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July 27, 2015

Ms Tiffany Bohee
OCII Executive Director
c/o Mr. Brett Bollinger
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA 94103
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Re: **Transportation Impacts** - Comments on Draft Subsequent Environmental Impact Report for the Event Center and Mixed Use Development at Mission Bay Blocks 29-32 (Warriors Arena Project); San Francisco Planning Department Case No. 2014.1441E; State Clearinghouse No. 2014112045

Dear Ms Bohee and Mr. Bollinger:

This office represents the Mission Bay Alliance ("Alliance"), an organization dedicated to preserving the environment in the Mission Bay area of San Francisco, regarding the project known as the Event Center and Mixed Use Development at Mission Bay Blocks 29-32 ("Warriors Arena Project" or "Project"). The Mission Bay Alliance objects to approval of this Project and certification of this EIR for the reasons stated in this letter.

This letter incorporates by reference, as comments on the DSEIR, all of the comments on the DSEIR contained in the July 23, 2015, letter report authored by traffic engineer Dan Smith (attached as Exhibit 1), and the July 21, 2015, letter report authored by traffic engineer Larry Wymer (attached as Exhibit 2).

I. THE DSEIR IS NOT SUFFICIENT AS AN INFORMATIONAL DOCUMENT WITH RESPECT TO TRANSPORTATION IMPACTS.

A. The DSEIR Fails to Assess the Project Traffic Impacts on the Entire Affected Environment.

The DSEIR studies Project-induced increases in congestion and delay, for both incremental and cumulative impacts, at twenty-two (22) intersections and six (6) freeway ramps, as shown in Table 1.

Table 1

Incremental Impact Assessment (With Implementation of the Special Events Transit Service Plan)	Incremental Impact Assessment (Without Implementation of the Special Events Transit Service Plan)	Cumulative Impact Assessment
Intersections at DSEIR, p. 5.2-18, Table 5.2-34 p. 5.2-121, Table 5.2-35 p. 5.2-123, Table 5.2-36 p. 5.2-172, Table 5.2-47 p. 5.2-174, Table 5.2-48	Intersections at DSEIR, p. 5.2-192, Table 5.2-53 p. 5.2-193, Table 5.2-54	Intersections at DSEIR, p. 5.2-214, Table 5.2-59 p. 5.2-217, Table 5.2-60.
Freeway ramps at DSEIR, p. 5.2-133, Table 5.2-37 p. 5.2-133, Table 5.2-38 p. 5.2-134, Table 5.2-39 p. 5.2-181, Table 5.2-49 p. 5.2-181, Table 5.2-50	Freeway ramps at DSEIR, p. 5.2-198, Table 5.2-55 p. 5.2-198, Table 5.2-66	Freeway ramps at DSEIR, p. 5.2-221, Table 5.2-61 p. 5.2-221, Table 5.2-62

Remarkably, the DSEIR fails to disclose the criteria the City used to select these intersections and freeway ramps. More importantly, the DSEIR fails to disclose the criteria the City used to *exclude* other intersections and freeway ramps. The omission of this fundamentally important information renders the DSEIR so legally inadequate as an informational document that it frustrates CEQA's goal of providing the public with a meaningful opportunity to comment on the DSEIR.

Also, as shown in the attached report from traffic engineers Larry Wymer and Dan Smith, the DSEIR omitted from its area of study numerous intersections and freeway ramps that will also suffer potentially substantial increases in traffic congestion and delay. The omission of these intersections and freeway ramps from the DSEIR's analysis of the Project's effect on traffic also renders the DSEIR so legally inadequate as an informational document that it frustrates CEQA's goal of providing the public with a meaningful opportunity to comment on the DSEIR.

How did this happen? The DSEIR simply states: "The traffic impact assessment for the proposed project was conducted for 23 study intersections and six freeway ramp locations in the vicinity of the project site" (DSEIR, p. 5.2-72),[1] with no further explanation. The same is true for

[1]The DSEIR actually studies 22 intersections, not 23, in the tables listed in footnote 1.

the six freeway ramps. (DSEIR, p. 5.2-74.)

The DSEIR does inform the reader that:

> The impacts of the proposed project on the surrounding transportation network were analyzed using the Transportation Impact Analysis Guidelines issued by the Planning Department in 2002 (SF Guidelines 2002), which provides direction for analyzing transportation conditions and in identifying the transportation impacts of a proposed project.

(DSEIR, p. 5.2-69.) These Guidelines provide:

> 2. Project Setting
> The setting information shall be presented immediately following the Project Description as a discrete chapter or report section. The goal is to provide a brief but complete description of existing transportation infrastructure and conditions in the vicinity of the project. Normally, the described vicinity is a radius between two blocks and 0.25 mile, however, a larger area may be determined in the scoping process. *The specific perimeters of the study area, for both setting and project impact analysis, are to be confirmed as part of the approval for the scope of work.*

(Transportation Impact Analysis Guidelines (October 2002), pp.6-7 (italics added).) Based on this text, the reader would expect to find the criteria and rationale for delimiting "the specific perimeters of the study area" in the Scope of Work which the City approved pursuant to these Guidelines as a prerequisite to preparation of the DSEIR. Unfortunately, this expectation is disappointed, because the City-approved Scope of Work is also silent on the topic. (DSEIR, Appendix TR, pp. TR-8 to TR 14.)

Consequently, the City must revise the DSEIR to include an analysis of the Project's congestion and delay impacts on the excluded intersections and freeway ramps and then recirculate the Revised DSEIR for at least 45 days for public review and comment.

B. The DSEIR Fails to Disclose the Severity of the Project's Impacts on Intersections and Freeway Ramps which the Project Will Cause to Deteriorate to Level of Service (LOS) F.

As explained by Dan Smith in his attached report, the DSEIR fails to disclose the severity of the Project's congestion and delay impacts on intersections and freeway ramps which the Project will cause to deteriorate to Level of Service (LOS) F.

The DSEIR discloses the Project will cause significant congestion and delay impacts at

numerous intersections and freeway ramps in the "study area," where Project-induced increases in congestion and delay will cause deterioration in Level of Service (LOS) to LOS E or F. (See intersections and freeway ramps listed in footnote 1.) For the intersections and freeway ramps in the "study area" where Project-induced increases in congestion and delay will cause deterioration to LOS E, the DSEIR provides a measurement of the degree of severity of the significant impact (i.e., average delay for intersections or average density for freeway ramps).

However, for the intersections and freeway ramps in the study area where Project-induced increases in congestion and delay will cause deterioration to LOS F, the DSEIR fails to provide a full measurement of the degree of severity of the significant impact. Instead, for intersections pushed to LOS F, instead of presenting a measure of average delay, the DSEIR provides a "greater than" measurement of "80 seconds per vehicle." (See 5.2-74 and Tables cited above.) For freeway ramps pushed to LOS F, instead of providing the average density, the DSEIR provides no measurement of "existing plus project" density. Instead, the severity of the Project's impacts at intersections and freeway ramps pushed to LOS F has no upper limit, and remains undisclosed, other than to note that "demand exceeds capacity." (See 5.2-75, Table 5.2-19 and Tables cited above.)

Thus, the DSEIR fails to comply with CEQA because, beyond making the binary determination that the Project's impacts on these intersections and freeway ramps are significant, the DSEIR fails to disclose the severity of these significant impacts. (See *Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818, 831 ["The conclusion that one of the unavoidable adverse impacts of the project will be the 'increased demand upon water available from the Santiago County Water District' is only stating the obvious. What is needed is some information about how adverse the adverse impact will be"].) Consequently, the City must revise the DSEIR to include this missing information, then recirculate the Revised DSEIR for at least 45 days for public review and comment.

C. The DSEIR Fails to Identify the Significance and Severity of the Project's Impacts on Intersections Where the Project Will Use Parking Control Officers.

In its impact assessment tables for "Intersection Level of Service - Existing plus Project Conditions - With a SF Giants Evening Game – Weekday PM and Saturday Evening Peak Hour" (DSEIR, p. 5.2-172, Table 5.2-47) and "Intersection Level of Service - Existing plus Project Conditions - With a SF Giants Evening Game – Weekday Evening and Late Evening Peak Hour" p. 5.2-174, Table 5.2-48), the DSEIR measures the significance of impacts by the use of Level of Service (LOS) and delay measurements.

But for two intersections, King and Third streets, and King and Fourth streets, the DSEIR provides no LOS or delay measurements, and therefore, no information on whether the Project's congestion and delay impacts on these intersections are significant, and if so, the severity of these significant impacts.

Instead, the DSEIR indicates that the Project calls for posting Parking Control Officers (PCOs) at these intersections at the times indicated. But the adoption of a mitigation measure cannot substitute for disclosing whether the Project's impacts on these intersections are significant or their severity.[2]

D. The DSEIR's Analysis of the Project's Construction-Related Traffic Congestion and Delay Impacts Is Legally Flawed.

The DSEIR's analysis of the Project's construction related traffic congestion and delay impacts is legally flawed because it is based on invalid criteria, it fails to lawfully assess the Project's cumulative construction period impacts, and it improperly defers the development of mitigation measures to reduce the Project's construction-related traffic impacts to less than significant.

The DSEIR states "Construction related impacts generally would not be considered significant due to their temporary and limited duration." (DSEIR, p. 5.2-46.) This statement is placed in the section describing the DSEIR's thresholds of significance. Therefore, it appears this conclusion reflects a policy decision rather than a fact-based assessment.

In the impacts analysis section, the DSEIR states: "Construction related impacts generally would not be considered significant due to their temporary and limited duration." (DSEIR p 5.2-111). Elsewhere the DSEIR quantifies the construction period's "temporary and limited duration" as 26 months. (DSEIR, p. 5.2-112.) However, the notion that the DSEIR can determine the Project's construction related traffic impacts to be "less than significant" based primarily on their temporary duration is legally and logically flawed because from a cumulative standpoint, the Project's construction impacts are part of an essentially permanent, not temporary, condition of ongoing construction in this part of San Francisco.

Indeed, the DSEIR's discussion of the Project's cumulative construction period impacts recognizes there are numerous other construction projects planned in Mission Bay and that the construction related traffic impacts of these projects will combine with this Project's construction related impacts. (DSEIR, p. 5.2-210 (Impact C-TR-1.)

However, the DSEIR's discussion of the Project's cumulative construction period impacts

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[2]CEQA does not permit an agency to simply adopt mitigation measures in lieu of fully assessing a project's potentially significant environmental impacts because mere acknowledgment that an impact would be significant is inadequate; the EIR must include a detailed analysis of "how adverse" the impact would be. (*Lotus v. Department of Transportation* (2014) 223 Cal.App.4th 645, 655-56' *Galante Vineyards v. Monterey Peninsula Water Management Dist.* (1997) 60 Cal.App.4th 1109, 1123*; Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818, 831.)

is flawed because it is constrained by several artificial limits.

First, as discussed in section I.A above, the impact assessment is limited to impacts and intersections and freeway ramps within the artificially restricted geographic "study area."

Second, the impact assessment considers only construction projects within the Mission Bay neighborhood without regard to whether other "past, present, or reasonably foreseeable future projects" may be "closely related" because their impacts may combine with the Project's impacts.

Third, the DSEIR's analysis of cumulative traffic impacts for *construction* of the project only references a handful of foreseeable projects located very close to the Project, and the DSEIR's discussion of these projects is solely in terms of whether their construction periods overlap with construction of this Project, as if the operational impacts of other "past, present, and reasonably foreseeable future projects" are not "closely related." (See DSEIR, p. 5.2-10 and 11.)[3] This is incorrect because "closely related" simply means the other projects' impacts may combine with the Project's impacts.

Table 3 in the attached report by Larry Wymer shows that it is possible to include a broader range of projects - across both time and area - in the assessment of the Project's cumulative construction period traffic impacts, and that when this is done, there are many Projects that will be under construction or operational in the period before, during, and after construction of the Project whose effects will combine with those of the Warriors Arena construction. Therefore, the Project's construction impacts are part of an essentially permanent, not temporary, condition of ongoing construction in this part of San Francisco and the DSEIR errs by basing its determination of significance on the "limited duration" of the construction period. (DSEIR, p. 5.2-212.)

The second basis for the DSEIR's less-than-significant determination is the DSEIR's statement that "construction activities would be ... required to be conducted in accordance with City

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[3]These projects are:
• 1.13 million gsf of UCSF LRDP projects under construction at the Mission Bay Campus, including, the UCSF East Campus project on Blocks 33/34,
• Construction of Bayfront Park,
• realignment of Terry A. Francois Boulevard,
• construction of a neighborhood park on the north side of Mariposa Street east of Owens Street,
• the Exchange project on Mission Bay Block 40,
• the Family House project on Mission Bay Block 7 East,
• the Residential and Hotel project on Mission Bay Block 1,
• the 360 Berry Street project on Mission Bay Block N4/P3, and
• Caltrain's Peninsula Corridor Electrification Project.

requirements." (DSEIR, p. 5.2-212.) This vague assurance is meaningless because the DSEIR does not specify what these " City requirements" are, does not specify a performance standard that these City requirements would either impose or achieve, and presents no evidence that these unspecified "City requirements" are likely to avoid significant cumulative construction related traffic effects. (See *Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70, 95 (*CBE*); *Gentry v. City of Murrieta* (1995) 36 Cal.App.4th 1359; 1394 (*Gentry*).

The third and final basis for the DSEIR's less-than-significant determination is "Improvement Measure I-TR-1: Construction Management Plan and Public Updates." The DSEIR suggests this Plan would help avoid significant cumulative construction related traffic effects. (DSEIR, p. 5.2-212.) But it is improper for the DSEIR to rely on Improvement Measure I-TR-1 to help reduce impacts to less than significant because it is not identified as a mitigation measure necessary to substantially reduce significant Project impacts; therefore, it is not enforceable. (CEQA Guideline 15126.4(a)(4).)

Finally, the DSEIR fails to quantify the Projects' construction period impacts, presumably based on its qualitative conclusion that unspecified "City requirements" and "Improvement Measure I-TR-1" will avoid significant impacts. This puts the cart before the horse.[4]

E. The DSEIR's Analysis of the Project's Operational Traffic and Transit Congestion and Delay Impacts Is Legally Flawed.

1. The DSEIR understates traffic and transit volumes in the PM peak period of 4:00 to 6:00 PM by using "time of arrival" at the Arena as a proxy measurement for "time of travel."

In modeling traffic and transit impacts, the DSEIR assumes only 5% of basketball game attendees will be traveling in the "study area" in the PM peak period of 4:00 to 6:00 p.m. Table 5.2-21 states that 5% of arrivals are expected before 6:00 p.m. for 7:30 p.m. weekday basketball games; another 11% will arrive between 6:00 and 6:30 p.m. (DSEIR, p. 5.2-83.) This data is based on turnstile counts of people entering the arena.

As explained by Dan Smith in his attached report, this proxy measurement does not provide reliable data as to when game or event attendees are actually traveling through affected intersections or freeway ramps or using affected transit routes:

> These considerations are so obvious to any transportation professional knowledgeable about sports stadium transportation issues that the analysis presented

[4]See footnote 2 above.

> in the DSEIR cannot be said to constitute the good faith effort to disclose impact that the California Environmental Quality Act demands. Since the entire analysis of transportation impacts flows from the estimate of trip generation and time-of-travel analysis, the entire transportation impact component of the DSEIR must be redone to accurately reflect the time that event attendees are actually traveling on the transportation system instead of the time they enter the event venue.

(Exhibit 1, p. 3.)

> In his analysis, Mr. Smith found:
>
> it seems highly probable that as much as one-third or more of the trips that the DSEIR considers to take place in the 6 to 7 PM period and the 7 to 8 PM period would actually be on the transportation system in the more critical 5 to 6 PM commute peak hour. That would put 7,466 event-related travelers on the transportation system in the 5 PM to 6 PM period instead of the 1,866 assumed in the DSEIR, a difference that would likely result in transportation impacts not disclosed in the DSEIR and/or intensification of impacts and mitigation needs of those that were disclosed.

(Exhibit 1, p. 3.)

Even just applying common sense to the DSEIR's data indicates that many or most of the 11% that the DSEIR says arrive at the turnstile between 6:00 and 6:30 p.m. would be traveling to the event in the PM peak period of 4:00 to 6:00 pm. This minimal adjustment alone changes the assumption on which the modeling is based from 5% to 16% traveling in the "study area" in the PM peak period of 4:00 to 6:00 pm. As shown by Mr. Smith, this minimal adjustment more than doubles the Project's contribution of traffic to affected intersections, and would change the DSEIR's determination from less-than-significant to significant at some intersections. (Exhibit 1, p. 4.)

This issue was flagged in public scoping comments on the DSEIR. (DSEIR, p. 2-15.) Yet, somehow, the DSEIR did not adjust its reliance on turnstile data to develop a reliable metric to use instead. Instead, the DSEIR offers a series of weak or irrelevant rationales for its methodology, including:

> because basketball games typically start at 7:30 p.m. a higher percentage of inbound event attendees would travel to the event center during the 6:00 to 8:00 p.m. period than during the 4:00 to 6:00 p.m. commute peak period.

(DSEIR p. 5.2-71); and

> the SF Guidelines do not include travel demand characteristics for the specialized uses (e.g., sports events, conventions, and other events) that would take place at the proposed event center. Similarly, standard trip generation resources, such as the Institute of Transportation Engineer's Trip Generation Manual, do not include sufficiently detailed trip generation data for such specialized uses. Therefore, the travel demand for the event center component of the proposed project was based on the estimated attendance, as well as information on current travel characteristics of Golden State Warriors basketball attendees at the Oracle arena in Oakland.

(DSEIR, p. 5.2-81); and

> The data are based on information provided by the Golden State Warriors for their current facility, which was then adjusted to provide for earlier arrival patterns based on comparable information collected at similar NBA facilities to account for the increased availability of retail and restaurant uses at the proposed project site compared to Oracle Arena in Oakland. A summary of this data is provided in the travel demand technical memorandum included in Appendix TR.

(DSEIR, p. 5.2-82.)[5]

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[5] In the "Travel Demand Methodology and Results" section of Chapter 5.2, the DSEIR states:

> The Basketball Game scenario reflects the travel demand of the office, retail and restaurant uses, plus an evening basketball game. The transportation impact analysis of the Basketball Game scenario was conducted for four analysis hours (weekday p.m., weekday evening, weekday late evening, and Saturday evening), for conditions without and with an overlapping SF Giants evening game at AT&T Park.
>
> Table 5.2-21 presents the expected temporal distribution of arrival and departure patterns for basketball game attendees of the proposed project. The data are based on information provided by the Golden State Warriors for their current facility, which was then adjusted to provide for earlier arrival patterns based on comparable information collected at similar NBA facilities to account for the increased availability of retail and restaurant uses at the proposed project site compared to Oracle Arena in Oakland. A summary of this data is provided in the travel demand technical memorandum included in Appendix TR. Based on this information, it was assumed that approximately 5 percent of arrivals to a basketball game would occur during the p.m. peak hour (5:00 to 6:00 p.m.), and up to 66 percent of arrivals would occur during the evening peak hour (7:00 to 8:00 p.m.). Similarly, up to 70 percent of the departures would occur during the late evening peak hour (9:00 to 10:00 p.m.).

A discussion and summary of the data from other venues than Oracle is provided in DSEIR, Appendix TR, at pp. TR-21 to TR-25 and TR-37 [Appendix A, p. A-9]. The table at page TR-37 provides time of arrival data from, in addition to Oracle, six purportedly "comparable" venues, namely: Icon Venue Group, Houston, Phoenix, Sacramento, Brooklyn (2013-2014), and Brooklyn (2014-2015). An interesting fact about this table is that the data for 4:00 to 6:00 p.m. arrivals at four of these six venues (i.e., Icon Venue Group, Houston, Phoenix, Sacramento) is "included in" the data for later time periods. So, in fact, the only purportedly comparable venue for which the DSEIR presents supporting data is Brooklyn (2013-2014 and 2014-2015). The venue with the largest proportion of arrivals in the 4:00 to 6:00 p.m. period is Brooklyn (2014-2015), with 4.1%.

In short, the City and the Warriors failed to develop reliable accurate, reliable data on the key variable in the entire transportation analysis, i.e., the number of people traveling to events in the peak PM time period when traffic and transit crowding are at their worst. A lead agency "must use its best efforts to find out and disclose all that it reasonably can." (CEQA Guideline, § 15144.)

The above quoted rationales do not excuse this failure. The scoping comments flagging this issue were submitted to the City between November 19, 2014, and December 19, 2014, during the middle of the basketball season. (DSEIR, p. 2-8 and 2-9, 2-15.) The Warriors played fifty-seven (57) games between December 19, 2014, through the close of the regular season on April 15, 2015.[6] There are thirty (30) teams in the NBA.[7] That means there were approximately eight-hundred and fifty five (i.e., 15 x 57 = 855) regular season games played in the 2014-2015 regular season after December 19, 2014. In the playoffs following the regular season, sixteen teams played a total of seventy-nine games after April 15, 2015.[8]

Therefore, both the Warriors and the City had ample opportunity to conduct market research by interviews and exit polling of a sample of the hundreds of thousands of fans attending these games to discover how far in advance of arriving at the turnstile they traveled through the traffic and transit impacted area surrounding the venue. The City's and Warriors' decision to pass up this opportunity after being informed of the issue does not satisfy their duty to use best efforts to find out

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> Event staff for basketball games would be expected to arrive between 4:30 and 5:00 p.m. and would be on post prior to the gate opening time; event staff would leave between 11:00 and 11:30 p.m.

(DSEIR, p. 5.2-82.)

[6]http://www.nba.com/warriors/schedule,

[7]http://www.nba.com/teams/?ls=iref:nba:gnav

[8]http://www.nba.com/playoffs/

and disclose all they reasonably can.

Indeed, the City was fully aware of the need to gather information more relevant to fans "time of travel" than turnstile counts and made some efforts to do so. But it failed to disclose that there are alternative metrics for "time of travel" or the results of its efforts in this regard. For example, an email exchange dated January 12, 2015, between the City's EIR consultant (ESA) and City Planning officials includes data on arrivals before 6:00 p.m. at the Arco Arena parking lot for a 7:00 p.m. Sacramento Kings game and arrivals before 6:00 p.m. in buildings for other NBA venues. Thus, the City was aware of other measurements (e.g., parking lot entry rather than turnstile counts) that could more accurately predict peak PM period travel to games.

Also, the arrival numbers cited in this email exchange show 14% arriving at the Arco Arena parking lot before 6 p.m. for one 7 p.m. game and 9% arriving before 6 p.m. in buildings for other NBA venues. These numbers indicate the DSEIR's assumption that 5% of fans will be traveling through the study area before 6 p.m. for 7:30 p.m. games is vastly understated. Yet the DSEIR fails to reference these numbers.

The DSEIR must be revised to provide accurate peak period traffic data and analysis

2. The DSEIR's Analysis of the Project's Cumulative Impacts Does Not Comply With CEQA.

a. The 5% threshold of significance for impacts at intersections and freeway ramps operating at LOS E or F violates CEQA.

For intersections operating at LOS E or F, the DSEIR uses a threshold of significance of "a contribution of 5 percent or more to the traffic volumes at the critical movements operating at LOS E or LOS F" (DSEIR, p. 5.2-73-74.) For freeway ramps operating at LOS E or F, the DSEIR uses a threshold of significance of "a contribution of 5 percent or more to the traffic volumes on the ramp." (DSEIR, p. 5.2-74.)[9]

No rationale for the 5% threshold is provided. Indeed, blind reliance on this number ignores the law governing the assessment of cumulative impacts, which requires a fact based assessment that takes into account the severity of preexisting impacts. A one-size-fits-all "ratio" violates CEQA. (See *Communities for a Better Environment v. California Resources Agency* (2002) 103 Cal.App.4th 98, 120 ("*Communities*"); *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d

[9]"The project may result in significant adverse impacts at intersections that operate at LOS E or LOS F under existing conditions depending upon the magnitude of the project's contribution to the worsening of the average delay per vehicle." (DSEIR, p. 5.2-45.)

692, 720-21 (*Kings County*). *Communities* and *Kings County* teach that the significance of a cumulative impact depends on the environmental setting in which it occurs, especially the severity of existing environmental harm, and that focusing on the magnitude (i.e., "ratio") of the Project's incremental contribution to severe preexisting harm is inconsistent with the definition of cumulative impacts under CEQA.[10]

b. The year 2040 baseline for assessing the significance of the Project's cumulative impacts violates CEQA.

The DSEIR assesses the Project's incremental traffic and transit impacts and its cumulative traffic and transit impacts pegged to the year 2040, which is 25 years in the future.[11] While the Alliance supports such long range forecasting in general, as used in this DSEIR the year 2040 baseline for assessing the significance of the Project's cumulative impacts is misleading, for two reasons.

First, this approach overlooks the Project's cumulative traffic and transit impacts pegged to its first 1 to 10 years of operations. This time period is of immediate interest to the citizens of San Francisco because the traffic mess predicted by the DSEIR will be upon them then. And who among them know whether they will even be in the City by the year 2040. Thus, while including a year 2040 baseline is not in itself objectionable, the omission of a baseline 5 to 10 years in the future

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[10](*Communities,* 103 Cal.App.4th at p. 120 ["[T]he relevant question"... is not how the effect of the project at issue compares to the preexisting cumulative effect, but whether "any additional amount" of effect should be considered significant in the context of the existing cumulative effect. [footnote omitted] In the end, the greater the existing environmental problems are, the lower the threshold should be for treating a project's contribution to cumulative impacts as significant. [footnote omitted]"]; *Kings County,* 221 Cal.App.3d at pp. 720-21 ["They contend in assessing significance the EIR focuses upon the ratio between the project's impacts and the overall problem, contrary to the intent of CEQA.... We find the analysis used in the EIR and urged by GWF avoids analyzing the severity of the problem and allows the approval of projects which, when taken in isolation, appear insignificant, but when viewed together, appear startling. Under GWF's 'ratio' theory, the greater the overall problem, the less significance a project has in a cumulative impacts analysis. We conclude the standard for a cumulative impacts analysis is defined by the use of the term 'collectively significant' in Guidelines section 15355 and the analysis must assess the collective or combined effect of energy development"].)

[11]"Future 2040 cumulative traffic volumes were estimated based on cumulative development and growth identified by the San Francisco County Transportation Authority SF-CHAMP travel demand model, using model output that represents Existing conditions and model output for 2040 cumulative conditions." (DSEIR, p. 5.2-110.)

renders the DSEIR informationally defective.

Second, by using a baseline projected to the year 2040, the DSEIR inflates the denominator in the 5% "ratio" it uses to determine the significance of Project cumulative impacts at LOS E and F intersections, thereby masking actual significant effects. (See Exhibit 2 (D. Smith), p. 25.)

c. The DSEIR's use of a "projection" based approach to the Project's cumulative impacts is misleading.

The DSEIR states that:

> Future 2040 cumulative traffic volumes were estimated based on cumulative development and growth identified by the San Francisco County Transportation Authority SF-CHAMP travel demand model, using model output that represents Existing conditions and model output for 2040 cumulative conditions. .... The 2040 cumulative traffic volumes take into account cumulative development projects in the project vicinity, such as the build-out of the Mission Bay Area, completion of the UCSF Research Campus and the UCSF Medical Center, the Mission Rock Project at Seawall Lot 337, Pier 70, etc., as well as the additional vehicle trips generated by the proposed project.

(DSEIR, p. 5.2-110.)[12]

The DSEIR presents no evidence supporting the DSEIR's assumption that the year 2040 projection is reliable for predicting future traffic and transit demand, other than the vague assertion that the "SF-CHAMP travel demand model, using model output that represents Existing conditions and model output for 2040 cumulative conditions ... has been validated to represent future

[12]In the section titled "Approach to Cumulative Impact Analysis" (DSEIR 5.1-6, § 5.1.5), the DSEIR asserts that the CEQA Guidelines provide "two approaches to a cumulative impact analysis ... (a) the analysis can be based on a list of past, present, and probable future projects producing related or cumulative impacts; or (b) a summary of projections contained in a general plan or related planning document can be used to determine cumulative impacts. The projections model includes individual projects and applies a quantitative growth factor to account for other growth that may occur in the area." (DSEIR, p. 5.1-7.) The DSEIR asserts that "The analyses in this SEIR employ both the list-based approach and a projections-based approach, depending on which approach best suits the individual resource topic being analyzed ... the Transportation and Circulation analysis relies on a citywide growth projection model that also encompasses many individual projects anticipated in and surrounding the project site vicinity, which is the typical methodology the San Francisco Planning Department applies to analysis of transportation impacts." (DSEIR, p. 5.1-7.)

transportation conditions in San Francisco." (DSEIR, p. 5.2-110.) But, as explained by Mr Smith, the SF-CHAMP model's margin of error is greater than the 5% threshold used to determine the significance of Project cumulative impacts at LOS E and F intersections. (See Exhibit 2 (D. Smith), p. 25.) Therefore, SF-CHAMP is the wrong tool for the task.

Further, given the sheer number of developments in this area of the City (see table 3 of Mr. Wymer's report) and the breakneck pace of their approval and implementation, the projection approach is misleading, not informative. Therefore, the DSEIR's cumulative impact assessment must use a list based approach to forecast reasonably foreseeable travel demand, and do so in a meaningful time frame.

F. The DSEIR's Methodology for Analyzing Project Impacts on the Transit System Is Legally Flawed.

The DSEIR summarizes its methodology for analyzing Project Impacts on the transit system, as follows:

> The impact of additional transit ridership generated by the proposed project on local and regional transit providers was assessed by comparing the projected ridership to the available transit capacity at the maximum load point. Transit "capacity utilization" refers to transit riders as a percentage of the capacity of the transit line, or group of lines combined and analyzed as screenlines across which transit lines travel. The transit analyses were conducted for the peak direction of travel for each of the analysis time periods.

(DSEIR, p. 5.2-75.)

This methodology contains two flaws. First, it suffers from the same unwarranted and unsupported assumptions about basketball fans' time of travel to the arena for games described above. Second, the DSEIR's use of transit screenline and route capacities is also misleading and unsupported.

1. The DSEIR's use of transit screenline and route capacities is misleading and unsupported.

For its Project specific (or incremental) transit impact analysis, the DSEIR uses the following thresholds of significance:

> The proposed project was determined to have a significant transit impact if project-generated transit trips would cause downtown or regional screenlines, and, where applicable, directly affected routes, operating at less than its capacity

> utilization standard under existing conditions, to operate at more than capacity utilization standard. For Muni, the capacity utilization standard is 85 percent for conditions without an event at the project site, and 100 percent for conditions with an event at the project site. For regional operators, the capacity utilization standard is 100 percent for conditions without and with an event at the project site.

(DSEIR, p. 5.2-76, 77.)

For its cumulative transit impact analysis, the DSEIR uses the following thresholds of significance:

> Under 2040 cumulative conditions, the proposed project was determined to have a significant cumulative impact if its implementation would cause the capacity utilization at the Muni and regional screenlines and/or corridors within the screenlines to exceed the capacity utilization standard noted above for conditions without and with an event at the project site, or if its implementation would contribute considerably to a screenline or corridor projected to operate at greater than the capacity utilization standard under 2040 cumulative plus project conditions (i.e., a contribution of 5 percent or more to the transit ridership on the screenline or route). In addition, if it was determined that the proposed project would have a significant project-specific transit impact under existing plus project conditions, then the impact would also be considered a significant cumulative impact under 2040 cumulative conditions.

(DSEIR, p. 5.2-76, 77.)

For both Project specific (incremental) and cumulative impacts, the DSEIR uses "capacity utilization standards" as baselines against which to measure the Project's impacts. Capacity utilization standards are specific percentages of the theoretical maximum capacity of a transit screenline or transit line.

For Project specific (or incremental) thresholds of significance for Muni, the DSEIR uses two different capacity utilization standards against which to measure the Project's impacts. For conditions without an event at the Project site, the capacity utilization standard is 85 percent of maximum theoretical capacity of the transit screenline or line. For conditions with an event at the Project site, the capacity utilization standard is 100 percent of maximum theoretical capacity.

If the question to be answered by the transit impact analysis is whether the Project will inflict significant suffering on people riding Muni, why does the DSEIR use two different baselines for its impact assessment. If exceeding 85% inflicts suffering without an event, then exceeding 85% will inflict suffering with an event.

The DSEIR does not examine this use of inconsistent baselines. However, the June 21, 2013, Planning Department Memorandum "Transit Data for Transportation Impact Studies" (at Appendix-TR, p. TR-624) states:

> The SFMTA Board has adopted an "85 percent" capacity utilization standard for transit vehicle loads. In other words, transit lines should operate at or below 85 percent capacity utilization. The SFMTA Board has determined that this threshold more accurately reflects actual operations and the likelihood of "pass-ups" (i.e., vehicles not stopping to pick up more passengers). The Planning Department, in preparing and reviewing transportation impact studies, has similarly utilized the 85 percent capacity utilization as a threshold of significance for determining peak period transit demand impacts to the SFMTA lines.

(DSEIR, Appendix-TR, p. TR-624.) Thus, the 85 percent capacity utilization threshold apparently has nothing to do with the suffering of Muni's passengers; it simply reflects the reality of Muni's operations. And even if 85% of capacity is the break point at which Muni drivers tend to refuse to pick up more passengers due to overcrowding, then using 100% of capacity as a threshold of significance is entirely unsupportable.

For its cumulative impact analysis, the DSEIR uses the same baselines and thresholds of significance discussed above plus one more if the Project "would contribute considerably to a screenline or corridor projected to operate at greater than the capacity utilization standard under 2040 cumulative plus project conditions (i.e., a contribution of 5 percent or more to the transit ridership on the screenline or route)."

The 5% threshold for determining a Project's contribution to be "considerable" is stated at Appendix-TR, p. TR-625. No rationale for this number is provided. A Project contributing 1% more capacity utilization to a screenline that usually operates at 84%, resulting in a total capacity utilization of 85%, may not contribute considerably to a significant impacts, while a Project contributing 1% more capacity utilization to a screenline that usually operates at 94%, resulting in a total capacity utilization of 95%, may well contribute considerably to a significant impact. A one-size-fits-all "ratio" violates CEQA. (See *Communities, supra; Kings County, supra*.)

G. The DSEIR Unlawfully Defers the Development of Mitigation Measures.

The DSEIR sketches out a number of concepts for mitigating the Project's significant transportation effects where it defers the development of specific mitigation measure until a future date. The DSEIR's deferral all of the mitigation measures listed below in this section does not meet CEQA requirements to identify specific mitigation measures in the Draft EIR so the public may meaningfully review and comment on them. These measures violate CEQA's requirements for deferred mitigation because the DSEIR does not specify binding performance standards by which

the measures' success can be judged, there is no evidence it is impracticable to develop and include the specific measures in the DSEIR, there is no evidence the measures will be effective, there is no evidence the measures are feasible, there is no evidence the measures will be implemented because the Project Sponsor may deem them infeasible, and the measures are not enforceable. (See *Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70, 95 (*CBE*); *Gentry v. City of Murrieta* (1995) 36 Cal.App.4th 1359; 1394 (*Gentry*).

The listed measures are qualified by language such as "if feasible" or "could include" (e.g., Measure M-TR-2b). Such qualifications render the measures illusory, unenforceable, and ineffective for purposes of the DSEIR's claim of substantial reductions in impact or reductions in impact to less-than-significant levels. (See *Federation of Hillside & Canyon Associations v. City of Los Angeles* (2000) 83 Cal.App.4th 1252, 1260-1262; *Lincoln Place Tenants Association v. City of Los Angeles* (2005) 130 Cal.App.4th 1491, 1508 ["mitigating conditions are not mere expressions of hope..."].)

Even the listed measures that include performance standards (e.g., Measure M-TR-18) do not require they be achieved. For example, Measure M-TR-18 only requires that the Project Sponsor "work to achieve" the performance standards. CEQA requires that deferred mitigation measures include binding performance standards.

- Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts. (DSEIR, p. 1-15.)

- Mission Bay FSEIR Mitigation Measure E.47: Transportation System Management Plan. (DSEIR, p. 1-17.)

- Mitigation Measure M-TR-5a: Additional Caltrain Service. (DSEIR, p. 1-18.)

- Mitigation Measure M-TR-5b: Additional North Bay Ferry and/or Bus Service. (DSEIR, p. 1-19.)

- Mitigation Measure M-TR-9a: Crane Safety Plan for Project Construction. (DSEIR, p. 1-20.)

- Mitigation Measure M-TR-9d: Event Center Exterior Lighting Plan. (DSEIR, p. 1-21.)

- Mitigation Measure M-TR-11b: Participation in the Ballpark/Mission Bay Transportation Coordinating Committee. (DSEIR, p. 1-22.)

- Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events. (DSEIR, p. 1-23.)

- Mitigation Measure M-TR-13: Additional Muni Transit Service during Overlapping Events.

(DSEIR, p. 1-24.)

- Mitigation Measure M-TR-14: Additional BART Service to the East Bay during Overlapping Events. (DSEIR, p. 1-24.)

- Mitigation Measure M-TR-18: Auto Mode Share Performance Standard and Monitoring. (DSEIR, p. 1-25.)

H. The DSEIR's Discussion of Transportation Impacts Is Incomplete.

The DSEIR analyzes transportation impacts in two broad scenarios: with and without implementation of the Special Events Transit Service Plan.

In the scenario "With Implementation of the Special Events Transit Service Plan" the DSEIR analyzes two narrower scenarios: with and without a Giants game. In each Giants game scenario, the DSEIR analyzes three narrower scenarios: no event, convention event, and basketball game. The result is six scenarios applied to ten different transportation resources, as shown in Table 2.

Table 2

With Implementation of the Special Events Transit Service Plan					
Without Giants game			With Giants game		
No event	Convention event	Basketball game	No event	Convention event	Basketball game
TR-1 Construction - Traffic LS TR-2 Traffic - Intersections SUM TR-3 Traffic - Freeway Ramps SUM TR-4 Transit - Muni LS TR-5 Transit - Regional - Caltrain SUM TR-6 Pedestrian LSM TR-7 Bicycle LS TR-8 Loading LS TR-9a Construction Helipad LSM TR-9b Const. Lights Helipad LS TR-9c Operation Helipad LS TR-9b Operation Lights Helipad LSM TR-10 Emergency Vehicle Access LS			TR-1 Construction - Traffic LS TR-11 Traffic - Intersections SUM TR-12 Traffic - Freeway Ramps SUM TR-13 Transit - Muni LSM TR-14 Transit - Regional -All SUM TR-15 Pedestrian LSM TR-16 Bicycle LS TR-17 Emergency Vehicle Access LS		

In the scenario "Without Implementation of the Special Events Transit Service Plan"

the DSEIR analyzes only one narrower scenario: without a Giants game and with a basketball game. The result is one scenario applied to ten different transportation resources, but the omission of the other five scenarios, as shown in Table 3.

Table 3

Without Implementation of the Special Events Transit Service Plan	
Without Giants game	
Basketball Game	
TR-1 Construction - Traffic	LS
TR-18 Traffic - Intersections	SUM
TR-19 Traffic - Freeway Ramps	SUM
TR-20 Transit - Muni	SUM
TR-21 Transit - Regional	SUM
TR-22 Pedestrian	LSM
TR-23 Bicycle	LS
TR-24 Loading	LS
TR-25Emergency Vehicle Access	LS

Since the scenario "Without Implementation of the Special Events Transit Service Plan" is likely enough to justify including it in the DSEIR, the DSEIR should include the other five omitted scenarios.

In addition, the DSEIR's cumulative impact analysis does not even inform the reader if it is performed for the "with" or "without" scenario for "Implementation of the Special Events Transit Service Plan." The cumulative impact analysis should include both scenarios, and should inform the reader which is which.

Thank you for your attention to this matter.

Very Truly Yours,

Tom Lippe

Thomas N. Lippe

List of Exhibits

1. July 23, 2015, letter report authored by traffic engineer Dan Smith.

2. July 21, 2015, letter report authored by traffic engineer Larry Wymer.

3. January 12, 2015, email exchange dated between the City's EIR consultant (ESA) and City Planning officials.

4. December 2013, Final Report, San Francisco Transportation Plan 2040, prepared by San Francisco County Transportation Authority.

5. Final Report Appendices, Appendix B: White Paper, TRANSPORTATION NEEDS, San Francisco Transportation Plan 2040, prepared by San Francisco County Transportation Authority.

6. Final Report Appendices, Appendix C: CORE CIRCULATION STUDY, San Francisco Transportation Plan 2040, prepared by San Francisco County Transportation Authority.

7. Final Report Appendices, Appendix K: SF TRAVEL AT A GLANCE, San Francisco Transportation Plan 2040, prepared by San Francisco County Transportation Authority.

8. May 21, 2013, San Francisco Transportation Plan Update, SPUR Annie Alley Forum, San Francisco Transportation Plan 2040, prepared by San Francisco County Transportation Authority.

EXHIBIT 1

SMITH ENGINEERING & MANAGEMENT

July 26, 2015

Mr. Tom Lippe
Law Offices of Thomas N. Lippe, APC
201 Mission Street, 12th Floor
San Francisco, CA 94105

Subject: Draft Subsequent Environmental Impact Report for Event Center and Mixed Use Development at Mission Bay Blocks 29-32. SCN:2014112045

P15003

Dear Mr. Lippe:

Per your request, I have reviewed the Draft Subsequent Environmental Impact Report (hereinafter "the DSEIR") on the above referenced Project in the City and County of San Francisco (hereinafter "the City"). The focus of my review is in regard to matters involving transportation and circulation. My qualifications to perform this review include registration as both a Civil and Traffic Engineer in California and 47 years professional consulting practice in these fields. I have prepared, reviewed, and commented on the traffic and circulation components of numerous environmental impact documents under the California Environmental Quality Act (hereinafter "CEQA"), working for Lead Agencies, Responsible Agencies and private citizens and organizations. I am familiar with the Project vicinity, having lived and worked in the Bay Area since 1967 and having been involved in numerous significant projects affecting the San Francisco Waterfront including a decade of planning studies for the Mission Bay development. My professional resume is attached. My comments follow.

The DSEIR's Transportation Impact Analysis Understates and Fails To Disclose and Mitigate Arena Event Impacts on PM Commute Peak Hour Travel Because It Fails to Consider the Time and Duration of Attendees Travel In Advance of Passing Through Venue Entry Turnstiles

The DSEIR considers turnstile data on time of arrival at the Golden State Warriors current venue site (Oracle Arena) and other basketball venues to

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estimate how many attendees traveling to a game with a 7:30 PM start time would be traveling on the area transportation system in the 4 to 6 PM peak commute period versus in the 6 to 8 PM early evening peak shoulder period. However, it uses an overly simplistic relationship between turnstile arrival data and whether the attendee traveled in the 4 to 6 peak or in the 6 to 8 shoulder: If the attendee arrives at the turnstiles more than 1.5 hours before the 7:30 event start, they are assumed to have traveled in the 4 to 6 peak; if they hit the turnstiles less than 1.5 hours in advance of the event start, they are presumed to have traveled in the 6 to 8 shoulder. The problem with this is it fails to take into account the duration of each attendee's travel (which varies by where each person is coming from, the mode or modes they choose and the travel time on that mode or modes). It also fails to consider the substantial portion of attendees who, rather than passing through the turnstiles immediately, choose to remain outside for a while (such as stopping at a nearby restaurant / bar for a meal or drinks, or just waiting outside, as in the circumstance where 2 or more people are going to sit together but are traveling independently from different points and one person has all the tickets). Turnstile data is only a weak surrogate measure for end-time of trip for travel to stadium and arena event venues. It is weak and non-representative of the actual times attendees may be traveling on the transportation system for the following reasons. Many attendees at weeknight Warriors games will be coming from places where they will have to travel more than 45 minutes or an hour to get there. Many attendees, when they reach the area of the Project will choose to patronize nearby bars or restaurants or need to wait outside to meet up with others. In reality, someone who has traveled an hour to get to the Project site and passes through the turnstile directly on arrival at 6:30, say, will have actually completed a substantial portion of their trip within the PM peak hour. Another person who has only traveled for, say, 45 minutes but spends a half-hour in a nearby bar before passing through the turnstiles at 6:45 will also have completed most of their trip in the PM peak hour. These offsets of actual time-of-travel on the transportation system from time of passage through the turnstiles are not adequately considered in the DSEIR.

The DSEIR States that 5 percent of arriving 7:30 PM basketball event attendees arrive between 5:00 and 6:00 PM (per Table 5.2-21) which would be 903 person trips for 18,064 maximum attendance. However, Table 5.2-22 shows a total of 1,803 person trips within the 4-6 PM peak hour. Presumably, this discrepancy accounts for roughly 900 trips of the assumed 1100 day-of-game workers (ushers, ticket-takers, vendors, event-level security personnel and other day-of-game functionaries who generally need to be in place when the turnstiles open). Some 95 percent of the attendees are assumed to arrive in the 6 – 8 PM early evening peak shoulder per Table 5.2-21 with the maximum arrival hour between 7 and 8 pm involving 11,742 trips (65 percent of attendees per Appendix TR Table 3).

But, considering the facts that:

- over 70 percent of the attendees will be coming from outside San Francisco (including 31.1 percent from the East Bay, 8.9 percent from the North Bay, 26.7 percent from the South Bay and 4 percent from completely outside the Bay Region)[1] meaning many of their trips to the Project site will take 45 minutes to an hour or more,
- many attendees will, after traveling to the vicinity of the Project site, stop in neighboring restaurants and bars for drinks or a meal, thereby advancing the actual time of their trip ahead of their time of passage through the arena turnstiles by 30 minutes to an hour or more. This would apply to attendees coming from points in San Francisco as well as those making longer trips.
- many of the attendees, after completing their trip to the site, may need to wait to meet with others before passing through the turnstiles, thereby advancing the actual time of their trip ahead of their time of passage through the arena turnstiles. While some waits to meet are of short duration, the arrivals may often be disparate by 30 minutes or more. This would apply to attendees coming from points in San Francisco as well as those making longer trips.

When all of these factors are considered, it seems highly probable that as much as one-third or more of the trips that the DSEIR considers to take place in the 6 to 7 PM period and the 7 to 8 PM period would actually be on the transportation system in the more critical 5 to 6 PM commute peak hour. That would put 7,466 event-related travelers on the transportation system in the 5 PM to 6 PM period instead of the 1,866 assumed in the DSEIR, a difference that would likely result in transportation impacts not disclosed in the DSEIR and/or intensification of impacts and mitigation needs of those that were disclosed.

These considerations are so obvious to any transportation professional knowledgeable about sports stadium transportation issues that the analysis presented in the DSEIR cannot be said to constitute the good faith effort to disclose impact that the California Environmental Quality Act demands.[2] Since the entire analysis of transportation impacts flows from the estimate of trip generation and time-of-travel analysis, the entire transportation impact component of the DSEIR must be redone to accurately reflect the time that event attendees are actually

[1] Per DSEIR Appendix TR Table 8 at page TR 25.

[2] This commenter has consulted regarding transportation issues related to many professional sports stadiums and arenas. In addition, by being an attendee at a very large number of professional sports events and concert events, this writer has observed with a professional eye the transportation and pre-event behavior of attendees at nearly 1200 major league stadium and arena events at various venues. The writer has held season tickets to the Giants at their current venue for 8 years, to the 49ers for 33 years, to the Oakland Raiders for 20 years and a quarter-share of season tickets to the San Jose Sharks.

traveling on the transportation system instead of the time they enter the event venue.

In order to illustrate how consequential is the DSEIR's failure to consider the time difference between the time when event attendees pass through the arena turnstiles and the time when they are actually travelling on the transportation system, we review a simplified scenario. Undisputedly, people who pass through the arena turnstiles in the half-hour between 6:00 AND 6:30 PM were traveling on the transportation system before 6 PM – that is, within the 5 to 6 PM peak period. DSEIR Table 5.2-21 at page 5.2-83 estimates that 11 percent of turnstile arrivals do so in the 6:00 to 6:30 PM half-hour, amounting to 1987 person trips at capacity basketball attendance of 18,064. When these trips are added to the 1803 trips the DSEIR already estimates are traveling in the 5 to 6 pm peak hour[3] , there would really be a total of 3790 Project basketball-related trips traveling in the pm peak hour. In other words, the Project's basketball-related trips in the PM peak hour would be more than doubled (actual factor 2.102).

The effects of a doubling of PM peak hour travel attributable to adding the Project with a 7:30 PM basketball game as compared to what the DSEIR estimates would be most evident at the intersection of Seventh Street with Mission Bay Drive where, instead of operating at LOS D as projected in table 5.2-24, it would operate at deficient LOS E, a significant impact. The effect on outbound MUNI lines T Third and 22 Filmore requires some special attention because Table 5.2-40 is obviously in error, showing the ridership on each of these lines as being *less* with a basketball game than without one. This is completely inconsistent with the text in the first bullet point on page 5.2-141 which states that a basketball game would add 681 new outbound transit trips to these lines in the PM peak hour. If we correct the table to be consistent with the text of the DSEIR analysis, the DSEIR's analysis of these two lines in the "with basketball" scenario should show a total outbound ridership of 3862 trips (or 81.3 percent of capacity).[4] If we add to that the riders who pass through the turnstiles in just the 6 to 6:30 PM period who, because of the offset between overall ride time and the 6-to 6:30 turnstile entry count, must have been riding on the transportation system in the 5 to 6 PM commute peak hour, the analysis would show an added ridership due to basketball of 1431, a net ridership in that situation of 4612, and a capacity utilization of 97.1, extremely close to crush capacity.[5]

[3] See DSEIR Table 5.2-24 at page 5.2-90.
[4] Regardless of whether the City agrees with our further analysis of the PM peak ridership with a basketball game, it must correct this table to make it consistent with the analysis findings in the text.
[5] Under the City's normal impact threshold, which is riders exceeding 85 percent of screenline capacity, this would be a significant impact on transit. However, because the City has improperly created a Project-specific impact threshold of 100 percent of screenline capacity for this Project, the ridership would fall just below the gerrymandered impact threshold. The impropriety of creating a specially relaxed threshold of impact for this one Project is discussed in a subsequent section.

The DSEIR Only Analyzes Impacts of Weeknight Basketball Games That Start at 7:30 PM, Not at Other Start Times Closer to the PM Peak.

The only scenarios analyzed involving weeknight basketball games assume a start time of 7:30 pm. But this is not the only times that weeknight basketball games start although it does account for a majority. In the three preceding full seasons to the time of the NOP, 6 percent of the weeknight home games started at 6 PM (average 2.5 games per season) and over the three seasons there were individual games starting at 5 PM and 7 PM. However, the recently completed season proves that earlier games than 7:30 PM start times are not likely to be just a rarity in future years. In the three regular seasons considered in the DSEIR, the Warriors team was mediocre to 'emerging'. However, after this year's excellent regular season, the team played 11 home playoff games, seven of which were weekday games that started at 6 PM. With an outstanding young team, the prospects are that the team could play similar numbers of home 6 PM weeknight playoff games (6 PM being the time nationally broadcast weeknight games normally start) for several seasons hence. Moreover, the national attention this team has attracted could result in several more national broadcasts of regular season home games (also normally starting at 6 PM). So there is a substantial likelihood that weeknight 6 PM games could become a frequent occurrence rather than a rarity. There might easily be 16 out of 54 or so combined regular season and playoff home games that start at 6 PM, or just under 30 percent of the total weeknight home games. Obviously, the 6 PM start puts more travel pressure on the 4 – 6 PM peak. The DSEIR should analyze this basketball start time as a separate scenario rather than dismissing it as an anomaly

The City's Process for Evaluating a Project's Impacts on Public Transit Evades Disclosure of Significant Impacts

The City's process for evaluating transit impacts for projects in the "greater downtown area" (the C-3, SOMA and Mission Bay districts) is to consider peak hour ridership on the routes that cross designated screen lines across portions of the City or, for regional routes, on its perimeters versus the aggregate capacity of the peak hour services crossing those screenlines. There are several problems with this procedure that result in failure to disclose impacts.

- Considering aggregate capacity across screen lines versus aggregate patronage does not reasonably disclose impacts. For the routes inside San Francisco served by the San Francisco Municipal Railway (MUNI), a standard has been established that there is significant impact when ridership crossing the screen line exceeds 85 percent of capacity on that screen line. But this standard of significance involves an underlying assumption that individual travelers could use any of the routes crossing a particular screen line to accomplish their trip. But in actual fact, an

individual traveler's particular trip is most often only well served by one route. When some routes crossing a screen line are heavily patronized while others are less patronized, the excess capacity on the less popular routes does not cancel out the overcrowding on the most popular routes. It is noted that the City Planning Department can request that transit impacts be analyzed on an individual line basis. When this is done, if the individual line ridership exceeds 85 percent of capacity *and the project's contribution exceeds 5 percent of the total ridership at its maximum load point (MLP)*, then the project would be found to have significant transit impact.

- MUNI's capacity standards per vehicle involve percentages of standees above seating capacity ranging from 30% to 80% of seating capacity (depending on vehicle type); therefore, the above addition of 5 percent ridership to the impact threshold in analysis of individual lines represents a substantial crush loading.
- The capacity as considered in the analysis is the theoretical capacity of the services as scheduled. However, rarely, if ever, does MUNI deliver all of its scheduled service. San Francisco Municipal Transportation Authority statistics show that MUNI typically delivers an average of between 95 and 98 percent of scheduled services although on some days the percentage of missed runs can be much worse. MUNI's goal is to only deliver 98.5 percent of scheduled service. Principal causes of missed runs include driver unavailability, insufficient vehicle availability and in-service breakdowns. On the light rail lines, the percentage of weekdays when enough light rail vehicles were operationally available to deliver scheduled service averaged only 61.7 percent in fiscal year 2014 and was well under 50 percent in the two preceding years.
- Difficulty maintaining schedule reliability (on-time performance) exacerbates capacity problems. Muni's on-time performance is normally less than 20 percent. As a result, there is difficulty maintaining planned headways between vehicles on a given route. Bunching occurs. When that happens, the lead vehicle in a bunch becomes overcrowded while the one or more closely following vehicles in the bunch are underutilized. Muni experiences bunching on about 4 percent of its trips overall; in excess of 5 percent on its "Rapid Network".

If the threshold of impact were measured at 85 percent of the capacity of *actual effective service delivered* instead of *theoretical schedule-based service capacity*, more of the individual lines and screen lines would be found to be closely approaching or above the 85 percent of capacity criterion. And as a consequences of these circumstances in the City's procedures and policy criteria, it is rare for a project to be found to have significant impact on MUNI transit services despite the fact that the public perception is that MUNI is overburdened and dysfunctional.

We also note that for scenarios involving arena events at this Project, the DSEIR alters the City's normal criterion for evaluating transit impacts, changing the threshold of significant impact from 85 percent of capacity to 100 percent of capacity. Its basis for making this alteration, which tends to shield the Project from disclosure of significant transit impacts, is that event-goers accept a higher level of crowding than normal riders. However, "accept" is too generous a word. Nobody wants to ride in 'crush load' conditions. Event attendees grudgingly tolerate 'crush loads' as the least undesirable of their other options of a)walking long distances, b)paying much more for taxis or shared ride services, c) paying even much more to drive and park or d) (only in the post-event exit) waiting until the crowding has dissipated. Moreover, this shift in acceptability criterion is impactful of itself in that it imposes the values and tolerances of event-attendees upon normal riders who use the involved lines at that particular time of day. Furthermore, the DSEIR is unclear whether the change in impact criterion is operative only for lines directly serving the Project site, or system-wide, which would have a far greater impact on normal riders. The City's action to alter its normal thresholds of impact in the case of one particular project to lessens the chance of findings of significant impact and is not consistent with the good faith effort to disclose impact that CEQA demands. The City should faithfully disclose impacts as measured by its normal criteria, and, if it still wants to approve the Project, make findings of overriding considerations.

