Plan/Bay Area: Technical Summary of Predicted Traveler Responses to First Round Scenarios

Technical Report

Metropolitan Transportation Commission

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1 Introduction

This report presents selected technical results from the first round of scenario analyses undertaken in support of the Metropolitan Transportation Commission's (MTC's) 2013 Plan/Bay Area. To provide context, the results are preceded by a brief overview of the technical methods used in the analysis.

For detailed information regarding the broader Plan/Bay Area effort, please see OneBayArea.org.

2 Analytical Tools

To first describe the reaction of travelers to transport projects and policies and to then quantify the impact of cumulative individual decisions on the Bay Area's transport networks and environment, MTC maintains an analytical tool, i.e. a collection of computer programs that implement statistical models, known to transportation planners as a "travel model" (or "travel demand model", "travel forecasting model"). The travel model is described here, along with two supporting tools, namely the population synthesizer and vehicle emissions model.

2.1 Population Synthesizer

MTC's travel model is an "agent-based simulation"; the "agents", in this case, are individual households, further described by the persons which form each household. This means that the computer programs that apply the series of statistical models attempt to predict the behavior of individual households and persons. In order to use such a tool, a population in which households and persons are described in a fair amount of detail is needed – and such information is needed for both the historical and prospective points in time at which the travel model is asked to describe traveler behavior.

Tools that perform the above-described task are known as "population synthesizers" because they create what are generally referred to as "synthetic"[1] populations. These synthetic populations are detailed descriptions of households (and the persons in those households, the details of which are drawn from the Census) that are constructed in such a way that the aggregation of characteristics across households along a variety of dimensions (specifics in the next paragraph), and combinations of dimensions, match the aggregate characteristics of the Bay Area's population we either know to be true (from census data, when attempting to describe historical populations) or we are willing to guess will be true in the future (when attempting to forecast populations). MTC's partner agency, the Association of Bay Area Governments (ABAG), predicts aggregate population characteristics 30 years hence.

MTC's population synthesizer attempts to "control" (i.e. make sure the synthetic population matches) along the following dimensions:

- Household "type", individual household unit or group quarters (e.g. college dorm);
- Household income category;
- Householder age;
- Number of persons in the household;
- Number of children under age 17 in the household;
- Number of employees in the household;
- Number of units in the household's physical location (one or more than one, as in an apartment building).

[1] Merriam-Webster defines *synthetic* as follows: "devised, arranged, or fabricated for special situations to imitate or replace usual realities" (definition 4b).

The population synthesizer attempts to locate actual households described in the 2000 Decennial Census Public Use Micro-sample (PUMS) data (i.e. those who responded to the old "long forms" used by the Census Bureau to collect more detailed household information) in such a way that when looking at the population along these dimensions spatially (at a level of detail below which the PUMS data is reported), the aggregate totals more or less match those predicted by other Census summary tables (in the base year) or ABAG's land use projections (in the forecast years). For example, if ABAG projects that 60 households containing 100 workers and 45 children will live in spatial unit X in the year 2035, the population synthesizer will attempt to locate 60 PUMS households in spatial unit X such that the number of workers in those households is close to 100 and the number of children is close to 45.

2.2 Travel Model

Travel models are frequently updated and modified. As such, a bit of detail as to which version of a given travel model is used for a given analysis is required. The current analysis uses *Travel Model One (version 0.0)*, completed Winter 2010/2011, calibrated to a 2000 base year, and validated to both year 2000 and year 2005 observed conditions.

Travel Model One is of the so-called "activity-based" archetype[2]. A more useful description of the travel model is given above: it is a partial agent-based simulation in which the agents being simulated are the households and persons that either engage or consider engaging in daily travel in the Bay Area. The simulation is partial because it stops short of simulating the *individual* behavior of passenger and transit vehicles on roadways and transit facilities (the model system does simulate the behavior of *aggregations* of vehicles and transit passengers).

The model operates on a synthetic population that includes representative households and persons for each actual household and person in the nine-county Bay Area – both in the base year and in forecast years. Travelers move through a space that is segmented into "travel analysis zones"[3]. A series of travel-related choices are simulated for each household and person within each household; these choices are simulated in the following sequence:

- Usual workplace and school location – Each worker, student, and working student in the synthetic population selects a travel analysis zone in which to work or attend school (or one zone to work and another to attend school);
- Household automobile ownership – Each household, given the household location and demographics as well as each members' work and/or school locations, decides how many vehicles to own;
- Daily activity pattern – Each household determines, together, the daily activity pattern of each household member, the choices being mandatory (go to work or school), non-mandatory (leave the house, but not for work or school), or stay at home.

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[2] The term "activity-based" is not the most descriptive label for the travel model, but it has been adopted into transportation planning jargon as a label for the family of travel models of which *Travel Model One* belongs.

[3] An interactive map of MTC's travel analysis zones is available here: http://geocommons.com/maps/58264

- Work/school tour frequency and scheduling – Each worker, student, and working student decides how many round-trips they will make to work and/or school, and then schedules a time to leave home for work and/or school as well as a time to return home;
- Joint non-mandatory tour frequency, party size, participation, destination, and scheduling – Each household determines the number and type (e.g. to eat, to visit friends, etc) of "joint" (i.e. two or more members of the same household traveling together) non-mandatory (i.e. not work or school) round trips in which to engage, then determines which members of the household will participate, where and at what time the tour (i.e. the time leaving home and the time returning home) will occur;
- Non-mandatory tour frequency, destination, and scheduling – Each person determines the number and type of non-mandatory (e.g. to eat, to visit friends, to shop, etc) round trips to engage in during the model day, where to engage in them, and at what time to leave and return home;
- Tour travel mode – The tour-level travel mode choice (e.g. drive alone, walk, take transit, etc) decision is simulated separately for each tour and represents the best[4] mode of travel for the round trip (a "tour" is a round trip from either home or the workplace);
- Stop frequency and location – Each traveler or group of travelers decide whether to make a stop on an outbound (from home) or inbound (to home) leg of a travel tour, and if a stop is to be made, where the stop is made, all given the round trip tour mode;
- Trip travel mode – A trip is a portion of a tour, either from the tour origin to a stop, a stop to another stop, or a stop to a tour destination, and a separate mode choice decision is made for each trip, doing so with awareness of the prior tour mode choice decision;
- Assignment – Vehicle trips for each synthetic traveler are aggregated to build time-of-day-specific matrices (i.e. tables of trips segmented by origin and destination) that are assigned via the standard static user-equilibrium procedures to the highway network (i.e. each vehicle is assigned to his or her shortest cost – both monetary and non-monetary – path between the origin and destination); transit trips are assigned to time-of-day-specific transit networks.

The *Travel Model One* system inherits without significant modification the representation of interregional and commercial vehicle travel from MTC's previous travel model (referred to as *BAYCAST-90*). Specifically, commercial vehicle demand is represented using methods developed for Caltrans and Alameda County as part of the *Interstate 880 Intermodal Corridor Study* conducted in 1982, and the *Quick Response Freight Manual* developed by the United States Department of Transportation in 1996. In combination, these methods estimate four classes of commercial travel, specifically: "very small" trucks, two-axle four-tire commercial vehicles; "small" trucks, two-axle six-tire vehicles; "medium" trucks, three-axle vehicles; and, "combination" trucks, four-or-more axle vehicles.

Reconciling travel demand with available transport supply is particularly difficult near the boundaries of planning regions, as models must attempt to predict travel demand with limited

[4] The choice of travel mode, as well as most other choices represented in the model, is simulated within a random utility theory framework – additional information available here: http://en.wikipedia.org/wiki/Choice_modelling.

knowledge of what land use – the primary driver of demand – or transport supply exists beyond the boundary. The typical approach to representing such interregional travel is to first estimate demand at each location where a major transport facility interacts with the boundary and to then distribute this demand to locations either within the planning region (so-called "internal/external" travel) or to other boundary locations (so-called "external/external" travel). MTC uses this typical approach and informs the process with Census 2000 journey-to-work flows, which are allocated via a simple method to represent flows to and from MTC's 1,454 travel analysis zones and 21 boundary locations (as well as flows between boundary locations).

2.3 Vehicle Emissions Model

Travel Model One generates spatially- and temporally-specific estimates of roadway usage and speed. This information is then input into an emissions model to estimate emitted criteria pollutants as well as carbon dioxide (used as a proxy for all greenhouse gases). MTC used the most recent version of CARB's emissions factor software (EMFAC 2007).

3 Scenarios

The following five scenarios are discussed in the remainder of this document: baseline (year 2005), current regional plans (years 2020 and 2035), and initial vision (years 2020 and 2035). In this section, we first provide a brief description of each scenario and then discuss the origin of key travel model inputs.

In general terms, scenarios differ across four dimensions, namely: land use, roadway supply, transit supply, and prices. By land use we mean the location of different kinds of households and jobs. Roadway supply refers to the network upon which automobiles, trucks, transit vehicles, bicycles, and pedestrians travel. Transit supply refers to the facilities upon which transit vehicles travel (the roadway, along with rail lines and other dedicated infrastructure), as well as the stop locations, route, and frequency of service on each facility. Prices include the monetary fee users are charged to board transit vehicles, cross bridges, park private vehicles, etc.

In the following paragraphs, each scenario is described along these four dimensions.

3.1 Baseline Scenario

Travel models must first demonstrate an ability to replicate historic conditions prior to being used to predict future conditions. This process of "ground-truthing" travel model results is known as "model validation". After making improvements to our analytical tools, MTC validated the model for two points in time. *Travel Model One* was validated to year 2000 and year 2005 conditions[5].

Even with a rigorous model validation effort, no travel model can accurately reflect all aspects of travel behavior in the base year. To ameliorate the inability of the model to inform every absolute truth, models should be used to inform relative truths by comparing future year results to base year results. The year 2005 scenario facilitates such comparisons.

The year 2005 (as opposed to other recent years past, i.e. 2006, 2007, 2008, etc) is selected as the "baseline" scenario against which the following scenarios are compared because (a) the Air Resources Board established 2005 as the base year to which forecast year greenhouse gas emissions are compared; and, (b) 2005 is the most recent year against which MTC has validated *Travel Model One.*

3.1.1 Land use inputs

The year 2005 travel model generates travel based on land use patterns estimated by ABAG in the *Projections 2009* data series. Prior to executing the travel model, the land use patterns estimated by ABAG are run through the population synthesizer described above. In doing so, minor inconsistencies between ABAG's estimates and the travel model inputs emerge. These inconsistencies emerge for two reasons: (1) expediency limits the time provided to the software to find the optimal solution, i.e. the synthetic population that best matches the control totals; (2) the control totals, as provided by ABAG, and base year data, as provided by the Census, are not perfectly consistent, meaning there is no synthetic population that could satisfy each of the control totals. These inconsistencies are quantified and presented in Table 1 below. Note that the inconsistencies only exist with the population estimates, not the employment estimates.

[5] Detailed documentation of these efforts is on-going and not available at the time of writing.

One key function of the population synthesizer is to identify each member of the imaginary populous with one of eight “person type” labels. As shown in Figure 1, each person in the population is identified as a full-time worker, part-time worker, college student, non-working adult, retired, driving-age student, non-driving-age student, or child too young for school. The travel model relies on these person type classifications to predict travel behavior. Two notable population synthesizer results apparent in Figure 1 are as follows:

- The share of the population engaged in full-time work declines slightly in the forecast years relative to the base year (this decline is partially off-set by an increase in the share of part-time workers); and,
- The retired share of the population increases significantly from 2005 through 2020 to 2035 in each scenario.

Table 1: Basic Demographic Statistics

Scenario	Households				Population			Total Employment
	Land use Projections		Synthetic Population	Percent difference†	Land Use Projections	Synthetic Population	Percent difference	
	Households	Group Quarters Population						
Year 2005 (version 0.0)	2,583,077	144,597	2,720,722	-0.3%	7,096,469	7,007,634	-1.3%	3,449,640
Year 2020, Current Regional Plans (v 0.0)	2,911,414	160,975	3,060,679	-0.4%	8,011,800	7,910,178	-1.3%	3,678,873
Year 2035, Current Regional Plans (v 0.0)	3,303,337	168,187	3,459,682	-0.3%	9,066,239	8,972,467	-1.0%	4,400,419
Year 2020, Initial Vision (v 0.0)	3,018,138	160,918	3,166,517	-0.4%	8,161,784	8,088,706	-0.9%	3,716,677
Year 2035, Initial Vision (v 0.0)	3,570,134	168,185	3,724,652	-0.4%	9,429,920	9,380,349	-0.5%	4,493,966

† – individuals living in group quarters are considered individual households in the synthetic population and, subsequently, the travel model

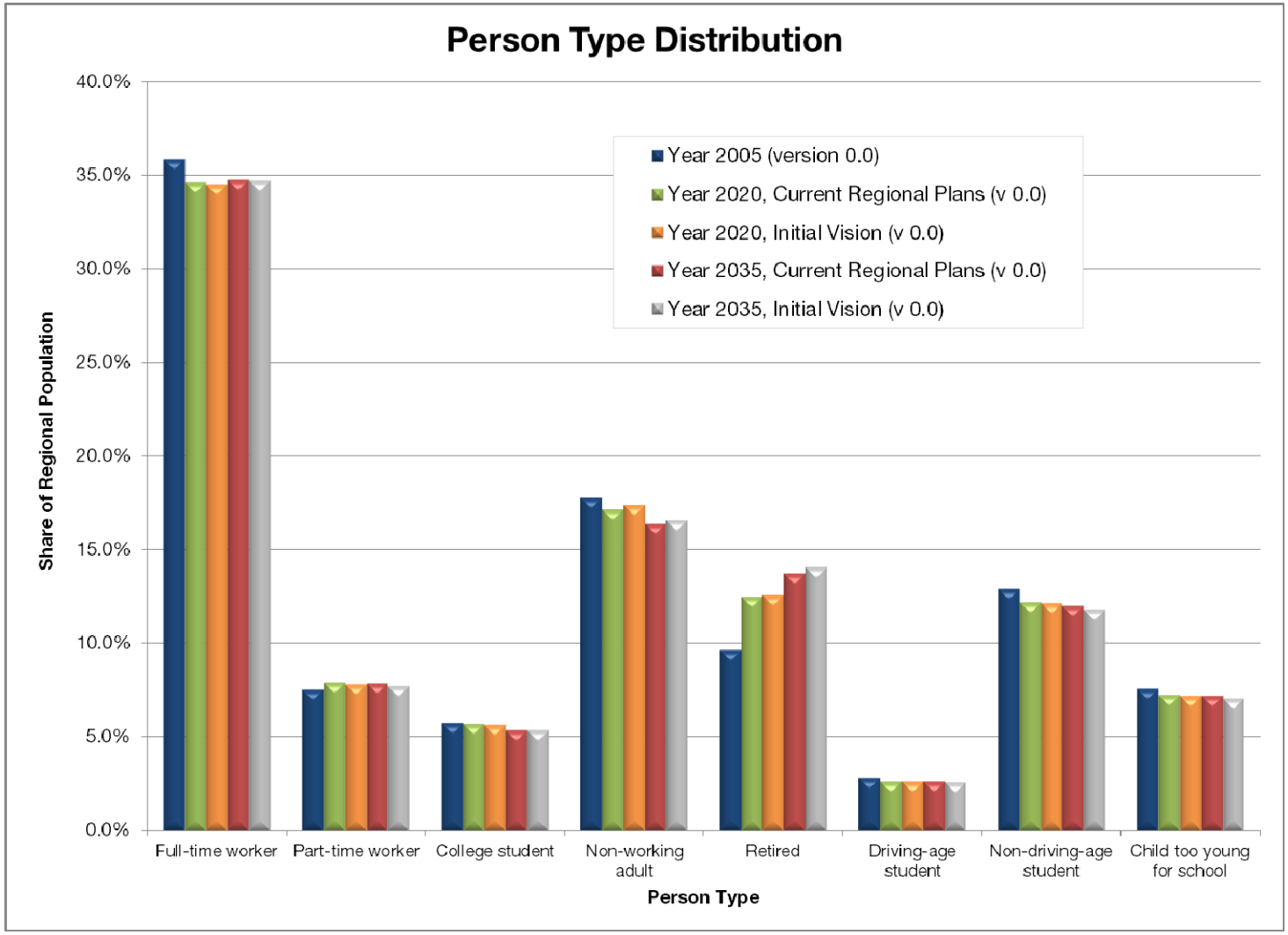

Figure 1: Synthetic Population Person Type Distribution

3.1.2 Roadway supply

An abstract representation of the roadway network as it was in 2005 is used in the baseline scenario.

3.1.3 Transit supply

An abstract representation of the transit network as it was in 2005 is used in the baseline scenario.

3.1.4 Prices

Six different types of prices are explicitly represented in the travel model, as follows: (i) value of travel time; (ii) bridge tolls; (iii) high-occupancy-lane tolls; (iv) transit fares; (v) perceived automobile operating cost; and, (vi) parking charges. Each of these prices is described below.

Value of Travel Time

Travel Model One includes statistical models in which travelers determine the best travel "mode" (e.g. automobile, transit, bicycle, etc.) for each of their daily trips. One determinant of this choice is the trade-off between saving time and saving money. For example, a traveler may have two realistic options for traveling to work: (a) driving, which would take 30 minutes roundtrip and cost $10 in parking fees; or, (b) taking transit, which would take 90 minutes roundtrip and cost $2 each way for the bus fare. The mode choice model structure, as estimated in the early 2000's, includes coefficients that dictate how different travelers in different contexts make decisions between saving time and saving money. These model coefficients value time in units consistent with year 2000 dollars, i.e. the model itself – not an exogenous input to the model – values time relative to costs in year 2000 dollars. Because re-estimating model coefficients is an "expensive" (in terms of staff time and/or consultant resources) process, it is done infrequently, which, in effect, "locks in" the dollar year in which prices are input to the travel model. In order to use the current model's coefficients properly, all prices must be input in year 2000 dollars. In the remainder of this document, prices are presented both in more current year (2005 or 2010) dollars (to give the reader an intuitive sense as to the scale of the input prices) as well as 2000 dollars (the units demanded by the model structure).

