 20-year time series dating back to 1992. This time series allows SCAG to understand trends and the changing nature of transit service provision and consumption over time in the region. All of the agency-level performance measures used by SCAG for FY 2011-2012 used data obtained from the NTD. See Tables 10 and 11.

Table 10. SCAG Agency-Level Transit Measures

Measure	Metrics
Cost Efficiency	Operating Cost per Vehicle Revenue Hour
	Farebox Recovery
Cost Effectiveness	Operating Cost per Passenger Trip
	Operating Cost per PM
Productivity	Passengers per Vehicle Revenue Hour
	Passengers per Vehicle Revenue Mile
Maintenance	Fleet Average Vehicle Age
Mobility/Travel Time	Average Vehicle Speed

Source: SCAG, 2012-2035 RTP Transit Appendixes (2012, p. 10).

Table 11. SCAG Regional Transportation Plan Transit Measures

Performance Measure	Metric
Ridership	Per Capita Transit Trips
Availability	Frequency
	Span-of-Service
	Location of stops and stations
	Productivity (boardings per service hour)
Speed	Average speed by modal transit vs. average auto speed
	Overall transit travel times vs. overall travel time by auto (accounting for travel time to and from metro stations/bus stops on each end of the trip)
Costs and Revenues	Farebox recovery
	Costs per PM traveled
Accessibility	% of jobs, housing and population with available transit

Source: SCAG, 2012-2035 RTP Transit Appendixes (2012).

SCAG also executed performance benchmarking to peer regions (New York-Newark-Bridgeport; Chicago-Naperville-Michigan City; Washington-Baltimore-Northern Virginia; Boston-Worcester-Manchester; San Jose-San Francisco-Oakland; Philadelphia-Camden-

Vineland; Houston-Baytown-Huntsville; Atlanta-Sandy Springs-Gainesville; Miami-Fort Lauderdale-Pompano Beach; and Detroit-Warren-Flint) to establish a frame of reference for the cost-effectiveness of current operations and to identify areas where other regions provide service at a lower cost. Performance benchmarking through peer comparison has become a new and popular method for evaluating performance due to the online availability of NTD data to gather information on individual transit agencies. SCAG looked at the following three measures in the peer comparison benchmarking analysis:

- Cost per Person Mile (PM) Traveled;
- Cost per Service Hour;
- System Productivity (passengers per hour by transit type).

SAN DIEGO ASSOCIATION OF GOVERNMENTS (SANDAG)

SANDAG represents 18 cities in the San Diego region. This region uses NTD data submitted to FTA for Transit Title VI on Low-Income and Minority Census Tracts, census data, regional travel demand model, and automatic data collection through the Regional Transit Management System, including automatic vehicle location and automatic passenger counters.¹⁶ Table 12 includes a list of their performance measures. These objectives relate to the goals of the Regional Comprehensive Plan (RCP) or the Regional Transportation Plan (RTP), or they are tracked through the annual Transportation Development Act program.

SANDAG relies on the Regional Transit Management System (RTMS), which is an advanced management tool for providing real-time performance monitoring and reporting.¹⁷ The RTMS uses data from AVL technology for real-time dispatch control and for real-time vehicle location to monitor on-time performance goals. Additionally, SANDAG utilizes the Passenger Counting Program (PCP), which provides stop-by-stop boarding and alighting information for weekday trips and a sampling of weekend trips. The PCP relies on manually collected data, but will soon use data from Automated Passenger Counters (APC). Currently, 48% of SANDAG vehicles are equipped with AVL, and 75% with APC. SANDAG has plans to advance its real-time transit data by integrating arterial (A-PeMS) and transit (T-PeMS) modules from the Caltrans Performance Measurement System (PeMS). A-PeMS collects and stores arterial data from roadway sensors. T-PeMS is a transit extension that uses APC and AVL, described above, to compute performance measures.

Table 12. SANDAG Transit Performance

Measure	Metric
Financial	Farebox Recovery
Productivity	Passengers per revenue-hour Average % of seats occupied
Access	Walking distance to bus stop (using GIS software) % “existing/planned” smart growth areas served by the minimum transit Number of return trips provided per week to destinations from rural villages % bus stops and transit stations fully accessible to disabled populations
Convenience	% stops that have transit service within a specified timeframe(s) Minimum headways (in minutes) that are at or below an established threshold
Reliability and Speed	% trips on time at departures, arrivals, and in-route timing points % trips completed % ADA trips with pickup within schedule window Average transit operating speed
Environmental Justice	% minority/low-income census tracts with transit vs. mean LOS non-minority*
Comfort	On-board occupancy suit distance, speed, fare, and type of service

* Level of Service (LOS); Non-minority is the population that does not include minorities, who include Black or African-Americans, Hispanics, Asian American or Pacific Islander, and American Indian or Alaskan Native. Source: SANDAG, Coordinated Plan 2014-2018 (2014).

SACRAMENTO AREA COUNCIL OF GOVERNMENTS (SACOG)

The Sacramento Area Council of Governments covers 22 cities in the counties of El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba. The 2016-2036 Metropolitan Transportation Plan/Sustainable Communities Strategy¹⁸ includes information on SACOG’s performance measures. SACOG uses data provided by operators, State Controller Reports, and the NTD to evaluate their performance on the following performance measures presented in Table 13.¹⁹

Table 13. SACOG Transit Performance

Measures	Metrics
Ridership	Total transit person trips Transit person trips per capita % weekday commute travel by transit
Productivity	Passenger boardings per service hour Frequency of service Total daily trips
Financial	Transit costs recovered by ticket sales (%)
Service Coverage	Share of new jobs near high-frequency transit (% of new jobs) Share of new homes near high-frequency transit (% of new homes)
Community Economic Impact	Total homes in environmental justice areas near high-frequency transit (% of homes)

Source: SACOG, 2016-2036 Metropolitan Transportation Plan/Sustainable Communities Strategy (2015).

METROPOLITAN TRANSPORTATION COMMISSION (MTC)

MTC is the transportation planning, coordinating, and financing agency for the nine counties in the San Francisco Bay Area. As described in the MTC *Statistical Summary 2014*,²⁰ the MTC collects the performance measures listed in Table 14. The data used to evaluate transit performance with these measures includes transit operators' annual Transportation Development Act claim for funds, the NTD, State Controllers' reports, and other "in-house" data from individual transit agencies as requested by MTC.

Table 14. MTC Transit Performance

Measure	Metric
Cost efficiency	Operating cost per revenue-vehicle hour
Cost effectiveness	Operating cost per passenger
Service effectiveness	Passengers per revenue-vehicle hour
	Passengers per revenue-vehicle mile
Labor efficiency	Revenue-vehicle hours per employee equivalent
Final	Ratio of fares received to total operating cost

Source: MTC, Statistical Summary (2015).

IV. CALIFORNIA TRANSIT AGENCIES

Investigators identified transit agency planning documents developed from 2010 to 2015 from internet searches. The list of transit agencies in California found in the NTD was a helpful reference for identifying reports with transit performance measures. The scope of the research project did not include the analysis of performance measures from all California transit agencies. Agencies that had developed performance measures but did not evaluate transit performance were not included in this report. Researchers compiled a list of performance measures from the following agencies, using their most recent reports (see date):

- Antelope Valley Transit Authority²¹
- Caltrain²²
- City of Davis²³
- City of Lodi²⁴
- Fairfield and Suisun Transit²⁵
- Foothill Transit²⁶
- Fresno Council of Governments²⁷
- Golden Gate²⁸
- San Joaquin Regional Transit District²⁹
- Livermore Amador Valley Transit Authority³⁰
- Los Angeles County Metropolitan Transportation Authority³¹
- Marin Transit³²
- Mendocino Transit Authority³³
- Modoc County Transportation Commission³⁴
- Napa County Transportation and Planning Agency³⁵
- Petaluma Transit³⁶
- Placer County Transportation Planning Agency³⁷
- Riverside Transit Agency³⁸
- Sacramento Regional Transit³⁹

- San Mateo County Transit District⁴⁰
- San Francisco Municipal Transportation Agency⁴¹
- Solano Transportation Authority⁴²
- Transit Joint Powers Authority for Merced County⁴³
- Union City Transit⁴⁴
- Visalia Transit⁴⁵
- Western Placer Consolidated Transportation Services Agency⁴⁶ (2011)

Figure 1 shows the frequency of performance measures used by transit agencies by performance measure category. The most frequent measures are in the financial category, followed by the delivery category – and then maintenance, availability, and administration.

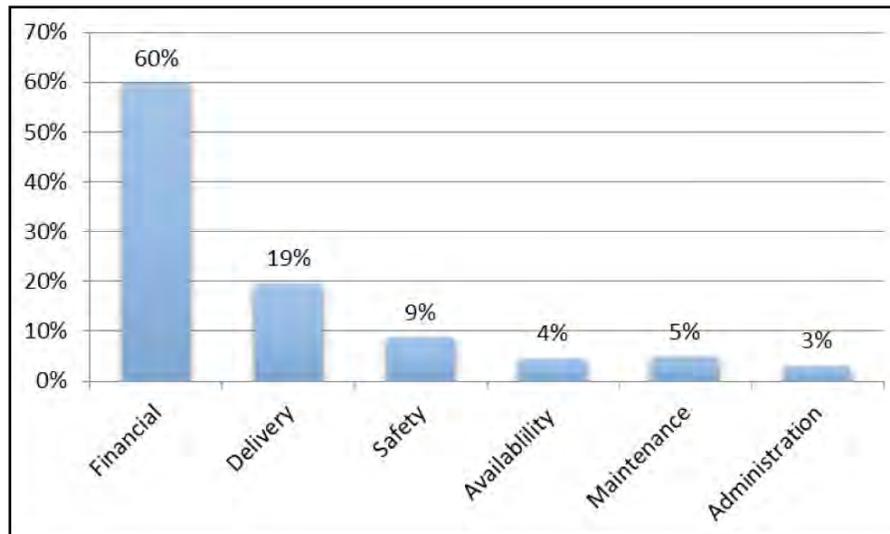


Figure 1. Transit Agencies: Frequency of Measures by Performance Categories (N=231)

Table 15 documents the specific measures within each category, as well as the frequency of use. Investigators saw a wide range of measures within the financial category, which largely uses NTD data. The most common measures in the financial category are farebox recovery, passenger trips per vehicle revenue or service hours, and cost per vehicle revenue or service hours. The most common measures for delivery are on-time performance, responsiveness to calls, and number of complaints. For safety, number of accidents, crimes, and injuries are the most typical measures. The measures used for availability include proximity to bus stops and frequency of service.

Table 15. Frequency of Performance Measures by Category for Transit Agencies (N=231)

Measures	Metrics	Frequency	Percent
Financial (N=138)	Farebox Recovery	32	23%
	Passenger Trips/Vehicle Revenue or Service Hours	24	17%
	Cost/Vehicle Revenue or Service Hours	21	15%
	Passenger Trips/Vehicle Revenue or Service Miles	13	9%
	Cost/Passenger Trips	13	9%
	Subsidy	10	7%
	Mean Fare	8	6%
	Passenger Trips/Week or Month	4	3%
	Cost/Vehicle Revenue or Service Miles	7	5%
	Vehicle Revenue Mile/Vehicle Revenue Hour	2	1%
	Passenger Miles/Vehicle Revenue or Service Miles	1	1%
	Cost/Passenger Miles	1	1%
	Energy/Vehicle Revenue or Service Miles	2	1%
Delivery (N=45)	On-Time Performance	10	22%
	Responsiveness to Calls	8	18%
	Complaints	9	20%
	Service Calls	5	11%
	Missed Trips	5	11%
	Load Factor	4	9%
	Timed Transfers	2	4%
	Transit Travel Times	2	4%
Safety (N=20)	Accidents	14	70%
	Crime	3	15%
	Injuries/Passenger Trips	2	10%
	Training	1	5%
Availability (N=10)	Proximity to Bus Stops	7	70%
	Frequency	3	30%
Maintenance (N=11)	Maintenance	9	82%
	VMT/Service Interruption	2	18%
Administrative (N=7)	Performance	4	57%
	Hours of Training	1	14%
	Employee Productivity	1	14%
	Employee Relations	1	14%

V. CONCLUSION

The first phase of this research involved a review of the available transit performance measure guidance publications. The goal was to identify a complete framework (categories, example metrics, and data) within which to organize this review of California agency measures. Investigators found the Transportation Research Board's TCRP Report 88, *A Guidebook for Developing a Transit Performance-Measurement System* (TCRP, 2003) to be consistent with and more comprehensive than other published guidance documents. Researchers identified the following key transit performance measures for use in this report:

- Service Availability: Ease of transit access based on where (service coverage and/or stop accessibility), how often (frequency), and how long (hours of service) service is provided.
- Service Delivery: Quality of passengers' day-to-day experiences using transit, as manifested in such categories as service reliability, quality of customer service, and passenger comfort.
- Safety and Security: Likelihood that an accident will occur involving passengers, or that a passenger will become the victim of a crime while using transit. Examples include the rate of accidents per specified distance, the injury accidents per passenger-miles, and quantity of safety devices and personnel.
- Community Impact: Quality-of-life impacts on the communities served by transit, such as mobility, job access, economic growth and productivity, personal finances (i.e., savings that individuals derive from choosing to use transit instead of driving), pollution reductions, and equitability of transit service.
- Financial Performance: How efficiently agencies use resources to meet travel demand within their budget constraints.
- Agency Administration: Efficiency, including employee productivity, employee relations, workdays lost due to injury, and efficiency of service delivery (i.e. vehicle miles per employee, or cost of administrative staff to operations staff).

Major sources of data for these performance measures include the following:

- In-House: Data that transit agencies normally have on hand through good record-keeping— for example, schedule data, system maps, service design standards, dispatch logs, maintenance records, operations logs, accident and incident records, financial data, fleet data, employee records, and complaint records.
- National Transit Database (NTD): Primary source for data, information, and statistics on the U.S. transit systems. Reporting required by those receiving Urbanized Area Formula Program (Section 5307) or Rural Area Formula Program (Section 5311) grants. Data examples include service area, agency information, fleet information, capital and operating funds, costs and expenses, maintenance, safety, service provided and consumed, and energy consumption.

- Other local, state, and federal agencies: Information on external factors that help evaluate the quality and location of transit service – demographic data, traffic data, GIS data, and transportation-planning models.
- Automated systems: Technology that improves data accuracy and completeness, timeliness of reporting, and data collection costs – automatic vehicle location (AVL), train control systems, automatic passenger counters (APC), and electronic fareboxes.

Next, researchers examined the use of performance measures in recent reports and publications by the four major California metropolitan planning organizations (MPOs). These MPOs include:

- Southern California Association of Governments (SCAG);
- San Diego Association of Governments (SANDAG);
- Sacramento Area Council of Governments (SACOG); and
- San Francisco Bay Area Metropolitan Transportation Commission (MTC).

The measures provided by these MPOs provide the most comprehensive and consistent source of transit performance measure data in California. In other words, these measures are available for a majority of the population of California and, as a result, Caltrans may be particularly interested in these measures as they consider the availability of data and the development of measures for the State of California.

The MPOs studied in this report together evaluate 40 different measures. Nearly half of the performance measures collected by the MPOs measure financial performance.

- Service Availability: All MPOs measured service availability – coverage by SANDAG, SCAG, and SACOG, frequency by SCAG and SANDAG, hours of service by SANDAG and SCAG, and stop accessibility by SANDAG.
- Service Delivery: SANDAG used several measures of service delivery, including missed trips, on-time performance, and passenger load, as well as a measure of passenger environment. SCAG used relative measures of auto and transit travel time.
- Community Impact: All MPOs measured community impacts – SANDAG used demographic data to evaluate service to low-income, elderly, and disabled populations; SCAG, SANDAG, and SACOG examined travel times and/or distance between origin and destination locations; and SACOG included service equitability.
- Maintenance: SCAG examined the average age of the transit fleet.
- Financial Performance: All MPOs conducted numerous measures of financial performance – including ridership, productivity, cost-effectiveness, and cost-efficiency.

- Agency Administration: MTC included an administrative performance measure.

The last step in this research was to evaluate the most recent transit agency planning documents in California based on an internet search. Investigators reviewed documents from 26 transit agencies – which included 231 performance measures. Researchers discovered that the most frequently measured category was financial and, within that category, the top three measures were farebox recovery, passenger trips per vehicle revenue or service hours, and cost per vehicle revenue or service hour. Delivery was the next most frequent performance measure category, and its top measures were on-time performance, responsiveness to calls, number of complaints, and missed trips. Safety measures, such as accidents, crime, and injuries, were also evaluated by some agencies. Less frequently evaluated measures included availability, maintenance, and administrative measures.

Not surprisingly, it appears that when agencies have data they use that data to measure transit performance. The data mandated for National Transit Data, especially financial data, are commonly used to evaluate transit performance by both MPOs and transit agencies. Performance measures also seem to align with agency goals. Transit agency measures tend to focus more on issues related to customer service, whereas MPO measures focus more on overall scope, location, quality, and equitability of transit service.

APPENDIX A: DESCRIPTION OF KEY NATIONAL TRANSIT DATABASE (PERFORMANCE MEASURE DATA)

Appendix A describes the data available from the 2014 National Transit Database (2015) Office of Budget and Policy, Federal Transit Administration, U.S. Department of Transportation.

Category	Data Labels
Transit Agency Information	<ul style="list-style-type: none"> State Organization Type Transit Agency Name Urbanized Area Urbanized Area Population Service Area Square Miles Month Fiscal Year Ends Transit Mode Service Type Vehicles Operated in Annual Maximum Service (VOMs)
Fleet Size	Vehicles Operated in Maximum Services: Directly Operated & Purchased Transportation
Operating Funds	<ul style="list-style-type: none"> State Funds: General Revenue & Dedicated and Other Local Funds: General Revenue & Dedicated and Other Federal Funds: FTA Urbanized Area Formula Funding & Other Directly Generated Funds: Directly Operated Fare Revenues, Purchased Transportation Fare Revenues, Other Revenues, & Dedicated and Other
Federal Government Sources for Transit Operating Funds Applied	<ul style="list-style-type: none"> Urbanized Area Formula Program Funds: Eligible Operating Assistance & Capital Assistance Spent on Operations Capital Program Funds Transportation Bill (e.g., MAP21) Funds Other FTA Funds: Eligible Operating Assistance & Capital Assistance Spent on Operations Funds Received from Other USDOT Grant Programs Other Federal Funds
Transit Capital Funds Applied – Summary and Federal Sources	<ul style="list-style-type: none"> Directly Generated Funds: Dedicated Taxes, Tolls, and Others & Other Directly Generated Funds State Funds: Funds Allocated out of General Revenue, Dedicated Taxes, Tolls, and Others, & Total State Funds Local Funds: Funds Allocated out of General Revenue & Dedicated Taxes, Tolls and Others Federal Funds: Capital Program, Urbanized Area Formula, MAP-21, Other FTA, Other USDOT, & Other Federal
Capital Funds Applied by Type of Expenditure	<ul style="list-style-type: none"> Guide Way Stations Administrative Buildings Facilities Rolling Stock Other Vehicles Fare Revenue Collection Equipment Systems Other

Table continued

Category	Data Labels
Transit Operating Expenses by Mode, Type of Service and Function	Vehicle Operations Vehicle Maintenance Non-Vehicle Maintenance General Administration
Transit Operating Expenses by Mode, Type of Service and Object Class	Operators Wages Other Salaries & Wages Fringe Benefits Services Materials and Supplies: Fuel and Lube & Tires and Other Utilities Casualty and Liability
Revenue Vehicle Maintenance Performance	Revenue Service Interruptions: Major Mechanical Failure, Other Mechanical Failure & Total Revenue System Mechanical
Energy Consumption	Diesel Gasoline Liquefied Petroleum Gas Liquefied Natural Gas Methanol Ethanol Bunker Fuel Compressed Natural Gas Kerosene Hydrogen Biodiesel Other Fuel Electric Propulsion Electric Battery
Employee Work Hours and Employee Counts	Employee Work Hours: Vehicle Operations, Maintenance (Vehicle and Non-Vehicle), General Administration, Capital Actual Employee Count: Vehicle Operations, Maintenance (Vehicle and Non-Vehicle), General Administration, Capital
Transit Operating Statistics: Service Supplied	Annual Scheduled Vehicle Revenue Miles Annual Vehicle Miles Annual Vehicle Revenue Miles Annual Vehicle Hours Annual Vehicle Revenue Hours
Transit Operating Statistics: Service Consumed	Unlinked Passenger Trips Passenger Miles
Transit Operating Statistics: Service Supplied and Consumed – Train Statistics – Rail Modes	Number of Trains in Operation (Average Week Day) Annual Train Miles Annual Train Revenue Miles Annual Train Hours Annual Train Revenue Hours
Maintenance Facilities	General Purpose Vehicles General Purpose Facilities Heavy Maintenance Facilities

Table continued

Category	Data Labels
Transit Way Mileage – Rail Modes	Track Miles by Type Number of Crossings Directional Route Miles
Transit Way Mileage – Non-Rail Modes	Lane Miles by Type Directional Route Miles by Type
Age Distribution of Active Vehicle Inventory	Active Vehicles By Age Grouping (in Years) Total Active Fleet Average Age of Fleet (in Years)
Fare per Passenger and Recovery Ratio	Fare Revenues Earned Total Operating Expenses Unlinked Passenger Trips Fare Revenues per Unlinked Passenger Trip Fare Revenues per Total Operating Expense (Recovery Ratio)
Service Supplied and Consumed Ratios: Operating Expenses	per Vehicles Operated in Maximum Service per Vehicle Hour per Unlinked Passenger Trip per Passenger Mile per Employee Work Hour
Funds Earned from State Taxes Dedicated at their Source to Transit	Income Taxes Sales Taxes Property Taxes Gasoline Taxes Other Taxes
Funds Earned from Local Taxes Dedicated at their Source to Transit	Income Taxes Sales Taxes Property Taxes Gasoline Taxes Other Taxes
Statement of Finances	Cash and Receivable Investments Special Funds Other Assets Long-Term Debt Term Pension Liabilities Other Estimated Liabilities Other Liabilities

ABBREVIATIONS AND ACRONYMS

ADA	Americans with Disabilities
APC	Automatic Passenger Counters
A-PeMS	Arterial Performance Measurement System
AVL	Automatic Vehicle Location
Caltrans	California Department of Transportation
GIS	Geographic Information System
LOS	Level of Service
MPO	Metropolitan Transportation Agency
MTC	San Francisco Bay Area Metropolitan Transportation Commission
NTD	National Transit Database
PCP	Passenger Counting Program
PeMS	Performance Measurement System
PM	Passenger Miles
PMT	Passenger Miles Traveled
RTP	Regional Transportation Plan
RCP	Regional Comprehensive Plan
RTMS	Regional Transit Management System
SACOG	Sacramento Area Council of Governments
SANDAG	San Diego Association of Governments
SCAG	Southern California Association of Governments
T-PeMS	Transit Performance Measurement System
TCRP	Transit Cooperative Research Program
VMT	Vehicle Miles Traveled
V/C	Volume to Capacity

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Caroline Rodier, Ph.D. is a Research Associate at the Mineta Transportation Institute and the Associate Director of the Urban Land Use and Transportation Center—and a Research Scientist—at the Institute of Transportation Studies, University of California, Davis. Dr. Rodier’s major areas of research include transport, land use, and environmental planning and policy analysis; she has extensive experience applying land use and transport models to inform public investment, planning, and policy decisions. She has managed the development of activity-based microsimulation travel models for the State of California and the San Joaquin Valley, as well as California’s PECAS land-use model. Dr. Rodier has expertise in the design and implementation of research projects that routinely make use of expert and stakeholder interviews, focus groups, and travel behavior surveys. Her research includes parking information and pricing technology pilot projects (most recently SFpark); shared-use modes to facilitate first- and last-mile access to transit; travel needs and mobility solutions for diverse populations in California (e.g., the elderly and immigrants); traffic safety impacts of Variable Message Signs; and the scoping plan for California’s landmark climate change legislation, Assembly Bill 32. Dr. Rodier has also conducted reviews of legal and institutional challenges in the areas of automated speed enforcement, low speeds modes (e.g., Segways and neighborhood electric vehicles), and the provision of public parking for carsharing services. Most recently, Dr. Rodier led the development of the content for scenario activities used in the workshop on Automated Vehicles within the Built Environment: 2020, 2035, and 2050 at the Automated Vehicle Symposium 2014 and 2015. She currently serves as the Chair of the Transportation Research Board’s Emerging and Innovative Public Transport and Technologies Committee. She holds a B.A. in U.S. History from Barnard College at Columbia University, and an M.S. in Community Development and a Ph.D. in Ecology from the University of California, Davis.