With regard to regional transit services, considering capacity versus ridership at San Francisco perimeter screenlines (North Bay, East Bay, South Bay) as the sole criterion of impact on the regional systems results in the analysis failing to address other significant impacts that are unrelated to corridor screenline ridership to capacity relationships. For example, in the case of BART, while Transbay capacity (the screen line analyzed) is a concern, an equal concern is the peak period platform capacity at the Embarcadero and Montgomery Street stations. These stations each individually serve 22 percent of all BART travelers and in the peaks are simultaneously serving peak-direction travelers to/from both eastbound and westbound corridors as well as serving contra-peak direction travelers in both directions. The platform congestion at both these stations is a serious operational and safety concern, has been documented in public[6], is visibly worse in the pm peak hour when the Giants have weekday night games scheduled and would presumably be similarly affected by weekday evening Warriors games and other large events at the Project. BART is actively developing designs for adding outboard platforms at both of these stations – a mitigation measure that the Project (and others) could make fair share contributions toward if the Project's impacts at these locations were properly

[6] See *BART Sustainable Communities Operations Analysis*, June 2013

analyzed. But for the present, the DSEIR's is deficient because it completely fails to analyze, disclose and mitigate the Project's impacts on this situation.

The City's Selections of Intersections (and Freeway Ramps) Studied in the DSEIR Excludes Intersections it Knew or Should Have Known Would Potentially Be Significantly Impacted by the Project

Intersections selected for study in the DSEIR for the subject Project exclude a number of intersection that were to be subject to analysis in the DEIR for the prior proposal for essentially the same project but located on the Piers 30/32 site. Among the intersections slated for study in the prior edition of the project but not studied in the current work are the 9 major intersections along Embarcadero from and including that with Brannan all the way to that with Broadway, plus those at Main with Harrison, Main with Bryant, Beale with Mission, Beale with Bryant, Delancy and the 80 on ramp, Fremont with each of Mission, Harrison and Folsom/80 off, Third with Harrison, Third with Mission, Second and Bryant, Second and Brannan, Second and King, Second and Bryant, First with Harrison and the 80 on ramp, Fourth and Howard, Fourth and Harrison/80 on ramp, Fourth and Bryant/80 off ramp, Bryant with Sterling/80 on ramp. Virtually all of these excluded intersections are heavily congested in the pm peak.

Although the Project location is now shifted to a site approximately 6800 feet south, and the DSEIR has added study intersections in that direction, the excluded intersections are still on the likely paths of traffic coming from the Northbay, Eastbay and northern parts of San Francisco. . The project is fundamentally the same size and will generate fundamentally the same amount of traffic. The amount of traffic through the excluded intersections approaching from and departing to the Northbay, Eastbay and northern parts of San Francisco is essentially unchanged from the totals that would have occurred with the Piers 30/32 site. So there is no reasonable logic for excluding these intersections from the current DSEIR analysis.

That the excluded intersections are at risk to be impacted by the Project is demonstrated in the DSEIR's own analysis of Alternatives to the Project. One of the alternatives it analyzes is putting the Project back on the previously proposed Piers 30-32 /Seawall Lot 330 site. Appendix TR at page TR-783 analyzes the project on the alternate (or formerly proposed site) at the intersections formerly proposed for evaluation. It shows the Existing + Project with Basketball Event would have significant project-specific impacts at 8 intersections, 5 of which are intersections excluded from the current DSEIR analysis of the Project at its current site, and would make significant contributions to traffic at 4 intersections already at LOS E or F, 3 of which are among the intersections excluded from the analysis of the Project at its currently proposed site. We reiterate, it is clear that most of the traffic contributory to the impacted intersections with the Project on

the formerly proposed site would still pass through these intersections with the Project located at the currently proposed site. So the DSEIR is deficient for excluding these intersections from the analysis of the Project.[7]

We also note that DSEIR Figures 5.2-14 E and 5.2-14 F indicate that approximately 31 percent of Warriors game weekday and Saturday attendees would approach and depart two and from the northwest via 7th Street at times when there are no overlapping Giants games. Although the DSEIR does not specifically present usage of this corridor by Warrior's attendee traffic at times of overlapping Giants home games, it would doubtless be considerably greater. In both cases, this suggests that the capacity-challenged intersections of Seventh and Townsend, Seventh and Brannan, Eighth and Brannan and Eighth and Bryant should have been analyzed in the DSEIR. Please do so.

There is a similar situation with the study of freeway ramps. The current DSEIR analyzes 6 ramps. The study for the prior site analyzed 12 ramps. Four of the six ramps studied in the current work are new (not considered in the analysis of the former proposed site). In other words, ten of the ramps to be studied in the analysis of the prior site, all problematic in peaks, are eliminated from consideration. There is no reasonable justification for their elimination.

The Transit Analysis Understates Impacts Because It Relies On Stale Transit Baseline Data

This DSEIR's Notice of Preparation was filed on November 19, 2014. The DSEIR's transit impact analysis relies upon transit ridership data published in a City Planning Department memo dated June 21, 2013 entitled *Transit Data for Transportation Impact Studies*[8]. However, the data published in that memo is from counts taken in the fall of 2010 and in 2011. Between 2010/11 and late 2014 when the NOP was filed there have been a large number of significant development projects that have been completed and occupied in the C-3, SOMA and Mission Bay and numerous others approved and placed under construction. These render the transit database collected in 2010/11 stale for evaluation of a Project whose NOP was filed in late 2014. Hence, the transit analysis is inadequate for relying on stale data.

Similarly, for the regional transit corridor screenlines, the cited *Transit Data for Transportation Impact Studies* memo relies on data from a SFMTA TEP Project

[7] Our colleague, Mr. Larry Wymer of Larry Wymer and Associates Traffic Engineering has provided a separate letter of comment on this DSEIR (dated July 21,2015) that concurs in the need for study of additional intersections and provides supporting data.

[8] *Transit Data For Transportation Impact Studies* is reproduced in DSEIR Appendix TR at pages TR-624 thru TR-632.

document produced in October, 2012. Obviously, the transit ridership data in that document reflects observations some time before October, 2012. Again, significant development has occurred in the C-3, SOMA and Mission Bay between whenever the data published in October 2012 was collected and the date of the NOP for the subject Project. This would result in significantly heavier loadings on the regional transit carriers in the peak periods at the time of the NOP than represented in the *Transit Data for Transportation Impact Studies* memo. For example, the data relied on in the DSEIR indicates BART's Transbay peak hour ridership is 19,716. *BART Sustainable Communities Operations Analysis* report[9] indicates peak hour Transbay ridership at 21,600 passengers in 2012 and projects 21,815 peak hour peak direction riders by 2015. BART's ridership values would respectively put BART at 98 percent of capacity in 2012 and at 98.9 percent currently. This leaves considerably less capacity for peak hour travelers to the Project to be accommodated without impact.

The DSEIR transit analysis should be redone based on updated estimates of baseline transit ridership, taking into account projections of transit use from the environmental documents for all projects known to the City to have been completed since the time of the actual transit ridership counts or known to be reasonably certain, at the time of this Project's NOP, of being completed by the estimated time of completion of this Project

The Traffic Analysis Underestimates Impacts Because It Relies on Stale Baseline Data

The traffic impact component of the DSEIR relies on a number of traffic counts taken in 2013 and others in June, 2014. It adjusts those counts to account for traffic from the UCSF Medical Center Phase 1 and the Public Safety Building that are located close to the Project site and were under construction when the counts were taken but were occupied about the time of the NOP. However, it seems likely that there was other development in C-3, SOMA and Mission Bay completed in the period between when the 2013 counts were taken and the date of the NOP that would logically affect baseline traffic at some of the intersections analyzed in the DSEIR and still more that is known to the City to be reasonably certain of completion by the time of completion of the subject project. Please list all such developments and adjust the baseline traffic used in the DSEIR analysis accordingly.[10]

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[9] *BART Sustainable Communities Operations Analysis*, Bay Area Rapid Transit District, June, 2013.

[10] The aforementioned separate comment letter on this Project by Mr. Larry Wymer includes a spreadsheet reflecting, to the best of Mr. Wymer's ability based on culling the posting of environmental documents of development projects on the City Planning Department's web site, a listing of such projects and the traffic they would contribute to locations that were or should have been studied in this DSEIR's traffic analysis. However, responsibility for developing a comprehensive list of such projects and adjusting the baseline for their effects rests with the City Planning Department that is charged with generating and maintaining these

The DSEIR Fails to Evaluate Impacts at Intersections Under PCO Control

The DSEIR does not report LOS or delay at intersections that are under PCO control in certain situations, claiming that LOS cannot be calculated for intersections under PCO control. However, this interpretation evades the issue of why PCO control is employed in the first place. The reason is because it is assumed or known through experience that these locations would become gridlocked (deep LOS F conditions) if left to automated traffic control. In theory, the PCO or group of PCOs is/are smarter than an automated traffic signal in such circumstances. In particular, the human controllers can observe downstream blockages and give advantage to movements with unblocked downstreams and alter phase sequences to give green to movements as their downstreams become unblocked. But fundamentally, any intersection under PCO control should be regarded as being at LOS F. But this poses another issue. There is no determination of how much worse (more impacted) conditions are in the Existing + Giants game + Warriors game situation than in the Existing + Giants game alone scenario. This determination is an essential purpose of this DSEIR and it is not being evaluated.

The DSEIR Fails To Evaluate Quantitatively the Severity of the Project's Traffic Impacts at Locations That Are Already In LOS F Condition

The DSEIR tables reporting intersection delay and intersection LOS for the various locations and scenarios analyzed fail to report the actual delay at intersections experiencing delay at or above the threshold of LOS F. They merely report the delay as being greater than 80 seconds of delay per vehicle. This manner of reporting prevents the public from knowing the severity of the Project's traffic impacts when it affects intersections already in impacted condition.

Most commercially available intersection LOS/delay calculation programs do calculate the actual delay of intersections that are above the LOS F threshold. It is the analyst's option to display the actual value in the program output or to suppress reporting it and display the >80 symbol. Some analysts claim that once an intersection is in LOS F, the delay value is irrelevant. But that is nonsense. If an existing condition is, say, just at the 80 second delay LOS threshold and a project causes the delay value to increase to 81 seconds, in that instance the degradation caused by the project may be almost imperceptible. But if the computation shows that the project increases delay to, say, 120 seconds per vehicle, than the degradation caused by the project is clearly quite severe and seriously impactful. Since an essential objective of an EIR is to disclose how

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records, not to an independent party attempting to do so from the outside.

adverse or severe a project's impacts are, the DSEIR is deficient in failing to disclose information relative to severity that it easily could have disclosed.

The same considerations apply to the freeway ramp analysis where, once a ramp has reached the average vehicle density threshold of LOS F operations[11], the DSEIR presents a special character symbol instead of the actual density compiled, thereby thwarting the ability of the public or professional reviewers to understand how severe and adverse the impacts of the project really are. We also note that DSEIR Table 5.2-2 contains an apparent error in the entry for the I-80 eastbound ramp at Sterling for the weekday evening (6-8 PM) period. It reports that vehicle density is 38 vehicles per vehicle lane-mile but a LOS of C. If the density really is 38, this ramp would be in the LOS E-F range; if the LOS really is C, the density would have to be less than 28. Please correct the error.

Complex Interrelated Issues Are Not Addressed In the DSEIR

At present, persons traveling between BART or the MUNI LRT lines and the Project site can make a simple in-station transfer to/from the K-T line from any of the downtown Market Street stations. Once the Central Subway is completed, the T-Third line will no longer be directly inter-routed with the K-Ingleside line in the Market Street subway. Instead, access from BART and the Market Street LRT lines to the T line that serves the proposed Project site will only be via the Powell Street station and only via a 1,000 foot tunnel in the wrong direction that connects Powell to the Union Square station where T LRT trains can be boarded – an unattractive and slower transfer than at present. Although other MUNI LRT lines from the Market Street subway will continue to connect to 4th and King via the Embarcadero, passengers on those lines or those from BART who transfer to them at the Market Street stations will be faced with another transfer to the T-Third at that point or an walk of .8 miles to the Project site. These are less attractive options than what is available at present. With the rise of ride-share services like Uber and Lyft that can be summoned via a cell phone application – a new phenomenon, the percentage of persons who take ride share services or conventional taxi instead of transit all the way to the site may be far more than for AT&T Park events (which will continue to be served by LRT lines that stop directly in all the Market Street BART stations). This is detrimental as each time people use ride-share or conventional taxi services to

[11] Vehicle density, the number of vehicles per lane mile, is the logical measure of either congestion or high quality service on freeways and ramps in merge and diverge areas. In free-flowing conditions, vehicles operate with substantial space between them so the number of vehicles per lane mile is low. At highly congested conditions, stop-and-go or crawl speed operations, vehicles are closely spaced and the number of vehicles per lane mile is high. Per *Highway Capacity Manual 2000* the threshold for LOS E and F operations is 35 passenger car equivalents per lane-mile per hour. With true scientific caution, *Highway Capacity Manual 2000* counsels against reporting vehicle densities in the LOS E-F range because flow rates, a principle factor in calculating vehicle density, vary radically in LOS E-F situations. Nevertheless, the computed vehicle densities are what they are, and constitute the only reasonable way to measure weather the Project's effects on an already unacceptable ramp situation are significantly deleterious or not.

access the Project, they cancel the environmental savings of direct transit access usage and double the number of motor vehicle trips to the area as compared to if they drove and parked in the area (because the ride-share or taxi vehicle drives away after dropping passengers off). The DEIR does not appear to address these considerations. Please do so.

The DSEIR Cumulative Analysis Fails To Consider and Analyze the Project in the Context of the City's Proposal to Remove the Northern Portion of I-280 As Far South As the Mariposa Street Interchange

Since at least as long ago as 2012, the City has been actively considering a proposal to demolish the northern portion of I-280 as far south as the Mariposa Interchange, eliminating the on- and off -ramp connections to King Street and to Sixth Street[12]. If carried out, the I-280 truncation would shift much of the traffic that now uses those ramps to surface streets in the immediate vicinity (including two of the frontage streets) of the subject Project. Moreover, development of the site freed up would add to demands on the traffic and transit system. In view of the City's continuing active consideration and refined development of this proposed major change in transportation infrastructure[13] both well before and after the NOP for the subject Project, this DSEIR should have, at a minimum, in addition to the cumulative scenarios studied, analyzed the proposed Project in the context of an alternative transportation network scenario that reflects the truncation of I-280 as far south as the Mariposa Interchange. However, the DSEIR's only mentions the I-280 truncation project in two places. One is a single short background paragraph about ongoing projects in the vicinity of the site in the Appendix TMP introductory section. The other is a lengthier two-paragraph description at DSEIR pages 5.2-109 and 5.2-110. That section concludes by stating that the information on the 280 truncation is provided for information purposes only and that because that project is not fully designed, has not received the approval of other responsible agencies and is not funded, it is speculative and is not considered in the DSEIR cumulative 2040 analysis. However, since the City has already spent in excess of $ 1.7 million in design and feasibility studies, has already approached other responsible agencies for funding involvement and approvals and since it has such a vast potential consequence for the transportation network in the immediate area of the subject

[12] Evidence of this is the unveiling by the Mayor's Transportation Policy Director, Gillian Gillett, at a San Francisco Planning and Urban Renewal Association (SPUR) forum on January 10, 2013, releasing a City study deceptively named Fourth and King Street Railyards, Final Summary Memo dated December, 2012 and a related request dated January 7, 2013 by the Office of the Mayor to Steve Hemminger. Executive Director of the Metropolitan Transportation Commission.

[13] The City's continuing interest in the I-280 truncation is demonstrated by the initiation of the San Francisco Planning Department's *Railyard Alternatives and I-280 Boulevard Feasibility Study*, which began in June, 2014 and in the May 11, 2015 *San Francisco Chronicle* column by Matier & Ross lead by the statement "San Francisco Mayor Ed Lee is quietly shopping plans to tear down Interstate 280 at Mission Bay and build an underground rail tunnel through the area – complete with a station between the proposed Warriors arena and AT&T Park.".

Project by the forecast year of the cumulative analysis, and since that forecast year, 2040, is 25 years hence, it is evasive, irresponsible, improper for the City to have failed to at least considered an *alternative cumulative scenario* that assumes the latest design concept from the *Railyard Alternatives and I-280 Boulevard Feasibility Study* in *addition to* the cumulative scenario that was analyzed. The DSEIR should be revised to include such a cumulative alternative and recirculated in draft status for the 45 day review period.

There Is No Evidence The DSEIR Considered the Disruptive Impacts of the At-Grade Rail Crossing of 16th Street on Intersection LOS at the Intersections of 16th and 3rd and 16th and 7th Streets.

The Caltrain rail mainline crosses Sixteenth Street in an at-grade crossing between the study intersections of Sixteenth with Third and with Seventh Streets. In the 5 to 6 PM peak hour, gate closure protection to allow train passage blocks Sixteenth Street traffic 10 times and another 10 times in the 6 to 7 PM early evening peak shoulder period. Increased rail traffic and increased train lengths will increase the blockage time. There is no evidence this blockage has been taken into account in the LOS calculations for the nearby intersections.
If it has, please explain how. If it hasn't, please adjust the calculations or explain why not.

The Project's Truck Loading and Truck Staging Provisions Appear Inadequate.

With regard to loading facilities, the Project Description narrative at DSEIR page 3-20 states: "*The loading and service areas, including 13 truck loading docks, would be located on the Lower Parking Level 1"*. After describing dimensions of those loading dock spaces, the narrative continues: *"In addition to the 13 on-site below grade loading area, 17 on-street commercial loading spaces would be provided on South Street (8 spaces), Terry A Francois Boulevard south of South Street (8 spaces) and 16th Street (1 space) …".*

This statement in the Project Description has multifold inaccuracies:

- The accompanying scale drawing of Lower Parking Level 1 actually shows 14 off street truck loading spaces but about half of them cannot be accessed or egressed if trucks, especially the 70± foot tractor trailer rigs, are occupying nearby spaces.
- Other docks, if not completely blocked by vehicles in other loading docks, involve extremely difficult backing maneuvers.
- Some docks involve "blind" right hand backing turns from the "hammerhead" area that are ordinarily avoided in truck loading area design.
- The Project does not *provide* 17 on-street commercial loading spaces. It does not *provide* any. It simply asserts claim to enough on-street parking

area to park 17 large trucks, taking use of area that otherwise would be available for public parking.

- In addition to the above, the Project does not appear to have sufficient area for staging of trucks that have already been unloaded. Headliner rock concerts and family shows are often supported by large numbers of trucks. For instance, concerts for U-2's current tour are supported by 26 tractor-trailer rigs. The Rolling Stones are supported by about the same number. A national political convention would involve many more. It is obvious that this many trucks cannot be staged within the proposed site plan, especially since the loading docks also need to be used for the truck loading that is routine for any event (such as delivery of food. drink and souvenir supplies for the concessions, removal of garbage and support for the other uses in the proposed Project. It appears that the Project will either stash those trucks, when not actively loading or unloading, by preempting public on-street parking areas in the Project vicinity or by obtaining a formal off-site staging area. Which of these is planned and if a formal staging area is planned, where is it and what is its capacity?

Construction Impacts on Transportation and Circulation Are Not Adequately Addressed

In its section describing thresholds of significance, the DSEIR's transportation and circulation analysis declares that "Construction related impacts generally would not be considered significant due to their temporary and limited duration". This assessment by fiat rather than by a reasonable effort to measure or estimate the Project's construction impacts on the transportation and circulation system is inconsistent with the good faith effort to disclose impact demanded by CEQA. It also flies in the face of common sense. For example:

- A project that is located on a heavily trafficked street, a street with high-volume transit service or a street with heavy pedestrian flows would tend to have much more construction impacts on transportation than a project on a minor street that has none of those characteristics.
- A project whose construction causes closures of traffic lanes or closures of continuous sidewalks or temporarily eliminates or relocates transit stops has more construction impact on transportation than one that does not. A project that does those things on busy streets has more construction impact on transportation than one on lesser-used streets.
- A project that is large tends to involve more workers commuting daily, more daily import of supplies and construction materials, more export of demolition and construction refuse and, as a consequence of its size, tends to be of longer duration, tends to have greater construction impacts on transportation than a smaller one.

These considerations that distinguish the severity of construction impacts on transportation can be defined or measured both qualitatively and quantitatively. The DSEIR is deficient in failing to do so.

Despite its "by fiat" finding that the Project's construction impacts on transportation and circulation are less than significant (LS in the Summary Of Impacts And Mitigation Measures), the DSEIR identifies "Improvement Measure I-TR-1: Construction Management Plan and Public Updates". This so called 'Improvement Measure' is a surrogate 'Mitigation Measure' and, by its very existence, is de facto admission that the Project does have construction impacts on transportation and circulation that should have been disclosed as such.

Unfortunately, the measure is in part, vague and yet to be defined (deferred mitigation that is improper under CEQA, and in other parts, defies common sense. We discuss these subjects in a subsequent section.

The DSEIR Concludes, Without Adequate Foundation, That the Project Would Not Have Adverse Impact on Emergency Access

The emergency entrance to the newly opened UCSF Benioff Children's Hospital is located on Fourth Street near its intersection with Mariposa, about 1050 feet (as the crow flies) from the nearest corner of the Project site. At two locations in the Transportation and Circulation section the DSEIR states that if a project were to result in inadequate emergency access, the project would be found to have a significant impact on the environment. Yet incredibly, it concludes that the subject Project would not result in inadequate emergency access when capacity events are taking place at the Project on weekday evenings, weekend afternoons or weekend evenings, regardless of whether or not the Giants or other events at AT&T park are taking place at overlapping times. The DSEIR offers no objective data to support its conclusion that emergency access would not be adversely impacted in event travel peaks – such as relative emergency vehicle travel time data with and without event traffic[14]. Instead, the DSEIR relies on its own rationalizations of why emergency vehicles might not be slowed during event travel peaks to justify concluding the Project would not have significant impact.

The DSEIR notes drivers' obligations to get out of the way of emergency vehicles under the vehicle code. However, it fails to note that in special event access/egress situations, when vehicles are queued bumper to bumper and pedestrians are swarming the crosswalks, drivers abilities to clear the way for emergency vehicles are impaired and the emergency vehicles will inevitably be delayed more than in a

[14] Emergency responders ordinarily log the time calls are received by dispatch, the time the subject is reached and the time the subject is delivered to an emergency care facility. So there is an objective data base that could have been examined to assess the consequences when special events currently take place in the area versus times when special events are not taking place.

normal traffic situation. The DSEIR notes that the presence of PCOs will help clear paths or emergency vehicles through event traffic. PCOs can help, but when event traffic is jammed up with scant maneuvering space and pedestrians are swarming about, PCOs can only do so much and the emergency vehicle(s) will inevitably be delayed compared to normal traffic. The DSEIR also claims emergency vehicles can utilize the proposed exclusive transit lane on 16th Street to bypass normal vehicles in event jams. This will be fine until an emergency vehicle overtakes a transit vehicle, at which time a more confusing than normal maneuvering will have to take place. And not all the emergency vehicles will be approaching from points from which 16th Street is the best route. Finally, not all vehicles traveling in emergencies are official emergency vehicles equipped with emergency lights and sirens. Quite often, parents, caregivers or friends attempt to rush a person requiring emergency care to the emergency room in private vehicles. Private vehicles on an emergency mission are often not recognized as such by other drivers, pedestrians, or PCOs and consequently, it event traffic, suffer even more delay than official emergency vehicles.

Because of these considerations, the DSEIR's conclusions about emergency access impacts are not only unsupported by objective data but incorrect and implausible.

Mitigation Measures Are Vague, Insubstantive, Unresponsive to the Impact Purportedly Addressed or Do Not Qualify as Mitigation Under CEQA

A number of the mitigation measures (and de facto mitigation measures identified as "improvement measures") identified in the DSEIR are vague, insubstantive, unresponsive to the impact purportedly addressed or offer no basis for the DSEIR's conclusion. Measure having these characteristics, which disqualify them as adequate mitigation under CEQA, are not limited to those cited as egregious examples highlighted below.

<u>De Facto Mitigation Measure: Improvement Measure I-TR-1: Construction Management Plan and Public Updates</u>

The first section of this measure states as follows:

> ***Construction Coordination*** – To reduce potential conflicts between construction activities and pedestrians, bicyclists, transit and vehicles at the project site, the project sponsor shall require that the contractor prepare a Construction Management Plan for the project construction period. The preparation of a Construction Management Plan could be a requirement included in the construction bid package. Prior to finalizing the Plan, the project sponsor/construction contractor(s) shall meet with DPW, SFMTA, the Fire Department, Muni Operations and other City agencies to coordinate feasible measures to include in the Construction Management Plan to reduce traffic congestion, including temporary transit stop relocations and other measures to reduce potential traffic, bicycle, and transit disruption and pedestrian circulation effects during construction of the proposed project. This review should consider other ongoing construction in the project vicinity, such as construction of the nearby UCSF LRDP projects and construction on Blocks 26 and 27.

While expressing good intention, what will be done as the result of this measure is so vague and subject to future determination as to constitute deferred mitigation. To be an effective measure, it should commit to explicit features such as the following examples:

A continuous protected sidewalk will be maintained at all times on the Project's frontage on the east side of Third Street. Third Street will not be subject to lane closures at any time during the construction period. All access to the Project for workers, import of construction materials and equipment and export of demolition and construction debris shall be from the Sixteenth Street, South Street or Terry Francois Boulevard frontages. All connections to underground utilities shall be made from the Sixteenth Street, South Street or Terry Francois Boulevard frontages.

The second section of this measure states as follows:

> ***Carpool, Bicycle, Walk and Transit Access for Construction Workers*** – To minimize parking demand and vehicle trips associated with construction workers, the construction contractor could include as part of the Construction Management Plan methods to encourage carpooling, bicycle, walk and transit access to the project site by construction workers (such as providing transit subsidies to construction workers, providing secure bicycle parking spaces, participating in free-to-employee ride matching program from www.511.org, participating in emergency ride home program through the City of San Francisco (www.sferh.org), and providing transit information to construction workers.

This section contradicts common sense and common knowledge. It is common knowledge that few construction workers will use a bicycle, walk or use transit to travel to and from work - for compelling reasons. Many workers carry their personal tools and equipment with them each day; it is impractical to do this while walking, bicycling or riding transit. Construction work often involves strenuous physical labor. Consequently, even if not carrying tools and equipment, construction workers are normally disinclined to walk or bike to and from work. Because of the physical labor aspect, construction workers are frequently dirty and sweaty on the homebound commute. Because of this, construction workers are themselves uncomfortable and make other riders uncomfortable if they ride transit. Because these considerations are well known, it is ridiculous and cynical for the City to pad the DSEIR with useless statements such as that reproduced above.

<u>Mitigation Measure M-TR-2</u>

This sequence of mitigation measures purportedly reduces the effects of Impact TR-2 (that the proposed Project would result in significant traffic impacts at multiple intersections that would operate at LOS E or LOS F under Existing plus Project conditions without a SF Giants game at AT&T Park) even though the impacts are still classified Significant and Unavoidable with Mitigation (SUM). While many of the measures sound potentially useful, close consideration reveals they do not have quantifiable effects, they affect conditions that are not part of the original

quantification of impact or they are ineffective in changing the behavior of the problem traveler population. We consider the mitigation measures for Impact TR-2 in sequence.

Mitigation Measure M-TR-2a: Additional PCOs during Events

This measure involves providing four more PCOs during events than the Project's proposed TMP and suggests 5 intersections where they may be deployed. The problem with this is that while PCOs can help prevent unnecessary degeneration of conditions (such as drivers 'blocking the box' or jaywalkers obstructing lanes on the green phase, they cannot cure fundamental LOS E or F conditions.

Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts

This measure involves fourteen itemized strategies in four subgroups. The lead in states:

"The project sponsor shall work with the City to pursue and implement, if feasible, additional strategies to reduce transportation impacts. In addition, the City shall pursue and implement, if feasible, additional strategies that could be implemented by the City or other public agency (e.g., Caltrans)."

Critical words here are "if feasible". CEQA requires that "feasible mitigation" be developed. If there is any doubt at this point about the feasibility of the mitigation proposals, they cannot be presented in the DSEIR as mitigation.

Strategies to Reduce Traffic Congestion

 The City to work with Caltrans to install changeable message signs upstream of key entry points onto the street network, such as on I-280 northbound.

Variable message signing only helps LOS if there are uncongested routes to which traffic can be directed. The variable message signs placed on the freeway approaches to Candlestick Park when the 49ers still played there were noteworthy in their uselessness because there were no uncongested routes to which traffic could be directed.

 The City to provide coordinated outreach efforts to surrounding neighborhoods to explore the need/desire for new on-street parking management strategies, which could include implementation of time limits and Residential Parking Permit program areas.

Neighborhood parking conditions and parking permit programs have nothing to do with the LOS E and F conditions at major intersections that are the object of mitigation in this item. The proposal is irrelevant.

 The project sponsor to offer for pre-purchase substantially all available on-site parking spaces not otherwise committed to office tenants, retail customers or season ticket holders, and to cooperate with neighboring private garage operators to presell parking spaces, as well as notify patrons in advance that nearby parking resources are limited and travel by non-auto modes is encouraged.

Preselling parking so that drivers have a fixed destination they can travel to directly instead of circling blocks looking for parking is a good idea. But it solves a problem not accounted for in the DSEIR's original measurement of impact. The DSEIR's underlying traffic assignments all assume drivers are destined for explicit destinations, not milling about looking for one. So this would not reduce the LOS impacts forecast.

 The project sponsor to create a smart phone application, or integrate into an existing smart phone application, transportation information that promotes transit first, allows for pre-purchase of parking and designates suggested paths of travel that best avoid congested areas or residential streets such as Bridgeview north of Mission Bay Boulevard and Fourth Street.

The problem with this entry is similar to some of the prior entries. At event times, there really are no uncongested paths to the Project vicinity, pre-purchase of parking helps solve a problem unaccounted for in the intersection LOS computations, keeping people out of residential streets is inconsistent with the supposed objective of reducing congestion at major intersections and people driving and using the app to find parking or avoid most congested routes are likely inured to transit first promotional messages.

 The City and the project sponsor to work to identify off-site parking lot(s) in the vicinity of the event center, if available, where livery and TNC vehicles could stage prior to the end of an event.

This is a worthwhile action. But it avoids an on-street clutter of pick-up activity that was not accounted for in the original intersection LOS impact estimates. Hence, it does not mitigate the impact disclosed.

 The City to include on-street parking spaces within Mission Bay in the expansion and permanent implementation of SF*park*, including installation of sensors, dynamic pricing, and smart phone application providing real-time parking availability and cost.

This is a worthwhile action. But again, it helps solve a problem that is not reflected in the DSEIR intersection LOS analysis – that of vehicles cruising the area searching for parking. The 'searching' traffic would be additive to the traffic that was considered in compiling the LOS impacts.

 The City shall work to include the publicly accessible off-street facilities into the permanent implementation of SF*park*, and incorporate data into a smart phone application and permanent dynamic message signs.

The problem with this is the same issue as above – the 'searching' traffic it may reduce was never considered in the DSEIR's analysis. Hence, it does not reduce the LOS impacts as disclosed.

 If necessary to support achievement of non-auto mode shares for the project, the project sponsor shall cooperate with future City efforts for active interventions to effectively manage and price the parking supply in the project vicinity to reduce travel by automobile, thus improving traffic conditions.

The problem with this proposed mitigation measure is twofold. First, the project sponsor does not control most of the parking event attendees may use in the Project vicinity. Hence, it cannot meaningfully "manage and price" the parking supply. Second, for the 2015-16 basketball season, Warriors individual game tickets at season ticketholder prices range from $30 to $60 in the upper deck and from $85 to $550 in the lower deck. Season ticketholder per game prices for the recent 2015 playoffs ranged from $100 to $165 (upper deck) and from $210 to $1050 (lower deck) in the first round to, in the final round, from $230 to $345 (upper deck) and $525 to $2000 (lower deck). At these ticket prices, very few of the attendees who haven't already chosen to ride transit for other reasons are going to be sensitive enough to parking pricing to change mode. So this strategy is unlikely to be effective.

 The project sponsor to seek partnerships with car-sharing services.

Given the above ticket pricing inference as to the economics of event goers, it is doubtful that car-sharing partnerships would have quantifiable effect on travel habits or the ultimate intersection LOS impacts. Hence, there is no mitigation.

Strategy to Enhance Non-auto Modes

 The project sponsor to provide a promotional incentive (e.g., show Clipper card or bike valet ticket for concession savings, chance to win merchandise or experience, etc.) for public transit use and/or bicycle valet use at the event center.

Given the above ticket pricing inference as to the economics of event goers, it is doubtful that the suggested incentives would have any effect on travel habits or the ultimate intersection LOS impacts. Hence, there is no mitigation.

Strategies to Enhance Transportation Conditions in Mission Bay and Nearby Neighborhoods

 The project sponsor to participate as a member of the Mission Bay Ballpark Transportation Coordination Committee (MBBTCC) and to notify at least one month prior to the start of any non-GSW event with at least 12,500 expected attendees. If commercially reasonable circumstances prevent such advance notification, the GSW shall notify the MBBTCC within 72 hours of booking.

The notification provided herein is useful to set the ordinary event traffic management procedures in place for the scheduled date. However, there is no inference that this would change the intersection LOS impacts disclosed in the DSEIR. Hence, there is no mitigative effect.

 The City and the project sponsor to meet to discuss transportation and scheduling logistics following signing any marquee events (national tournaments or championships, political conventions, or tenants interested in additional season runs: NHL, NCAA, etc.).

Again, the notification provided herein is useful to set the ordinary event traffic management procedures in place for the scheduled date. However, there is no inference that this would change the intersection LOS impacts disclosed in the DSEIR. Hence, there is no mitigative effect.

Strategies to Increase Transit Access

 The City to coordinate with regional providers to encourage increased special event service, particularly longer BART and Caltrain trains, and increased ferry and bus service.

If the City really wanted to mitigate the significant impacts on intersection LOS, instead of just asking the regional service providers for more services, it should condition the Project to pay the regional providers for the incremental cost of such services over fare revenue generated. Otherwise, the measure as constituted is unenforceable and ineffective.

 The City to work in good faith with the Water Emergency Transportation Agency, the project sponsor, UCSF, and other interested parties to explore the possibility of construction of a ferry landing at the terminus of 16th Street, and provision of ferry service during events.

Discussing possibilities is not mitigation. If the City wants to have this measure as an effective mitigation, it must condition the Project to contribute a fair-share payment to the ferry landing, if developed, and to pay fair share incremental costs over fare revenues for ferry operations.

The next section of mitigation for Project Impact TR-2 counts on the Mission Bay FSEIR Mitigation Measure E.47: the Transportation System Management Plan.

However, the effects of those portions of that TSM Plan that have been implemented have been absorbed and are reflected in the existing baseline counts that underlie this DSEIR's disclosures of impact TR-2. To constitute effective mitigation for the subject Project, this DSEIR should identify the specific elements of the hypothetical Mission Bay FSEIR Mitigation Measure E.47 that have actually been implemented and what enhancements to it this Project needs to carry out. For instance, considering the elements of Mission Bay FSEIR Mitigation Measure E.47 the following observations can be made.

> *FSEIR Mitigation Measure E.47.a*: Shuttle Bus - Operate shuttle bus service between Mission Bay and regional transit stops in San Francisco (e.g., BART, Caltrain, Ferry Terminal, Transbay Transit Terminal), and specific gathering points in major San Francisco neighborhoods (e.g., Richmond and Mission Districts).

To be effective mitigation, the DSEIR must disclose what additions to shuttle routes and times of service would be needed to alter conditions reported in Impact TR-2 and commit the Project to implement them.

> *FSEIR Mitigation Measure E.47.b*: Transit Pass Sales - Sell transit passes in neighborhood retail stores and commercial buildings in the Project Area.

The effect of this measure is not quantifiable as mitigation. It is doubtful that anyone who might use transit to and from the Project site is deterred from doing so for want of a convenient location selling transit passes.

> *FSEIR Mitigation Measure E.47.c*: Employee Transit Subsidies - Provide a system of employee transportation subsidies for major employers.

While transit subsidies might alter the commute modes of some daytime employees at the Project, given the composition of uses proposed, it is unclear how many employers would be characterized as "major" and consequently, how many employees would be qualified for subsidies. Hence, the effect of this measure cannot be quantified.

> *FSEIR Mitigation Measure E.47.e*: Secure Bicycle Parking - Provide secure bicycle parking area in parking garages of residential buildings, office buildings, and research and development facilities. Provide secure bicycle parking areas by 1) constructing secure bicycle parking at a ratio of 1 bicycle parking space for each 20 automobile parking spaces, and 2) carry out an annual survey program during project development to establish trends in bicycle use and to estimate actual demand for secure bicycle parking and for sidewalk bicycle racks, increasing the number of secure bicycle parking spaces or racks either in new buildings or in existing automobile parking facilities to meet the estimated demand. Provide secure bicycle racks throughout Mission Bay for the use of visitors.

This measure might change the mode of choice of a few daytime employees or visitors to the site who would otherwise not use bicycle but it

is not likely to change the choices of event attendees, particularly in the evening or evening workers.

FSEIR Mitigation Measure E.47.f: Appropriate Street Lighting - Ensure that streets and sidewalks in Mission Bay are sufficiently lit to provide pedestrians and bicyclists with a greater sense of safety, and thereby encourage Mission Bay employees, visitors and residents to walk and bicycle to and from Mission Bay.

Since adequate lighting is a prerequisite of any modern urban development, it is unlikely that this measure would change the mode splits the DSEIR already projects in disclosing impact TR-2. The measure has no. quantifiable mitigation effect.

FSEIR Mitigation Measure E.47.g: Transit and Pedestrian and Bicycle Route Information - Provide maps of the local and citywide pedestrian and bicycle routes with transit maps and information on kiosks throughout the Project Area to promote multi-modal travel.

The amount of change in the mode choice pattern the DSEIR already projects that provision of this information would result in is not quantifiable. Hence, there is no clear mitigation of Impact TR-2.

FSEIR Mitigation Measure E.47.h: Parking Management Strategies - Establish parking management guidelines for the private operators of parking facilities in the Project Area.

This measure is so vague that consequences of it are not quantifiable. Hence, there is no clear mitigation of Impact TR-2.

FSEIR Mitigation Measure E.47i: Flexible Work Hours/Telecommuting - Where feasible, offer employees in the Project Area the opportunity to work on flexible schedules and/or telecommute so they could avoid peak hour traffic conditions.

This FSEIR mitigation measure does nothing to address the Project's special event transportation impacts in the PM peak and Early Evening hours.

FSEIR Mitigation Measure E.49: Ferry Service - Make a good faith effort to assist the Port of San Francisco and others in ongoing studies of the feasibility of expanding regional ferry service. Make good faith efforts to assist in implementing feasible study recommendations.

As previously noted in the context of other mentions of ferry service, this item does not qualify as mitigation for the DSEIR subject project since the DSEIR has failed to determine that ferry service is feasible and since it does not condition the Project to take qualifying actions such as paying fair share contributions to development of a ferry landing serving the Project or paying a fair share of the incremental cost of ferry operations over revenue.

Impact and Mitigation Measure TR-5

The DSEIR finds that the Project would result in a substantial increase in transit demand that could not be accommodated by regional transit capacity and finds it significant and unavoidable with mitigation (SUM). However, many of the purported mitigations disclosed are fatally flawed as demonstrated below.

> **Mitigation Measure M-TR-5a: Additional Caltrain Service**
> As a mitigation measure to accommodate transit demand to and from the South Bay for weekday and weekend evening events, the project sponsor shall work with the Ballpark/Mission Bay Transportation Coordinating Committee to coordinate with Caltrain to provide additional Caltrain service to and from San Francisco on weekdays and weekends. The need for additional service shall be based on surveys of event center attendees conducted as part of the TMP.
>
> Coordination does not qualify as mitigation. Doing something substantial such as offering to pay for incremental cost of additional services over revenues is necessary to consider this as mitigation. And determining the need for special service should have been done in this DSEIR, not deferred to subsequent surveys.
>
> **Mitigation Measure M-TR-5b: Additional North Bay Ferry and/or Bus Service**
> As a mitigation measure to accommodate transit demand to the North Bay following weekday and weekend evening events, the project sponsor shall work with the Ballpark/Mission Bay Transportation Coordinating Committee to coordinate with Golden GateTransit and WETA to provide additional ferry and/or bus service from San Francisco following weekday and weekend evening events. The need for additional service shall be based on surveys of event center attendees conducted as part of the TMP.
>
> The same comment as immediately above applies. M-TR -5b does not qualify as mitigation under CEQA.

In summary, as these examples demonstrate, the measures proposed in an attempt to mitigate the Project's significant impacts lack substance, and their feasibility is still undetermined. Hence, the attempt at disclosing feasible mitigation is inadequate under CEQA.

Excessively Distant Time Frame and Massive Development Assumptions Masks Significance of Project's Nearer Term Cumulative Impacts

The cumulative analysis of the Project's transportation and circulation impacts is done in the context of a Year 2040 (25 years hence) plan-based development scenario. That scenario assumes development in Downtown, the SOMA and

Mission Bay that would add 162,000 new PM peak hour trips over existing[15]. Per DSEIR Table 5.2-22, the Project, at its highest PM peak hour trip generation intensity (with an evening capacity basketball game scheduled) would generate some 4599 person trips. This is only 2.84 percent of the new downtown-SOMA-Mission Bay trips projected in the 2040 cumulative analysis. As previously noted, San Francisco transportation impact thresholds require a project to add 5 percent to critical movements at an intersection already at unacceptable LOS, 5 percent to vehicle density on freeway ramps already at unacceptable levels, and 5 percent to MUNI ridership on screen lines and specific routes already exceeding acceptable percentages of capacity. Because the Project comprises only 2.84 percent of the PM peak hour core area trip growth contemplated in the cumulative analysis, it is highly unlikely that this Project, or any project of similar size, or even nearly double its size, could ever be found to cause transportation impacts that are cumulatively significant, given the nature of the impact thresholds and the distant and bloated development scenario that is the context of the cumulative transportation impact analysis of the Project. A more reasonable cumulative analysis would consider a future analysis year of, say, 10 years forward, and consider other development projects and transportation infrastructure projects that are reasonably foreseeable in that time frame. The cumulative analysis should be redone in that or similar context.

While on this subject, it is worthwhile considering the transportation forecast model relied upon in the cumulative analysis – SF Champ. This is a model that, by its nature, is intended to provide information guiding major planning development policy decisions and major transportation investment decisions. It is not intended, or suitable, for providing microscale information at the level of transportation impact assessment of individual development projects on intersections, freeway ramps, individual transit lines and so on. This is evident in the validation statistics of the model. On traffic *screenlines* its validation accuracy is within 10 percent on only 80 percent of the screenlines tested[16]. Its accuracy on individual roadways and intersections would be significantly less. Since the criterion of significant cumulative impact at unsatisfactory intersections and ramps is a 5 percent contribution to the traffic at that location, the accuracy of the model is less than the impact threshold that the environmental analysis is attempting to measure. So using this forecast model for an EIR type micro-analysis is like using a sledge hammer or pile driver to drive a common pin. The lesson in this is that the City should be using a project-based build-up analysis over a shorter term future to develop the cumulative scenario.

Conclusion

[15] *San Francisco Transportation Plan 2040, Appendix C, Core Circulation Study,* SFMTA, 2013.
[16] See *San Francisco Transportation Forecasting Model Final Report, Executive Summary,* San Francisco County Transportation Authority by Cambridge Systematics, October 1, 2002.

Due to all of the foregoing, the DSEIR transportation and circulation section is inadequate. The document must be completely revised, a revision that will involve disclosure of significant new information. Hence, the document should be recirculated in draft status for a full 45 day review period.

Sincerely,

Smith Engineering & Management
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Daniel T. Smith Jr., P.E.

DANIEL T. SMITH, Jr.
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EDUCATION

Bachelor of Science, Engineering and Applied Science, Yale University, 1967
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PROFESSIONAL REGISTRATION

California No. 21913 (Civil) Nevada No. 7969 (Civil) Washington No. 29337 (Civil)
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PROFESSIONAL EXPERIENCE

Smith Engineering & Management, 1993 to present. President.
DKS Associates, 1979 to 1993. Founder, Vice President, Principal Transportation Engineer.
De Leuw, Cather & Company, 1968 to 1979. Senior Transportation Planner.
Personal specialties and project experience include:

Litigation Consulting. Provides consultation, investigations and expert witness testimony in highway design, transit design and traffic engineering matters including condemnations involving transportation access issues; traffic accidents involving highway design or traffic engineering factors; land use and development matters involving access and transportation impacts; parking and other traffic and transportation matters.

Urban Corridor Studies/Alternatives Analysis. Principal-in-charge for State Route (SR) 102 Feasibility Study, a 35-mile freeway alignment study north of Sacramento. Consultant on I-280 Interstate Transfer Concept Program, San Francisco, an AA/EIS for completion of I-280, demolition of Embarcadero freeway, substitute light rail and commuter rail projects. Principal-in-charge, SR 238 corridor freeway/expressway design/environmental study, Hayward (Calif.) Project manager, Sacramento Northeast Area multi-modal transportation corridor study. Transportation planner for I-80N West Terminal Study, and Harbor Drive Traffic Study, Portland, Oregon. Project manager for design of surface segment of Woodward Corridor LRT, Detroit, Michigan. Directed staff on I-80 National Strategic Corridor Study (Sacramento-San Francisco), US 101-Sonoma freeway operations study, SR 92 freeway operations study, I-880 freeway operations study, SR 152 alignment studies, Sacramento RTD light rail systems study, Tasman Corridor LRT AA/EIS, Fremont-Warm Springs BART extension plan/EIR, SRs 70/99 freeway alternatives study, and Richmond Parkway (SR 93) design study.

Area Transportation Plans. Principal-in charge for transportation element of City of Los Angeles General Plan Framework, shaping nations largest city two decades into 21'st century. Project manager for the transportation element of 300-acre Mission Bay development in downtown San Francisco. Mission Bay involves 7 million gsf office/commercial space, 8,500 dwelling units, and community facilities. Transportation features include relocation of commuter rail station; extension of MUNI-Metro LRT; a multi-modal terminal for LRT, commuter rail and local bus; removal of a quarter mile elevated freeway; replacement by new ramps and a boulevard; an internal roadway network overcoming constraints imposed by an internal tidal basin; freeway structures and rail facilities; and concept plans for 20,000 structured parking spaces. Principal-in-charge for circulation plan to accommodate 9 million gsf of office/commercial growth in downtown Bellevue (Wash.). Principal-in-charge for 64 acre, 2 million gsf multi-use complex for FMC adjacent to San Jose International Airport. Project manager for transportation element of Sacramento Capitol Area Plan for the state governmental complex, and for Downtown Sacramento Redevelopment Plan. Project manager for Napa (Calif.) General Plan Circulation Element and Downtown Riverfront Redevelopment Plan, on parking program for downtown Walnut Creek, on downtown transportation plan for San Mateo and redevelopment plan for downtown Mountain View (Calif.), for traffic circulation and safety plans for California cities of Davis, Pleasant Hill and Hayward, and for Salem, Oregon.

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Transportation Centers. Project manager for Daly City Intermodal Study which developed a $7 million surface bus terminal, traffic access, parking and pedestrian circulation improvements at the Daly City BART station plus development of functional plans for a new BART station at Colma. Project manager for design of multi-modal terminal (commuter rail, light rail, bus) at Mission Bay, San Francisco. In Santa Clarita Long Range Transit Development Program, responsible for plan to relocate system's existing timed-transfer hub and development of three satellite transfer hubs. Performed airport ground transportation system evaluations for San Francisco International, Oakland International, Sea-Tac International, Oakland International, Los Angeles International, and San Diego Lindberg.

Campus Transportation. Campus transportation planning assignments for UC Davis, UC Berkeley, UC Santa Cruz and UC San Francisco Medical Center campuses; San Francisco State University; University of San Francisco; and the University of Alaska and others. Also developed master plans for institutional campuses including medical centers, headquarters complexes and research & development facilities.

Special Event Facilities. Evaluations and design studies for football/baseball stadiums, indoor sports arenas, horse and motor racing facilities, theme parks, fairgrounds and convention centers, ski complexes and destination resorts throughout western United States.

Parking. Parking programs and facilities for large area plans and individual sites including downtowns, special event facilities, university and institutional campuses and other large site developments; numerous parking feasibility and operations studies for parking structures and surface facilities; also, resident preferential parking .

Transportation System Management & Traffic Restraint. Project manager on FHWA program to develop techniques and guidelines for neighborhood street traffic limitation. Project manager for Berkeley, (Calif.), Neighborhood Traffic Study, pioneered application of traffic restraint techniques in the U.S. Developed residential traffic plans for Menlo Park, Santa Monica, Santa Cruz, Mill Valley, Oakland, Palo Alto, Piedmont, San Mateo County, Pasadena, Santa Ana and others. Participated in development of photo/radar speed enforcement device and experimented with speed humps. Co-author of Institute of Transportation Engineers reference publication on neighborhood traffic control.

Bicycle Facilities. Project manager to develop an FHWA manual for bicycle facility design and planning, on bikeway plans for Del Mar, (Calif.), the UC Davis and the City of Davis. Consultant to bikeway plans for Eugene, Oregon, Washington, D.C., Buffalo, New York, and Skokie, Illinois. Consultant to U.S. Bureau of Reclamation for development of hydraulically efficient, bicycle safe drainage inlets. Consultant on FHWA research on effective retrofits of undercrossing and overcrossing structures for bicyclists, pedestrians, and handicapped.

MEMBERSHIPS

Institute of Transportation Engineers Transportation Research Board

PUBLICATIONS AND AWARDS

Residential Street Design and Traffic Control, with W. Homburger *et al*. Prentice Hall, 1989.

Co-recipient, Progressive Architecture Citation, *Mission Bay Master Plan*, with I.M. Pei WRT Associated, 1984.

Residential Traffic Management, State of the Art Report, U.S. Department of Transportation, 1979.

Improving The Residential Street Environment, with Donald Appleyard et al., U.S. Department of Transportation, 1979.

Strategic Concepts in Residential Neighborhood Traffic Control, International Symposium on Traffic Control Systems, Berkeley, California, 1979.

Planning and Design of Bicycle Facilities: Pitfalls and New Directions, Transportation Research Board, Research Record 570, 1976.

Co-recipient, Progressive Architecture Award, *Livable Urban Streets, San Francisco Bay Area and London*, with Donald Appleyard, 1979.

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EXHIBIT 2

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July 21, 2015

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RE: Draft Subsequent EIR Informational Sufficiency Review for Golden State Warriors Arena aka - Event Center and Mixed Use Development at Mission Bay Blocks 29-32 (SCN:2014112045)

Mr. Lippe,

This letter summarizes the professional opinions of Larry Wymer, licensed California Traffic Engineer (#1955), on the informational sufficiency of the Draft Subsequent Environmental Impact Report (DSEIR) for the proposed Golden State Warriors Arena. Henceforth, "DSEIR" will refer to the arena project's DSEIR

Per your request, I reviewed specific aspects of the DSEIR focusing on transportation and circulation. My Curriculum Vitae is attached outlining my 26 years of consulting experience in traffic engineering/transportation planning.

My opinions are outlined below.

OPINION 1 - The DSEIR's Transportation and Circulation analysis does not adequately analyze the entirety of the study area impacted by the development

The defined study area for the DSEIR is taken to be a subsection of the study area identified for the "Mission Bay Final Subsequent Environmental Impact Report", from which the DSEIR was tiered. Since the Mission Bay FSEIR was completed in 1998, the assumptions included therein are presently 17 years old and require appropriate revisions, and possibly expansions beyond those assumed within that report, to provide a similar level of impact analysis as provided therein.

Numerous San Francisco regional planning documents conclude that auto trips within and adjacent to the DSEIR's study area will increase significantly up to the 2040 cumulative year horizon. Specifically, the "2040 San Francisco Transportation Plan" concludes that daily auto trips within the "SoMa/Mission Bay" (South of Market/Mission Bay) regions along roadways arena traffic would travel will grow by the following percentages between 2012 and 2040:[1]

- Overall SoMa/Mission Bay auto trips (2012-2040) = +82% (+125,000 vehicles)
- So/Ma between Downtown Core & I-80 (2012-2040) = +42%
- So/Ma (south of I-80) to Mission Bay = +174%

[1] San Francisco Transportation Plan 2040, Appendix K: SF Travel At a Glance

The DSEIR provides six figures showing "Project Vehicle Trip Patterns to Major Parking Facilities" serving the arena. **Table 1** summarizes the information within these figures establishing the trip percentages that travel to/from or through the SoMa and North Mission Bay areas.

Table 1
Project Vehicle Trip Patterns to Major Parking Facilities
North Mission Bay & South SoMa

Figure	Page	Figure Title	Trip Assignment Along Roadway			
			Seventh St s/o Townsend St	Fourth St s/o Townsed St	King St e/o Third St	from WB I-80 to Fifth St
5.2-14A	5.2-95	Project Vehicle Trip Patterns to Major Parking Facilities - Inbound Weekday PM Peak Hour - No Event and Convention Event	18% / 22%	7% / 7%	5% / 11%	8% / 7%
5.2-14B	5.2-96	Project Vehicle Trip Patterns to Major Parking Facilities- Outbound Weekday PM Peak Hour - No Event and Convention Event	19% / 19%	7% / 12%	5% / 5%	8% / 8%
5.2-14C	5.2-97	Project Vehicle Trip Patterns to Major Parking Facilities - Inbound Saturday Evening Peak Hour - No Event	20%	8%	5%	9%
5.2-14D	5.2-98	Project Vehicle Trip Patterns to Major Parking Facilities - Outbound Saturday Evening Peak Hour - No Event	20%	8%	5%	7%
5.2-14E	5.2-99	Project Vehicle Trip Patterns to Major Parking Facilities - Inbound Weekday and Saturday Peak Hours - Basketball Game Without a SF Giants Evening Game	31% / 32%	13% / 13%	9% / 11%	29% / 30%
5.2-14F	5.2-100	Project Vehicle Trip Patterns to Major Parking Facilities - Outbound Weekday Late Evening Peak Hour - Basketball Game Without a SF Giants Evening Game	31%	13%	11%	20%

Source: "Event Center and Mixed Use Development at Mission Bay Blocks 29-32" DSEIR (June 5, 2015)

The table above establishes that the arterials within the northern portion of the study area will experience significant increases in traffic volumes ranging from 9% to 32%. At issue for much of this traffic is where the traffic will originate.