The model coefficients which link the value of time with other components of decision utilities remain constant between the baseline and forecast years, with the one exception of the coefficients on travel cost. These coefficients are a function of each individual's value of time, a number drawn, in both the base year and forecast years, from one of four log-normal distributions (see Figure 2) – the means of which are a function of each traveler's household income. The means and shapes of the distributions are held constant between the base and forecast years.

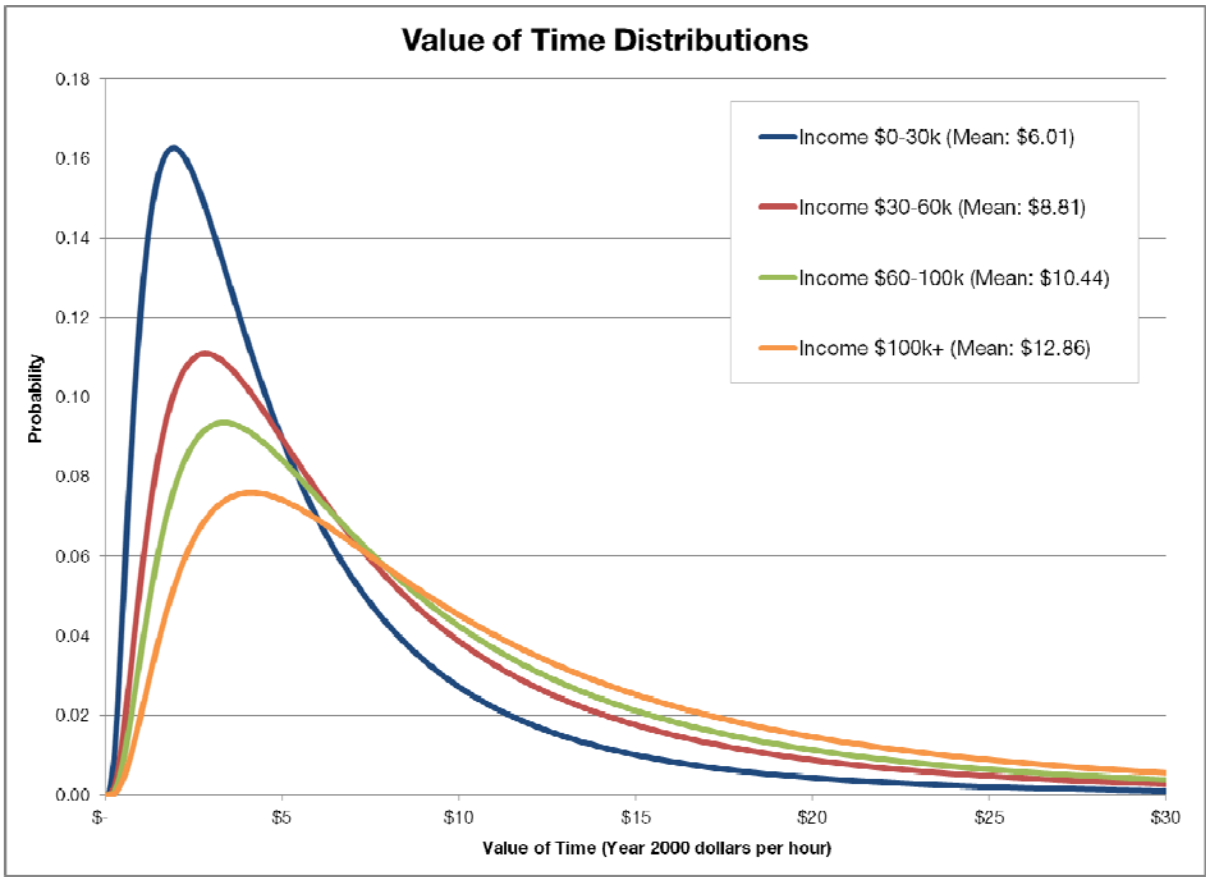

Figure 2: Value of Time Distribution by Household Income

Bridge Tolls

The bridge tolls assumed in the year 2005 baseline scenario are shown below in Table 2. Please note that Table 2 includes the price of tolls in year 2005 expressed in both year 2000 and year 2005 dollars.

Table 2: Common Peak Period Bridge Tolls in Year 2005 Baseline Scenario†

Bridge	2-axle, Single-occupant Vehicle Toll ($2000)	2-axle, Single-occupant Vehicle Toll ($2005)	2-axle, Carpool * Vehicle Toll ($2000)	2-axle, Carpool Vehicle Toll ($2005)
San Francisco/Oakland Bay Bridge	$2.67	$3.00	$0.00	$0.00
Antioch Bridge	$2.67	$3.00	$0.00	$0.00
Benicia-Martinez Bridge	$2.67	$3.00	$0.00	$0.00
Carquinez Bridge	$2.67	$3.00	$0.00	$0.00
Dumbarton Bridge	$2.67	$3.00	$0.00	$0.00
Richmond-San Rafael Bridge	$2.67	$3.00	$0.00	$0.00
San Mateo Bridge	$2.67	$3.00	$0.00	$0.00
Golden Gate Bridge	$3.56	$4.00	$0.00	$0.00

† The full toll schedule includes tolls for 3- or more axle vehicles; * Car pools are defined as either two-or-more or three-or-more occupant private vehicles, depending on the bridge, and only receive a discount during the morning and evening peak periods (Source: bata.mtc.ca.gov; goldengatebridge.org)

High-occupancy Toll (HOT) Lane Prices

No high occupancy toll facilities were in operation in the Bay Area in 2005.

Transit Fares

The transit fares assumed in the year 2005 baseline scenario are shown below in Table 3. Please note that Table 3 includes the price of fares in year 2005 expressed in both year 2000 and year 2005 dollars.

Table 3: Common Transit Fares in Year 2005 Baseline Scenario[†]

Operator	Base Fare ($2000)	Base Fare ($2005)
San Francisco Municipal Transportation Agency (Muni)	$1.33	$1.50
Alameda Contra Costa Transit (AC Transit)	$1.56	$1.75
Santa Clara Valley Transportation Authority (VTA) – Local buses	$1.56	$1.75
Santa Clara Valley Transportation Authority (VTA) – Express buses	$3.11	$3.50
San Mateo County Transit (SamTrans) – Local buses	$1.33	$1.50
Golden Gate Transit – Marin County to San Francisco service	$1.78	$2.00
County Connection (CCCTA)	$1.33	$1.50
Vallejo Transit	$1.33	$1.50
Tri-Delta Transit	$1.11	$1.25
Livermore Amador Valley Transit Authority (WHEELS)	$1.11	$1.25

[†] This is a sample, rather than an exhaustive list, of Bay Area transit providers and fares.

Perceived Automobile Operating Cost

When deciding between traveling to work in a private automobile or on a transit vehicle (or by walking, bicycling, etc.), MTC assumes travelers consider the cost of operating and maintaining, but not owning and insuring, their automobiles. The following three inputs are used in determining this perceived automobile operating cost: average fuel price, average fleet-wide fuel economy, and non-fuel-related operating and maintenance costs.

In an effort to improve consistency among travel models across the state, the Regional Targets Advisory Committee (formed in response to Senate Bill 375) recommended that metropolitan planning organizations (MPOs) across the state use consistent assumptions for fuel price and for the computation of automobile operating cost in long range planning. Using long range estimates provided by the United States Department of Energy (DOE) in the Summer of 2010, MPOs agreed to use the fuel prices and non-fuel-related prices presented in Table 4, which represents a weighted average of DOE's low-end estimate (25 percent weight) and DOE's high-end estimate (75 percent weight), plus a 25 cents surcharge to account for fuel generally being more expensive in California. The average fleet-wide fuel economy implied by the EMFAC 2007 software – also presented in Table 4 – is used to represent the average fleet-wide fuel economy.

Table 4: Inputs to MTC's Perceived Automobile Operating Cost Calculations

Measure	Analysis Year		
	2005	**2020**	**2035**
Average fuel price ($2000 per gallon)	$2.24	$3.81	$4.21
Average fuel price ($2010 per gallon)	$2.79	$4.74	$5.24
EMFAC implied fuel economy (miles per gallon)	19.76	24.10	27.67
Non-fuel-related operating cost ($2000 per mile)	$0.05	$0.07	$0.09
Non-fuel-related operating cost ($2010 per mile)	$0.06	$0.08	$0.11
Perceived automobile operating cost ($2000 per mile)[†]	*$0.166*	*$0.223*	*$0.238*
Perceived automobile operating cost ($2010 per mile)[†]	*$0.206*	*$0.278*	*$0.297*

[†] This number is the sum of the fuel-related operating cost (average fuel price divided by average fuel economy) and non-fuel-related operating cost.

Parking Costs

As noted in *2.2 Travel Model*, MTC's travel model segments space into travel analysis zones (TAZs). Travelers move between travel analysis zones and, in doing so, burden the transport network. Parking costs are applied at the TAZ-level: travelers going to zone X in an automobile must pay the parking cost assumed for zone X.

MTC's travel model uses hourly parking rates for daily (long-term, those going to work or school) and hourly (short-term) parkers. The long-term hourly rate for daily parkers represents the advertised monthly parking rate, averaged for all lots in a given TAZ, scaled by 22 days per month, and then scaled by 8 hours per day; the short-term hourly rate is the advertised hourly rate – generally higher than the rate daily parkers pay – averaged for all lots in a given TAZ.

To give the reader a sense of the spatial distribution and scale of parking charges in the Bay Area, Figure 3 presents a zoomed-in map of the hourly parking rates for daily parkers assumed for the 2005 model year in San Francisco, Oakland, and Berkeley; note that a handful of zones (in downtown San Jose and Palo Alto specifically) outside these areas are also priced, but not shown in Figure 3.

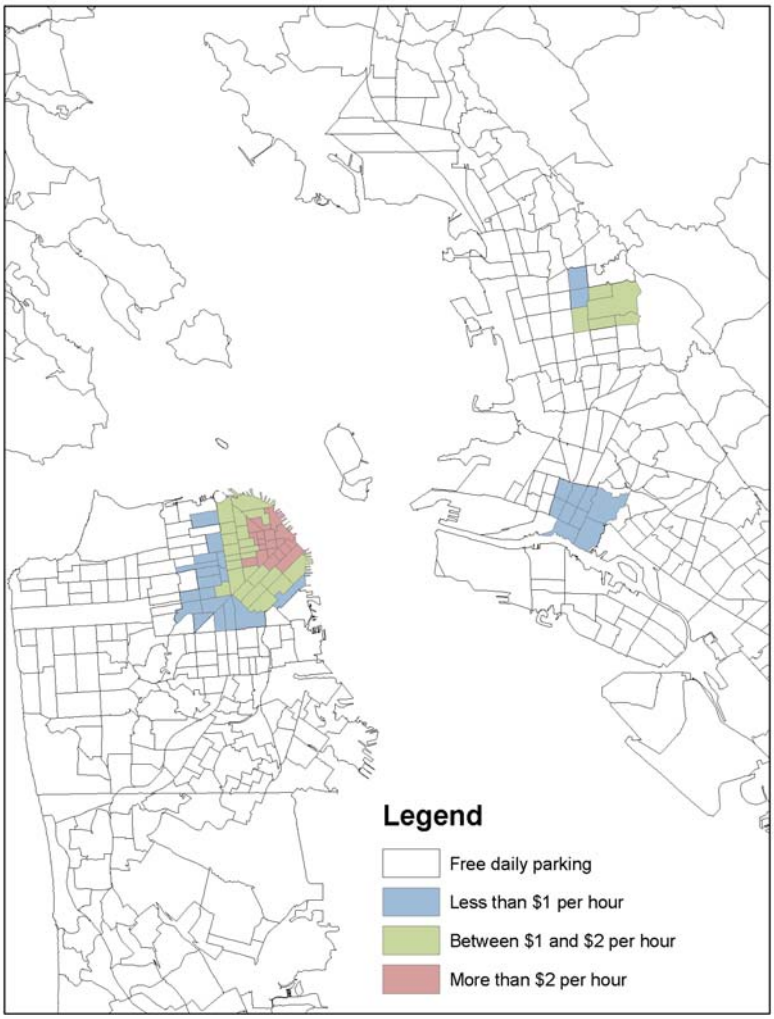

Figure 3: Model Year 2005 Hourly Parking Charge for Daily Parkers in Year 2010 Dollars by TAZ

3.2 Current Regional Plans Scenarios

The current regional plans scenarios attempt to estimate the impact of the region's current plans and policies using MTC's improved analytical tools. Two separate scenarios, one representing year 2020 and another representing year 2035 are described below.

3.2.1 Land use inputs

Historically, ABAG has produced bi-annual *Projections* data series in which formal land use forecasts are developed and distributed to interested stakeholders. With Senate Bill (SB) 375, ABAG now develops a draft set of land use forecasts which are used by MTC and others at the beginning of the development of the sustainable communities strategy. These forecasts are not formally adopted by ABAG's board.

The land use forecasts used in the current regional plans scenarios were delivered to MTC on January 14, 2011. Internally, these forecasts are referred to as the *Draft Current Regional Plans* (Jan 14, 2011). These forecasts are still being tinkered with by ABAG, hence the draft label.

Table 1 and Figure 1 above provide a broad overview of the land use characteristics contained in the land use data as well as the resulting synthetic population.

3.2.2 Roadway supply

The basis of the roadway network used in the current regional plans scenario is the so-called "T-2035" network from the last regional transportation plan[6]. One significant modification was made to the T-2035 network: the regional high occupancy toll (HOT) lane system was reduced from a region-wide, 800 mile system, to a so-called "backbone", 500 mile system. Figure 4 below presents a graphical depiction of the roadway network. Each segment of the backbone HOT network operates as an "HOT 3+" lane, meaning vehicles with three or more occupants can use the facility free of charge and vehicles with two or fewer occupants can pay a fee to use the facilities.

The backbone HOT system is assumed to be complete by 2020. As such, in the modeling, the 2020 and 2035 current regional plans networks were assumed to be identical, both with the backbone HOT network complete. Figure 5 below shows the growth in roadway miles relative to a 2005 base year for the current regional plans scenarios and the initial vision scenarios (please see *3.3.2 Roadway supply* for a discussion of the initial vision scenarios roadway networks).

3.2.3 Transit supply

The T-2035 transit networks as specified in the last regional transportation plan were included in the current regional plans scenarios. Figure 6 below shows the growth in transit seat miles relative to a 2005 base year for the current regional plans scenarios and the initial vision scenarios. Importantly, the transit networks use the year 2005 networks as the "background" network – meaning we start with the year 2005 network and add/delete projects in the RTP to build the forecast year projects. The economic downturn in recent years had a significant effect on transit service in the Bay Area; by using the 2005 network as a "background" network, MTC is explicitly assuming that the level of transit service will rebound with the economy (please see *3.3.3 Transit supply* for details regarding the initial vision scenario transit network).

[6] Full details available here: http://www.mtc.ca.gov/planning/2035_plan/index.htm