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Trends in the SCAG Region 2005-2015

Regional Transit TAC
October 5, 2016

Philip Law
Manager, Transit/Rail

Data Collection Parameters

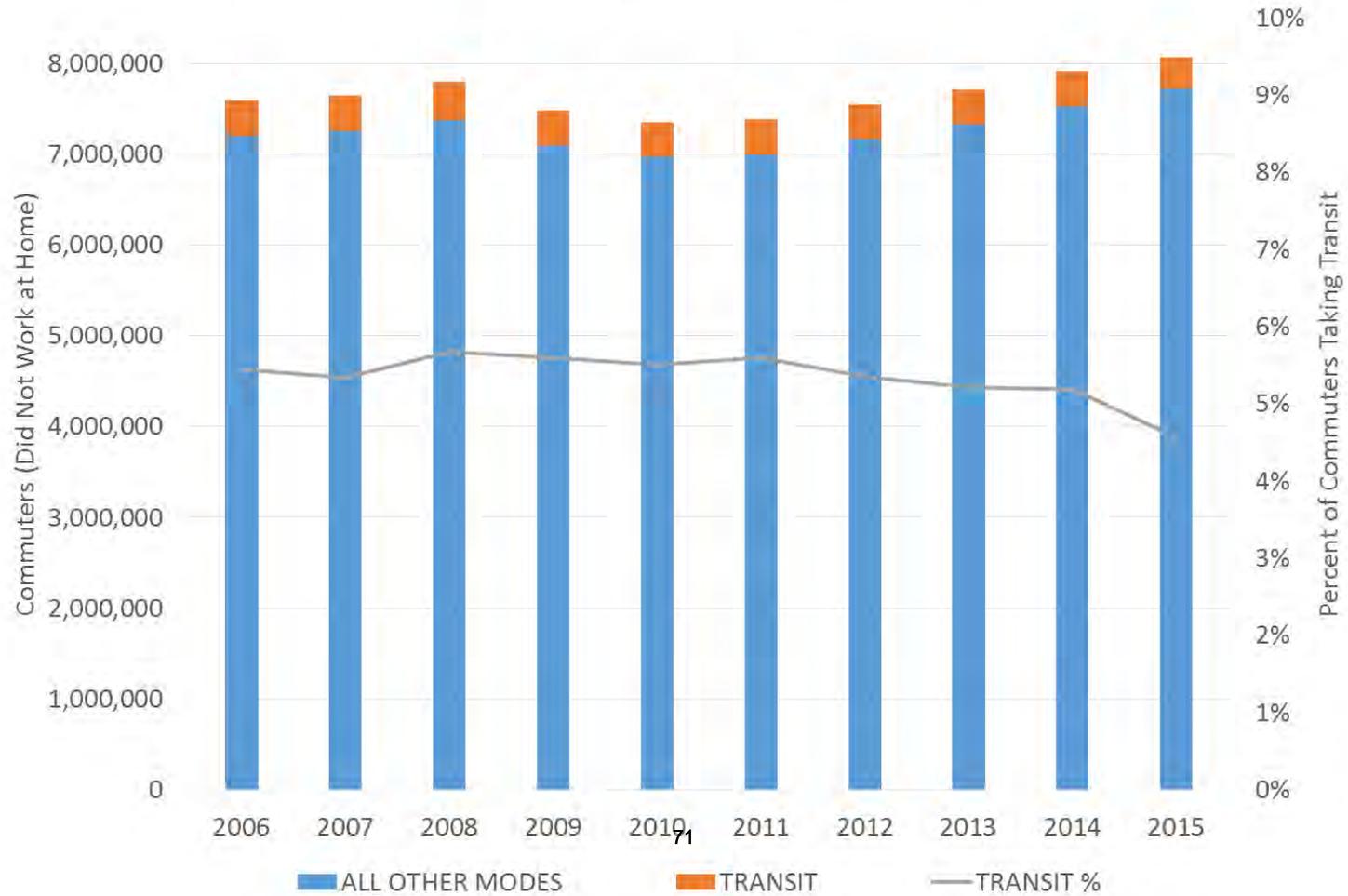
- Timeframe: 2005 to 2015, if available
- Geography: SCAG region by county
- Sources:
 - American Community Survey
 - CA Department of Finance
 - CA Department of Motor Vehicles
 - CA Employment Development Department
 - US Energy Information Administration
 - Census Longitudinal Employer-Household Dynamics, Origin Destination Employment Statistics
 - CA Air Resources Board

Data Variables

- Commute Characteristics
- Demographics
- Auto Ownership
- Fuel Prices
- Employment
- VMT and Congestion

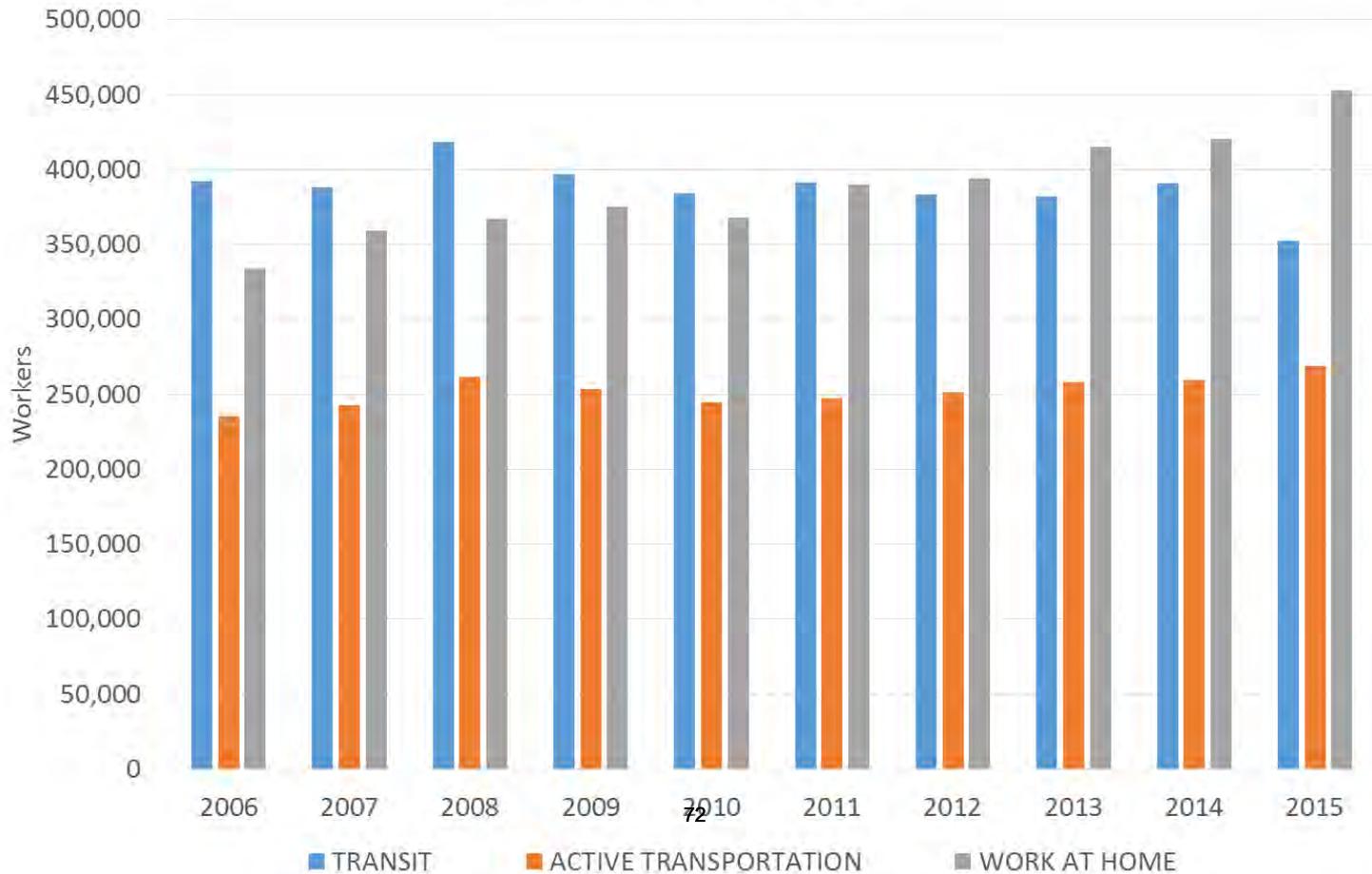
Commute to Work, Transit Mode Split, SCAG Region 2006-2015

Source: American Community Survey



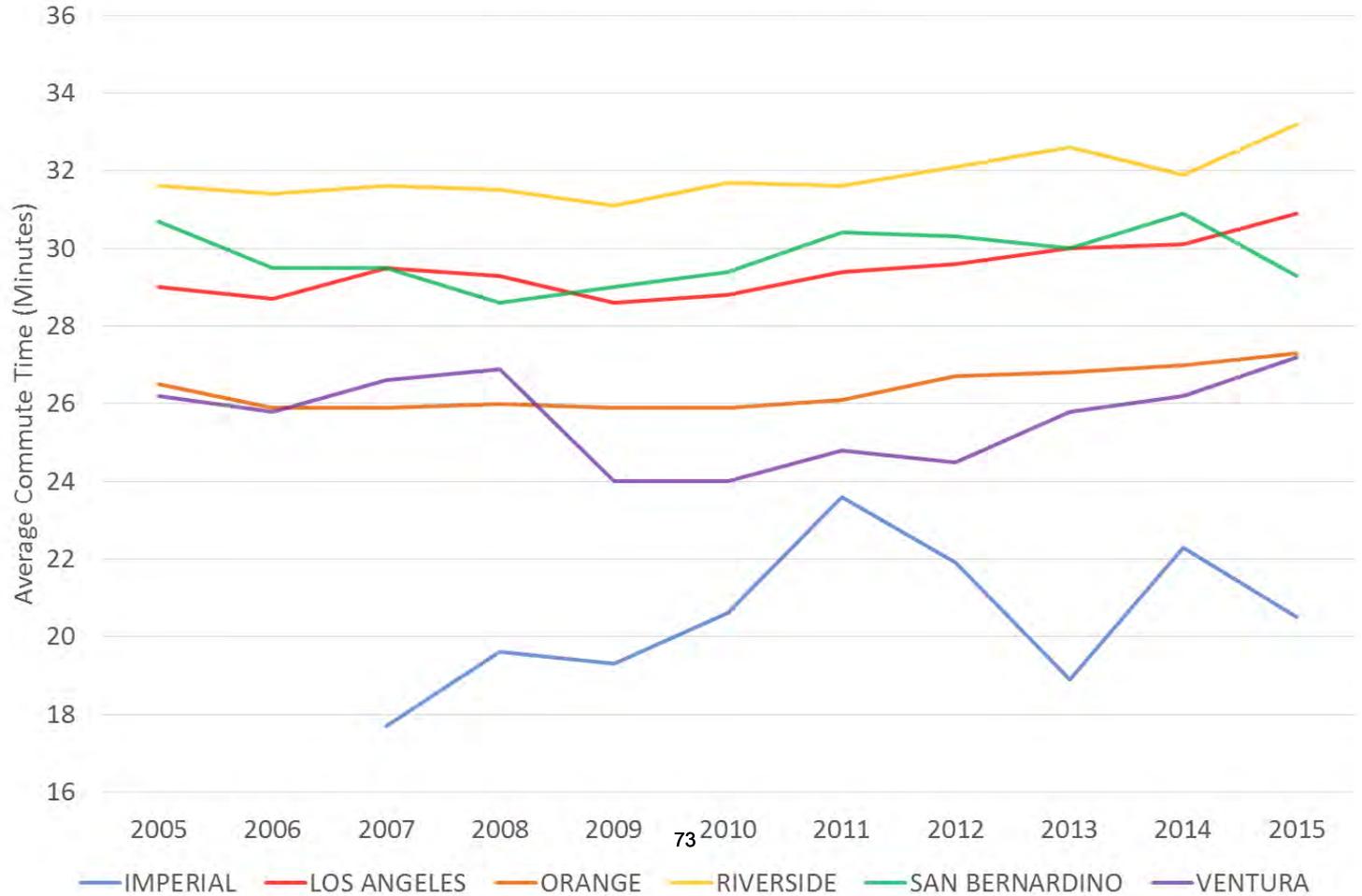
Workers by Mode - Transit, Active Transportation, and Work at Home, SCAG Region 2006-2015

Source: American Community Survey



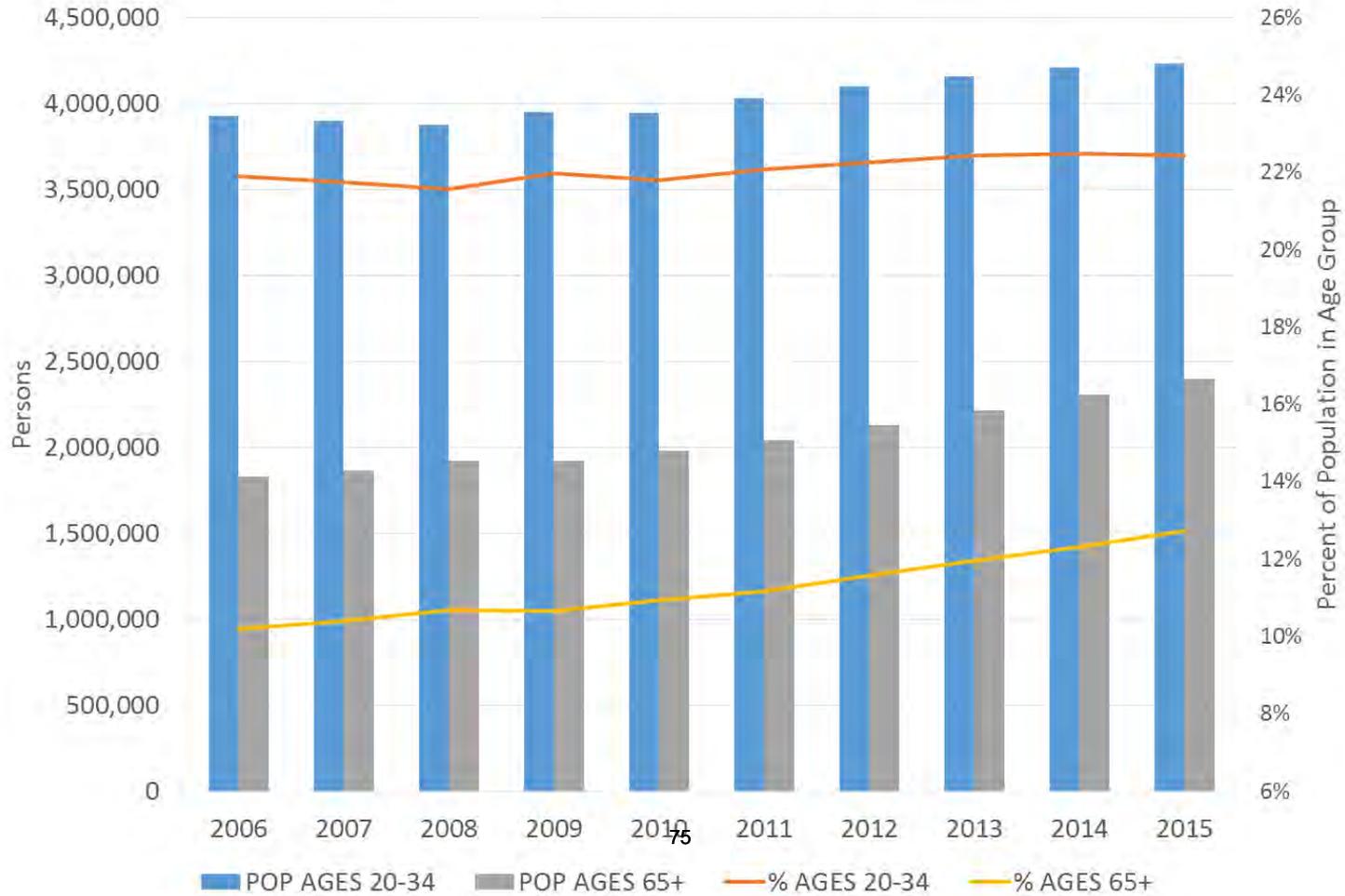
Average Commute Time, By County 2005-2015

Source: American Community Survey



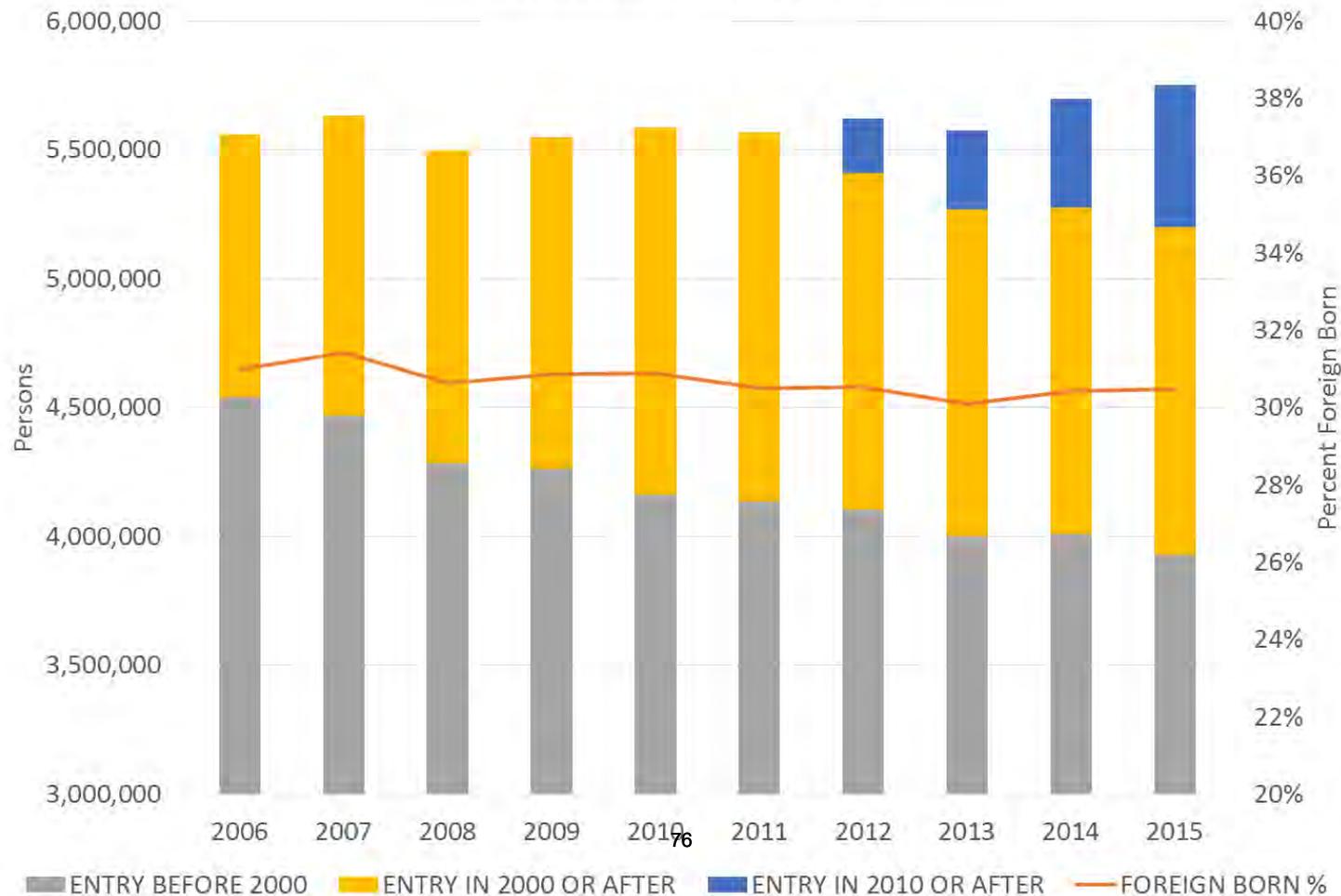
Population Ages 20-34 and 65+, SCAG Region 2006-2015

Source: American Community Survey



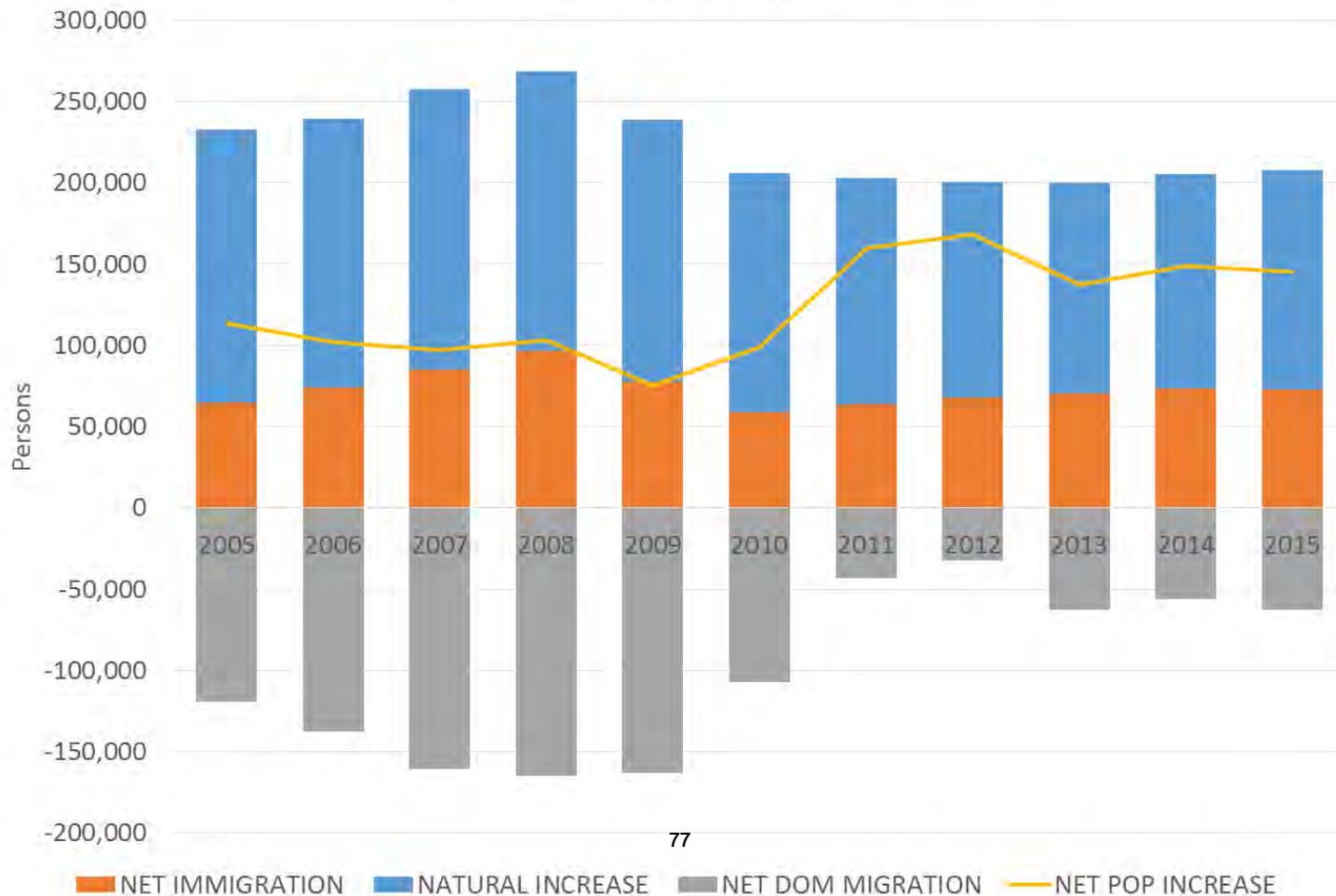
Foreign Born Population, SCAG Region 2006-2015

Source: American Community Survey



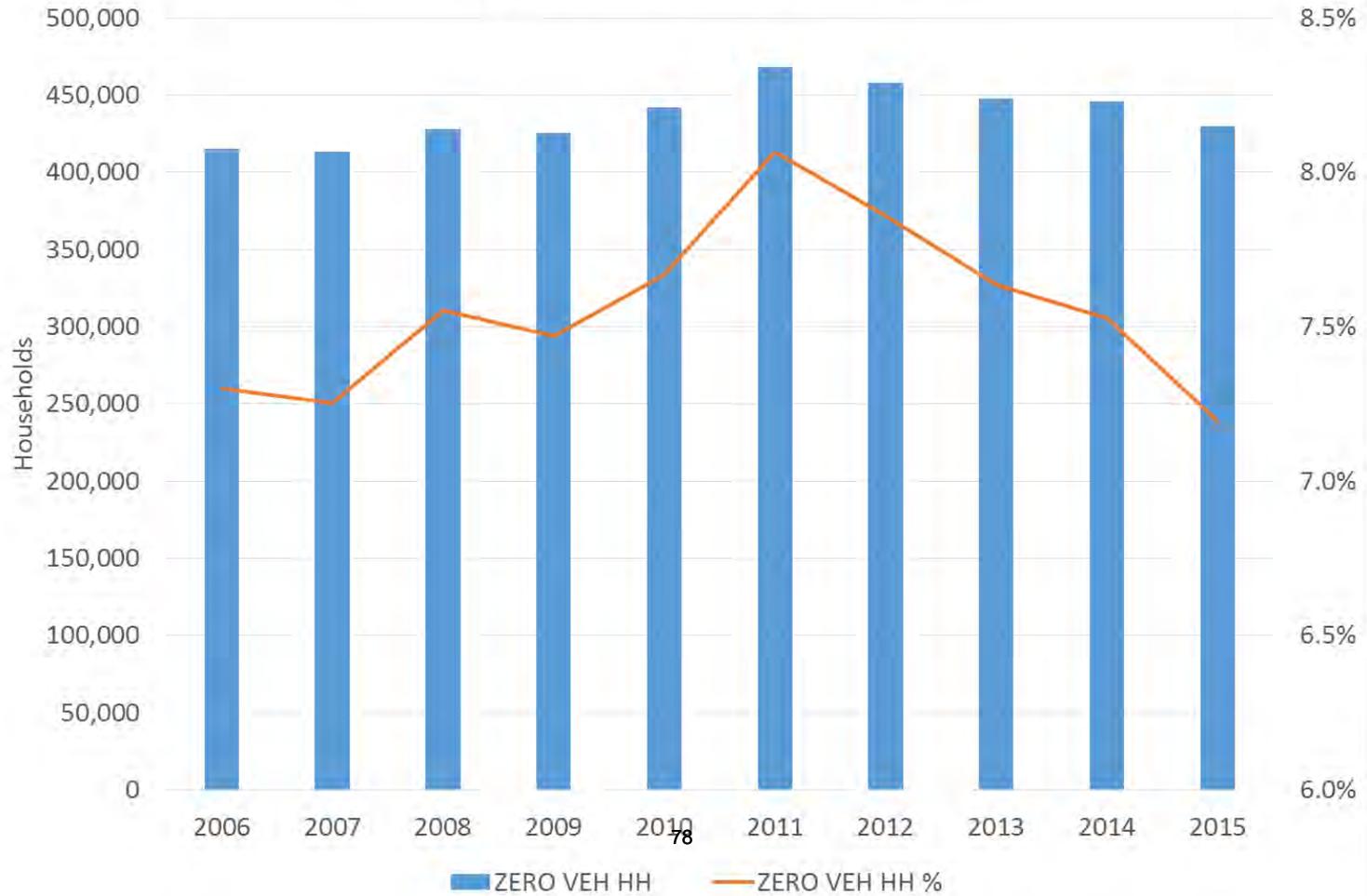
Components of Population Growth, SCAG Region 2005-2015

Source: CA Dept. of Finance, July 1 Estimates



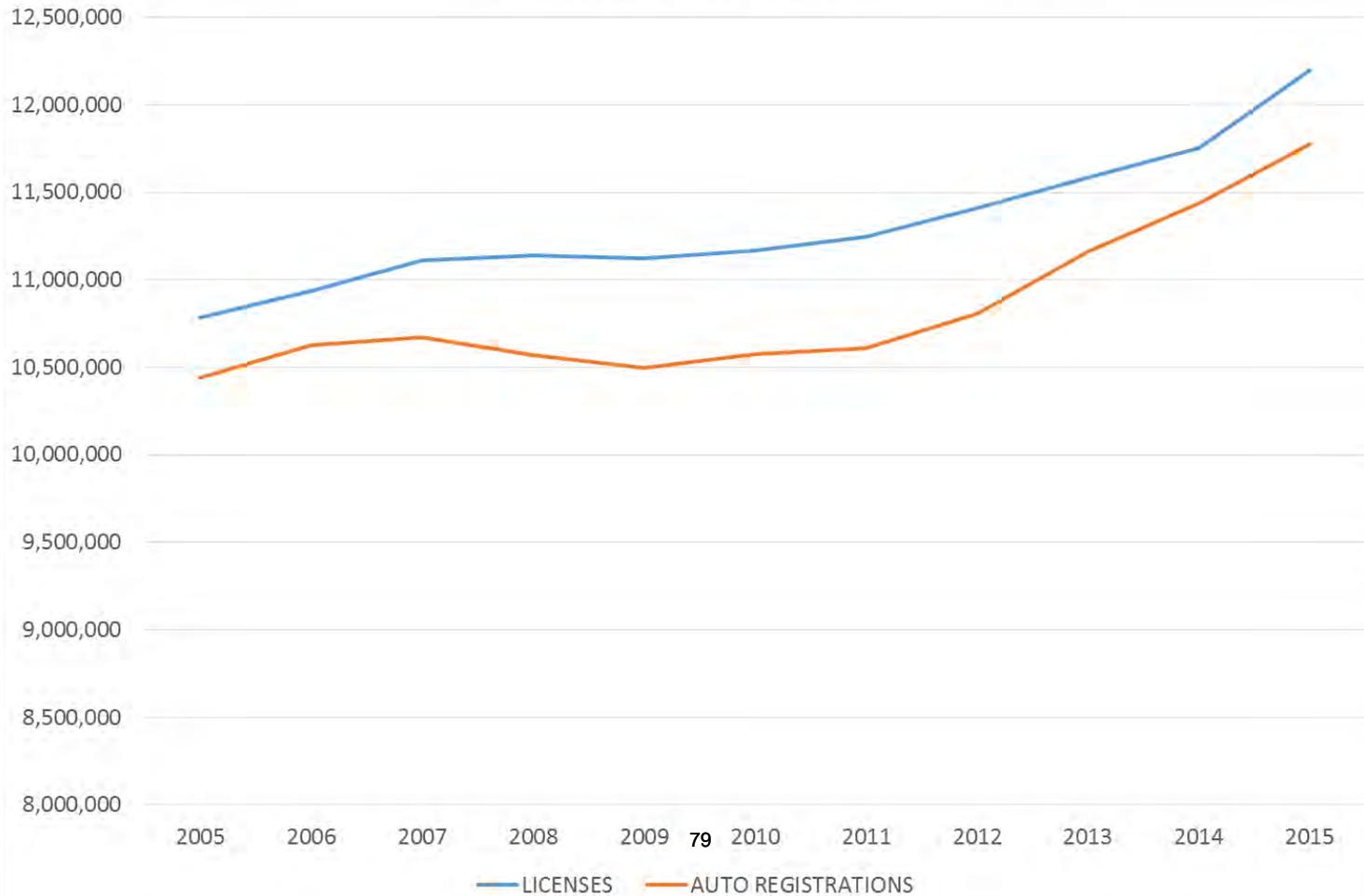
Zero Vehicle Households, SCAG Region 2006-2015