Table 5.2-23 (page 5.2-85), and corresponding text on pages 5.2-84 to 5.2-86, describes expected trip distribution patterns to the project site from attendees arriving from the downtown area, with increased numbers on weekdays due to attendees traveling to the study area directly from their jobs downtown:

> *The origin/destination distribution range for a weekday basketball game reflects an adjustment for event attendees who would travel to the event center directly from work rather than from their place of residence. The adjustment was based on a survey of Golden State Warriors season ticket holders (see Appendix TR). As shown in Table 5.2-23, the number of trips starting in San Francisco on a weekday is projected to be about 7.5 percentage points greater than on a weekend, with the corresponding reductions in trips arriving from the East Bay (2 percentage points), North Bay (4 percentage points), and South Bay (1.5 percentage points) areas. The majority of visitor trips to a convention event, retail, office, and restaurant uses would be from within San Francisco (70 to 81 percent), followed by South Bay (9 to 10 percent), and then East Bay (3 to 9 percent) origins/destinations.*

Because these attendees will be arriving largely from the high employment areas in and near downtown, significant numbers of attendees would be required to pass through the SoMa area and northern portion of the DSEIR's defined study area to arrive at either the stadium or one of the ancillary land uses (i.e. restaurants) in the vicinity of the proposed arena. And because these attendees will be travelling to the arena directly from work, it can be reasonably assumed many (if not most) would initiate their trip within the later part of the PM peak period (i.e. 5:00/5:30 to 6:00

pm). Thus it can be expected many intersections north of those studied within the DSEIR (i.e. from north of Market Street to south of King Street) will experience large increases in PM peak hour traffic volumes as a result of this Project.

When these project volumes are combined with the 42% to 174% increases within this same area (from north of Market Street to south of King Street), the potential impacts are compounded necessitating the need to widen the study area northward towards downtown. Thus the increases in both cumulative background and project traffic volumes, particularly during weekday PM peak hour periods, requires widening the study area beyond that included within the Mission Bay Blocks 29-32 DSEIR, and beyond the study area within the 1998 "Mission Bay Final Subsequent Environmental Impact Report" from which the more recent DSEIR was tiered.

A revised SEIR should expand the study area northward to at least Market Street, an area henceforth referred to as the "expanded study area". For planning purposes, the expanded study area into north Mission Bay and SoMa is assumed to be northward from the existing study area within an area bounded generally by 8th Street to the west, Market Street to the north between 8th Street and The Embarcadero, northward along The Embarcadero to Broadway, and the San Francisco Bay to the east. A few additional intersections are included in the neighborhood east of the I80/US-101 interchange.

Further justification for expanding the study area northward is provided in Opinion 2 below.

The following opinion will almost exclusively focus on weekday PM peak hour conditions since that is the time period my proposed expanded analysis is assumed will largely experience the most significant impacts.

OPINION 2 - The DSEIR's Transportation and Circulation analysis does not analyze impacted study intersections and ramps in the SoMa and North Mission Bay areas, most notably those between Market Street and King Street

To assist in reviewing the adequacy of the DSEIRs study area limits, I reviewed the draft traffic study (in memorandum format) for the previous proposed arena site. That memorandum report was titled *"Travel and Parking Demand Estimates for the Proposed Event Center and Mixed Use Development at Piers 30-32 and Seawall Lot 330";* stamped "Draft-Subject to Revisions; dated August 9, 2013; submitted by Jose I. Farran of Adavant Consulting; and submitted to the San Francisco Planning Department (Brett Bollinger, Chris Kern and Viktoriya Wise), Orion Environmental (Joyce Hsiao), and Environmental Science Associates (Paul Mitchell). The traffic study for this earlier proposed arena will henceforth be referred to as the "2013 memorandum traffic study," or "2013 arena study" within tables.

Although the arena analyzed in the 2013 memorandum traffic study was also originally proposed to be located south of I-80 (same as the currently proposed arena), trip distribution patterns and intersections identified as critical intersections warranting study stretches significantly further northward into and through the entire SoMa area, with a few even included north of Market Street. Since both versions of the arena project are located south of I-80, traffic arriving at the respective arena sites would include traffic originating from the downtown areas as described in Opinion 1, traffic would travel southeastward along SoMa arterials and through SoMa intersections to both sites, and traffic would also pass through still more intersections within the first several blocks south of I-80. The original 2013 memorandum traffic study analyzed 12 intersections north of I-80 and 10 intersections between I-80 and King Street, whereas none of these 22 intersections were analyzed within the DSEIR. A review of trip distribution patterns for both versions of the project reveal that trip distribution and assignment patterns are not substantially different between the two, however the DSEIR fails to reflect this reality with a noticeable absence of much needed analysis of the critical intersections identified in the traffic study for the earlier site.

Table 2 provides a summary of 27 study intersections located within the SoMA area and blocks north and south of I-80 which were analyzed within the 2013 memorandum traffic study, and the PM peak hour levels of service which

were established therein for Existing (No Project), Existing Plus Project, and Existing Plus "No Event" Project conditions. The table also notes that 10 of these 27 intersections were analyzed within the1998 Mission Bay DSEIR, yet only 5 of those 10 intersections (and 5 of the 27) were analyzed within the DSEIR. And finally, the table shows that 13 of the 22 intersections neglected in the DSEIR would operate at deficient level of service (LOS) E or F operations for no project and/or plus project conditions.

Table 2
Expanded Study Area LOS Analysis

Intersection	Original Arena Study LOS Operations Weekday PM Peak Hour (4:00-6:00)						LOS Analysis Intersection # if Analyzed w/in Study		
	Existing (No Project)		Existing Plus Project		Existing Plus No Event		2013 Arena Study [1]	1998 Mission Bay FSEIR [2]	2015 DSEIR Arena Study [3]
	Delay	LOS	Delay	LOS	Delay	LOS			
The Embarcadero / Broadway	36.70	D	37.40	D	36.90	D	1		
The Embarcadero / Washington St	30.50	C	38.00	D	31.50	C	2		
The Embarcadero / Mission St	**79.50**	**E**	**>80 (1.13)**	**F**	**>80 (1.06)**	**F**	3		
The Embarcadero / Howard St	**>80 (1.13)**	**F**	**>80 (1.38)**	**F**	**>80 (1.18)**	**F**	4		
The Embarcadero / Folsom St	**61.90**	**E**	**>80 (1.39)**	**F**	**66.80**	**E**	5		
The Embarcadero / Harrison St	**71.00**	**E**	**>80 (1.01)**	**F**	**>80 (0.93)**	**F**	6		
The Embarcadero / Bryant St	**>80 (1.51)**	**F**	**>80 (1.08)**	**F**	**>80 (2.17)**	**F**	7		
The Embarcadero / Brannon St	39.10	D	42.40	D	37.60	D	9		
The Embarcadero / Townsend St	**58.10**	**E**	**70.40**	**E**	**62.60**	**E**	10		
2nd St / King St	**55.80**	**E**	**63.10**	**E**	**59.60**	**E**	11	X	
3rd St / King St	**72.70**	**E**	**>80 (0.99)**	**F**	**>80 (0.95)**	**F**	12	X	1
4th St / King St	51.90	D	**59.50**	**E**	**56.00**	**E**	13	X	2
5th St / King St / I-280 Ramps	**59.20**	**E**	**72.80**	**E**	**56.00**	**E**	14	X	3
Main St / Harrison St	**>80 (0.91)**	**F**	**>80 (1.07)**	**F**	**>80 (0.93)**	**F**	15		
Main St / Bryant St	21.20	C	24.20	C	32.50	C	16		
Beale St / Mission St	33.80	C	41.80	D	37.10	D	17		
Beale St / Bryant St	54.00	D	**>80 (1.15)**	**F**	**>80 (1.13)**	**F**	18		
Fremont St / Harrison St	32.40	C	38.80	D	34.40	C	19	X	
Fremont St / Folsom St	53.60	D	**>80 (0.75)**	**F**	54.00	D	20		
1st St / Harrison St / I-80 Ramps	**>80 (1.13)**	**F**	**>80 (1.28)**	**F**	**>80 (1.17)**	**F**	21	X	
4th St / Howard St	52.20	D	54.40	D	53.10	D	22		
4th St / Harrison St / I-80 Ramps	41.80	D	44.50	D	42.00	D	23		
4th St / Bryant St / I-80 Ramps	**>80 (0.76)**	**F**	**>80 (0.87)**	**F**	**>80 (0.77)**	**F**	24	X	
5th St / Harrison St / I-80 Ramps	48.40	D	**>80 (1.07)**	**F**	**60.90**	**E**	25	X	4
2nd St / Brannon St	20.20	C	28.20	C	21.30	C	27		
2nd St / Bryant St	**>80 (1.23)**	**F**	**>80 (1.27)**	**F**	**>80 (1.24)**	**F**	28	X	
5th St / Bryant St / I-80 Ramps	see note [4]		see note [4]		see note [4]		? [4]	X	5

NOTES:

Deficient LOS E or F within 2015 DSEIR LOS analysis.

[1] = Analyzed in Original 2013 Arena Study - "Event Center & Mixed-Use Development at Piers 30-32 & Seawall Lot 330" (GSW P30-32 LOS_Table 052815_FP.xlsx)(pg TR-783)

[2] = Analyzed in 1998 "Mission Bay Final Subsequent Enviroronmental Impact Report"

[3] = Analyzed in 2015 "Event Center and Mixed Use Development at Mission Bay Blocks 29-32" (SCN:2014112045).
Table only considers study intersections north of the proposed project site, thus study intersections #6 through #22 of the DSEIR are neglected herein.

[4] = Incomplete data from memoranudm traffic study indicates deficient LOS E &/or F but no specifics regarding intersection #, delays, and which scenarios are projected to experience LOS E/F.

The information provided in the Table above supports Opinion 1 that the DSEIR's Transportation and Circulation analysis does not adequately analyze the entirety of the study area impacted by the development, and that by extension the DSEIR's Transportation and Circulation analysis also does not adequately analyze impacted study intersections and ramps in the SoMa and North Mission Bay areas.

Based on the deficient levels of service identified in the table above which the proposed project would potentially add significant traffic volumes, a revised SEIR should add (at a minimum) the following 13 study intersections from the expanded study area identified above.

1) Mission Street / The Embarcadero
2) Howard Street / The Embarcadero
3) Folsom Street / The Embarcadero
4) Harrison Street / The Embarcadero
5) Bryant Street / The Embarcadero
6) Townsend Street / The Embarcadero
7) King Street / Second Street
8) Harrison Street / Main Street
9) Bryant Street / Beale Street
10) Folsom Street / Freemont Street
11) Harrison Street / First Street
12) Bryant Street / Fourth Street
13) Bryant Street / Second Street

Further justification for adding these 13 intersections is provided below.

Table 3 (divided into 3 sections 3a, 3b and 3c) summarizes a review of all of the CEQA Documents and notices for non-SFPUC projects consisting of Environmental Impact Reports, Negative Declaration, NOPs, etc. which were listed on the City/County of San Francisco's Planning Department Website as of July 17, 2015.[2] Each of the projects were reviewed to establish the location of the project relative to the arena, and more importantly if traffic generated by the project would impact any intersections the arena might also impact.

If a cumulative project is located both well outside of the expanded study area, and it can be reasonably concluded the project would add little to no traffic to potential study intersections within the expanded study area, the project was eliminated from further consideration and not included in Table 3.

If the cumulative project was located near the expanded study area with the potential to add traffic volumes to potential study intersections within the expanded study area, the project was reviewed further to make a determination whether or not it should be added to Table 3.

If a cumulative project was located within the general boundaries of the expanded study area, it was included in Table 3 regardless of whether an EIR had been prepared or the project was at the initial NOP stage with study intersections yet to be determined.

For those projects which have an EIR and corresponding traffic impact study, I reviewed the traffic impact study with particular attention to trip distribution and study intersection graphics, and LOS intersection and freeway ramp operations analysis tables. I noted any study intersections located within the expanded study area described in Opinion 1 which were found to operate at a deficient level of service for weekday PM peak hour conditions for any scenario whether it be existing, cumulative, no project, plus project, etc. These intersections, along with corresponding deficient delays and LOS E and/or F operations, are noted in Table 3.

If the proposed project was located within the expanded study area itself, it is included in Table 3 whether it has completed an EIR with corresponding LOS tables, or simply an NOP with no traffic analysis yet. They were included because the project will obviously add some level of (yet to be determined) traffic to (yet to be determined) study intersections in the expanded study area, some of which might be newly added study intersections for the arena

[2] http://www.sf-planning.org/index.aspx?page=3562

project. Cumulative NOP projects without an EIR or traffic impact study are included for future planning purposes with the assumption an EIR and traffic impact study might be ready when a review is initiated to establish a revised scope and study area for a revised DSEIR. In the meantime, Table 3 includes an "NA" (not applicable) notation in place of a list of intersections operating at deficient levels of service.

Note that Table 3 is considered a planning level tool. Because a more detailed analysis will need to be performed at a later time to establish trip distribution and assignment patterns through the expanded study area, there is at present some uncertainty regarding the complete list of intersections within the expanded study area which will warrant study. Although an initial list of additional study intersections is provided below which in my opinion satisfies that criteria, it is not comprehensive and requires additional planning level analysis to expand to a full list. Thus without foresight regarding what intersections may or may not be included within that final list, and in the interest of providing an initial list of potential study intersections, Table 3 simply lists any and all study intersections identified as operating deficiently within the expanded study area within any EIR or traffic study.

Table 3a
Approved & Cumulative Projects
with Designated Study Intersections at LOS E or F
from SoMa to Mission Bay

Case #	Project Name and Document	Study Intersections at LOS E or F (No Project Delay/LOS) > (Plus Project Delay/LOS)		Latest Update	Construction Status	Pgs in Report	Pgs in PDF	Study Link
		Existing Conditions	Cumulative Conditions					
2007.1275E and 2014.13	San Francisco 2004 and 2009 Housing Element	10) ---------- 11) ---------- 12) ---------- 13) 1st St/Market St (67.7 / E) 14) 1st St/Mission St (>80.0 / F) 15) 1st St/Harrison St (>80.0 / F) 16) ---------- 17) 2nd St/Bryant St (60.3 / E) 18) ---------- 19) ---------- 20) 4th St/Harrison St (63.2 / E) 22) ---------- 23) ---------- 24) 6th St/Brannan St (>80 / F) 55) ----------	10) The Embarcadero / Broadway (>80.0 / F) 11) The Embarcadero / Washington St (69.1 / E) 12) The Embarcadero / Harrison St (55.0 / E) 13) 1st St/Market St (>80.0 / F) 14) 1st St/Mission St (>80.0 / F) 15) 1st St/Harrison St (>80.0 / F) 16) 2nd St/Folsom St (>80.0 / F) 17) 2nd St/Bryant St (>80.0 / F) 18) 3rd St/King St (>80 / F) 19) 4th St/King St (57.3 / E) 20) 4th St/Harrison St (67.4 / E) 22) 6th St/Market St (60.2 / E) 23) 6th St/Mission St (>80.0 / F) 24) 6th St/Brannan St (>80.0 / F) 55) 3rd St / Cesar Chavez St (>80.0 / F)	7/14/2015	CONSTRUCTION ONGOING **(thru 2019)**	V.F-31 V.F-31	363 363	http://sfmea.sfplanning.org/2007.1275E_DEIR.pdf
2014.0198E	850 Bryant Street -- Hall of Justice - Rehabilitation and Detention Facility	Bryant Street/Sixth Street (>80 / F)	Bryant Street/Sixth Street (>80 / F)	5/13/2015	Construction Planned **2016-2020** (http://www.sfdpw.org/index.aspx?page=1818)	84 84	92 92	http://sfmea.sfplanning.org/2014.0198E_PMND.pdf
2014-001272ENV	Pier 70 Mixed-Use District Project	NOP Stage - No study intersections identified	NOP Stage - No study intersections identified	5/6/2015	Construction Planned **2018-2029** (http://sfmea.sfplanning.org/2014-001272ENV_NOP.pdf)	NA	NA	http://sfmea.sfplanning.org/2014-001272ENV_NOP.pdf
2013.1407E	Academy of Art University Project	---------- ---------- ---------- ---------- Bryant Street/Fifth Street (64.3 / E) > (63.3 / E) ---------- ----------	Eighth St/Market St (70.8 / E) > (72.7 / E) Sixth St/Market St (>80 / F) > (>80 / F) Sixth St/Mission St (71.2 / E) > (72.8 / E) Second St/Folsom St (55.4 / E) > (60.4 / E) Fifth St/Bryant St (>80 / F) > (>80 / F) Sixth St/Brannan St (>80 / F) > (>80 / F) Sixth St/Folsom St (63.6 / E) > (69.2 / E)	4/10/2015	???	4.6-11 4.6-131	295 415	http://sfmea.sfplanning.org/2008.0586E_DEIR_VolI-3.pdf
2009.0291E and 2010.0275E	San Francisco Museum of Modern Art (SFMOMA) Expansion/Fire Station Relocation and Housing Project	1) Third/Market (56.2 / E) > (58.0 / E) 2) ---------- 3) ---------- 11) ---------- 14) Sixth/Shipley Streets (WB) (37.3 / E) > (37.5 / E)	1) Third/Market Streets (>80 / F) 2) Third/Mission Streets (>80 / F) 3) Third/Howard Streets (>80 / F) 11) Fifth/Harrison Streets/I-80 off-ramp (>80 / F) 14) Sixth/Shipley Streets (WB) (60.3 / F)	2/24/2015	CONSTRUCTION ONGOING **(2013-spring 2016)** (http://www.sfmoma.org/about/our_expansion/expansion_project_faq#ixzz3gfd1Oo75)	261 301	300 340	http://sfmea.sfplanning.org/2010.0275E_DEIR1.pdf
2007.0347E	Second Street Improvement Project	1) Market St/ Montgomery St (51.0 / D) > (77.8 / E) 2) New Montgomery St/Mission St (61.3 / E) > (>80 / F) 3) Howard St/New Montgomery St (39.5 / D) > (77.2 / E) 4) Howard St/Hawthorne St (19.6 / B) > (61.9 / E) 5) Hawthorne St/Folsom St (74.5 /E) > (>80 / F) 6) Harrison St/ Hawthorne St (43.4 / D) > (71.0 / E) 7) ---------- 8) ---------- 9) ---------- 10) Third St/King St (>80 / F) > (>80 / F) 14) ---------- 15) Second St/Folsom St (64.6 / E) > (30.7 / C) 16) ---------- 17) Second St/Bryant St (>80 / F) > (>80 / F) 18) South Park St/Second St (EB) (>80) / F) (4.6 / A) 20) ---------- 21) ---------- 22) ---------- 23) Harrison St/Essex St (>80 / F) > (>80 / F) 26) ---------- 27) Folsom St/ First St (>80 / F) > (>80 / F) 28) Harrison St/ First St (>80 / F) > (>80 / F) 29) Fifth/Bryant/I-80 EB on-ramps (> 80 / F) > (> 80 / F)	1) Market St/Montgomery St (>80 / F) > (>80 / F) 2) Mission St/New Montgomery St (>80 / F) > (>80 / F) 3) Howard St/New Montgomery St (17.5 / B) > (55.9 / E) 4) Howard St/Hawthorne St (12.0 / B) > (42.7 / D) 5) Folsom St/Hawthorne St (>80 / F) > (>80 / F) 6) Harrison St/Hawthorne St (30.5 C) / (>80 / F) 7) Bryant St/Third St (>80 / F) > (>80 / F) 8) Brannan St/Third St (>80 / F) > (>80 / F) 9) Townsend St/Third St (>80 / F) > (>80 / F) 10) King St/Third St (>80 / F) > (>80 / F) 14) Howard St/Second St (>80 / F) (>80 / F) 15) Folsom St/Second St (>80 / F) > (>80 / F) 16) Harrison St/Second St (>80 / F) > (>80 / F) 17) Bryant St/Second St (>80 / F) (>80 / F) 18) South Park St/Second St (61.0 / F) > (10.7 / B) 20) Townsend St/Second St (73.3 / E) > (>80 / F) 21) King St/Second St (>80 / F) > (>80 / F) 22) Folsom St/Essex St (>80 / F) > (>80 / F) 23) Harrison St/Essex St (>80 / F) > (>80 / F) 26) Howard St/First St (>80 / F) > (>80 / F) 27) Folsom St/First St (>80 / F) > (>80 / F) 28) Harrison St/First St (>80 / F) > (>80 / F) 29) Fifth St/Bryant St/I-80 EB On-Ramp (>80 / F) > (>80 / F)	2/11/2015	Construction Planned **Fall 2016-late 2017** (http://sfmea.sfplanning.org/2007.0347E_Draft%20SEIR.pdf)	54 90	70 106	http://sfmea.sfplanning.org/2007.0347E_Draft%20SEIR_Appx.pdf
2014.0012E	Better Market Street Project	NOP Stage - MARKET STREET intersections between Octavia Boulevard and The Embarcadero	NOP Stage - MARKET STREET intersections between Octavia Boulevard and The Embarcadero	1/14/2015	Construction Planned **2018** (http://www.bettermarketstreetsf.org/docs/BMS-Factsheet.pdf)	NA	NA	http://www.sf-planning.org/index.aspx?page=4003

Table 3b
Approved & Cumulative Projects
with Designated Study Intersections at LOS E or F
from SoMa to Mission Bay

Case #	Project Name and Document	Study Intersections at LOS E or F (No Project Delay/LOS) > (Plus Project Delay/LOS)		Latest Update	Construction Status	Pgs in Report	Pgs in PDF	Study Link
		Existing Conditions	Cumulative Conditions					
2011.0409E	5M Project, 925-967 Mission Street	Existing No Project > Existing Plus Project 1) Fourth/Market/Stockton (56.1 /E) > (64.6 / E) 2) ---------- 3) Fourth/Howard (52.5 / D) > (74.8 / E) 4) Fourth/Folsom (> 80 / F) > (80 / F) 5) Fifth/Market (55.9 / E) > (56.8 / E) 8) Fifth/Natomac (EB) (38.2 / E) > (40.9 / E) 9) ---------- 10) ---------- 11) Fifth/Harrison (58.7 / E) > (60.7 / E) 12) Fifth/Bryant (>80 / F) > (>80 / F) 13) Sixth/Market (44.6 / D) > (45.3 / D) 15) Sixth/Minnac (WB) (>50 / F) > (>50 / F] 16) Sixth/Natomac (EB) (>50 / F) > (>50 / F) 17) ---------- 18) Sixth/Folsom (43.3 / D) > (>80 / F) 19) ---------- 20) Sixth/Bryant (>80 / F) > (>80 / F) 21) Sixth/Brannan (74.4 / E) > (>80 / F)	Existing No Project > Cumulative Plus Project 1) Fourth/Market/Stockton (56.1 / E) > (>80 / F) 2) Fourth/Mission (28.1 / C) > (> 80 / F) 3) Fourth/Howard (52.5 / D) > (> 80 / F) 4) Fourth/Folsom (> 80 / F) > (> 80 / F) 5) Fifth/Market (55.9 / B) > (> 80 / F) 8) Fifth/Natoma (38.2 / E) > (>50 / F) 9) Fifth/Howard (15.1 / B) > (>80 / F) 10) Fifth/Folsom (27.7 / B) > (>80 / F) 11) Fifth/Harrison (77.1 / E) > (>80 / F) 12) Fifth/Bryant (> 80 / F) > (>80 / F) 13) Sixth/Market (44.6 / D) > (62.4 / E) 15) Sixth/Minna (WB) (>50 / F) > (18.5 / B) 16) Sixth/Natoma (EB) (>50 / F) > (>80 / F) 17) Sixth/Howard (35.5 / D) > (>80 / F) 18) Sixth/Folsom (43.3 / D) > (>80 / F) 19) Sixth/Harrison (31.6 / C) > (>80 / F) 20) Sixth/Bryant (>80) / F) > (>80 / F) 21) Sixth/Brannan (74.4 / E) > (>80 / F)	10/15/2014	Construction Planned **Phase 1: 2017-2021** **Phase 2: 2020-2025** (http://5mproject.com/uploads/documents/150615_openhouse_factsheet.pdf) (http://sf-planning.org/ftp/files/Commission/hpcpacket/5M%20Project%20Public%20Draft%20EIR.pdf(pg 59)	310 351	386 427	http://sfmea.sfplanning.org/2011.0409E_DEIR.pdf
2013.0154E	Moscone Center Expansion Project	1) Market St/N. Montgomery St (66.8 / E) > (66.8 / E) 2) ---------- 3) Market St/Fourth St (57.7 / E) > (58.0 / E) 4) Market St/Fifth St (59.3 / E) > (60.0 / E) 5) Mission St/N. Montgomery St (70.7 / E) > (70.9 E) 6) Mission St/Third St (71.9 / E) > (74.9 E) 7) ---------- 9) ---------- 11) Howard St/Third St (>80 / F) > (>80 / F) 12) Howard St/Fourth St (65.7 / E) > (69.5 / E) 13) ---------- 14) Folsom St/ Hawthorne St (78.4 / E) > (79.2 / E) 15) Folsom St/Third St (>80 / F) > (>80 / F) 16) Folsom St/Fourth St (>80 / F) > (>80 / F) 17) ---------- 18) ---------- 19) ---------- 20) ---------- 21) Harrison St/Fifth St (60.4 / E) > (60.7 / E) 22) ---------- 23) ---------- 24) Bryant St/Fifth St (>80 / F) > (>80 / F)	1) Market St/N. Montgomery St (>80 / F) 2) Market St/Third St (>80 / F) 3) Market St/Fourth St (>80 / F) 4) Market St/Fifth St (>80 / F) 5) Mission St/N. Montgomery St (>80 / F) 6) Mission St/Third St (>80 / F) 7) Mission St/Fourth St (>80 / F) 9) Howard St/N. Montgomery St (58.6 E) 11) Howard St/Third St (>80 / F) 12) Howard St/Fourth St (>80 / F) 13) Howard St/Fifth St (>80 / F) 14) Folsom St/ Hawthorne St (>80 / F) 15) Folsom St/Third St (>80 / F) 16) Folsom St/Fourth St (>80 / F) 17) Folsom St/Fifth St (>80 / F) 18) Harrison St/Hawthorne St (>80 / F) 19) Harrison St/Third St (>80 / F) 20) Harrison St/Fourth St (>80 / F) 21) Harrison St/Fifth St (>80 / F) 22) Bryant St/Third St (>80 / F) 23) Bryant St/Fourth St (>80 / F) 24) Bryant St/Fifth St (>80 / F)	9/16/2014	Construction Planned **2014-2018** (http://mosconeexpansion.com/faq)	IV.A-54 IV.A-54	155 155	http://sfmea.sfplanning.org/2013.0154E_DEIR.pdf
2013.0208E	Seawall Lot 337 and Pier 48 Mixed-Use Project	NOP Stage - No intersections identified	NOP Stage - No intersections identified	12/11/2013	Construction Planned **2015-2021** (http://sfport.com/Modules/ShowDocument.aspx?documentID=5666)	NA	NA	http://sfmea.sfplanning.org/2013.0208E_NOP.pdf
2005.0424E	465 Tehama/468 Clementina Street	Mitigated Neg Dec (No Intersection LOS Analysis)	Mitigated Neg Dec (No Intersection LOS Analysis)	11/19/2013	???	NA	NA	http://sfmea.sfplanning.org/2005.0424E_FMND.pdf
2011.0702E	101 Polk Street	Mitigated Neg Dec (No Intersection LOS Analysis)	Mitigated Neg Dec (No Intersection LOS Analysis)	3/27/2013	CONSTRUCTION ONGOING **(thru early 2016)** (http://www.sfhog.com/101-polk-street-architecture-construction-analysis-summary/)	NA	NA	http://sfmea.sfplanning.org/2011.0702E_PMND1.pdf
2007.0385E	345 Brannan Street	Mitigated Neg Dec (No Intersection LOS Analysis)	Mitigated Neg Dec (No Intersection LOS Analysis)	3/20/2013	CONSTRUCTION ONGOING **(thru late 2015)** (http://www.sfbuildingtradescouncil.org/news/top-stories/177-developers-working-together-on-brannan-street-projects)	NA	NA	http://sfmea.sfplanning.org/2007.0385E_PMND.pdf

Table 3c
Approved & Cumulative Projects
with Designated Study Intersections at LOS E or F
from SoMa to Mission Bay

Case #	Project Name and Document	Study Intersections at LOS E or F (No Project Delay/LOS) > (Plus Project Delay/LOS)		Latest Update	Construction Status	Pgs in Report	Pgs in PDF	Study Link
		Existing Conditions	Cumulative Conditions					
2008.1084E	706 Mission Street – The Mexican Museum and Residential Tower Project	Existing No Project > Existing Plus Project Third / Market (56.2 / E) > (63.2 / E) ---------- ---------- ---------- Fourth / Market (>80 / F) > (>80 / F) ---------- ----------	Existing No Project > Cumulative Plus Project Third / Market (56.2 / E) > (>80 / F) Third / Stevenson (12.1 / B) > (>80 / F) Third / Mission (20.1 / C) > (>80 / F) Third / Howard (36.1 / D) > (>80 / F) Fourth / Market (>80 / F) > (>80 / F) Fourth / Mission (41.8 / D) > (>80 / F) Fourth / Howard (42.5 / D) > (>80 / F)	3/7/2013	CONSTRUCTION ONGOING **(thru September 2018)** (http://www.sfgate.com/bayarea/article/Record-breaking-condo-project-coming-to-SoMa-6126543.php)	IV.E.37 IV.E.60	149 172	http://sfmea.sfplanning.org/2008.1084E_DEIR_Part_3.pdf
2000.618E	801 Brannan and One Henry Adams Streets Project	1) ---------- 2) ---------- 3) ---------- 4) ---------- 5) Division/Brannan/Potrero/Tenth (57.8 / E) > (61.5 / E) 6) Eighth/Brannan (55.4 / E) > (77.5 / E) 7) ---------- 9) ---------- 10) Division/Rhode Island (NB) (24.6 / C) > (39.2 / E) 15) ---------- 16) Sixteenth/Rhode Island (NB) (48.7 / E) > (>50 / F)	1) Seventh/Harrison (>80 / F) 2) Ninth/Bryant (60.6 / E) 3) Eighth/Bryant (>80 / F) 4) Seventh/Bryant (>80 / F) 5) Division/Brannan/Potrero/Tenth (>80 / F) 6) Eighth/Brannan (>80 / F) 7) Seventh/Brannan (75.7 / E) 9) Seventh/Townsend (>80 / F) 10) Division/Rhode Island (NB) (>50 / F) 15) Sixteenth/Kansas/Henry Adams (>80 / F) 16) Sixteenth/Kansas/Rhode Island (NB) (>80 / F)	1/9/2013	CONSTRUCTION ONGOING One Henry Adams **(thru 2016)** http://news.theregistrysf.com/equity-residential-breaks-ground-on-one-henry-adams-in-san-francisco/801 Brannon) 801 Brannon **(thru Spring 2017)** (http://www.bizjournals.com/sanfrancisco/blog/real-estate/2015/05/equity-residential-soma-apartments-801-brannan.html)	177 205	271 299	http://sfmea.sfplanning.org/2000.618E_DEIR1.pdf
2011.1381E	Art & Design Educational Special Use District (1111 8th Street)	Mitigated Neg Dec (No Intersection LOS Analysis)	Mitigated Neg Dec (No Intersection LOS Analysis)	9/26/2012	?????	NA	NA	http://sfmea.sfplanning.org/2011.1381E
2011.1086E	752 Carolina Street	Mitigated Neg Dec (No Intersection LOS Analysis)	Mitigated Neg Dec (No Intersection LOS Analysis)	9/5/2012	?????	NA	NA	http://sfmea.sfplanning.org/2011.1086E_PMND-CPE.pdf
2008.0586E	Academy of Art University Project	NOP Stage - No study intersections identified	NOP Stage - No study intersections identified	9/29/2010	?????	NA	NA	http://www.sf-planning.org/modules/ShowDocument.aspx?documentid=8289
2006.1106E	222 Second Street	1) ---------- 2) ---------- 3) ---------- 4) ---------- 5) ---------- 6) ---------- 7) ---------- 8) Folsom Street / Second Street (36.8 / D) > (60.5 / E) 9) Harrison Street/ Fourth Street (62.0 / E) > (68.1 / E) 10) Harrison Street / Second Street (55.7 / E) > (64.2 / E) 11) Harrison Street / First Street (>80 / F) > (>80 / F) 12) Second Street / Tehama Street (28.7 / D) > (>50 / F)	1) Mission Street / Third Street (>80 / F) 2) Howard Street / Third Street (>80 / F) 3) Howard St / New Montgomery St (>80 / F) 4) Howard Street / Second Street (>80 / F) 5) Howard Street / First Street (>80 / F) 6) Howard Street / Fremont Street (>80 / F) 7) Folsom St. / Hawthorne St. (76.6 / E) 8) Folsom Street / Second Street (>80 / F) 9) Harrison Street/ Fourth Street (>80 / F) 10) Harrison Street / Second Street (>80 / F) 11) Harrison Street / First Street (>80 / F) 12) Second Street / Tehama Street (>50 / F)	7/8/2010	CONSTRUCTION ONGOING **(thru 2016)** (http://www.bloomberg.com/news/articles/2014-04-22/linkedin-said-to-fully-lease-tishman-s-san-francisco-tower)	81 81	109 109	http://www.sf-planning.org/modules/ShowDocument.aspx?documentid=8070
2006.1506E	749 Wisconsin Street	NOP Stage - No study intersections identified	NOP Stage - No study intersections identified	6/30/2010	?????	NA	NA	http://www.sf-planning.org/ftp/files/MEA/2006.1506E_749_Wisconsin_NOP.pdf
2004.0588E	255 Seventh Street Project	Reduction in Traffic Volumes	Reduction in Traffic Volumes	2/24/2007	?????	NA	NA	http://www.sf-planning.org/modules/ShowDocument.aspx?documentid=408

Table 4 (divided into tables 4a and 4b due to length) combines and refines information provided within Tables 2 and 3 to provide a better planning level focus on the selection of study intersections within the expanded study area. It includes all of the intersections identified and included within Table 2 and/or Table 3. The table is organized with intersections separated into five different categories with those within the top most section being those which in my opinion absolutely satisfy the criteria of requiring analysis within a revised DSEIR, and those at the bottom of the list not requiring analysis unless a future screening analysis included them. A full and complete list of additional study intersections should be determined through a planning level analysis which considers trip distribution and assignment through the SoMa and northern Mission Bay areas north and south of I-80.

For clarity, intersections are organized within Table 4 with a specific order. For example, intersection "A"/"B" is such that street "A" consists of the northwest-southeast street (i.e. The Embarcadero, 1st St, 2nd St, ... , 7th St, 8th St, etc.) and street "B" consists of the southwest-northeast street (i.e. Market St, Mission St, ... , Harrison St, Bryant St, Brannan St, Bryan St, King St, Berry St, etc.). Additionally, lists of intersections are ordered beginning in the northeast (i.e. The Embarcadero/Broadway) and ending in the southwest (i.e. 8th St/Berry St).

The first five intersections (included within Table 4a) were already included within the DSEIR and are assumed would be included within the revised DSEIR. They are included simply to provide a full list of the intersections included in the 2013 memorandum traffic study.

The second set of intersections (also included within Table 4a) are comprised of the same thirteen intersections identified above as those which a revised SEIR should add (at a minimum) into the traffic analysis, all of which were also included within the 2013 memorandum traffic study.

The third set of intersections (also included within Table 4a) are comprised of the nine remaining intersections analyzed within the 2013 memorandum traffic study which may or may not be established as being included within a revised SEIR depending on the outcome of a refined trip distribution/assignment process.

The fourth set of intersections (also included within Table 4a) are comprised of the eleven remaining intersections analyzed within the 1998 Mission Bay FSEIR excluded from the 2015 DSEIR which may or may not be established as being included within a revised SEIR depending on the outcome of a refined trip distribution/assignment process.

The fifth and final set of intersections (comprising the entirety of Table 4b) are all of the remaining intersections included within Table 3, some of which may be established as being included within a revised SEIR depending on the outcome of a refined trip distribution/assignment screening process.

Table 4a
Potentially Impacted Intersections in Expanded Study Area

Intersection	Approved/Cumulative Projects LOS E/F (E=Existing)(C=Cumulative) Project ID Code (see notes) A	B	C	D	E	F	G	H	I	J	#	2013 Arena Study [1] #	ENP	E+P	E+P (NE)	LOS E/F	2015 DSEIR Arena Study [2]	1998 Mission Bay FSEIR [3]	Note
3rd St / King St	-C				EC						2	12	**E**	**F**	**F**	**E/F**	1	X	KEEP
4th St / King St	-C										1	13	D	**E**	**E**	**E/F**	2	X	KEEP
5th St / King St / I-280 Ramps											0	14	**E**	**E**	**E**	**E/F**	3	X	KEEP
5th St / Harrison St / I-80 Ramps				-C		EC	EC				3	25	D	**F**	**E**	**E/F**	4	X	KEEP
5th St / Bryant St / I-80 Ramps			EC		EC	EC	EC				4	see note [4]				**E/F**	5	X	KEEP
The Embarcadero / Mission St											0	3	**E**	**F**	**F**	**E/F**			ADD 1
The Embarcadero / Howard St											0	4	**F**	**F**	**F**	**E/F**			ADD 2
The Embarcadero / Folsom St											0	5	**E**	**F**	**E**	**E/F**			ADD 3
The Embarcadero / Harrison St	-C										1	6	**E**	**F**	**F**	**E/F**			ADD 4
The Embarcadero / Bryant St											0	7	**F**	**F**	**F**	**E/F**			ADD 5
The Embarcadero / Townsend St											0	10	**E**	**E**	**E**	**E/F**			ADD 6
Main St / Harrison St											0	15	**F**	**F**	**F**	**E/F**			ADD 7
Beale St / Bryant St											0	18	D	**F**	**F**	**E/F**			ADD 8
Fremont St / Folsom St											0	20	D	**F**	D	**E/F**			ADD 9
1st St / Harrison St / I-80 Ramps	EC				EC					EC	3	21	**F**	**F**	**F**	**E/F**		X	ADD 10
2nd St / Bryant St	EC				EC						2	28	**F**	**F**	**F**	**E/F**		X	ADD 11
2nd St / King St					-C						1	11	**E**	**E**	**E**	**E/F**		X	ADD 12
4th St / Bryant St / I-80 Ramps							-C				1	24	**F**	**F**	**F**	**E/F**		X	ADD 13
The Embarcadero / Broadway	-C										1	1	D	D	D				
The Embarcadero / Washington St	-C										1	2	C	D	C				
The Embarcadero / Brannon St											0	9	D	D	D				
Main St / Bryant St											0	16	C	C	C				
Beale St / Mission St											0	17	C	D	D				
Fremont St / Harrison St											0	19	C	D	C			X	
2nd St / Brannon St											0	27	C	C	C				
4th St / Howard St						EC	EC	-C			3	22	D	D	D				
4th St / Harrison St / I-80 Ramps	EC						-C				2	23	D	D	D				
Essex St / Harrison St / I-80 Ramps					EC						1							X	
2nd St / Harrison St					-C					EC	2							X	
3rd St / Townsend St					-C						1							X	
3rd St / Berry St											0							X	
4th St / Townsend St											0							X	
4th St / Berry St											0							X	
6th St / Brannan St / I-280 ramps	EC		-C			EC					3							X	
7th St / Harrison St									-C		1							X	
7th St / Bryant St									-C		1							X	
7th St / Brannon St									-C		1							X	
7th St / Townsend St									-C		1							X	

NOTES:

Approved/Cumulative Projects

A = (2007.1275E & 2014.1327E) = San Francisco 2004 and 2009 Housing Element
B = (2014.0198E850 Bryant Street -- Hall of Justice - Rehabilitation and Detention Facility
C = (2013.1407E) = Academy of Art University Project
D = (2009.0291E & 2010.0275E) = San Francisco Museum of Modern Art (SFMOMA) Expansion/Fire Station Relocation and Housing Project
E = (2007.0347E) = Second Street Improvement Project
F = 2011.0409E) = (5M Project, 925-967 Mission Street
G = 2013.0154E) = (Moscone Center Expansion Project
H = (2008.1084E) = 706 Mission Street – The Mexican Museum and Residential Tower Project
I = (2000.618E) = 801 Brannan and One Henry Adams Streets Project
J = (2011.1381E) = Art & Design Educational Special Use District (1111 8th Street)
K = (2006.1106E) = 222 Second Street

Original Arena Study LOS Operations - Weekday PM Peak Hour (4:00-6:00)

= Study Intersection # in Study / ENP = Existing No Project / E+P = Existing Plus Project / E+P(NE) = Existing Plus No Event

[1] = Analyzed in Original 2013 Arena Study - "Event Center & Mixed-Use Development at Piers 30-32 & Seawall Lot 330" (GSW P30-32 LOS_Table 052815_FP.xlsx)(pg TR-783)

[2] = Analyzed in 2015 "Event Center and Mixed Use Development at Mission Bay Blocks 29-32" (SCN:2014112045).
Table only considers study intersections north of the proposed project site, thus study intersections #6 through #22 of the DSEIR are neglected herein.

[3] = Analyzed in 1998 "Mission Bay Final Subsequent Enviroronmental Impact Report"

[4] = Incomplete data from memoranudm traffic study indicates deficient LOS E &/or F but no specifics regarding intersection #, delays, and which scenarios are projected to experience LOS E/F.

Table 4b
Potentially Impacted Intersections in Expanded Study Area

Intersection	Approved/Cumulative Projects LOS E/F (E=Existing)(C=Cumulative) Project ID Code (see notes) A	B	C	D	E	F	G	H	I	J	#	2013 Arena Study [1] #	ENP	E+P	E+P (NE)	LOS E/F	2015 DSEIR Arena Study [2]	1998 Mission Bay FSEIR [3]	Note
Fremont St / Howard St										-C	1								
1st St / Market St	EC										1								
1st St / Mission St	EC										1								
1st St / Howard St					-C					-C	2								
1st St / Folsom St					EC						1								
Essex St / Folsom St					-C						1								
2nd St / Howard St					-C					-C	2								
2nd St / Tehama St										EC	1								
2nd St / Folsom St	-C		-C		EC					EC	4								
2nd St / South Park St					EC						1								
2nd St / Townsend St					-C						1								
New Montgomery St / Market St					EC		EC				2								
New Montgomery St / Mission St					EC		EC				2								
New Montgomery St / Howard St					EC		-C			-C	3								
Hawthorne St / Howard St					EC						1								
Hawthorne St / Folsom St					EC		EC			-C	3								
Hawthorne St / Harrison St					EC		-C				2								
3rd St / Market St				EC			-C	EC			3								
3rd St / Stevenson St								-C			1								
3rd St / Mission St				-C			EC	-C		-C	4								
3rd St / Howard St				-C			EC	-C		-C	4								
3rd St / Folsom St							EC				1								
3rd St / Harrison St							-C				1								
3rd St / Bryant St					-C		-C				2								
3rd St / Brannan St					-C						1								
3rd St / Cesar Chavez St	-C										1								
4th St / Market St / Stockton						EC	EC	EC			3								
4th St / Mission St						-C	-C	-C			3								
4th St / Folsom St						EC	EC				2								
4th St / Harrison St										EC	1								
5th St / Market St						EC	EC				2								
5th St / Natoma St						EC					1								
5th St / Howard St						-C	-C				2								
5th St / Folsom St						-C	-C				2								
6th St / Market St	-C		-C			EC					3								
6th St / Mission St	-C		-C								2								
6th St / Minna St						EC					1								
6th St / Natoma St						EC					1								
6th St / Howard St						-C					1								
6th St / Folsom St			-C			EC					2								
6th St / Shipley St				EC							1								
6th St / Harrison St						-C					1								
6th St / Bryant St		EC				EC					2								
8th St / Market St			-C								1								
8th St / Harrison St / I-80 Ramps											0								
8th St / Bryant St									-C		1								
8th St / Brannan St									EC		1								
9th St / Bryant St									-C		1								
10th St / Brannan St / Division / Potrero									EC		1								
16th St / Kansas St / Henry Adams St									-C		1								
Rhode Island St / Division St									EC		1								
Sixteenth / Kansas St / Rhode Island St									EC		1								

OPINION 3 –The DSEIR's Transportation and Circulation analysis understates and fails to disclose and mitigate arena event impacts on PM commute peak travel because it fails to consider the time and duration of attendees travel in advance of passing through venue entry turnstiles

I have reviewed Dan T. Smith Jr.'s opinion within his report dated July 15, 2015 regarding The DSEIR's failure to adequately consider PM peak hour impacts due to its failure to consider the time and duration of attendees travel in advance of their arrival at the turnstile. I agree particularly with his statement that:

"many attendees will, after traveling to the vicinity of the Project site, due to their this stop in neighboring restaurants and bars for drinks or a meal, thereby advancing the actual time of their trip ahead of their time of passage through the arena turnstiles by 30 minutes to an hour or more."

I can personally attest to this dynamic. I have personal experience with 'time of arrival' issues pertaining to the NBA arena where the Sacramento Kings play, presently called 'Sleep Train Arena', but historically called (and still commonly called) 'Arco Arena'. I lived in Sacramento for sixteen years (1996-2012), and during seven of those years (1996-2003) I literally lived within 100 ft of the I-80/Truxel Road interchange. The I-80/Truxel Road interchange is presently 1 of 3 main interchanges providing primary access to the arena, and during the time I lived near the interchange I witnessed the building of the interchange (about 1998, which at the time became the 2nd main interchange providing primary access to the arena). I also witnessed and experienced the development of nearly ALL of the ancillary commercial developments (including restaurants, bars, shopping, etc.) surrounding the arena following the completion of the Truxel interchange. Throughout those seven years I commuted to/from work along the highways and arterials surrounding the arena, and frequented the commercial developments surrounding the arena during and immediately after the PM peak hour period. Thus on each and every game day, whether I personally went to a game myself or not, I experienced first-hand the increased trip generation to ancillary land uses during the later part of the PM peak hour (i.e. 5:00-6:00), experienced increased traffic volumes on I-80 and connecting arterials near the arena, and experienced worsening levels of service and increased delays. In addition to living for a time in the immediate vicinity of the arena, I also attended over 200 NBA games at the arena (as well as dozens of other special events at the arena) throughout the sixteen years I lived in Sacramento. Although I moved to and lived in the Rocklin area between 2003 and 2012, I continued to visit the arena for games, concerts, etc. and would often arrive early to meet with friends and/or frequent one of the many restaurants in the area. Through this experience, I can personally attest to the fact that the ancillary commercial uses surrounding the arena most definitely experiences a significant uptick beginning about 5:00/5:30 pm on game days (and other special events), and that this uptick most definitely increases traffic volumes along I-80, on I-80 freeway ramps to the three interchanges providing primary access to the arena, and along the arterials (and surface streets) surrounding the arena. As part of my research to provide opinions of the sufficiency of review for the proposed Golden State Warriors Arena in Mission Bay, I contacted one of the traffic engineers in the City of Sacramento's Department of Transportation to discuss this 'early arrival' dynamic. He was in agreement that the area most definitely experiences an uptick in traffic and resulting worsening in levels of service during the end of the PM peak period.

Please feel free to give me a call if you have any questions.

Sincerely,

Larry Wymer & Associates Traffic Engineering

Larry Wymer, CA T.E. 1955

Larry Wymer
& Associates
Traffic Engineering

P.O. Box 4635
El Dorado Hills, CA 95762

Phone: (916) 768-6158
E-Mail: Larry@LarryWymerTE.com
Website: LarryWymerTE.com

Larry Wymer & Associates Traffic Engineering provides traffic/transportation engineering and transportation planning consulting services for development projects, public agencies, and others requiring solutions to their transportation challenges.

Owner Larry Wymer is a licensed traffic engineer with over twenty years of diverse experience covering a full range of traffic and transportation issues, including completion of over 100 traffic impact studies ranging from small single-use developments to large multi-use developments having regional impact. His experience includes working with private clients, as well as public sector clients including Caltrans, numerous Cities and Counties throughout California, and California tribal governments. This experience with both the private and public sectors, and the establishment of successful, positive, working relationships with both private entities and public agency officials, helps to assure that fair and equitable traffic mitigation measures will be identified and/or negotiated when project induced traffic impacts are identified within our client's traffic impact studies. Mr. Wymer is known for his skillful report writing and strict attention to detail which assures that all traffic studies conform to CEQA, Caltrans, and local agency standards, and include well researched, thorough, and detailed analysis which meet the expectation of reviewing agencies.

In addition to his involvement in typical transportation engineering projects, Mr. Wymer brings three years of distinctive experience working with attorneys and expert witnesses to analyze impacts, design conceptual mitigated alternative site designs, and formulate opinions for use in depositions and expert witness testimony for over 100 properties undergoing eminent domain proceedings; as well as investigating, analyzing, reconstructing, and formulating opinions for over 100 accidents.

SERVICES PROVIDED

- Traffic/Transportation Engineering Consulting
- Transportation Planning Consulting
- Traffic Impact Studies (including CEQA level for EIR's)
- Circulation Elements
- Traffic Operations and Flow Analysis
- Project Access & Internal Circulation Analysis
- Traffic Signal Warrant Analysis
- Speed Studies
- Traffic Data Collection (including Peak Hour Intersection Turning Movement Counts)

LARRY C. WYMER
Curriculum Vitae

PROFESSIONAL REGISTRATION

- California T.E. (Traffic Engineer) #TR-1955, February, 1998
- Florida P.E. (Professional Engineer) #47692, February 1994
- Professional Traffic Operations Engineer (P.T.O.E.) #2187, June, 2007

PROFESSIONAL ORGANIZATIONS

- Institute of Transportation Engineers – Northern California Section
  - President (2007-08)
  - Section Administrator (2008-present)
  - Board Member (2004-Present) through positions as Treasurer (2004-05), Secretary (2005-06), Vice President (2006-07), President (2007-08), Past President (2008-09), Section Administrator (2008-present)
  - Various Chairs: Career/Student Guidance Chairperson (1997-2000), Technical Chairperson (1999-2000), Membership Chairperson (2004-present), Archivist (2007-08).
- Institute of Transportation Engineers – Western District (aka District 6 / Western United States)
  - Current Vice Chair for Student Initiatives (2008-present)
  - Current N. CA Section Representative of ITE District 6 Student Endowment Fund Grassroots Committee
  - Candidate for ITE International Director representing Western District (2009-12 term)
  - Candidate for ITE Western District Secretary-Treasurer (2008-09 term)

EDUCATION / HONORS

- University of Texas at Arlington. B.S. in Civil Engineering, 1989
  - President - American Society of Civil Engineers Student Chapter
  - Distinguished Senior Award - Civil Engineering Department
  - Chi Epsilon National Civil Engineering Honor Society
  - Omicron Delta Kappa National Leadership Honor Society
- Recipient of ITE District 6 (Western US District) Presidential Proclamation (2008)

PROFESSIONAL EXPERIENCE

Owner, *Larry Wymer & Associates Traffic Engineering*, El Dorado Hills, CA	Jan 2009 – Present
Manager, Traffic Engineering, *Gene E. Thorne and Associates*, Cameron Park, CA	Oct 2006 – Jan 2009
Senior Transportation Engineer, *Omni Means*, Roseville, CA	Feb 2004 – Sept 2006
Senior Transportation Engineer, *Analytical Environmental Services*, Sacramento, CA	July 2002 – Feb 2004
Manager, Traffic Engineering, *David Evans & Associates*, Roseville, CA	Aug 1999 – July 2002
Senior Transportation Engineer, *CCS Planning & Engineering*, Sacramento, CA	May 1996 – Aug 1999
Transportation Engineer, *Zook, Moore & Associate*, West Palm Beach, FL	Dec 1992 – Nov 1995
Transportation Analyst, *Kimley-Horn & Associates*, Orange, CA	Jan 1992 – Dec 1992
Associate Transportation Engineer, *DKS Associates,* Oakland & Santa Ana, CA	June 1989 – Nov 1991

College Internships

Transportation Technician, *Texas Transportation Institute*, Arlington, TX	Aug 1988 – May 1989
Environmental Technician, *Environmental Protection Agency,* Dallas, TX	Summer 1987

RELEVANT SKILLS / REPRESENTATIVE PROJECTS

OFFICE/BUSINESS MANAGEMENT SKILLS

- Owner of Larry Wymer & Associates Traffic Engineering (2009-present).
- Developed and managed Transportation Engineering Department at Gene E. Thorne & Associates in Cameron Park (2006-2009).
- Managed newly established Transportation Engineering Department of David Evans & Associates' Roseville office (2000-2002).
- Served as interim office manager of CCS Planning and Engineering's Sacramento office during the summer of 1997.
- Former licensed irrigator in Texas - Owner and operator of Forever Green Lawn Irrigation (June 1986 - June 1989) and Co-Operations Manager/Salesman at Sprinkler Engineering Corporation (Feb. 1982-June 1986).

TRANSPORTATION PLANNING

- Project manager/engineer on over 100 traffic impact studies ranging from small single-use developments requiring simple hand trip assignments and operations analysis to large regionally impacting multi-use developments requiring detailed computer analysis. (*NOTE: See attached list of selected traffic impact studies)*
- Project manager/engineer studying the feasibility of potential bypass alternatives for SR-49 traffic between I-80 and North Auburn, as well as traffic continuing to/from Nevada County. Analyzed existing travel patterns through use of video surveys and an associated DMV license plate check, oversaw the development and calibration of a MINUTP traffic model to simulate these patterns, tested ten alternative routes and various improvement strategies to alleviate congestion along the S.R. 49 corridor, and compared and contrasted the relative benefits and impacts associated with each of these alternatives, particularly in terms of how it eases congestion and improves operation of SR-49. Was an integral part of the SR-49 Bypass Study Technical Advisory Committee (TAC).
- Project manager/engineer of transportation/circulation studies for various design options associated with development of the Shingle Springs Rancheria in El Dorado County, a 160 acre site located adjacent to US-50 belonging to the Shingle Springs Band of the Miwok Indians. The latest proposed project includes a 238,500 sq. ft. casino and 250 room hotel with access via a new US-50 interchange. The various studies conformed to both CEQA/NEPA criteria and included: (1) Shingle Springs Hotel-Casino Environmental Assessment (EA), (2) Shingle Springs Medical Clinic-Residential EA, (3) Shingle Springs Interchange Project Study Report (PSR), and (4) Shingle Springs Interchange Project EIR/EA. Worked with El Dorado County traffic engineering personnel to establish analysis methodologies consistent with the El Dorado County General Plan, including helping the County to establish a matrix which outlines specific significant impact thresholds and criteria. The analysis investigated impacts to roadways and highways throughout all of El Dorado County through use of the El Dorado County MINUTP traffic model. The analysis also involved extensive research regarding recreational activity options within El Dorado County which resulted in an establishment of the likely distribution of recreation oriented trips to and from the hotel component of the project. Also an active member of the Project Development Team (PDT).
- Project engineer for Project Study Reports (PSR) for I-80/Elkhorn-Greenback interchange in Sacramento and SR-99/Hammer Lane and SR-99/Wilson Way interchanges in Stockton. Assisted with development of traffic forecasts, performed traffic operation analyses for various alternatives and helped establish final recommended geometrics.
- Project manager/engineer assisting the developer of the Pheasant Run development in the City of Dixon by providing justification to the City of Dixon to change the parcel's zoning from light industrial to residential. Prepared a traffic study using the City's MINUTP model. Presented findings to the city council showing the lessened impacts which would accompany the proposed change in zoning. The city council subsequently approved the project.
- Project engineer performing numerous screenline analyses of fatal impacts associated with the development of Indian gaming casinos at various locations to help casino developers and tribes with the selection or elimination of potential casino locations in and around the San Francisco Bay metropolitan area.
- Project engineer in responsible charge of preparing the first circulation element for the newly incorporated City of Diamond Bar, California. The project included development of a corresponding forecast transportation demand model using EMME/2. Also organized and oversaw a license plate survey which quantified the through traffic along all of the city's arterials. Also prepared circulation element updates for the cities of South Pasadena and Chino Hills.
- Project engineer performing analysis of added trips within various San Diego County sub-regions which would be

generated by new housing and commercial development associated with growth induced by development of the Jamul Indian gaming casino. Trips were established based on the number of jobs which would be established and the number of new homes which would be built to accommodate newly created jobs, with consideration for commutes occurring between and within each sub-region.