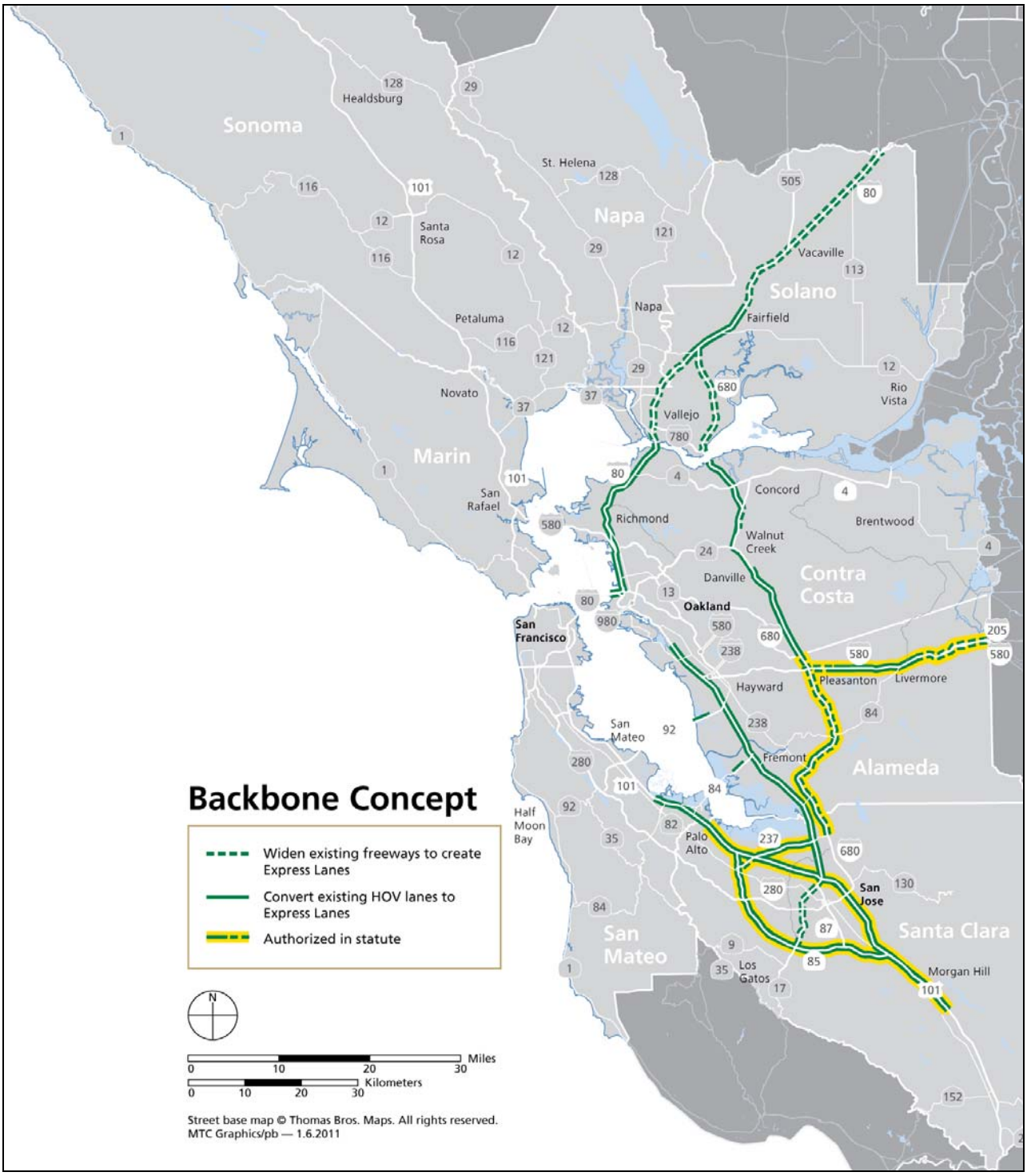

Figure 4: "Backbone" High Occupancy Toll Network

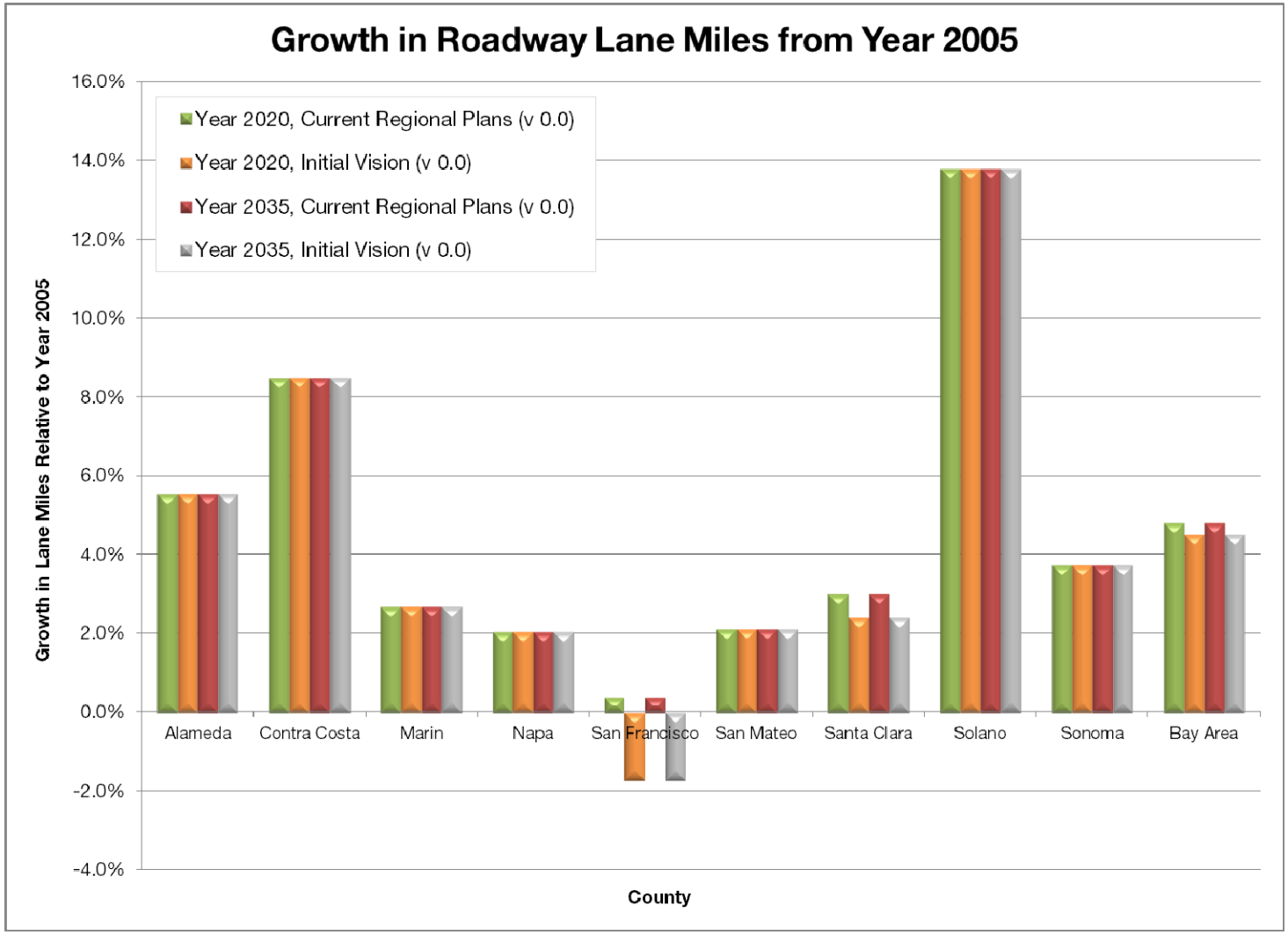

Figure 5: Growth in Roadway Lane Miles from Year 2005

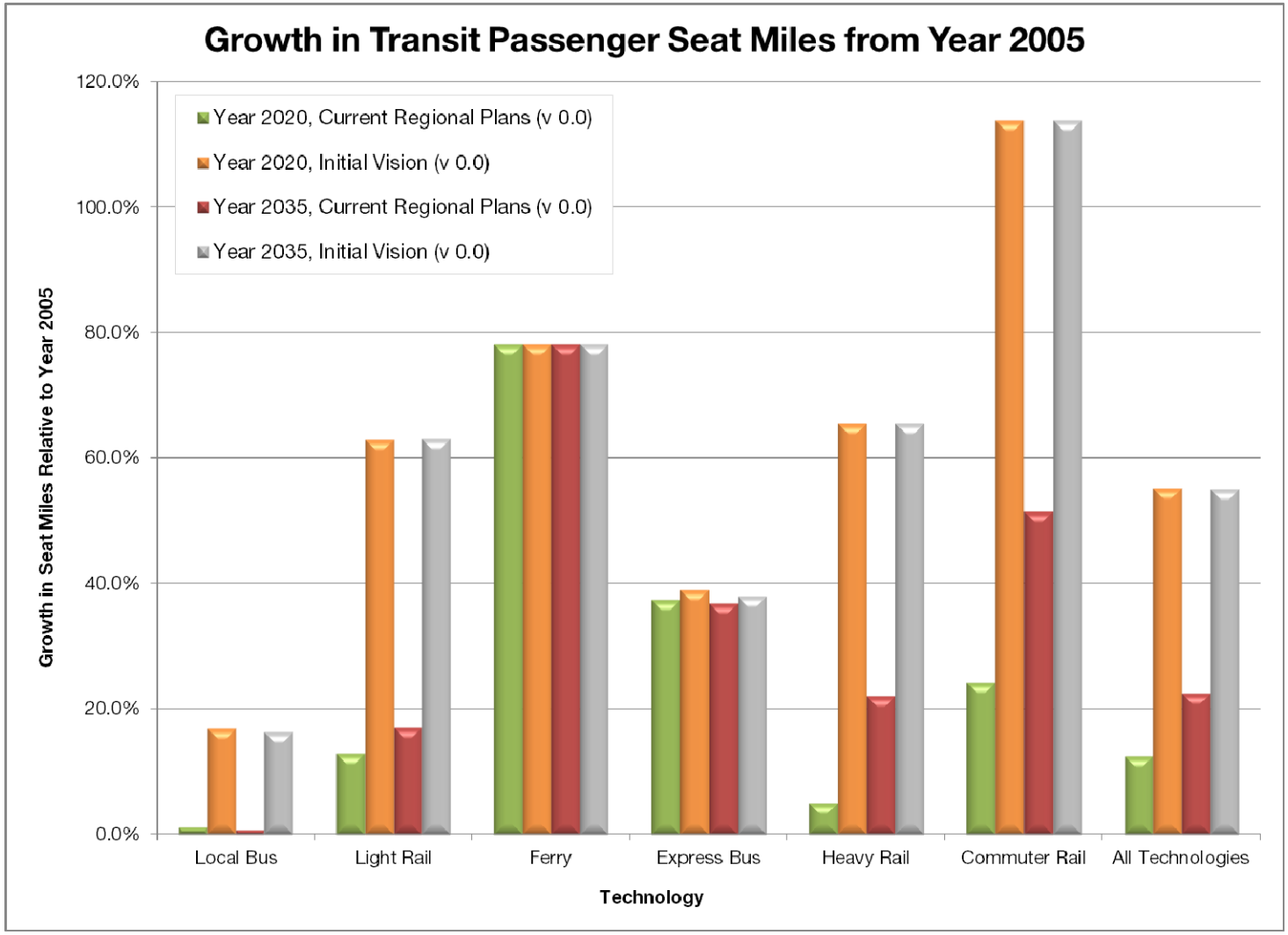

Figure 6: Growth in Transit Passenger Seat Miles from Year 2005

3.2.4 Prices

As with the baseline scenario, six different types of prices are described below: (i) value of travel time; (ii) bridge tolls; (iii) high-occupancy-lane tolls; (iv) transit fares; (v) perceived automobile operating cost; and, (vi) parking charges.

Value of Travel Time

ABAG's land use forecasts imply a slight increase in real incomes, i.e. the average Bay Area household's income will increase at a rate that exceeds inflation. Because the model's prediction of each traveler's value of time is a function of household income (see *3.1.4 Prices*), the average traveler will have a higher value of time in the forecast years than the base year.

Bridge Tolls

The bridge tolls assumed in the current regional plans and initial vision scenarios are shown below in Table 5; these toll values were in place as of July 1, 2010. Table 5 includes the price of tolls in years 2020 and 2035 expressed in both year 2000 and year 2010 dollars. The bridge tolls, as expressed in year 2000 dollars, do not change in the forecast years; the implication of this assumption is that MTC expects bridge fares to be as "expensive" relative to parking fees, travel time, and transit fares in the forecast years as they are today.

Table 5: Common Peak Period Bridge Tolls in Year 2035 Current Regional Plans and Initial Vision Scenarios†

Bridge	2-axle, Single-occupant Vehicle Toll ($2000)	2-axle, Single-occupant Vehicle Toll ($2010)	2-axle, Carpool * Vehicle Toll ($2000)	2-axle, Carpool Vehicle Toll ($2010)
San Francisco/Oakland Bay Bridge	$4.82	$6.00	$2.01	$2.50
Antioch Bridge	$4.02	$5.00	$2.01	$2.50
Benicia-Martinez Bridge	$4.02	$5.00	$2.01	$2.50
Carquinez Bridge	$4.02	$5.00	$2.01	$2.50
Dumbarton Bridge	$4.02	$5.00	$2.01	$2.50
Richmond-San Rafael Bridge	$4.02	$5.00	$2.01	$2.50
San Mateo Bridge	$4.02	$5.00	$2.01	$2.50
Golden Gate Bridge	$4.82	$6.00	$2.41	$3.00

† The full toll schedule includes off-peak tolls and tolls for 3- or more axle vehicles; * Car pools are defined as either two-or-more or three-or-more occupant private vehicles, depending on the bridge, and only receive a discount during the morning and evening peak periods (Source: bata.mtc.ca.gov; goldengatebridge.org)

High-occupancy Toll (HOT) Lane Prices

MTC's *Travel Model One* explicitly represents the choice of travelers to pay a toll to use a high-occupancy toll lane in exchange for the travel time savings offered by that facility. To exploit this functionality, the analyst must explicitly assign a travel price by time of day and vehicle

class on each HOT link in the network. To increase the efficiency and transparency of this effort, MTC segmented the backbone HOT network into 22 corridors, with each corridor receiving a time-of-day-specific per mile price; each of the five eligible vehicle classes (drive alone, car pools with two persons, very small (two-axle) commercial vehicles, small (two-axle) commercial vehicles, and medium (three-axle) commercial vehicles) paid this single price (the two ineligible vehicle classes are car pools with three or more persons, which travel for free, and combination trucks, which are prohibited from the facilities). Table 6, below, presents the peak direction, peak period price for the year 2035 current regional plan scenario in each corridor (year 2020 prices are a bit lower).

Table 6: Year 2035 Current Regional Plans Peak Period, Peak Direction High Occupancy Toll Lane Prices

Roadway	Direction	From	To	Cents per mile ($2000)	Cents per mile ($2010)
Interstate 80	WB	I-680	Bay Bridge	12.0	14.9
Interstate 80	EB	Bay Bridge	I-680	10.0	12.5
Interstate 80	WB	Yolo County line	I-680	4.0	5.0
Interstate 80	EB	I-680	Yolo County line	4.0	5.0
Interstate 880	NB	US 101	Oakland International	4.0	5.0
Interstate 880	SB	Oakland International	US 101	4.0	5.0
I-880/CA 17	NB	CA 85	US 101	4.0	5.0
I-880/CA 17	SB	US 101	CA 85	4.0	5.0
US 101	NB	I-880	Willow Road	4.0	5.0
US 101	SB	Willow Road	I-880	4.0	5.0
US 101	NB	San Benito Cnty line	I-880	3.0	3.7
US 101	SB	I-880	San Benito Cnty line	3.0	3.7
CA 85	NB	US 101	US 101	3.0	3.7
CA 85	SB	US 101	US 101	3.0	3.7
Interstate 680	SB	I-580	CA 237	12.0	14.9
Interstate 680	NB	CA 237	I-580	10.0	12.5
Interstate 680	SB	I-80	I-580	3.0	3.7
Interstate 680	NB	I-580	I-80	3.0	3.7
Interstate 580	WB	San Joaquin Cnty line	I-680	12.0	14.9
Interstate 580	EB	I-680	San Joaquin Cnty line	10.0	12.5
CA 237	WB	I-880	CA 85	6.5	8.1
CA 237	EB	CA 85	I-880	3.0	3.7

† This is a sample, rather than an exhaustive list, as separate tolls are coded for each of five time periods, as follows: early AM (3 am to 6 am), AM peak (6 am to 10 am), midday (10 am to 3 pm), PM peak (3 pm to 7 pm), and evening (7 pm to 3 am the next day). The above tolls are for the peak period for each corridor, which is either the AM peak or the PM peak, depending on the directionality of travel.

The prices presented in Table 6 and Table 7 are not optimal; meaning, MTC did not have the time to find the price that maximizes some defined operational goal in each corridor. Rather, the prices were adjusted a couple of times in an attempt to keep congestion low and utilization high. Please keep in mind that these prices are held constant over four-hour morning/evening peak period assignments. Meaning, MTC's model structure assumes congestion to be uniform over the morning and evening peak periods. We know this is not true, but do this as a simplification; the peak one-hour within the peak four-hours would certainly require a higher toll than those listed in these tables.

Transit Fares

As noted above, the transit networks used in this scenario are built from the year 2005 transit networks. As such, the transit fares in place in 2005 remain in place through the year 2020 and year 2035 current regional plans scenarios (see Table 3 for details). By keeping these values constant in year 2000 dollars, MTC is explicitly assuming that transit fares will keep pace with inflation in the forecast years.

Perceived Automobile Operating Cost

For the current regional plans scenarios, the perceived automobile operating cost is assumed to be 22.3 cents per mile ($2000) in 2020 and 23.8 cents per mile ($2000) in 2035 (in $2010, the prices are 27.8 and 29.7 cents per mile, respectively); see Table 4 for details. By increasing the perceived cost of operating an automobile, MTC is explicitly assuming that operating a car will be more expensive in 2020 and 2035 relative to transit fares, travel time, bridge tolls, and parking fees.

Parking Costs

MTC assumes that parking prices will change over time per a simple model: parking cost is assumed to increase linearly with employment density. In the current analysis, future year density estimates are based on the current regional plans land use data provided by ABAG. Figure 7 presents a companion to Figure 3, showing parking charges for year 2035.

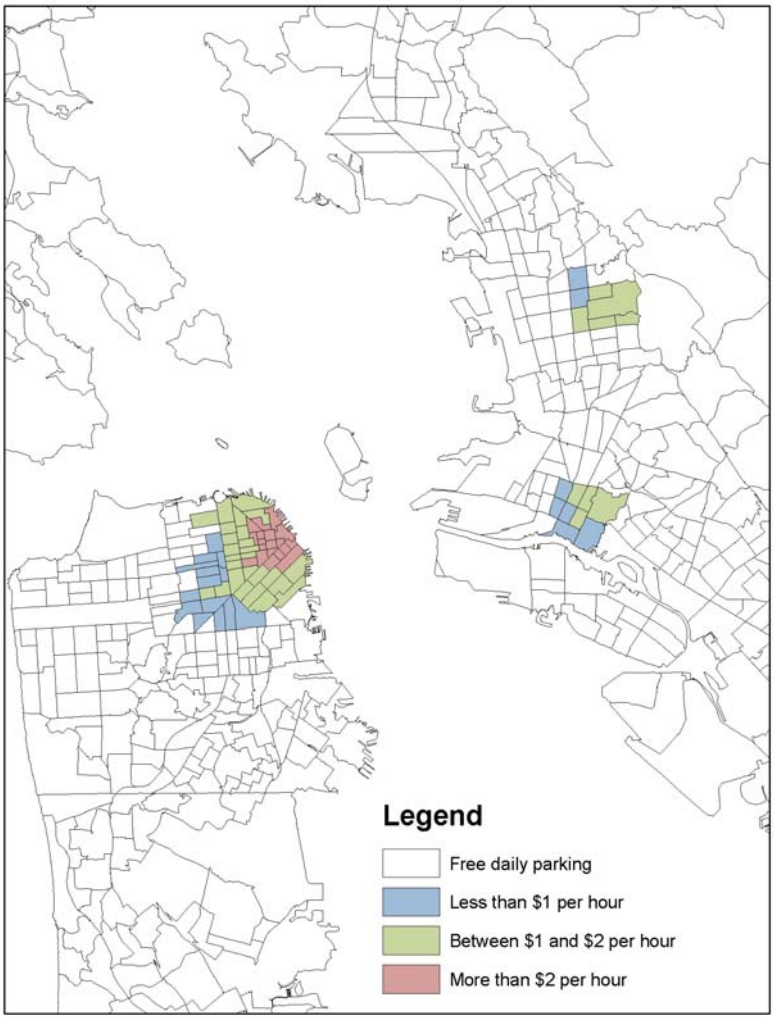

Figure 7: Year 2035, Current Regional Plans Scenario Hourly Parking Charge for Daily Parkers in Year 2010 Dollars by TAZ

3.3 Initial Vision Scenarios

The initial vision scenarios match more robust transit service with a land use pattern that includes more households and jobs than the current regional plans scenarios. Details are described in this section of the report.