Source: American Community Survey



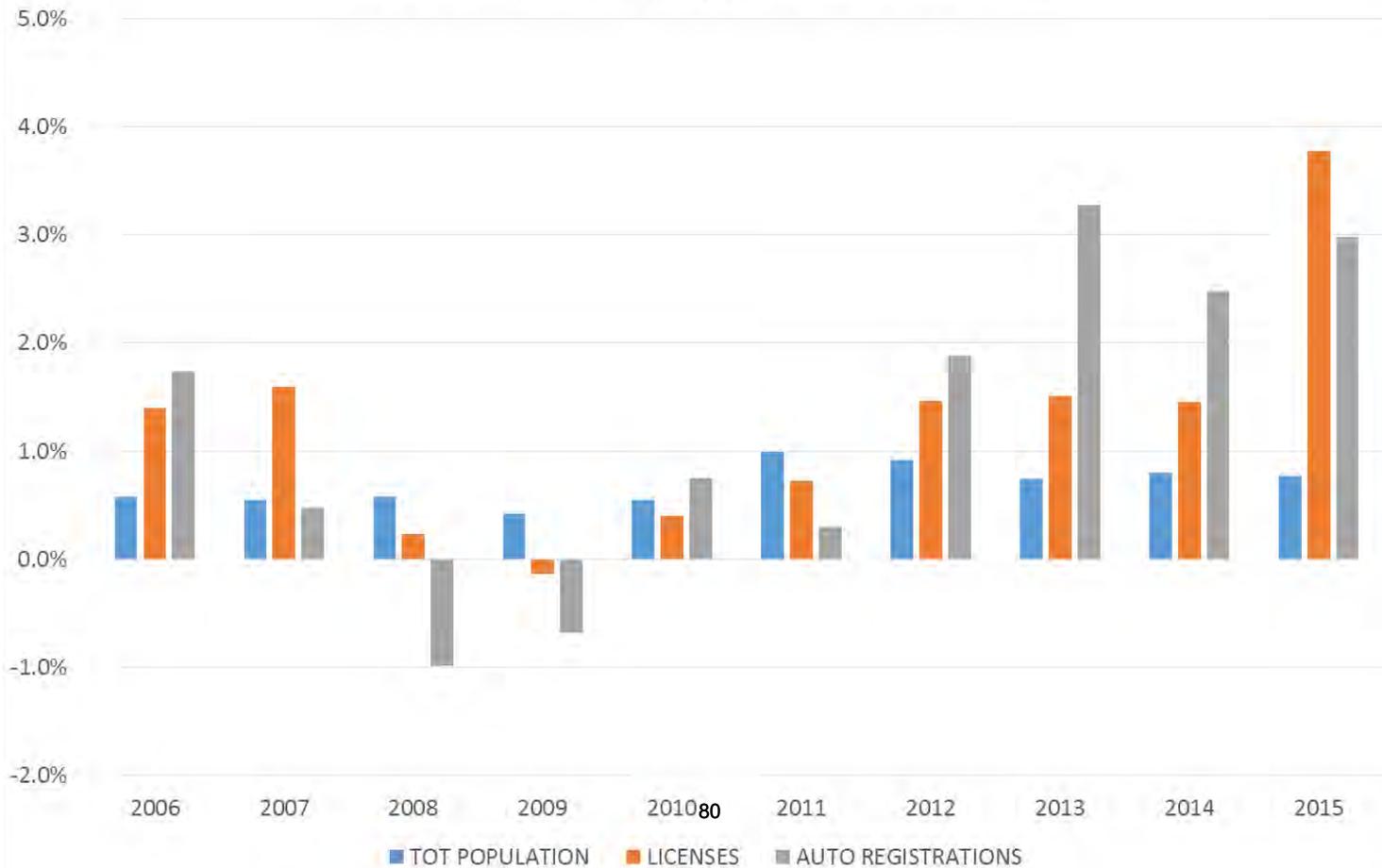
Driver Licenses and Auto Registrations, SCAG Region 2005-2015

Source: CA Department of Motor Vehicles



Year-to-Year Change in Population, Driver Licenses, Auto Registrations, SCAG Region 2006-2015

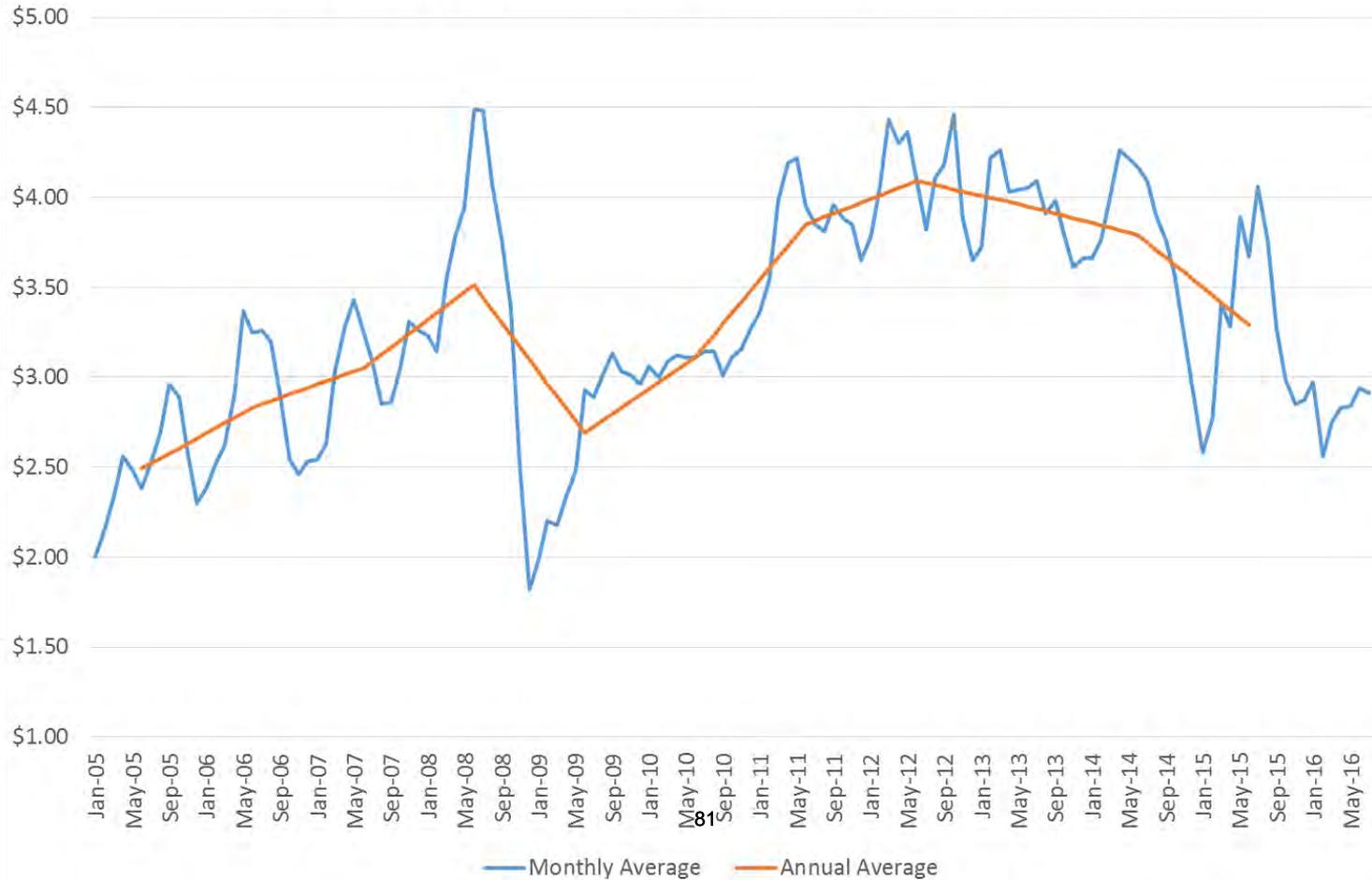
Sources: CA Department of Finance, CA Department of Motor Vehicles



Average Fuel Prices, Adjusted For Inflation* 2005-2016

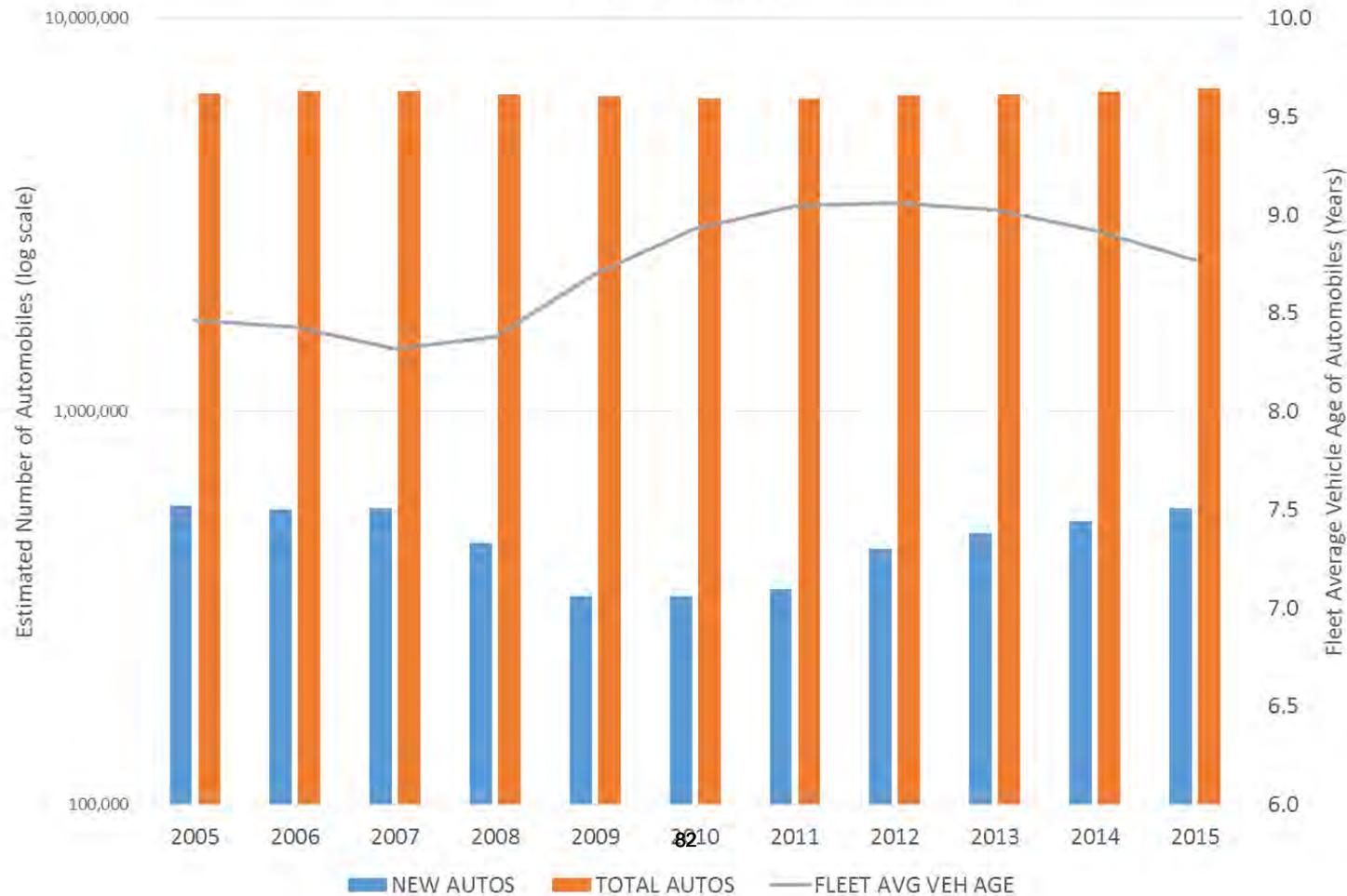
Source: US Energy Information Administration

*Includes Los Angeles, Orange, and Ventura Counties, and Western Portions of Riverside and San Bernardino Counties



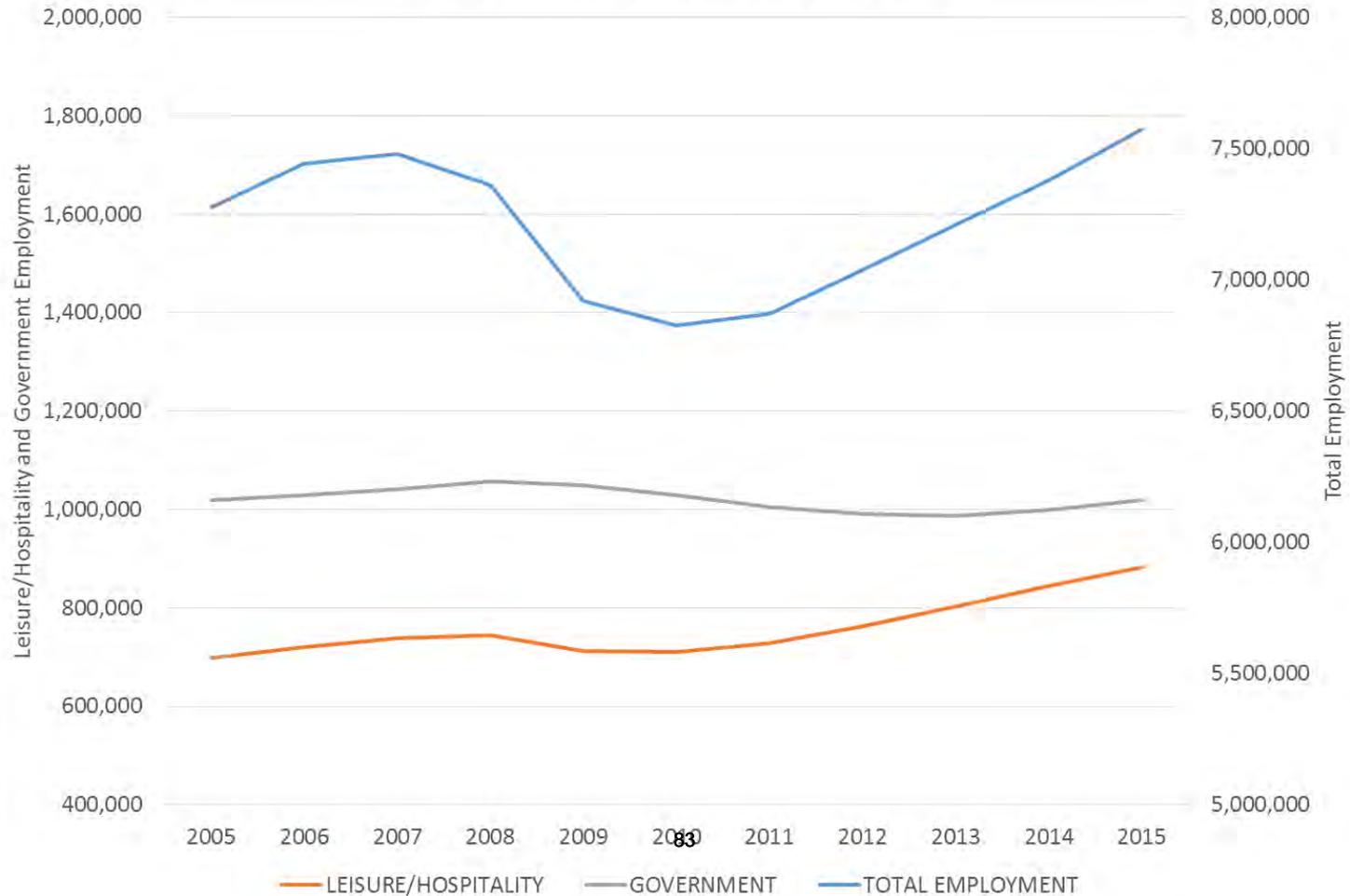
Estimated Automobiles and Average Fleet Age, SCAG Region 2005-2015

Source: EMFAC2014



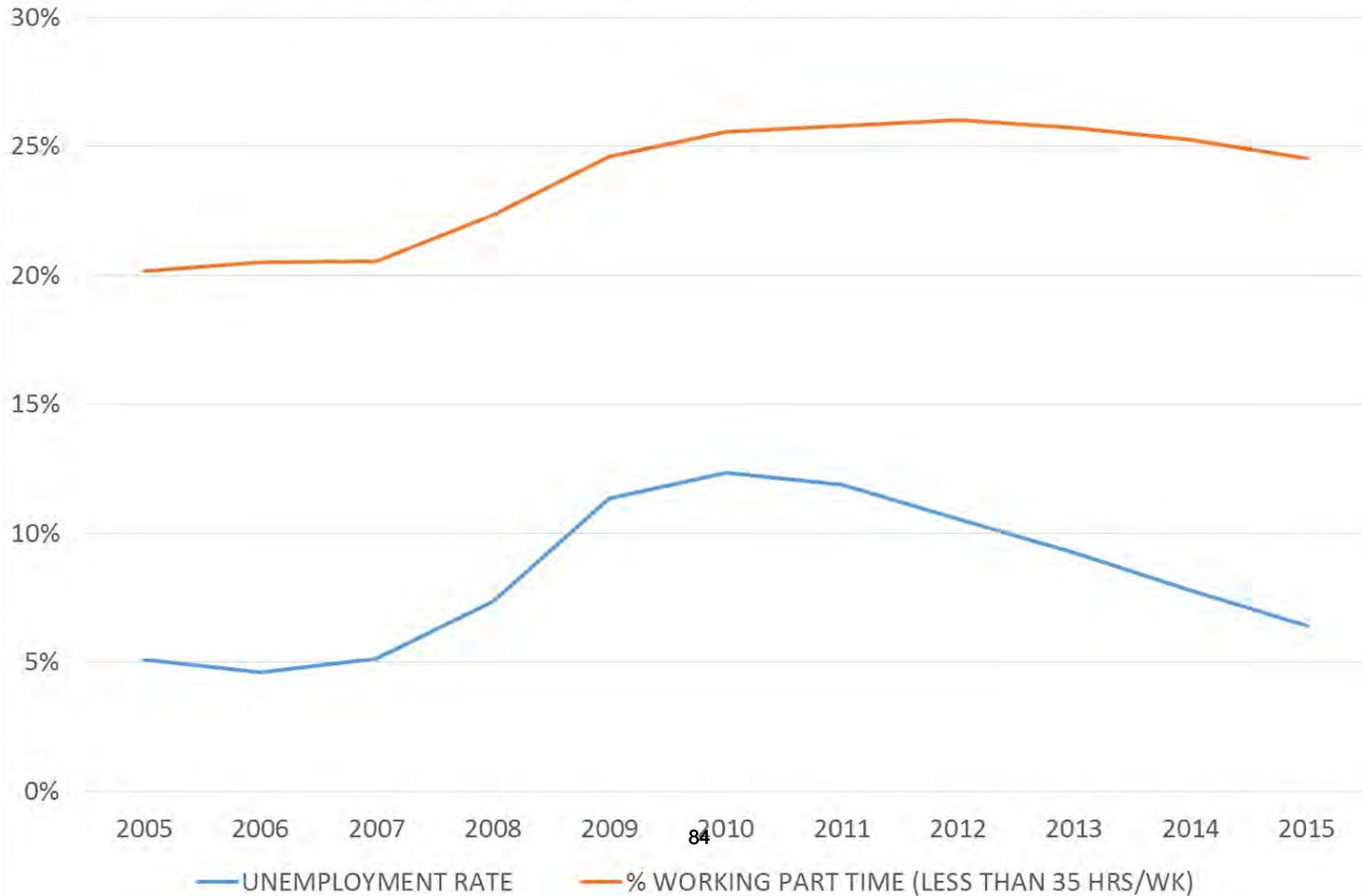
Employment in SCAG Region 2005-2015

Source: CA Employment Development Department



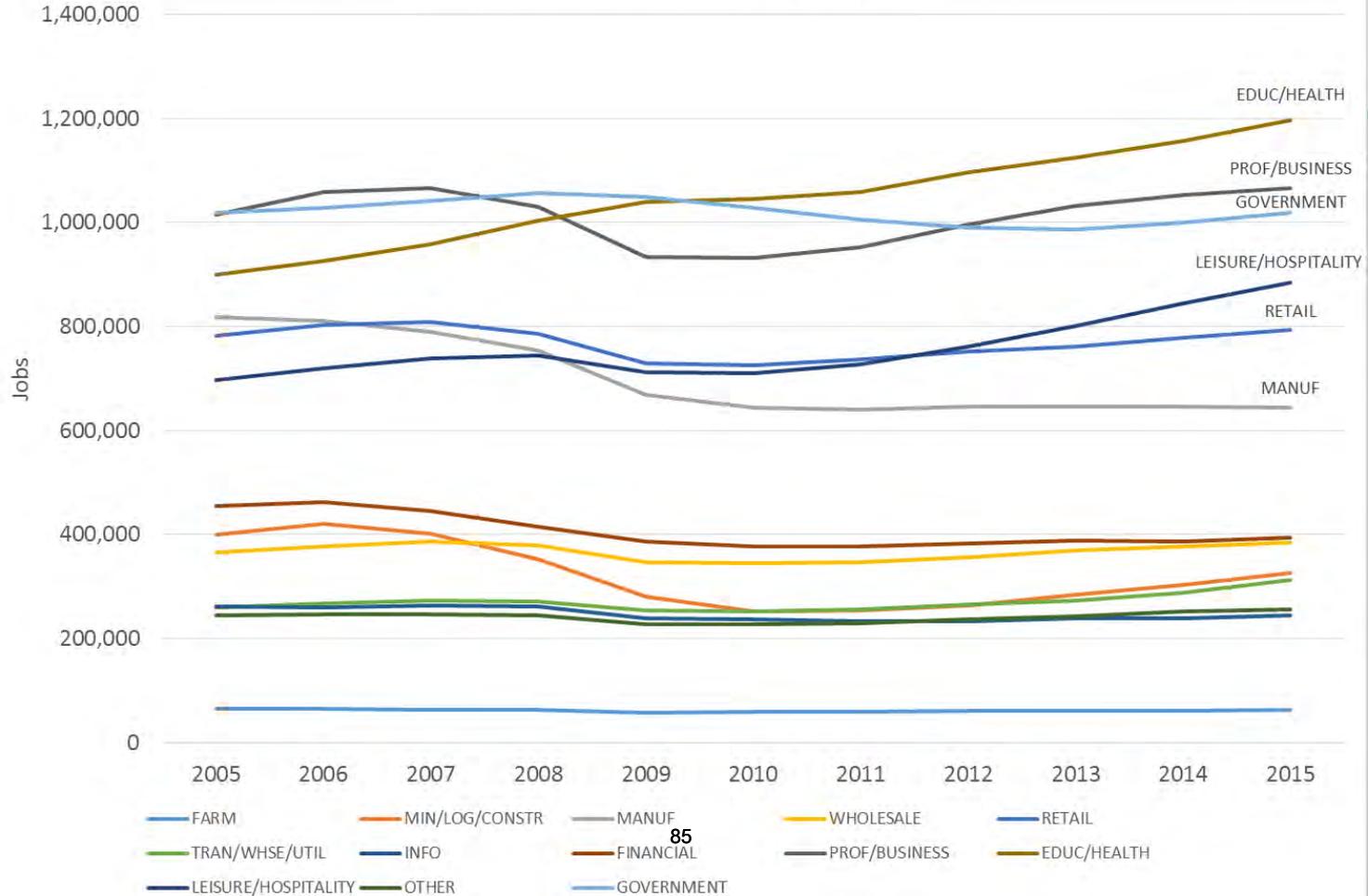
Unemployment and Part Time Employment, SCAG Region 2005-2015

Sources: CA Employment Development Department; American Community Survey (Annual Estimates)



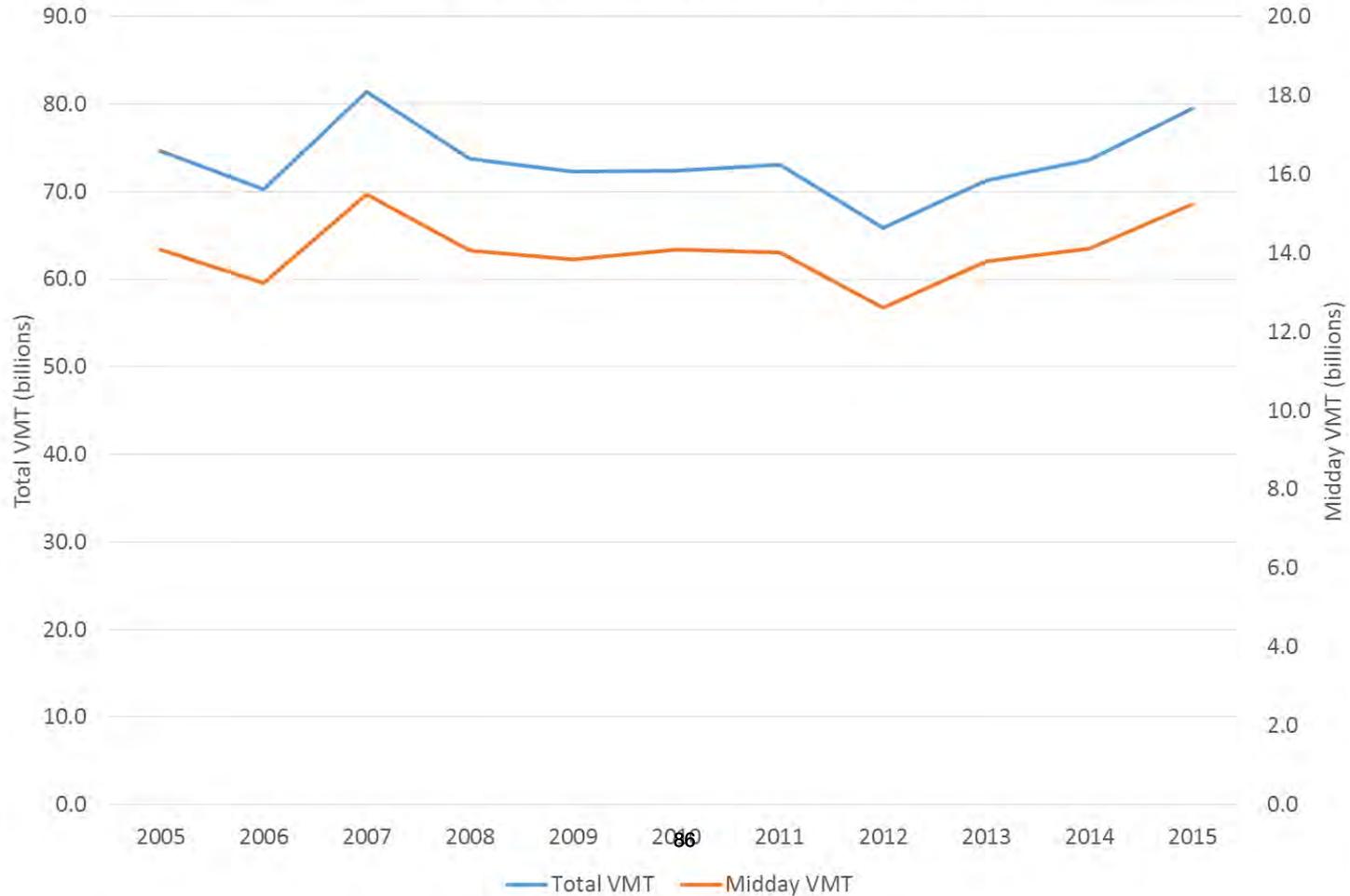
Employment by Industry, SCAG Region 2005-2015