- Project engineer involved in the development and post-processing of the Riverside-San Bernardino Regional Transportation Model (RIVSAN) for the Riverside County Transportation Commission (RCTC) using TRANPLAN.
- Assistant project manager/project engineer for initial stages of preparation of the South San Diego County Impact Fee Study.

TRAFFIC ENGINEERING

- Extensive experience analyzing intersection and roadway operations using a variety of methodologies, software applications, and traffic impact study guidelines. Operations analysis includes detailed methodologies requiring use of TRAFFIX and HCM software; more simple critical movement analysis methodologies (i.e. Circular 212, CMA); and straight volume-to-capacity analysis. Experience includes detailed research and surveys for purposes of collecting and establishing existing, proposed and future year field conditions including traffic volumes, geometrics, and signal timings; supplemented as necessary by experienced engineering judgment to establish reasonable assumptions when data is not available.
- Owned and operated business performing traffic data collection services, including peak hour intersection turning movement counts. Organized and supervised data collection crews, summarized traffic data for clients.
- Project manager/engineer for Ridge Road speed study to analyze 85th percentile speeds and safety consideration for establishment of a speed zone in the vicinity of the Jackson Rancheria, including testimony to Amador County Board of Commissioners.
- Project manager/engineer for traffic control analysis of Lincoln Boulevard/Wyandotte Avenue intersection in the City of Oroville. Analyzed the feasibility of various traffic control measures to improve traffic operations at the intersection including signalization, all-way stop, and a round-about, along with opinions of costs for each alternative.
- Project manager/engineer for traffic operations and capacity analysis of design alternatives for a new roundabout intersection providing access to the new Grand Canyon Transit Center.
- Project engineer involved in the traffic engineering element of the Long Beach-Los Angeles Metro Blue Line Light Rail Transit Project. Field manager overseeing the bench and field testing and installation of modified local and central traffic signal control and surveillance software for all 27 traffic signals within the City of Los Angeles. Continued to provide system fine tuning, modifications, and on-call troubleshooting during actual operation of the system. Modified design specifications and prepared final as-built functional specifications and users manuals for the software. Also assisted in the development of the automated traffic signal testing programs created specifically for the project.
- Project engineer in responsible charge of overseeing data collection and analysis of traffic related data for the Contra Costa Transportation Authority's (CCTA) Traffic Service Objective (TSO) Monitoring Study. The study was the first detailed study performed to gauge the degree to which the County's traffic goals were met as compared to specific TSO's developed eight years earlier by CCTA, the five sub-County districts, Contra Costa County, Caltrans, BART and other local transit agencies, and the 20 incorporated cities within the County. Traffic Engineering analysis included level of service analysis for 120 intersection and numerous roadways, travel time studies and vehicle occupancy studies along freeways and dozens of major arterials, transit ridership, park and ride lot utilization, reduction of accidents, and reduction of through truck traffic.
- Project engineer assisting in the redesign of Tropicana Avenue in Las Vegas, Nevada to an 8-lane facility by analyzing intersection design alternatives, and assisting with preparation of final intersection, signal, and roadway designs.
- Principal project engineer for a corridor traffic improvement study for Spring Mountain Road in Las Vegas, Nevada.
- Experience and classroom training in use of TSIS/CORSIM (including TRAF-NETSIM, FRESIM), with ability to construct simulation models using ITRAF or write input code from scratch, and calibrate model with actual field conditions; applications include use in analyzing vehicle progression, signal coordination, and alternatives testing.

CALTRANS INITIAL STUDIES

- Project manager/engineer on seven Initial Studies analyzing impacts associated with roadway and intersection improvements along SR-16 associated with the expansion of the Cache Creek Casino in Yolo County. The first of

seven Initial Studies analyzed impacts associated with revised project access to the casino including a new signalized entrance, two new additional access driveways, and the widening and realigning of SR-16 adjacent to the casino. The other six Initial Studies analyzed impacts associated with improvements at six off-site intersections along SR-16 to accommodate increased traffic volumes associated with the expansion. Also active member of Project Development Team (PDT), and participated in public meeting in the affected community accepting comments on the first of the seven Initial Studies.

BICYCLE ROUTE STUDIES

- Completed the Safety and Transportation Analysis section of the City of Sacramento Bikeway Master Plan Update EIR which addressed safety and traffic related impacts which would be associated with adoption of the proposed plan amendments studied. Issues which were addressed included cyclist safety including shared use of roadways, potential conflicts with traffic, adequacy of roadways to accommodate proposed bikeways, and impacts associated with barriers such as freeways, freeway interchanges, rivers, railroad crossings, and major intersections. The analysis also addressed the consistency of the Bikeway Master Plan Amendment with local and regional transportation plans and programs.

CONSTRUCTION TRAFFIC HANDLING

- Project engineer responsible for evaluating traffic impacts and preparing preliminary traffic handling strategies for SRCSD pipeline construction projects along major arterials in Sacramento County including the 8 mile long Folsom 2 Interceptor and the 34 mile long Northwest Interceptor.
- Project engineer responsible for performing field inspections and assisting in the preparation of PS&E for traffic handling, construction area signing, and pavement delineation along the project corridor for the US-50 Storm Damage Repair Project in Caltrans District 3.

SPECIAL EVENT TRAFFIC MANAGEMENT

- Project engineer responsible for aspects of traffic and parking for the first annual Wings over Stockton Air Show with an attendance of over 100,000 people. Responsibilities included designing and overseeing creation and placement of signing designating routes into and through the City of Stockton to off-site shuttle lots and on-site parking; design of on-site parking including public parking, handicap, and various special pass lots; overseeing actual parking and traffic during the show including coordinating the activities of approximately 250 volunteers and troubleshooting.

EMINENT DOMAIN / SITE DEVELOPMENT & ANALYSIS

- Project engineer involved with analyzing the impacts to over 100 properties undergoing eminent domain proceedings for use in expert witness testimony. Analysis of impacts and design of mitigating cures requires investigation and analysis of numerous issues encompassing many disciplines of civil engineering in addition to traffic engineering, transportation planning, and roadway design. Civil and traffic engineering issues which are typically addressed include site access and circulation, parking, building setbacks and landscape buffers, site drainage, adjacent roadway design, conceptual site redesigns, and preparation of construction cost estimates. Transportation planning issues include concurrency reviews and conceptual traffic impact analysis for both vacant sites and fully developed sites with alternative land use concepts. Work with attorneys as well as marketing experts, appraisers, contractors, and engineers acting as expert witnesses to help formulate final opinions and courtroom defense tactics.

ACCIDENT STUDIES & ACCIDENT RECONSTRUCTION

- Project engineer involved with the investigation and reconstruction of over 100 accidents for use in expert witness testimony. Analyze accident dynamics through hand calculations, graphical analysis, and the utilization of accident reconstruction computer programs such as EDVAP. Investigate potential deficiencies in roadway designs and traffic control. Research accident histories and conduct cost-benefit analysis for potential improvements at high accident risk locations. Work with attorneys and engineer acting as expert witness to help formulate final opinions and courtroom defense tactics.

SELECTED TRAFFIC IMPACT STUDIES

Penobscot Ranch Subdivision TIS (El Dorado County) – 331.54 acre site with 33 single family residences.
Diamond Plaza TIS (El Dorado County) – 1.80 acre site with 10,389 sq. ft. retail, 5,603 sq. ft. office, 3,644 sq. ft. restaurant, and 7 single family residential lots.
Wild Chaparral Offices TIS (El Dorado County) – 2.00 acre site with 18,000 sq. ft. office.
Lakeside Avenue Sub-division TIS (City of Redding) – 25.9 acre site with 40 single family residences.
Willows Wal-Mart Expansion TIS (City of Willows) – Replacement of existing Wal-Mart store with 187,348 sq. ft. Wal-Mart Supercenter, plus 3,206 sq. ft. fast food restaurant with drive through, and gas station.
Sierra College Center TIS (City of Rocklin) – 9.83 acre site with 77,588 sq. ft. of retail/office development.
West Ridge MP TIS (City of Redding) - 400 acre site with 296 single family residences.
Chico Wal-Mart South TIS (City of Chico) – Expansion of existing 97,124 sq. ft. Wal-Mart store to a 223,013 sq. ft. Wal-Mart Superstore, plus a 5,000 sq. ft. fast food restaurant with drive through, and gas station.
Woodcreek Terraces TIS (City of Roseville) – 10 acre site with 30,420 sq. ft. of mixed retail, and 53 single family dwelling units.
Tierra Oaks TIS (City of Redding) – Expansion of subdivision to include an additional 57 single family residences.
Oroville Retail NW of SR-70 & Nelson TIS (City of Oroville) – 15.56 acres with 271,117 sq. ft. of retail/business.
Martin Ranch TIS (City of Oroville) – 70 acres with 238 single family residences.
Fiddler Green TIS (Placer County) - 18.5 acre site 116 single family residences.
Butte Woods 2 TIS (City of Oroville) - 55 acre site with 169 single family residences.
Bella Ceda TIS (City of Oroville) - 24.1 acre site with 22,000 sq. ft. medical-dental office, 7,000 sq. ft. restaurant, and 87 single family residences.
Javani Estates TIS (Sacramento County) - 7.67 acre site with 74,527 sq. ft. of grocery/retail.
Oroville Los Olivos & Ceraolo TIS (City of Oroville) - 35 acre site 132 single family residences.
Mercy San Juan Medical Center TIS (Sacramento County) – Expansion of existing hospital to include new 142,683 sq. ft. hospital tower, and a new 40,000 sq. ft. medical office building, as well as two new parking structures.
Auburn Fitness TIS (Placer County) – 3.5 acre site with 35,000 sq. ft fitness center.
West Tuolumne Rd Subdivision (City of Turlock) – 48 single family residences.
California Waste Recovery & Transfer Station (City of Galt) – 5 acre waste/recycling transfer facility.
Walnut Avenue Theater / Retail Project (City of Galt) – 15.5 acre site with 117,000 sq. ft. retail and 43,000 sq. ft. (11 screen / 1,800 seat) movie theatre.
Rocklin Pavilion (City of Rocklin) – 41.9 acre site with 415.1 sq. ft. of retail shopping center and 15,000 sq. ft. office.
Cache Creek Casino-Hotel (Yolo County) – 262,137 sq. ft. casino and 200 room hotel.
Enterprise Rancheria Casino-Hotel (Yuba County) – 40 acre site including a 207,760 sq. ft. casino and 170 room hotel.
Auburn Rancheria School (Placer County) – 2.84 acre site including 19,354 sq. ft. facility with school, administrative and tribal offices, health center, and assembly hall.
Guenoc Winery (Lake and Napa County) – Expansion of irrigated winery vineyard, pasture, and forage cropland from 1,819 acres to 6,847 acres.
Lincoln Gateway Development (City of Lincoln) – Analysis of three alternatives for 18 acre site: (1) Proposed Project: 52,500 sq. ft. retail, 5,000 sq. ft. restaurant, 12,500 sq. ft. fast food, 75,000 sq. ft. professional office, 25,000 sq. ft. medical office, and 150 affordable senior residences; (2) Reduced Commercial/Reduced Residential Alternative: 39,375 sq. ft. retail, 12,500 sq. ft. fast food, 56,250 sq. ft. professional office, 18,750 sq. ft. medical office, and 112 affordable senior residences; (3) Reduced Commercial/Increased Residential Alternative: 52,500 sq. ft. retail, 12,500 sq. ft. fast food, 5,000 sq. ft. restaurant, 44 single family residences, and 138 affordable senior residences.
Latrobe Self Storage (El Dorado County) – Rezone of 7.0 acre site from Research/Development to self-storage facility containing 104,880 sq. ft. of enclosed storage space (containing up to 693 storage units), 121 RV parking spaces, and a 4,052 sq. ft. manager office/residence.
Horizon Church (San Joaquin County) – 10, 880 sq. ft. church.
Timbisha Shoshone Casino-Hotel (City of Hesperia) – 58.1 acres including 182,500 sq. ft. casino and 300 room hotel.
Ione Casino-Hotel (City of Plymouth) – 120,000 sq. ft. casino and 250 room hotel.
Sacramento Mormon Temple (Sacramento County) – 47 acre site containing 17,500 sq. ft. the Church of Jesus Christ of Latter-Day Saints temple, a clothing and curriculum supply distribution center, and two caretakers' residences.

Evans Creek Storage (El Dorado County) – 122,000 sq. ft. of enclosed storage space consisting of up to 752 storage units.
Travis Crossing Apartments (Solano County) – 9.52 acres with 181 apartments.
All Outdoor Whitewater Rafting (El Dorado County) – Modification of existing 7.5 acre site to provide for commercial whitewater rafting put-ins and take-outs at the site.
Chapa De Indian Health Program Medical Center (City of Grass Valley) – 26,980 sq. ft. medical clinic.
Shingle Springs Casino-Hotel (El Dorado County) – 238,500 sq. ft. casino complex and 250 room hotel.
Shingle Springs Clinic and Residential Development (El Dorado County) – 14,335 sq. ft. health clinic and six single family residences.
Paskenta (Rolling Hills) Reservation Casino (Tehama County) – 50 acres including 60,000 sq. ft. casino.
Santa Rosa Rancheria Fire Station (King County) – Relocation of Kings County Fire Station #7 to Santa Rosa Rancheria adjacent to The Palace Casino.
Greenville Rancheria Casino (Tehama County) – Analysis of 2 alternatives: (1) 120,000 sq. ft. casino; (2) 122,250 sq. ft. commercial development.
Mechoopda/Chico Rancheria Casino (Butte County) – 7.58 acres with 41,600 sq. ft. casino.
Sienna Vista PCD Development (City of Phoenix, Arizona) – 260.6 acre mixed use development including 805 single family residences, elementary school, convenience market/gas station, and 13.5 acre park.
North Coast Business Park (Clatsop County, Oregon) – Master plan of 270 acre community with analysis of 2 alternatives: (1) 59.4 acres light industrial, 80 bed youth correctional facility and county animal shelter; (2) 59.4 acres light industrial, 326,700 sq. ft. shopping center, 170 county jail, 80 bed youth correctional facility county animal shelter, and 2,100 student junior college.
San Jose Continuation High School (City of San Jose)
Coachella-Augustine Rancheria Casino (Riverside County) – Two studies: (1) 162,500 sq. ft. Casino, 200,000 sq. ft. Retail, 400 room hotel, and an 18 hole golf course; (2) scaled down development with a 31,200 sq. ft. casino.
Sybil Women's Prison (Los Angeles County) – renovation of 900 bed Sybil Brand Institute and Correction Facility.
5-Star Storage (El Dorado County) – 3.34 acres with 295 storage units.
Cameron Park Storage (El Dorado County) – 5.9 acres with 90,790 sq. ft. of enclosed storage and 105 RV parking spaces.
Rios Labor Farm Camp (San Joaquin County) – existing 80 acre farm with 75 proposed housing units to accommodate approximately 400 employees/labor camp residents.
Delta Church (San Joaquin County) – 37,580 sq. ft. church including a 499 seat worship area, education, and administration facilities, as well as outdoor recreational facilities.
Central Valley Baptist Church (San Joaquin County) – 10,000 sq. ft. church and 2,400 sq. ft. multi-purpose building.
Granade Automotive (El Dorado County) – 4,000 sq. ft. automotive repair garage.
March Industrial Park (City of Roseville) – 5.25 acres of light industrial development.
Arbor View Development (City of Roseville) – 6.8 acres with 29, 909 sq. ft. retail, 7,477 sq. ft. office, and 4,500 sq. ft. restaurant.
Lincoln Terrace Apartments (City of Lincoln) – 5.1 acres with 80 apartments.
6th Street Extension (City of Lincoln) – Impacts associated with abandonment of proposed westward extension of 6th Street to accommodate 190 dwelling unit apartment complex.
Warmington Homes (City of Auburn) – 16.98 acre rezone from commercial to residential to accommodate 83 single family residences.
Forest Hill Retirement Community (Placer County) – 1700 unit active retiree community.
Peabody Green Residential Development (City of Fairfield) – 17.9 acres with 146 single family residences.
Pleasant Valley Executive Homes (City of Vacaville) – 629 acre single family residential development with planning level analysis of 500 units vs. 700 units vs. 900 units vs. 1,200 units.
Pheasant Run (City of Dixon) – 37 acre rezone from light industrial to 132 single family residences and 4.71 acres of highway commercial development.
Second Street Senior Apartments (City of Dixon) – 3.8 acres containing 81 affordable senior apartments.
Vineyard Springs Comprehensive Plan Update (Sacramento County) – 2,560 acre community with analysis of 2 alternatives: (1) 5,409 single family residences, 1,160 multi-family residences, 100,000 sq. ft. medical/dental office, 100,000 sq. ft. general office, 2 elementary schools, 18-hole golf course, 10 neighborhood parks; (2) 5,399 single family

residences, 1,170 multi-family residences, 14 acres shopping center, 5 acres limited commercial, 146,000 sq. ft. medical/dental office, 146,000 sq. ft. general office, 2 elementary schools, 18-hole golf course, 10 neighborhood parks.

Arcadian Village Community Plan Amendment Update (Sacramento County) – 268 acres including 883 single family residences, 300 multi-family residences, 22 acres commercial, 11 acres office, 1 elementary school, 3 neighborhood parks, 1 community park.

Riverwalk General Plan/Community Plan Amendment (Sacramento County) – 677 acres including 305 single family residences, 18-hole golf course, 35 acre equestrian center, swim/tennis club.

Deer Creek Hills Community Plan (Sacramento County) – 1,892 acre seniors community including 2,224 single family residences, 775 multi-family residences, 150 dwelling unit congregate care facility, 50 bed nursing home, 80,000 sq. ft. shopping center, 30,000 sq. ft. medical/dental office, 18-hole golf course.

Embassy Suites Waterfront Hotel (Downtown City of Sacramento) – 248 room hotel with meeting rooms, restaurant, bar, retail.

Capitol East End Office Development (Downtown City of Sacramento) – 1.45 million sq. ft. state office park immediately east of State Capitol.

Capitol Area Plan Update (Downtown City of Sacramento) – Master plan for downtown Sacramento including development of 2.8 million sq. ft. of new office, 4,211 new parking spaces, 90,000 sq. ft. of new commercial, and 725 new residential dwelling units.

Neighborhood Preservation Transportation Plan (NPTP) Alternative Analysis (Downtown City of Sacramento) – Recirculation of traffic following implementation of complex network of traffic calming measures.

Coral Business Park (City of Sacramento) – 18 acres including 360,000 sq. ft. office park, gas station/restaurant, 2 restaurants, 240 room hotel.

Farmer's Market IV (City of Sacramento) – 90,000 sq. ft. office.

Calvary Christian School (City of Sacramento) – 300 student elementary school/day care center.

Citgo 7-11 Convenience Store (City of Sacramento)

Taco Bell at Folsom/53rd (City of Sacramento)

South Sacramento Streams (City of Sacramento) – Area wide levee improvement project.

Arch Road Industrial Site (San Joaquin County) – 103 acres including 2,700,000 sq. ft. light industrial/warehouse.

Woodson Road Trucking Facility (San Joaquin County) – 15 acre agricultural trucking facility.

Morada Ranch (City of Stockton) – 265 acre rezone including 107 single family residences, 413,000 sq. ft. commercial.

University of the Pacific Campus Plan (City of Stockton) – Reconfiguration of campus roadways and circulation.

Sacramento Valley (Bill Graham Presents) Amphitheater (Yuba County) – 20,000 seat concert amphitheater.

City of Dixon Multi-Modal Station (City of Dixon) – Commuter Rail Station.

San Joaquin River Conservancy EIR (Fresno and Madera Counties) – Development of recreational facilities along 45 miles of San Joaquin River.

Pleasant Grove/Foothills Commercial Center - Woodcreek Plaza (City of Roseville) – 14 acres including 12,300 sq. ft. shopping center, 16,800 sq. ft. quality restaurant, 2,000 sq. ft. fast food restaurant, 8,400 sq. ft. medical office, 8,400 sq. ft. general office, 7,800 sq. ft. day care center.

Lifescan 2 Corporate Expansion (City of Milpitas) – 85,000 sq. ft. add on of administrative office to corporate park.

Peery-Arrilliga Business Park (City of Milpitas) – 144 acres including 1,945,000 sq. ft. of research and development center, 150,000 sq. ft. general office, 110,000 sq. ft. commercial.

Treefarm Condominium/Office Development (City of Los Altos) – Includes 90 multi-family residences, 72,000 sq. ft. office, 28,000 sq. ft. retail.

Phil Lewis Property (West Palm Beach, Florida) – 100,000 sq. ft. light industrial development.

Parkway Center (Downtown City of Las Vegas, Nevada) – 250 acres including 3 hotel/casinos (5,404,000 sq. ft.), 1,642,000 sq. ft. office, 1,690,000 sq. ft. County Administration Center, 773,000 sq. ft. commercial, 78,000 sq. ft. fast food, 65,000 sq. ft. quality restaurant, 65,000 sq. ft. high turnover restaurant.

The Orchards Development (City of Las Vegas, Nevada) – 432 acres including 1,750 single family residences, 1,250 multi-family residences, 11.3 acres commercial, 600 student elementary school, 15,400 sq. ft. church, 13 acre city park.

Meadow Valley Development – North & South (Clark County, Nevada) – 75 acres including 294 single family residences, 376 multi-family residences, 3,700 sq. ft. bank, and 58,000 sq. ft. commercial.

Greenway Gardens Development (City of Henderson, Nevada) – 89 single family residences.

Foothills North Development (City of Henderson, Nevada) – 43 acres including 205 single family residences.

Wilson Tower Development (City of San Gabriel) – 25,000 sq. ft. 3-story commercial/office building.
Huntington Plaza Development (City of South Pasadena) – 23,000 sq. ft. 2-story commercial/office building.
Guasti Community (City of Ontario/Ontario International Airport) – 74 acres including 2,038,000 sq. ft. of office, 422,000 sq. ft. of office/industrial, 3 hotels with 1,100 rooms and commercial uses.
Beach Blvd./La Mirada Blvd. Shopping Center (City of Buena Park) – 11 acres including 53,000 sq. ft. supermarket and 78,000 sq. ft. commercial.
Villages of Palm Springs (City of Palm Springs) – 348 single family residences.
Duoc Su Buddhist Temple (City of Garden Grove)
San Juan Meadows Development (City of San Juan Capistrano) – Residential development with 18-hole golf course and driving range.
Bixby Old Ranch Development (City of Seal Beach) – 231 acres including 168 single family residences, 125 multi-family residences, 15,000 sq. ft. restaurant, 180 room hotel.
Santa Monica College Satellite Campus - Madison School Site (City of Santa Monica) – Use of old elementary school to accommodate 8 college classrooms and a day care center for 24 children.
South Gate New Elementary and High Schools (City of South Gate) – 100 classroom (2,700 student) high school and 21 classroom (600 student) elementary school.

EXHIBIT 3

From:	Paul Mitchell
To:	lubaw@lcwconsulting.com; Bollinger, Brett (CPC); Wise, Viktoriya (CPC); Jose Farran
Cc:	Joyce; Brian Boxer
Subject:	RE: GSW - Arrival distribution
Date:	Monday, January 12, 2015 3:01:04 PM

Luba:

I just sent everyone in this email the Sacramento Kings RTC document via ESA DeliverIt. Also, Brian Boxer sent the information below regarding arrival/departure patterns for the Kings ESC EIR to Jose last Wednesday.

Paul Mitchell
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The following is extracted from pages 4.10-43 and 4.10-44 of the Sacramento ESC EIR:

Arrival / Departure Patterns

Following is an evaluation of expected arrival/departure patterns for each event type (see Appendix D for technical data).

- **Weekday Evening Kings Game** – Table 4.10-8 displays the observed percentages of vehicles entering the Sleep Train Arena parking lot (via all four entrances) for a 7 pm weekday Kings game on April 5, 2012. As shown, 67.4 percent of all attendees arrived between 6 and 7 PM. This table also shows data provided by ICON Venue Group for a number of other NBA arenas. Although the data show that 53.8 percent entered the arena during the one-hour prior to the game start, it is likely that many of the 37 percent that arrived at or after tipoff initially arrived to the site during the one-hour prior (and were searching for parking or visiting an adjacent retail/restaurant. Therefore, to be reasonably conservative, 67.4 percent of evening Kings game attendees are assumed to enter the study area during the pre-event peak hour.

- **Morning Civic Event** – Based on data from previous studies and professional judgment, two-thirds (66.7 percent) of civic event attendees are expected to arrive during the AM peak hour. This is reasonably conservative when compared to other of conference centers that assume 50 percent or less of arrivals occur during the AM peak hour.

- **Afternoon Event** – Based on data from previous studies and professional judgment, three-quarters (75 percent) of special/family event attendees are assumed to depart during the PM peak hour. This input is substantiated by 2010 traffic counts collected at a Los Lobos concert at the Mondavi Performing Arts Center on the UC Davis campus. That study found that 74 percent of all

concert attendees departed the event within the one-hour after the event ended.

TABLE 4.10-8
PRE-EVENT ATTENDEE ARRIVAL PATTERNS

Time	Percent Entering Sleep Train Arena Parking Lot for 7 pm Game [1]	Percent Entering Building for Other NBA Venues [2]
5-6 pm	14%	9.2%
6-6:30 pm	22.7%	21.5%
6:30-7 pm	44.7%	32.3%
7-8 pm	18.6%	37.0%

1. Fehr & Peers conducted counts from 5 to 8 pm at all entrances to a Kings home game (versus Clippers) at Sleep Train Arena on Friday, April 5, 2012. Game had attendance of 12,600.
2. Based on data provided by Icon Venue Group.

SOURCE: Fehr & Peers, 2013.

According to the Sacramento Kings, about 850 of the 1,200 ESC Kings game event employees would arrive two hours prior to the start of the event (i.e., prior to the pre-event peak hour) and remain on-site for some time after the event concludes.[1] For analysis purposes, 100 inbound employee trips are conservatively assumed during the pre-event peak hour.

During weekday evening Kings games, other event management, all-day, and cleaning staff would arrive/depart during various parts of the day. Data from the April 5, 2012 Kings game were reviewed and showed 190 outbound trips departing Sleep Train Arena from 6 to 7 PM. This may have included departing day employees, deliveries, and even some drop-offs. To account for these types of activities, 200 outbound employee trips are estimated for the pre-event peak hour.

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From: lubaw@lcwconsulting.com [mailto:lubaw@lcwconsulting.com]
Sent: Monday, January 12, 2015 10:04 AM
To: Brett Bollinger; Viktoriya Wise; Joyce; Paul Mitchell
Cc: Jose Farran
Subject: GSW - Arrival distribution

Hi all

The numbers that GSW Warriors provided are the actual Oracle arena arrivals numbers, but Clarke was happy that they were higher than the other NBA aggregated venues that Kate had provided late on Friday (Although it is likely that the aggregated venues do not include lots of downtown arenas - plus SF is different anyway).
There is some question about what exactly was used in the Kings arena, and Clarke is following up with Brian with that. Also, Clarke will ask Brian on how the AECOM comment on the EIR was responded to.

Changing the distribution now would add more than a week to the schedule, depending.

I mentioned that one way or another we need to address this issue this Wednesday, and that we need direction from EP. We feel that it is appropriate that the percentage arriving during the 4 to 6 PM peak period at the SF site is greater than at the existing arena. What percentage, not sure.

Paul, can you get the Kings EIR RTC document to us? And maybe have someone find the AECOM comment?

Thanks,
Luba

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[1] See Chapter 2, Project Description, Table 2-5.

EXHIBIT 4

moveSmartSF

SAN FRANCISCO TRANSPORTATION PLAN 2040

FINAL REPORT

DECEMBER 2013

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

FROM THE EXECUTIVE DIRECTOR

The countywide transportation plan is where all of the city's transportation modes, operators, and networks come together. Ten years ago we developed the first long-range transportation plan and investment blueprint for San Francisco. This investment strategy served as the basis for Prop K, the half-cent transportation sales tax reauthorized by over 75% of voters in late 2003. To date, we have allocated over $1 billion in Prop K expenditures, leveraging as we did so significant regional, state, and federal matching dollars. The Transportation Authority's Prop K and other allocations have funded critical improvements in every neighborhood such as traffic calming, safe pedestrian and bicycle networks, new transit vehicles, signal priority, and street resurfacing. With the help of public and private partners, all of the Plan's signature capital investments also have been implemented or are substantially underway, including the Presidio Parkway, Transbay Transit Center, Central Subway, and Van Ness Avenue Bus Rapid Transit. During this time, the city responded together with the region to a statewide call to action on climate change, approving a generation of land use plans with transit-oriented designs and sustainable policies. Together, we weathered an economic cycle whose impacts were mitigated by our ability to use local funds such as Prop K to keep projects moving forward and competitive for new funding opportunities when they eventually arose (such as federal stimulus funds). We also partnered with the City to maintain our transportation assets, though significant needs remain. Now, as economic activity returns, we must continue to invest to address pressing maintenance and safety needs. We should deploy and manage our scarce resources efficiently. And we will develop innovative solutions and deliver the next generation of infrastructure that is necessary to meet our goals for a healthy, vibrant, and equitable transportation system for all users.

Tilly Chang

EXECUTIVE DIRECTOR, SFCTA

CONTENTS

Adopted by the Transportation Authority Board on December 17, 2013

Preparation of this report was made possible in part by the San Francisco County Transportation Authority through a grant of Proposition K local transportation sales tax funds and a grant from the U.S. Department of Transportation and the Federal Highway Administration. Content of this report does not necessarily reflect the official views or policy of the U.S. Department of Transportation.

Photo above courtesy of Perkins + Will | Report design by Bridget Smith

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Tina Spencer, Alameda-Contra Costa Transit District (AC Transit)
Ana Validzic, San Francisco Department of Public Health
Barbara Vincent, GGBHTD
Beth Walukas, Alameda County Transportation Commission
Rube Warren, BART

CHAPTER ONE

INTRODUCING THE SAN FRANCISCO TRANSPORTATION PLAN

THE SAN FRANCISCO TRANSPORTATION PLAN, OR SFTP, is the blueprint for San Francisco's transportation system development and investment over the next 30 years. The SFTP brings all transportation modes, operators, and networks together, with a view to improving travel choices for all users. Through detailed analysis, interagency collaboration, and listening to the public, we've evaluated ways to improve our system with existing and potential new revenues. The SFTP recommends a diverse investment plan that makes meaningful progress towards our important goals: livability, world-class infrastructure, economic competitiveness, and a healthy environment. The SFTP also recommends policy changes that depart from business as usual and will help us make the most of our investments.

INSIDE THE SFTP

The SFTP contains:

- The Investment Plan, to guide spending of existing and anticipated new transportation funds through 2040.
- The SF Investment Vision, to guide spending of additional new locally-controlled revenues.
- Policy recommendations and strategic initiatives to complement the Investment Plan and Vision.
- Next steps for implementing the SFTP recommendations and monitoring results.

Through 2040, we can expect about $75 billion in funding to support San Francisco's transportation system. Most of this is already committed to specific projects or purposes. This leaves $5 billion in existing and anticipated new revenues that we can decide how to spend. As shown in Figure 1, this $75 billion funds the Investment Plan. Because there is far more need than available revenues for transportation, the SF Investment Vision assumes an additional $7.5 billion in locally-controlled revenues. Figure 2 presents the highlights of the Investment Plan and Vision.

PHOTO: CENTRAL SUBWAY'S TUNNEL BORING MACHINE "MOM CHUNG" IS NOW MAKING ITS WAY BENEATH THE STREETS OF SAN FRANCISCO

FIGURE 1. SF INVESTMENT PLAN AND SF INVESTMENT VISION REVENUE
(BY USE)

FIGURE 2. HIGHLIGHTS OF THE SFTP INVESTMENT SCENARIOS

	INVESTMENT PLAN		SF INVESTMENT VISION	
Operations and Maintenance of Transit and Streets	$66.3B 88%	70% of highest priority transit maintenance needs met Maintains today's pavement condition	$69.7B 84%	100 % of highest priority transit maintenance needs met Pavement condition improves to "good" levels
Multimodal Street Safety, Enhancement, and Community Mobility	$1.2B 1%	About 40% of the City's Pedestrian Safety Strategy and 22% of the City's Bicycle Strategy funded Parking and peak period congestion pricing downtown help reduce auto trips by up to 10%	$2.5B 3%	100% of the Pedestrian Safety and Bicycle Strategies funded Further expansions of cost-effective employer, school, and community trip reduction programs help reduce auto trips by up to 14%
Efficiency and Expansion Projects	$7.6B 10%	15 miles of protected transit lanes Caltrain electrification and extension to a rebuilt Transbay Terminal	$10.4B 13%	Up to 33 miles of protected transit lanes, including increased BART capacity and reliability Freeway management and transit efficiency strategies, including increased BART capacity and reliability
TOTAL	**$75.1B**		**$82.6B**	

The SFTP recommends a diverse investment plan that makes meaningful progress towards our important goals: safe and livable neighborhoods, well-maintained infrastructure, economic competitiveness, and environmental health.

KEY FINDINGS AND POLICY RECOMMENDATIONS

- Prioritize revenues to fully fund timely vehicle replacement and rehabilitation
- Expand transit service while supporting steps to stabilize costs
- Achieve city goals for average pavement condition
- Build the pedestrian and bicycle strategies to establish safer neighborhood networks citywide
- Create more complete streets (at lower cost) through coordination with repaving
- Increase investment in employer, school, and community trip reduction programs
- Increase transparency and promote public involvement by sharing agency prioritization and development processes
- Continue to develop pricing approaches to congestion management
- Continue rapid transit network development, including bus rapid transit
- Continue to coordinate transit investment with land use development plans
- Set a vision for managing the city's freeway network
- Identify the next generation transit network priorities for BART, Caltrain, and Muni
- Consider all options for delivering projects

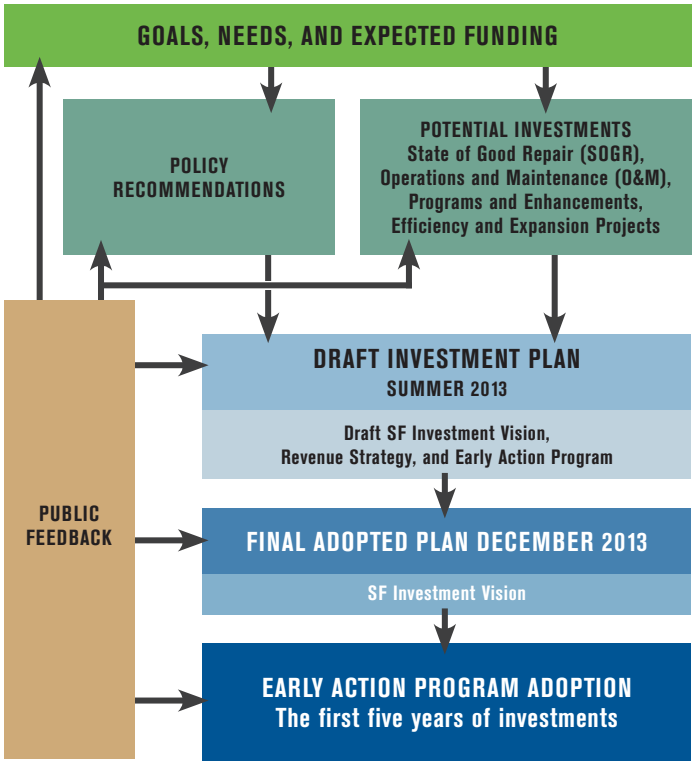

FIGURE 3. SFTP PROCESS FLOW CHART

SFTP GOALS

The SFTP positions San Francisco to meet our city's transportation system goals. We identified the four SFTP goal areas, shown in Figure 4, through Board, partner agency, and community input, and through consideration of city policies like the Transit First Policy in the City Charter and the City's Climate Action Plan. Appendix A (SFTP Plan Development Process) and Appendix B (Needs Analysis White Paper) describe how these goals and associated performance measures shaped our assessment of transportation system needs, the Investment Plans, and policy recommendations.

HOW WE DEVELOPED THE SFTP

As Congestion Management Agency (CMA) for San Francisco, the Transportation Authority is responsible for developing a long-range, countywide transportation plan. We developed the SFTP through extensive technical analysis, consultation with partner agencies, and community outreach over several years. Appendices A-J describe the technical analysis behind the plan.

Throughout the SFTP development process, we heard several consistent policy questions from our Board, partner agencies, and the public, and we responded with research and analysis. Figure 5 (next page) lists the policy research topics and associated products. The research findings led to the creation of the final policy recommendations contained in this document.

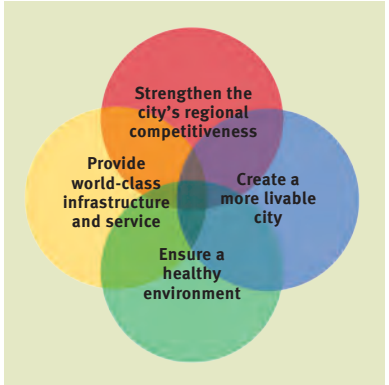

FIGURE 4. SFTP GOAL AREAS

THE SIGNIFICANCE OF THE SFTP

The priorities established in the SFTP influence the regional transportation plan prepared by the Metropolitan Transportation Commission (MTC), known as Plan Bay Area, and position San Francisco for regional, state, and federal transportation funding. Transportation projects seeking this funding must be consistent with the SFTP and Plan Bay Area.

Additionally, the SFTP informs and guides other local and regional plans and policy priorities:

- It reflects and reinforces San Francisco's Transit First Policy, adopted in 1973.
- It informs local plans and investments including the General Plan Transportation Element, the SFMTA and City and County of San Francisco Capital Plans, and regional transit operator (e.g. BART and Caltrain) expansion plans.
- It informs San Francisco's efforts to manage congestion and coordinate transportation investment with land use, as described in the Congestion Management Program (CMP).
- It guides project selection for the Proposition K (Prop K) 5-year plans. Prop K is San Francisco's half-cent transportation sales tax, approved by over 75% of voters in 2003. Prop K leverages federal, state, and other funds to direct hundreds of millions of dollars toward SFTP implementation.

Significant progress has been made on goals set in the 2004 Countywide Transportation Plan, projects that were made possible in part through San Francisco's Prop K transportation sales tax dollars, approved by over 75% of voters in 2003.

FIGURE 5. ANALYSIS AND POLICY STUDIES DEVELOPED DURING THE SFTP PROCESS

POLICY QUESTION/STRATEGIC INITIATIVE	RESEARCH PRODUCT
How can we...	
Meet our ambitious livability and environmental goals?	Needs Analysis White Paper (Appendix B)
Improve the social and geographic equity of our transportation system?	Transportation Equity Analysis (Appendix F)
Create complete streets that improve safety for all users?	Small Project Delivery White Paper (Appendix H)
Deliver transportation projects faster?	Small Project Delivery White Paper (Appendix H) Large Project Delivery White Paper (Appendix I)
Reduce conflicts between the local and regional transportation systems, and improve connections?	Core Circulation Study (Appendix C)
Collaborate more effectively with the private sector to manage travel demand?	Travel demand management strategic plan (expected spring 2014)
Reduce conflicts and provide for the needs generated by the fast-growing SoMa neighborhood?	Core Circulation Study (Appendix C)
Raise new revenue for transportation?	Revenue Options Analysis (available on request) Revenue White Paper (expected early 2014)
Meet the unique transportation needs of young students, visitors, and deliveries?	Needs Analysis White Paper (Appendix B)

ACCOMPLISHMENTS SINCE THE LAST PLAN

The SFTP builds on the accomplishments of the 2004 Countywide Transportation Plan,[1] including:

- Major investments in new transit capacity and system maintenance projects are constructed or underway:
  - » T-Third Light Rail linking the Bayview and South of Market.
  - » Tunneling work for the new Central Subway linking the T-Third to SoMa, Union Square and Chinatown.
  - » Replacement of the old Central Freeway with Octavia Boulevard.
  - » Replacement of Doyle Drive with Presidio Parkway.
  - » A new Transbay Transit Center under construction.
- A citywide network of rapid buses is under development:
  - » Completion of environmental work for Van Ness Avenue Bus Rapid Transit (BRT).
  - » Environmental impact analyses are underway for Geary Boulevard BRT and the Transit Effectiveness Project.
- Neighborhoods are more livable, through bicycle, pedestrian, traffic calming, and streetscape improvements:
  - » Prop K provided the first and only stable source of funding for traffic calming.
  - » Examples such as Leland Avenue, Valencia Street, and Broadway Street re-designs demonstrate new ways of improving safety, livability, and creating open space.
  - » Majority of SF Bicycle Plan constructed.
- Parking management and road pricing are key concepts in discussions about managing San Francisco's transportation system:

1 The 2004 Plan is available on the authority web site: http://www.sfcta.org/documents-and-data/documents/2004-countywide-transportation-plan

  - » SFMTA piloted variable parking pricing and management (SFpark).
  - » The Transportation Authority Board adopted the Mobility Access and Pricing Study exploring various scenarios for possible congestion charge downtown.
  - » The Board of Supervisors unanimously adopted the innovative road and parking pricing program for Treasure Island.
- Multiple Neighborhood Transportation Plans adopted by the Authority Board have established a pipeline of community-supported neighborhood transportation projects, many of which have been implemented, including in the Outer Mission, Mission South of Chavez, Tenderloin/Little Saigon, Bayview, Western South of Market, and Balboa Park.
- Numerous state of good repair investments to improve the reliability of the transportation network:
  - » Construction of the Muni Metro East Maintenance Facility, the first major expansion to the SFMTA's Light Rail Vehicle maintenance facilities since the 1970s.
  - » Acquisition of nearly 200 new hybrid buses for Muni and the construction of the Islais Creek Maintenance Facility, the first new rubber-tire maintenance facility in 60 years.
  - » Street resurfacing, traffic signal upgrades, sidewalk repairs, and new curb ramps on sidewalks citywide.

Top to bottom: Projects as diverse as the Central Subway, new bicycle facilities, the T-Third light rail line, and Western SoMa streetscape enhancements are all part of the legacy of the 2004 Countywide Transportation Plan.

THE SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

Created in 1989, the Transportation Authority:

- Develops San Francisco's long-range transportation plan (SFTP)
- Helps analyze and fund transportation system improvements
- Administers the Prop K half-cent local transportation sales tax program and the Prop AA vehicle license fee.
- Manages the Transportation Fund for Clean Air (TFCA).
- Serves as Congestion Management Agency (CMA) for San Francisco under state law. Prop 111, passed in 1990, increased the state fuel tax and required urban counties to designate a CMA responsible for coordinating transportation planning, funding and other activities in a congestion management program. To learn more about the Transportation Authority, visit our web site at www.sfcta.org.

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CHAPTER TWO

OUR TRANSPORTATION CHALLENGES AND OPPORTUNITIES

SEVERAL CRITICAL CHALLENGES AND OPPORTUNITIES must be considered as we strive to achieve our transportation system goals for livability, world-class infrastructure, economic competitiveness, and a healthy environment. The following section highlights these issues, and Appendix B provides additional detail. Appendix K (San Francisco Travel at a Glance) depicts three key travel trends that shaped the SFTP.

LIVABILITY

San Francisco aims to be a livable city—one where walking, bicycling, and transit are safe, comfortable, and convenient modes of travel. Accordingly,

- The SFMTA has set a goal of more than 50% of trips by walking, bicycling, and transit by 2018.
- The Mayor's Executive Directive 10-03 called for a 50% reduction in severe and fatal pedestrian injuries by 2021.
- The Board of Supervisors set a goal of achieving a 20% bicycle mode share by 2020.

Achieving the desired growth in bicycling, walking, and transit trips while reducing the rate of injuries and fatalities will require increased investment, education, and re-allocation of street space—sometimes with difficult trade-offs—to these modes.

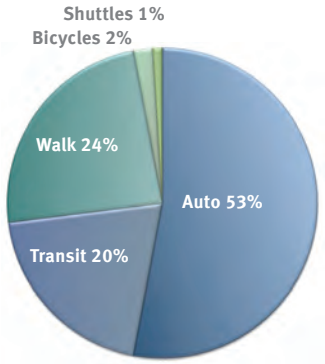
We asked "what would it take?" to achieve San Francisco's ambitious goals. Some of our goals, such as world-class infrastructure would require major increases in funding. Others require both new funding and bold policies that prioritize transit, walking, and bicycling in our limited rights of way. See page 19 for a summary.

MANY WANT TO WALK AND BIKE TODAY, BUT DON'T DUE TO SAFETY CONCERNS

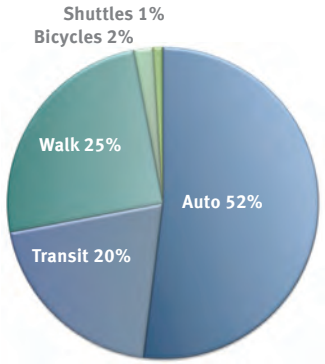
Supporting travel by walking and bicycling requires safety improvements. Safety concerns discourage pedestrians: about 820 pedestrians are killed or injured every year in San Francisco, many on arterials roadways identified in the Walkfirst Investment Plan (Figure 6). Without

FIGURE 7. SHARE OF TRIPS BY MODE OF TRAVEL, 2013 (TOP) AND 2040 BUSINESS AS USUAL (BOTTOM)

2013



2040, BUSINESS AS USUAL



SOURCE: SFCTA, SF CHAMP

significant new investment, this number could grow as high as 980[1] by 2040 due to projected increases in automobile trips.

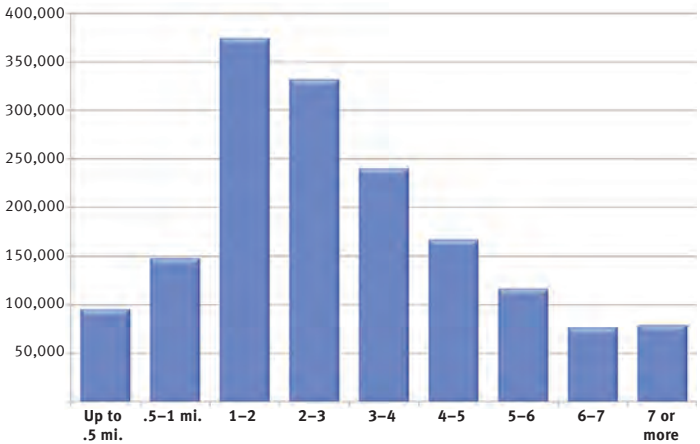
San Francisco's aging population also adds to the challenge of achieving this goal. San Francisco is projected to experience 68% growth in number of people 65 and older by 2040, making this group 20% of the population (compared to 16% today[2]). Older pedestrians are more vulnerable to serious injury or death when struck by an automobile.

Safety concerns also discourage bicycling. Surveys conducted for the SFMTA's 2012 State of Cycling Report indicate that almost half of those who do not currently bicycle say they are uncomfortable bicycling in mixed flow traffic with cars, and only 13% said they feel safe from traffic when bicycling. At the same time, 94% of respondents said they would feel comfortable riding in bicycle lanes.

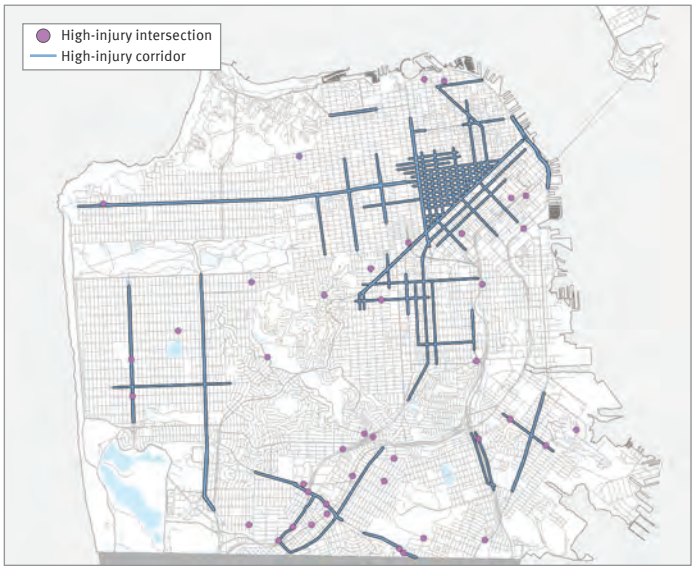
UNRELIABLE TRANSIT DISPROPORTIONATELY AFFECTS OUTER NEIGHBORHOODS

Livable neighborhoods are accessible by transit, not just during peak commute periods, but throughout the day and evening. This supports San Franciscans' ability to get to and from school, medical appointments and recreational activities by transit. Analysis of transit transfer rates and input received during outreach indicate that outlying neighborhoods, including the Bayview and Sunset, are less accessible throughout the day by transit. A shortage of maintained vehicles results in turning back buses and light rail vehicles before they serve outer neighborhoods, forcing riders into extra waits. The transit network in the lower-density Sunset neighborhoods and hilly Eastern Neighborhoods is less dense, resulting in fewer transit alternatives and fewer direct rides—and making reliability all the more important.

FIGURE 8. AUTOMOBILE TRIPS WITHIN SAN FRANCISCO BY LENGTH, 2040



SOURCE: SFCTA, SF CHAMP



SOURCE: WALKFIRST INVESTMENT STRATEGY, 2013

FIGURE 6. HIGH-INJURY PEDESTRIAN CORRIDORS

PLANNED INFILL LAND USE PATTERNS SUPPORT WALKING, BICYCLING, AND TRANSIT

The land use plans adopted by the San Francisco Planning Commission and Board of Supervisors over the last decade are expected to move us in the right direction, supporting infill and making walking and bicycling easier. As new residents and jobs locate in areas already convenient for bicycling and walking, the share of trips made by bicycling and walking is expected to grow slightly (Figure

1 Based on SFDPH Eastern Neighborhoods Impact Analysis which indicated that holding all other variables constant, a 15% increase in vehicle volume produces a 10% increase in pedestrian injury collisions.

2 Based on Association of Bay Area Governments population projections for San Francisco.

7) but additional investment is needed to meet the city's goal of more than 50% of trips by walking, bicycling and transit. San Francisco has a great potential for further increasing rates of walking and bicycling—as Figure 8 (previous page) shows, nearly 60% of all local automobile trips projected in 2040 will be less than three miles in length, a convenient distance for non-motorized travel.

COMMUNITY SUPPORT FOR TRADEOFFS IS CRITICAL TO ACHIEVE SAFE, EFFICIENT NETWORKS

Research shows that walkability contributes to the livability and affordability of neighborhoods and overall competitiveness of cities. Accordingly, the City has developed strategies that provide a vision for significantly improving the safety of pedestrian and bicycle networks (specifically, the SFMTA Bicycle Strategy and the Mayor's Pedestrian Strategy), but implementation requires investment and, at times, challenging tradeoffs. This is especially so where many of the easy, lower-cost fixes to improve bicycling and walking infrastructure (e.g., striping and signage) are already complete.

Improvements that more significantly benefit bicyclists and pedestrians do so by physically separating these travelers from vehicular traffic or by reducing vehicle traffic and speeds, which may require parking removal or increased signal delay for vehicles. Implementing these improvements requires leadership and community acceptance in return for increased safety for bicyclists and pedestrians.

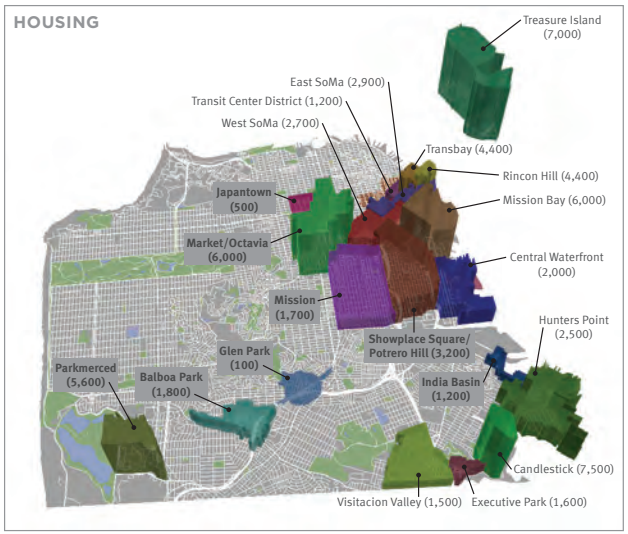
ECONOMIC COMPETITIVENESS

San Francisco's economic competitiveness depends on having an affordable and reliable transportation system with sufficient capacity to accommodate our travel needs efficiently.

PLANNED HOUSING AND JOB GROWTH CONTRIBUTES TO A MORE SUSTAINABLE CITY AND REGION

The Association of Bay Area Governments has forecast significant job and housing growth in the city. A city of about 800,000 residents and 570,000 jobs today is forecast to house nearly 1.1 million residents and more than 750,000 jobs by 2040—much of this

FIGURE 9. SAN FRANCISCO'S PROJECTED HOUSING GROWTH (TOP) AND JOBS GROWTH (BOTTOM) AREAS THROUGH 2040



SOURCE: SAN FRANCISCO CITY PLANNING DEPARMTENT (2013)

San Francisco's economic competitiveness depends on having an affordable and reliable transportation system with sufficient capacity to accommodate our travel needs efficiently.

By 2040, new growth will result in about 300,000 new transit trips per day on a system that is already strained by crowding and reliability issues.

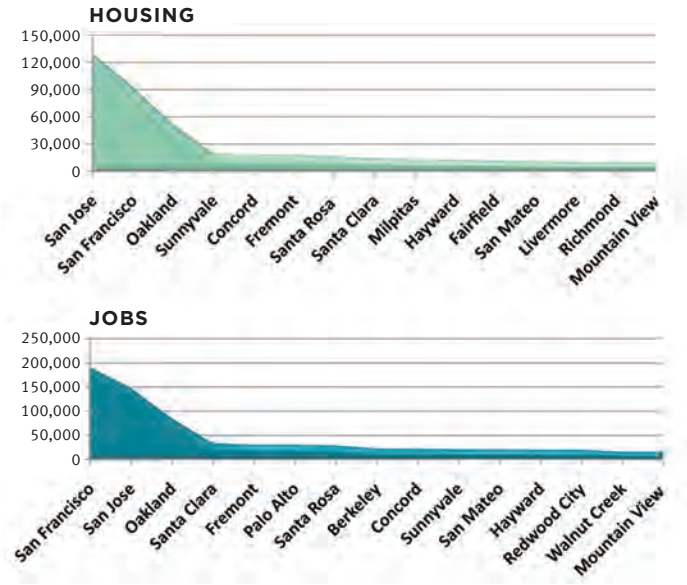
growth is expected in the downtown core, southeast, and southwest (Figure 9). This would mean adding about 9,800 new residents each year for the next thirty years, compared to about 4,200 residents that have been added per year over the prior thirty years.