3.3.1 Land use inputs

Relative to the current regional plans scenarios, the initial vision scenario increases the number of households, people, and jobs in the nine-county Bay Area in the forecast years. Details on these differences are presented in Table 1 and Figure 1.

3.3.2 Roadway supply

The roadway network assumed for the initial vision scenario is identical to the current regional plans scenario save for the conversion of arterial travel lanes in San Francisco and Santa Clara

counties from general purpose lanes to transit only lanes (this accounts for the relative decrease in roadway supply in these counties depicted in Figure 5).

3.3.3 Transit supply

The initial vision transit network was constructed in collaboration with the regional Congestion Management Agencies (CMAs) and ABAG. CMA staff submitted a list of projects to MTC, the majority of which MTC included in the scenario. Additionally, MTC staff examined the relative growth between the forecasted current regional plans and initial vision scenario land use patterns. In areas of significant growth that were not served by projects submitted by CMA staff, MTC staff increased existing bus service. A full list of projects included in the scenario is presented in *Appendix B: Initial Vision Scenario Transit Project List*. A graphical depiction of the substantial increase in transit service, expressed in seat miles, is presented in Figure 6. Please note, as demonstrated in Figure 6, that the same transit network was assumed for both the 2020 and 2035 versions of the initial vision scenarios.

3.3.4 Prices

As for the baseline and current regional plans scenarios, six different types of prices are described below: (i) value of travel time; (ii) bridge tolls; (iii) high-occupancy-lane tolls; (iv) transit fares; (v) perceived automobile operating cost; and, (vi) parking charges. Each of these prices is described below.

Value of Travel Time

Time is valued in the initial vision scenarios in a manner identical to the current regional plans scenarios.

Bridge Tolls

The bridge tolls assumed in the current regional plans and initial vision scenarios are shown in Table 5 and are identical; these toll values were in place as of July 1, 2010 and are assumed to increase with inflation.

High-occupancy Toll (HOT) Lane Prices

The HOT prices were further optimized, though are still not optimal, between the current regional plans and initial vision scenarios. Table 7 below presents the peak direction, peak period price for the year 2035 scenario in each corridor (year 2020 prices are a bit lower).

Table 7: Year 2035 Initial Vision Scenario Peak Period, Peak Direction High Occupancy Toll Lane Prices

Roadway	Direction	From	To	Cents per mile ($2000)	Cents per mile ($2010)
Interstate 80	WB	I-680	Bay Bridge	5.0	6.2
Interstate 80	EB	Bay Bridge	I-680	2.0	2.5
Interstate 80	WB	Yolo County line	I-680	0.0	0.0
Interstate 80	EB	I-680	Yolo County line	0.0	0.0
Interstate 880	NB	US 101	Oakland International	3.5	4.4
Interstate 880	SB	Oakland International	US 101	10.0	12.5
I-880/CA 17	NB	CA 85	US 101	1.0	1.2
I-880/CA 17	SB	US 101	CA 85	1.2	1.5
US 101	NB	I-880	Willow Road	5.0	6.2
US 101	SB	Willow Road	I-880	2.0	2.5
US 101	NB	San Benito Cnty line	I-880	2.0	2.5
US 101	SB	I-880	San Benito Cnty line	1.5	1.9
CA 85	NB	US 101	US 101	0.7	0.9
CA 85	SB	US 101	US 101	0.5	0.6
Interstate 680	SB	I-580	CA 237	13.0	16.2
Interstate 680	NB	CA 237	I-580	4.0	5.0
Interstate 680	SB	I-80	I-580	2.0	2.5
Interstate 680	NB	I-580	I-80	0.5	0.6
Interstate 580	WB	San Joaquin Cnty line	I-680	1.0	1.2
Interstate 580	EB	I-680	San Joaquin Cnty line	2.0	2.5
CA 237	WB	I-880	CA 85	6.5	8.1
CA 237	EB	CA 85	I-880	3.0	3.7

† This is a sample, rather than an exhaustive list, as separate tolls are coded for each of five time periods, as follows: early AM (3 am to 6 am), AM peak (6 am to 10 am), midday (10 am to 3 pm), PM peak (3 pm to 7 pm), and evening (7 pm to 3 am the next day). The above tolls are for the peak period for each corridor, which is either the AM peak or the PM peak, depending on the directionality of travel.

Transit Fares

As noted above, the transit networks used in this scenario are built from the year 2005 transit networks. As such, the transit fares in place in 2005 remain in place through the year 2020 and year 2035 (see Table 3 for details). The fares are the same in the current regional plans and initial vision scenarios.

Perceived Automobile Operating Cost

The perceived automobile operating cost is the same in the current regional plans and initial vision scenarios; see Table 4 for details.

Parking Costs

As noted above, MTC assumes that parking prices increase linearly with employment density. In the current analysis, future year density estimates are based on the initial vision land use data. The distribution of costs is highly similar to the data presented in Figure 7.

4 Key Results

In this section, key travel model results for the base year, current regional plans, and initial vision scenarios are summarized across numerous dimension of individual travel behavior and transport system performance.

4.1 Performance Targets and Equity Analysis

The purpose of this document is to describe, in some detail, the response of travelers to the projects and policies implemented in the two scenarios described above. The travel model also informs agency-adopted performance targets, the purpose of which is to illuminate the relative effectiveness of various alternatives in meeting the agency's long range goals. A separate summary of the performance targets methodology and results will be produced as the methods and targets are finalized.

The travel model also informs an analysis of the equitability of the investments implied by each scenario. A separate summary of the equity analysis methodology and results will be produced as the methods are finalized.

4.2 Automobile Ownership Levels

The automobile ownership decision is made in the travel model at the household level and considers, among other factors, household characteristics (e.g. number of workers, drivers, and children), competiveness of transit for the work travel of household members, and accessibility of the home location to retail services.

Figure 8 presents the distribution of households by automobile ownership category for each of the five scenarios. Important findings include:

- An increase in the share of zero automobile households in the region; and,
- A general decrease in the share of two, three, and four or more automobile households.

Both of the above findings were expected, as both the current regional plans and initial vision scenarios forecast an increase in household and employment density – these types of land use patterns reduce the utility of owning an automobile.

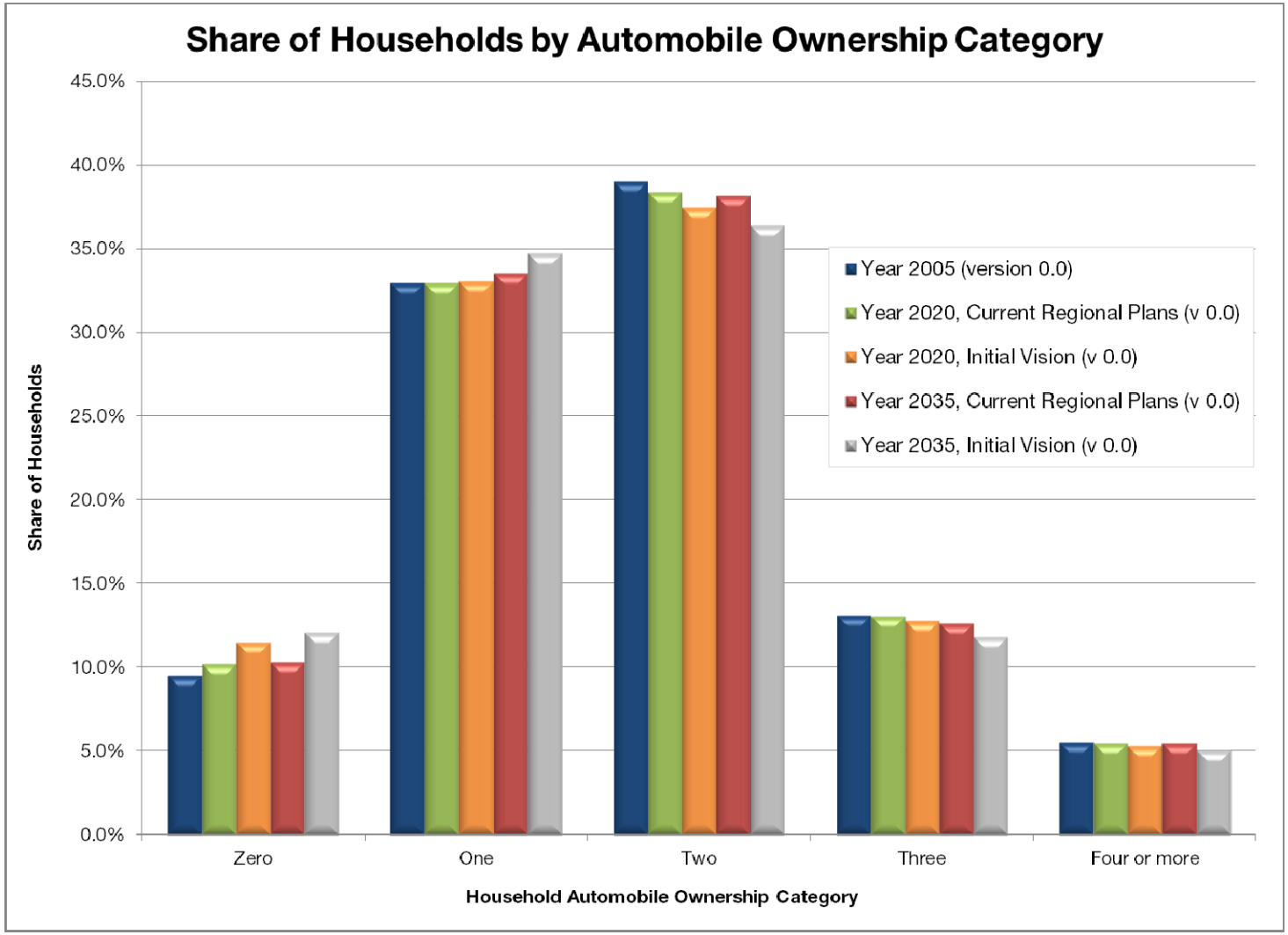

Figure 8: Share of Households by Automobile Ownership Category

4.3 Activity Location Decisions

The travel model explicitly identifies the location in which travelers participate in all manner of activities, from working to going to school to visiting friends. These decisions are an important factor in determining the manner in which travel is made. Figure 9 and Figure 10 below provide a broad summary of the nature in which travelers are making these decisions in each of the five scenarios. Figure 9 summarizes the average trip distance, by travel mode, for all travel; Figure 10 presents the same information for trips that take place as part of work tours[7]. Important findings from these charts include the following:

- There is a general decrease in travel distance across all modes, which suggests that the forecasted land use patterns provide for a more efficient spatial mix of households and jobs.
- The general increase in transit travel distance is expected, as the current regional plans scenario invests heavily in faster, longer-distance transit service, such as ferries, commuter rail, and heavy rail (i.e. BART), and the initial vision scenario enhances rail services as well as express bus service.
- The average travel distance on so-called "non-motorized" modes, namely walking and bicycling, does not change across scenarios. This finding reflects a general tendency of travelers within the model to choose these modes when travel distances are short, as well as the general inability of the model to provide useful information as to the micro-impact (i.e. at geographies smaller than travel analysis zones) of land use patterns. One limitation of the travel model is the very large size of the travel analysis zones between which travelers move; smaller zones would likely reveal more interesting results along this dimension.

[7] Work tours are round-trips to and from a workplace that begin and end at a traveler's residence. Travelers can make non-work-related stops on these tours, for example at a coffee shop. All travel to and from stops on work tours are considered trips on work tours, which is the subject of Figure 10.

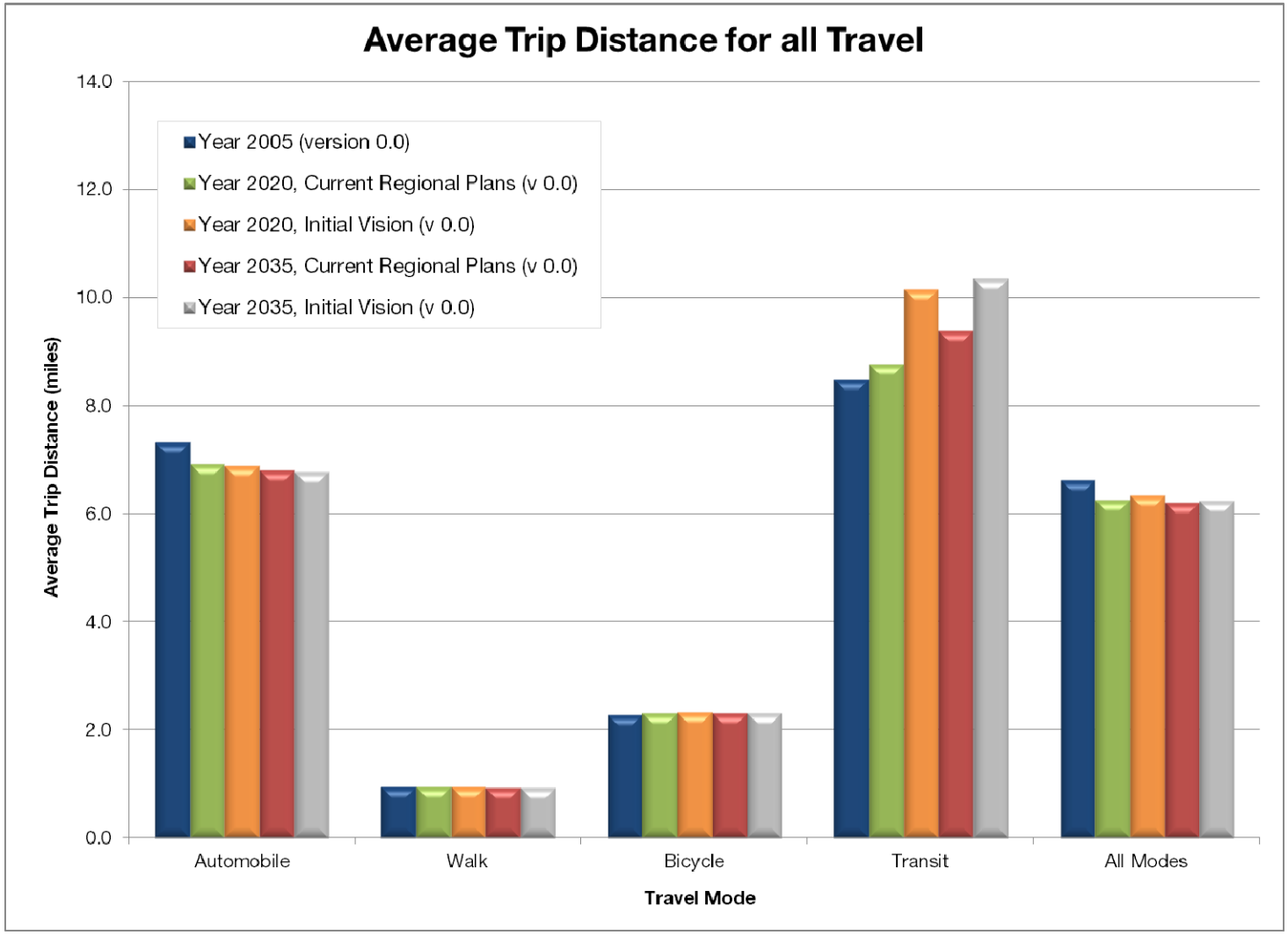

Figure 9: Average Trip Distance for all Travel

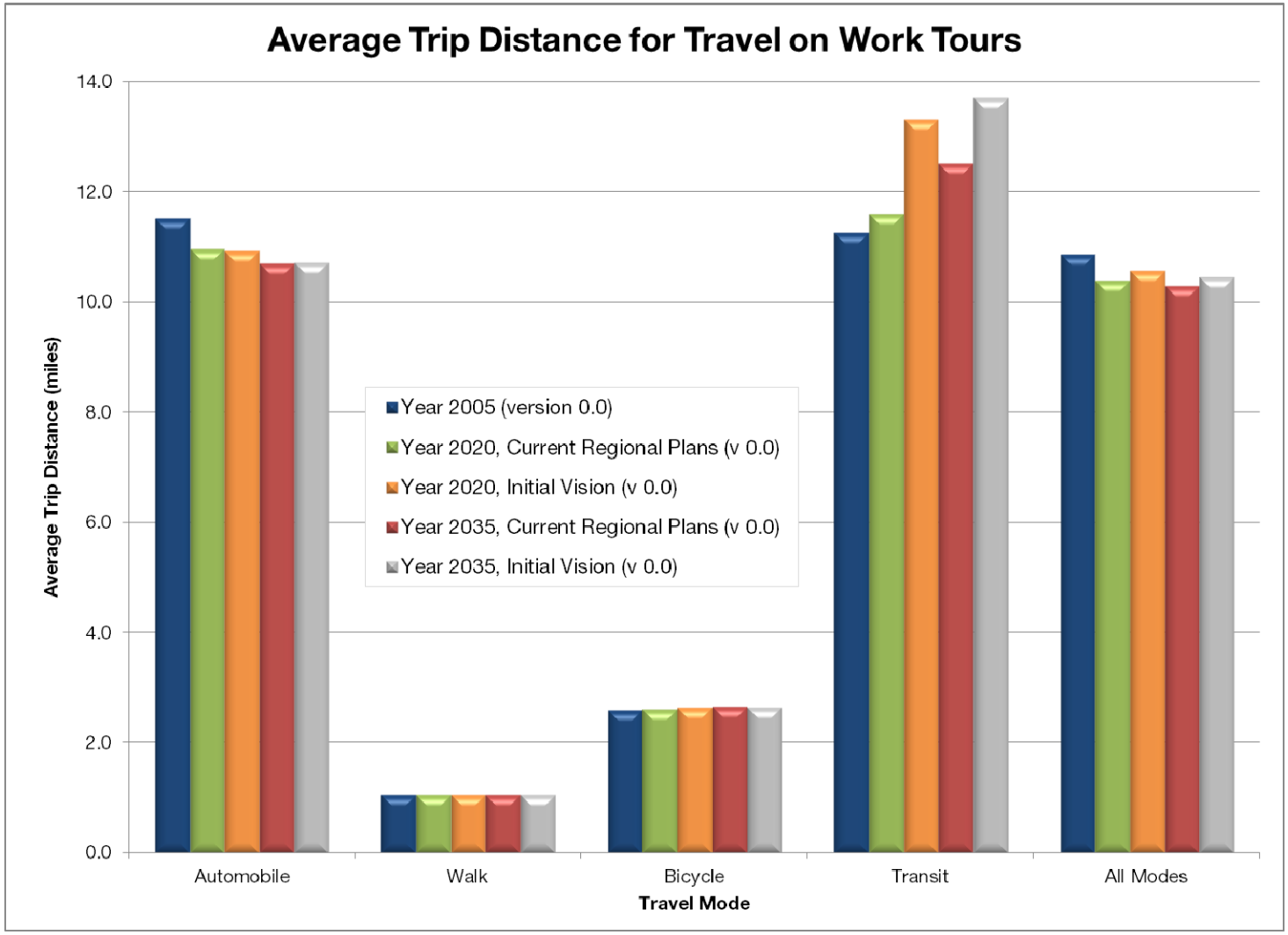

Figure 10: Average Trip Distance for Travel on Work Tours

4.4 Travel Mode Choice Decisions

The means by which a traveler gets from point A to point B is referred to as the travel mode. Within MTC's representation of travel behavior, five automobile-based modal options are considered, specifically:

- traveling alone in a private automobile and opting *not* to pay to use a high-occupancy toll facility ("single occupant, no HOT"), an option only available to those in households who own at least one automobile;
- traveling alone in a private automobile and opting to pay to use a high-occupancy toll facility ("single occupant, pay to use HOT"), an option only available to those who both own a car and whose journey would logically benefit from using an HOT facility (e.g., this option is not available to those driving through a residential neighborhood to drop a child at school);
- traveling with one other occupant in a private automobile and opting *not* to pay to use a high-occupancy toll facility ("two occupants, no HOT"), an option available to those in households with and without automobiles;
- traveling with one other occupant in a private automobile and opting to pay to use a high-occupancy toll facility ("two occupants, pay to use HOT"), an option available to those in households with and without automobiles but only to those who would logically benefit from using an HOT facility; and,
- traveling with two other occupants in a private automobile – these vehicles are allowed to travel for free on HOT facilities.