Source: CA Employment Development Department



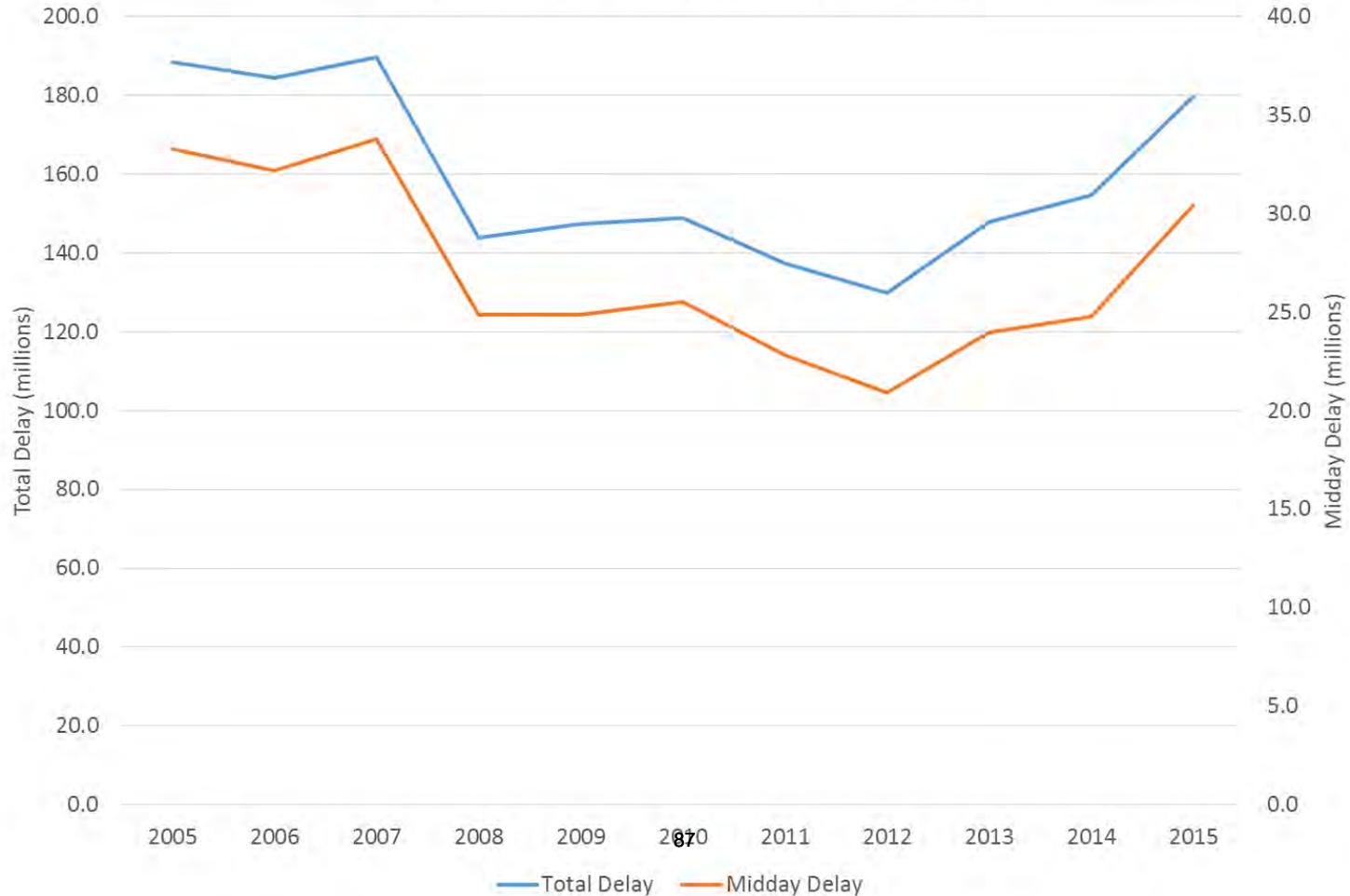
Vehicle Miles Traveled - State Highway System, SCAG Region 2005-2015

Source: Caltrans Performance Measurement System (PeMS)



Vehicle Hours of Delay - State Highway System, SCAG Region 2005-2015

Source: Caltrans Performance Measurement System (PeMS)



Thank You

REPORT

DATE: October 5, 2016

TO: Regional Transit Technical Advisory Committee (RTTAC)

FROM: Steve Fox, Senior Regional Planner; 213-236-1855; fox@scag.ca.gov

SUBJECT: Imperial Valley College/San Diego State Transit Shuttle Analysis

EXECUTIVE SUMMARY:

Improved transit access to the three college campuses in Imperial County: Imperial Valley College (IVC), and San Diego State University-Imperial Valley (SDSU-IV), with campuses in both Calexico and Brawley, was the focus of a study conducted by the Imperial County Transportation Commission (ICTC) and the Southern California Association of Governments (SCAG) and funded by a Caltrans' Sustainability grant. Study options looked at creating a new, dedicated transit service that serves the three campuses, as well as potentially rerouting and adjusting existing Imperial Valley Transit (IVT) service. The study also recommended equipment and fuel types as well as funding and implementation strategies.

BACKGROUND:

IVT currently operates 14 lines in the Imperial Valley in Imperial County, California. However, the three college campuses in the valley are not optimally served by IVT. IVC is Imperial County's only community college, with a 160-acre main campus located approximately four miles east of the City of Imperial at the intersection of State Highway 111 and Aten Road, and is currently served by IVT. IVC has an enrollment of about 10,000 students and has about 490 employees. SDSU-IV's campus site in Calexico is located within walking distance of the IVT Terminal and is located in the heart of Calexico's civic center. The SDSU-IV site in Brawley is a small satellite campus, located 24 miles north of Calexico amidst agricultural lands, near the intersection of State Routes 111 and 78 but not currently served by IVC. About 950 students are enrolled at the two San Diego State Imperial Valley campuses.

The population of Imperial County continues to grow and at a significantly faster rate than any other county in Southern California, and has a current population of about 185,000 people. The population in 2020 is estimated at 244,000. The city of Imperial is growing at a very fast rate and nearly doubled in size between 2000 and 2010, from 7,418 to 14,759 residents. The City of Calexico is also experiencing fast growth, with a 43 percent increase in population over the last decade. Of the three cities with college campus locations in the Imperial Valley, the City of Brawley is growing at the slowest rate, with a 13 percent increase in population over the last decade.

Service Development. Several transit options were developed during the course of the study that could provide shuttle service between SDSU-IV campuses in Calexico and Brawley and the IVC campus near Imperial. At the outset of the study, it was determined that State Route 111 clearly formed the most logical and direct connection among the three campuses and that therefore a shuttle link between the campuses



would most likely need to utilize this roadway alignment. Several route alignment options were developed that would connect the three campuses, and some of these options were modified as the study progressed. These included a single route concept connecting all three campuses, a two-route concept with a transfer at IVC (which is between the SDSU campuses), and an express route between the two SDSU campuses that would bypass IVC. As the study progressed, three phases were developed including a short-, medium- and long-term (i.e., Phases One, Two and Three), with the long-term scenario including connections to the main SDSU main campus in San Diego and Northern Arizona University in Yuma, Arizona. Alternatives to reroute and adjust existing IVT services were also designed but were not recommended to be carried forward.

Public Outreach. Two rounds of public outreach activities took place for the study. Initial public outreach efforts took place in November 2015 at the three campuses, and gathered focused input from over 300 participants on intercampus travel patterns, student ridership, and other information to provide guidance on transit improvements. Based on this initial input, transit alternatives were developed. The second round of public outreach activities took place in April 2016, where transit alternatives were presented to the college communities. More than 100 people participated in the outreach activities to review transit alternatives and provide input to refine and prioritize the alternatives. Further, a survey was conducted and over 90% of the survey respondents desired new transit service between the three college campuses.

Implementation. The Phase One scenario consists of two new “shuttle” routes that meet at the IVC campus connecting the three campuses and has a yearly operating cost of approximately \$638,000. The Phase Two scenario consists of adding the express route connecting the two SDSU campuses over the Phase One services bypassing IVC and has a yearly operating cost of \$248,000. (The long-term Phase Three scenarios were not costed out as part of the study.) Capital costs include bus shelter equipment and new vehicles required to operate the services at a cost of \$3,000,040. Ridership for Phase One is estimated at 79,000 annual passengers resulting in fare revenue of \$98,000 (farebox recovery estimated at 15%). Phase Two has annual ridership estimated at 86,000 annual passengers resulting in fare revenue of \$108,000 (farebox recovery estimated at 12%).

The study recommendations offered several potential sources of funding including federal 5307, state Cap and Trade and local sales tax proceeds. However, in addition to these potential new services, IVT and ICTC have a first priority of implementing additional intra-city circulator routes as recommended in their most recent SRTP. One avenue recommended to increase ridership and farebox revenue is to implement a student/university institutional pass, which currently does not exist for IVT with IVC and SDSU’s Imperial County campuses.

NEXT STEPS:

IVT and ICTC will actively pursue grant and funding opportunities to implement the campus service recommended in the report.

ATTACHMENT:

1. Imperial Valley College/San Diego State Transit Shuttle Analysis Presentation



**PRESENTATION TO THE
REGIONAL TRANSIT TECHNICAL
ADVISORY COMMITTEE**

Recommended Plan

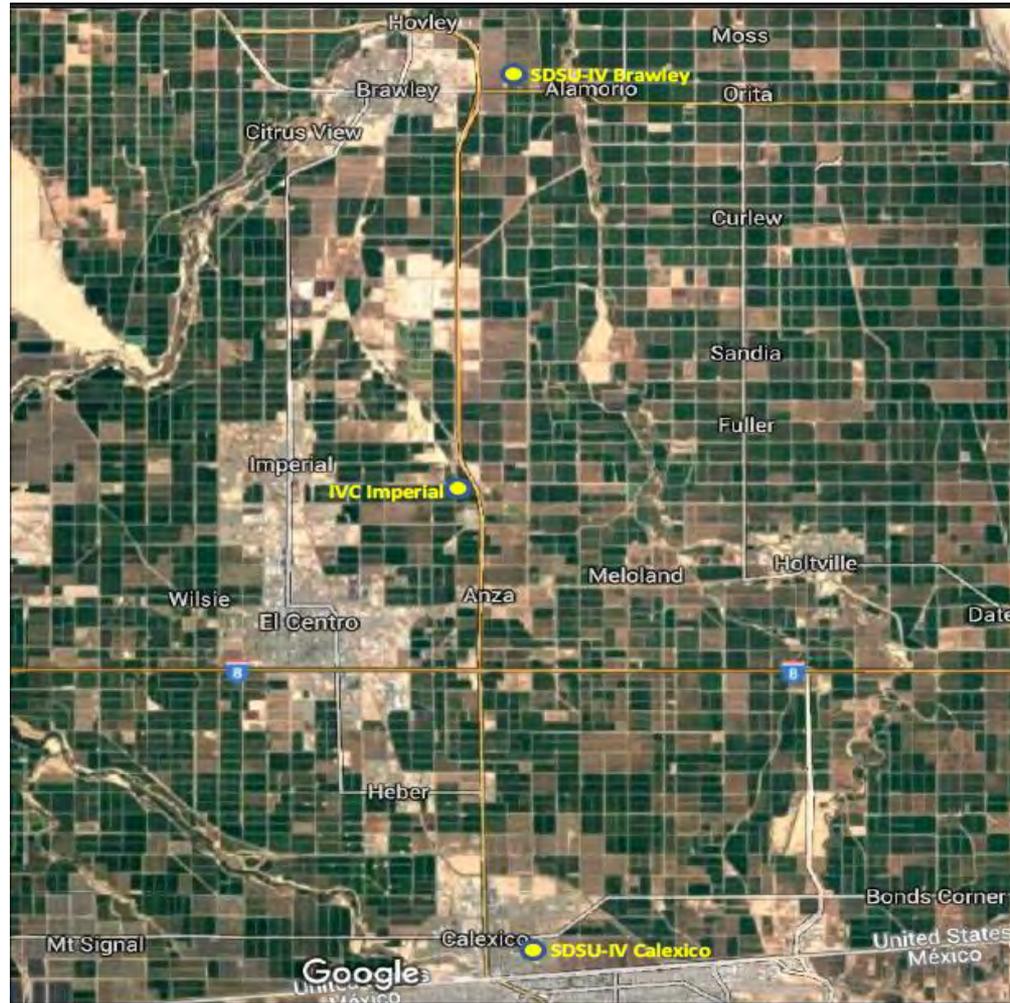
**Imperial Valley College/
San Diego State University
Transit Shuttle Analysis**



October 5, 2016



Imperial County – Study Area



Imperial Valley Transit (IVT)

- FIXED ROUTE services operate along specific routes and fixed time schedules
- Service areas include the cities of Niland, Seeley, Ocotillo, Holtville, Calexico, Brawley, Calipatria, Westmorland, West Shores, Heber and El Centro
- 353 days of operation, including Sundays
- Average Monthly Passenger Trips are 66,788
- Additional dedicated fixed route services for the southern and northern portions of the City of El Centro (including the City of Imperial) and the City of Brawley
- Website Address: www.ivtransit.com

Imperial Valley Transit Fleet

- All vehicles are ADA and CARB Compliant
- 16 - 40 Foot Low-Floor Gillig Transit Buses(Clean Diesel)
 - Wheel Chair Ramp and 2 Wheelchair Tie Down Positions
 - 40 seated, 70+ is the Total Capacity
- 6 - 25 Foot Cutaway Buses
 - Wheelchair Lift Equipped



IVT Access

- Curb to Curb intercity service for ADA certified disabled persons who cannot access regular fixed route transit service
- Fleet consists of 11 – 25 Ft Cutaway vehicles with 4 wheel chair positions each
- Up to 20 passengers seated without wheelchairs
- FY2015-16 – 32,291 Passengers
- FY2015-16 – 9,675 Wheelchairs (30%)
- Website Address: www.ivtaccess.org



IVT Ride

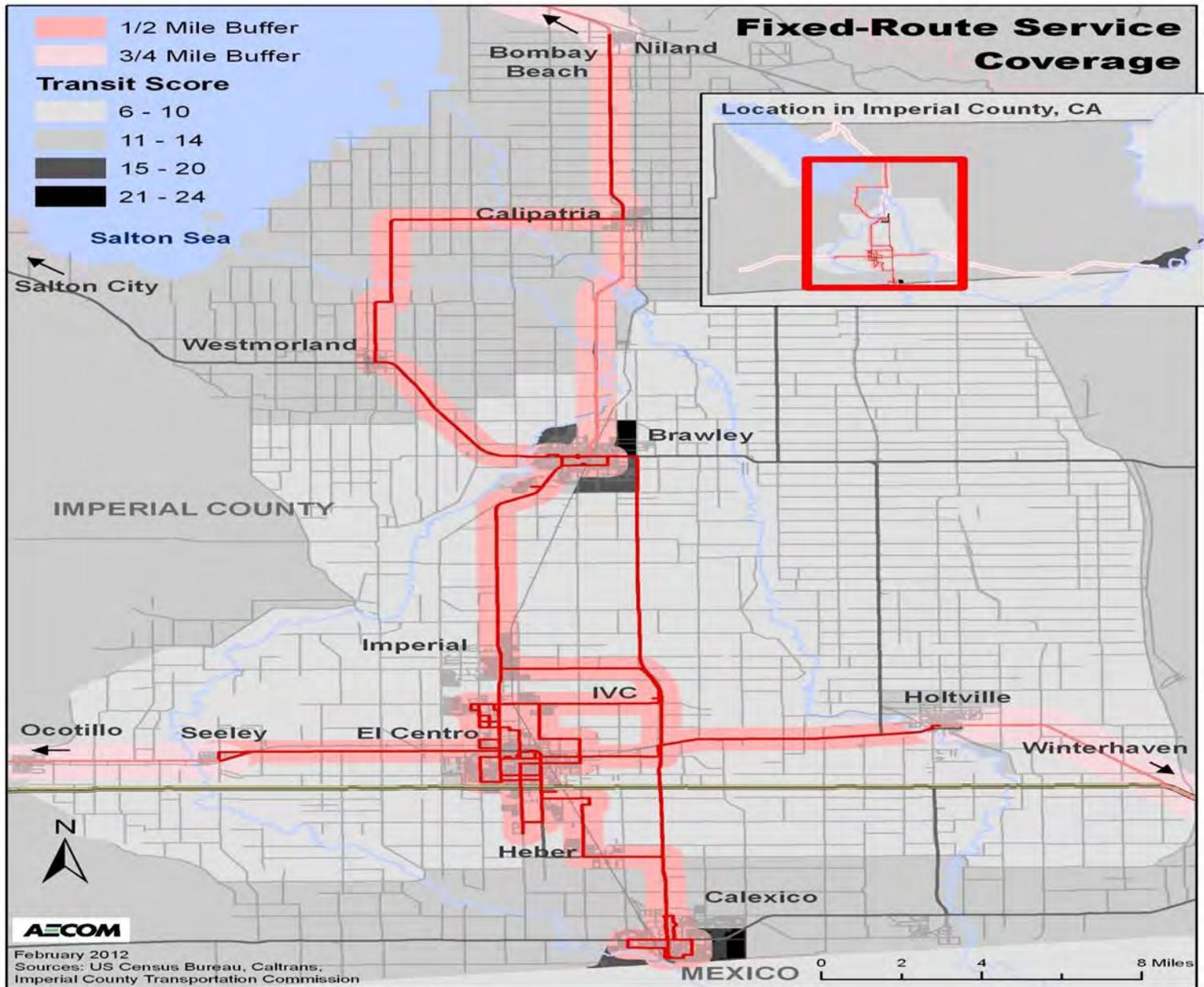
- Service operations began Fall 2014; El Centro Summer of 2016
 - Intracity Dial-A-Ride Consolidation:
Brawley – Calexico - El Centro – Imperial – West Shores
- Curb to Curb Demand Response Paratransit Service
 - Seniors age 60 and over OR Disabled (ADA Riders)
- Riders must schedule their trips in advance (ALL TRIPS)
- 14 Low-Floor Cutaways
- Website Address: www.ivtride.com



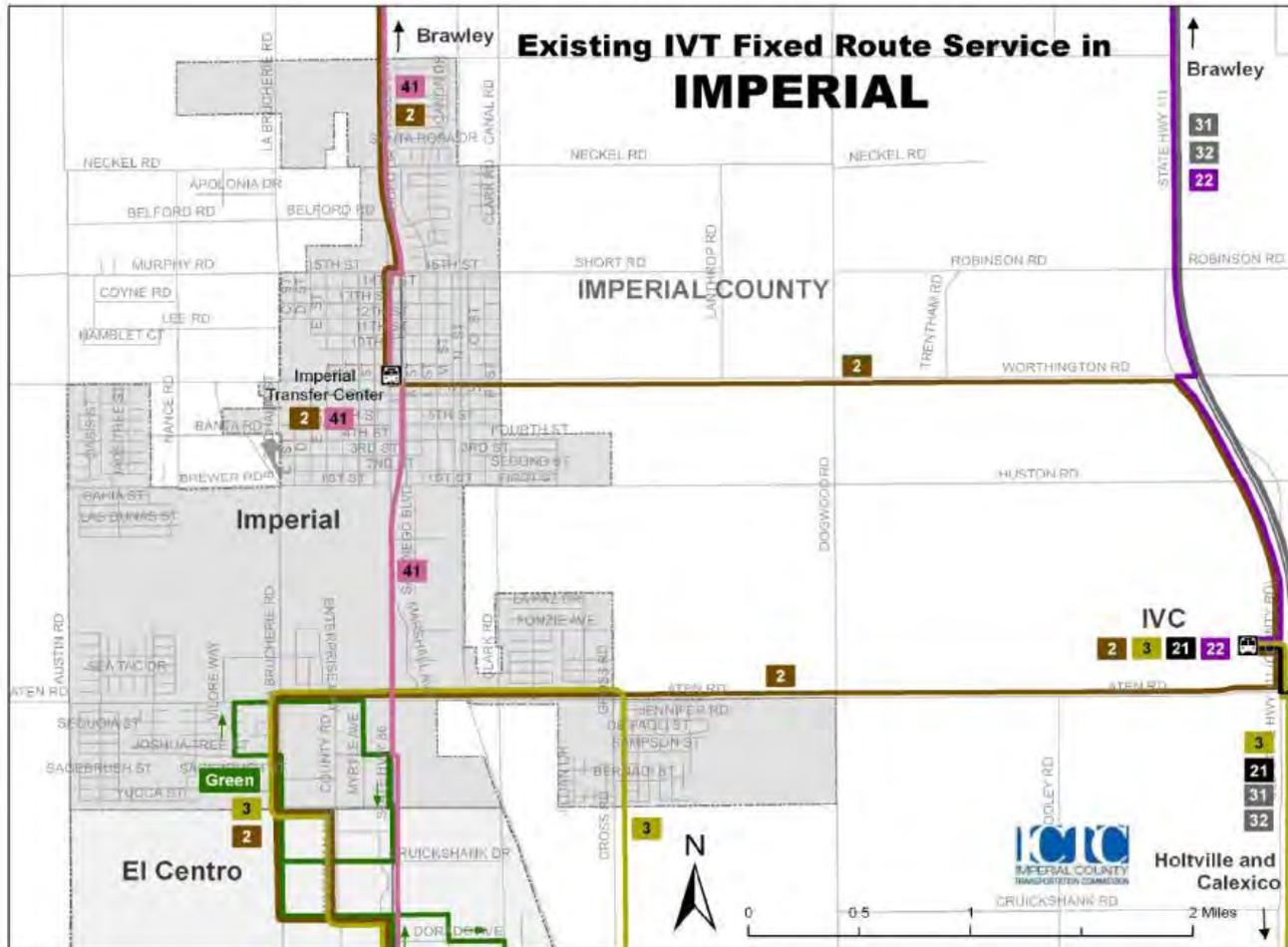
IVT Meditrans

- Service Started July 2016 – 1,300 Passengers first two months
- Same Day Round Trip service for Medical Trip Purposes Only
- Services all major San Diego Health Care facilities in the I-8 corridor with service to South Bay once a month
 - Children's Hospital, UCSD Medical Center, Scripps, VA Hospital, Sharps, Shiley Eye Center, and many others
 - Departs Imperial County @ 7:00am & 11:00am
 - Return Trip from San Diego – Departs @ 3:00pm & 5:30pm
- Website Address: www.ivtmedtrans.com
- 3 Cutaways