These projections reflect expectations for robust regional growth and regional policy stemming from Senate Bill 375 (2008), which required regional governments to reduce greenhouse gases from transportation. To meet the SB 375 target, the Regional Transportation Plan, known as Plan Bay Area, calls for concentration of growth in densely developed areas with good transit access especially in San Francisco, San Jose, and Oakland (Figure 10)—a pattern that supports less driving and produces fewer greenhouse gases.

INCREASED TRANSIT CAPACITY AND SERVICES ARE NEEDED TO ACCOMMODATE GROWTH

Concentrating jobs and housing in San Francisco is good for the city's economy as well as the environment, but will also increase congestion and transit system crowding in downtown San Francisco and Eastern neighborhoods. By 2040, new growth will result in about 300,000 new transit trips per day on a local and regional system that is already strained by crowding and reliability issues. The San Francisco Planning Commission has adopted land use plans that direct much of the city's projected growth in the central and eastern neighborhoods, where crowding is already acute. Figure 11 compares transit crowding today and in 2040,

FIGURE 10. POPULATION AND EMPLOYMENT GROWTH PROJECTIONS IN THE TOP 25 BAY AREA CITIES (2010-2040)



SOURCE: METROPOLITAN TRANSPORTATION COMMISSION, PLAN BAY AREA (2013)

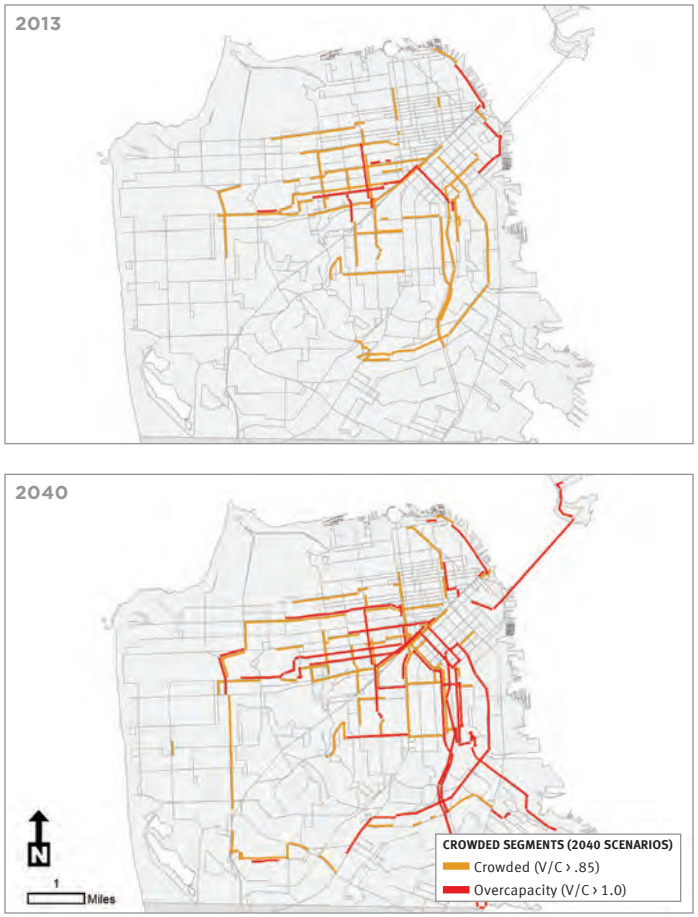
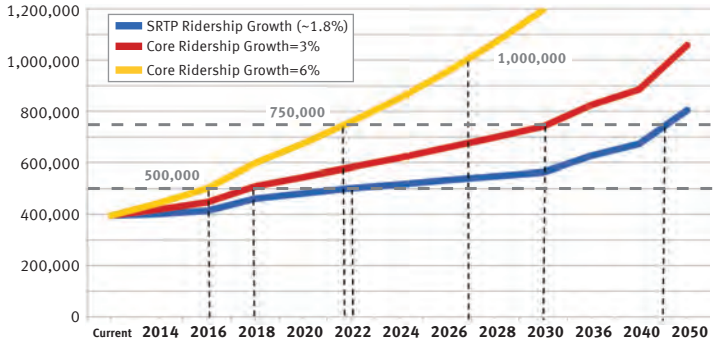


FIGURE 11. CROWDING* ON MUNI IN 2013 (TOP) AND IN 2040 (BOTTOM)

SOURCE: SFCTA, SF CHAMP

* Crowding is defined by the percent of person-hours traveled in crowded (passenger-volume-to-vehicle-capacity ratio is 85% or higher) or over-capacity conditions (volume to capacity ratio is more than 100%).

FIGURE 12. BART STATION CAPACITY CONSTRAINTS



SOURCE: BART

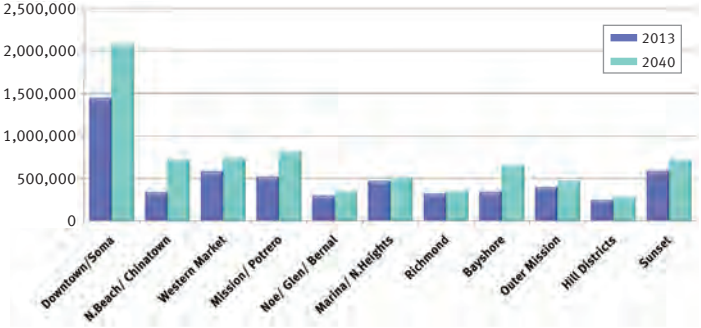
and shows that crowding will grow most on the lines expected to serve these areas and the new development areas, such as the southeast waterfront, Treasure Island, and Parkmerced.

Many regional bus and rail operators already face peak-period crowding and would also see that increase significantly by 2040. BART ridership to, from, and within San Francisco is projected to grow by 37%, and as such, the system's two most crowded stations, Embarcadero and Montgomery, are forecast to hit limits in their person-carrying capacity. BART estimates that at 500,000 daily system riders, stations will be at capacity in 2016, and at 750,000 system riders, the stations will experience significant backups at escalators and overcapacity platforms (Figure 12).

CAPACITY NEEDS MOST ACUTE IN THE CORE: DOWNTOWN, SOUTH OF MARKET, MARKET/OCTAVIA, AND EASTERN NEIGHBORHOODS

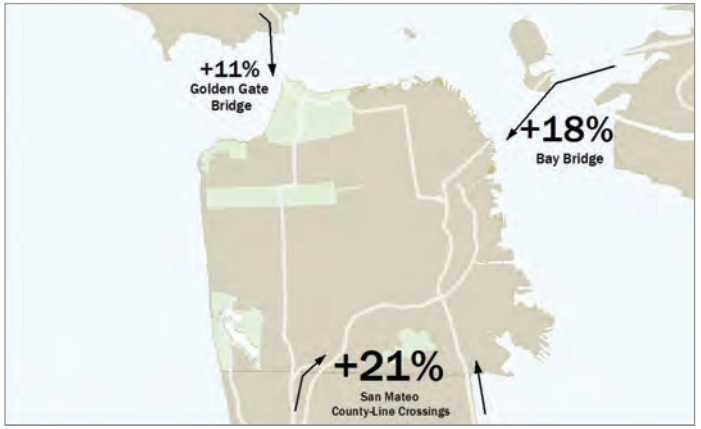
36% of trips to, from, or within San Francisco begin or end in the downtown and South of Market neighborhoods, more than any other neighborhood (Figure 13). Expected growth will significantly increase transit crowding and street congestion downtown. With projected growth and no new investment beyond already-planned projects, increased traffic will slow speeds to gridlocked conditions for cars and buses alike during peak hours. A nearly 30% reduction in projected private vehicle traffic would be necessary to avoid this condition (see Appendix C for detail). Strategies

FIGURE 13. DAILY PERSON TRIPS BY SAN FRANCISCO NEIGHBORHOOD



SOURCE: SFCTA, SF CHAMP. EACH BAR INCLUDES ALL TRIPS TO, FROM, AND WITHIN THE NEIGHBORHOOD.

FIGURE 14. CHANGE IN DAILY COUNTY LINE CROSSINGS BY AUTOMOBILE, 2012-2040



SOURCE: SFCTA, SF CHAMP

recommended to achieve this reduction are discussed on pages 29–30, and are incorporated into the SFTP Investment Plan, SF Investment Vision, and associated policy recommendations.

NETWORK DEVELOPMENT AND MANAGEMENT NEEDED FOR THE SOUTHEAST AND PENINSULA CORRIDORS

Over the SFTP period, daily automobile trips entering San Francisco from the South Bay are expected to grow by 21% (Figure 14). This results in worsening congestion on Highway 101 and 280. The planned extension of Caltrain to the new Transbay Transit Center would help accommodate this growth and provide access

for the future high speed rail system, but funding is incomplete. Better management of existing freeway space through high-occupancy vehicle lanes or other solutions is also needed.

WORLD CLASS INFRASTRUCTURE

San Francisco's transportation system relies on aging infrastructure that will need significant repair or replacement in the next decades. Without a significantly increased financial commitment to reach and maintain a state of good repair, riders will see increasing delays and crowding related to vehicle breakdowns, reduced service levels, and worsening pavement condition.

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TRANSIT VEHICLE REPLACEMENT AND BETTER MAINTENANCE WOULD IMPROVE RELIABILITY

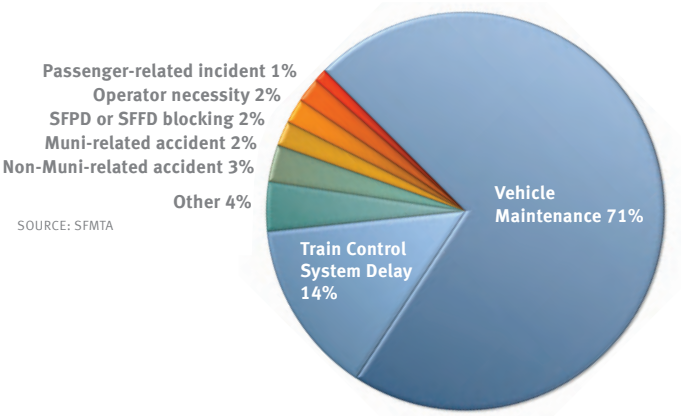
After decades of underinvestment, Muni and regional transit agencies that serve San Francisco have significant unfunded capital needs amounting to more than $5 billion through 2040 (see Appendix B for detail). These needs include new or updated facilities for maintaining transit vehicles, rail and overhead wire replacement, vehicle maintenance and replacement, and other needs.

As a result of resource limitations, Muni's vehicles have not received mid-life rehabilitations or timely replacement, resulting in a fleet that has high service unreliability and frequent expensive emergency repairs, as well as frequent unscheduled vehicle turnbacks. Figure 15 shows that vehicle maintenance is responsible for a large share of transit-service delays. Increased investment in routine maintenance and timely vehicle replacement would significantly reduce these delays and improve reliability. Figure 16 shows how breakdowns can be minimized with proper maintenance and mid-life replacement.

TRANSIT OPERATING COSTS ARE GROWING FASTER THAN REVENUES

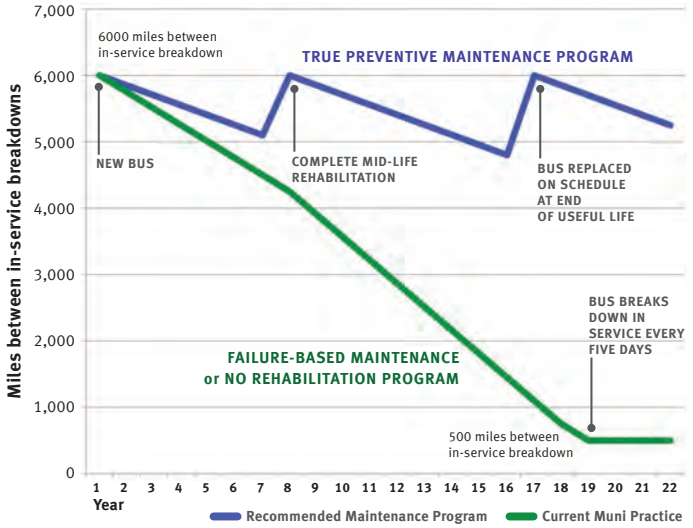
The cost of providing transit service has risen rapidly in recent years, a trend which destabilizes Bay Area transit systems and affects riders impacted by resulting service cuts. Figure 17 (next page) shows the rising real (inflation-adjusted) costs of transit

FIGURE 15. MUNI LIGHT RAIL: MAY 2013 REASONS FOR DELAY



SOURCE: SFMTA

FIGURE 16. LIFE CYCLE OF A TROLLEY BUS



SOURCE: SFMTA (FIGURE IS CONCEPTUAL)

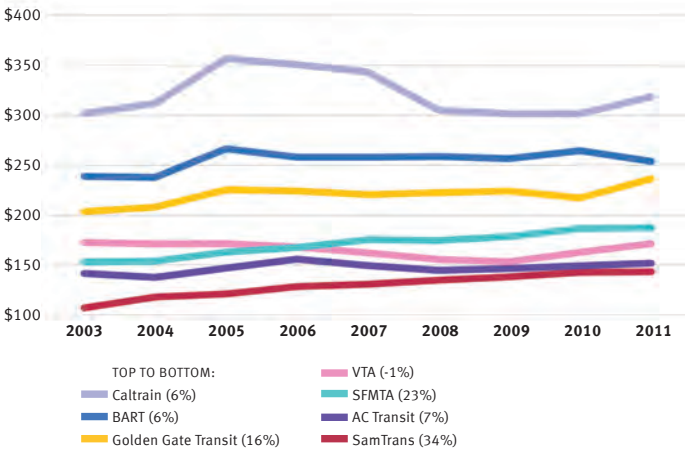
service for major Bay Area transit operators. In its Transit Sustainability Project (TSP) Report, the Bay Area MTC found that cost increases are primarily the product of employee fringe benefit cost growth (e.g. health care and pensions). Between 1997 and 2008, real fringe benefit costs at SFTMA, BART, and AC Transit grew by 72% (after adjusting for inflation), or about 5% per year.

Declining transit performance also affects operating costs. The TSP indicated that speeds on SFMTA's bus and light-rail system fell by more than 10% between 1997 and 2008. Slower speeds mean the same driver and vehicle can complete fewer route runs in a day, leading to less service for the same price.

RECENT IMPROVEMENT IN AVERAGE PAVEMENT CONDITION NEEDS INVESTMENT TO MAINTAIN

The city's Pavement Condition Index (PCI) has slowly fallen over time to the low 60s (fair) from 70s (good). The 2011 Proposition B streets bond enabled an increase in the PCI from 64 to 66 and provides increased funding levels until 2016. The PCI score is projected to fall into the 50s (at risk) by 2030. Without an additional investment in street rehabilitation and replacement, reaching and maintaining a PCI of 70 in the longer term will require about $2 billion more than what is already committed to street resurfacing over the life of the SFTP, but this is ultimately more cost-effective than further deferring maintenance needs. Maintaining pavement at a good condition costs $9,000 per block. If the PCI score lowers below 50, the cost to maintain pavement would balloon to $436,000 per block.

FIGURE 17. TRANSIT COSTS PER REVENUE SERVICE HOUR



SOURCE: NATIONAL TRANSIT DATABASE TS2.2, SERVICE DATA AND OPERATING EXPENSES TIME-SERIES BY SYSTEM, AND THE CALIFORNIA DEPARMENT OF FINANCE (FOR BAY AREA INFLATION DATA).

MORE EFFICIENT AND EFFECTIVE PROJECT DELIVERY IS NEEDED GIVEN GROWING CITYWIDE NEEDS

Small project delivery research indicates consensus that small projects and complete street projects can be delivered more efficiently, helping to lower unit costs or make improvements more quickly. As discussed on page 11, the scope of the city's goals for supporting bicycling, pedestrians, and efficient transit require that we construct improvements faster than we have historically. The Project Delivery Strategic Initiative of the SFTP (Appendices H and I) sought to identify opportunities to improve the timeliness, transparency, and efficiency of project implementation in San Francisco's transportation sector.

HEALTHY ENVIRONMENT

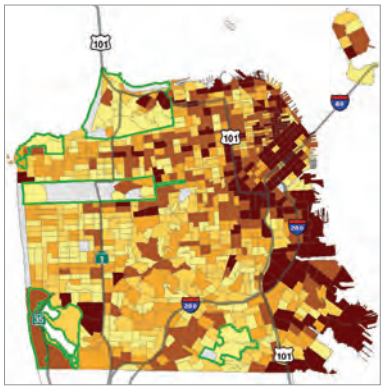
Reducing vehicle pollution—including greenhouse gases and other pollutants—is critical for a healthy environment. More stringent state vehicle emissions regulations will reduce vehicle pollution over the SFTP period, but growth in driving means that additional action will be necessary to for San Francisco to meets our aggressive greenhouse gas reduction goals.

VEHICLE TRAVEL GROWTH EXPECTED, ESPECIALLY TO AND FROM THE EASTERN NEIGHBORHOODS AND SOUTHWEST SAN FRANCISCO, THE PENINSULA

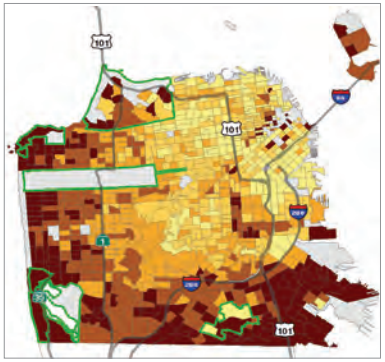
Miles driven by private vehicles, or VMT (vehicle miles of travel), are the main source of greenhouse gases and air pollutants from the transportation sector. Growing population and employment in San Francisco and regionally is expected to result in VMT in-

Research indicates that small projects and complete streets can be delivered more efficiently, resulting in more improvements and more "bang for the buck" as we invest in our streets.

FIGURE 18. VEHICLE MILES TRAVELED IN 2040. (DARKER COLORS INDICATE MORE VEHICLE MILES OF TRAVEL.)



Workplace Vehicle Miles of Travel per Worker



Household Vehicle Miles of Travel per Household Automobile

SOURCE: SFCTA, SF CHAMP

creases of approximately 30% by 2040 under a business as usual scenario. Much of this VMT will be generated by driving trips to and from the downtown core (for workplace VMT), and outlying southwest and southeast neighborhoods (for household VMT)—(Figure 18).

VEHICLE TECHNOLOGY ALONE WILL NOT ACHIEVE SAN FRANCISCO'S AMBITIOUS GOALS

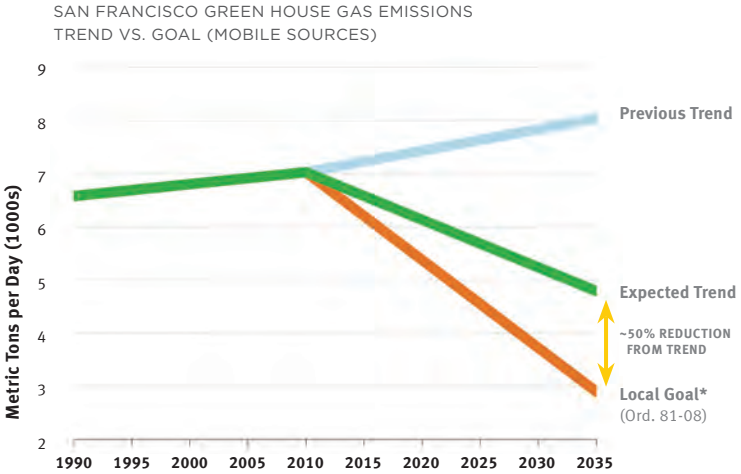
Technology will do much to reduce climate change impacts from private vehicles. Tough state laws (Pavley I and II) regulating vehicle emissions are expected to reduce greenhouse gases by more than 40%. However, this is not sufficient to allow San Francisco to achieve its aggressive greenhouse gas reduction goals, set by ordinance 81-08, which call for an 80% reduction below 1990 levels by 2050 (Figure 19). This is five times more aggressive than regional greenhouse gas reduction goals, and will take tremendous local committment and regional, state, and Federal support to achieve.

DEMAND MANAGEMENT STRATEGIES ARE CRITICAL TO ACHIEVING PROGRESS TOWARD OUR GOALS

Scenario testing conducted for the SFTP (see the "What would it take" sidebar box on page 19) revealed that, though necessary, supply-side investments such as major new transit lines and transit frequency are alone not very cost-effective at reducing greenhouse gases. Among the more cost-effective strategies are those that reduce vehicle tripmaking by more directly linking the cost or impact of driving to the decision to make a trip:

- **CONGESTION MANAGEMENT.** The Transportation Authority's 2010 Mobility, Access and Pricing study found that implementation of a peak-period congestion charge in San Francisco's northeast cordon would reduce vehicle delay by 21%, and greenhouse gases by 5% citywide, among other benefits. Congestion can also be managed through direct regulation of vehicle trips to the worksite.
- **EMPLOYER OUTREACH AND INCENTIVES.** Incentive and outreach programs in partnership with employers can provide employee travel counseling, transit promotions, tools to facilitate shared rides, and supportive services such as guaranteed ride home programs.

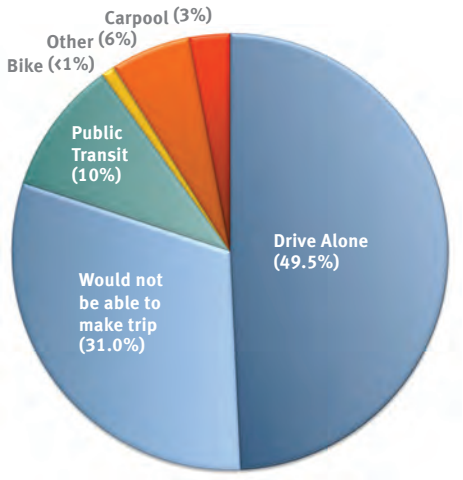
FIGURE 19. SAN FRANCISCO GREENHOUSE GAS (GHG) REDUCTION GOALS



* Assumes on-road mobile sector is responsible for proportional share of economy-wide goals set by Ordinance 81-08

SOURCE: SFMTA, SAN FRANCISCO CLIMATE ACTION PLAN

FIGURE 20. SHARE OF SHUTTLE USERS WHO WOULD DRIVE ALONE WITHOUT THE SHUTTLE*



SOURCE: SFMTA

*Surveys have indicated that shuttles are serving about 35,000 commute trips per day, or about 1% of all trips to, from, and within San Francisco.

- **PARTNERSHIPS WITH THE PRIVATE SECTOR AND COMMUNITY BASED ORGANIZATIONS.** The private sector is increasingly involved in providing transportation services, many of which could reduce single occupancy vehicle trips and greenhouse gases. The SFMTA Shuttle Partners program, for example, seeks to allow private employer shuttles to use Muni stops in exchange for a fee. SFMTA's data indicates that shuttles displace over 45 million vehicle miles traveled and 11,000 metric tons of GHG per year, and about half of shuttle riders say they would drive alone without shuttle access (Figure 20).

WHAT WOULD IT TAKE TO MEET SFTP GOALS?

To meet our adopted goals and targets for livability, world-class infrastructure, economic competitiveness, and a healthy environment would require significantly increased funding; commitments to prioritize our limited rights of way for transit, walking, and bicycling; and closer linking of the cost of driving to the decision to make a trip. Each of the aspirational scenarios described below includes a package of supply-side and demand-side improvements valued at about $10 billion above and beyond revenues we expect to have. The complete findings of "what it would take" to meet San Francisco's ambitious goals are included in Appendix B and summarized below.

LIVABILITY. We examined what it would take to meet the city's "transit first" goal of no more than 50% of daily trips by car. Expanding the capacity of transit (such as a with a second BART tube across the bay) and elevating safety through citywide traffic calming, road diets, a cycle track network, and more, decreased the expected share of trips by car by 6 percentage points to 53%. Only when paired with demand-management measures (congestion pricing) is the goal achieved (Muni and San Francisco's share of BART and Caltrain).

WORLD-CLASS INFRASTRUCTURE. We asked how much funding would be required to maintain our road conditions and transit system in a state of good repair in 2040. The unfunded cost to meet this goal is approximately $5 billion for the transit system and $1.5 billion for streets, which is in excess of the uncommitted funding available over the plan period. New revenues will be required just to meet these basic needs.

ECONOMIC COMPETITIVENESS. Competitive and reliable travel times are critical for businesses and their workers, customers, and suppliers. We analyzed what it would take to keep commute travel times from worsening in the future, given the large projected increase in new residents and jobs in the city. We found that transit and driving commute times in 2035 could be maintained at today's levels (average of 40 minutes), but it would take $5 billion worth of investments in new transit supply including an extension of Caltrain to downtown, bus rapid transit projects on key corridors, and other improvements, as well as demand management approaches including peak period area pricing and related mobility improvements.

HEALTHY ENVIRONMENT. In partnership with the city's Climate Action Plan team, we tested what it would take to meet the city's goal of reducing greenhouse gas emissions to 80% below 1990 levels by 2050. We found this goal is only possibly attainable with a robust combination of aggressive local and regional vehicle pricing, widespread use of electric vehicles, and major new infrastructure (including a new BART tube across the Bay at a cost of $10 billion).

A consistent finding across all scenarios was that strategies to manage travel demand, such as community outreach and education campaigns, employee programs, peak-period or area pricing, and parking pricing, are much more cost-effective in achieving desired goals than supply-side investments.

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CHAPTER THREE

FUNDING OUR TRANSPORTATION NEEDS

SAN FRANCISCO'S NEEDS FOR TRANSPORTATION FUNDING—even to maintain the existing transit and street networks in today's condition—far exceed expected revenues, and most funds are already committed to specific projects and purposes. The SFTP proposes ways to invest expected funding most effectively to make progress toward our goals, but analysis shows that this progress is limited without policy changes and additional investment from new revenues. Based on public input and technical analysis, we have developed two scenarios (Figure 21) that invest strategically in a diverse set of projects to make meaningful progress towards each of the SFTP's four goals. Because there is far more need than available revenues for transportation, each scenario anticipates some new revenues:

- The Investment Plan shows how existing and some anticipated new federal, state, and regional revenue (consistent with the Bay Area's long-range transportation plan, Plan Bay Area) could be spent.
- The SF Investment Vision imagines how we could get further towards our goals with major new sources of local revenue.

This chapter summarizes the revenue forecasts for the two scenarios. The next chapter describes the investments we could make and what they could achieve, along with supporting policy recommendations to get the most out of our investments.

FIGURE 21. THE INVESTMENT PLAN AND SF INVESTMENT VISION

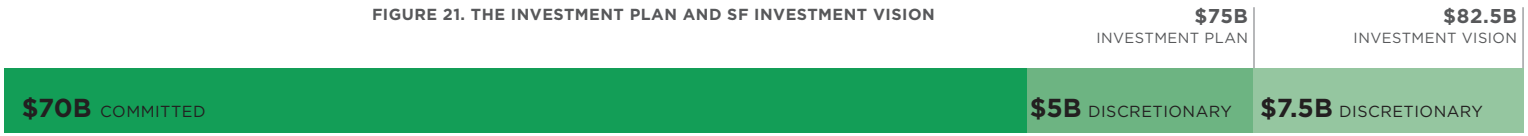
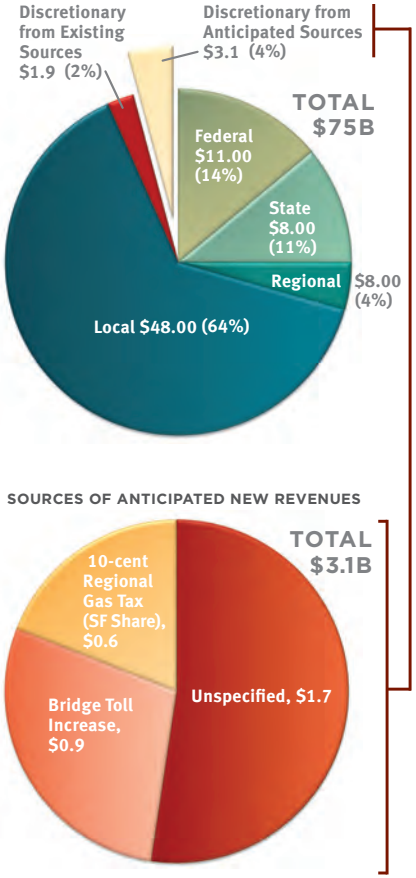


FIGURE 22. PLAN REVENUES BY SOURCE
(IN BILLIONS OF YEAR-OF-EXPENDITURE DOLLARS THROUGH 2040)



SOURCE: SFCTA (SEE APPENDIX D FOR DETAIL)

INVESTMENT PLAN: INCLUDES BOTH EXISTING AND ANTICIPATED NEW FEDERAL, STATE, AND REGIONAL REVENUE

The SFTP Investment Plan proposes how we should invest revenues we expect to have through 2040, including some expected new federal, state, and regional funds. About $75 billion in federal, state, regional and local revenue is expected for transportation in San Francisco through 2040. Figure 22 illustrates the sources of existing and anticipated new revenues for the Investment Plan. SFTP Appendix D describes the assumptions used to estimate expected revenues in more detail. All revenues are expressed in billions of year-of-expenditure dollars over the SFTP period.

MOST EXPECTED REVENUE IS FROM LOCAL AND REGIONAL SOURCES

The federal gas tax that funds transportation is not indexed to inflation, and has not been increased since 1992. Similarly, the state has struggled with budget deficits for years. As a result, the responsibility of paying for our transportation system increasingly falls on the shoulders of local and regional governments, or through direct user payment. Over 65% of the $75 billion expected for the Investment Plan comes from local and regional funding sources, such as the Prop K transportation sales tax and the $10 Prop AA vehicle registration fee.

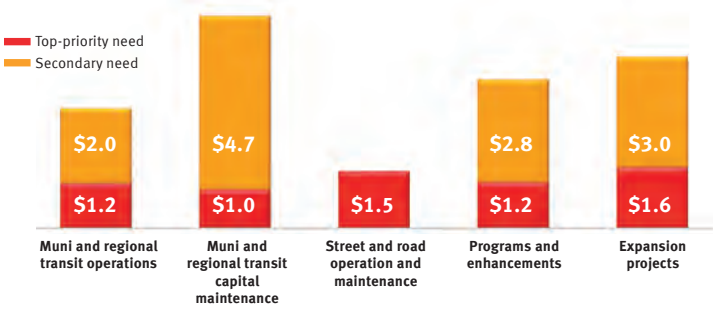
MOST EXPECTED REVENUES ARE ALREADY COMMITTED

Over 90% ($70 billion) of the expected funds are already committed to specific projects (such as the Presidio Parkway, Central Subway, and Caltrain Electrification) and purposes (such as transit and local streets operations and maintenance). This means that of the $75 billion in revenue we expect through 2040, only about $5 billion (or 7%) is discretionary, meaning we can decide how it should be invested to improve our transportation system.

ANTICIPATED REVENUES ARE INSUFFICIENT TO MEET OUR EXISTING AND FUTURE SYSTEM NEEDS

San Francisco's unfunded transportation needs far exceed the expected $5 billion in uncommitted revenue. Even if we spent every cent of discretionary funds on transit and streets maintenance, repair and replacement projects, we still would not have enough just to maintain the existing transportation system in a state of good repair—let alone make safety and livability enhancements or address planned growth. Figure 23 summarizes the transportation system investment need by category.

FIGURE 23. UNFUNDED TRANSPORTATION NEEDS BY CATEGORY



SOURCE: SFCTA, SFMTA, SFDPW, BART, MTC

TWO-PRONGED REVENUE STRATEGY

The SFTP (through its investment plans and policy recommendations) proposes ways to cost-effectively invest expected transportation funds, but analysis shows that this progress is limited unless we identify new revenues. So, the SFTP recommends a two-pronged revenue strategy. First, the Investment Plan seeks to position San Francisco well to compete for the anticipated additional new federal, state, and regional funding sources. Second, the SF Investment Vision calls for an additional $7.5 billion in locally-controlled transportation revenues. With $7.5 billion in additional local revenues, the SF Investment Vision achieves more of our maintenance, livability, and economic competitiveness goals, and makes more progress towards our ambitious environmental goals.

SF INVESTMENT VISION

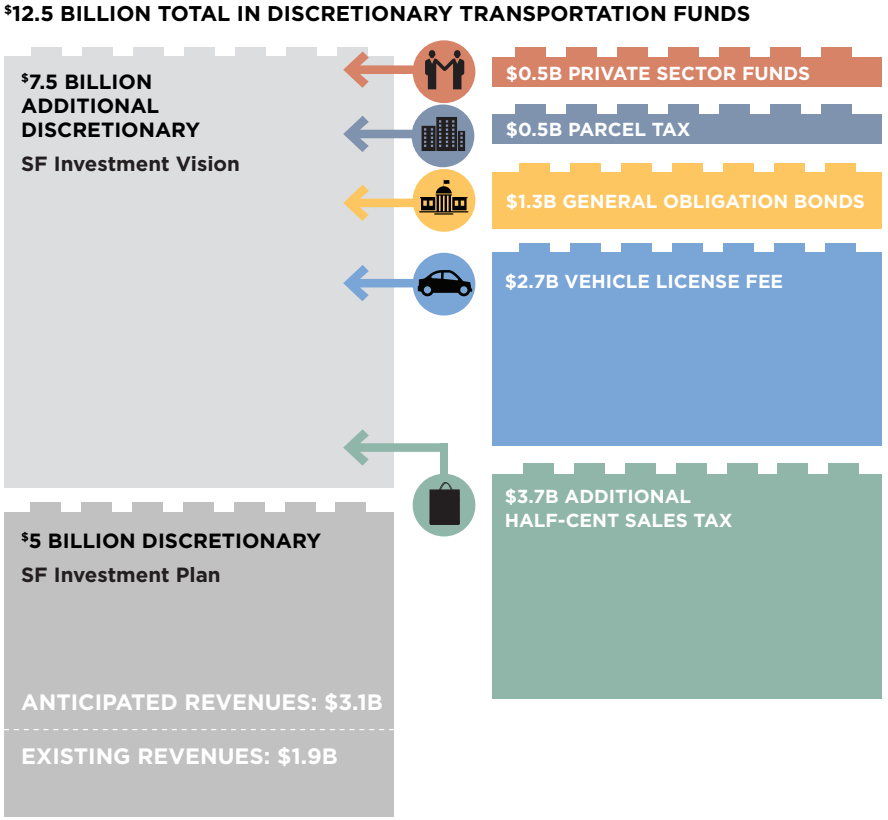
NEW LOCAL SOURCES OF FUNDING UNDER CONSIDERATION

For the SFTP, we evaluated a range of potential new local revenue sources, considering factors like revenue stability, growth potential, equity, and likelihood of being put into place. The SFTP Revenue White Paper provides a comparison table and information on the primary local sources we evaluated. A combination of sources pictured in Figure 24—such as general obligation bonds, a Vehicle License Fee, additional half-cent sales tax, or others could provide the $7.5 billion needed beyond the Investment Plan to achieve the $82.5 billion SF Investment Vision.

MAYOR'S 2030 TRANSPORTATION TASK FORCE

We coordinated SFTP development with the Mayor's 2030 Transportation Task Force. The Task Force has developed recommendations for potential new local transportation revenues, and has recommended that voters approve $1 billion in general obligation bonds, a half-cent increase in the sales tax, and a 1.35% increase in the vehicle license fee to generate just over $2.95 billion ($2013) in new transportation revenues between 2015 and 2030.

FIGURE 24. A COMBINATION OF SOURCES CAN PROVIDE $7.5 BILLION ADDITIONAL DISCRETIONARY



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CHAPTER FOUR

INVESTMENT PLANS AND POLICY RECOMMENDATIONS

THE SFTP IS THE BLUEPRINT for the future of our city's transportation system through 2040. With input from the public (detailed in Appendix E), and informed by other agencies and robust technical analysis (Appendices A, B, and F), we've developed two investment scenarios that will allow us to make meaningful progress toward our transportation goals: the Investment Plan and SF Investment Vision. The result is a diverse investment plan paired with specific policy actions and new revenues.

CONTENTS OF THE INVESTMENT SCENARIOS

The Investment Plan and SF Investment Vision are organized into three major categories of spending:

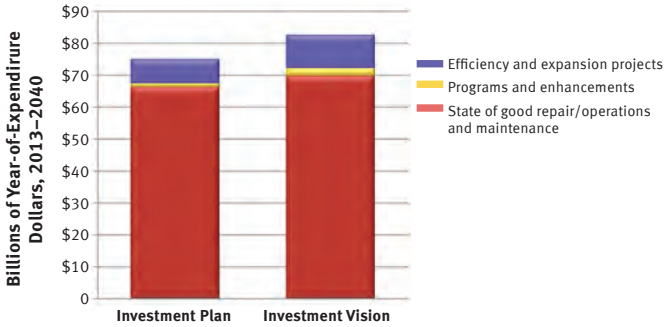
- **ONGOING MAINTENANCE AND OPERATIONS FUNDING.** Each investment scenario recommends funding levels for the ongoing maintenance and operations of our street network (including roadway-repaving street sweeping, traffic signal maintenance); and transit system operation, maintenance and replacement. The vast majority of funding is dedicated to this category.
- **TRANSPORTATION PROGRAMS AND ENHANCEMENTS.** This category includes funding for seven transportation programs that improve safety, expand or enhance the transportation system through small-to-medium scale improvements for all modes.
- **EFFICIENCY AND EXPANSION PROJECTS.** This category recommends funding for a list of major capital projects that would improve the efficiency of the existing system or cost-effectively expand system capacity.

Figure 25 (next page) provides an overview of the amount of funding dedicated to these categories in the Investment Plan and Investment Vision, and the remaining sections describe each category in detail.

The SFTP also recommends policy actions. This chapter highlights some of the key policy recommendations. For a complete list, see Appendix G.

We've developed two investment scenarios that will allow us to make meaningful progress toward our transportation goals: the Investment Plan and SF Investment Vision. What it takes is a diverse investment plan paired with specific policy actions and new revenues.

FIGURE 25. MAJOR USES OF INVESTMENT AND VISION REVENUES (COMMITTED AND DISCRETIONARY FUNDS)



SOURCE: SFCTA

DISCRETIONARY INVESTMENT: USES OF $5B AND $12.5B IN DISCRETIONARY FUNDS

As discussed in Chapter 3, 90% of the expected $75 billion in transportation revenue is dedicated to specific projects or purposes. This leaves $5 billion in expected and new revenues that we can decide how to spend. With the SF Investment Vision, a combination of new local funding sources can provide the additional $7.5 billion needed beyond the Investment Plan to go further toward our goals. Figure 26 summarizes the uses of expected and new discretionary funds in the Investment Plan and SF Investment Vision.

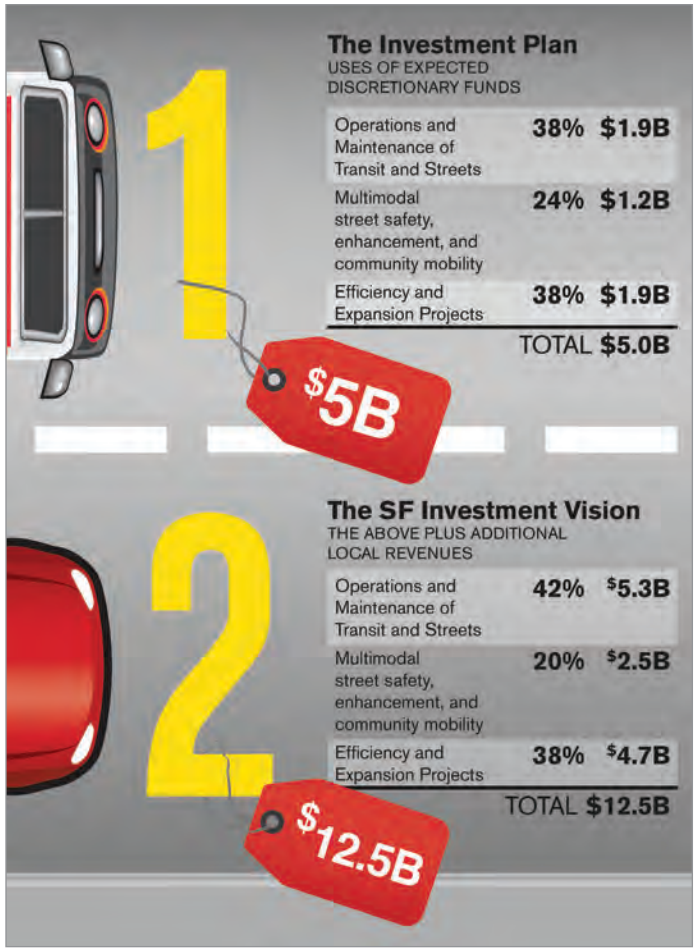
PLAN AND VISION INVESTMENTS

The following sections describe the investments proposed in the SFTP Investment Plan and SF Investment Vision.

DEDICATED MAINTENANCE AND OPERATING FUNDING

About $60 billion of the expected $75 billion in transportation revenue is already committed to operations and maintenance of the existing system and major projects that rehabilitate existing infrastructure. These include the Presidio Parkway, Yerba Buena Island Ramp Improvements, and Transbay Transit Center Phase 1. As discussed on page 16, an additional $5 billion is needed to maintain transit capital assets in an optimal state of good repair. Another $1.54 billion is needed to achieve the city's pavement condition goals. An additional $1.2 billion would be required to provide all of the transit service Muni is scheduled to provide today.[1] Figure 27 shows how we allocated funding to help address some of these maintenance and operations needs.

FIGURE 26. USES OF DISCRETIONARY FUNDS



SOURCE: SFCTA

1 Funding constraints are one factor that currently prevents Muni from operating all scheduled service.

FIGURE 27. COMPARISON OF PLAN AND VISION FUNDING LEVELS FOR MAINTENANCE AND OPERATION

INVESTMENT CATEGORY	INVESTMENT LEVEL	PLAN	VISION
State of Good Repair / Operations and Maintenance			
Muni and Regional Transit: Operations. Provides funding to operate Muni and regional transit service.	**PLAN:** Maintain today's funding and actual service levels. **VISION:** Fully fund all today's scheduled service levels.	$43.80	$45.00
Muni and Regional Transit: Capital Asset Maintenance. Provides funding to maintain and replace Muni and regional transit vehicles, stations, and maintenance facilities.	**PLAN:** Fully fund transit vehicle replacement needs for all operators; all MTA vehicle mid-life overhauls; and 70% of Score 16 (most important) assets. **VISION:** Fund 100% of Muni Score 16 needs.	$12.41	$14.06
Local Streets and Roads: System Preservation. Provides funding to re-pave streets and roads.	**PLAN:** Maintain today's pavement condition. **VISION:** Reach and maintain pavement condition index of 70 ("good").	$3.27	$3.83
Local Streets and Roads: Operations. Provides funding for street sweeping, signal maintenance, and other roadway upkeep.	**PLAN AND VISION:** Maintain today's levels of street operations.	$2.80	$2.80
Local Street and Bridges Structures: Capital Maintenance. Provides funding to maintain or replace aging structures (e.g. bridges and tunnels).	**PLAN AND VISION:** Fund unmet need of $3M/decade.	$0.01	$0.02
State of Good Repair Projects. Funds major capital replacement and rehabilitation projects.	**PLAN AND VISION:** Provide full funding for the Presidio Parkway; Transbay Transit Center Phase I Improvements; and Yerba Buena Island Ramp Improvements.	$4.01	$4.01
	SUBTOTAL (AMOUNT IN $BILLIONS YOE)	$66.30	$69.72
	PERCENT OF TOTAL INVESTMENT	88%	84%

The Investment Plan provides sufficient funding to support mid-life vehicle overhauls for Muni, extending the life of each vehicle and reducing the incidence of vehicles that are out of service.

RECOMMENDATION:

PRIORITIZE REVENUES TO FULLY FUND TIMELY VEHICLE REPLACEMENT AND REHABILITATION

Underfunding vehicle maintenance contributes to reduced reliability and unscheduled service turnbacks in outlying neighborhoods, a top concern recorded during public outreach. The Investment Plan provides sufficient funding to meet vehicle replacement needs for all transit operators as well as to support mid-life vehicle overhauls for Muni, extending the life of each vehicle and reducing the incidence of vehicles that are out of service.

Local funds prioritized for this purpose will leverage significant regional and federal monies. An example is MTC's Transit Core Capacity program, which benefits Muni, BART, and AC Transit (all of which provide San Francisco service).

RECOMMENDATION:

EXPAND TRANSIT SERVICE WHILE SUPPORTING STEPS TO STABILIZE COSTS

New funding will be necessary to increase transit service frequencies to reduce crowding and serve new riders. However, new funding should be accompanied by measures to stabilize the rapid rise in transit operating costs (described on page 17). Such measures could include prioritizing projects to speed up Muni vehicles, such as the Transit Effectiveness Project; implementing transit operator fringe benefit cost control strategies recommended in the MTC's Transit Sustainability Project; and seeking a regional funding solution to stabilize Caltrain operating and capital funding. SFMTA and other transit agencies have already committed to a 5% real reduction in costs by fiscal year 2016–2017.

RECOMMENDATION:
ACHIEVE CITY GOALS FOR AVERAGE PAVEMENT CONDITION

Smoother roads benefit all modes of travel. The SFTP Investment Vision dedicates sufficient funding for San Francisco to achieve and maintain an average pavement condition index of 70, or "good," over the life of the plan. Streets maintained at pavement score 70 are several times less expensive to keep up than streets which aren't maintained at this level.

FIGURE 28. COMPARISON OF PLAN AND VISION FUNDING LEVELS FOR PROGRAMS AND ENHANCEMENTS

INVESTMENT CATEGORY	INVESTMENT LEVEL	PLAN	VISION
Programs			
Walking and Traffic Calming. Supports new and widened sidewalk construction, sidewalk bulb outs to shorten crossing distances, crosswalk upgrades, pedestrian countdown signals, landscaping, and vehicle speed control treatments.	**PLAN:** Provides $10m/year (exceeds historic funding levels). **VISION:** Funds full build out of the Mayor's Pedestrian Strategy.	$0.28	$0.63
Bicycling. Supports physical improvements on the citywide bicycle network, such as new cycle tracks (bike lanes physically separated from moving cars), bike lanes and paths, repair of existing lanes, bicycle parking, and bicycle outreach and education.	**PLAN:** Funds a citywide cycle track network. **VISION:** Funds full buildout of the SFMTA Bicycle Strategy.	$0.15	$0.60
Regional Transit Enhancements. Supports improvements for regional transit operators serving San Francisco, including BART, Caltrain, and Golden Gate Transit, such as additional escalators at stations, new signage, and station access improvements (e.g. more bike parking).	**PLAN:** Maintain historic levels. **VISION:** Increase moderately over historic levels.	$0.20	$0.35
Muni Enhancements and Customer First Treatments. Supports new Muni equipment to improve transit reliability and passenger amenities, such as on-vehicle cameras, ticket vending machines, and new station platform information displays, as well as new and improved transit stops.	**PLAN:** Maintain historic levels. **VISION:** Increase moderately over historic levels.	$0.19	$0.29
Street and Signal Upgrades and Street Network Development. Supports new traffic signs and signals, red light photo enforcement equipment, management of major arterials such as Guerrero or Lincoln, and new streets in developing areas of the City such as Hunters Point and Candlestick Point.	**PLAN:** Doubles historic funding levels. **VISION:** Triples historic funding levels.	$0.21	$0.28
Transportation Demand Management. Supports educational, outreach, and regulatory programs that reduce single-occupant vehicle use for commuters, schools and universities, and institutions.	**PLAN:** Increase of 20% over historic funding. **VISION:** Doubles historic funding levels.	$0.06	$0.10
Equity. Supports planning, project development, and service to promote equitable access and investment.	Provides $10M/year for planning, operations, and/or implementation	$0.14	$0.28
	SUBTOTAL (AMOUNT IN $BILLIONS YOE)	$1.23	$2.53
	PERCENT OF TOTAL INVESTMENT	2%	3%

TRANSPORTATION PROGRAMS AND ENHANCEMENTS

The Investment and SF Vision Plans provide $1.2 and $2.5 billion, respectively, to eight transportation safety and enhancement programs. Figure 28 describes how the funding levels compare to historic funding and the need.

RECOMMENDATION:

BUILD THE PEDESTRIAN AND BICYCLE STRATEGIES TO ESTABLISH SAFER NEIGHBORHOOD NETWORKS CITYWIDE

As discussed on page 11, the City has set aggressive goals for increasing the share of trips made by bicycling and walking while improving safety. Public outreach indicated that bicycling and walking infrastructure are top public priorities after basic transit operations and maintenance (See Appendix E). Accordingly, the plan and vision scenarios increase funding for traffic calming, walking, and bicycling programs (combined) by 80% and 400%, respectively, over historic funding levels. The vision-level funding is sufficient to support full implementation of the SFMTA's Bicycle and Pedestrian Strategies.

Funding for pedestrian and bicycle safety can be spent most effectively by focusing it on the roadways with the highest incidence of pedestrian and bicyclist injuries and fatalities, many of which are arterial roadways. The Pedestrian Strategy has identified these 70 miles of High-Injury Corridors, which represent only 6% of San Francisco's street miles, but 60% of severe and fatal injuries.

RECOMMENDATION:

CREATE MORE COMPLETE STREETS (AT LOWER COST) THROUGH COORDINATION WITH REPAVING

Safety and enhancement projects can be implemented more efficiently through coordination with roadway repaving, which occurs on a regular schedule city-wide. The SFTP recommends setting aside some Prop K funds to advance safety project coordination with re-paving projects, utility projects, and/or major capital investments. It also recommends developing a checklist for all repaving projects to facilitate consideration of complete streets elements.

RECOMMENDATION:

INCREASE INVESTMENT IN EMPLOYER, SCHOOL, AND COMMUNITY TRIP REDUCTION PROGRAMS

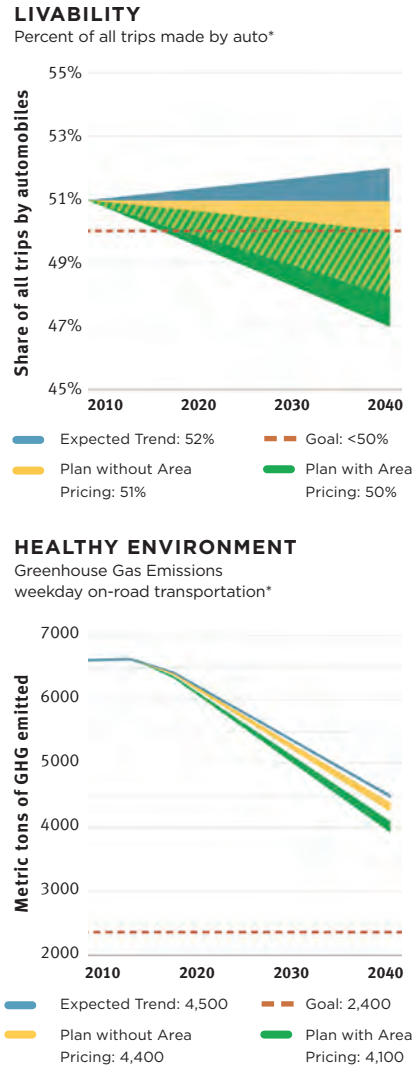
As described on page 16, San Francisco's downtown—especially as growth expands in SoMa and Mission Bay—will see transit performance decline if growth occurs as expected and travel behavior remains the same. The City's 1985 Downtown Plan introduced then-innovative demand management strategies, such as incentives for employers to provide employee travel counseling, helping to reduce peak period congestion and the need for parking. A new generation of incentive and outreach programs is needed for our growing downtown, especially South of Market and Eastern Neighborhoods. These partnerships with employers, institutions, and residential associations can provide travel counseling, incentives for taking transit, tools to facilitate shared rides, and supportive services such as guaranteed ride home programs. The SFTP increases funding for these travel demand management incentive programs by 20% and 100% over historic levels in the Investment Plan and Investment Vision, respectively.

RECOMMENDATION:

INCREASE TRANSPARENCY AND PROMOTE PUBLIC INVOLVEMENT BY SHARING AGENCY PRIORITIZATION AND DEVELOPMENT PROCESSES

Often during SFTP outreach, the public would express confusion about how San Francisco agencies identify, prioritize, and design street improvements. Fragmented institutional roles can also contribute to slower-than-desired project delivery rates. Small Project Delivery research conducted for the SFTP (Appendix H) found that coordination within and among agencies is inadequate to deliver a multi-modal vision, and that a consensus-based approach to project design diminishes the benefits of many projects. Strategies to increase project delivery and support quality projects include dedicating funds for increasing agency capacity, increasing transparency and coordination of agency prioritization processes, and enhancing public involvement in project development and planning efforts.

FIGURE 29. CONTRIBUTION OF AREA PRICING TO PLAN GREENHOUSE GAS AND AUTOMOBILE TRIP REDUCTION BENEFITS



* 2040 forecasts are derived from the Transportation Authority's regional travel demand Model, SF-CHAMP; the more ambitions end of the range represents additional travel demand management (TDM) program assumptions such as bikesharing, shuttles, carsharing, and other TDM policy efforts, which are calculated outside of the SF-CHAMP model and applied on top of modeling results.

A COMPREHENSIVE STRATEGY FOR THE SOUTH OF MARKET AND EASTERN NEIGHBORHOODS

The City's original 1984 Downtown Plan introduced new measures such as Transportation Management Associations (TMAs) to address the congestion caused by employment growth. Now a new wave of growth in the downtown, South of Market, and Mission Bay will significantly increase core crowding conflicts and congestion (see Appendix C). A comprehensive strategy is needed for the new, expanded core to manage congestion and maintain livability, including: transit capacity and other infrastructure; dedicated transit and bicycle networks; pedestrian safety measures; area-wide congestion and freeway management measures; and strengthened trip-reduction programs in partnership with employers.

RECOMMENDATION:
CONTINUE TO DEVELOP PRICING APPROACHES TO CONGESTION MANAGEMENT

Scenario testing conducted for the SFTP (see the "what would it take" sidebar box on page 19) revealed that the most cost-effective ways to reduce greenhouse gas emissions are those that reduce vehicle tripmaking by more directly linking the cost or impact of driving to the decision to make a trip. The Investment and SF Vision Plans recommend considering peak or area pricing in the Northeast Cordon, in addition to the pricing already approved for Treasure Island.[2] These projects require about $0.03 billion in start-up capital costs, which is less than .01% of the Investment

2 Analysis of Congestion Pricing can be found in the Mobility, Access, and Pricing Study (2008) on the Transportation Authority web site at www.sfcta.org. Information about Treasure Island pricing can be found at www.sfcta.org/TIMMA.