The share of all trips by the above automobile modes is presented in Figure 11. Figure 11 shows the overall share of travel by all automobile modes decreases in the forecast years; this result was expected, as the combination of increased densities, congestion, and improved transit service lessens the attractiveness of automobile travel.

The travel model explicitly considers numerous non-automobile options, which are collapsed to the following four options shown in Figure 12:

- walk;
- bicycle;
- transit, getting to and from by foot; and,
- transit, getting to or from in an automobile.

Figure 12 shows a general increase in the mode share of each of these modes, with larger transit share increases occurring in the initial vision scenarios – expected, given the dramatic increase in transit supply included in these scenarios.

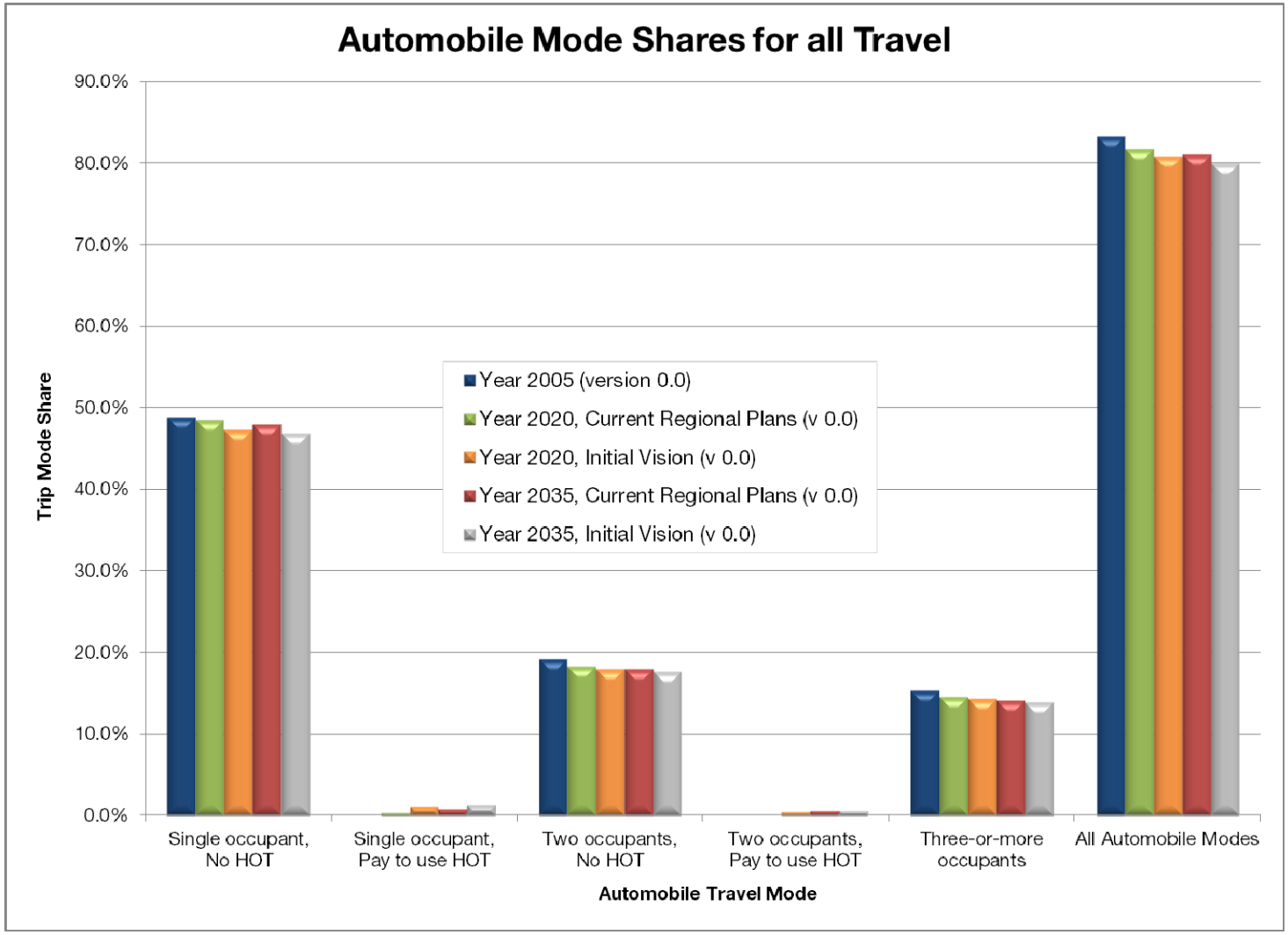

Figure 11: Automobile Model Shares for all Travel

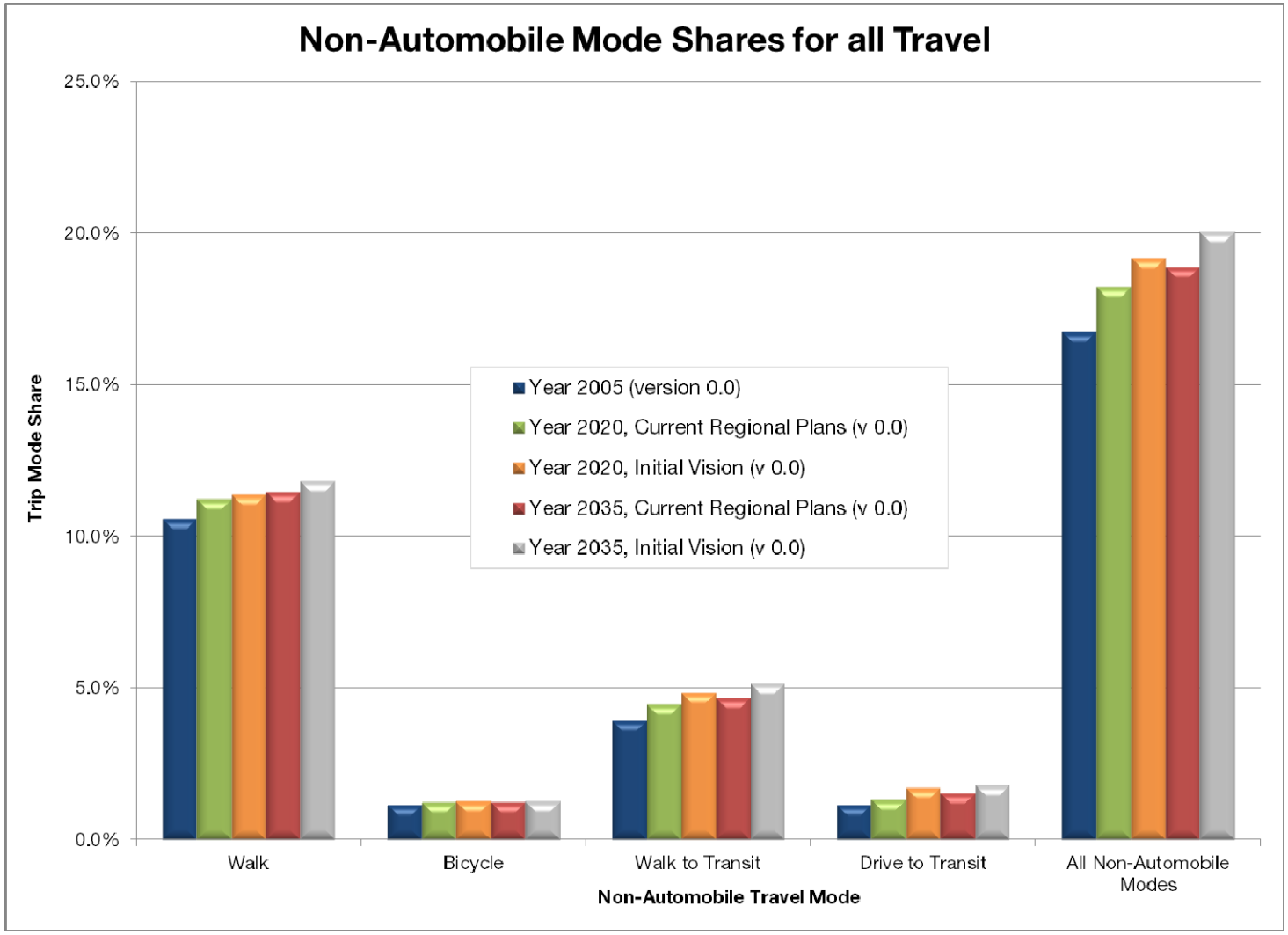

Figure 12: Non-Automobile Mode Share for all Travel

4.5 Aggregate Transit Demand Estimates

Travelers choosing to travel by transit are explicitly assigned to a specific transit line. As a simplification, MTC groups transit lines by technology, specifically: local bus, express bus, light rail, ferry, heavy rail, and commuter rail. Local bus transit service represents standard, fixed-route bus service, of the kind a traveler may take to and from a neighborhood grocery store, as well as bus rapid transit service. Express bus service represents longer-distance service typically provided in over-the-road coach technology; Golden Gate Transit, for example, provides this service between Marin County and downtown San Francisco. Light rail service is represented in the Bay Area by San Francisco's Muni Metro and F-Market streetcar services, as well as Santa Clara Valley Transportation Authority's light rail service. Heavy rail service is provided in the Bay Area by the Bay Area Rapid Transit (BART) district; BART is the only provider of heavy rail in each of these forecasts. Finally, commuter rail captures longer distance rail service typically on grade-separated railroads; Caltrain, for example, offers this service along the Peninsula (other Bay Area providers of commuter rail service are Altamont Commuter Express and Amtrak).

Figure 13 presents transit boardings by technology for each of the scenarios. Important findings include:

- Transit boardings increase dramatically in the initial vision scenarios, increasing to over 3.2 million boardings in 2035, up from 2.6 million in the current regional plans scenario, and 1.6 million in the 2005 baseline.
- The reduction in express bus service in the initial vision scenarios relative to the current regional plans scenarios is due to a coding error identified and corrected between the execution of the alternatives. Specifically, a few local bus routes were incorrectly coded as express bus routes in the current regional plans scenarios. As such, the change in bus service between the two alternatives is correctly presented, but the identification of routes as either express or local is incorrect. We will correct this error moving forward.

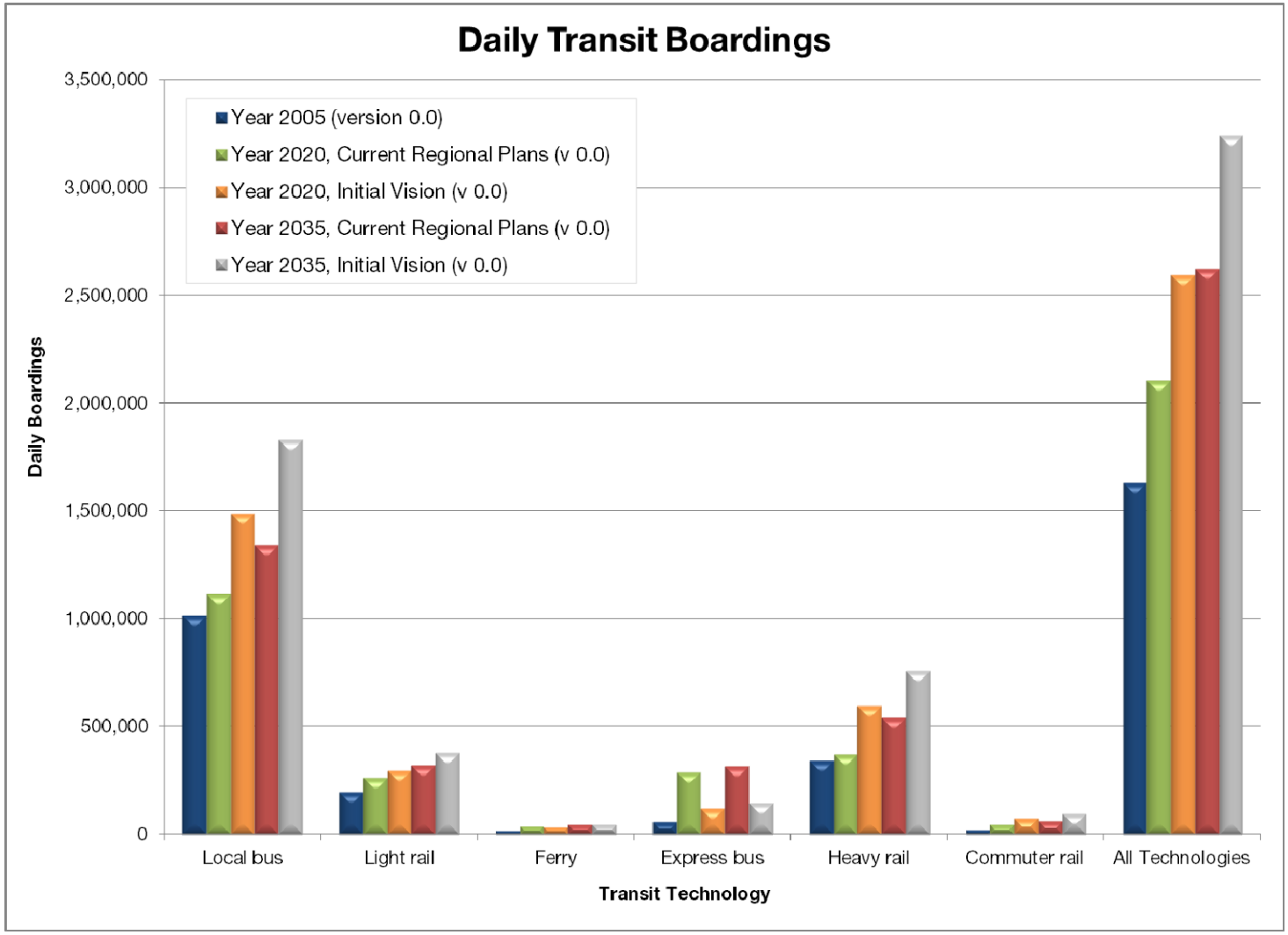

Figure 13: Daily Transit Boardings

4.6 Congestion Estimates

Trips made by automobile are first aggregated into matrices identifying each trip's origin and destination and then "assigned" to a representation of the Bay Area's roadway network. The assignment process iteratively determines the shortest path between each origin-destination pair, shifting some number of trips to each iteration's shortest path, until the network reaches a certain level of equilibrium – defined as a state in which travelers cannot change to a lower "cost" route (where cost is expressed in monetary and non-monetary (e.g. time) units). The assignment process inherently computes numerous quantities of interest, such as vehicle miles traveled, delay, and average travel speed.

Please note that MTC maintains three separate estimates of the quantity vehicle miles traveled (VMT), specifically: (1) the quantity assigned directly to the highway network; (2) the quantity assigned to the highway network plus so-called intra-zonal VMT, which is computed off-line; (3) the quantity (2) adjusted to match the amount of VMT the Air Resources Board (CARB) believes takes place in the Bay Area (a number slightly higher than MTC's estimate). In this document, the VMT identified as quantity (1) in the above list is presented.

Figure 14 below presents vehicle miles traveled by time period; interesting aspects of this data include:

- VMT is scaled by the number of hours in each time period to give the reader a feel for the rate of travel that takes place in each interval.
- Vehicular travel increases as population increases, even with the improvements in transit service included in the initial vision scenario.

Figure 15 shows the share of VMT that occurs in each of the five time periods. One of the important features of *Travel Model One* is the explicit scheduling of travel. As congestion increases in the forecast years, travelers adjust by shifting the time in which they travel. The chart demonstrates a slight decrease in the share (though not the quantity, as shown in Figure 14) of travel that occurs during the AM peak period; travelers are adjusting by shifting to the early AM and midday time periods.