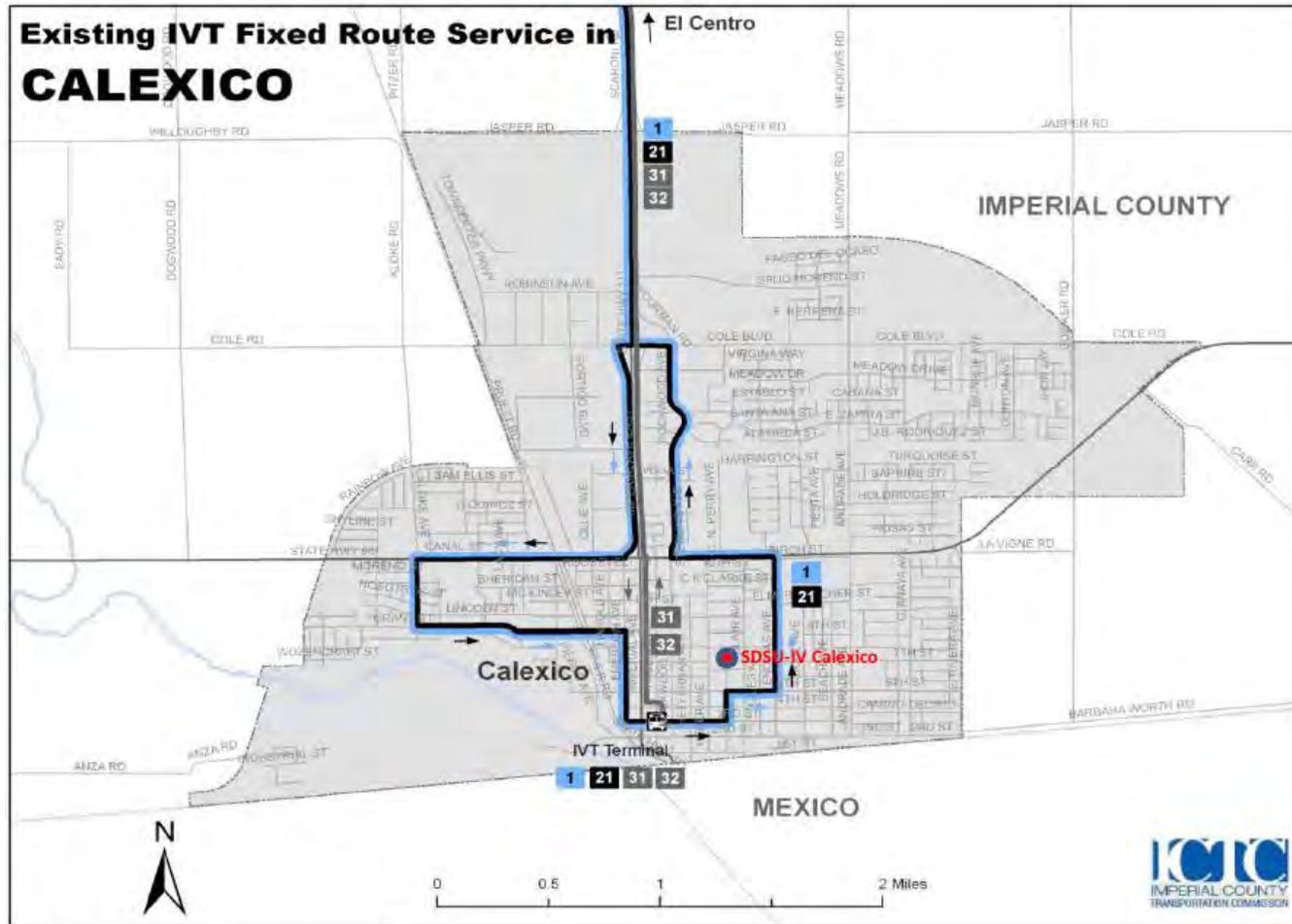




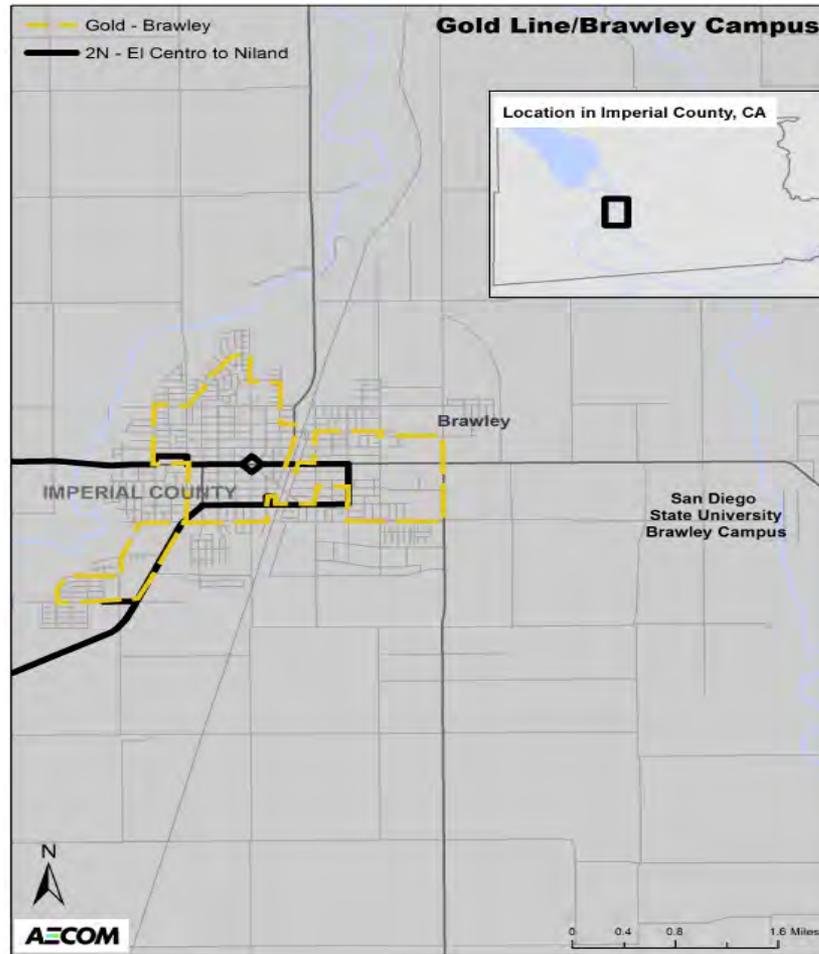
IVT Service in Imperial



IVT Service in Calexico



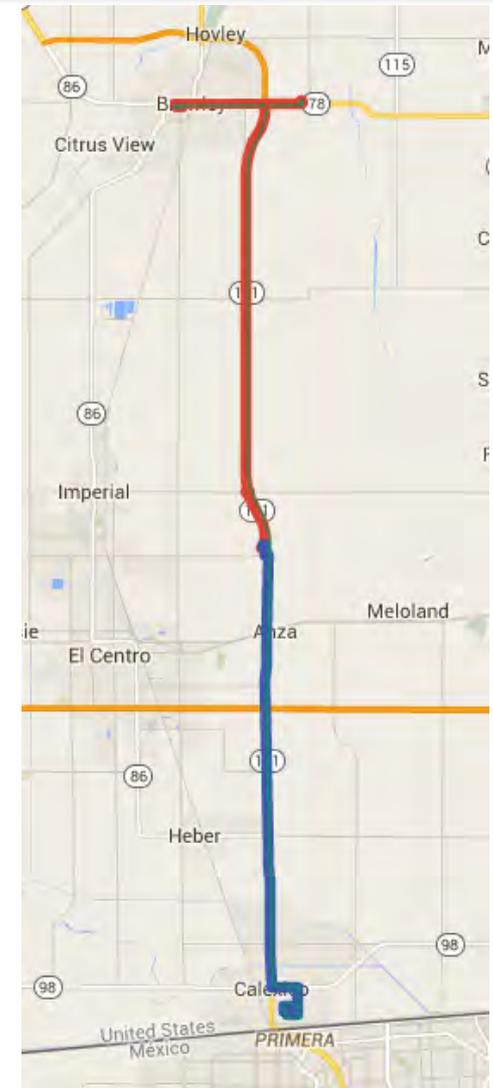
IVT Service in Brawley



Phase One (2017-2025)

Implement IVC Transfer Concept

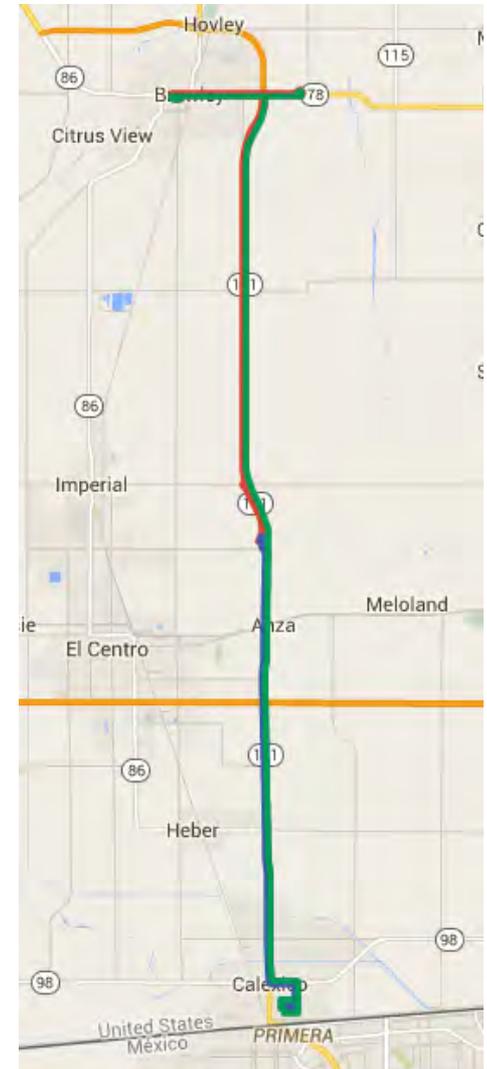
- Two new “shuttle” routes that meet at the IVC campus
- **SDSU Brawley-IVC Route** requires approximately 60 minutes cycle time
 - Uses 1 bus to provide a 60 minute frequency
 - Service operates from approximately 12:00PM to 10:30PM when school is in session
- **SDSU Calexico-IVC Route** requires approximately 60 minutes cycle time
 - Uses 1 bus to provide a 60 minute frequency
 - Service operates from approximately 6:00AM to 10:30PM when school is in session



Phase Two (2020-2028)

Implement IVC Transfer Concept + SDSU Express Shuttle

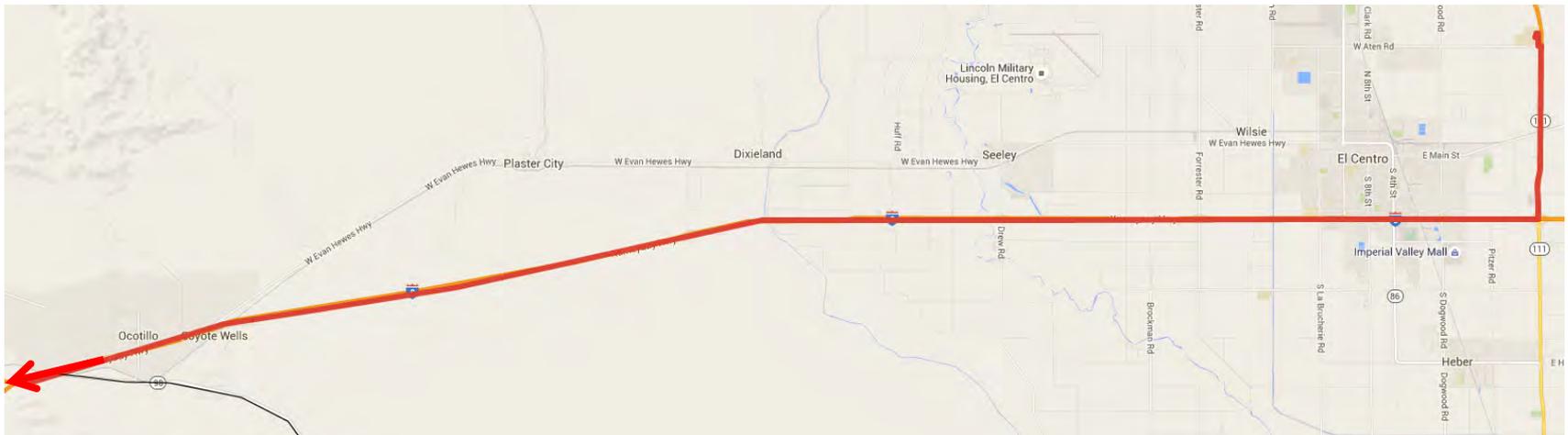
- **SDSU Brawley-IVC Route +**
- **SDSU Calexico-IVC Route +**
- **SDSU Calexico-SDSU Brawley Express Route**
requires approximately 90 minutes cycle time
 - Would use 1 bus to provide a 90 minute frequency
 - Service operates from approximately 12:00PM to 10:30PM when school is in session



Phase 3 – Long Term

Implement SDSU Main Campus Service

- **IVC-SDSU Main Campus Service**
 - Long term option
 - Doesn't fit current funding structure



ALTERNATIVE Phase 3 – Long Term

Implement SDSU Main Campus Service

- **SDSU Calexico-SDSU Main Campus Service**

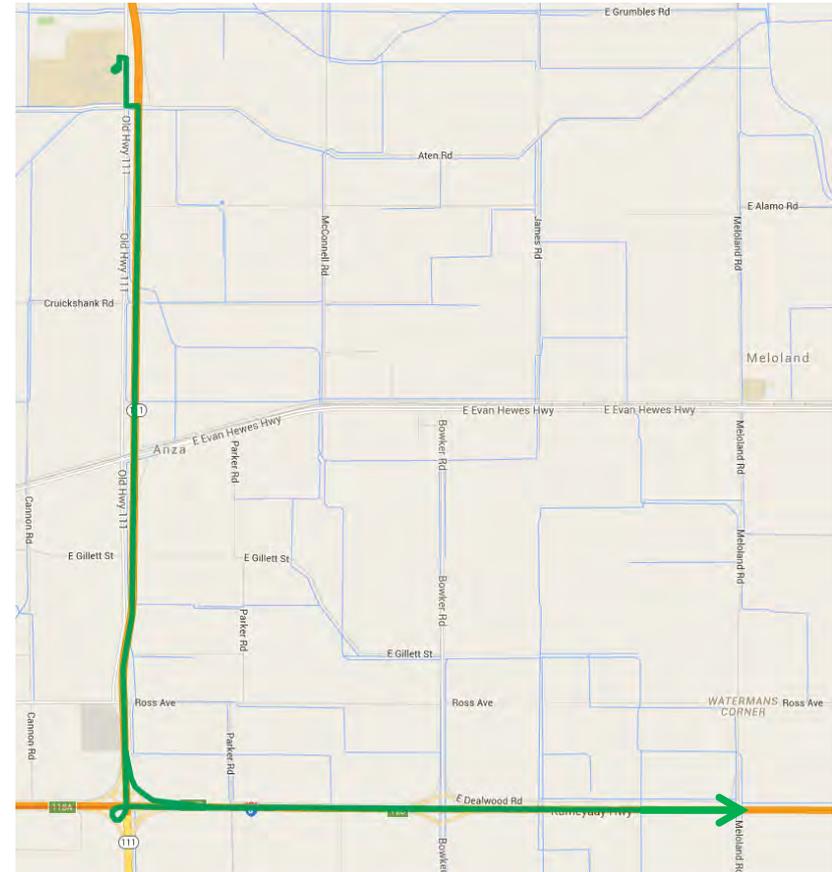
- Would use State Highway 98 to/from Interstate 8 to access SDSU Calexico campus instead of State Route 111 & Interstate 8 to access IVC campus
- Long term option
- Doesn't fit current funding structure



Phase 3 – Long Term

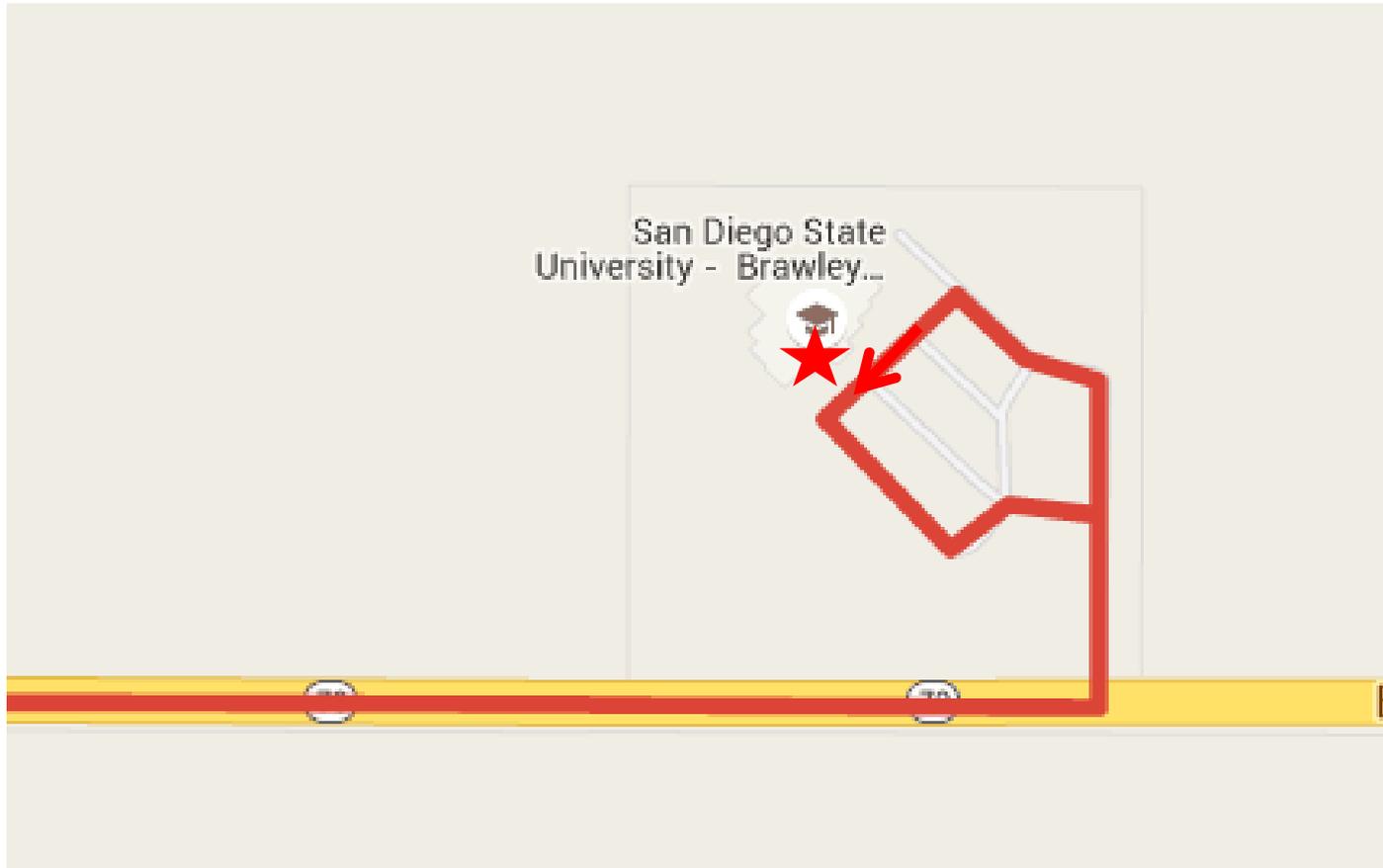
Implement NAU -Yuma Service

- **IVC-NAU Yuma Service**
 - Long term option
 - Doesn't fit current funding structure



SDSU Brawley Stop Location

Currently Unserved by IV Transit



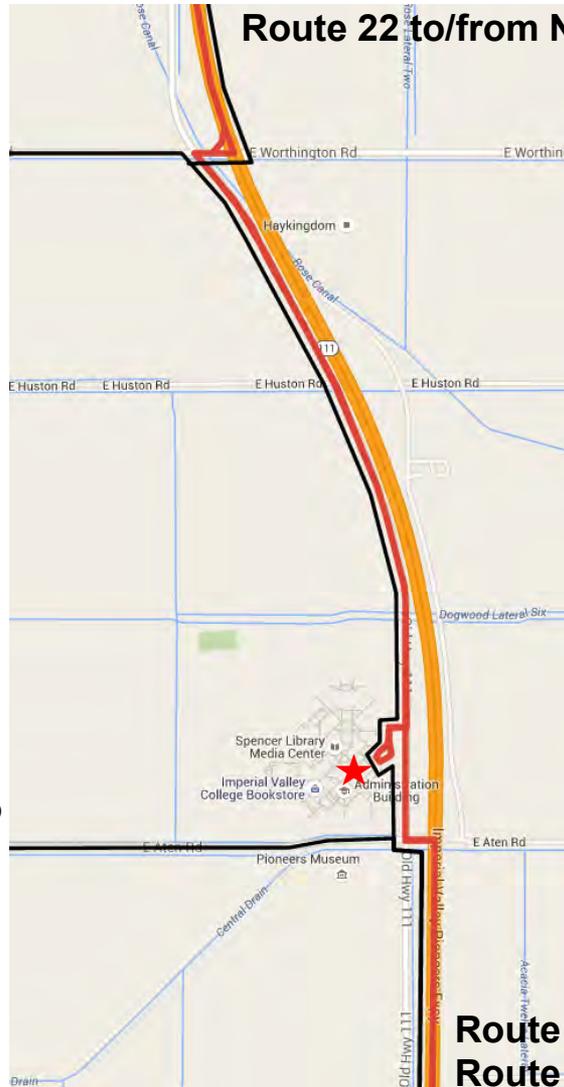
IVC Stop Location

Currently Served by IV Transit Routes 2, 3, 4, 21 & 22

Route 2 to/from Niland

Route 22 to/from Niland

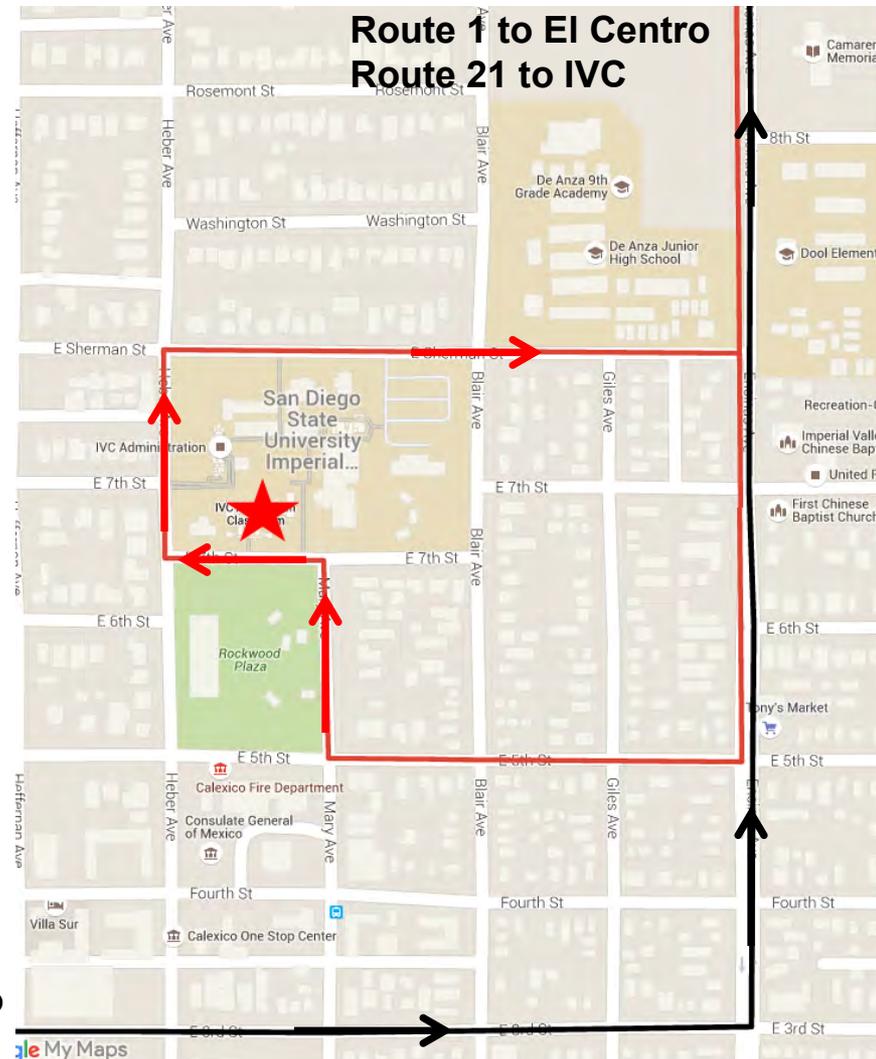
**Route 2 to/from El Centro
Route 4 from Seeley**



**Route 3 to/from El Centro & Holtville
Route 21 to/from Calexico**

SDSU Calexico Stop Location

Currently Served by IV Transit Routes 1 & 21



Route 1 from El Centro
Route 21 from IVC

Annual Operating Cost Estimates – Standard Transit Bus

All Costs Estimates Are Approximate

- **Phase 1**

- SDSU Brawley-IVC Route = \$248,100/year
- SDSU Calexico-IVC Route = \$389,900/year
- **TOTAL Phase 1 Cost = \$638,000/year**

- **Phase 2**

- SDSU Brawley-SDSU Calexico Express = \$248,100/year
- **TOTAL Phases 1 & 2 Cost = \$886,200/year**

Annual Operating Cost Estimates

Assumptions Utilized

- **201 days per year (based on current IVC Express service)**
- **Based on revenue hours**
- **Uses approximate potential operating cost (all in current dollars):**
 - **\$117.57/hour** for potential standard transit bus cost operating cost

Slide 24 – Examples of Vehicle Types

- Recommended – Standard Transit Bus
 - *35 foot model recommended*
- Body-on-chassis “cutaway” bus
- 15 passenger van



Capital Cost Estimates

All Cost Estimates Are Approximate

- **Two new shelters = \$40,000**
 - Assumes approximately \$20,000/bus stop, with one at SDSU Brawley and one at SDSU Calxico
- **New standard transit buses = approximately \$3,000,000 in vehicle costs**
 - Assumes a unit cost of approximately \$750,000 per bus for an alternative fuel bus or electric bus
 - Assumes three vehicles needed for revenue service by Phase 2, with one spare (20% spare ratio)

Annual Ridership and Revenue Estimates

All Estimates Are Approximate

- **Phase 1 Annual Ridership**

- SDSU Brawley-IVC Route = 19,000/year
- SDSU Calexico-IVC Route = 59,700/year (*approximately 30,000/year from existing IV Transit Route 21*)
- **TOTAL Phase 1 Ridership = 78,700/year**

- **Phase 1 Annual Revenue**

- SDSU Brawley-IVC Route = \$23,700/year
- SDSU Calexico-IVC Route = \$74,600/year
- **TOTAL Phase 1 Revenue = \$98,300/year**

- **Phase 1 Farebox Recovery = 15%**

Annual Ridership and Revenue Estimates

All Estimates Are Approximate

- **Phase 2 Annual Ridership**

- SDSU Brawley-IVC Route = 14,200/year
- SDSU Calexico-IVC Route = 44,800/year (*approximately 30,000/year from existing IV Transit Route 21*)
- SDSU Calexico-SDSU Brawley Express Route = 27,400/year
- **TOTAL Phase 2 Ridership = 86,400/year**

- **Phase 2 Annual Revenue**

- SDSU Brawley-IVC Route = \$17,800/year
- SDSU Calexico-IVC Route = \$56,000/year
- SDSU Calexico-SDSU Brawley Express Route = \$34,300/year
- **TOTAL Phase 2 Revenue = \$108,100/year**

- **Phase 2 Farebox Recovery = 12%**

Funding Considerations

- **All phasing assumptions are contingent on funding availability**
- **Current sources of state and federal funds are essentially prioritized and “spoken for”**
 - Implementation of additional circulator routes considered a priority
 - Diversion of existing funds for new intercampus shuttle services would mean service reductions elsewhere
 - Funding new service under current programs could require several years’ lead time

Potential Funding Programs

- **Federal Sources**

- Section 5307 Urbanized Formula for both capital and operating funds (operating funds require a 50% local match)
- Section 5339c Low or No Emission Vehicles Grant (capital funds require 20% local match)
- CMAQ for capital expenditures (capital funds require 20% local match)

- **State Sources**

- Transportation Development Act (TDA): IV Transit already uses allocation of Local Transportation Fund (LTF) and State Transit Assistance (STA)
- Low Carbon Transit Operation Program (LCTOP) from Cap-and-Trade

- **Local Sources**

- Existing – fares from the public
- Potential:
 - U-Pass for IVC and San Diego State University
 - Local Option Sales Tax Measure: requires ballot initiative

Other Transit Recommendations

- For the new “***Imperial Valley University Transit Shuttle***” services:
 - Ridership eligibility
 - General public – must be available to the general public if it is an IV Transit service
 - Express stopping pattern assumed – “closed door” between campus stops
 - Fare/transfer policy should assume integration with existing IV Transit services to maximize convenience and ridership – no “fare advantage” to using new shuttle routes as opposed to existing services
 - Recommended plan assumes a “regularly-scheduled” service
 - Orientation to class times might increase required resources
- New service will be branded as the “***Imperial Valley University Transit Shuttle***”
- ***Next Steps:***
 - *Phases 1 & 2 will be evaluated as part of the ICTC Short Range Transit Plan (SRTP). Next SRTP is estimated to begin Spring 2017.*

Discussion and Questions?