FIGURE 30. SFTP EFFICIENCY AND ENHANCEMENT PROJECT LIST

PROJECT	PLAN	VISION
Transbay Transit Center Phase 2/Caltrain Downtown Extension: Extension of Caltrain to the Transbay terminal	$2.60	$2.60
Central Subway: Extension of the T-Third light rail to downtown and Chinatown	$1.58	$1.58
Developer Funded Projects (Parkmerced, Mission Bay, Treasure Island, SE Waterfront Local Streets)	$0.90	$0.90
Caltrain Electrification/Signal System (SF remaining share of total cost)	$0.48	$0.48
Van Ness Avenue Bus Rapid Transit: Dedicated bus lanes and transit-priority treatments.	$0.13	$0.13
Long-Range Transit Network Development, including Transit Performance Initiative, one or more major projects to improve BART/Muni transit travel time, and reliability at key bottlenecks, such as the Embarcadero Muni Metro turnaround, the J-Church and N-Judah merge point, and at West Portal.	$0.14	$1.54
Expanded Transit Service and New Vehicles, Muni and Regional Operators: Increases funding for transit service by 1% over expected revenues and purchases new vehicles.	$0.41	$0.71
BART Metro: One or more major construction projects that allow BART to run more frequent transbay service to the core of San Francisco	$0.00	$0.50
M-Line West Side Alignment and Grade Separation: Relocate the M-Ocean View light rail line from the center of 19th Avenue near Stonestown to a dedicated transit lane on the west side of the road to remove conflicts with 19th Avenue auto traffic, improving pedestrian safety and transit travel speed/reliability (only environmental phase funded).	$0.12	$0.43
Better Market Street (transportation elements only): Re-designs and improves Market Street for transit, bicycling, and pedestrians.	$0.20	$0.39
Transit Effectiveness Project: Improves Muni reliability and reduces travel times system-wide through stop improvements such as bus bulb-outs, stop placement, lane modifications, signals, and other tools to prioritize transit.	$0.34	$0.34
Geary Corridor Bus Rapid Transit: Dedicated bus lanes and other transit priority treatments on Geary Boulevard to increase the speed and reliability of the 38/38-Limited lines.	$0.24	$0.24
Bayshore/Potrero Bus Rapid Transit: Dedicated bus lanes and other transit-priority treatments on Potrero Avenue and Bayshore Boulevard to increase the speed and reliability of the 9/9-Limited lines.	$0.13	$0.13
Freeway Performance Initiative: Convert freeway lanes and ramps to carpool and transit lanes, such as on I-280 between 6th Street and US 101.	$0.04	$0.13
Bi-County Program: Includes extension of the T-Third Street to Caltrain Bayshore Station and the Geneva-Harney Bus Rapid Transit	$0.09	$0.09
Bi-County Program, T-Third Street to Caltrain Bayshore Station: Extend the T-Third Muni Metro line and provide new service from Bayshore/Sunnydale to the Bayshore Caltrain station.	$0.05	$0.05

Plan Cost, but generate almost half the benefits of the Plan (Figure 29). They would also generate as much as $2.5 billion in revenue that could be re-invested into multimodal projects and programs.

EFFICIENCY AND EXPANSION PROJECTS

About six billion of the expected $75 billion in transportation revenue is dedicated to committed efficiency or expansion projects, including those under construction (Central Subway), fully funded (some development-related projects), or prioritized in regional agreements (e.g., Van Ness Avenue Bus Rapid Transit). The Investment Plan recommends dedicating about $2 billion in discretionary funding to plan our long-range transit network and provide efficiency and expansion investments. This includes new transit service and defined capital projects beyond existing commitments. See Appendix A for detail on how we prioritized projects for inclusion. Figure 30 lists project costs, and Figures 31 and 32 (pages 32, 33) illustrate project locations.

FIGURE 30 (CONTINUED)

PROJECT	PLAN	VISION
Bi-County Program, Geneva-Harney Bus Rapid Transit: Dedicated bus lanes from Bayshore Boulevard to Prague Street and transit-preferential treatments such as transit signal priority in mixed-traffic lanes from Prague to Ocean Avenue to increase the speed and reliability of the 28-Limited line.	$0.04	$0.04
Oakdale Caltrain Station: New Caltrain station at Oakdale Avenue in the Bayview.	$0.05	$0.05
Waterfront transit capacity and performance, e.g., E-Historic Streetcar Service between Fisherman's Wharf and the 4th Street Caltrain Station: Construct a turn-around track for streetcars at the Caltrain station necessary to provide permanent direct historic streetcar service between Fisherman's Wharf and the 4th Street Caltrain station.	$0.05	$0.05
Express Bus Service: Service from Candlestick and Hunters Point to Downtown.	$0.03	$0.03
Area Pricing, Capital Startup Costs: Northeast Cordon and Treasure Island.	$0.03	$0.03
Area Pricing, Ongoing Operations: Northeast Cordon and Treasure Island: Install a peak period congestion charge for cars entering or leaving downtown or Treasure Island, and invest net revenues in its implementation and related transit, pedestrian, bicycle and carpool alternatives.	N/A*	
Southeast Waterfront Transit Priority and Increased Service	N/A**	
SUBTOTAL (AMOUNT IN $BILLIONS YOE)	$7.57	$10.35
PERCENT OF TOTAL INVESTMENT	10%	13%

* The area pricing program raises approximately $2.5 billion in revenue (not reflected above) that is invested into supportive multimodal projects and programs.

** Southeast Waterfront improvements proposed to be funded by future growth in the general fund resulting from development.

RECOMMENDATION: CONTINUE RAPID TRANSIT NETWORK DEVELOPMENT, INCLUDING BUS RAPID TRANSIT

The most cost-effective transportation projects are those that make the most efficient possible use of existing infrastructure. Bus Rapid Transit is an affordable approach to creating a network of rapid transit along key corridors throughout San Francisco, including Geneva Avenue and Potrero / Bayshore Boulevard. Another example of making the most efficient use of existing infrastructure is the Transit Effectiveness Project, which cost-effectively improves transit travel times and reliability through transit-priority treatments on Muni's Rapid Network, the top lines that carry 75% of total transit ridership. Bus Rapid Transit could also be deployed to fill gaps in regional transit connections to the city's west side.

RECOMMENDATION: CONTINUE TO COORDINATE TRANSIT INVESTMENT WITH LAND USE DEVELOPMENT PLANS

With new state requirements to focus on reducing greenhouse gas emissions through more coordinated land use and transportation planning, regional funding frameworks increasingly emphasize Priority Development Areas (PDAs), where cities are planning for infill, transit-oriented growth. San Francisco agencies have identified PDAs, generally in the eastern part of the city. The Transportation Investment and Growth Strategy identifies the transportation needs to support this growth. As area plans and major developments are contemplated, such as along the Eastern Waterfront, transportation needs in all categories—operations and maintenance, safety and enhancements, and efficiency and expansion—should be identified and prioritized.

RECOMMENDATION: INVEST IN PLANNING AND PROJECT DEVELOPMENT TO REDUCE DISPARITIES

In response to concerns heard during SFTP outreach, we analyzed how transportation conditions such as safety, transit access, and reliability vary geographically in the city (see Appendix F). We found some disparities. For example, low-income communities experience disproportionately high numbers of pedestrian and bicyclist injuries and fatalities, and outlying neighborhoods experience worse transit reliability. We responded by proposing a set-aside equity funding program with $140 million for projects that improve equity and including equity as a consideration in project prioritization.

RECOMMENDATION:

SET A VISION FOR MANAGING THE CITY'S FREEWAY NETWORK

San Francisco's greatest increases in vehicle travel are projected to be to and from the eastern neighborhoods and the Peninsula/South Bay. Overall development and management strategies are needed for the US 101 and I-280 corridors. As the region develops the Bay Area Express Lane Network, San Francisco agencies should partner with Caltrans, the MTC, and neighboring cities and counties to develop a local strategy for managing our freeway network and related surface streets such as Potrero and Bayshore.

RECOMMENDATION:

IDENTIFY THE NEXT GENERATION TRANSIT NETWORK PRIORITIES FOR BART, CALTRAIN, AND MUNI

Addressing bottleneck points in our local and regional rail networks will significantly improve rides for existing and passengers and allow for new passengers on our system. and The SFTP identifies the need to establish a long-range, multi-operator transit network development strategy. The SF Investment Vision identifies up to $1.5 billion in expected and potential new revenues for expanding the capacity of BART, Caltrain, and Muni.

RECOMMENDATION:

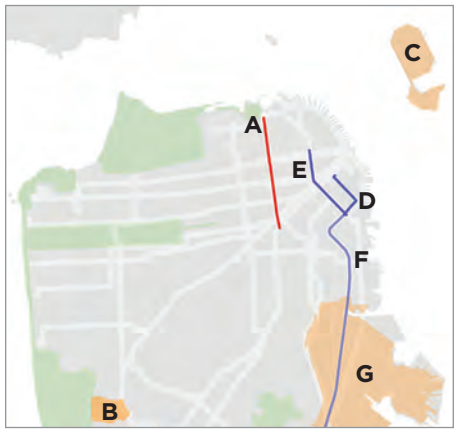
CONSIDER ALL OPTIONS FOR DELIVERING PROJECTS

Transportation projects may fall behind schedule and experience cost increases, and the public generally perceives delivery as taking too long. The SFTP Small and Large Project Delivery White Papers (Appendices H and I) explore strategies to aid project delivery. Key recommendations include consideration of a wide range of public-private partnership opportunities for major capital improvements such as the Caltrain Downtown Extension to the rebuilt Transbay Terminal, and the Treasure Island Transportation Improvement Plan.

INVESTMENT PLAN AND VISION SCENARIO BENEFITS

San Francisco's needs for transportation funding far exceed expected revenue. The SFTP proposes ways to invest the dollars we expect to have to most effectively make progress towards our goals, but analysis shows that our progress will be limited unless we identify new revenues. Figure 33 (pages 34–35) illustrates the additional benefits possible through higher funding levels. See Appendix J for more detail on plan performance results.

FIGURE 31. COMMITTED EFFICIENCY AND ENHANCEMENT PROJECTS



$9.43 billion in expected revenue is dedicated to projects that San Francisco has already committed to building.

A. Van Ness Bus Rapid Transit

B. Improvements to support development of Parkmerced

C. Improvements to support development on Treasure Island including

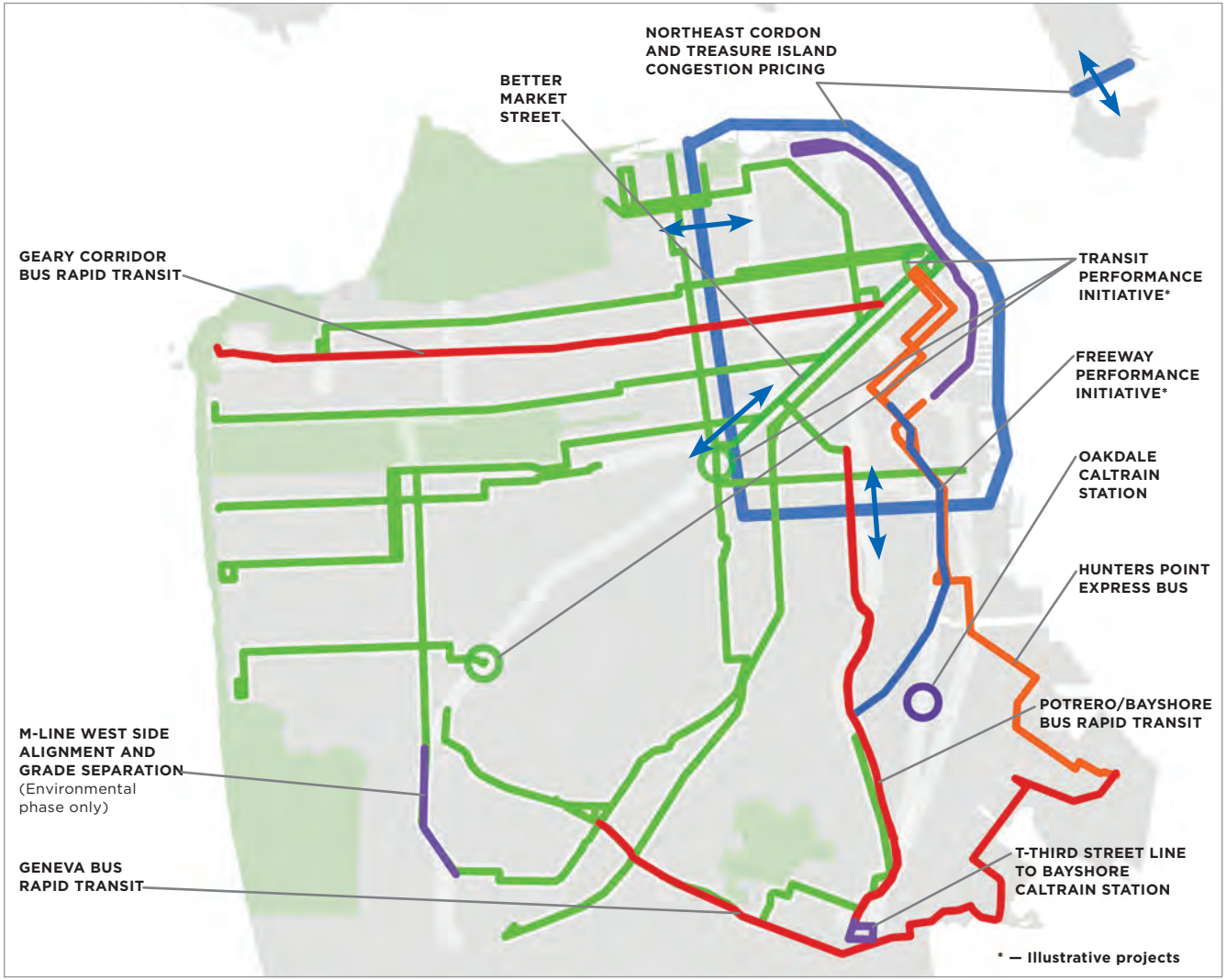
D. Extension of Caltrain to Downtown

E. Central Subway

F. Caltrain Electrification and signal system upgrade

G. Improvements to support development of Candlestick Point/Hunters Point-Shipyards

FIGURE 32. INVESTMENT PLAN DISCRETIONARY EFFICIENCY AND ENHANCEMENT PROJECTS



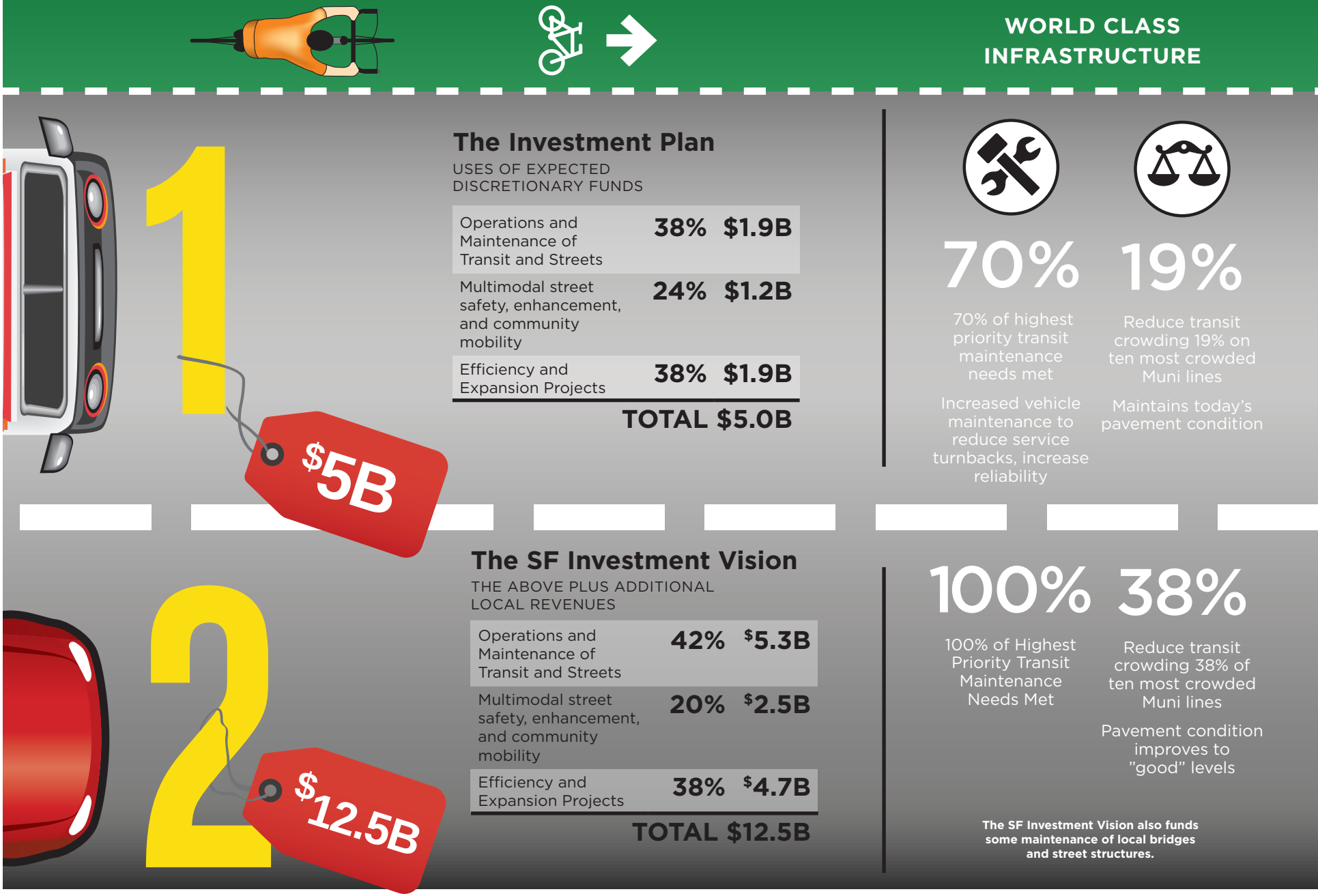


FIGURE 33. COMPARISON OF PLAN AND VISION SCENARIO BENEFITS

SAFE STREETS AND VIBRANT NEIGHBORHOODS

20MI

About 40% of the City's Pedestrian Safety Strategy funded (nearly 20 miles) of pedestrian safety improvements

22%

Nearly 22% of the City's Bicycle Strategy funded

40MI

100% of the City's Pedestrian Safety and Bicycle Strategies (Over 40 miles of pedestrian safety improvements)

100%

100% of the City's Bicycle Strategy funded

Both scenarios include dedicated planning funds to develop safety and mobility projects in Communities of Concern and neighborhoods citywide

HEALTHY ENVIRONMENT

10%

Up to 10% reduction in auto trips

Expanded employer, school and community trip reduction partnerships

12%

Up to 12% reduction in GHG emissions

14%

Up to 14% reduction in auto trips

Freeway management and transit efficiency strategies to increase safety and encourage carpools.

15%

Up to 15% reduction in GHG emissions

Multimodal investments and demand management, including area pricing, downtown and on Treasure Island account for half of these benefits in both scenarios

ECONOMIC COMPETITIVENESS

15MI

15 miles of protected transit lanes including Bus Rapid Transit on key corridors

14%

14% improvement in Muni speeds on rapid network

33MI

Up to 33 miles of protected transit lanes

Increased BART capacity and reliability

18%

18% improvement in Muni speeds on rapid network

Muni Metro system bottlenecks addressed to improve reliability and travel times

Additional Caltrain service and/or BART express buses increase rapid connections to the South and East Bays.

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CHAPTER FIVE

NEXT STEPS

THE SFTP WILL SHAPE THE WORK of the Transportation Authority and our partner agencies in the years to come. Major next steps are:

- Rolling out the first five years of SFTP investments through an Early Action Program.
- Coordinating with the Mayor's 2030 Transportation Task Force and other local and regional partners to pursue new local revenues to address unmet transportation needs.
- Conducting monitoring and evaluation to ensure efficient and equitable progress towards SFTP goals.

Additionally, the SFTP itself will be updated approximately every several years.

EARLY ACTION PROGRAM

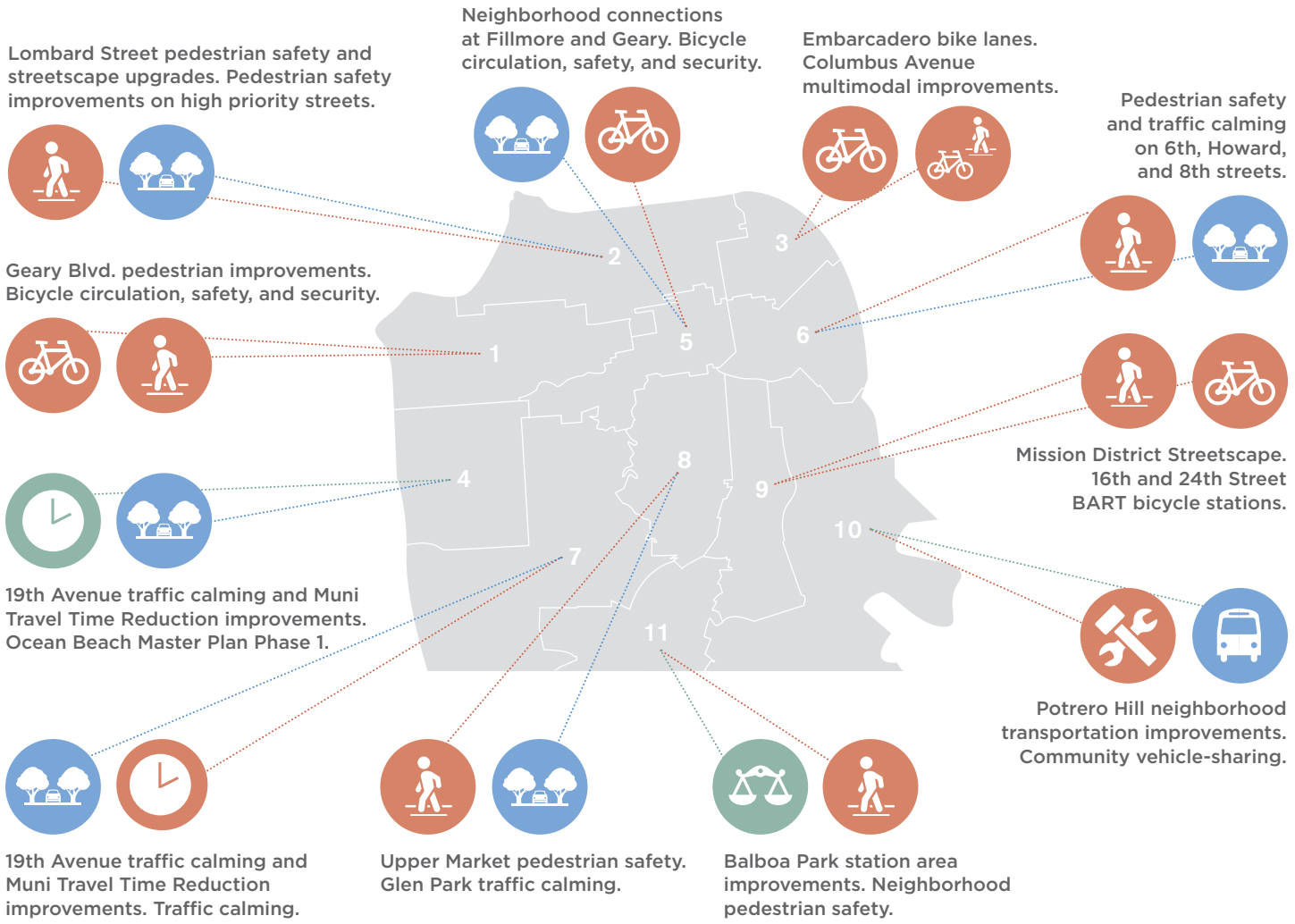
The Early Action Program represents the first five years of the 30-year SFTP and will fund improvements in every part of the city for every mode of travel. The Early Action Program uses the Prop K transportation sales tax and its ability to leverage federal, state and other funds to direct hundreds of millions of dollars toward SFTP investments. Over the next five years, city and regional agencies will work to define and implement these projects. The Figure 34 (next page) shows a representative sample of potential Early Action Program projects. We anticipate Early Action Program projects in each District. Information about these projects is available through the Authority's interactive web site, www.mystreetsf.com. We anticipate Transportation Authority Board approval of the Early Action Program in Spring 2014.

NEW REVENUES

We evaluated a range of potential new local revenue sources to meet existing and future transportation needs. A combination of sources such as private sector funds, a parcel tax, sales tax, and vehicle license fee are possible candidates for generating the additional $7.5 billion recommended for the SFTP vision. Over the past year, we worked closely with the Mayor's 2030 Transportation Task Force, which has recommended a vehicle license fee, general obligation bonds, and a half-cent sales tax increase for the 2014 and 2016 ballots. We will continue

The Early Action Program represents the first five years of investments for the 30-year SFTP and will fund improvements in every part of the city for every mode of travel.

FIGURE 34. EARLY ACTION PROGRAM: REPRESENTATIVE PROJECTS IN THE FIRST FIVE YEARS OF THE SFTP



to work with the Mayor's Office, partner agencies, and stakeholders to pursue new local, regional, state, and federal transportation funding sources. The Mayor's Transportation Task Force is further analyzing next steps for potential new local revenues.

MONITORING AND EVALUATION

Performance measurement is one of the Transportation Authority's statutory functions in its capacity as Congestion Management Agency, and as administrator of the Prop K half-cent transportation sales tax. The Transportation Authority will focus on performance tracking and evaluation in the following areas of policy interest, spanning the monitoring of system needs and trends, project delivery, and project effectiveness:

- **ONGOING MONITORING AND REPORTING.** Through biennial monitoring as Congestion Management Agency, and through www.mystreetsf.com, the Transportation Authority will track and provide information to the public on the delivery of transportation projects, including those identified for implementation in the Early Action Program. The Transportation Authority will also support the City's efforts to monitor the transportation obligations within development agreements.
- **DEMOGRAPHIC AND TRIP-MAKING TRENDS.** The Transportation Authority will continue to monitor demographic and travel behavior trends and the effect of new growth on the transportation system.
- **TRANSIT SYSTEM PERFORMANCE, ESPECIALLY EQUITY AND RELIABILITY.** SFTP outreach revealed that transit reliability is a socioeconomic and geographic equity issue, as well as a top priority for the general public. Yet data measuring and tracking reliability are limited. More research is needed to improve reliability measurement. Equity monitoring should additionally track safety trends and affordability outcomes.
- **DOCUMENTING THE COST EFFECTIVENESS OF TRANSPORTATION INVESTMENTS THROUGH BEFORE-AND-AFTER STUDIES.** The Transportation Authority will work with implementing agencies to strategically evaluate the effectiveness of new projects and programs to inform future project selection and prioritization, especially in the areas of pedestrian safety, traffic calming, and travel demand management.

Major next steps are:
Rolling out the first five years of SFTP investments through an Early Action Program, pursuing new local revenues to address unmet transportation needs, and conducting monitoring and evaluation to ensure efficient and equitable progress towards SFTP goals.

STAFF ACKNOWLEDGEMENTS

The Transportation Authority gratefully acknowledges the staff who produced this document. Rachel Hiatt, Principal Transportation Planner, served as project manager, and was assisted by: Bill Bacon, Liz Brisson, Colin Dentel-Post, Kyle Gebhart, Ryan Greene-Roesel, Chad Rathmann, Bridget Smith, Dan Tischler, and Lisa Zorn under the direction of Elizabeth Sall, Maria Lombardo and Anna LaForte.

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EXHIBITS 5-8

To Mission Bay Alliance Comment Letter dated July 27, 2015

Re: **Transportation Impacts** - Comments on Draft Subsequent Environmental Impact Report for the Event Center and Mixed Use Development at Mission Bay Blocks 29-32 (Warriors Arena Project); San Francisco Planning Department Case No. 2014.1441E; State Clearinghouse No. 2014112045

EXHIBIT 5

Appendix B: White Paper

TRANSPORTATION NEEDS

KEY TOPICS

- The performance of San Francisco's transportation system, under both current and future (2040) baseline conditions
- Issues that need to be addressed to make progress towards the four major SFTP goal areas: world-class infrastructure; economic competitiveness; livability; and healthy environment
- "What it would take" to achieve San Francisco's ambitious goals in these four areas
- Issues and opportunities related to visitor and student travel and goods movement

1 Introduction

In 2040, San Francisco will host 200,000 new jobs and more than 250,000 additional residents, bringing its population over one million for the first time. Over the next 30 years, the city's transportation system will need to adjust to accommodate the trips made by these new residents and visitors. It will also need to confront the significant challenges it faces today, including years of underinvestment in system upkeep, escalating operating costs, challenges delivering new projects in advance of growth, an overcrowded transit system, and a road network that lacks capacity to absorb the projected growth in driving (even assuming the emerging innovations from the technology sector, including car- and ride-sharing and private commuter shuttles).

We analyzed these trends and their implications for San Francisco's transportation system to inform development of the San Francisco Transportation Plan (SFTP). This report describes the analysis in detail. It is organized in four sections corresponding to the four SFTP goal areas: world-class infrastructure, economic competitiveness, healthy environment, and livability, with a final section analyzing the transportation needs of specific groups of travelers – visitors, students, and companies making deliveries in the city. Specifically:

- **SECTION 2: ECONOMIC COMPETITIVENESS** describes projected housing and employment growth through 2040 and resulting roadway congestion and transit crowding. It shows how system expansion, especially in the downtown core, is needed to ensure new workers, visitors, and residents can be accommodated.

- **SECTION 3: WORLD-CLASS INFRASTRUCTURE** examines what will be required to maintain a state of good repair across our transit and roadway systems. It details the transit system performance impacts of capital asset maintenance deficiencies, identifies key transit systems' capital asset maintenance funding needs, and discusses the condition of the city's roads and bridges. Key needs include a large unfunded backlog of vehicle maintenance needs that will contribute to further declines in transit system reliability if not addressed.

- **SECTION 4: LIVABILITY** analyzes trends in bicycling and walking, especially safety, relative to San Francisco's goals for nonmotorized transportation and describes future investments needed to ensure the city can meet its goals for the share of trips made by bicycling and walking while ensuring safety.

- **SECTION 5: HEALTHY ENVIRONMENT** describes environmental goals for our transportation sector, including those stemming from SB 375 (which set greenhouse gas emission reduction targets for the Bay Area). It describes trends in GHG emissions and vehicle travel under current and future baseline "business as usual" conditions, and explains what it would take to achieve our ambitious environmental goals. The section identifies strategies such as congestion pricing and travel demand management that could help reduce existing vehicle traffic and greenhouse gases.

- **SECTION 6: VISITOR, GOODS MOVEMENT, AND SCHOOL TRANSPORTATION NEEDS** describes the transportation issues faced by these three groups, whose needs do not fit neatly into the sections above. This section discusses strategies to reduce visitors' reliance on private automobile travel to help reduce congestion. It describes the effects of increasing congestion on goods movement and proposes some ways to solve the problems. Then it presents information from a survey of students and their parents about factors that prevent them from taking transit, walking, or riding a bicycle to school.

  In addition to the analysis in these sections, we also assessed the performance of the future transportation system through the lens of geographic and socioeconomic equity (see SFTP Appendix F), and did a focused study of future conditions in the downtown core where transportation congestion and crowding are expected to be most acute (see SFTP Appendix C).

THE FUTURE BASELINE:
THE TRANSPORTATION SYSTEM OF THE FUTURE ASSUMING BUSINESS AS USUAL

Most of the quantitative transportation system performance measures in this document are generated by the SFCTA's travel demand model, SF CHAMP. To identify emerging needs, we compared performance today with performance in a 2040 future baseline scenario. The future baseline includes all projected housing and job growth as well as committed transportation improvements (See SFTP Appendix A for a definition of committed improvements) such as the Central Subway, the Van Ness Bus Rapid Transit, and the Presidio Parkway, among others. The future baseline represents conditions without any new investment beyond what is already committed, and illustrates performance gaps where additional investment is needed.

2 Economic Competitiveness

SECTION SUMMARY:

- San Francisco is planning for jobs and housing to each grow by 30 percent over the plan period.
- Crowding in transit vehicles and at popular transit stations will worsen without investments in new capacity, especially in the highest-growth areas such as the northeast core and southeast waterfront.
- Projected levels of new development will increase street congestion, particularly in the northeast core. Traffic forecasts predict that the city would need to reduce private-vehicle traffic by more than 25 percent to avoid peak-period gridlock in this area.
- Trip-making patterns will evolve with increased density along the eastern waterfront and in the city's southwest, suggesting a need for more investment in these areas.

This section describes the transportation performance indicators most closely related to economic competitiveness, the city's ability to continue drawing jobs and talent. Today, San Francisco is home to 11 percent of Bay Area residents and 17 percent of Bay Area jobs. While the city is projected to grow significantly over the plan period, the ability of San Francisco's transportation system to handle the trips of hundreds of thousands of new residents and workers will determine whether these projections can, in fact, become reality. This section analyzes key aspects of the transportation system and assesses what new investments will be necessary for it to handle forecast growth.

2.1 | Goals and Performance Measures

The SFTP economic competitiveness goal is to ensure the transportation system can accommodate new demands from a growing population and employment, and in doing so, ensure that Bay Area residents, employers, and visitors continue to want to live, work, and play here.

Key metrics associated with this goal are:

- Major changes in trip making patterns in growing markets
- Commute travel times
- Transit crowding (expressed as person-hours traveled in crowded conditions)
- Street congestion (expressed as percent of roadways experiencing congestion)
- Transit speeds

2.2 | Trends and future conditions

2.2.1 | OVERALL GROWTH TRENDS

San Francisco's economy has seen dramatic growth over the last two decades. As Figure 1 shows, even with the national downturns in 2001 and 2008, the per-capita gross domestic product of the metropolitan area centered on San Francisco outpaced both statewide and national economic productivity over the first decade of the 21st century. This robust economy has led to steady increases in real-estate demand, making San Francisco one of the most expensive places to live in the United States.[10]

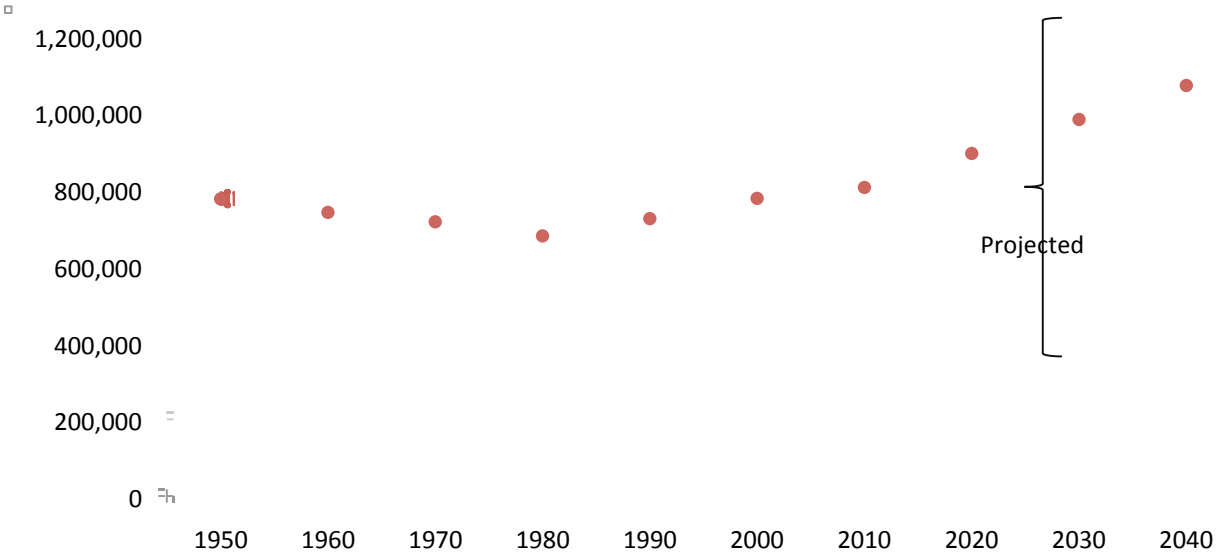
Figure 1 Economic Productivity in Per Capita Private-Sector GDP, 2001-2012 (2005 dollars)

Source: United States Bureau of Economic Analysis. State and Regional Data, Per Capita Real GDP (Chained 2005 Dollars). Retrieved from www.bea.gov on 10/17/13.

Those economic dynamics, combined with state and regional policies aimed at encouraging development in areas that are already urbanized and transit-oriented (see Section 5 for more on these policies), are why the Association of Bay Area Governments has forecast significant job and housing growth in the city. A city of 800,000 residents and 570,000 jobs today is forecast to house nearly 1.1 million residents and more than 750,000 jobs by 2040.[11] This would be the fastest growth in population and jobs since the 1950s (see Figure 2).

[10] Bloomberg.com. "Most Expensive Housing Markets: U.S. Cities." Retrieved from http://www.bloomberg.com/visual-data/best-and-worst/most-expensive-housing-markets-us-cities on 10/7/13.
[11] United States Census Bureau. *American Community Survey*, 2011.

Figure 2 San Francisco: Historic Population Growth, 1850-2013



Source, 1950-2010: United States Census Bureau via Bay Area Census. San Francisco City and County Decennial Census Data. Retrieved from http://www.bayareacensus.ca.gov/counties/SanFranciscoCounty40.htm on 10/17/13. 2020-2040 estimated based on projected 2040 from the Association of Bay Area Governments.

The SF Planning Department is planning to accommodate much of the city's projected growth in the northeast core and along the eastern waterfront, both areas the city and region have identified as appropriate for densification given their central locations or access to transit (Figures 3 and 4). Major development projects like those in Mission Bay, Hunters Point/Candlestick Point, Treasure Island, the Schlage Lock site in Visitacion Valley, and Parkmerced will contribute a great deal to this projected growth, but smaller-site projects throughout the eastern third of the city will also house a significant portion of the planned growth.

Much of the new development will also be concentrated in SoMa, which already has significant new transit infrastructure that is already under construction. Two major Planning Department efforts demonstrate this focus. The Central Corridor Plan, for the area around the new Central Subway, includes zoning changes and increases in height limits for a 28-square-block area between Market, Townsend, 2nd, and 6th streets. The Transit Center District Plan, for the area around the new Transbay Terminal, also includes significant increases in zoned density and height limits, among other changes, for the area between Market, Folsom, Steuart, and 3rd streets. The Central Subway and the new Transbay Transit center will help accommodate some of this growth.

Figure 3 Projected Housing Growth by Neighborhood

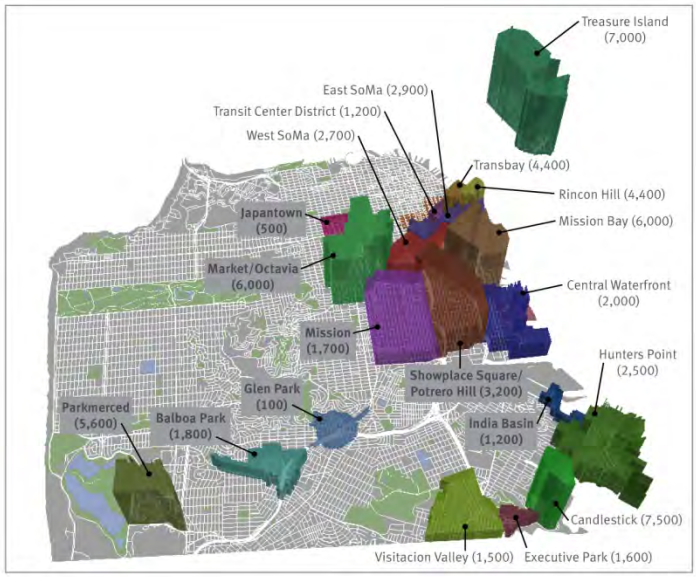
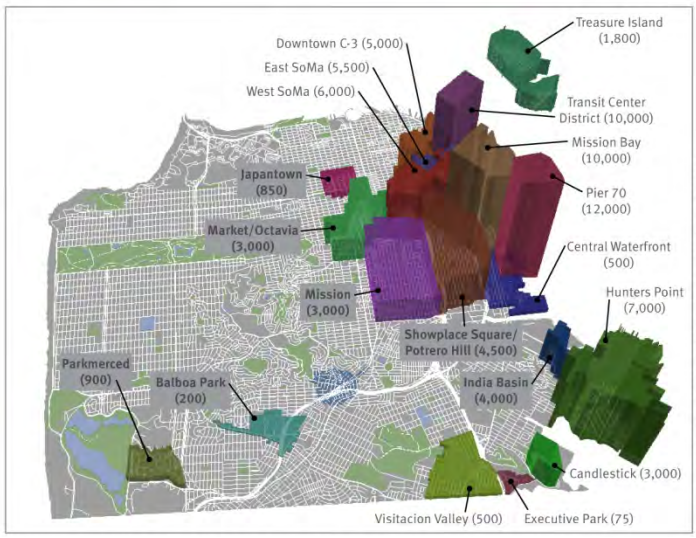


Figure 4 Projected Job Growth by Neighborhood

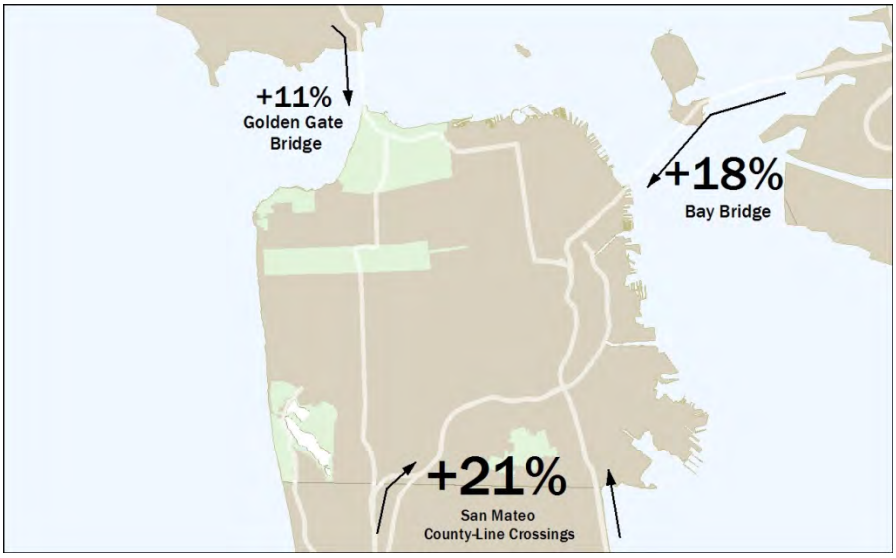


Source: SF Planning Department

The forecast growth in jobs and residents over the plan period is projected to lead to major increases in trip-making across all modes in San Francisco. The city is projected to see 600,000 daily new person-auto trips by 2040.[12] A portion of these new trips are forecast to come from outside the city, and as Figure 5 shows, the bridges and major San Mateo county line crossings are projected to see major increases in daily traffic volumes. However, almost three quarters of all daily auto trips to downtown are forecast to come from elsewhere in San Francisco.

[12] SF-CHAMP 4.3.

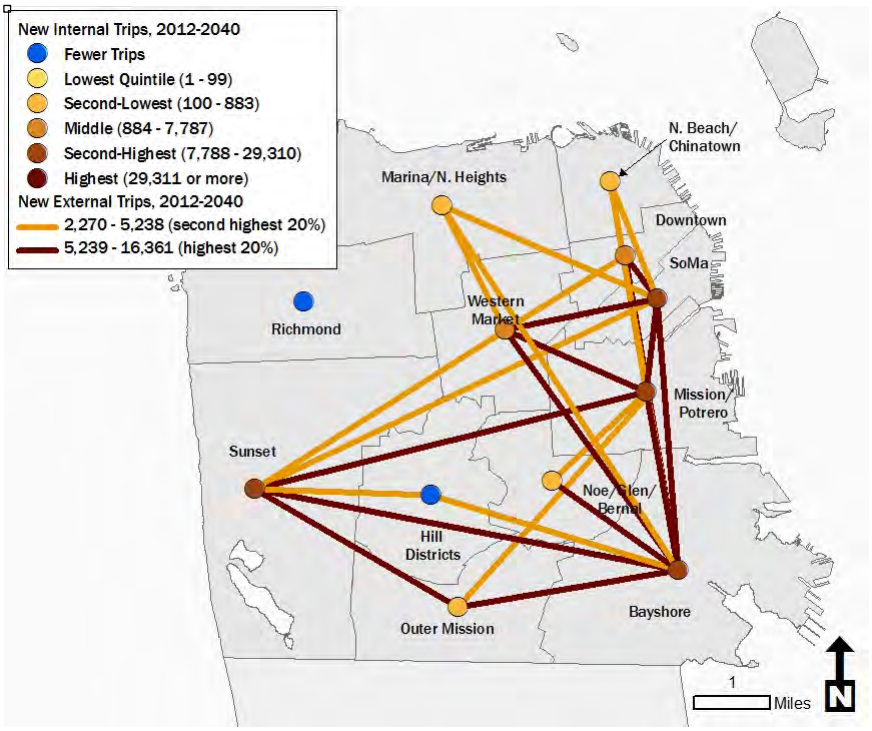
Figure 5 Change in Daily County Line Crossings by Automobile, 2012-2040



Source: SF-CHAMP 4.3.

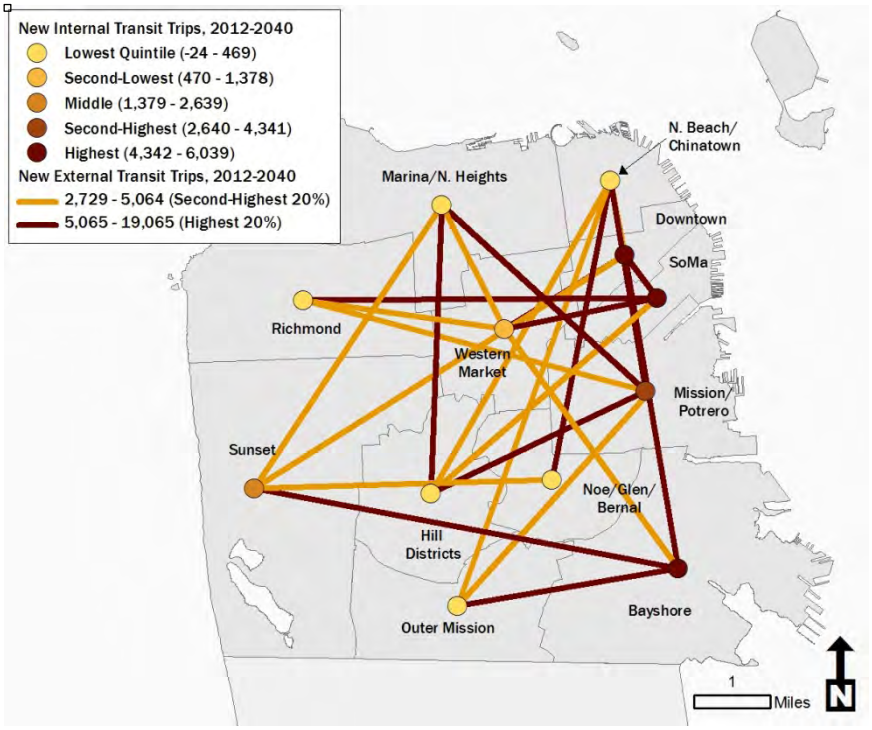
Figure 6 illustrates changes in auto trip-making patterns within the city: darker lines show the neighborhood pairs that will see the highest growth in auto trips between them, and these lines are concentrated along the city's eastern and southern borders. Darker brown circles indicate the neighborhoods that will see the biggest growth in internal auto trips, and again, they concentrate in the east and south. The transit system is also projected to see changes in trip-making patterns (Figure 7). The transit system is centered on the northeast core today, but the biggest increases in transit demand will be for trips across town, to and from the eastern neighborhoods.

Figure 6 Changes in Daily Auto Trip-Making Patterns within San Francisco, 2012-2040



Source: SF-CHAMP 4.3.

Figure 7 Change in Daily Transit Trip-Making Patterns within San Francisco, 2012-2040



Source: SF-CHAMP 4.3.

Economic Competitiveness: What Would it Take?

The SFCTA analyzed what it would take to meet specific quantitative transportation system performance targets for each SFTP goal area. The analysis results for economic competitiveness are presented below.

- **CHALLENGE:** One of the transportation-related factors that affects where employers choose to locate or expand is commute travel times for their employees. Commute travel times are expected to worsen in the future due to new growth.
- **TARGET:** Keep commute travel times (combined for car and transit commuters) to and from downtown San Francisco in 2035 from degrading relative to 2010.
- **IMPROVEMENTS:** This scenario analyzed three levels of investment, as described below.
  - **LOW:** Frequency improvements to local and regional transit service, Caltrain electrification, and lower-cost capital projects such as bus priority measures and more extensive traffic management on key commute corridors.
  - **MEDIUM:** The above plus more extensive programmatic investments in transit, congestion pricing, and higher-cost capital projects such as Caltrain's downtown extension and bus rapid transit on key corridors. A sensitivity test was conducted to determine the effect of a hypothetical regional policy that modestly increases parking prices in other major Bay Area employment centers.
  - **HIGH:** The above plus major capital projects, namely a new cross-bay BART tube and high-speed rail service.

Table 1: Performance of Economic Competitiveness Scenarios

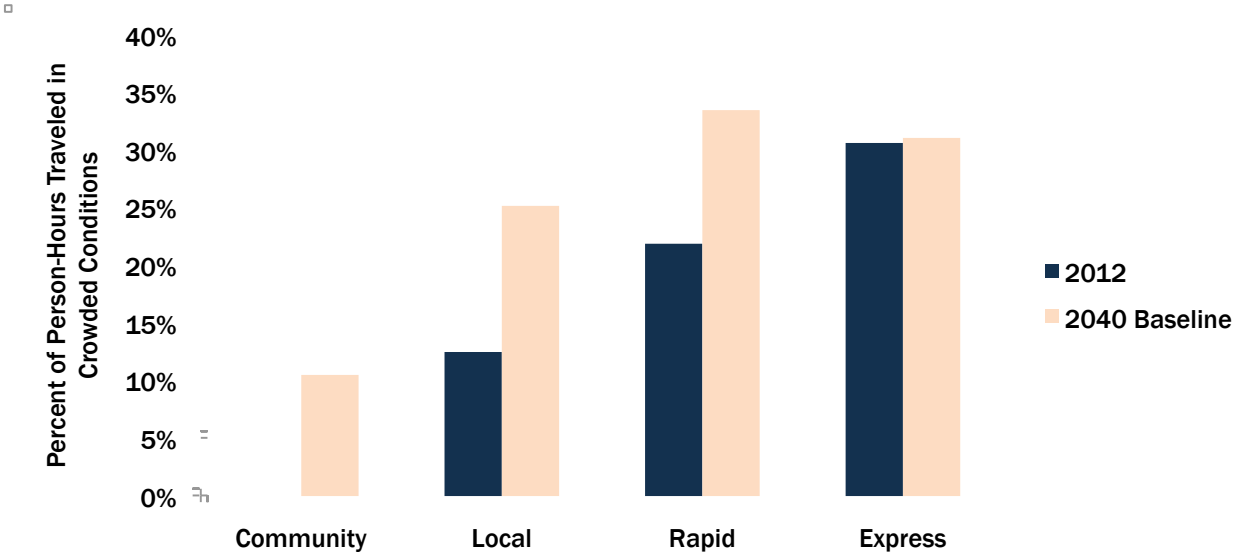
	2010	2035 BASE	2035 LOW	2035 MED	2035 MED + PARKING PRICING	2035 HIGH
Total average commute time to SF including non-motorized (minutes)	40	42	41	40	40	41
Auto	38	39	39	35	35	36
Transit	48	51	49	48	48	49
Cost (millions of $)	–	–	$2,000	$5,000	$5,000	$20,000
Cost Effectiveness	–	–	High	Med	Med	Low

- **COST:** From $2 billion (low level of investment) to $15 billion (high level of investment).
- **RESULTS:** Three of the scenarios (medium, medium with pricing, and high) keep combined car/transit commute travel times from degrading (see table above).
- **CONCLUSIONS:** The target under this scenario appears achievable. Between the low and medium levels, it takes an extra $3 billion in improvements to reduce travel times by one minute. The high level performs worse than the medium level perhaps because major investments such as a new BART tube increase overall travel significantly by improving accessibility. An additional finding was that because so many of San Francisco's commute trips begin or end in other cities, San Francisco's progress is greatly affected by policies implemented elsewhere. SF needs to take an active role in supporting regional policies that support its goals.

2.2.2 | TRANSIT CROWDING

By 2040, the city is forecast to see 300,000 new transit trips per day on a system that already suffers from crowding and reliability issues. Figure 8 shows that a significant percentage of transit passengers experience crowded conditions when traveling during peak hours today and that the issue is projected to get significantly worse under a 2040 baseline scenario. The baseline scenario includes the existing transit system and expansions or enhancements that have already secured significant funding or are already under construction. Crowded conditions are defined as vehicles with loads at 85 percent of capacity or more. As the figure shows, crowding is expected to increase significantly on all Muni service types except the express series.

Figure 8 Daily Person Hours of Travel in Crowded Conditions for Different Muni Service Types



Source: SF-CHAMP 4.3.

Crowding is particularly acute on the ten most crowded lines, with more than 60 percent of person-hours traveled spent in crowded conditions and a slight worsening of conditions on these lines by 2040. The total number of lines with any crowding is projected to grow from 31 to 50 over the plan period.

ADDRESSING CROWDED CONDITIONS

Expected crowding can be addressed, in part, by providing additional transit service during peak periods. However, the need to add peak-hour service should be balanced with consideration of cost-effectiveness (peak service is costly to provide), and equity concerns. Some lower-income shift workers depend on having adequate service during off-peak periods.

Figure 9 shows the current and projected spatial distributions of crowding. While Muni vehicles typically reach their most crowded points near the center of the system today, the extent of crowding moves outward from the core by 2040, in part as a result of significant new development at the end of several key lines and in part because of the increased employment pull of downtown and the eastern waterfront.