Figure 16 and Figure 17 summarize the change in average travel speed. Important findings along this arc include:

- The roadway expansion included in both the 2020 and 2035 representations of the current regional plans and initial vision scenarios keeps congestion at bay through 2020 but not to 2035.
- The location of households in the existing inner urban areas in the initial vision scenarios causes a fairly sharp increase in roadway congestion, both on freeways and other roadways.

Figure 18 presents VMT by speed category. This data is an important input to the emissions modeling used to forecast criteria pollutants. Note the increase in VMT in each speed category, with larger increases occurring at lower speeds.

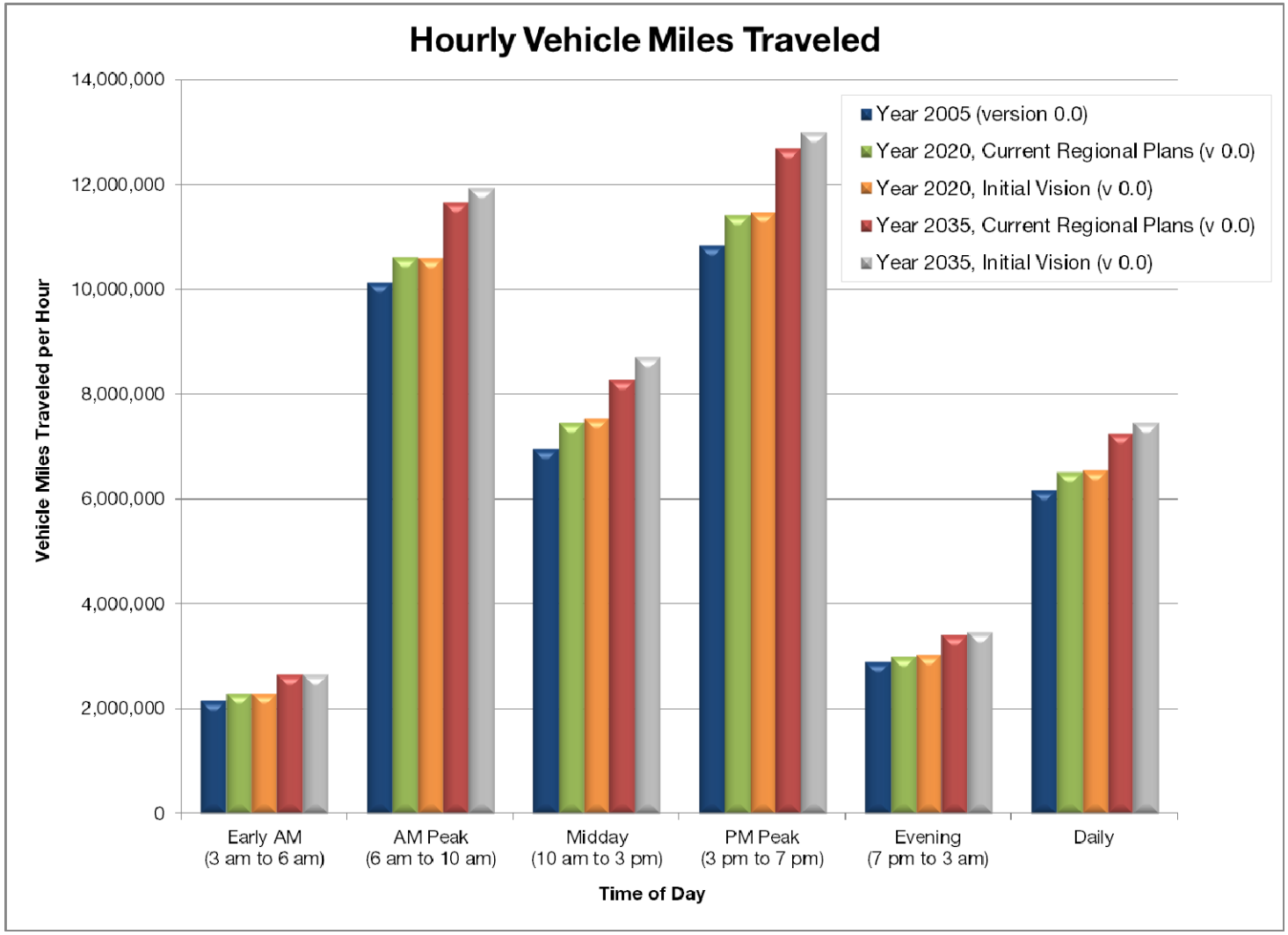

Figure 14: Hourly Vehicle Miles Traveled

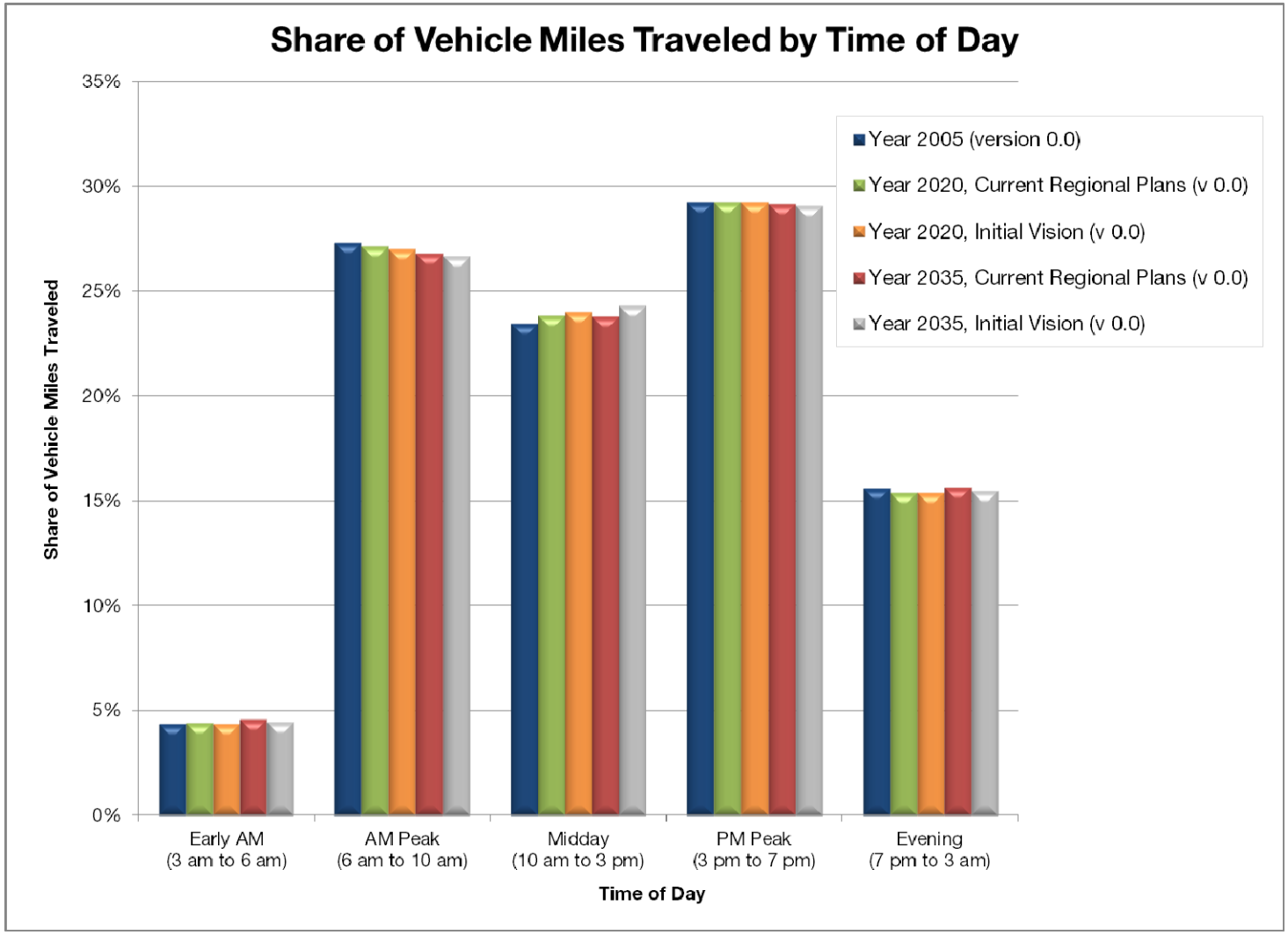

Figure 15: Share of Vehicle Miles Traveled by Time of Day

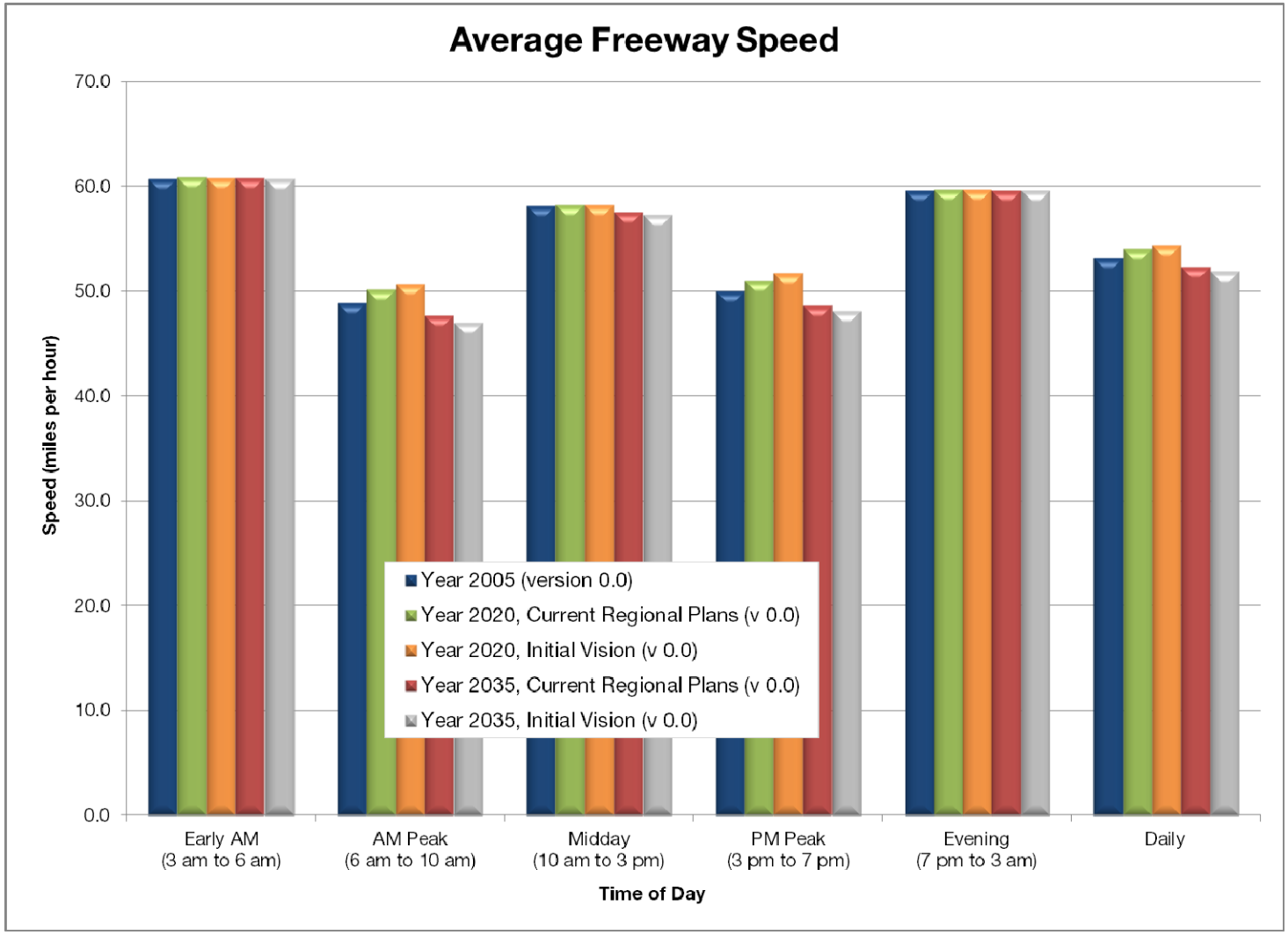

Figure 16: Average Freeway Speed

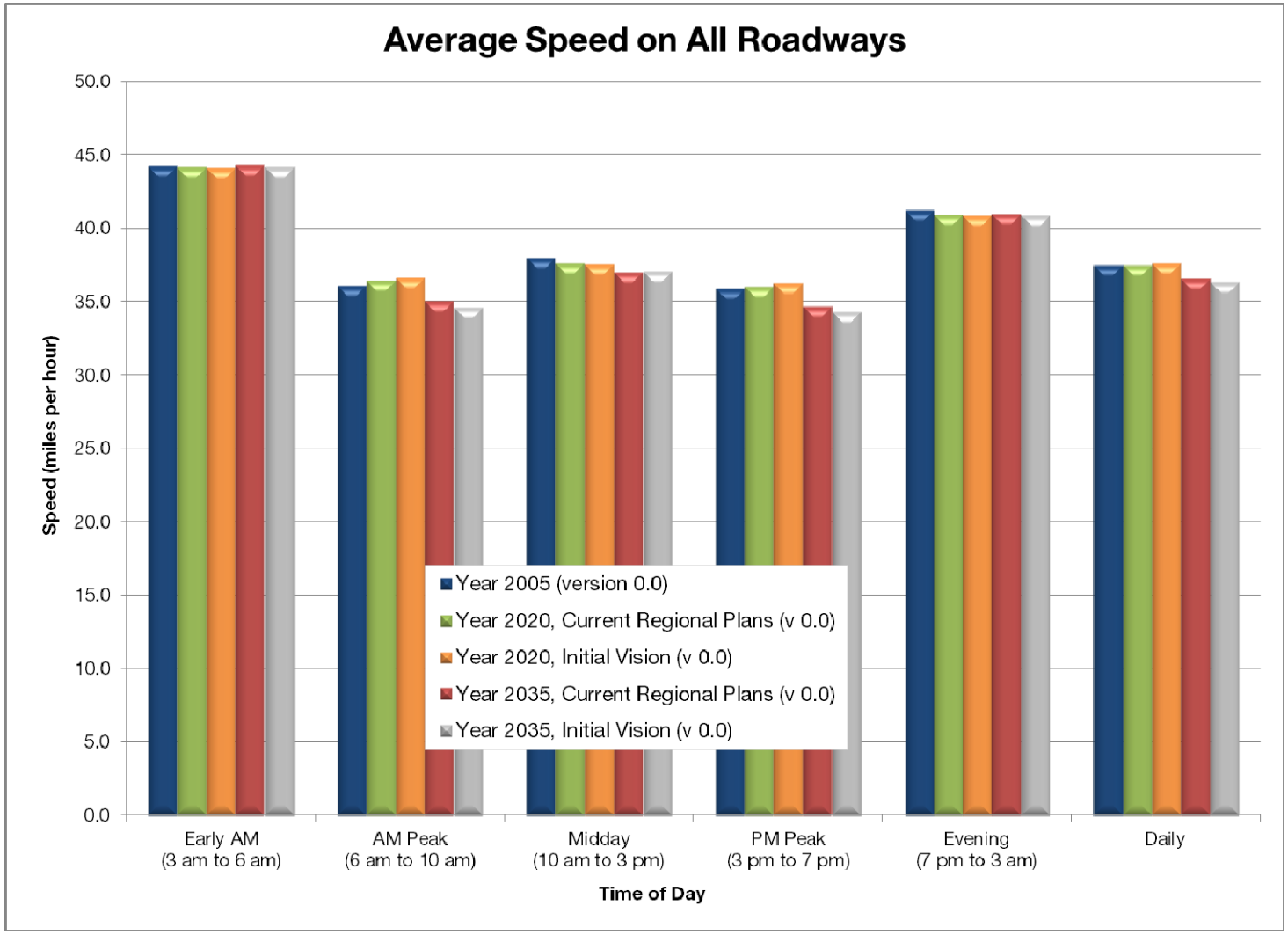

Figure 17: Average Speed on all Roadways

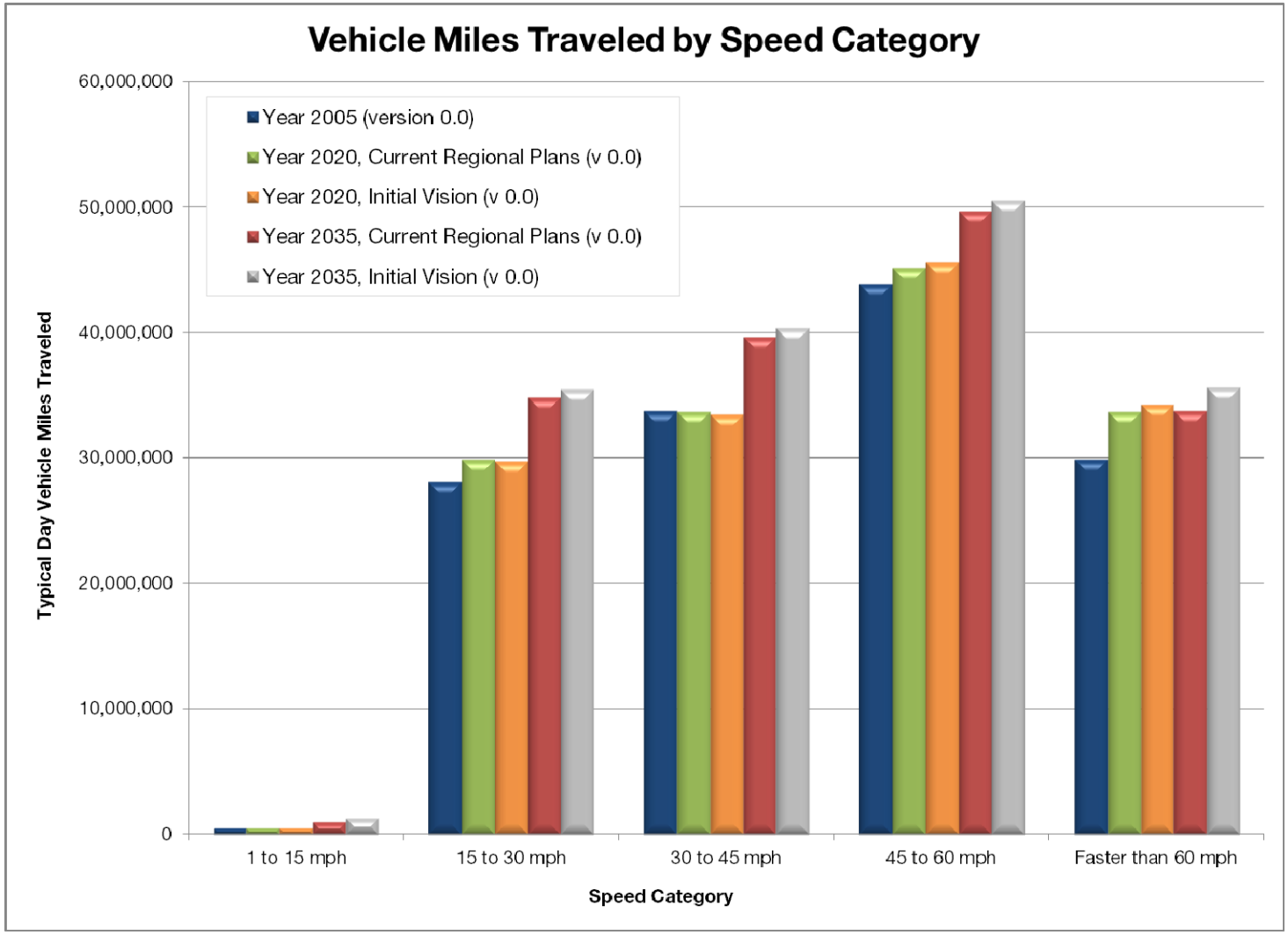

Figure 18: Vehicle Miles Traveled by Speed Category

4.7 Air Quality Implications

Table 8 below summarizes various on-road mobile source emission estimates. Key findings from the table are as follows:

- carbon dioxide, which serves as a proxy for all greenhouse gases, increases steadily from the base year through the forecast years;
- other pollutants, which are subject to vehicle control regulations, decrease, in some cases dramatically, in moving from the base year through the forecast years.