FY2013-14 System Performance Report:

Regional Transit Technical Advisory Committee
October 5, 2016

Matt Gleason

Goals of the FY13-14 Transit System Performance Report

Framework for understanding the region's transit investments

- Mobility
- Governance
- Service Provision and Consumption

Resource for Policy Makers

- Investments and Returns
- Planning for Operations

Benchmarking Resource for Operators

MAP-21

- Address performance planning provisions
- Initial step toward transit system performance report for 2016 RTP/SCS

FY2013-14 System Performance Report

- Staff previously presented in June
- After comments from RTTAC members, investigations into declining ridership were made over the summer
- Further investigations are pending
- This presentation is an update



Format of the FY13-14 Transit System Performance Report

Section 1: Public Transportation in the SCAG Region

- Governance
- Transit's role in providing mobility and other external benefits
- Transit sub-modes

Section 2: Evaluating Transit System Performance

- Legislative context
- Literature review

Section 3: Regional Performance

- Assesses regional performance
- Lays out financial performance and productivity

Section 4: Market Sector Performance

- Focus on performance by market sector. Mostly looking at current year performance, with some analysis of trends to highlight change.
- More discussion on slides 13-18

Measures

- Staff has previously recommend the following measures be used in the report
- Mix of cost efficiency/ effectiveness, productivity, and speed/mobility
- Staff are seeking to include Maintenance measures, but some PT operators report in different manners

Performance Concept	Performance Measure
Cost Efficiency	Operating Cost/Revenue Hour
	Farebox Recovery
Cost Effectiveness	Operating Cost/Passenger Trip
	Operating Cost/Passenger Mile
Service Effectiveness/ Productivity	Passengers/Revenue Hour
	Passengers/Revenue Mile
Maintenance	Fleet Average Vehicle Age
Mobility/Travel Time	Average Vehicle Speed

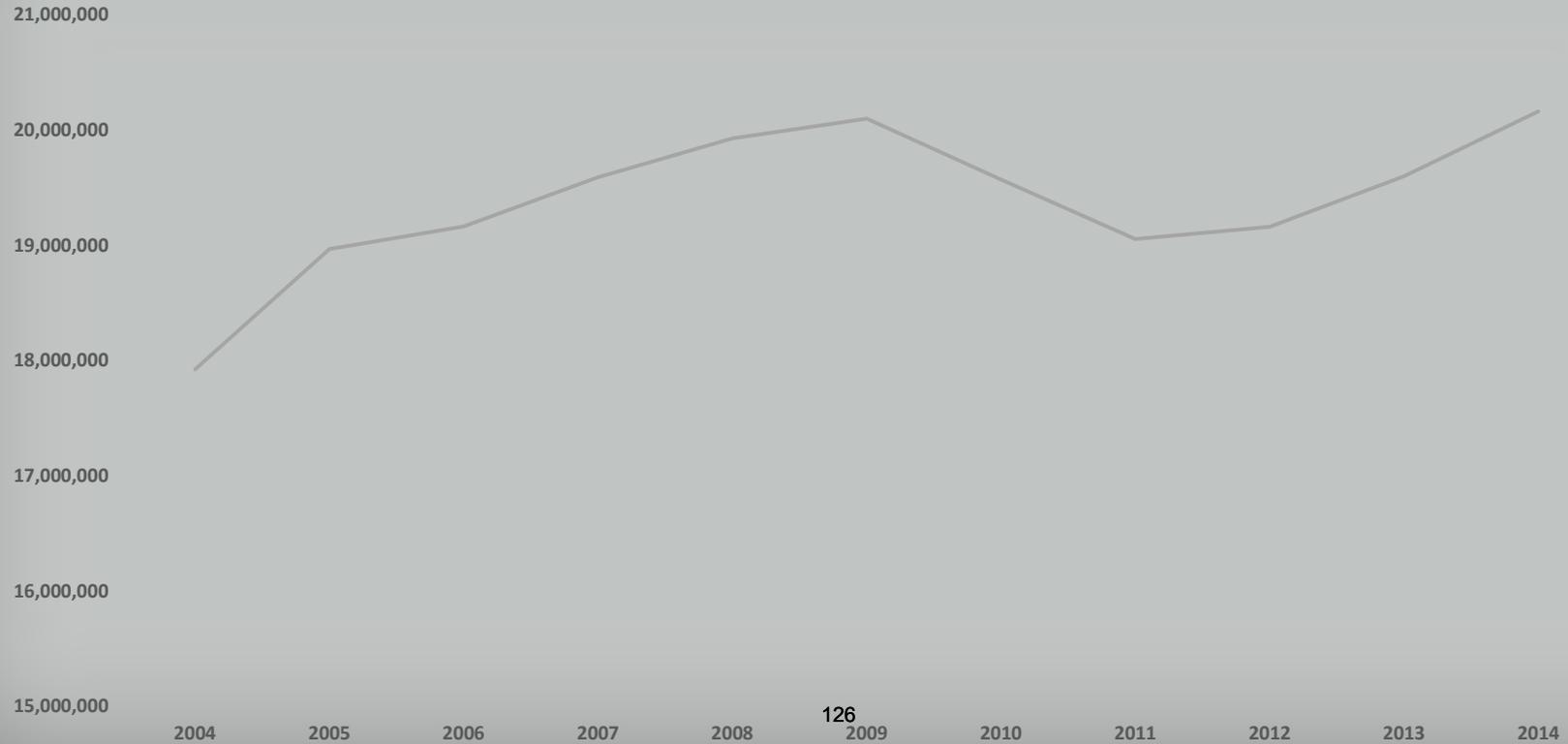
Regional Performance Analysis

Regional Performance Trends

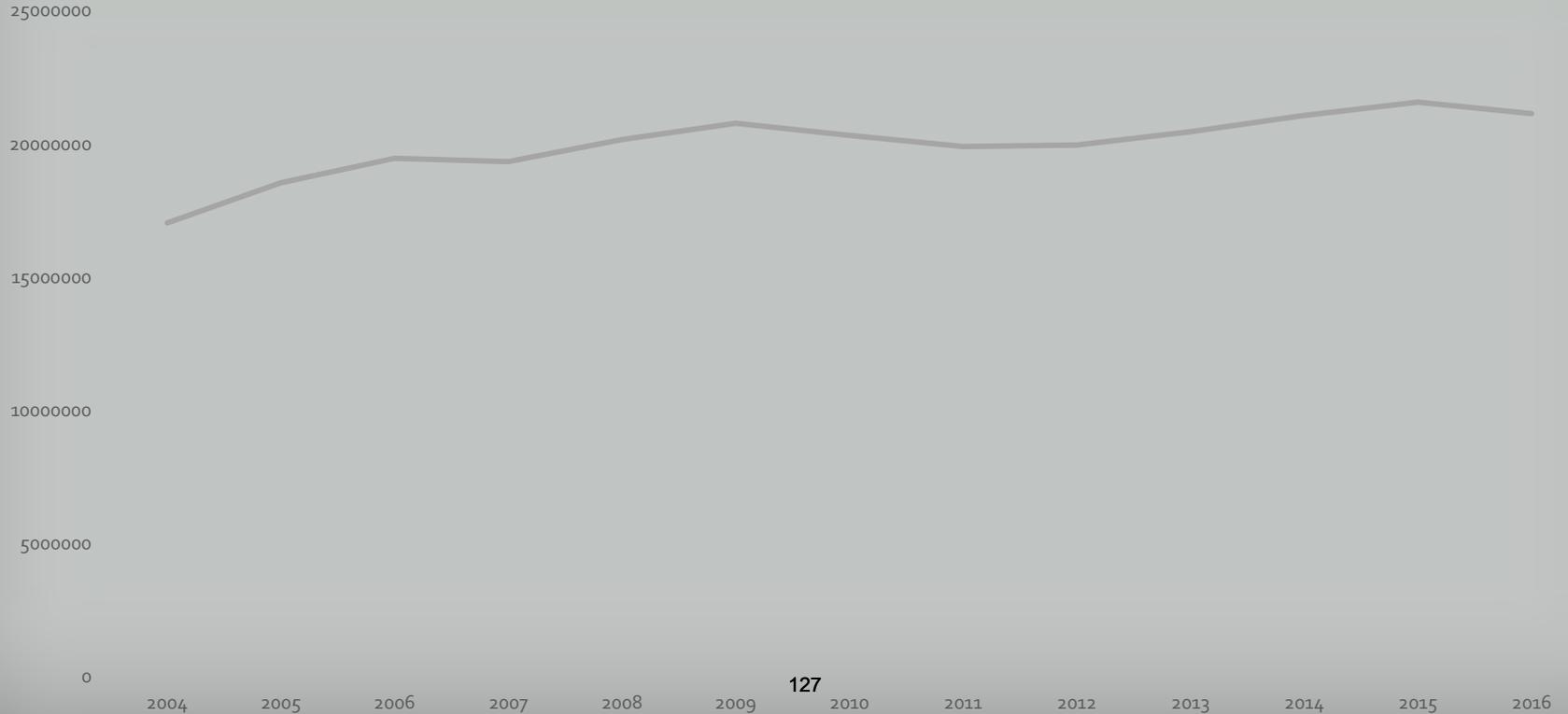
- 10 Year Trend
- 2014 Dollars
- FY2013-14 Data, aggregated at Regional level



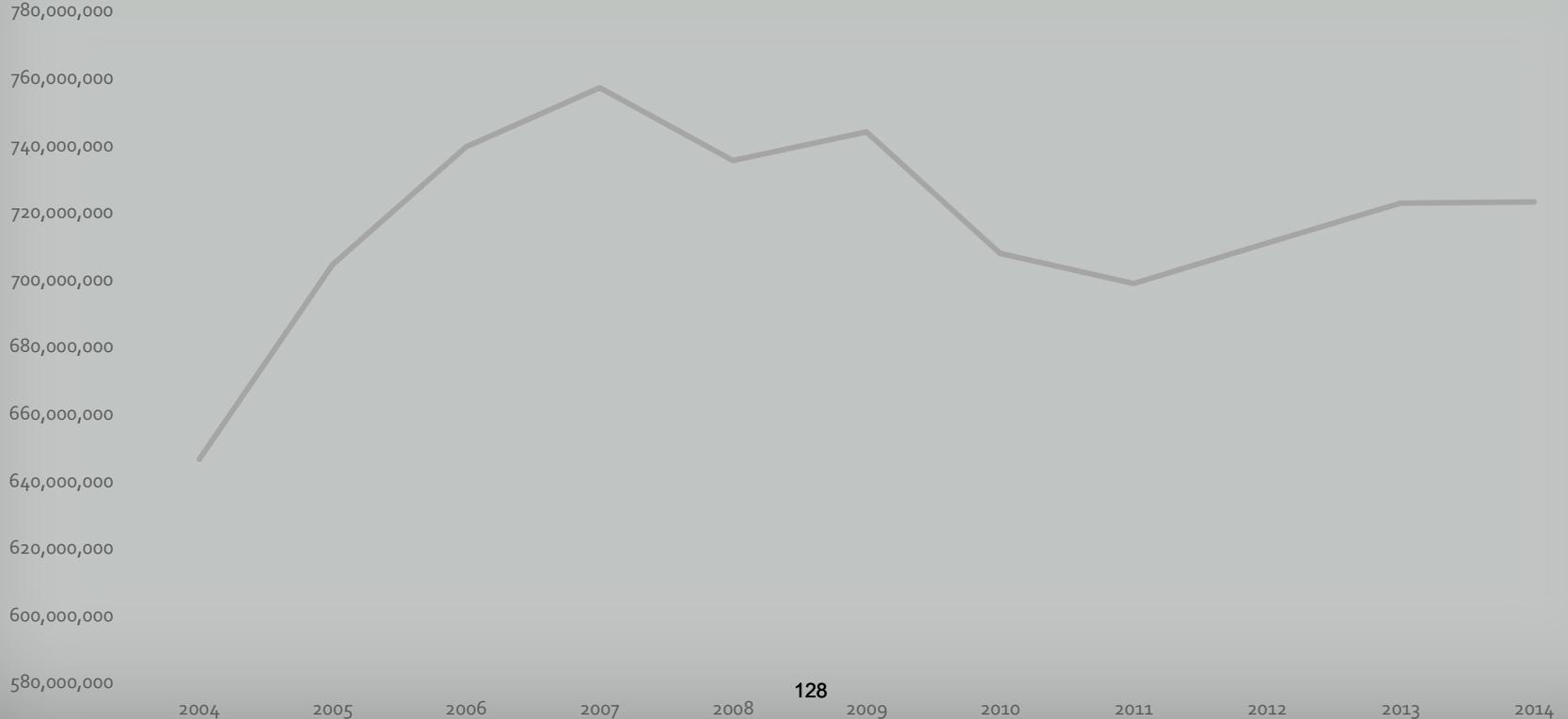
Total Revenue Hours, 2014 NTD, 2014 NTD



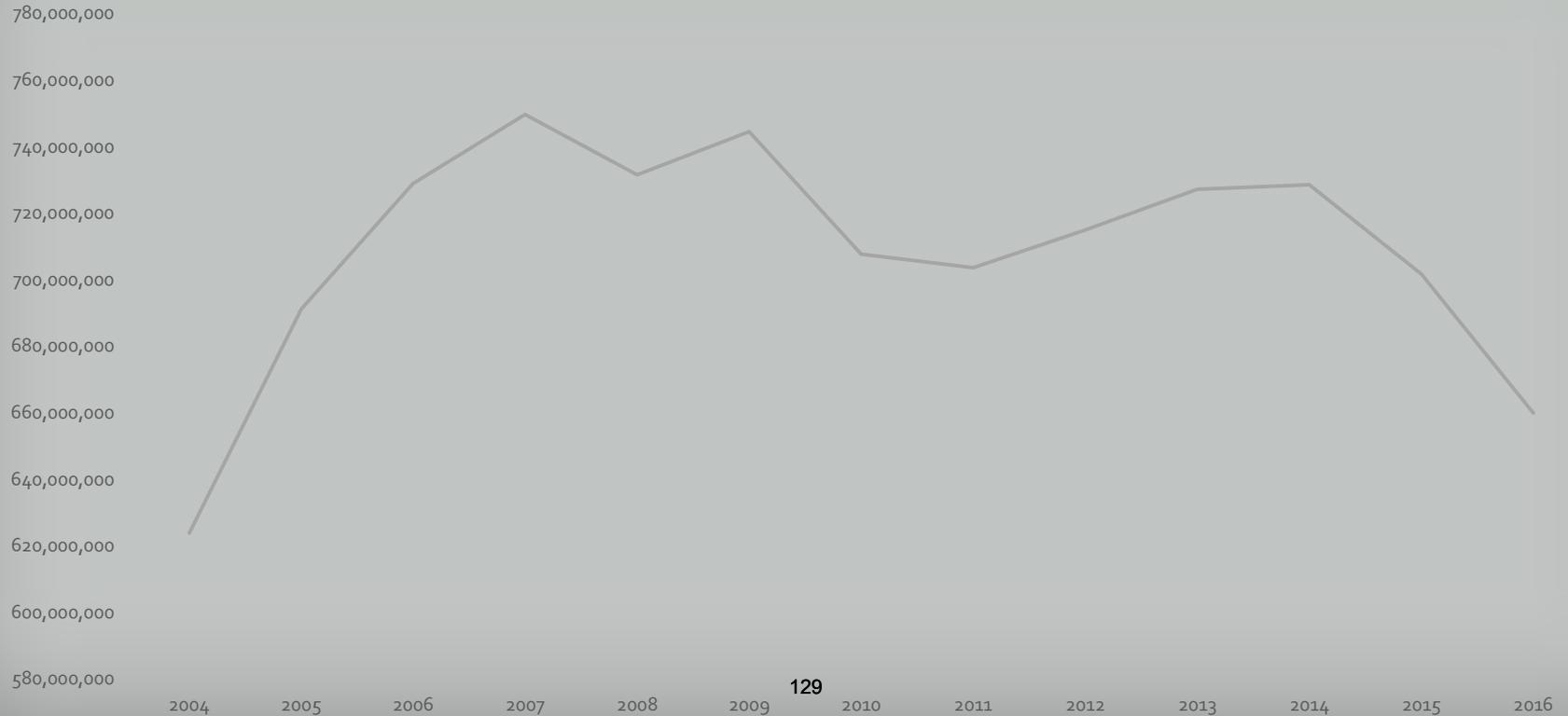
Aggregated Monthly Revenue Hours Through June 2016, 2016 NTD



Total Unlinked Trips 2004-2016, NTD, 2014 NTD



Aggregated Monthly Trips through June 2016, 2016 NTD



Per Capita Trips, 2004-2014, SCAG Region, 2014 NTD

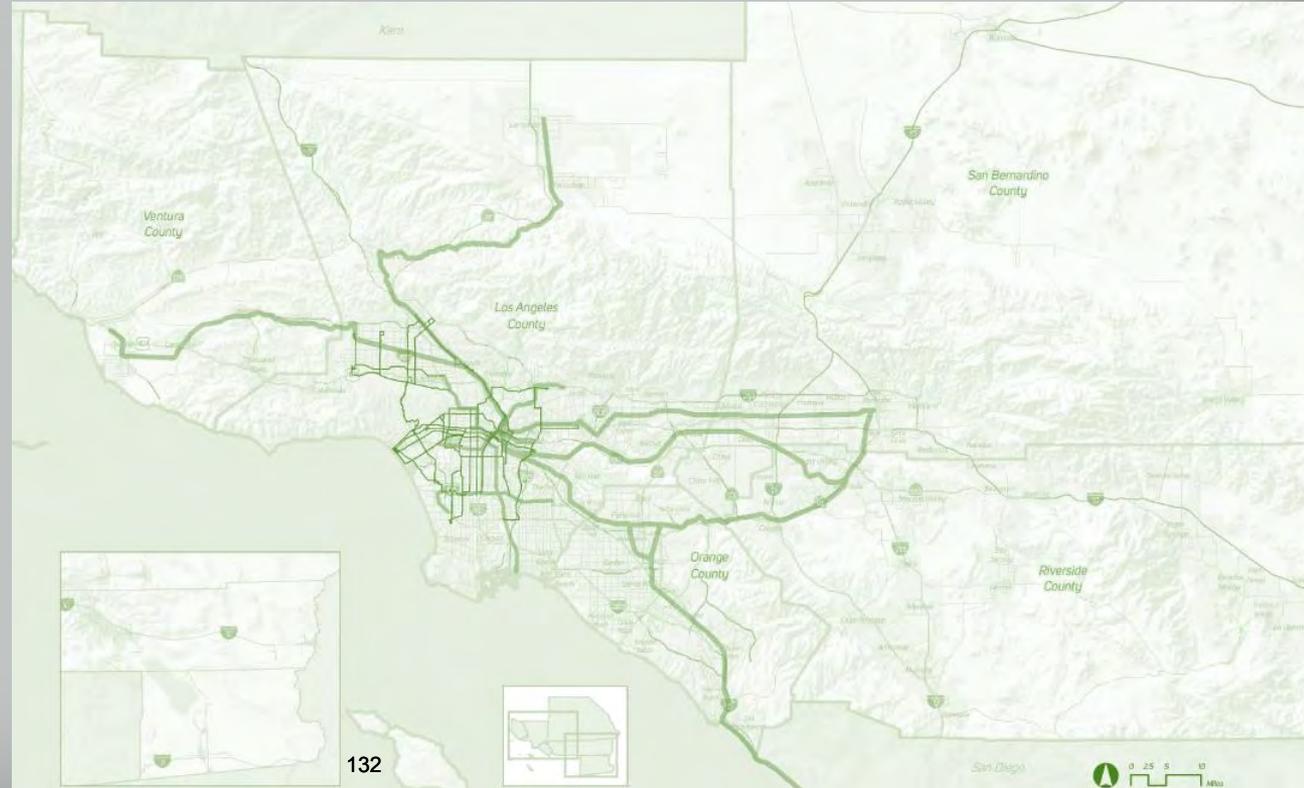


Aggregated Monthly Per Capita Trips Through June 2016, 2016 NTD



Market Sector Analysis

- SCAG Region is very complex environment
 - Nearly 70 providers of some sort of fixed route service
 - Almost 100 transit providers
 - Variety of modes
 - It's rare that metropolitan regions have this many agencies providing public transportation



Market Sector Analysis

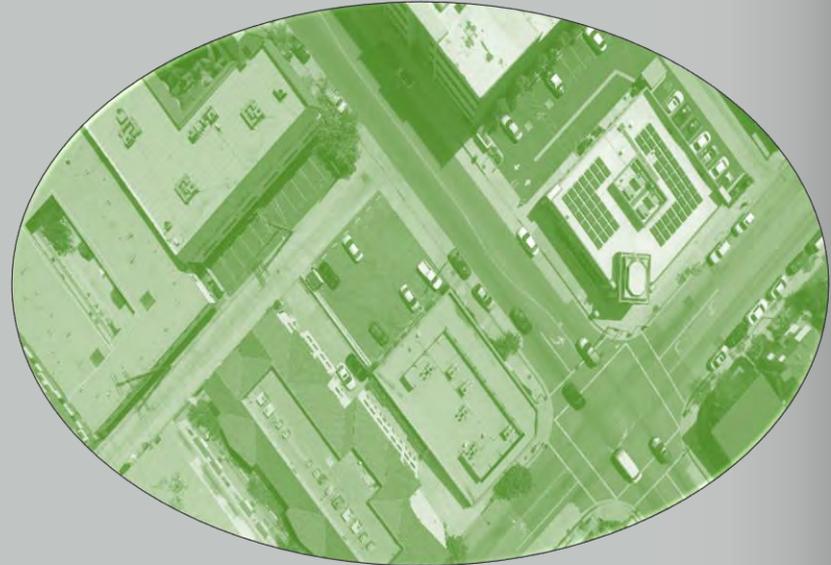
- Regional Governance Continues to evolve
 - VVTA – Barstow Merger
 - Heritage Valley
 - OC Municipals -- growth & change
 - La Habra
 - ATN
- Post recession service cuts at large agencies are changing the way service is being provided



Market Sector Analysis

- The market sector concept was developed to:

- Allow closer comparison between similar transit properties
- Stand in as a proxy for land use, financing, and geographic proximity
- Identify broad trends in the way transit service is provided and consumed



Service Provision and Consumption by UZA

	Vehicle Revenue Miles	Vehicle Revenue Hours	Unlinked Passenger Trips	Operating Expenses
Camarillo	0.12%	0.12%	0.01%	0.05%
El Centro-Calexico	0.41%	0.26%	0.12%	0.20%
Indio-Cathedral City	1.44%	1.35%	0.67%	0.97%
Lancaster-Palmdale	1.13%	0.87%	0.50%	0.78%
Los Angeles-Long Beach-Anaheim	83.66%	85.43%	93.52%	90.58%
Mission Viejo-Lake Forest-San Clemente	0.08%	0.11%	0.09%	0.09%
Oxnard	1.67%	1.59%	3.54%	0.95%
Riverside-San Bernardino	8.35%	7.77%	0.49%	4.68%
Santa Clarita	1.31%	1.04%	0.06%	0.81%
Simi Valley	0.23%	0.22%	0.04%	0.18%
Thousand Oaks	0.37%	0.32%	0.04%	0.20%
Victorville-Hesperia	1.24%	0.92%	3.54%	0.50%

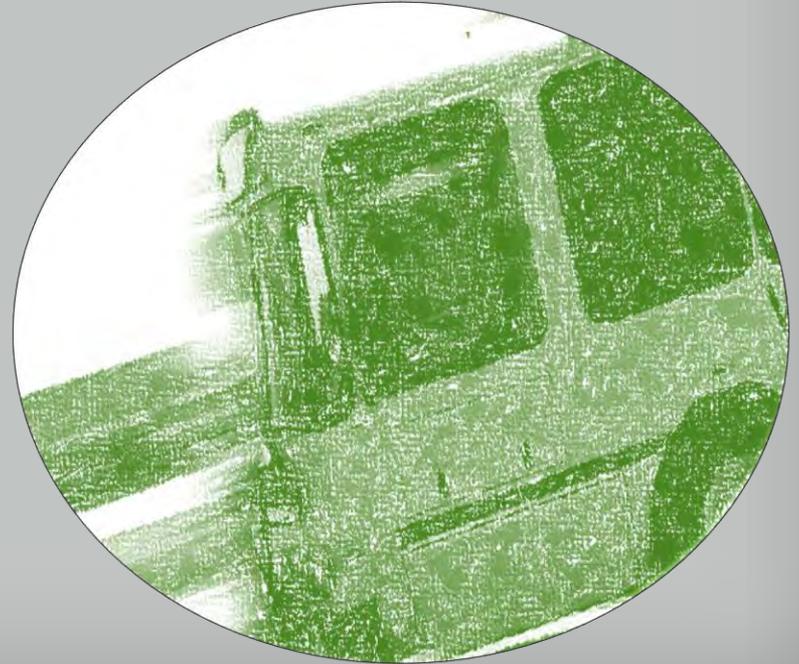
- Analysis can be done at regional, county, UZA, or market sector levels
- **We've proposed to use market sectors for this report**

Next Steps: Market Sectors

- Proposed Sectors:

Proposed Market Sectors	
Coachella Valley	Metro Bus
Commuter Rail	Metro Rail
East Ventura	OC Munis
Imperial	OCTA
Inland Empire*	Victor Valley
LA County Muni	West Ventura
LA County LTSS	

136

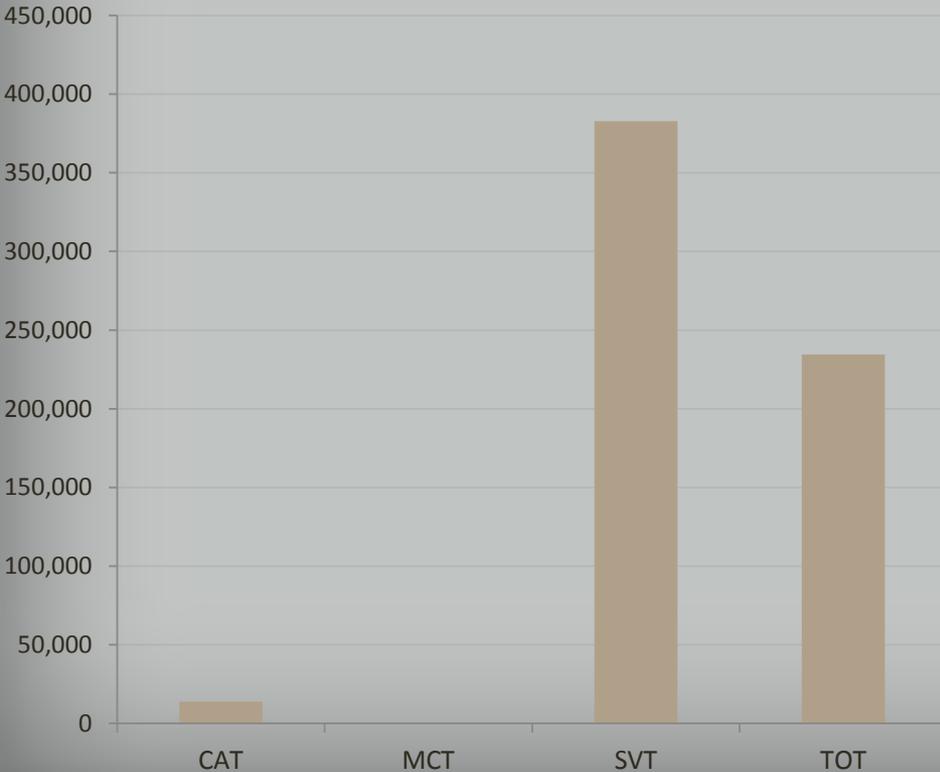


*The Inland Empire refers to Western Riverside County and the San Bernardino Valley