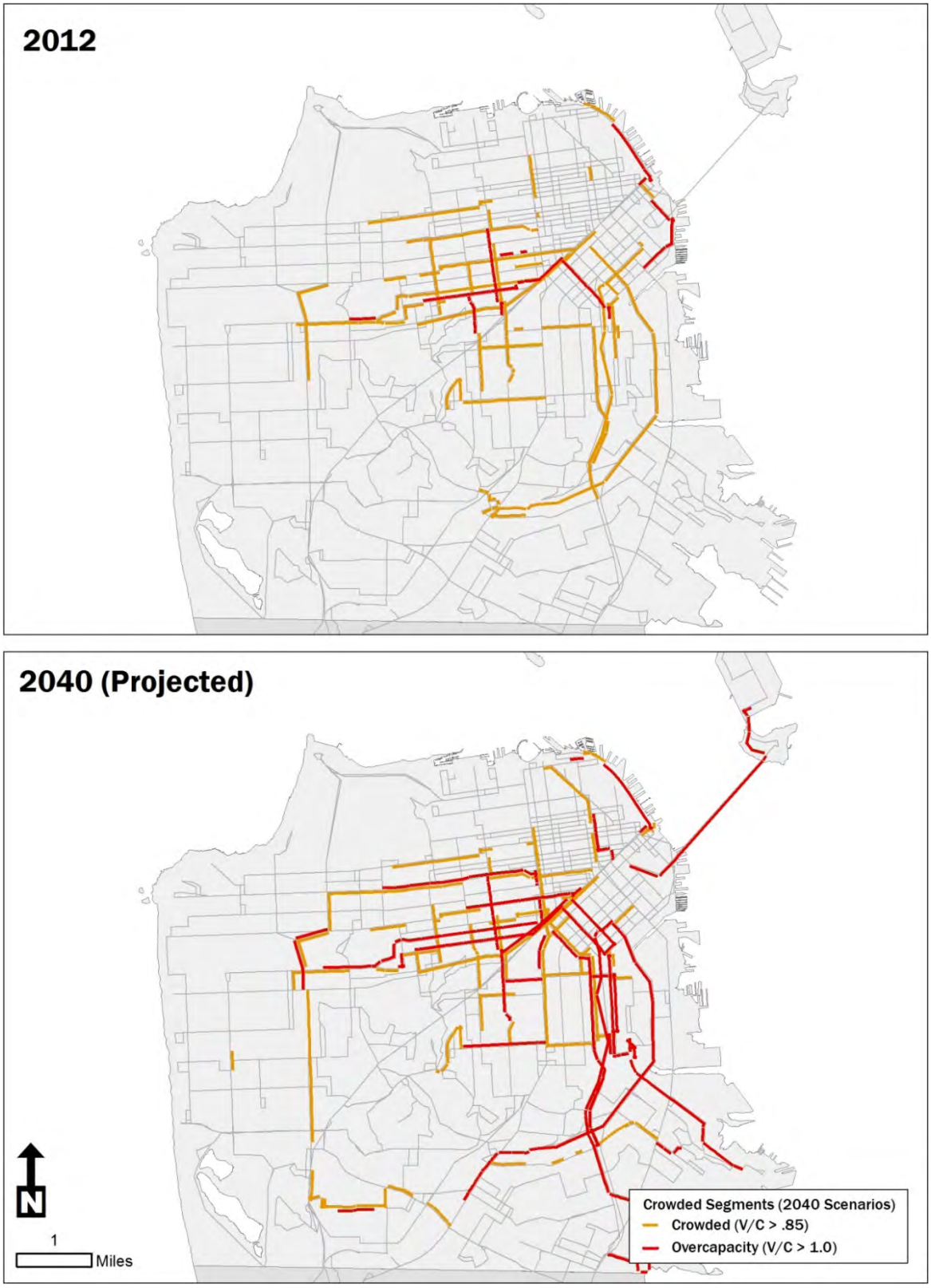
Regional operators will also feel the effects of San Francisco's growth. As Figure 10 shows, bus operators, including SamTrans, Golden Gate Transit, and AC Transit, already face peak-period crowding and would see that increase significantly by 2040. Caltrain and BART are both currently below 85 percent full during peak periods but would see some lines go over the threshold during the SFTP plan period.

For regional operators, crowding will have noticeable effects outside of transit vehicles as well. Projected ridership growth will make it more difficult to access stations and could make stations themselves crowded at key points in the system. BART ridership to, from, and within San Francisco is projected to grow by 37 percent, and as such, the system's two most crowded stations, Embarcadero and Montgomery, are forecast to hit limits in their capacity.[13] According to a BART study, delayed peak-hour conditions could lead to significant backups at escalators and crowding-related safety issues on platforms. Demand for travel to the system's core will also create station access issues outside San Francisco. Even with new transit-oriented developments around stations, BART will likely see issues like full parking lots and crowded feeder-bus routes throughout the system.

The agency has started to work solutions to all of these problems, exploring ways to redesign Embarcadero and Montgomery stations and improve parking management and bike and bus access,[14] but the agency and partner municipalities, including San Francisco, will need to identify funding for such changes once plans are in place. Caltrain could see similar problems up and down its corridor with projected ridership growth.

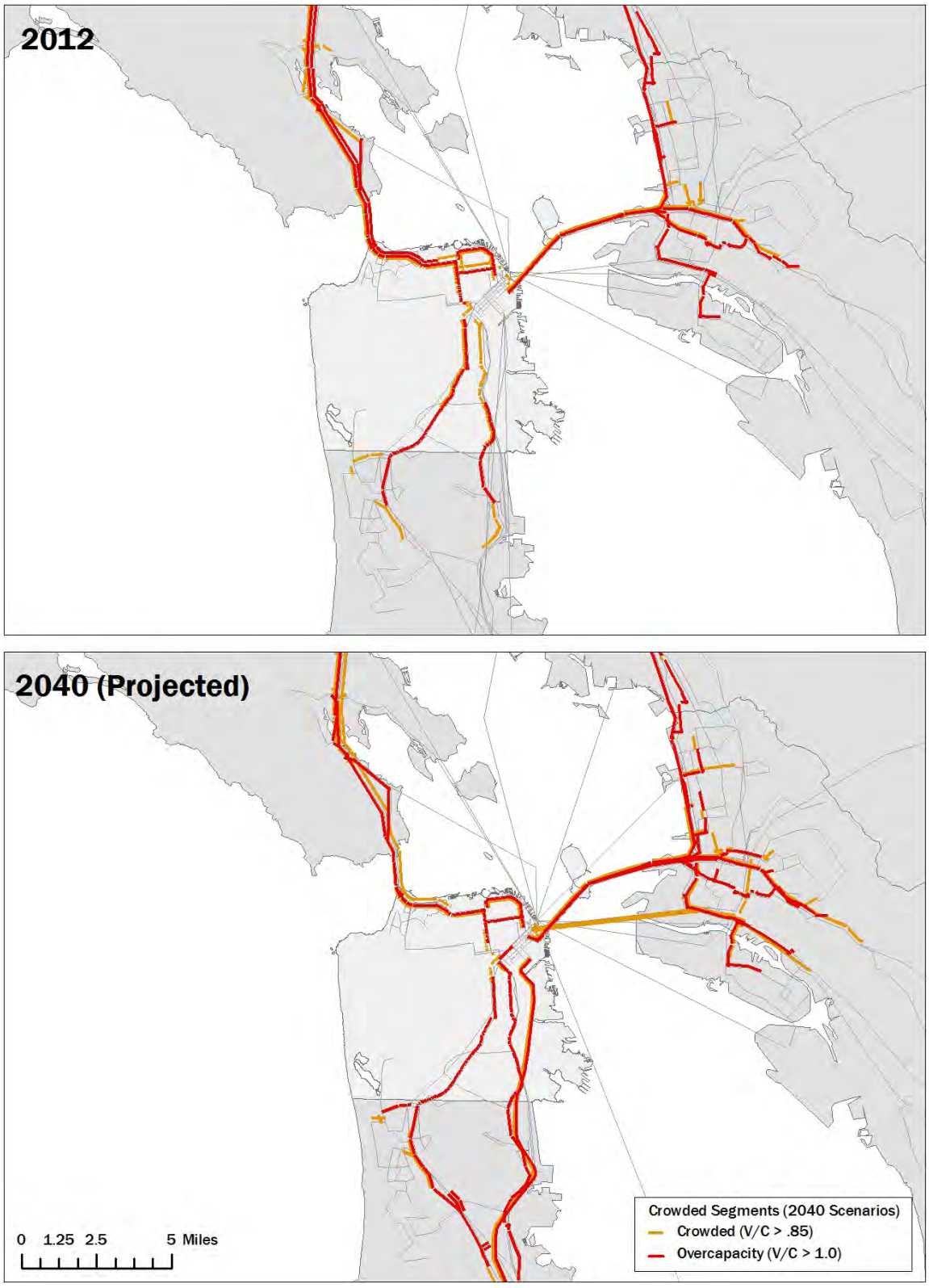
[13] Capacity Planning: Board Workshop, January 2013 (http://www.bart.gov/docs/capacity.pdf)
14 Capacity Planning: Board Workshop, January 2013 (http://www.bart.gov/docs/capacity.pdf), page 6.

Figure 9 Crowding on Muni, 2012 and 2040



Source: SF-CHAMP 4.3. O:\Active Studies\CWTP Update\Data\Zonal Maps\Crowding for map; Q:\Model Projects\sftp\ch430.JHC.2040.SFTP.NoProject\Outputs – SFTP Transit AM mdb 4040 and 2012

Figure 10 Regional Transit Crowding, 2012 and 2040.



Source: SF-CHAMP 4.3.

2.2.3 | STREET CONGESTION

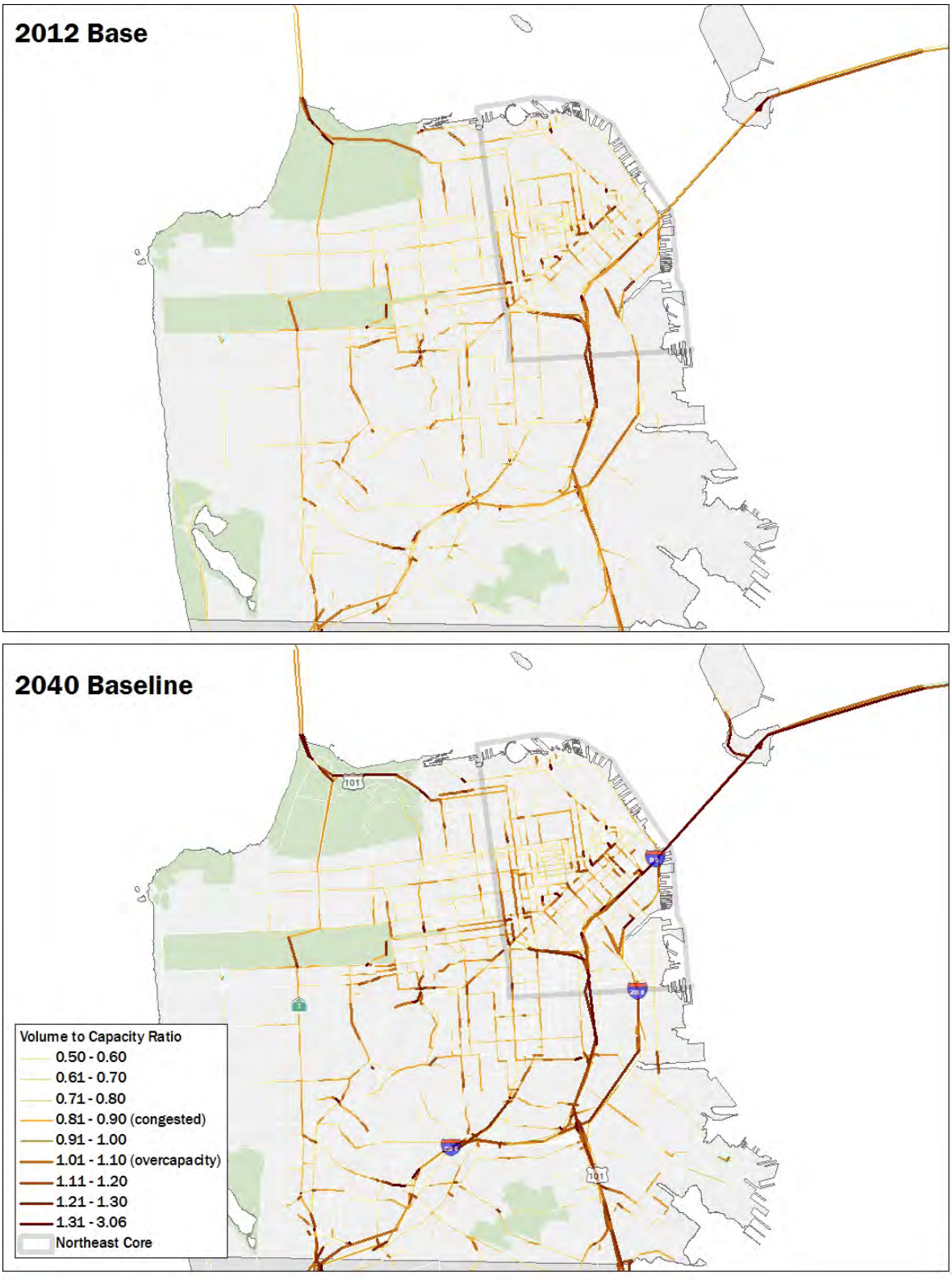
New population and employment will result in about 30 percent more automobile trips on the network compared to today, or an increase of about 600,000. Figure 11 illustrates the effects of this increase on the street network, and shows that many streets will reach or exceed levels considered congested or overcapacity.[15]

2.2.4 | TRANSIT SPEEDS

Overall modeled daily average speeds on the Muni network are around 11 miles per hour today. Projections for the 2040 baseline scenario show those speeds remaining the same in the future although street congestion worsens due to population growth. This is in part because several major transportation improvements included in the future baseline (such as the Van Ness Bus Rapid Transit Project, the Central Subway, and others) improve conditions for transit and offset the negative effects of congestion.

[15] Congestion is defined as a ratio between a road's volume and its capacity of between .8 and 1.0. "Congested" means vehicle volumes are between 80% and 100% of the volumes the road was designed to handle. "Overcapacity" is defined as a ratio of more than 1.0, in which a road carries volumes that are greater than the levels for which it was designed.

Figure 11 Congestion, 2012 and 2040



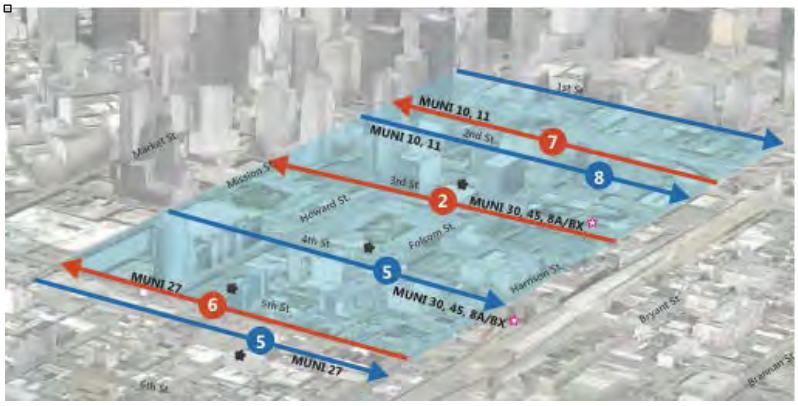
Source: SF-CHAMP 4.3.

2.2.5 | CONGESTION IN THE NORTHEAST CORE

The effects of increased congestion will be most acute in SoMa, given the area's significant projected job and housing growth and its location between Interstate 80 and the city's dense job core. The forecast increase in auto traffic is projected to lead to gridlock during peak periods, with queues at traffic lights spilling into downstream intersections and bringing multi-block areas to a standstill. Avoiding these cascading effects in this critical part of the system would require a 27 percent reduction in private-vehicle traffic in SoMa.[16]

Gridlocked conditions in SoMa would slow transit vehicles as well as cars. As Figure 12 shows, some of the bus lines that run through the neighborhood would slow to the low single digits during the evening peak hour. Such slow speeds would have a ripple effect across Muni's bus system, tying up drivers and vehicles and exacerbating reliability issues throughout the city.

Figure 12 Projected 2035 SoMa Bus Speeds (miles per hour), Evening Peak Hour



Source: SF-CHAMP 4.3 volumes for "Baseline Prime," Fehr + Peers SimTraffic Analysis, 2012

2.3 | Summary of needs

San Francisco needs to improve its transportation system, especially in the downtown core, to accommodate new growth. The following strategies could help address transit and roadway crowding caused by development growth:

- **ENHANCED TRANSIT CAPACITY IN GROWING AREAS (E.G. CORE, SOUTHWEST, SOUTHEAST), ESPECIALLY ON REGIONAL TRANSIT.** BART has already started to explore increasing its capacity in the most heavily used parts of its system through the BART Metro concept, which could increase service levels, platform capacity, and/or the number of stops between the Mission in San Francisco and downtown Oakland. Caltrain is also working to increase the number of trains it can run every hour through electrification (see Section 2) and new communications equipment that would allow the system to safely run trains closer together during peak times. Implementing these ideas could help reduce auto traffic on downtown streets.

- **IMPROVED DIRECT REGIONAL TRANSIT SERVICES FOR AREAS OF THE CITY LESS WELL SERVED BY TRANSIT.** Much of the west side of San Francisco is at least a bus ride away from the Bay Area's regional transit system. A regional express-bus system providing direct connections from San

[16] Brisson, Liz, Kyle Gebhart, and John Urgo. "Core Network Circulation Study – Evaluation Framework and Baseline Analysis Findings." 9/14/2012.

Francisco's west side to regional transit and regional employment centers could help address the growing numbers of trips expected between the west and east sides of the city.

- **IMPLEMENTATION OF INVESTMENTS CRITICAL TO MEET NEW DEMAND GENERATED BY DEVELOPMENT.** The city and developers have already agreed to a set of transit enhancements to serve the major developments that will come online between now and 2040. Timely implementation of these investments – including enhanced bus and ferry service to and from Treasure Island, light-rail enhancements serving San Francisco State University and Parkmerced, express-bus service to Candlestick and Hunters points, and the other enhancements already underway as part of the Southeast Waterfront Transportation Plan –will be critical to accommodating new growth in these areas.

- **MORE EFFICIENT USE OF FREEWAY CAPACITY TO SERVE TRAVELERS, ESPECIALLY IN THE SOUTH BAY MARKET.** High occupancy vehicle lanes on the city's freeway system and other performance enhancements could encourage carpooling and ensure that commuters are making efficient use of ever more crowded infrastructure.

- **DIRECT CONGESTION MANAGEMENT AND PARTNERSHIPS WITH PRIVATE OPERATORS.** The city will also need to provide financial disincentives to driving alone into the congested core through congestion pricing and transportation demand management partnerships with private companies. See Section 5 for more detail.

3 World-Class Infrastructure

SECTION SUMMARY:

- After years of underinvestment, Muni and regional transit agencies that serve San Francisco have significant unfunded capital needs.
- Poor vehicle condition is already responsible for many transit service delays and the situation will worsen without increased investment.
- Operating costs are growing rapidly and will crowd out critical capital investments if transit agencies do not take steps to control growth in costs.
- Pavements will require significant new investment to maintain adequate conditions.

San Francisco's transportation system relies on aging infrastructure that will need significant repair or replacement over the course of the plan period. This section discusses investments needed to achieve the goal of world-class infrastructure and maintain a state of good repair.

It includes the following sections:

- **TRANSIT OPERATING NEEDS** discusses what it will take to keep the existing system running given rising transit operating costs. It does not discuss the additional service expansion necessary to accommodate San Francisco's growing population and employment, which were covered in the prior section on Economic Competiveness.
- **TRANSIT MAINTENANCE NEEDS** discusses what it will take to repair and replace vehicles and fixed infrastructure at the appropriate times in their lifecycles over the course of the plan period and the performance consequences of not investing sufficiently in capital asset maintenance.
- **ROADS, BRIDGES, AND STRUCTURES** discusses investments needed to meet city pavement-condition goals and keep bridges and other structures in safe operating conditions for all users.

3.1 | Goals and Performance Measures

The SFTP world class infrastructure goal is to improve the condition of San Francisco's infrastructure so that it is reliable and can be maintained cost-effectively. Key goals and performance measures for this section include:

- Stabilize transit operating costs
- Improve transit system reliability through adequate maintenance
- Achieve a pavement condition index of 70 [Proposition B streets bond goal]
- Maintain road and bridge structural sufficiency

3.2 | Trends and future conditions

3.2.1 | TRANSIT OPERATING NEEDS

Transit operating expenses include the cost of wages for vehicle drivers, maintenance and customer-service staff, system administrators, and others. They also include the cost of fuel or energy to power transit

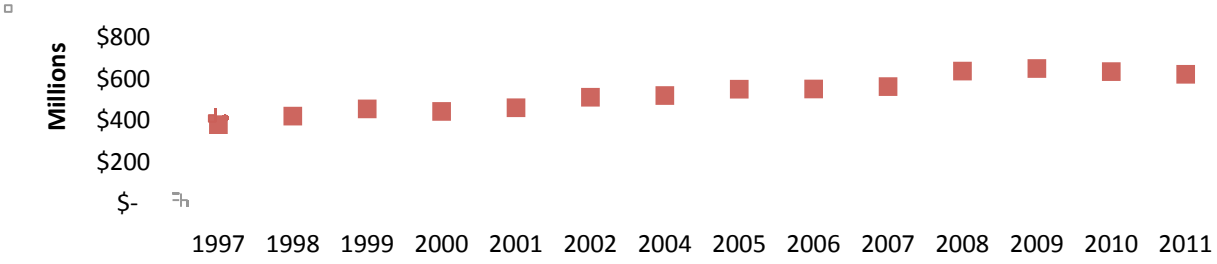
vehicles and parts or other materials for regular maintenance tasks. Transit operating needs alone will take up nearly 60 percent of available revenues. If current trends continue, funding needs could be even higher and could crowd out system-efficiency projects and those aimed at serving new trip patterns. Among these trends:

- **RISING COSTS:** The real cost of providing transit service has been rising over the last several decades (Figure 13). According to the Metropolitan Transportation Commission's Transit Sustainability Project, rising fringe benefit costs are a major contributor to cost growth. The cost of fringe benefits like health care and pensions nearly doubled between 1997 and 2008 (Figure 14).
- **SLOWER SPEEDS AND LOWER RELIABILITY FOR SFMTA AND REGIONAL BUS OPERATORS:** A less direct but still important operating-cost driver, speeds slowed significantly on SFMTA's bus and light-rail systems between 1997 and 2008 (see Figure 15). Slower speeds mean a driver and vehicle can complete fewer route runs in a day, leading to less service for the same price.

Figure 13 Cost per Hour of Service, 2003-2011 (Inflation-Adjusted)

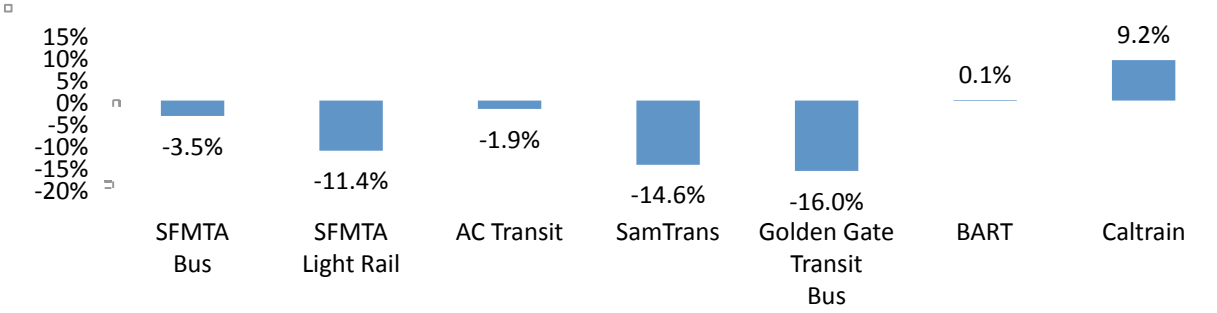
SOURCE: NATIONAL TRANSIT DATABASE TS2.2 - SERVICE DATA AND OPERATING EXPENSES TIME-SERIES BY SYSTEM, AND THE CALIFORNIA DEPARMENT OF FINANCE (FOR BAY AREA INFLATION DATA).

Figure 14 Growth in General and Fringe Benefit Costs for Agencies Serving San Francisco, 1997-2011 (Inflation-Adjusted)



Agencies included: SFMTA, BART, AC Transit, Golden Gate Transit, and SamTrans. Caltrain contracts for operations and maintenance, so fringe benefit data only covers administration and was not included.

Figure 15 Change in Average Speed, 1997-2008



Source: Metropolitan Transportation Commission. Transit Sustainability Project: Background and Findings. September 2011, page 8.

Agencies are already taking steps to make their operations more efficient. The MTC's Transit Sustainability Project created an incentive program that is aimed at reducing agencies' operating costs[17] by 5 percent by the middle of this decade. Implementation of additional cost-control recommendations from the TSP, such as capping agency contributions to health insurance costs, could also be explored.

Strategies to improve transit vehicle speeds and reliability can also help address crowding, since faster-moving vehicles are less expensive to operate. SFMTA is moving forward with its Transit Effectiveness Project, which aims to improve speeds and make operations across the system more efficient through route changes, stop consolidation, and small-scale investments like curb bulb-outs and painted transit-only lanes at key bottlenecks. Caltrain is moving forward with a plan to power its trains by overhead wires rather than diesel locomotives, which is projected to save fuel costs and trim travel times up and down the corridor due to faster acceleration and deceleration rates. BART is also studying expanded service in the system's core, between downtown Oakland and the Mission in San Francisco, allowing it to more efficiently meet demand in the highest ridership portion of the system. Many of these projects support both the world class infrastructure and economic competitiveness goals.

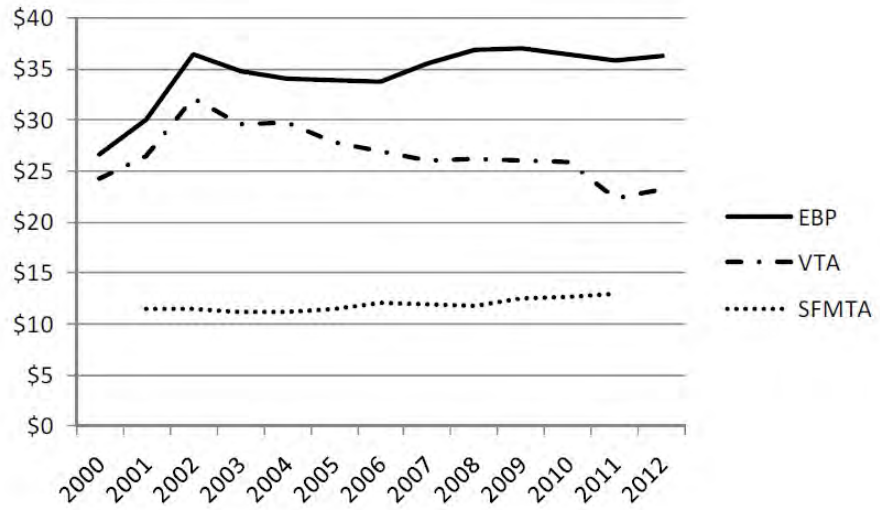
3.2.2 | PARATRANSIT

Growth in San Francisco's senior population and accompanying demand for paratransit services may also put additional growth pressure on operating costs, though SFMTA and other large paratransit operators in

[17] The MTC Transit Sustainability Project's final recommendations say these reductions can be per service hour, per passenger, or per passenger mile.

the Bay Area have effectively controlled the cost of such services on a per-trip basis in recent years (see Figure 16).[18] As of 2011, paratransit services made up just over 5 percent of transit operating costs region-wide.

Figure 16 Paratransit Operating Cost per Eligible Passenger Trip, Large Bay Area Operators



Source: Metropolitan Transportation Commission. "Transit Sustainability Project: Draft Paratransit Final Report." August 29, 2011. Page 3-10. Note: Dollars adjusted for inflation. VTA is Valley Transportation Agency, EBP is East Bay Paratransit.

San Francisco's senior population is projected to grow by 68 percent over the plan period, which should increase demand and thus the total cost of paratransit over time. However, several recent research reports on the strength of the relationship between the size of a city's elderly population and the level of paratransit demand have reached conflicting conclusions. While data shows that paratransit demand increased by 37% nationally between 2000 and 2009, and the American Public Transportation Association forecasts a 32% increase in paratransit demand by seniors between 2010 and 2020, a 2007 report concluded that demand is more closely related to an area's total population than to its senior population.[19] Further study is needed to quantify precisely how costs will increase as the elderly population grows.

[18] Metropolitan Transportation Commission. "Transit Sustainability Project: Draft Paratranist Final Report." San Francisco: August 29, 2011, page 3-10.
[19] *Ibid*, 3-18.

3.2.3 | TRANSIT CAPITAL NEEDS

Bay area transit operators face significant transit capital shortfalls totaling approximately $5 billion over the SFTP plan period. These capital needs include new vehicles and mid-life overhauls and for repairing or rebuilding existing infrastructure. Table 1 shows the total need, San Francisco share, and projected funding shortfall for Muni and the regional operators that serve San Francisco.

Table 1 Transit Capital Revenue and Need, 2012-2040 (In Billions, Year-of-Expenditure Dollars)

Operator	Total Need[1]	Revenue Vehicle and Score 16[3] Need	Revenue Vehicle and 70% of Score 16 Need	Expected Transit Capital Revenue	Total Shortfall
SFMTA	$12.7	$9.1	$7.6	$8.4	$4.3
Caltrain (SF Share)	$1.1	$0.7	$0.5	$0.4	$0.8
BART (SF Share)[2]	$2.1	$2.1	$2.1	$2.1	N/A
GGBHTD (SF Share)[2]	$0.3	$0.3	$0.3	$0.3	N/A
Grand Total	$16.16	$12.13	$10.48	$11.10	$5.07

[1] Need to meet target of 0% of assets past useful life.
[2] For the purpose of this assessment we are not expecting SF to have a discretionary share of the BART and GGBHTD capital need. BART and GGBHTD needs will be addressed at the regional/partner level.
[3] Score 16 vehicles are those the regional government has identified as top priority for replacement.

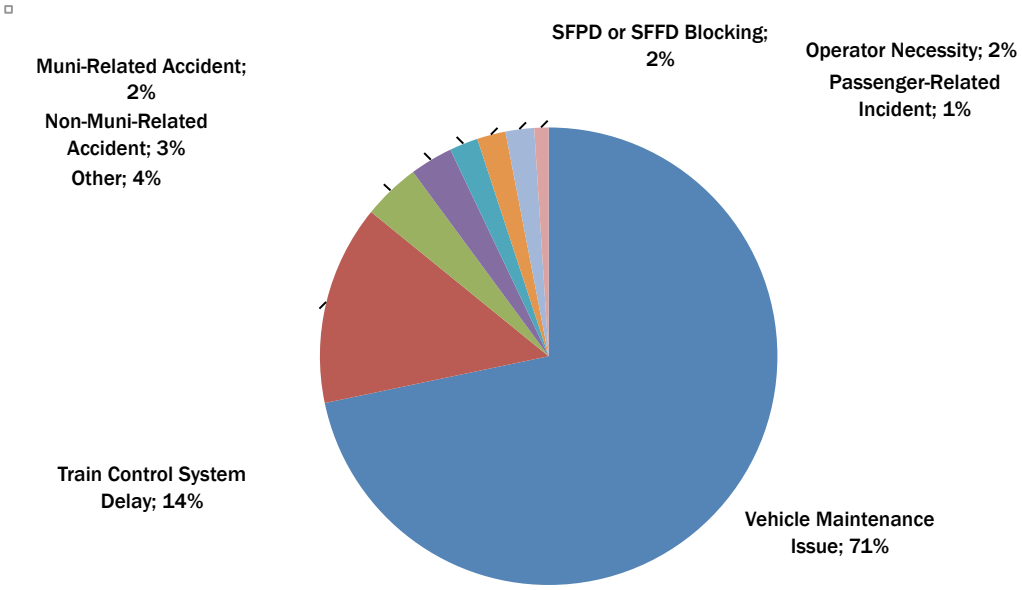
Shortfalls in state-of-good-repair investments can lead to significant reliability, safety, and customer-satisfaction issues. Specifically, they can, over time, cause:

- **VEHICLE BREAKDOWNS.** Failing to perform routine service on buses and rail cars can increase maintenance issues later in vehicles' lives. Poor transit vehicle maintenance has significant reliability impacts, resulting in service breakdowns, unscheduled turnbacks, and delays in tunnels. Illustrating this point, Muni's aging light-rail fleet had on-time performance of 50 percent in May 2013, and vehicle mechanical issues were responsible for 71 percent of the delays (see Figure 17).

- **INFRASTRUCTURE PROBLEMS.** Failing to invest appropriate amounts in fixed infrastructure can lead to cracked or worn-down rails, electricity issues, and communications problems along whole segments of the system, causing more frequent service suspensions for emergency repairs. It can also require initiation of "go slow" zones, further reducing speeds. As shown in Figure 17, train-control system delays were the second-largest cause of light-rail delay in May 2013. These maintenance-related delays are experienced on top of the routine delays associated with street congestion, traffic signals, and so forth.

- **DEGRADATION IN PASSENGER SAFETY AND COMFORT.** All of these issues have an impact on passenger safety and comfort, as they lead to lower adherence to service schedules and more frequent inconveniences like vehicle turn-backs and pass-ups. Additionally, they can lead to unevenness in passenger loads, with significant crowding on delayed vehicles.

Figure 17 Muni Light Rail Reasons for Delay, May 2013



Source: SFMTA 2013.

Table 1 shows that transit capital needs are very large and that much of the need is unfunded. This is because of the age of the region's transit systems, many of which are among the oldest in the state. The region as a whole, and San Francisco in particular, relies heavily on rail systems, which require higher ongoing maintenance investments than other modes because of the significant amount of fixed infrastructure they require.[20] Budget pressure over the last several years, which resulted in some deferred maintenance in addition to service cuts, also contributed to the large amount of need going forward. The following sections describe operator capital needs in more detail.

MUNI

Based on the direction set in its 2010 Fleet Plan, the agency aims to steadily lower the average age of its fleet through smaller vehicle procurements every few years instead of large procurements every five or 10 years, as it has done in the past.[21] As of 2010, the average Muni vehicle age was 7.5 years, but the agency projects that it can reduce that to 4 to 6 years by 2030. This approach would help keep enough operational vehicles available for peak service and reduce stress on the agency's maintenance department by spreading out lifecycle maintenance demands.

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[20] Metropolitan Transportation Commission. *Plan Bay Area*. Draft, March 2013. Page 67.
[21] San Francisco Municipal Transportation Agency. *2010 SFMTA Transit Fleet Management Plan*. Revised April 2011. Retrieved from http://beta.sfmta.com/cms/rhome/documents/2010FleetPlan_MainText-FinalAccessible.pdf on 9/16/13.

Beyond vehicles, Muni has several other areas of need related to maintaining a state of good repair. The agency estimates that, given the need for more vehicles of all types due to increased peak-hour demand, it will need more than 17 additional acres for maintenance facilities through 2030.[22] A portion of the total need also includes repairing or replacing rails, wires, and systems for train control and communication.[23]

REGIONAL TRANSIT OPERATORS

Caltrain will be transitioning from its current diesel-powered trains to new electric-powered trains by 2019. As such, the system's needs are related to both existing vehicles' ages and the need to buy train cars that are compatible with the new technology. Many of Caltrain's locomotives are more than 25 years old, near the end of their useful lives, and their age is already resulting in increased delays and maintenance issues.[24]

BART's vehicle fleet is one of the oldest and most heavily used in the industry, with an annual average of 95,000 miles of use per car.[25] As such, the agency's vehicle-replacement and maintenance needs make up a significant proportion of its total capital needs over the plan period. The agency also expects that it will need 30 percent more rail cars by 2030 to serve a growing number of riders. Given all of these factors, the agency's total capital shortfall is the largest of any Bay Area operator.[26]

Golden Gate Transit's capital needs are all related to replacing its more than 200 buses and 5 ferries at the end of their useful lives and growing its fleet as needed to meet passenger demand.[27]

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[22] SFMTA (2011), page 38.
[23] SFMTA. *2011 20-Year Capital Plan*. Page 9. Retrieved from https://www.sfmta.com/sites/default/files/FInalCapitalPlanMTAB_accessibleplan.pdf on 9/16/13.
[24] Emslie, Alex. "Aging Caltrain fleet leading to longer delays." San Francisco Examiner. September 18, 2013. Retrieved from http://www.sfexaminer.com/sanfrancisco/aging-caltrain-fleet-leading-to-longer-delays/Content?oid=2580990.
[25] Bay Area Rapid Transit. "New Rail Vehicle Program: Board Workshop." January 2013, Slide 11. Retrieved from http://www.bart.gov/docs/NewVehicleProgram.pdf on 9/16/13.
[26] MTC. *Plan Bay Area: Transit Operating and Capital Needs and Revenue Assessment.* Draft March 2013. Retrieved from http://onebayarea.org/pdf/Draft_Plan_Bay_Area/Draft_PBA_Transit_Operating_and_Capital_Needs_and_Revenue_Assessment.pdf on 9/16/13.
[27] Golden Gate Bridge, Highway, and Transportation District. *Short-Range Transit Plan, Fiscal Years 2008-2017*. Page 3-2. Retrieved from http://goldengatetransit.org/services/documents/SRTP-Chapter3.pdf on 10/2/13.

World Class Infrastructure: What Would it Take?

- **CHALLENGE:** San Francisco has an extensive and aging transportation infrastructure. Funding is not sufficient to adequately maintain the system in a state of good repair.
- **TARGET:** Raise the city's transportation system to a state of good repair, defined as:
    - Transit: fully fund transit vehicle replacement and mid-life overhauls and replace all capital assets at the end of their useful life; maintain today's levels of transit operations.
    - Roads: achieve a pavement quality index of 70 and maintain today's levels of street operation.
- **IMPROVEMENTS:** This scenario estimated the funding needed to achieve the state of good repair performance measures listed above. It does not include any needs associated with meeting additional demand due to population and employment growth.
- **CONCLUSIONS:** An additional $5 billion in year-of-expenditure dollars through 2040 would be needed to fully fund all transit capital maintenance needs. An additional $1.5 billion is necessary to reach and maintain a pavement condition index of 70. Existing revenues are sufficient to maintain today's levels of street and transit operation.

3.2.4 | STREETS AND BRIDGES

Maintaining San Francisco's road and bridge infrastructure is another key element of achieving the goal of world-class infrastructure. Smooth and well maintained streets increase safety and reduce wear and tear on both private cars and transit vehicles and make conditions safer for bikers and pedestrians.

As of 2011, the average pavement condition on local streets was "fair," with a pavement condition index rating of 64 out of 100, although TRIP: A National Transportation Research Group recently ranked the San Francisco-Oakland metropolitan area's roads the second worst in the country, with 60 percent of roadways in poor condition.[28]

In developing the Proposition B streets bond in 2011, the Department of Public Works and the San Francisco Capital Planning Committee set a goal of achieving an average citywide PCI score of 70, which is considered "good" condition, by 2021. Proposition B increased San Francisco's annual street resurfacing budget from $26 million in 2011 to $65.5 million in 2012 and provided funds for this increased investment level for four additional years. Achieving and maintaining a PCI score of 70 over the long term will require a total investment of $3.83 billion over the life of the plan, $1.53 billion more than is already committed to street resurfacing. Without a sustained, long-term increase in street resurfacing funding, San Francisco's PCI score will fall below 60 and into "poor" condition by 2030.

Streets and roads also require an investment of $2.84 billion in street operations like street cleaning, pothole filling, and signal maintenance; this funding is available through existing sources.

[28] TRIP: A National Transportation Research Group. "Bumpy Roads Ahead: America's Roughest Rides and Strategies to Make our Roads Smoother." Washington, DC: October 3, 2013. Retrieved from http://www.tripnet.org/docs/Urban_Roads_Report_Oct_2013.pdf on 10/11/13.

Bridges and other structures, including the state-owned freeways that run through San Francisco, will require additional investments over the coming decades. According to a recent study by Transportation for America, most of San Francisco's bridges are in good condition, but segments of U.S. 101 and a few non-freeway bridges will be in need of attention in the next 20 years.[29] In many cases, bridge decks (the concrete road beds on which surface asphalt rests) are the element that needs the most urgent attention, rather than deeper structural elements.

Caltrans owns and maintains state and US highways and interstates and will be responsible for funding the upkeep and replacement of highway bridges and structures. San Francisco government agencies can play an important role in advocating for timely investment in these structures. The Department of Public Works maintains a number of additional local-road bridges, retaining walls, and stairways that will need to be repaired or rebuilt over the life of the plan. The department prioritizes and funds maintenance needs through a citywide 10-year capital planning process.

[29] Transportation for America. "The Fix We're In For: The State of Our Bridges." Retrieved from http://t4america.org/resources/bridges/#?latlng=37.77583200000001,-122.4180973&bridge_id=%0A340034 on 9/16/13.

4 Livability

SECTION SUMMARY:

- Infill development near transit within San Francisco is expected to slightly increase the share of trips made by bicycling and walking by 2040, but this will be insufficient to achieve the city's aggressive goals. Additional investment will be needed.
- Investments in safety for walkers and bicyclists is a critical step necessary to allow growth in walking and bicycling.
- The SFMTA's Bicycle Strategy provides a vision for a safe, interconnected network of protected bicycle-ways, but funding is not sufficient to complete the network.
- The SFMTA's Pedestrian Strategy provides a vision for reducing collisions on the 44 miles of the most dangerous roadways. Funding is not sufficient to implement the strategy.

The concept of livability has become a key focus in recent years. Former U.S. Secretary of Transportation Ray LaHood described livability as "being able to take your kids to school, go to work, see a doctor, drop by the grocery or post office, go out to dinner and a movie, and play with your kids in a park, all without having to get in your car.[30]" The SFCTA also recently held a twitter contest to define livability and received numerous creative responses (Figure 18).

Figure 18 Responses to SFCTA Twitter Contest on Defining Livability

This section reviews recent trends and future needs with respect to improving the quality of alternatives to the automobile, with a particular emphasis on bicycling and walking.[31] It includes discussion of the current

[30] See the U.S. DOT's livability web page: http://www.dot.gov/livability

[31] Mass transit is covered in the World Class Infrastructure and Economic Competitiveness sections.

condition of bicycling and walking infrastructure, recent planning efforts in the area of bicycling and walking, and a summary of future investments needed to make bicycling and walking as safe and attractive as possible.

Bicycling and walking are the focus of efforts to improve livability because they are environmentally sustainable, pollution-free, and healthful modes of travel, and are inexpensive relative to other modes of travel, as illustrated in Figure 19. Additionally, if bicycling and walking investments shift even a small number of trips out of crowded transit vehicles, significant savings can be realized since peak-period demand is a key driver of the cost of providing transit service.

Figure 19 Cost Effectiveness of Bicycling, Walking, Transit, and Automobile Use

Source: SFMTA Bicycle Strategy.

4.1 | Goals and performance measures

The SFTP livability goal is to improve the quality and safety of the bicycle, pedestrian, and transit networks so that San Franciscans can have multiple attractive options for getting where they need to go. Performance measures for this area include:

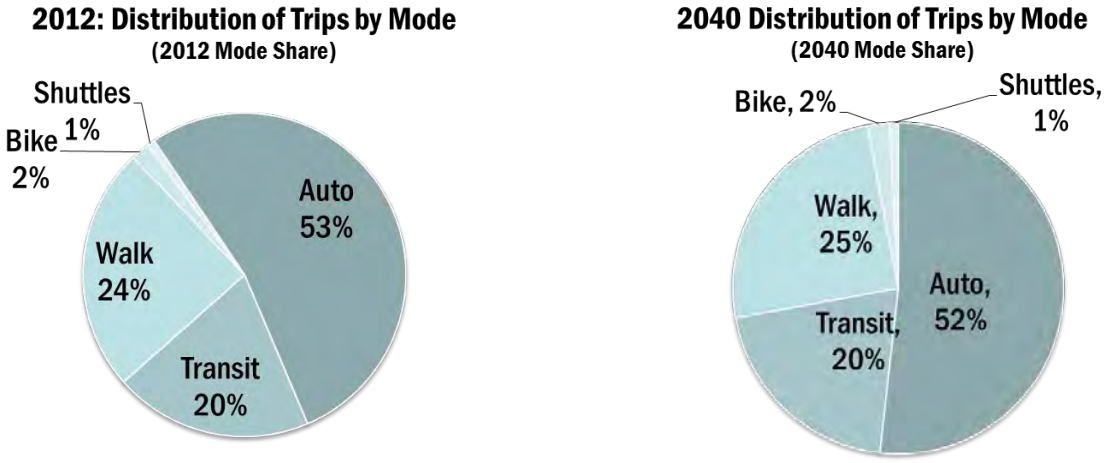
- **THE SHARE OF TRIPS MADE BY BICYCLING, WALKING, AND TRANSIT.** SFMTA has set a goal of greater than 50 percent of trips by these non-automobile modes. The Board of Supervisors set a goal of a 20 percent bicycle mode share by 2020.
- **BICYCLE AND PEDESTRIAN SAFETY.** The Mayor's Pedestrian Safety Task Force set a goal of reducing severe and fatal pedestrian collisions by 50 percent by 2021.
- **TRIP LENGTHS** (shorter trips are more easily made with non-motorized modes).

4.2 | Trends and future conditions

The outlook for increased rates of bicycling and walking is good. As San Francisco adds population and employment to areas already convenient for bicycling and walking (see the Economic Competitiveness section for a discussion of land use projections), the share of trips made by bicycling and walking is expected to grow slightly (by about a percentage point) without any additional infrastructure investment (Figure 20).

Nevertheless, as the following discussions demonstrate, additional investment will be needed for the city to meet its aggressive goals for increasing the share of trips made by bicycling and walking.

Figure 20 Distribution of All Trips To, From, and Within San Francisco by Mode, 2012 and 2040 Baseline

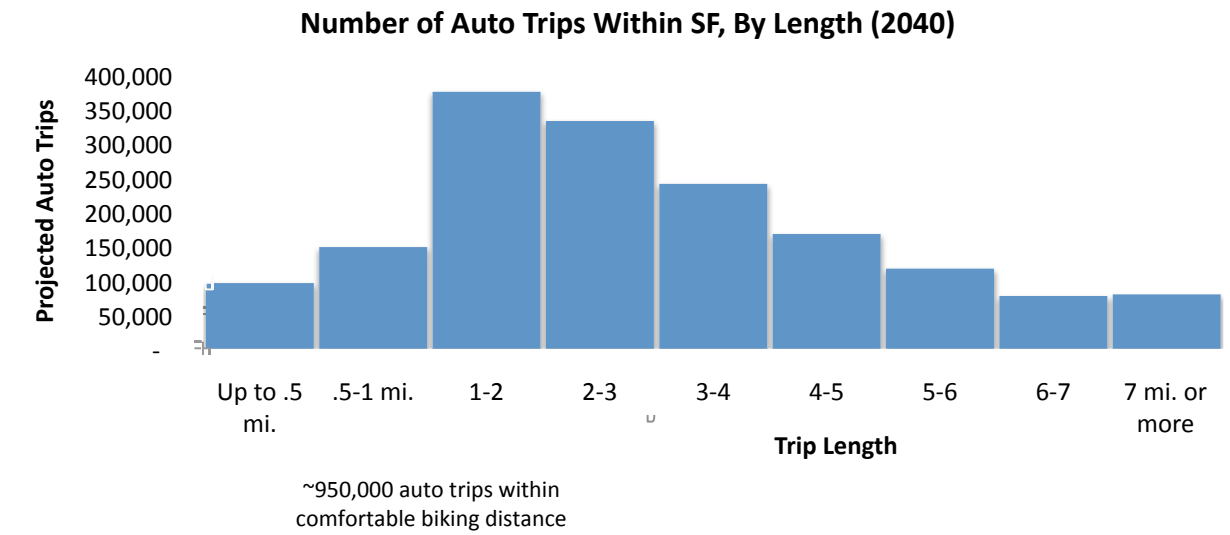


Source: SF-CHAMP 4.3 with manual adjustments to include private shuttle sector.

4.2.1 | BICYCLING

Bicycling is on the rise in San Francisco. The SFMTA's State of Cycling Report indicates that bicycle trip volumes are approaching 75,000 bicycle trips per day; nearly a third of San Francisco residents report bicycling at least occasionally. Rates of commuting by bicycle are also growing, and San Francisco now ranks third in the nation behind Portland, Oregon and Seattle, Washington in bicycle commuting rates among major US cities. The potential for further increasing rates of bicycling is high – as Figure 21 shows, nearly 60 percent of all local automobile trips will be less than three miles in length by 2040, a convenient distance for bicycling.

Figure 21 Projected Auto Trip Lengths, 2040



The SFMTA and its partners are making rapid progress towards improving infrastructure. Since completion of the city's Bicycle Plan in 2009, 50 bicycle projects and nearly 30 miles of bicycle lanes have been added, along with more than four thousand shared lane markings (sharrows), hundreds of new bicycle racks, numerous innovative pilot projects such as the Green Wave on Market Street, and initiation of a regional bicycle sharing system in San Francisco.

These improvements are helping support the trend towards more and more bicycling, but are not sufficient to allow achievement of the aggressive goal – set by the San Francisco Board of Supervisors in 2010 – of achieving a 20 percent bicycle mode share by 2020. To grow bicycling further, San Francisco must do more to address cyclist safety. Surveys conducted for the SFMTA's 2012 State of Cycling Report indicated that almost half of those who do not currently bicycle say they are uncomfortable bicycling in mixed-flow traffic with cars, and only 13 percent said they feel safe from traffic when bicycling. At the same time, 94 percent of respondents say they would feel comfortable riding in bicycle lanes. Network fragmentation is also a challenge to improving cyclists' sense of safety. Many of the existing bicycle facilities are disconnected from one another (Figure 22), and cyclists may find it impossible to complete their whole trip on protected bicycle ways or bicycle lanes.

Figure 22 Bicycle Network Fragmentation

The SFMTA's recent Bicycle Strategy (2013) envisions a world-class bicycle facility network for San Francisco – one on which cyclists of all ages and abilities would be safe and comfortable. Full network build-out would include the following actions:

- Complete the bicycle plan (10 miles)
- Upgrade 200 miles of the existing bicycle network to premium bicycle facilities
- Construct 35 miles of new bicycle facilities
- Upgrade 200 intersections to accommodate bicycles
- Install 50,000 bicycle parking spaces
- Deploy and maintain a 3000+ bicycle / 300+ station bicycle sharing system. Support electric bicycles. This system was recently launched with the implementation of the Bay Area Bike Share Program in 2013, which includes an initial 700 bicycles and 70 stations throughout the Bay Area (including San Francisco).
- Provide supportive programs ($10m/yr).

CHALLENGES IN IMPROVING BICYCLING AND WALKING INFRASTRUCTURE

Many of the "easy fixes" to improve bicycling and walking infrastructure have already been completed or are underway. These include pedestrian crosswalk restriping, countdown signals, curb cuts, and striping of new bicycle lanes and sharrows.

Improvements that more significantly benefit bicyclists and pedestrians by physically separating them from vehicular traffic or by reducing vehicle traffic and speeds are frequently more challenging to implement, as they may require re-allocation of roadway space. These include road diets, widened sidewalks, and separated bike-ways, or signal timing changes such as more crossing time for pedestrians. Implementing these improvements requires political and community acceptance of parking or lane removal, or signal delays for vehicles.

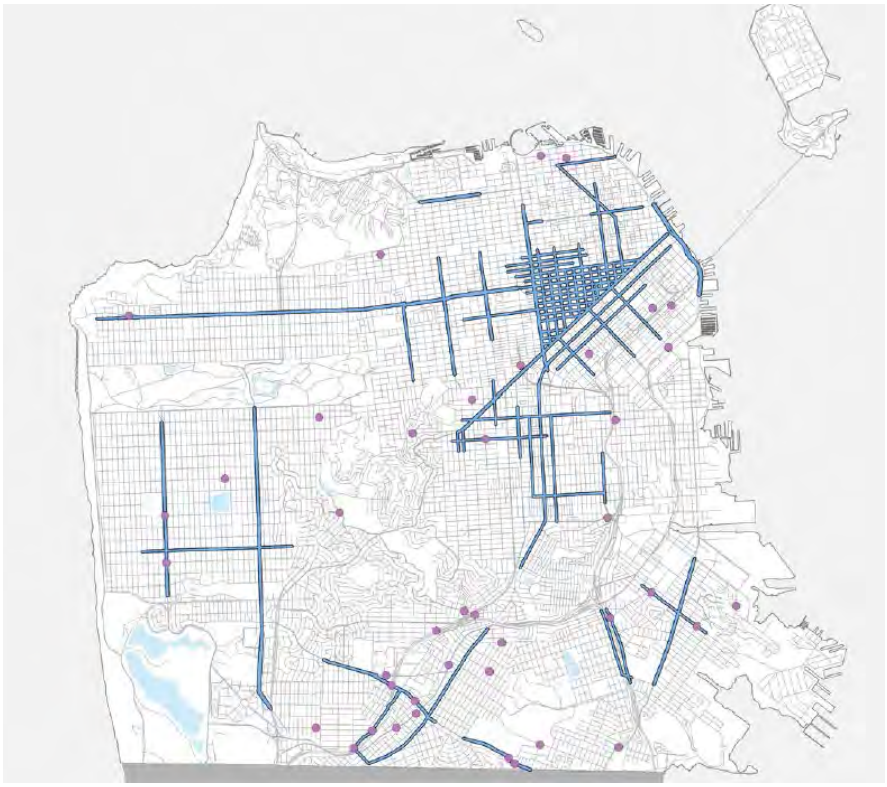
The SFMTA's Strategy estimates the total cost of this strategy to be approximately $600 million in year-of-expenditure dollars through 2040; most of this is unfunded.

4.2.2 | WALKING

San Francisco is a walking city, with nearly 20 percent of trips made by walking. The condition of the city's streets – whether noisy or calm, crowded or spacious, clean or dirty, safe or scary – greatly impacts how San Franciscans and visitors experience the city as they walk around, and is a major determinant of livability.

Although many of San Francisco's streets are inviting and pleasant, many are not, and some are inhospitable to pedestrians. This is evidenced by the fact that on average, 20 pedestrians are killed and 800 injured in collisions with motor vehicles every year.[32] In 2008, Gavin Newson initiated the Mayor's pedestrian safety task force and set a goal of reducing serious and fatal pedestrian injuries by 25% by 2016 and by 50% by 2021. The Task Force's report identified key sources of pedestrian danger, including speeding, failure to yield, and conflicts involving drivers making left turns, and identified 70 miles of the highest-injury corridors for pedestrians. These miles account for 60 percent of all pedestrian collisions in the city, and include most of the city's busiest arterial roadways (Figure 23).

Figure 23 High-Injury Corridors and Pedestrian-Injury Collisions



Source: SFMTA 2013.

Achieving the Mayor's goals will be a major challenge and will require high levels of investment in pedestrian infrastructure. The challenge is compounded by growing population and employment, which will bring an increase in walking trips, automobile trips, and pedestrian-automobile collisions unless aggressive action is taken.

[32] SFMTA Pedestrian Strategy, page 5

Aging of the population is another major challenge for pedestrian safety. San Francisco is projected to experience a 68 percent growth in the number of people 65 and older by 2040, making this group 20 percent of the population (compared to 16 percent today[33]). Older pedestrians are more likely to be killed when struck by an automobile.

Another notable recent effort to improve pedestrian safety and livability is the Better Streets Plan, which creates a unified set of standards, guidelines, and implementation strategies to govern how the city designs, builds, and maintains its pedestrian environment. The Plan seeks to balance the needs of all street users, with a particular focus on the pedestrian environment and how streets can be used as public space.