Table 8: On-road Mobile Source Emission Estimates

Scenario	Pollutant (tons per typical weekday)					
	Carbon Dioxide (CO_2)	Small Particulate Matter ($PM_{2.5}$)†	Particulate Matter (PM_{10})	Wintertime Nitrous Oxides (NO_x)	Reactive Organic Gases	Carbon Monoxide (CO)
Year 2005 (version 0.0)	70,140	6.53	9.35	240.1	134.4	1,277.0
Year 2020, Current Regional Plans (v 0.0)	72,190	4.93	7.71	74.4	49.8	380.3
Year 2020 Initial Vision (v 0.0)	72,590	4.86	7.65	71.4	50.0	380.7
Year 2035, Current Regional Plans (v 0.0)	80,330	5.11	8.17	40.3	32.2	227.5
Year 2035, Initial Vision (v 0.0)	82,960	5.28	8.43	41.4	33.1	234.2

† – Does not include road dust emissions

Appendix A: Chart Data

Table 9: Synthetic Population Person Type Distribution (Data for Figure 1)

Scenario	Person Type								
	Full-time worker	Part-time worker	College student	Non-working adult	Retired	Driving-age student	Non-driving-age student	Child too young for school	All Persons
Year 2005 (version 0.0)	35.9%	7.6%	5.8%	17.8%	9.7%	2.8%	12.9%	7.6%	100.0%
Year 2020, Current Regional Plans (v 0.0)	34.6%	7.9%	5.7%	17.2%	12.5%	2.6%	12.2%	7.2%	100.0%
Year 2020, Initial Vision (v 0.0)	34.5%	7.8%	5.7%	17.4%	12.6%	2.7%	12.1%	7.2%	100.0%
Year 2035, Current Regional Plans (v 0.0)	34.7%	7.9%	5.4%	16.4%	13.7%	2.6%	12.0%	7.2%	100.0%
Year 2035, Initial Vision (v 0.0)	34.7%	7.7%	5.4%	16.6%	14.1%	2.6%	11.8%	7.1%	100.0%

Table 10: Growth in Roadway Lane Miles (excluding "centroid connectors") from Year 2005 (Data for Figure 5)

Scenario	County									
	Alameda	Contra Costa	Marin	Napa	San Francisco	San Mateo	Santa Clara	Solano	Sonoma	Bay Area
Year 2005 (version 0.0)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Year 2020, Current Regional Plans (v 0.0)	5.5%	8.5%	2.7%	2.0%	0.4%	2.1%	3.0%	13.8%	3.7%	4.8%
Year 2020 Initial Vision (v 0.0)	5.5%	8.5%	2.7%	2.0%	-1.7%	2.1%	2.4%	13.8%	3.7%	4.5%
Year 2035, Current Regional Plans (v 0.0)	5.5%	8.5%	2.7%	2.0%	0.4%	2.1%	3.0%	13.8%	3.7%	4.8%
Year 2035, Initial Vision (v 0.0)	5.5%	8.5%	2.7%	2.0%	-1.7%	2.1%	2.4%	13.8%	3.7%	4.5%

Table 11: Growth in Transit Passenger Seat Miles from Year 2005 (Data for Figure 6)

Scenario	Technology						
	Local Bus	Light Rail	Ferry	Express Bus	Heavy Rail	Commuter Rail	All Technologies
Year 2005 (version 0.0)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Year 2020, Current Regional Plans (v 0.0)	1.0%	12.7%	78.2%	37.3%	4.9%	24.1%	12.4%
Year 2020 Initial Vision (v 0.0)	16.7%	62.9%	78.2%	38.8%	65.5%	113.9%	55.1%
Year 2035, Current Regional Plans (v 0.0)	0.7%	16.9%	78.2%	36.8%	22.0%	51.4%	22.5%
Year 2035, Initial Vision (v 0.0)	16.3%	63.0%	78.2%	38.0%	65.5%	113.9%	54.9%

Table 12: Share of Households by Automobile Ownership Category (Data for Figure 8)

Scenario	Household Automobile Ownership Category					
	Zero	One	Two	Three	Four or more	All Households
Year 2005 (version 0.0)	9.5%	32.9%	39.0%	13.1%	5.5%	100.0%
Year 2020, Current Regional Plans (v 0.0)	10.2%	33.0%	38.4%	13.0%	5.5%	100.0%
Year 2020 Initial Vision (v 0.0)	11.5%	33.0%	37.5%	12.7%	5.3%	100.0%
Year 2035, Current Regional Plans (v 0.0)	10.3%	33.6%	38.2%	12.6%	5.4%	100.0%
Year 2035, Initial Vision (v 0.0)	12.1%	34.7%	36.4%	11.8%	5.0%	100.0%

Table 13: Average Trip Distance for all Travel (Data for Figure 9)

Scenario	Travel Mode				
	Automobile	Walk	Bicycle	Transit	All Modes
Year 2005 (version 0.0)	7.3	0.9	2.3	8.5	6.6
Year 2020, Current Regional Plans (v 0.0)	6.9	0.9	2.3	8.8	6.3
Year 2020 Initial Vision (v 0.0)	6.9	0.9	2.3	10.1	6.3
Year 2035, Current Regional Plans (v 0.0)	6.8	0.9	2.3	9.4	6.2
Year 2035, Initial Vision (v 0.0)	6.8	0.9	2.3	10.3	6.2

Table 14: Average Trip Distance for Travel on Work Tours (Data for Figure 10)

Scenario	Travel Mode				
	Automobile	Walk	Bicycle	Transit	All Modes
Year 2005 (version 0.0)	11.5	1.1	2.6	11.2	10.9
Year 2020, Current Regional Plans (v 0.0)	11.0	1.1	2.6	11.6	10.4
Year 2020 Initial Vision (v 0.0)	10.9	1.1	2.6	13.3	10.6
Year 2035, Current Regional Plans (v 0.0)	10.7	1.1	2.7	12.5	10.3
Year 2035, Initial Vision (v 0.0)	10.7	1.1	2.6	13.7	10.5

Table 15: Automobile Mode Share for all Travel (Data for Figure 11)

Scenario	Automobile Travel Mode					
	Single occupant, No HOT	Single-occupant, Pay to use HOT	Two occupants, No HOT	Two occupants, Pay to use HOT	Three-or-more occupants	All Automobile Travel Modes
Year 2005 (version 0.0)	48.9%	0.0%	19.1%	0.0%	15.3%	83.3%
Year 2020, Current Regional Plans (v 0.0)	48.5%	0.3%	18.3%	0.2%	14.5%	81.8%
Year 2020 Initial Vision (v 0.0)	47.2%	1.0%	18.0%	0.4%	14.2%	80.8%
Year 2035, Current Regional Plans (v 0.0)	47.9%	0.7%	17.9%	0.5%	14.1%	81.1%
Year 2035, Initial Vision (v 0.0)	46.8%	1.3%	17.6%	0.5%	13.8%	80.0%

Table 16: Non-Automobile Mode Share for all Travel (Data for Figure 12)

Scenario	Non-Automobile Travel Mode				
	Walk	Bicycle	Walk to Transit	Drive to Transit	All Non-Auto Travel Modes
Year 2005 (version 0.0)	10.6%	1.1%	3.9%	1.1%	16.7%
Year 2020, Current Regional Plans (v 0.0)	11.2%	1.2%	4.5%	1.3%	18.2%
Year 2020 Initial Vision (v 0.0)	11.4%	1.2%	4.8%	1.7%	19.2%
Year 2035, Current Regional Plans (v 0.0)	11.5%	1.2%	4.7%	1.5%	18.9%
Year 2035, Initial Vision (v 0.0)	11.8%	1.3%	5.2%	1.8%	20.0%

Table 17: Daily Transit Boardings (Data for Figure 13)

Scenario	Transit Technology						
	Local bus	Light rail	Ferry	Express bus	Heavy rail	Commuter rail	All Technologies
Year 2005 (version 0.0)	1,012,073	192,552	12,753	53,454	339,296	16,083	1,626,211
Year 2020, Current Regional Plans (v 0.0)	1,113,580	259,565	35,854	282,795	369,272	41,063	2,102,129
Year 2020 Initial Vision (v 0.0)	1,487,790	293,325	31,664	115,854	594,070	70,261	2,592,964
Year 2035, Current Regional Plans (v 0.0)	1,342,937	319,961	43,313	313,249	540,642	61,022	2,621,124
Year 2035, Initial Vision (v 0.0)	1,831,728	378,800	41,897	141,624	756,697	91,658	3,242,404

Table 18: Hourly Vehicle Miles Traveled (Data for Figure 14)

Scenario	Time of Day					
	Early AM (3 am to 6 am)	AM Peak (6 am to 10 am)	Midday (10 am to 3 pm)	PM Peak (3 pm to 7 pm)	Evening (7 pm to 3 am)	Daily
Year 2005 (version 0.0)	2,144,706	10,130,300	6,951,791	10,844,402	2,893,731	6,176,739
Year 2020, Current Regional Plans (v 0.0)	2,280,733	10,611,020	7,457,793	11,425,451	3,000,996	6,511,876
Year 2020 Initial Vision (v 0.0)	2,284,246	10,599,769	7,536,699	11,480,064	3,020,134	6,542,360
Year 2035, Current Regional Plans (v 0.0)	2,649,742	11,667,766	8,283,469	12,691,323	3,404,563	7,251,643
Year 2035, Initial Vision (v 0.0)	2,650,003	11,939,569	8,709,222	13,006,330	3,461,349	7,457,104

Table 19: Share of Vehicle Miles Traveled by Time of Day (Data for Figure 15)

Scenario	Time of Day					
	Early AM (3 am to 6 am)	AM Peak (6 am to 10 am)	Midday (10 am to 3 pm)	PM Peak (3 pm to 7 pm)	Evening (7 pm to 3 am)	Daily
Year 2005 (version 0.0)	4.3%	27.3%	23.4%	29.3%	15.6%	100.0%
Year 2020, Current Regional Plans (v 0.0)	4.4%	27.2%	23.9%	29.2%	15.4%	100.0%
Year 2020 Initial Vision (v 0.0)	4.4%	27.0%	24.0%	29.2%	15.4%	100.0%
Year 2035, Current Regional Plans (v 0.0)	4.6%	26.8%	23.8%	29.2%	15.6%	100.0%
Year 2035, Initial Vision (v 0.0)	4.4%	26.7%	24.3%	29.1%	15.5%	100.0%

Table 20: Average Freeway Speed (Data for Figure 16)

Scenario	Time of Day					
	Early AM (3 am to 6 am)	AM Peak (6 am to 10 am)	Midday (10 am to 3 pm)	PM Peak (3 pm to 7 pm)	Evening (7 pm to 3 am)	Daily
Year 2005 (version 0.0)	60.7	48.9	58.1	50.0	59.6	53.2
Year 2020, Current Regional Plans (v 0.0)	60.9	50.2	58.2	51.1	59.7	54.0
Year 2020 Initial Vision (v 0.0)	60.8	50.7	58.2	51.7	59.7	54.4
Year 2035, Current Regional Plans (v 0.0)	60.8	47.7	57.5	48.7	59.6	52.3
Year 2035, Initial Vision (v 0.0)	60.7	47.0	57.3	48.1	59.6	51.9

Table 21: Average Speed on All Roadways (Data for Figure 17)

Scenario	Time of Day					
	Early AM (3 am to 6 am)	AM Peak (6 am to 10 am)	Midday (10 am to 3 pm)	PM Peak (3 pm to 7 pm)	Evening (7 pm to 3 am)	Daily
Year 2005 (version 0.0)	44.3	36.1	38.0	35.9	41.2	37.5
Year 2020, Current Regional Plans (v 0.0)	44.2	36.4	37.6	36.0	40.9	37.5
Year 2020 Initial Vision (v 0.0)	44.1	36.6	37.6	36.3	40.9	37.6
Year 2035, Current Regional Plans (v 0.0)	44.3	35.0	37.0	34.6	41.0	36.5
Year 2035, Initial Vision (v 0.0)	44.2	34.6	37.1	34.3	40.9	36.3

Table 22: Vehicle Miles Traveled (VMT) by Speed Category (Data for Figure 18)

Scenario	Time of Day					
	1 to 15 mph	15 to 30 mph	30 to 45 mph	45 to 60 mph	Faster than 60 mph	Total VMT
Year 2005 (version 0.0)	424,546	28,073,494	33,720,919	43,871,555	29,873,564	135,964,078
Year 2020, Current Regional Plans (v 0.0)	463,539	29,848,250	33,630,035	45,174,611	33,670,652	142,787,087
Year 2020 Initial Vision (v 0.0)	455,724	29,711,949	33,432,313	45,563,818	34,243,321	143,407,125
Year 2035, Current Regional Plans (v 0.0)	910,785	34,825,907	39,611,452	49,682,607	33,737,641	158,768,392
Year 2035, Initial Vision (v 0.0)	1,264,191	35,481,843	40,365,472	50,499,944	35,633,001	163,244,451

Appendix B: Initial Vision Scenario Transit Project List

METROPOLITAN
TRANSPORTATION
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Memorandum

TO: File

DATE: March 7, 2011

FR: Shimon Israel, David Ory

RE: Initial Vision Scenario Transit Network Coding

The purpose of this memorandum is to document the transportation network considered in the Initial Vision scenario. The Initial Vision scenario is one of two future year scenarios considered during the first round of analysis performed by the Association of Bay Area Governments (ABAG) and MTC in support the 2013 Regional Transportation Plan (RTP) – the other scenario is referred to as Current Regional Plans.

Background

In defining the transportation component of the Initial Vision scenario, MTC first examined the change in the population forecasts between the Initial Vision and Current Regional Plans scenarios. In areas of growth, transit frequencies were increased. MTC also solicited input from the Bay Area Congestion Management Agencies (CMAs), receiving detailed information regarding transit improvements from San Francisco, San Mateo, Santa Clara, and Alameda counties. Projects received from the CMAs that were consistent with the Initial Vision scenario's land use patterns were included. Following a review by MTC Planning and Executive staff, as well as staff from ABAG, MTC modeling staff translated the project descriptions into detailed operational representations within MTC's travel demand model for analysis.

Please note that the forecast year transit networks overlay a year 2005 base network – meaning projects considered in the RTP are added to the 2005 network. For this reason, transit routes that have been discontinued (as of today) continue to be a part of the travel model's representation of future transit service.

Initial Vision Scenario Projects

Detailed lists of projects included in the Initial Vision scenario are included in Tables 1 and 2 below. Table B-1 lists transit frequency improvements made for the scenario, organized by operator and route. Peak and off-peak headways for both the Current Regional Plans and Initial Vision scenarios are provided. Table B-2 lists new transit service and infrastructure; service frequencies are provided where relevant. Tables B-3 and B-4 identify the Priority Development Areas which are served by each of the projects in Tables B-1 and B-2; a map of the Priority

Development Areas is included at the end of the document for reference. Significant transit projects previously coded for the T-2035 Regional Transportation Plan are provided in Table B-5 for reference. The highway network considered in the Initial Vision is the same as in the Current Regional Plans scenario.