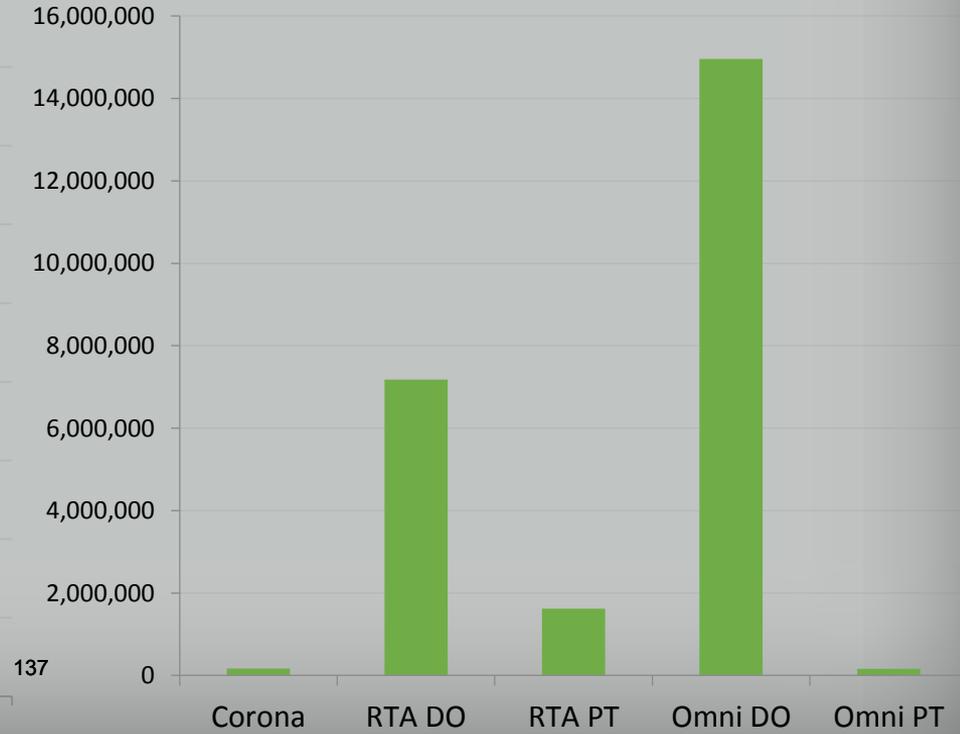
Market Sectors

Current Year Analysis Example

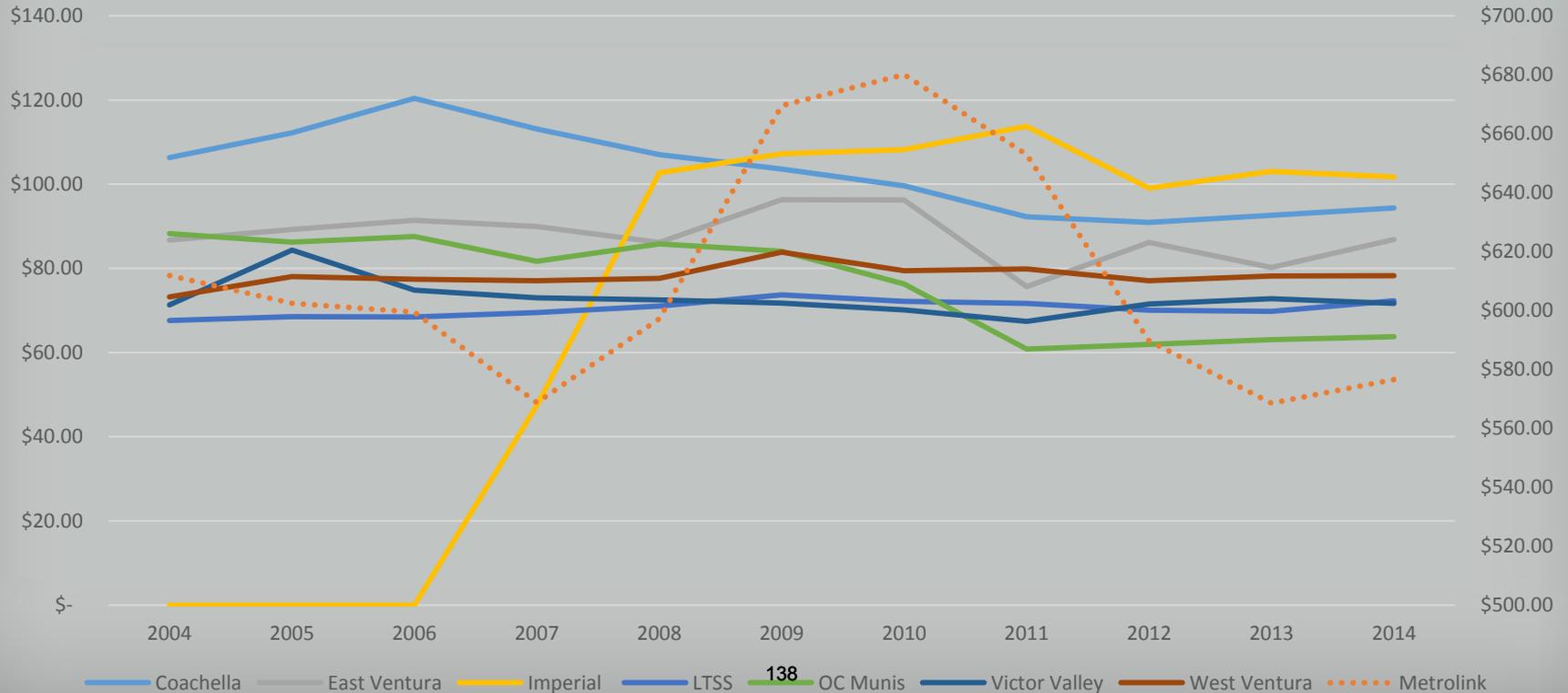
East Ventura UPT Bus



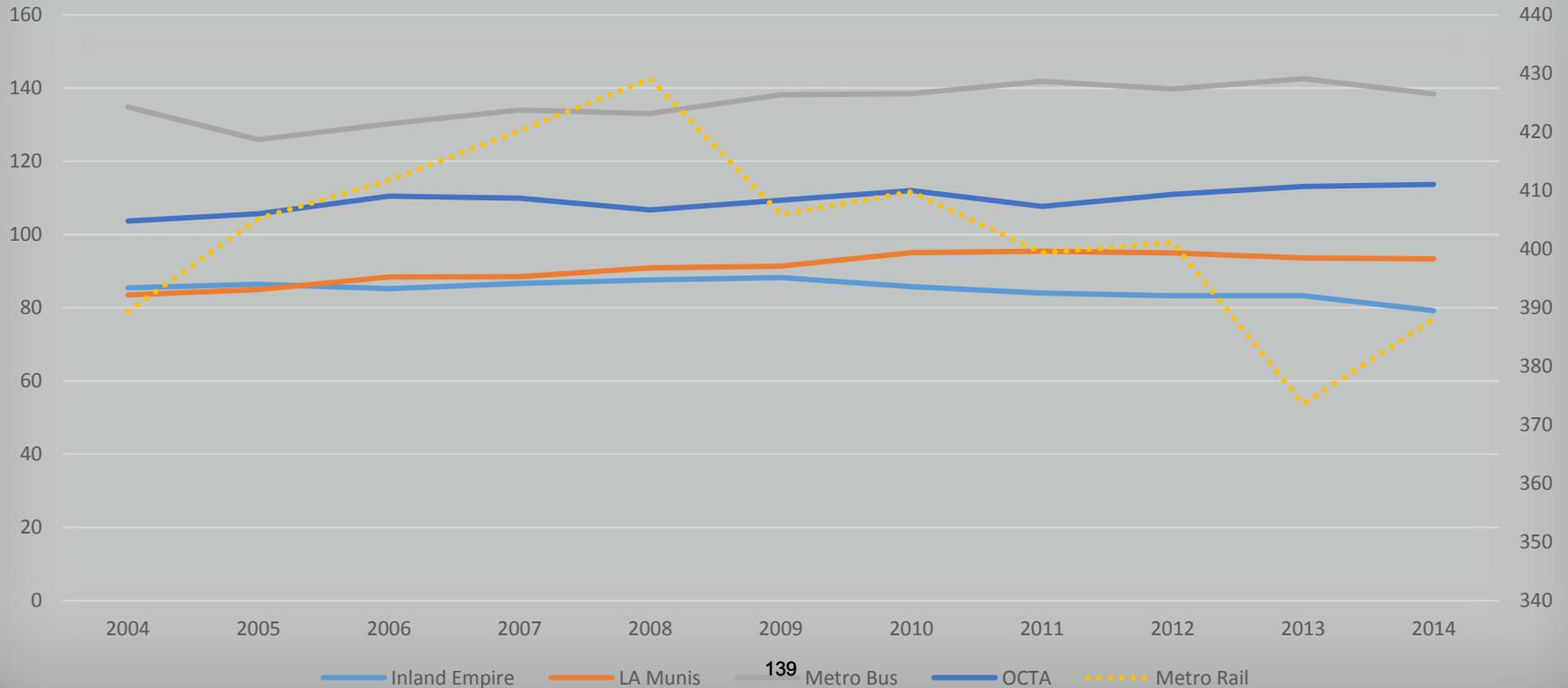
Inland Empire UPT Bus



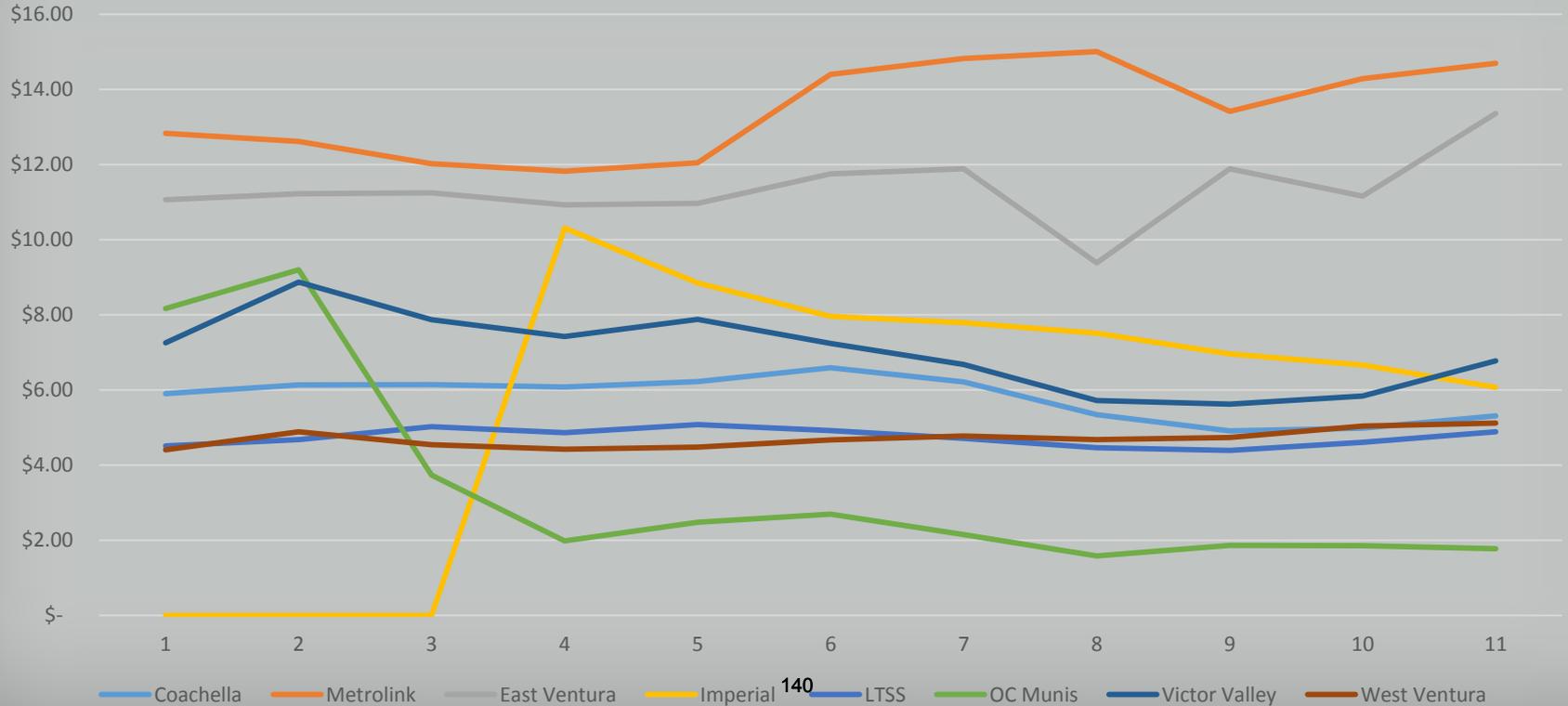
Cost per Hour (under 15million UPT)



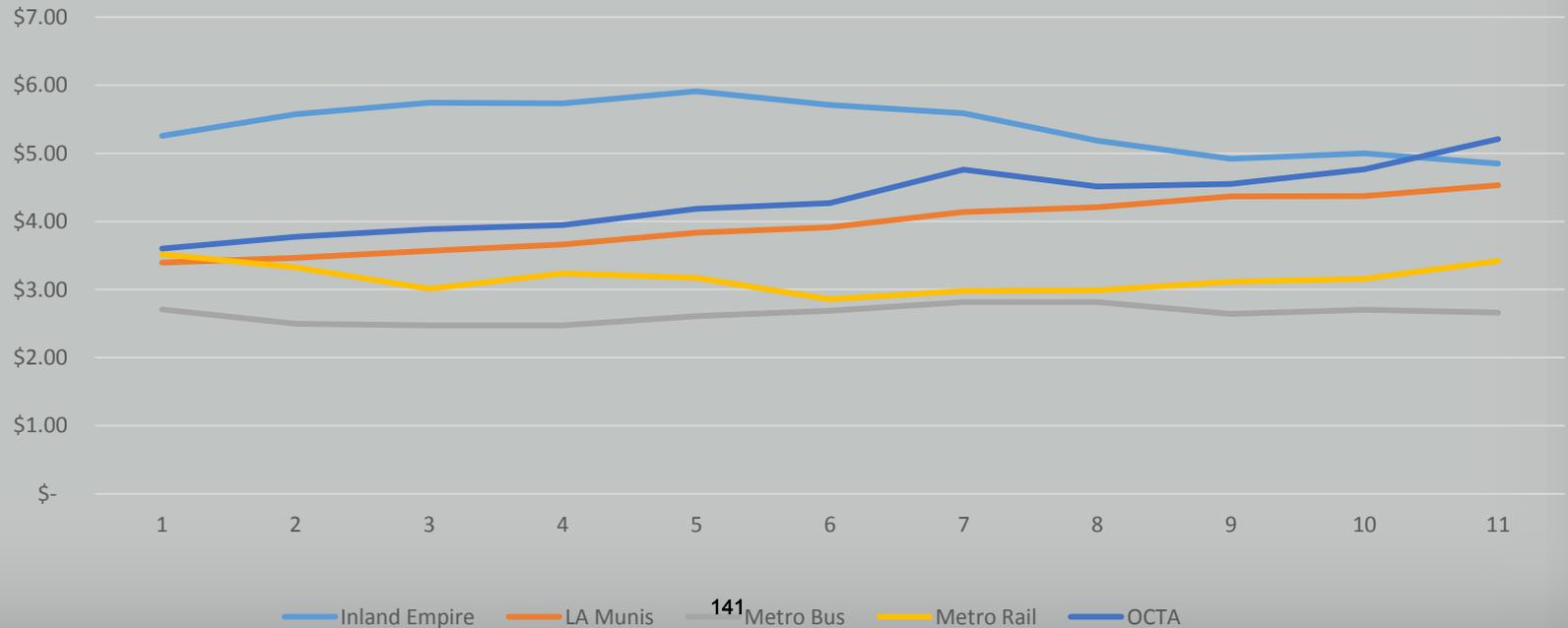
Cost per Hour (over 15million UPT)



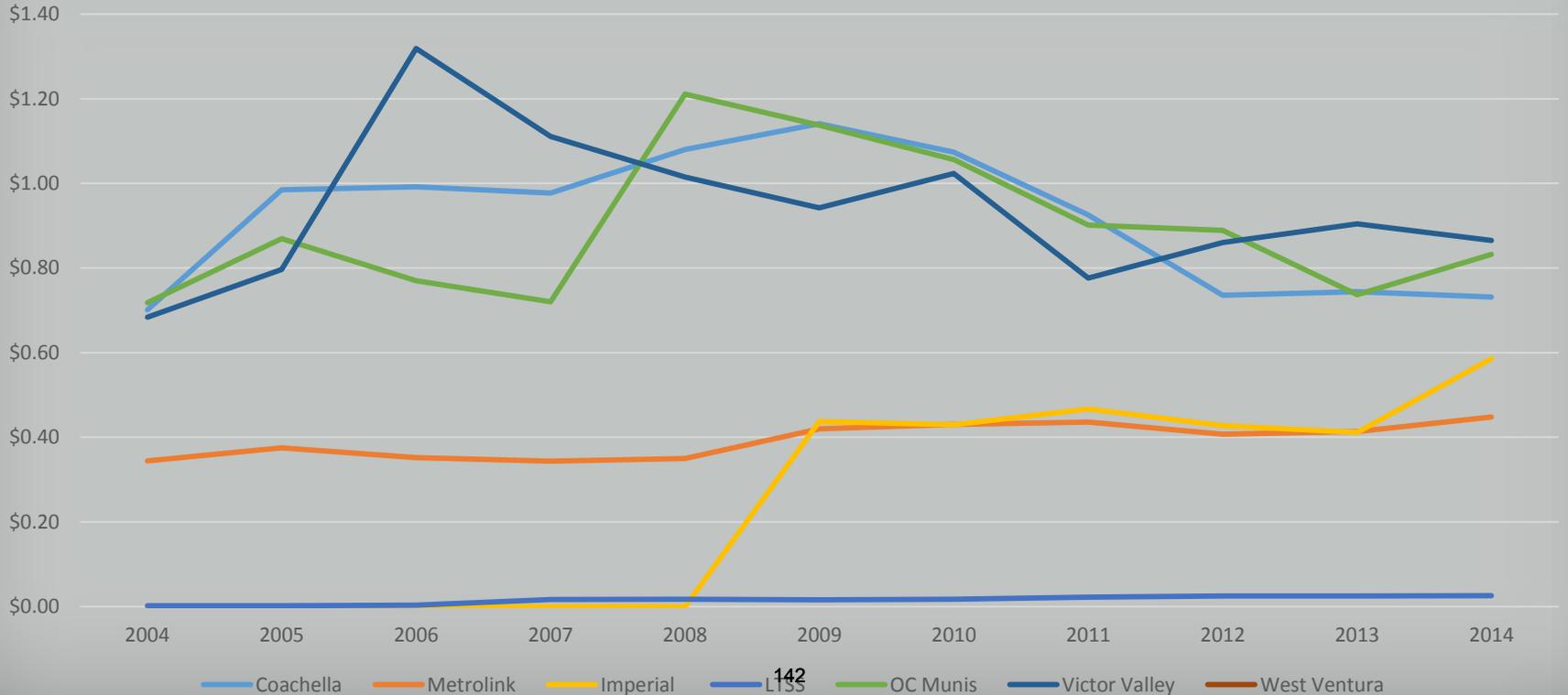
Cost per Trip (under 15 million UPTs)



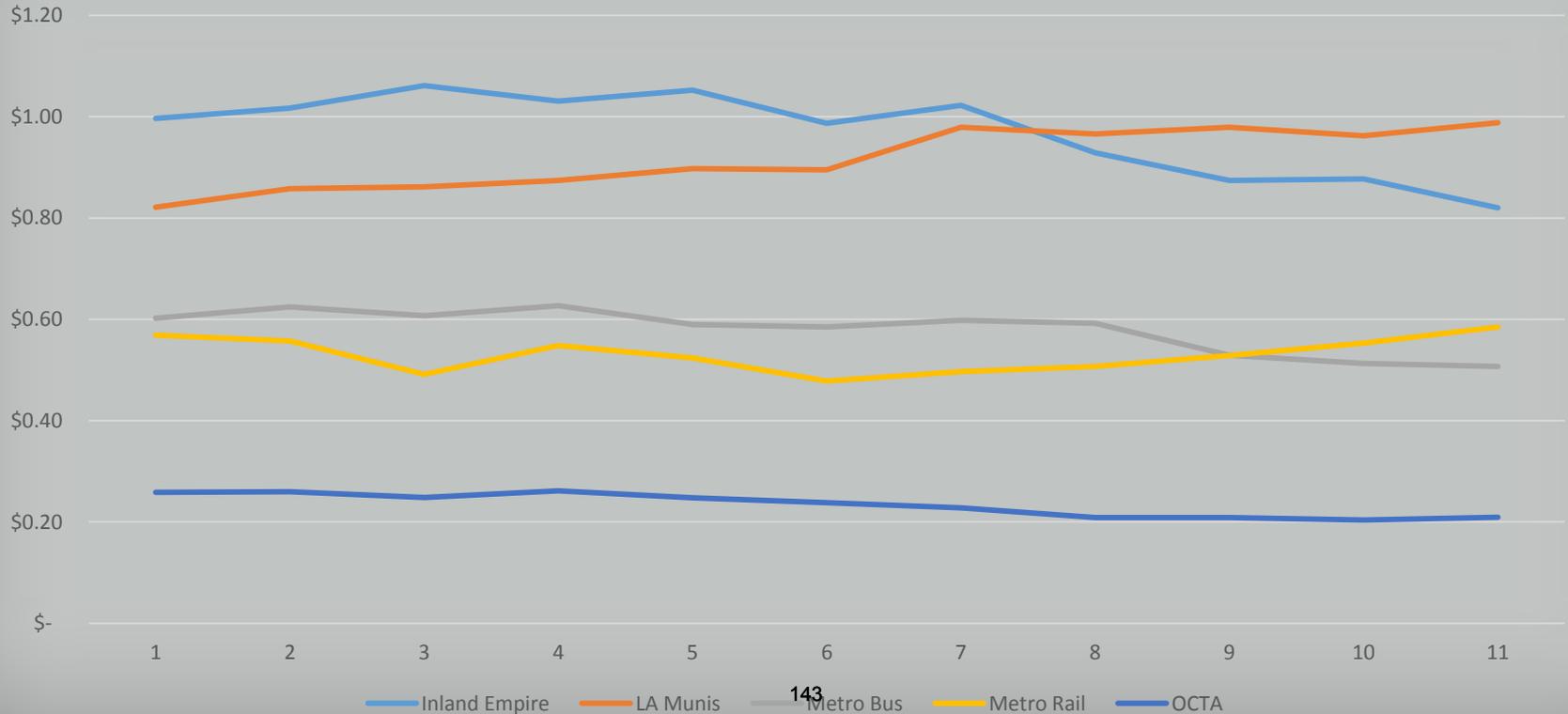
Cost per Trip (over 15 million UPTs)



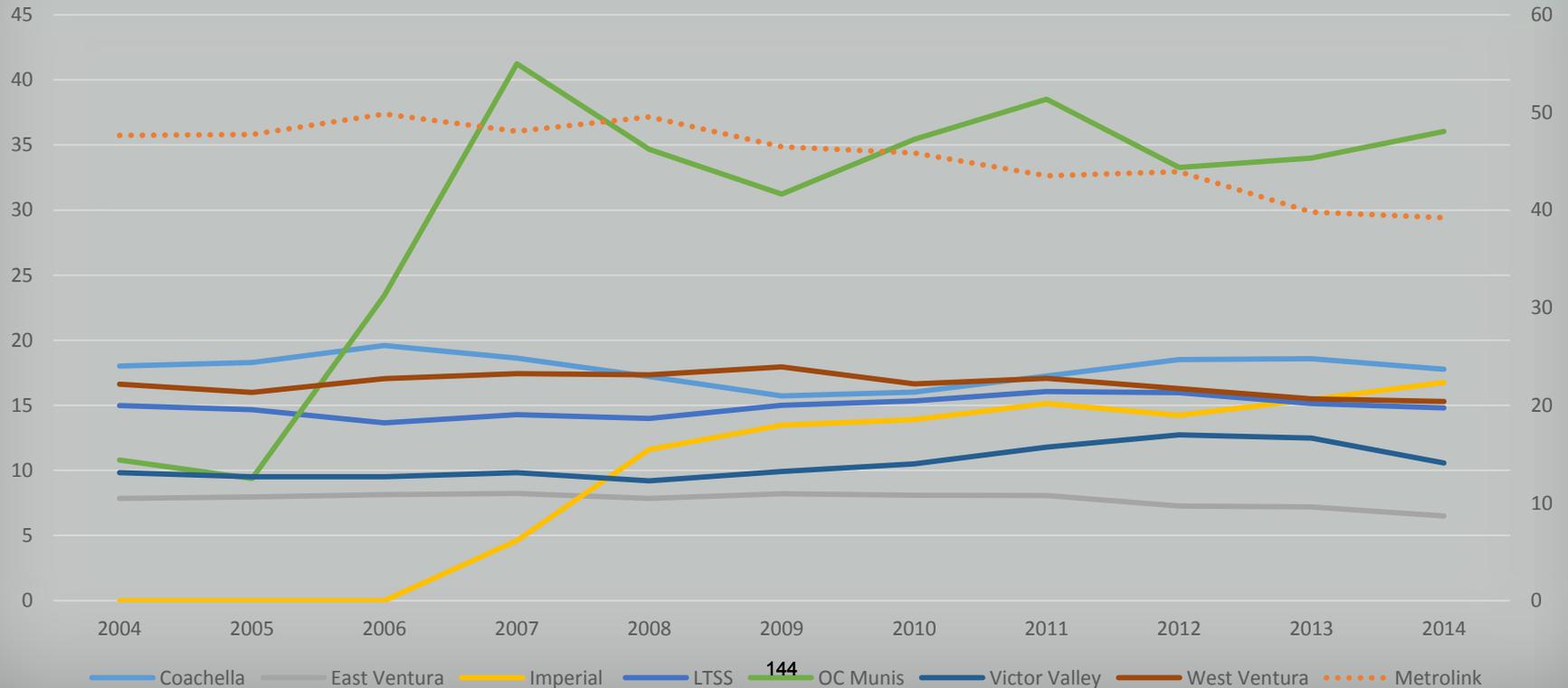
Cost per Passenger Mile (under 15 million UPTs)



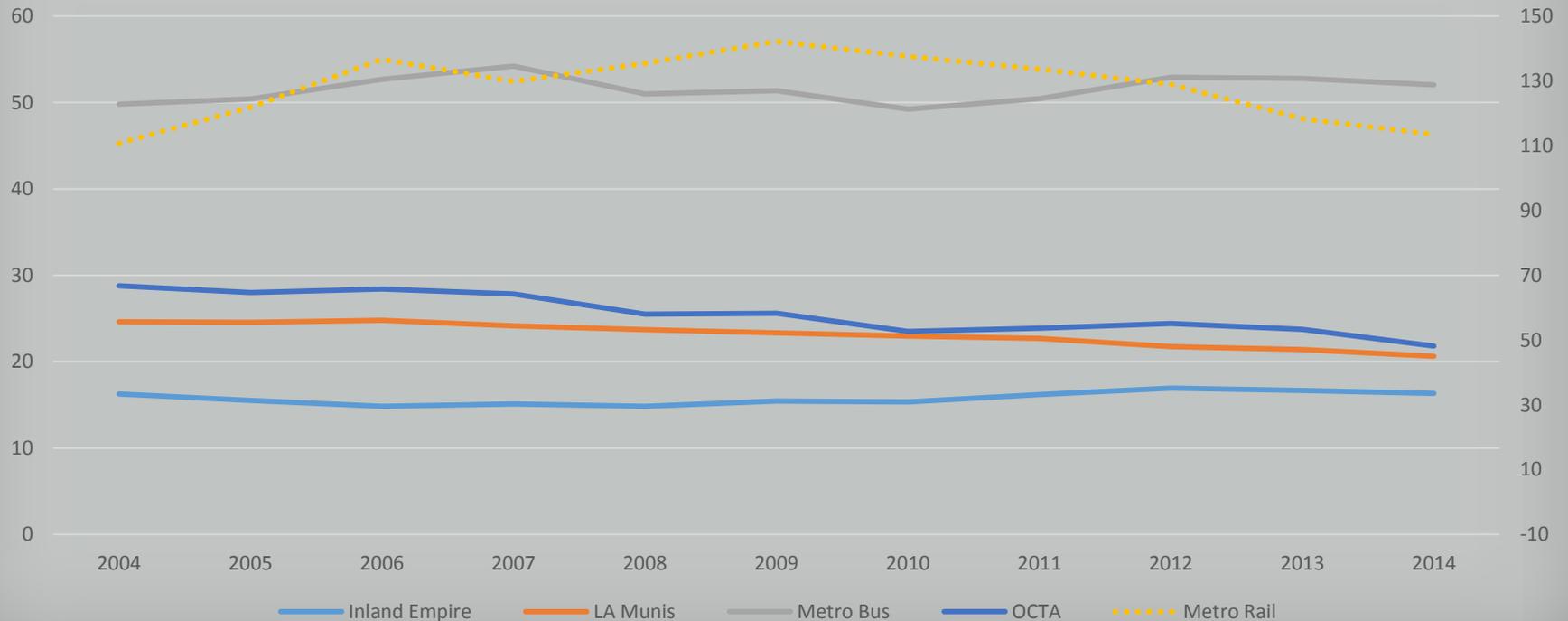
Cost per Passenger Miles (over 15 million UPTs)