Table B-1: Transit Frequency Improvements between the Current Reg. Plans and Initial Vision Scenarios

Operator	Line	Headways			
		Current Reg Plans		Initial Vision	
		Peak	Off-Pk	Peak	Off-Pk
ACE	Stockton to San Jose	60	---	30	30
AC Transit	11 – Diamond District to Downtown Oakland	20	30	15	30
	12 – Berkeley BART to Downtown Oakland	20	30	15	30
	15 – Montclair Village to San Pablo and Fairmount	30	30	20	20
	40 – Downtown Oakland to Bayfair BART	15	15	10	10
	43 – Eastmont Transit Center to El Cerrito	30	30	20	20
	51 – Rockridge BART to Fruitvale BART	8	10	5	10
	71 – El Cerrito Plaza BART to Richmond Parkway Transit Center	30	30	20	20
	72 – Point Richmond to Oakland AMTRAK	30	30	20	20
	72R – San Pablo Rapid	12	12	10	10
	76 – El Cerrito del Norte BART to Hilltop Mall	30	30	20	20
	82 – International Blvd.	15	15	10	10
	82L – International Blvd. Limited	10	10	8	8
	99 – Bayfair to Union City	30	30	10	10
	211 – Union City BART to Fremont BART	30	30	10	10
BART	All lines	15	15	10	10
Caltrain	Baby Bullet Service	~ 60	---	30	---
	Limited Service	~ 120	---	60	---
	Local Service	240	---	240	30
eBART	eBART – Baypoint to Eastern Contra Costa County	12	12	10	10
Benicia Transit	98 – Express Service Vallejo Ferry Terminal to Pleasant Hill BART	60	---	30	30
CCCTA	110 – Pleasant Hill Shopping Center to Marsh Creek	40	45	30	30
Golden Gate	71 – Novato to Marin City	10	10	8	8
LAVTA	3 - Dublin/ Pleasanton BART to Stoneridge Mall to West Dublin BART	30	240	20	30

Table B-1 (cont): Transit Freq. Improvements between the Current Reg. Plans and Initial Vision Scenarios

Operator	Line	Headways			
		Current Reg Plans		Initial Vision	
		Peak	Off-Pk	Peak	Off-Pk
Muni	J – Muni Metro from Balboa Park to Third Street	9	9	7	7
	10 – Townsend	15	15	10	10
	48 – Quintara Bus	12	20	10	15
	82 – Levi Plaza Express	35	---	20	---
	108 – Transbay Terminal to Treasure Island	15	20	10	15
SamTrans	292 – Hillsdale Shopping Center to San Francisco	30	30	15	15
	250 – Downtown San Mateo to College of San Mateo	30	30	15	15
	251 – Bridgepoint to Hillsdale Shopping Center	60	60	15	15
	262 – Carlmont Village to Hillsdale Shopping Center	60	60	15	15
	271 – Westwood Terrace to Woodside Plaza	30	30	15	15
	274 – Cañada College to Redwood City Caltrain Station	30	30	15	15
	296 – Redwood City to East Palo Alto	30	30	15	15
	391 – El Camino Express Service	30	30	10	10
SR CityBus	1 – Mendocino Avenue	30	30	20	20
	2 – Bennett Valley	30	30	20	20
	3 – West Ninth Street	30	30	20	20
	4 – Rincon Valley	60	60	30	30
	5 – Santa Rosa	30	30	20	20
	6 –West Third Street	30	30	20	20
	7 – Montgomery Village and Rincon Valley	60	60	30	30
	8 – Sonoma Avenue	30	30	20	20
	9 – Sebastopol Road	30	30	20	20
	10 – Coddingtown	30	30	20	20
	11 – Fulton Road	30	30	20	20
	12 – Roseland	30	30	20	20

Table B-1 (cont): Transit Freq. Improvements between the Current Reg. Plans and Initial Vision Scenarios

Operator	Line	Headways			
		Current Reg Plans		Initial Vision	
		Peak	Off-Pk	Peak	Off-Pk
SR CityBus	14 – County Center	30	30	20	20
	15 – Stony Point Road	30	30	20	20
	17 – Piner Road	30	30	20	20
	18 – Southeast Circulator	60	60	30	30
Tri Delta	DX MAR – Express Martinez to Antioch Park & Ride	240	---	60	---
	DX LIV – Express Dublin/Pleasanton BART and Hacienda Business Park	120	---	60	---
	200 – Express to Martinez	60	60	30	30
	201 – Concord Route	60	60	20	30
	380 – Pittsburg BART to Antioch	30	60	20	30
	387 – Pittsburg BART to Antioch	60	60	30	30
	388 – Pittsburg BART/Antioch Park & Ride (Hillcrest)	60	60	30	30
	389 – Pittsburg BART/Bay Point Loop	60	60	30	30
	390 – Express Pittsburg BART/Antioch Park & Ride (Hillcrest)	60	60	30	30
	391 – Pittsburg BART/Brentwood Park & Ride	30	60	30	30
	392 – Pittsburg BART/Antioch Park & Ride (Hillcrest)	60	60	30	30
	393 – Bay Point/Brentwood Park & Ride	60	60	30	30
VTA	62 – Good Samaritan Hospital to Sierra and Piedmont via Union	40	40	30	30
	72 – Senter and Monterey to Downtown San Jose	30	30	15	30
	102 – South San Jose to Palo Alto	80	---	45	45
	103 – Eastridge Transit Center to Palo Alto	80	---	20	20
	104 – Penitencia Creek Transit Center to Palo Alto	80	---	45	45
	121 – Gilroy Transit Center to Moffett Ind. Park	60	---	30	30
	122 – S. San Jose to Moffett Ind. Park	240	---	120	120
	168 – Gilroy Transit Center to San Jose Diridon Transit Center	30	---	15	30

Table B-1 (cont): Transit Freq. Improvements between the Current Reg. Plans and Initial Vision Scenarios

Operator	Line	Headways			
		Current Reg Plans		Initial Vision	
		Peak	Off-Pk	Peak	Off-Pk
VTA	182 – Palo Alto to IBM/Bailey Avenue	120	---	15	15
	321 – Great Mall/Main Transit Center to Moffett Ind. Park	80	---	15	30
	523 – Eastridge Transit Center to DeAnza College Rapid Service	12	12	5	5
	568 – Downtown San Jose to Santa Theresa Light Rail Rapid Service	15	15	5	5
	900 – Light Rail Ohlone/Chynoweth to Almaden	15	15	10	10
	901 – Light Rail Alum Rock to Santa Teresa	15	15	10	10
	902 – Light Rail Downtown Mountain View to Winchester	15	30	10	10
Vallejo Transit	1 – South Vallejo to Rancho Vallejo	30	30	20	20
	2 – Northeast Vallejo to Downtown	30	30	20	20
	3 – Glen Cove to Georgia Street	30	30	20	20
	4 – Tuolumne Street to Downtown	30	30	20	20
	5 – Redwood Parkway to Gateway Plaza to Springs Road	30	30	20	20
	6 – Tennessee Street to Beverly Hills	30	30	20	20
	7 – Redwood Parkway to Gateway Plaza to Springs Road	30	30	20	20
	8 – Vallejo Loop	30	30	20	20
	9 – Fairgrounds/ Whitney to Vallejo Ferry Terminal	30	30	20	20
	200 – Express Service Vallejo Ferry to Downtown SF	60	---	30	60

Table B-2: New Projects Considered in Initial Vision Scenario

County	Project	Transit Line Code	Headway for New Transit Service	
			Peak	Off-Pk
Alameda	AC Transit Bus Service from Treasure Island to Downtown Oakland	TIOAK	30	30
	LAVTA Shuttle Service from West Dublin BART to Hacienda Business Park	WDTOHAC	10	30
Contra Costa	County Connection Express Service from Walnut Creek to West Dublin BART	WCWD	30	30
San Francisco	Muni Express Service from Candlestick Park to Transbay Terminal line	CPX	10	15
	Muni Express Servce from Hunters Point Shipyard to Transbay Terminal line	HPX	12	15
	Muni Treasure Island to Civic Center Service	109	10	15
	Muni Exclusive Lane on Geary Blvd., Polk to 33rd, for BRT Service. No Change to Headways	38 BRT	---	---
	Muni Exclusive Lane on Market Street, Van Ness to Embarcadero, for BRT Service. No Change to Headways	Multiple MUNI Lines	---	---
	Muni Exclusive Lane on Mission Street, Cesar Chavez to Embarcadero, for BRT Service. No Change to Headways	14 BRT	---	---
	Muni Exlusive Lane on Judah, 9th Avenue to the Great Highway, for Dedicated Streetcar Right-of-Way. No Change to Headways	N-Judah	---	---
Santa Clara	VTA Exclusive Lane on El Camino/Santa Clara Street/Alum Rock Avenue Corridor for BRT Service, Eastridge Transit Station to Palo Alto	522 BRT	5	5

Table B-3: Priority Development Areas Served by Transit Freq. Improvements in Initial Vision Scenario

Operator	Line	PDAs Served
ACE	Stockton to San Jose	Multiple PDAs
AC Transit	11 – Diamond District to Downtown Oakland	PDAs in Oakland
	12 – Berkeley BART to Downtown Oakland	PDAs in Berkeley, Oakland
	15 – Montclair Village to San Pablo and Fairmount	Multiple PDAs
	40 – Downtown Oakland to Bayfair BART	PDAs in Oakland, San Leandro
	43 – Eastmont Transit Center to El Cerrito	Multiple PDAs
	51 – Rockridge BART to Fruitvale BART	PDAs in Oakland
	71 – El Cerrito Plaza BART to Richmond Parkway Transit Center	PDAs in El Cerrito, Richmond
	72 – Point Richmond to Oakland AMTRAK	Multiple PDAs
	72R – San Pablo Rapid	Multiple PDAs
	76 – El Cerrito del Norte BART to Hilltop Mall	PDAs in El Cerrito, Richmond
	82 – International Blvd.	Multiple PDAs
	82L – International Blvd. Limited	Multiple PDAs
	99 – Bayfair to Union City	Multiple PDAs
	211 – Union City BART to Fremont BART	PDAs in Fremont, Union City
BART	All lines	Multiple PDAs
Caltrain	Baby Bullet Service	Multiple PDAs
	Limited Service	Multiple PDAs
	Local Service	Multiple PDAs
eBART	eBART – Baypoint to Eastern Contra Costa County	Multiple PDAs
Benicia Transit	98 – Express Service Vallejo Ferry Terminal to Pleasant Hill BART	Multiple PDAs
CCCTA	110 – Pleasant Hill Shopping Center to Marsh Creek	Pleasant Hill
Golden Gate	71 – Novato to Marin City	PDAs in San Rafael, Marin County
LAVTA	3 - Dublin/ Pleasanton BART to Stoneridge Mall to West Dublin BART	PDAs in Dublin

Table B-3 (cont): Priority Development Areas Served by Transit Frequency Improvements in Initial Vision Scenario

Operator	Line	PDAs Served
Muni	J – Muni Metro from Balboa Park to Third Street	PDAs in San Francisco
	10 – Townsend	PDAs in San Francisco
	48 – Quintara Bus	PDAs in San Francisco
	82 – Levi Plaza Express	PDAs in San Francisco
	108 – Transbay Terminal to Treasure Island	PDAs in San Francisco
SamTrans	292 – Hillsdale Shopping Center to San Francisco	Multiple PDAs
	250 – Downtown San Mateo to College of San Mateo	PDAs in San Mateo
	251 – Bridgepoint to Hillsdale Shopping Center	PDAs in San Mateo
	262 – Carlmont Village to Hillsdale Shopping Center	PDAs in San Mateo
	271 – Westwood Terrace to Woodside Plaza	PDAs in Redwood City
	274 – Cañada College to Redwood City Caltrain Station	PDAs in Redwood City
	296 – Redwood City to East Palo Alto	PDAs in Redwood City, East Palo Alto
	391 – El Camino Express Service	Multiple PDAs
SR CityBus	1 – Mendocino Avenue	PDAs in Santa Rosa
	2 – Bennett Valley	PDAs in Santa Rosa
	3 – West Ninth Street	PDAs in Santa Rosa
	4 – Rincon Valley	PDAs in Santa Rosa
	5 – Santa Rosa	PDAs in Santa Rosa
	6 –West Third Street	PDAs in Santa Rosa
	7 – Montgomery Village and Rincon Valley	PDAs in Santa Rosa
	8 – Sonoma Avenue	PDAs in Santa Rosa
	9 – Sebastopol Road	PDAs in Santa Rosa
	10 – Coddingtown	PDAs in Santa Rosa
	11 – Fulton Road	PDAs in Santa Rosa
	12 – Roseland	PDAs in Santa Rosa

Table B-3 (cont): Priority Development Areas Served by Transit Frequency Improvements in Initial Vision Scenario

Operator	Line	PDAs Served
SR CityBus	14 – County Center	PDAs in Santa Rosa
	15 – Stony Point Road	PDAs in Santa Rosa
	17 – Piner Road	PDAs in Santa Rosa
	18 – Southeast Circulator	PDAs in Santa Rosa
Tri Delta	DX MAR – Express Martinez to Antioch Park & Ride	Multiple PDAs
	DX LIV – Express Dublin/Pleasanton BART and Hacienda Business Park	Multiple PDAs
	200 – Express to Martinez	Multiple PDAs
	201 – Concord Route	PDAs in Concord
	380 – Pittsburg BART to Antioch	PDAs in Antioch, Pittsburg
	387 – Pittsburg BART to Antioch	PDAs in Antioch, Pittsburg
	388 – Pittsburg BART/Antioch Park & Ride (Hillcrest)	PDAs in Antioch, Pittsburg
	389 – Pittsburg BART/Bay Point Loop	PDAs in Pittsburg
	390 – Express Pittsburg BART/Antioch Park & Ride (Hillcrest)	PDAs in Antioch, Pittsburg
	391 – Pittsburg BART/Brentwood Park & Ride	PDAs in Antioch, Pittsburg
	392 – Pittsburg BART/Antioch Park & Ride (Hillcrest)	PDAs in Antioch, Pittsburg
	393 – Bay Point/Brentwood Park & Ride	PDAs in Antioch, Pittsburg
VTA	62 – Good Samaritan Hospital to Sierra and Piedmont via Union	PDAs in San Jose
	72 – Senter and Monterey to Downtown San Jose	PDAs in Campbell, San Jose
	102 – South San Jose to Palo Alto	Multiple PDAs
	103 – Eastridge Transit Center to Palo Alto	Multiple PDAs
	104 – Penitencia Creek Transit Center to Palo Alto	Multiple PDAs
	121 – Gilroy Transit Center to Moffett Ind. Park	Multiple PDAs
	122 – S. San Jose to Moffett Ind. Park	Multiple PDAs
	168 – Gilroy Transit Center to San Jose Diridon Transit Center	Multiple PDAs

Table B-3 (cont): Priority Development Areas Served by Transit Frequency Improvements in Initial Vision Scenario

Operator	Line	PDAs Served
VTA	182 – Palo Alto to IBM/Bailey Avenue	Multiple PDAs
	321 – Great Mall/Main Transit Center to Moffett Ind. Park	Multiple PDAs
	523 – Eastridge Transit Center to DeAnza College Rapid Service	PDAs in San Jose
	568 – Downtown San Jose to Santa Theresa Light Rail Rapid Service	PDAs in San Jose
	900 – Light Rail Ohlone/Chynoweth to Almaden	PDAs in San Jose
	901 – Light Rail Alum Rock to Santa Teresa	PDAs in Milpitas, San Jose
	902 – Light Rail Downtown Mountain View to Winchester	PDAS in Mountain View, San Jose
Vallejo Transit	1 – South Vallejo to Rancho Vallejo	PDAs in Vallejo
	2 – Northeast Vallejo to Downtown	PDAs in Vallejo
	3 – Glen Cove to Georgia Street	PDAs in Vallejo
	4 – Tuolumne Street to Downtown	PDAs in Vallejo
	5 – Redwood Parkway to Gateway Plaza to Springs Road	PDAs in Vallejo
	6 – Tennessee Street to Beverly Hills	PDAs in Vallejo
	7 – Redwood Parkway to Gateway Plaza to Springs Road	PDAs in Vallejo
	8 – Vallejo Loop	PDAs in Vallejo
	9 – Fairgrounds/ Whitney to Vallejo Ferry Terminal	PDAs in Vallejo
	200 – Express Service Vallejo Ferry to Downtown SF	PDAs in San Francisco, Vallejo

Table B-4: Priority Development Areas Served by New Transit Projects in Initial Vision Scenario

County	Project	PDAs Served
Alameda	AC Transit Bus Service from Treasure Island to Downtown Oakland	PDAs in Oakland, San Francisco
	LAVTA Shuttle Service from West Dublin BART to Hacienda Business Park	PDAs in Dublin, Pleasanton
Contra Costa	County Connection Express Service from Walnut Creek to West Dublin BART	Multiple PDAs
San Francisco	Muni Express Service from Candlestick Park to Transbay Terminal line	PDAs in San Francisco
	Muni Express Servce from Hunters Point Shipyard to Transbay Terminal line	PDAs in San Francisco
	Muni Treasure Island to Civic Center Service	PDAs in San Francisco
	Muni Exclusive Lane on Geary Blvd., Polk to 33rd, for BRT Service. No Change to Headways	PDAs in San Francisco
	Muni Exclusive Lane on Market Street, Van Ness to Embarcadero, for BRT Service. No Change to Headways	PDAs in San Francisco
	Muni Exclusive Lane on Mission Street, Cesar Chavez to Embarcadero, for BRT Service. No Change to Headways	PDAs in San Francisco
	Muni Exlusive Lane on Judah, 9th Avenue to the Great Highway, for Dedicated Streetcar Right-of-Way. No Change to Headways	PDAs in San Francisco
Santa Clara	VTA Exclusive Lane on El Camino/Santa Clara Street/Alum Rock Avenue Corridor for BRT Service, Eastridge Transit Station to Palo Alto	Multiple PDAs

Table B-5: Significant Transit Projects Coded for T2035 Network

Project	Included in Scenario	
	Current Plans	Initial Vision
AC Transit Berkeley-Oakland-San Leandro Rapid Service (72R)	√	√
BART to San Jose/Santa Clara	√	√
Caltrain Electrification (Faster Travel Times)	√	√
Caltrain Extension to Transbay Terminal	√	√
Central Subway in San Francisco	√	√
eBART Pittsburg/BayPoint BART to Eastern Contra Costa County	√	√
Expanded Regional Ferry Service, Phase I and II	√	√
Sonoma Marin Area Rapid Transit (SMART)	√	√