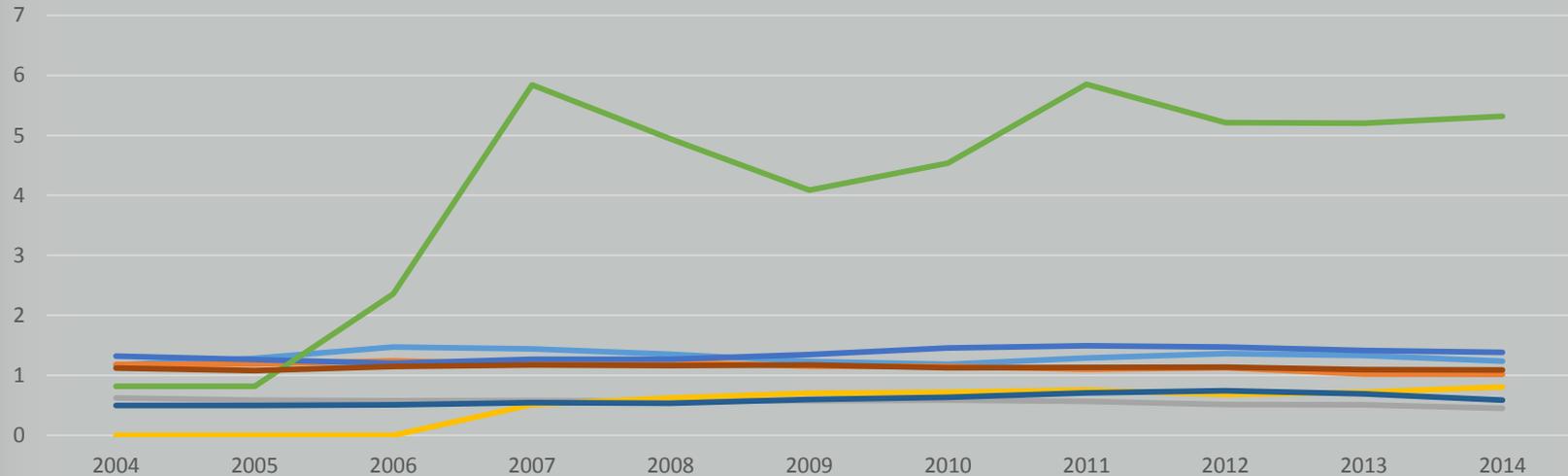
Trips per Hour (under 15 million UPTs)



Trips per Hour (over 15 million UPTs)

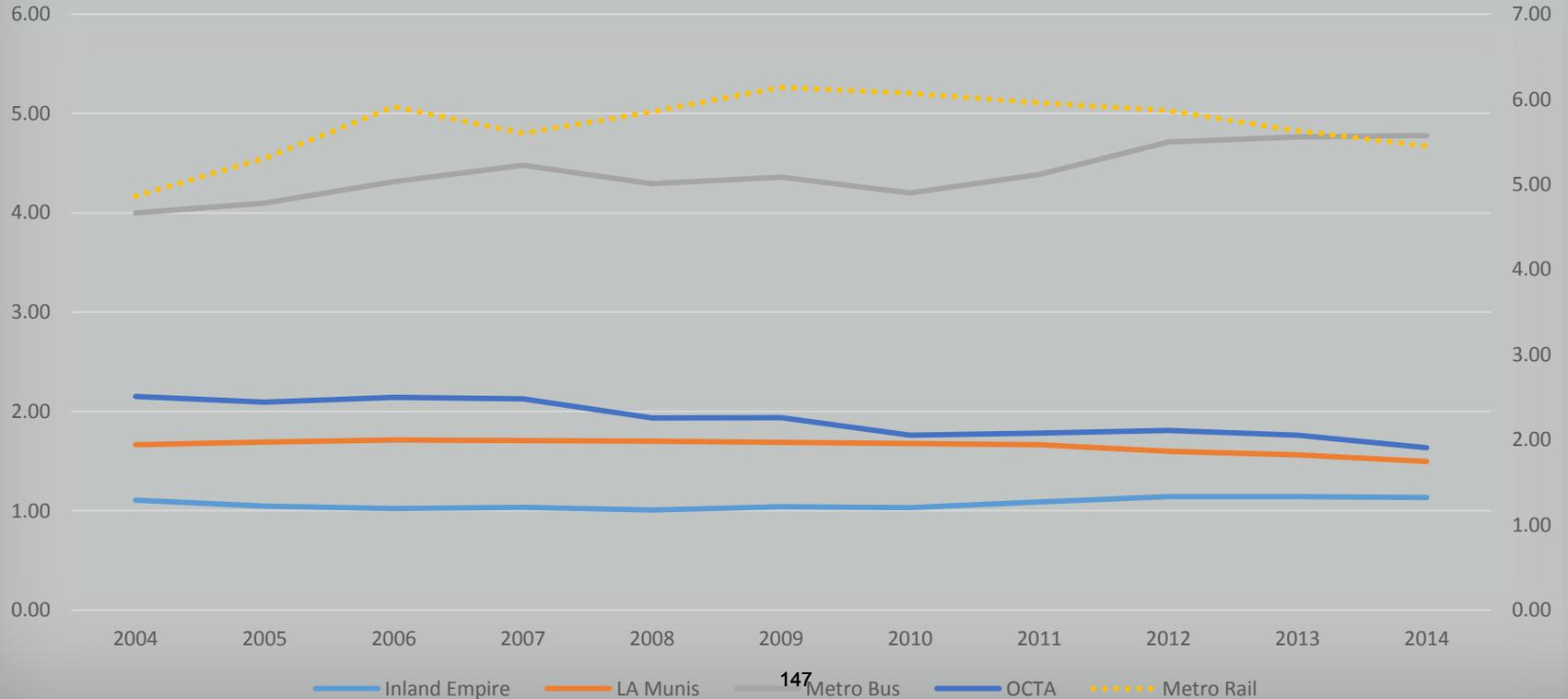


Trips per Mile (under 15 million UPTs)

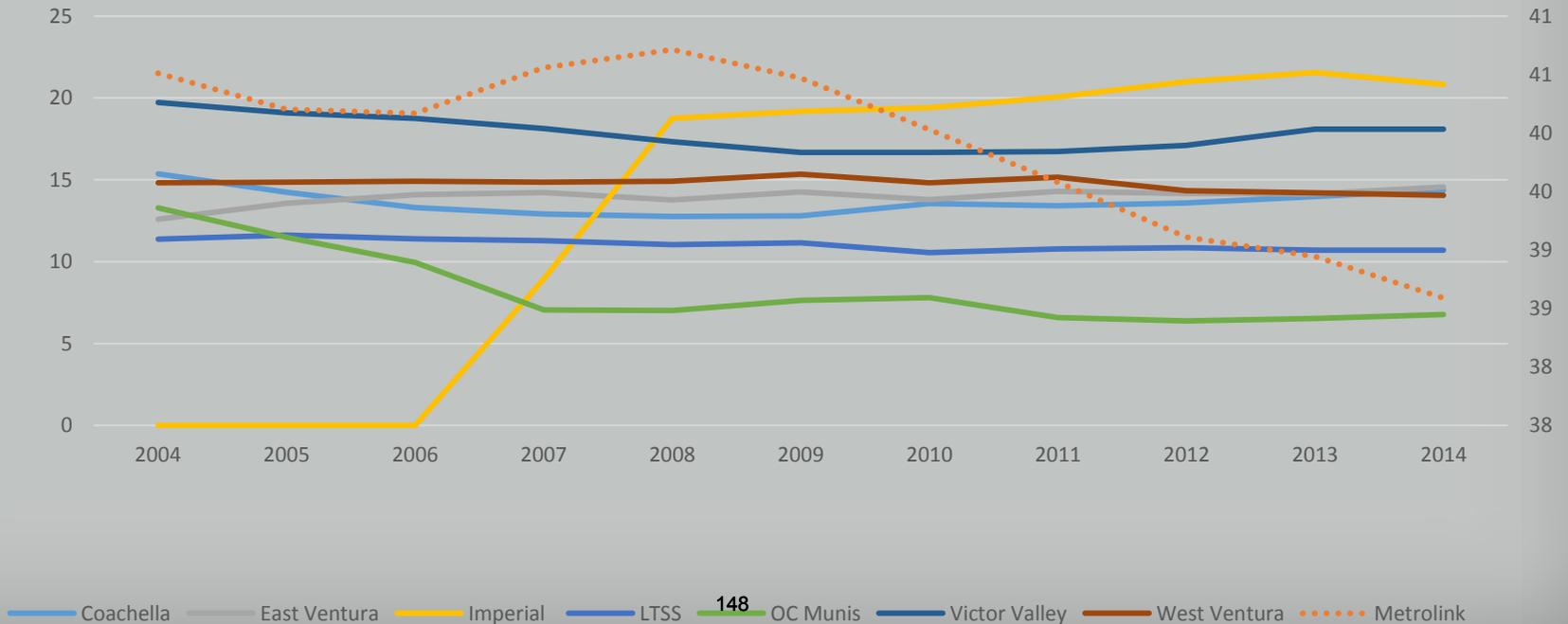


Coachella Metrolink East Ventura Imperial 146 LTSS OC Munis Victor Valley West Ventura

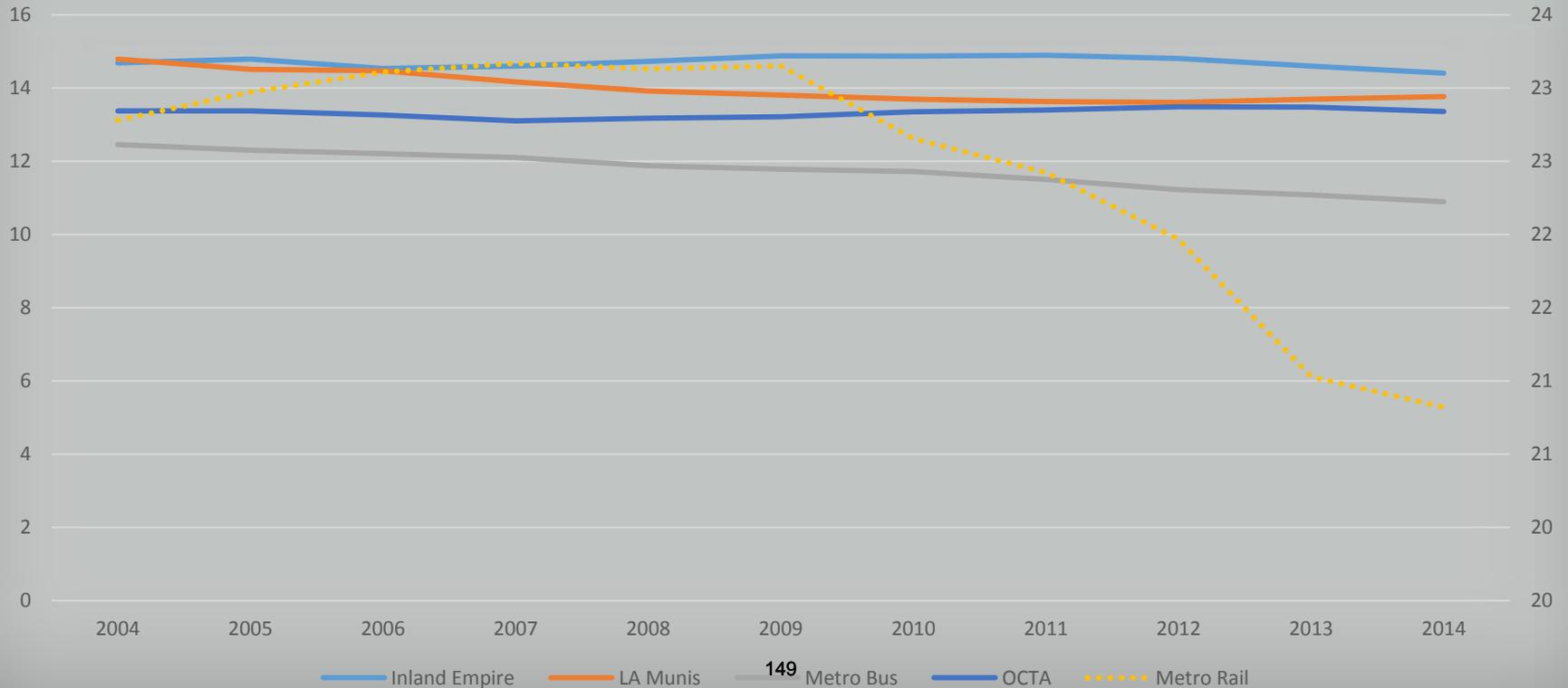
Trips per Mile (over 15 million UPTs)



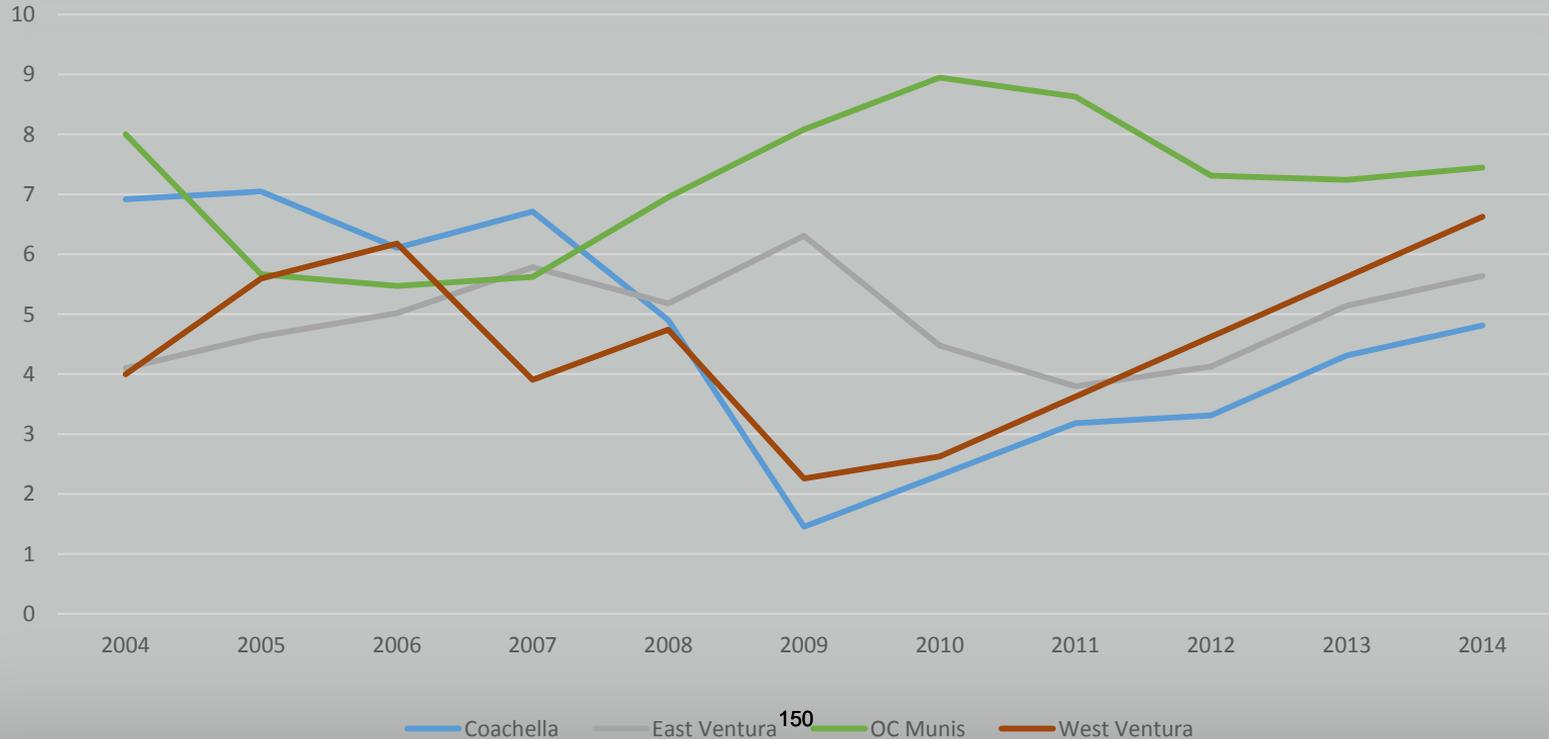
Miles per Hour (under 15 million UPTs)



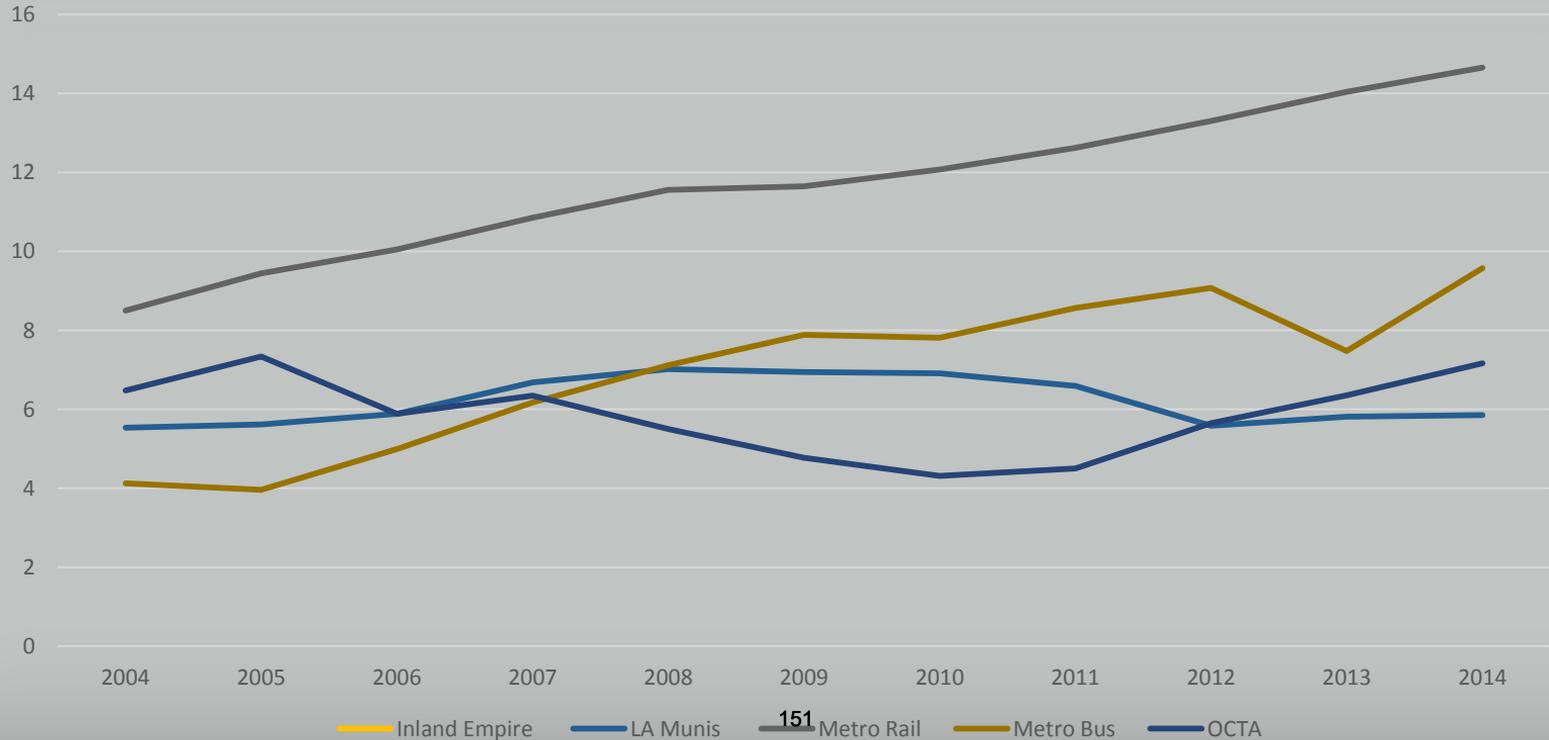
Miles per Hour (over 15 million UPTs)



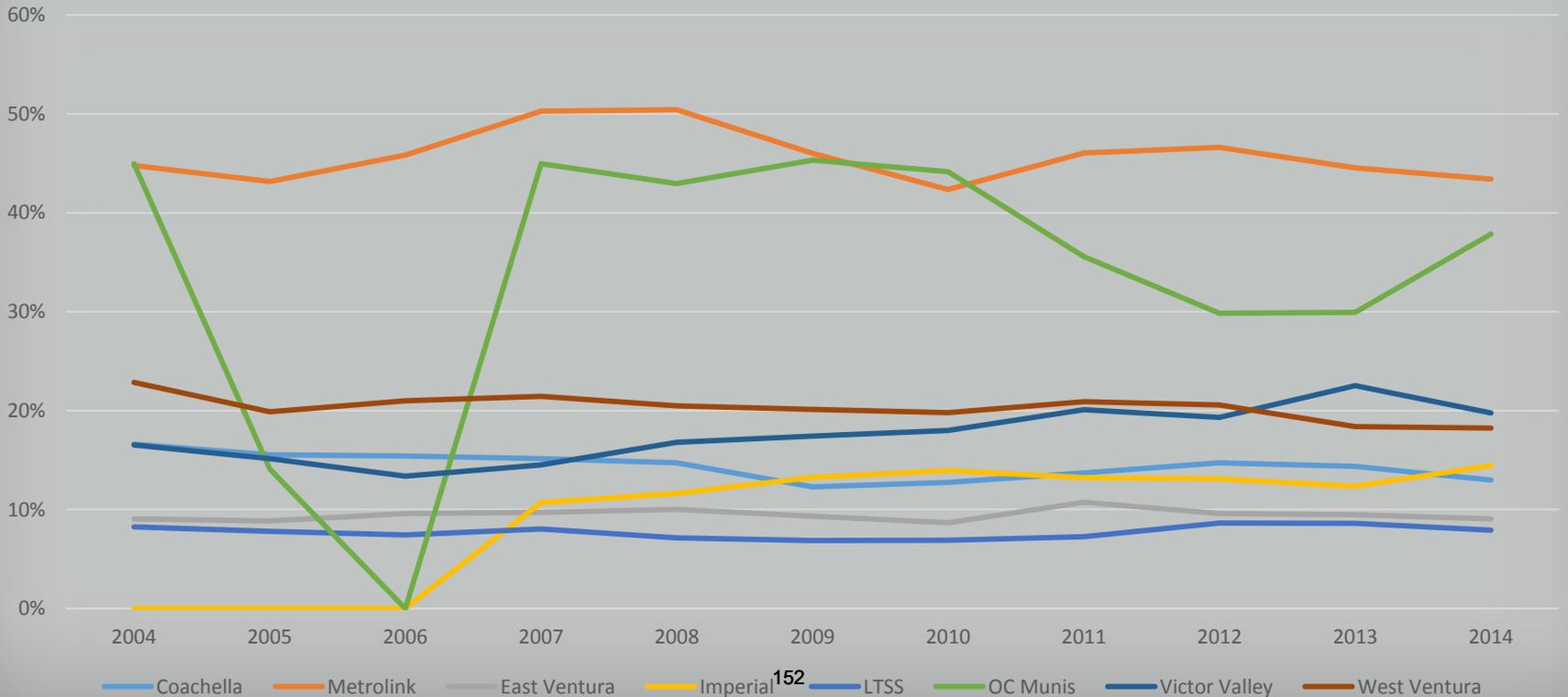
Fleet Average Age (under 15 million UPTs)



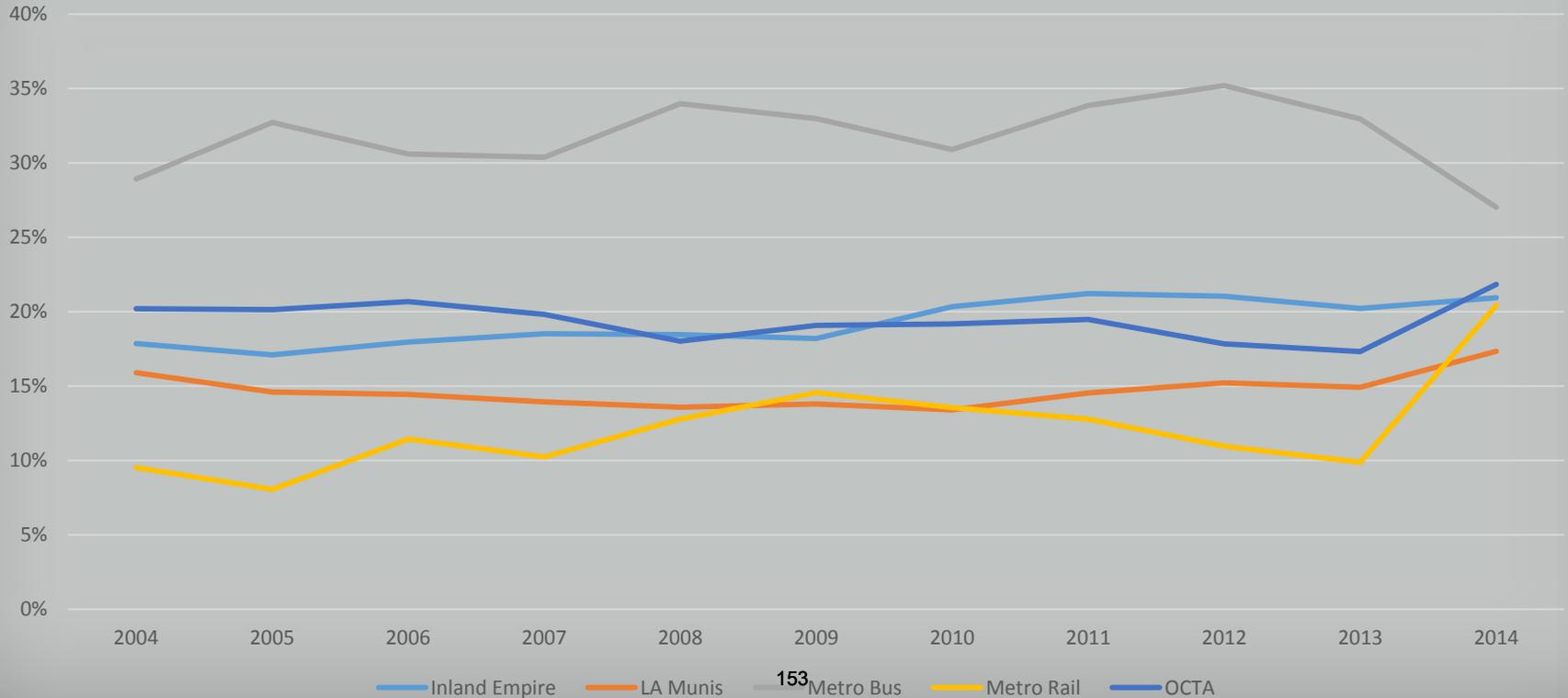
Fleet Average Age (over 15 million UPTs)



Farebox Recovery (under 15 million UPTs)



Farebox Recovery (over 15 million UPTs)



Questions?



For more information, please contact:

**Matt Gleason – gleason@scag.ca.gov
(213)-236-1832**

www.scag.ca.gov/transit