The Mayor's Pedestrian Safety Task Force report presented a vision for improving pedestrian safety and walkability in San Francisco. Key strategies referenced in the plan include:

- Upgrading the 44 miles of high-injury corridors to provide pedestrian safety features throughout
- Providing extra pedestrian crossing time at 800 intersections citywide
- Re-engineering streets around at least five schools and in 2 areas with high numbers of senior injuries annually
- Updating or creating at least nine plazas
- Re-opening 20 closed crosswalks
- Planning a city-wide network of 140 miles of green streets to help people walk safely to parks and the waterfront
- Upgrading 13,000 curb ramps
- Installing pedestrian countdown signals at 184 intersections by 2021
- Targeting enforcement of high-risk behaviors such as speeding and red-light running on high-injury corridors and intersections, and reporting quarterly on injury collisions and enforcement
- Pursuing state legislation for prioritizing sustainable transportation and targeted enforcement, such as speed cameras, congestion pricing, and vulnerable user laws

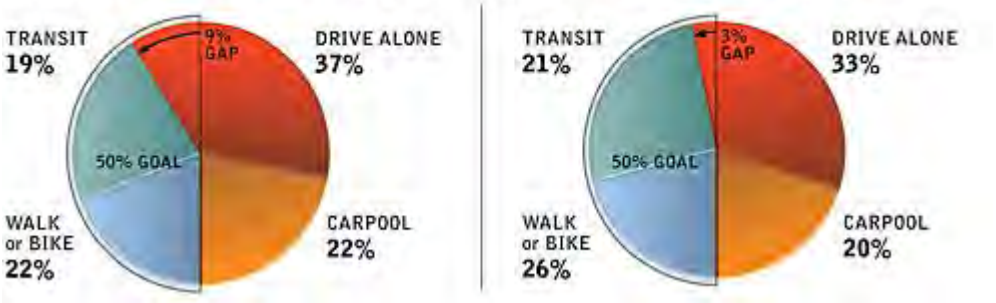
Full funding of the SFMTA Pedestrian Strategy would require approximately $600 million over the life of the SFTP; most of this is unfunded.

[33] Association of Bay Area Governments population projections

Livability: What Would it Take?

- **CHALLENGE:** San Francisco has a "Transit First" policy, yet under the Baseline almost 60% of trips in the city will be made by car (this includes carpooling). Such high levels of car use will have significant negative impacts on traffic safety, neighborhood cohesion, noise levels and other important aspects of urban livability.
- **TARGET:** Less than 50% of trips to, from and within San Francisco are made by car. Reaching this target means shifting approximately 430,000 trips daily in 2035 from cars to "Transit First" modes (transit, walking and biking).
- **IMPROVEMENTS:**
  - Transit projects that improve frequency or reliability or that reduce travel times, transfers or crowding; includes big-ticket items such as new rail lines and a second cross-bay tube for BART
  - Projects to promote walking, such as traffic calming, road diets, street closures and streetscaping
  - Projects to encourage bicycling, such as a network of cycletracks, more secure bike parking (including bike stations at major transit hubs) and bike sharing
  - In order to make it sufficiently different from other scenarios, this scenario did not incorporate congestion pricing
- **COST:** $15 billion.
- **RESULTS:** This scenario results in a shift in mode share from cars to "Transit First" modes of 6 percentage points compared to the Baseline scenario: the percentage of trips made by car decreases from 59% of all trips to 53% while the percentage of trips made by transit, walking and bicycling increases from 41% to 47% (see figure below).

Figure 1. Performance of Livability Scenario: 2035 Baseline (LEFT), Livability Scenario (RIGHT)



- **CONCLUSIONS:** The scenario makes significant progress toward its target but does not reach it. To achieve the target, an additional shift in mode share of 3 percentage points is necessary. That shift could be accomplished through congestion pricing: based on other analyses, congestion pricing would yield an additional shift in mode share from cars to "Transit First" modes of 3–5 percentage points.

5 Healthy Environment

SECTION SUMMARY:

- San Francisco has set aggressive goals for reducing greenhouse gas emissions from transportation; the goals would require 80 percent reduction in greenhouse gas below 1990 levels, which is five times more aggressive than regional greenhouse gas reduction goals.
- More stringent state vehicle emissions regulations will cause greenhouse gas emissions to fall by about 30 percent by 2040, but this is insufficient to achieve the goal.
- Some of the most promising strategies to achieve additional progress include congestion management, employer outreach, and partnerships with the private sector.

Transportation has significant environmental impacts. For example, emissions from cars and trucks account for one third of San Francisco's greenhouse gas emissions.[34] Addressing these impacts, particularly greenhouse gas emissions, is a key focus of the SFTP. This section reviews trends in greenhouse gas emissions, and discusses possible additional strategies that could help San Francisco achieve its goals, especially congestion management, employer outreach, and private sector partnerships.

5.1 | Goals and performance measures

The SFTP healthy environment goal focuses on minimizing the negative environmental effects of motorized transportation. Key performance measures include:

- Vehicle miles of travel
- Greenhouse gases associated with vehicle travel

5.2 | Trends and future conditions

Technology will do much to reduce climate change impacts from private vehicles. Tough state laws (Pavley I and II) regulating vehicle emissions are expected to reduce greenhouse gases by more than 40% compared to a business-as-usual scenario. However, this is not sufficient to allow San Francisco to achieve its goal of an 80% reduction below 1990 levels by 2050,[35] especially given the large amount of population and employment growth San Francisco expects to absorb. Additional, aggressive strategies will be needed to meet these goals.

[34] Brisson, Elizabeth, Elizabeth Sall, and Jeffrey Ang-Olson. "Achieving Goals of San Francisco, California, for Greenhouse Gas Reductions in Transportation Sector: What Would it Take?" Transportation Research Record: Journal of the Transportation Research Board. No. 2287, 2012, p89.

[35] From local ordinance 81-08. This is the amount climate scientists say is needed to stabilize the climate and prevent major sea level rise, extreme heat events, and other impacts.

Miles driven by private vehicles, or "VMT" (vehicle miles of travel) is the main source of greenhouse gases and air pollutants from the transportation sector. Growing population and employment in San Francisco and regionally is expected to result in a VMT increase of approximately 30% by 2040 under a business-as-usual scenario.[36] As shown in Figures 24 and 25, much of this VMT will come from the downtown core (for workplace VMT), and outlying southwest and southeast neighborhoods (for household VMT). The maps illustrate that major institutions such as medical centers and universities generate significant vehicle miles of travel.

PLAN BAY AREA: REGIONAL GREENHOUSE GAS REDUCTION GOALS

Plan Bay Area is the regional transportation plan developed by the Bay Area's regional transportation planning agency (the Metropolitan Transportation Commission). Approved in 2013, it sets a goal of reducing greenhouse gas emissions by 15% between 2005 and 2035, a statutory requirement of the California Air Resources Board.

Plan Bay Area shows how this reduction will be met by concentrating new growth in already built-up transit-accessible areas and through regional transportation investments and policies. Notably, San Francisco is expected to take on more new jobs than any other city, and more new housing than all other cities except San Jose. Concentrating jobs and housing in San Francisco supports efficient travel patterns and greenhouse gas reduction, but could also result in severe congestion and transit system crowding in downtown San Francisco unless major new system investments are made. See the Economic Competitiveness section for more detail.

[36] O:\Active Studies\CWTP Update\Data\Scenarios\Data\GraphicsSheets-E.xlsx Economic competitiveness. Includes VMT within SF only.

Figure 24 Household Vehicle Miles of Travel, 2040

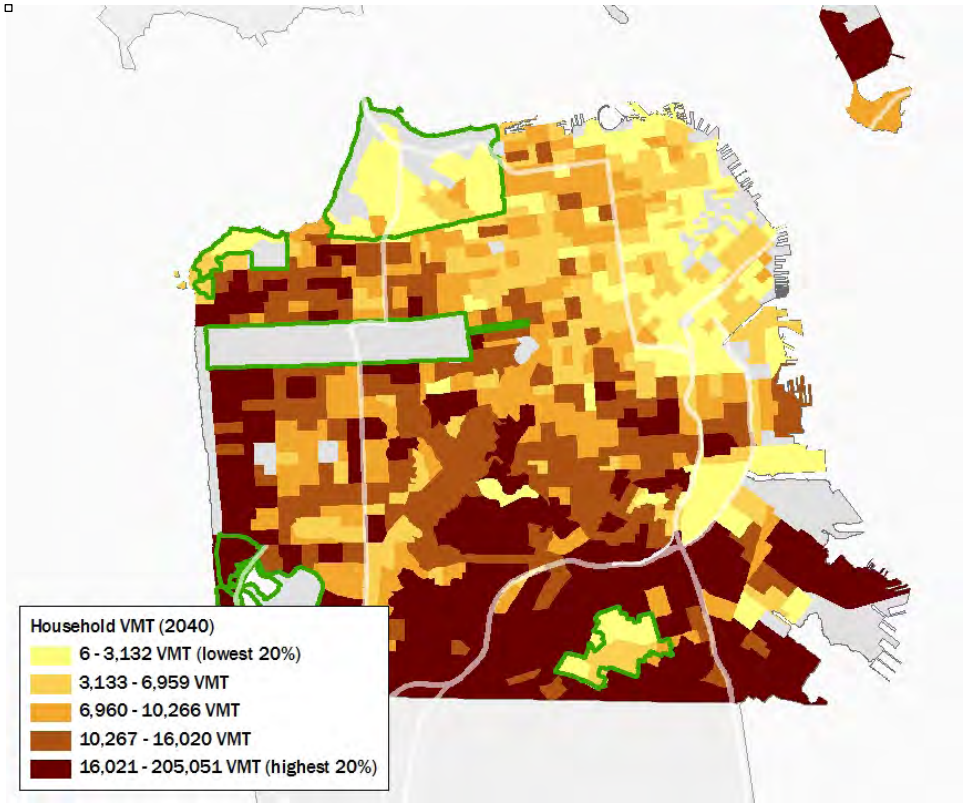
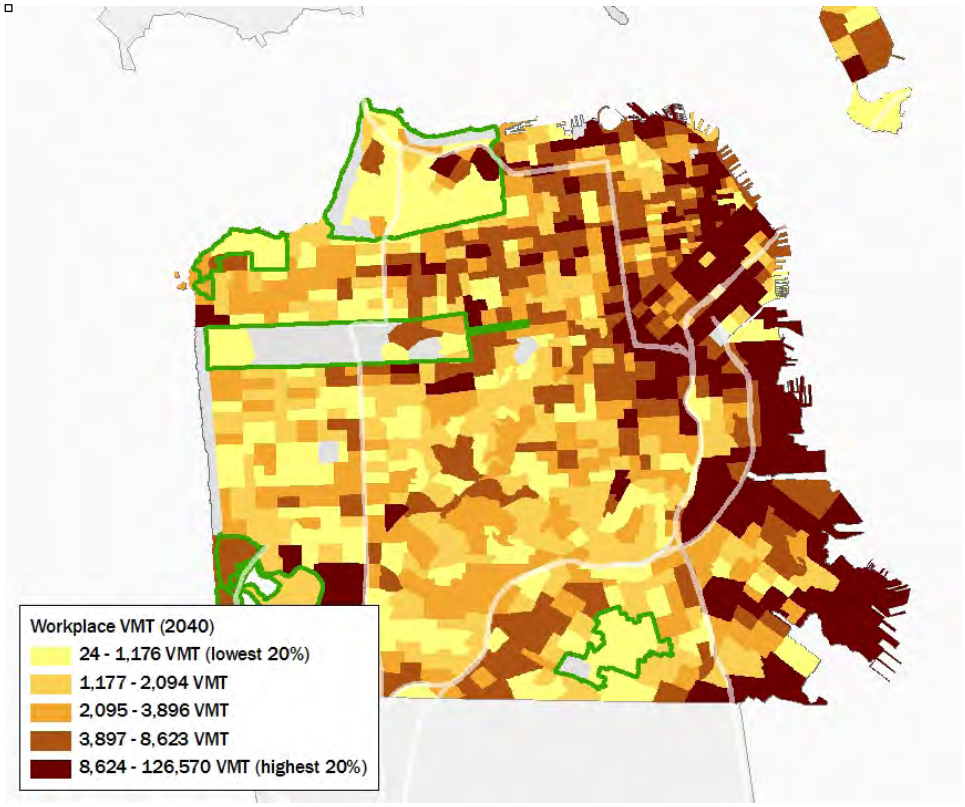
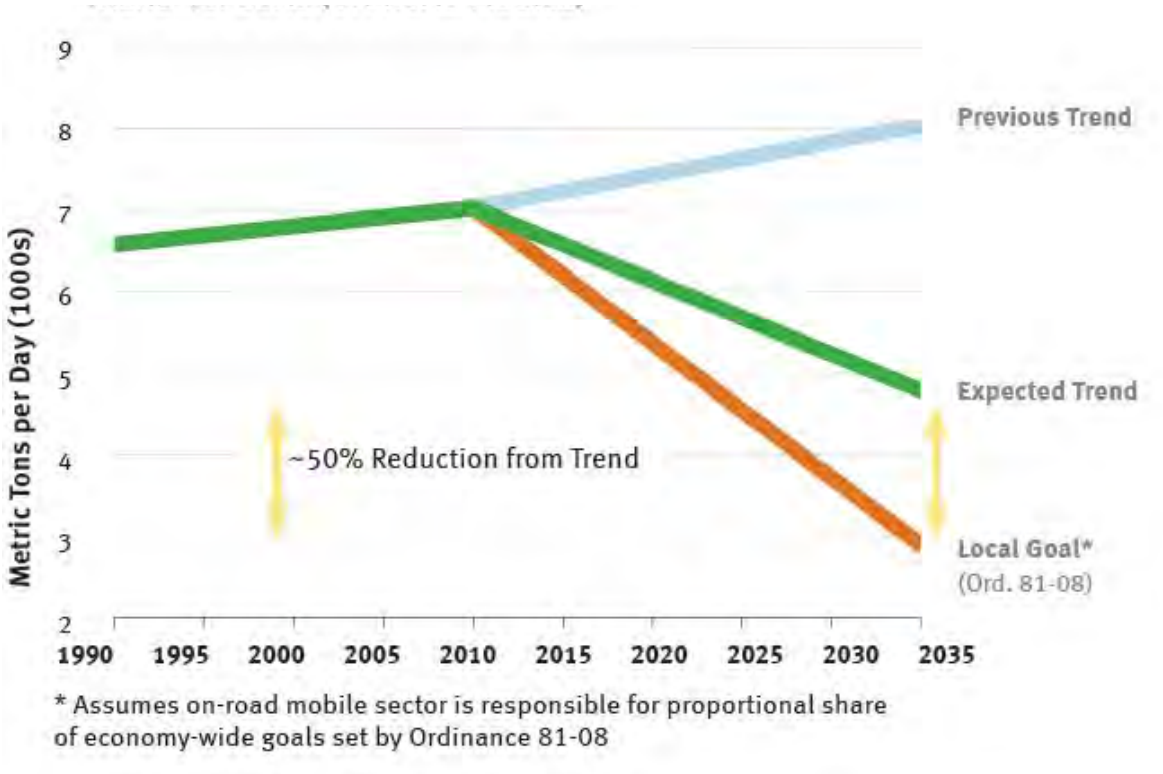


Figure 25 Vehicle Miles of Travel to Workplaces, 2040



Despite this VMT growth, greenhouse gases are expected to fall by about 30 percent between 2012 and 2040 due to the state emissions regulations described above. As shown in Figure 26, this will be insufficient to achieve the levels of GHG necessary to meet San Francisco's goals expressed in the city's Climate Action Strategy, which sets a very aggressive goal of reducing GHGs by 80 percent below 1990 levels by 2050, the reduction scientists consider necessary to stabilize the climate.[37] This goal is five times more aggressive than regional GHG reduction goals outlined in the One Bay Area Plan.

Figure 26 San Francisco Greenhouse Gas Reduction Goal Compared to Expected Trend



As described in the sidebar box above, the SFCTA conducted scenario testing to determine what it would take to achieve this goal. Multiple strategies were tested, focusing on road pricing, transit investments, and travel demand management activities. While even the most aggressive scenarios were insufficient to achieve San Francisco's goals, they allowed up to an 85 percent reduction relative to the expected trend.

The analysis also revealed which are the most cost-effective strategies for reducing greenhouse gases, namely congestion pricing, subsidized transit passes, and travel demand outreach programs. Investments in new mass transit services and electric vehicles were less cost-effective methods. The section below describes how the most cost-effective programs could be expanded and advanced in the future.

5.3 Approaches to achieving GHG reduction goals

This section describes three cost-effective approaches to reducing greenhouse gases in San Francisco: congestion management programs, outreach/incentive programs, and leveraging of private sector

[37] From ordinance 81-08.

investments. Ideas in this section are drawn from the city's Climate Action Plan and the Core Circulation Study (Appendix C).

5.3.1 | CONGESTION MANAGEMENT

Managing congestion through roadway pricing or similar means is one of the most effective tools available for reducing greenhouse gas emissions from transportation. One form of pricing already implemented in San Francisco is the SF*park* Program, which uses variable pricing on parking spots to reduce congestion (and associated greenhouse gases) associated with drivers searching for parking.

Another form of pricing has also been considered for downtown San Francisco. In 2010, the Transportation Authority published the Mobility, Access and Pricing study, which examined the feasibility of implementing a congestion charge for vehicles entering or leaving the northeast quadrant of San Francisco. The study found the following potential benefits of the program:

- 12 percent fewer peak-period vehicle trips
- 21 percent reduction in vehicle hours of delay
- 5 percent reduction in greenhouse gases citywide
- Increase in transit speeds of 20-25 percent
- Reduction in pedestrian incidents of 12%
- Generation of $60-$80 million in annual net revenue for mobility improvements

On December 14, 2010, the Transportation Authority Board unanimously approved the MAPS Final Report and voted 8–3 in favor of pursuing additional study of the concept.

Vehicle travel can also be limited through regulation. For example, a 1998 ordinance implemented in Cambridge, Massachusetts, requires any employer who expands available parking by more than five spaces to develop a plan for limiting vehicle trips to the worksite through employee incentives, parking pricing, technology, or other means. Implementation of the plan is enforced by the city and employers must demonstrate through surveys and driveway vehicle counts that they are not exceeding their vehicle trip allowance. The program has reduced vehicle miles of travel by 24 percent between 2000 and 2010, and has successfully allayed community concerns regarding traffic impacts from new development.

5.3.2 | INCENTIVE PROGRAMS AND OUTREACH

Incentive and outreach programs can also be a cost-effective method of reducing private vehicle travel and associated environmental impacts. Programs that involve personal interaction, monetary incentives, and tailored information are particularly effective in supporting behavioral change. One example is King County, Seattle's "In Motion" program, which involves provision of targeted marketing materials to encourage alternatives to driving paired with free transit passes to neighborhoods in King County on a rolling basis. Since 2004, about 13,000 residents have participated, and follow-up surveys indicate that vehicle miles of travel have been reduced by 2.4 million miles. Crowding on San Francisco's transit vehicles (covered in Section 3) and budget shortfalls make widespread provision of free transit passes impractical, but other types of incentives can be explored.

TRAVEL DEMAND PARTNERSHIP PROGRAM

The San Francisco Travel Demand Partnership Program is an innovative inter-agency effort to pilot test several innovative approaches to managing greenhouse gas emissions from transportation. Pilot projects include employer ridesharing and shuttle programs, a sustainability marketing campaign, and a flexible employee benefits program designed to reduce solo commuting. These pilot programs will inform development of the next generation of travel demand management strategies in San Francisco. The program is being funded through the Metropolitan Transportation Commission's Climate Initiatives Program.

5.3.3 | PRIVATE SECTOR TRANSPORTATION SERVICES AND TECHNOLOGY

Another approach to cost-effectively reducing greenhouse gases is to leverage private sector investment. In recent years, the private sector, and the technology sector in particular, have become more active in the transportation sector, both by providing direct transportation services to their employees in San Francisco, and by creating new services and technologies to serve the general public. Many of these innovations have significant potential to reduce single occupancy vehicle trips and greenhouse gases. Examples include:

- **CAR-SHARING AND SCOOTER-SHARING –** Private car-sharing companies have expanded rapidly, with multiple companies such as Zipcar, CityCarshare, Getaround, and the scooter-sharing company Scoot now offering services in many neighborhoods. Some companies, like Getaround and Relayrides, allow private vehicle owners to share their personal vehicles with others. Studies have indicated that access to car-sharing vehicles can allow residents to reduce the number of vehicles owned[38], which can support reductions in driving and associated greenhouse gas emissions. When car-sharing is offered at the worksite, it can also support employees who want to avoid driving to work but need access to a car during working hours.
- **RIDE-MATCHING –** Technological advances are allowing people to share rides more easily. Many private vendors are now offering customizable software programs that employers can offer to their employees to help them identify co-workers with similar travel needs – examples include Zimride, ride Amigos, rideShark, Greenride, TwoGo, and many others. Another set of companies, including Lyft, Uber, and Sidecar, have developed smartphone applications that allow drivers to find potential riders in exchange for a donation.
- **PRIVATE EMPLOYER SHUTTLES –** Many of the larger technology sector employers, such as Google and Genentech, are now offering private shuttles for their employees' commutes. Surveys have indicated that shuttles are serving about 35,000 commute trips per day, or about 1 percent of all trips to, from, and within San Francisco. About half of riders indicate they would drive alone if the shuttle were not provided.

[38] Martin, E., Shaheen, S., Lidicker, J. Carsharing's Impact on Household Vehicle Holdings: Results from a North American Shared Used Vehicle Survey. 2010 Transportation Research Record, March 15, 2010.

The public sector can play a key role in supporting growth of these services while minimizing any negative impacts on the transportation system. Some examples of possible roles the public sector can play include:

- **ADOPTING REGULATORY POLICY THAT SUPPORTS GROWTH IN PRIVATE SECTOR TRANSPORTATION SERVICES.** One such effort is the Shuttle Partners Program, a pilot program within the TDM Partners Project described previously. The program would allow private employer shuttles access to select MUNI stops in exchange for a fee. Successful implementation of this program will clear a path toward expansion of the private shuttle sector while addressing community concerns around shuttle impacts. Another example is the city planning department's policy of allowing developers to purchase residential car-share accounts to justify exceptions to maximum parking allowances.
- **ALLOWING PRIVATE SERVICES ACCESS TO STREET SPACE.** In July 2013 the SFMTA adopted a formal policy to guide the agency's facilitation of car-sharing in its off-street parking lots and garages, as well as approving a two-year pilot to test the use of on-street parking spaces as car-share spaces ("pods"). This pilot builds on lessons learned from a small-scale pilot of on-street car-share pods carried out in 2011 and 2012, and will make as many as 900 on-street parking spaces available across all districts of the city for use by qualified car-share organizations over the two years of the pilot.
- **SUPPORTING MARKETING OF PRIVATE SERVICES.** City staff can aid in the marketing of private sector services that support sustainability goals by incorporating information on these services into marketing materials provided to employees, and on city web sites.

Healthy Environment: What Would it Take?

- **CHALLENGE:** The city has an ambitious official policy to reduce emissions of greenhouse gases to 80% below 1990 levels by 2050. However, the large number of new residents and workers anticipated for San Francisco in coming decades will greatly blunt the impact of even such effective measures as the state's "Pavley Law," which tightens fuel-economy standards for cars and light trucks.
- **TARGET:** To reduce the city's transportation-related emissions of greenhouse gases by 2035 to 2,900 metric tons daily below the post-Pavley trend (this translates the city's official policy to the SFTP's horizon year and to the percentage contributed by transportation sources to total emissions).
- **IMPROVEMENTS:** This scenario included the projects, programs, and policies identified below. An additional, more aggressive sensitivity analysis was also conducted incorporating a regional road-pricing strategy that doubles the operating cost for a car and estimates a penetration rate for electric vehicles of 25%.
  - Increased penetration of electric vehicles into San Francisco's private-vehicle fleet to 9–16%
  - A $6 congestion-pricing toll in downtown San Francisco during peak periods
  - New designated transit lanes and rail extensions
  - Employer-subsidized transit passes and additional employer-based TDM measures
  - Mandatory transit passes for new housing units and other residential TDM measures, including personalized outreach on commute alternatives and increased car-sharing
  - Bicycle improvements, including a network of cycle tracks
  - School-based TDM measures, including Safe Routes to School-type investments, and outreach and other tools to facilitate carpools and school-pools, at both primary and secondary schools
- **COST:** $10 billion ($4 billion excluding second cross-bay BART tube and high-speed rail service).
- **RESULTS:** The basic scenario reduces post-Pavley emissions by 1,600–1,800 metric tons daily (see chart below). With the aggressive sensitivity analysis, the reduction is 2,200–2,600 metric tons daily.
- **CONCLUSIONS:** The basic scenario falls well short of its target even with the most aggressive measures. It is worth noting that each improvement analyzed presents trade-offs in terms of performance, cost-effectiveness, political acceptability, and co-benefits. Electric vehicles, for example, reduce emissions very cost-effectively but lack the co-benefits of strategies aimed at reducing car travel, such as reducing congestion or improving traffic safety. These tradeoffs were considered in the evaluation of improvements for inclusion in the preferred and vision alternatives.

6 Visitor, Goods Movement, and School Transportation Needs

SECTION SUMMARY:

- Of the thousands of people who visit San Francisco every day, more than 25 percent are from the Bay Area, and many of these visitors drive. Reducing this group's reliance on automobile travel could have a significant impact on congestion in the northeast core, where many visitor trips end.
- Increasing congestion could have an impact on goods movement, delaying delivery vehicles and causing inconveniences and economic hardships for delivery recipients. A combination of citywide congestion-mitigation programs and neighborhood-level parking-management strategies will be required to solve this problem.
- Reliability, safety, and other factors prevent students from taking transit to school instead of getting a ride from a parent.

The prior sections discussed the transportation investments necessary to make progress towards the SFTP goals of world-class infrastructure, economic competitiveness, a healthy environment, and livability,. This section discusses the transportation needs of three important constituencies whose needs do not fit neatly within the SFTP goal areas: visitors, companies moving goods through the city, and students.

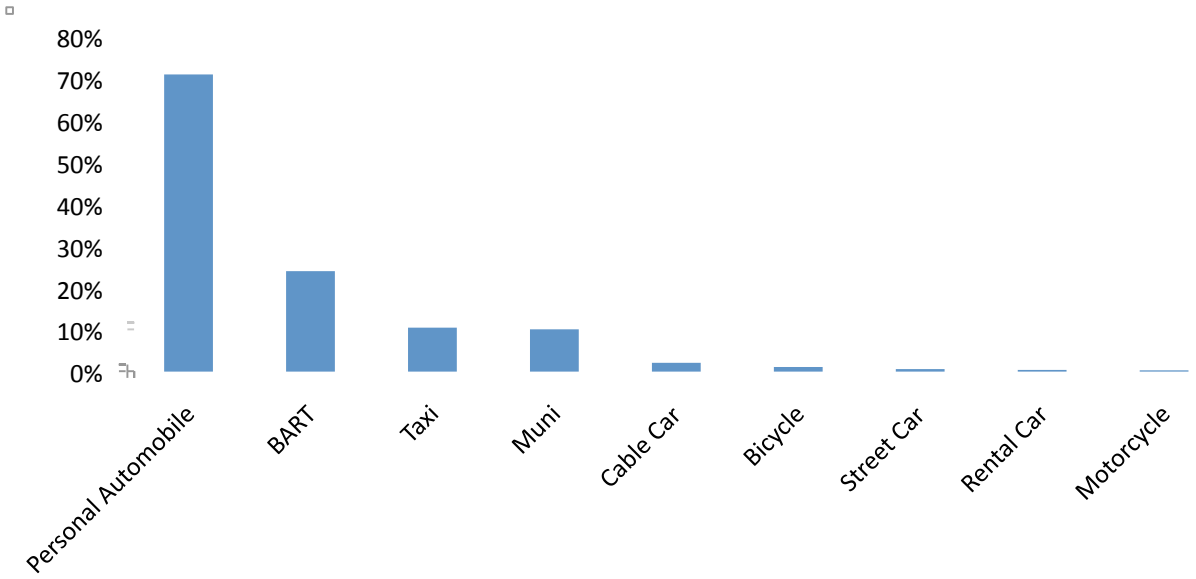
6.1 | Visitors

The San Francisco Convention and Visitors Bureau estimates that approximately 131,000 people visit San Francisco every day,[39] generating an estimated 500,000 miles of daily vehicle travel[40]. While this is far less vehicle travel than generated by daily commutes, it can still contribute to intense congestion as it clusters in specific times and places, such as around popular tourist sites, for major sports events, and during Sunday afternoons.

Visitor travel is concentrated in the city's congested northeast core, and as Figure 27 shows, many visitors from the Bay Area, who make up nearly a quarter of all visitors, come to the city by car.[41] Shifting them to other modes will be critical in reaching the San Francisco Transportation Plan's goals.

[39] San Francisco Convention and Visitors Bureau. "San Francisco Visitor Industry Statistics." Retrieved from http://www.sanfrancisco.travel/research/ on 10/7/13.
[40] Estimate assumes each visitor makes 4 trips per day; about 30 percent of trips are by automobile; and trips are three miles in length.
[41] San Francisco Convention and Visitors Bureau. "Visitor Profile Research." Presentation, January-September 2010. Slide 14.

Figure 27 Bay Area Residents' Mode of Travel to San Francisco for Day Trips



Source: San Francisco Convention and Visitors Bureau, 2010.

While visitors from further away have more varied travel patterns, they still center on the automobile. Seventy-six percent of international visitors and 61 percent of domestic visitors travel by taxi or rental car.

Some potential strategies for addressing congestion associated with visitor demand include:

- Distributing transportation information and, potentially, Clipper cards, to hotels. The SFMTA has already begun outreach to hotels and convention centers.
- Working with major event venues to manage demand, such as through advertising alternatives and facilitating shared rides or taxis to events.
- More clearly identifying designated areas for tour bus loading and unloading.
- Providing additional transit services in areas with the highest tourist demand, where appropriate.
- Piloting direct bus services from Bay Area locations to major San Francisco attractions not readily accessible by transit to serve high demand from Bay area visitors.
- Working to deploy bicycle sharing at the most visited locations.

6.2 | Goods Movement

Goods movement is critical to San Francisco's economic competitiveness and livability, two of the San Francisco Transportation Plan's four goal areas. Problems with goods movement in today's transportation

system center on delivery vehicles' competition with private automobiles for space on city roads and at the curbside.

In Spring 2011, the SFTP team conducted eight interviews with a variety of goods movement stakeholders, including merchants, delivery companies, and drivers, the United Parcel Service, and the San Francisco Municipal Transportation Agency. The conversations revealed a number of related issues that impede efficient deliveries:

- **INSUFFICIENT SPACE FOR LOADING AND UNLOADING.** Though yellow curb zones reserve some space for deliveries, delivery vehicles often must compete with cars, large employer shuttles, and other vehicles to drop off goods at local businesses. When there is no curbside space available, drivers double park or must take additional time to cart deliveries from more distant parking spots.

- **POOR MANAGEMENT OF AVAILABLE LOADING AND UNLOADING SPACE.** Stakeholders noted that loading and unloading zones are often too short, poorly placed, have inadequate hours, and are poorly enforced.

- **CONGESTION DURING PEAK TRAVEL PERIODS.** Many delivery-vehicle destinations are in the densest parts of the city, where traffic congestion is the biggest problem. For such vehicles, slower deliveries mean less productivity and, ultimately, lost money.

Shorter-term strategies to remedy these issues include continually refining and rationalizing the hours of yellow zones and determining locations through a community process. Delivery spaces should also be an additional consideration in crafting neighborhood plans.

In the longer term, congestion management strategies can support more efficient goods movement. As described in the Environment section, forecasts show that pricing will significantly reduce congestion in the city's dense northeast core, the destination of many deliveries and the area of the city in which competition between drivers and delivery vehicles is most intense

6.3 | School Transportation

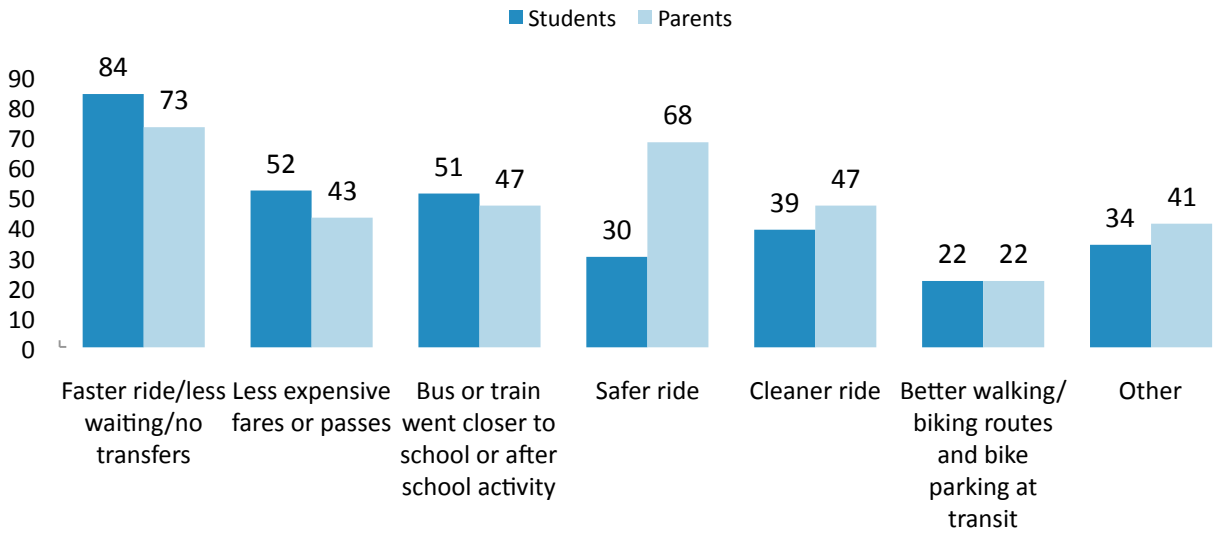
Outreach for the SFTP (described fully in the SFTP Appendix E: Outreach Summary) included a survey of students and parents to gauge their transportation needs. The survey asked participants about factors that hold them back from taking transit, biking, or walking to school (or, in the case of parents, allowing their students to take those modes). More than 1,000 responses were received, and results revealed that the frequency and reliability of transit service is the top priority of students and parents. For students, reduced-price transit passes and transit stops closer to school were also important but significantly less so. For parents, transportation safety was another key area of importance (Figure 28).

The survey findings reveal that the top school transportation needs can be met through projects and programs designed to improve transit service quality, especially those that would serve major educational institutions. Sections 2 and 3 discuss current efforts and possible future strategies to improve transit service.

In addition, other efforts are already underway to support non-auto school transportation. In late 2012, the Board of Supervisors funded a short-term youth-pass pilot to provide students with free Muni passes, more

than 18,000 students signed up for the program in the months before it officially began, in March 2013.[42] The pilot will continue for 16 months. The program was developed in response to cuts in San Francisco Unified School District's yellow school bus service and recent increases in the cost of Muni youth passes.[43]

Figure 28 Priority School Transportation Concerns of San Francisco Students and Parents



Source: SFCTA School Transportation Survey. Numbers indicate number of respondents who marked the issue as being of importance.

[42] Cabanatuan, Michael and Neal J. Riley. "18,000 youth sign up for free Muni pass." *San Francisco Chronicle*, February 7, 2013. Retrieved from http://www.sfgate.com/bayarea/article/18-000-youth-sign-up-for-free-Muni-pass-4261349.php on 10/15/13.

[43] Ciria-Cruz, Rene. "Youth Score Win for Free MUNI Passes." Retrieved from http://urbanhabitat.org/19-2/ciria-cruz-TJ on 10/15/13.

EXHIBIT 6

Appendix C

CORE CIRCULATION STUDY

Recognizing that a large share of San Francisco's future growth is planned for the city core (downtown, South of Market, and Mission Bay Neighborhoods), we undertook a study of current and projected circulation patterns in the core as part of SFTP development. The study resulted in a paper accepted for publication at the Transportation Research Board 2014 annual conference (attached). Study findings informed the SFTP Investment Plans and policy recommendations.

PREVENTING CARMAGEDDON IN SAN FRANCISCO'S RAPIDLY DENSIFYING CORE

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ABSTRACT

Several land use and transportation plans propose changes that would affect the "Core" of San Francisco. The Core encompasses the greater Downtown area, including the South of Market (SoMa) neighborhood. SoMa is currently comprised of a predominantly one-way street grid with long blocks of multi-lane arterial streets designed to carry traffic from Downtown to the city's major regional freeway access points. With at least 48,000 housing units and 122,000 more jobs expected in this area, San Francisco has developed plans to aggressively reduce number of general purpose travel lanes on many streets to improve livability and better balance travel options amongst modes. This paper presents analysis and findings of an effort to use quantitative analysis to identify the cumulative transportation performance effects of these proposed changes. The paper presents a combination of activity-based travel demand model, traffic microsimulation, and off-model analysis to describe one of the key problems identified – that plans for the Core could lead to a "carmaggedon" scenario (i.e perpetual gridlock) where the forecast level of auto demand "breaks" the Core network—a particular problem because of the negative impact perpetual gridlock would have for transit operating at-grade. A range of strategies to reduce auto demand are evaluated for their effectiveness, finding that demand management and mobility improvement strategies are essential. The paper closes with two key discussion areas: 1) opportunities and challenges to making transit, walking, and cycling function effectively in extremely congested conditions; 2) a need for the city evolve from the typical forecasting/analysis approaches to long-range transportation planning to solve tomorrow's transport challenges.

INTRODUCTION

To see an example of how traffic congestion impacts other modes of transportation today, you only need to stand for a moment on a street in Downtown, San Francisco during rush hour. You will likely see private autos illegally trespassing in unprotected bus lanes. You will see 50+ passengers on a bus waiting for a single motorist to make a right turn through a pedestrian-filled intersection. You will see frustrated motorists block intersections because they have already waited too long to cross. You will see cyclists risking their lives navigating the slim and unpredictable gaps between vehicles. This problem—of congestion, and its negative travel time, reliability, and safety impacts to all modes of transportation—has been of particular interest to San Francisco given plans underway to rapidly intensify land uses while reducing the number of general purpose travel lanes on many streets to increase livability. Given this context, the City has struggled with questions such as: how much can auto congestion's impacts on other modes be mitigated by simple low-cost solutions or are major capital investments needed? Can we, and/or should we strive to mitigate congestion? What level of intervention is needed to maintain a safe, habitable urban environment while providing sufficient mobility to maintain the City's economic competitiveness? This paper explores these challenging questions and analyzes potential solutions.

BACKGROUND

San Francisco is a city recognized for its leadership in planning for transit-oriented growth. The City's Charter even has a Transit First policy that states that, "decisions regarding the use of limited public street and sidewalk space shall encourage the use of public rights of way by pedestrians, bicyclists, and public transit."*(1)* The City's currently adopted or underway land use plans call for a significant increase of 48,000 housing units and 122,000 jobs within the city's Core *(2)*. The city has made planning for this growth a policy priority. In addition, the Bay Area region (population of approximately 7 million) looks to San Francisco, as well as the other core cities of the region (Oakland and San Jose) as the most important locations to focus most growth due to the existing infrastructure and density within these locations. In fact, in the recently adopted *Plan Bay Area* long-range land use and transportation plan., San Francisco is expected to take on approximately 92,000 housing units and 190,000 jobs to help achieve the region's greenhouse gas reduction goals (*3*). Citywide, this expected growth represents approximately a 25% increase in housing and a 34% increase in jobs, relative to today's levels citywide.

Within this context, San Francisco has placed emphasis on planning for growth within the "Core" of the city, generally those areas adjacent to the Downtown/Civic Center job centers. Combined, approximately 60% of growth in housing units and 85% growth in jobs has been planned to be accommodated in the Core, with a lot of it focused in the neighborhoods directly south of Downtown: the South of Market (SoMa) and Mission Bay neighborhoods *(4)*. SoMa is known for its multi-lane one-way arterial streets that provide access between Downtown and the regional freeway network. As a result of the needs of existing SoMa residents, as well as in response to growth planned, there have been significant efforts to develop and implement plans to increase the neighborhood's livability by re-purposing right-of-way of general purpose lanes to provide safer, more attractive non-motorized facilities and faster, more reliable transit. Mission Bay, just south of SoMa is a redevelopment area with a research and heath-care oriented master plan in the process of building out, and separated from SoMa by a channel to the Bay, with only two streets connecting north-south to SoMa (see Figure 1).

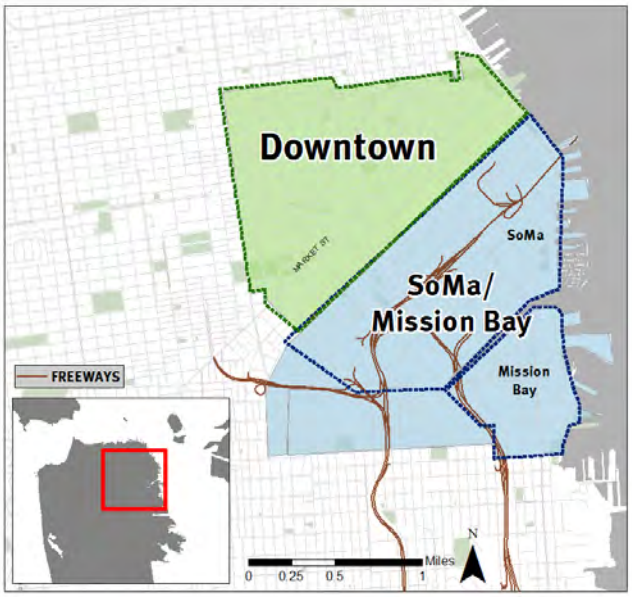

FIGURE 1 Core Study Area

The San Francisco County Transportation Authority (Transportation Authority) undertook a focused study of the Core to inform the 2013 update to the San Francisco Transportation Plan (SFTP), San Francisco's long-range, countywide transportation plan that prioritizes transportation investments and recommends policies to support the city's transportation goals. The purpose of this analysis, known as the Core Network Circulation Study (Study) was to analyze the cumulative impact of growth and

changes to the transportation network; identify transportation performance problems; and propose recommendations.

The analysis revealed three key problems: 1) the forecast increase in auto trip-making caused by the intensifying land use would result in more auto demand than could be served, in particular given concurrent projects to promote livability through reducing private vehicle capacity—in other words, if the demand for vehicle travel forecast were realized, a perpetual gridlock or "carmageddon" scenario was expected given current plans; 2) even if auto demand was to be substantially reduced, significant transit performance challenges remained; and 3) the overall increase in trips of all modes would exacerbate multi-modal conflicts endangering the safety of pedestrian and cyclists. The purpose of this paper is to describe the methodology, findings, policy implications, limitations, and conclusions related to the first problem (the problem of "carmaggedon").

METHODOLOGY/ANALYSIS APPROACH

The Study's approach to identifying problems relied on an evaluation framework that included metrics related to performance of each mode of transportation, including transit, walking, cycling, and private vehicle travel. The analysis proceeded in three phases: first, a baseline **travel market analysis** was conducted to understand who is traveling in the Core, in particular which high auto trip markets affected the Core; next, transportation performance was assessed and problems identified, including the problem that is the focus of this paper, forecast **perpetual gridlock congestion** during peak hours; finally, **effectiveness of strategies** to respond to problem areas were identified and evaluated.

Two main scenarios were considered to inform the analysis: a "Base" year, representing current conditions, and a "Planned Future" horizon, that included all land use and transportation network changes planned for in the 2035-2040 timeframe. The study team chose the PM peak hour as representative of a typical daily "worst case" scenario.

A variety of analysis tools were used including:

- The Authority's activity-based travel demand model, the San Francisco Chained Activity Modeling Process (SF-CHAMP) *(5)*. SF-CHAMP incorporates a state-of-the-art approach to forecasting travel demand, sensitive to a broad array of conditions that influence travelers' choices. It incorporates the most recent 2010 Census household travel data, along with calibration to observed data including traffic volumes and transit ridership.
- Micro-simulation traffic analysis software, SimTraffic, which was used to determine how the level of auto trip-making demand forecast in SF-CHAMP would affect on-the-ground performance during PM peak hour conditions. As compared to SF-CHAMP, SimTraffic better accounts for delays under congested conditions and represents more detailed network characteristics such as traffic signal phasing, coordination, turn lanes, and the effects of queuing between intersections.
- Off-model techniques customized to understand the effectiveness of strategies that are not currently represented in SF-CHAMP or SimTraffic. These methodologies are summarized in the following section alongside descriptions of the strategies considered. More detailed documentation is available as a technical appendix *(6)*.

FINDINGS

This section presents findings from each of the three phases of the analysis: travel markets, transportation performance problems, and effectiveness of strategies.

1. Travel Markets

The Travel Market analysis investigates the purpose and characteristics of travel in the Core during PM peak hours including: travel mode, common origins and destinations, and breakdown between trips passing through versus originating or destined to the Core. This was a focus, as understanding the major and changing travel markets would inform which strategies would most effectively respond to problems identified.

Figure 2 summarizes overall trip-making levels in Downtown and SoMa/Mission Bay today and in the Planned Future using SF-CHAMP model output for each scenario. SoMa/Mission Bay is responsible for most of the growth in trip-making—about twice as many in the

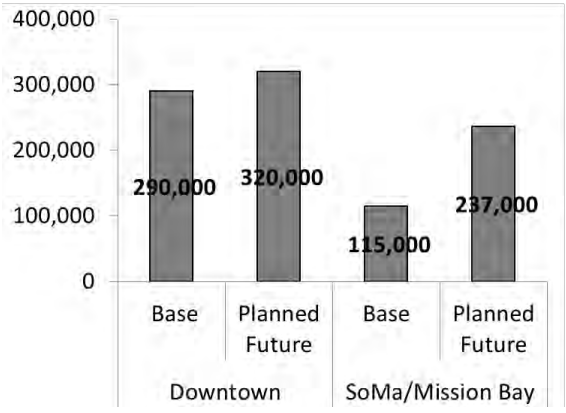

FIGURE 2 Trips to/from/within Downtown and SoMa/Mission Bay: Base vs. Planned Future, pm peak
Source: SF-CHAMP 4.3, Focused Growth

Planned Future than today. However, Downtown still attracts the most total trips. As shown in Figure 3, nearly all the new auto trips to or from the Core in the future are generated by SoMa/Mission Bay.

Figures 2 and 3 show travel occurring to, from, or within the Core, but many other trips pass through the Core without starting or ending there. Figure 4 includes this larger universe of trips and breaks down trips between those that start or end somewhere else within San Francisco (i.e. local), versus those that are regional and have their other end in another Bay Area county. Viewing trip ends and through trips together indicates that over half of the vehicles traveling on the SoMa street network are not going to a destination in SoMa; and, of the trips which pass through, half are local to San Francisco and half have regional destinations. Figure 4 also shows that the share of trips destined to or from this part of the City is increasing, while the share of trips passing through this area is decreasing, potentially indicating that as this part of the city densifies, the local streets are used by more core-related traffic, crowding out vehicles destined to other parts of the City.

FIGURE 3 Change in Trips to/from/within Downtown and SoMa/Mission Bay: 2010-2035, pm peak
Source: SF-CHAMP 4.3, Focused Growth

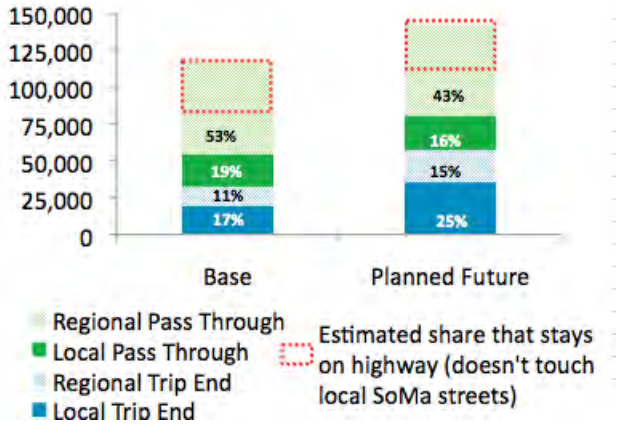

FIGURE 4 SoMa Auto Trips, Pass-Through vs. Trip Ends, Regional vs. Local, pm peak
Source: SF-CHAMP 4.3, Focused Growth

The Study team executed additional analysis focused on short auto trips, due to their greater potential to shift to walk and bicycle trips. Figure 5 shows "sub-areas" that were the focus of the analysis, as well as the number of short auto trips under 2 miles and under 0.5 miles in the Planned Future and the change relative to today.

In the aggregate, PM peak auto trips less than two miles more than double (233% increase) from today to

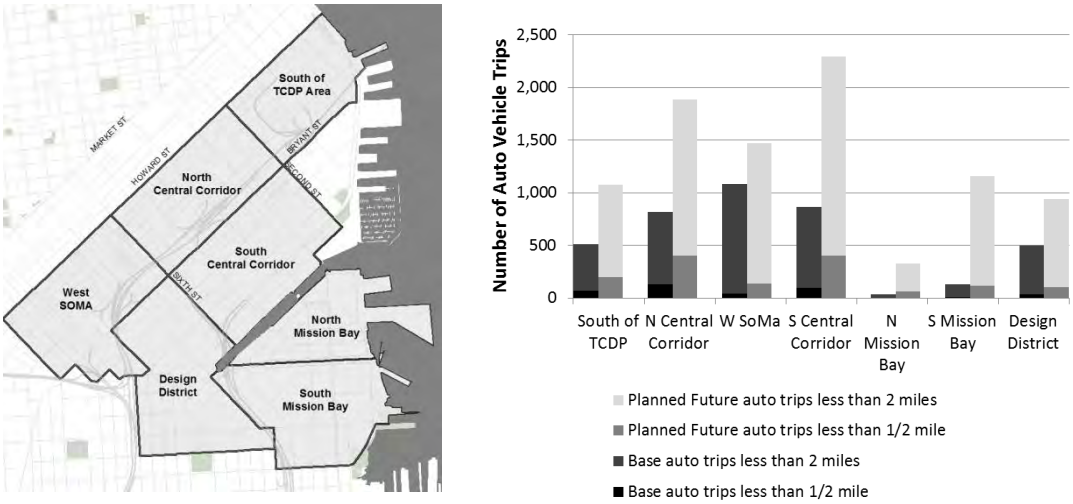

FIGURE 5 Short Auto Trip Analysis: Study Area, and Change in Auto Trips Under Two Miles, 2011 vs. 2035 Baseline
Source: SF-CHAMP 4.3, Focused Growth

the Planned Future. The auto mode share of trips less than two miles actually *decreases* (20% to 17%), yet the share of auto traffic in SoMa/Mission Bay that is completing a trip less than two miles *increases* (18% to 20%). In the context of an overall increase in trip-making, this means a lower percentage of people are choosing to drive for short trips, yet, more vehicles on the network are completing short trips due to changes in land use and density. Many of these short auto trips are likely a result of trip-chaining, which the Study team considered as it developed the strategy response (described in Part 3 of this section). The implication is that transportation demand management (TDM) strategies should be pursued to discourage people from arriving via automobile in the first place, allowing these short auto trips to more easily be shifted to walking and bicycling trips. By encouraging transit, shuttle use, ridesharing, parking policy, and other TDM measures people will be less likely to drive to these districts in the first place, and thus decreasing the possibility of short auto trips. Shifting to walking and cycling is a particular opportunity not only for short vehicle trips but also for short transit trips, which would free up room on overcrowded buses and trains for longer transit commutes.

2. Transportation Performance: Congestion Reduction to Avoid Gridlock

The study team analyzed the auto and transit performance impacts of the forecast increase in net auto travel in the Planned Future. The Study team prepared a SimTraffic microsimulation analysis, assuming the transportation network proposals (i.e. reduction in general purpose travel lanes) were in place, for a subset of SoMa that experiences some of the greatest levels of congestion today. The purpose of this analysis was to determine how much auto demand reduction would be necessary to prevent vehicle queues from spilling into upstream intersections and maintain a saturated, but flowing network. Results determined that an approximate 26% reduction of auto volumes during the PM peak period relative to Planned Future SF-CHAMP forecasted levels of demand was needed to reach an operational point at which traffic could flow (see Figure 6). In other words, the Core San Francisco road network can only accommodate about half of the forecasted auto demand increase before creating a perpetual gridlock condition.

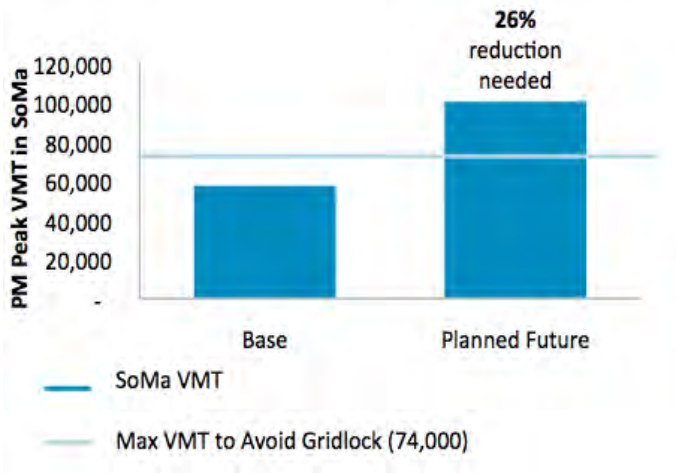

FIGURE 6 PM Peak Vehicle Miles Traveled on SoMa Streets: Comparison of Scenarios *Source: SF-CHAMP 4.3, Focused Growth*

3. Congestion Reduction Strategy Effectiveness

The final aspect of the analysis was to assess the effectiveness of a range of strategies in contributing to achieving the 26% reduction in PM peak VMT needed. Informed by the trip analysis findings, a set of potential strategies were identified for analysis.

Generally, strategies were identified in line with those that responded to a larger needs analysis conducted for the SFTP. In particular, there was a focus on newer and innovative demand management strategies that have

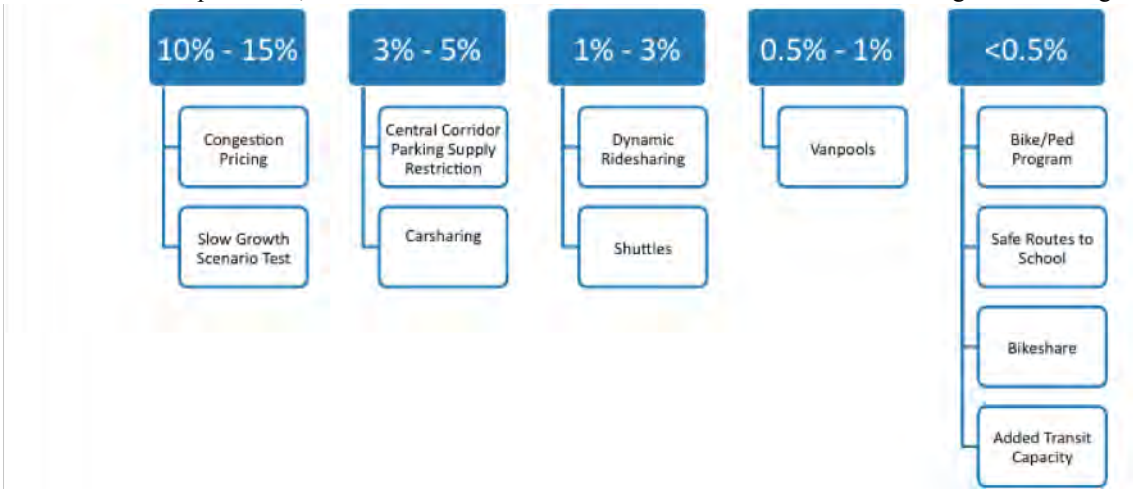

FIGURE 7 Relative Effectiveness of Strategies to Reduce PM Peak SoMa VMT
Source: SFCTA, 2013.

recently come into practice or are under consideration in San Francisco.

Figure 7 summarizes the range of potential impacts of selected strategies to further reduce core VMT from the Planned Future (each strategy listed could individually provide the level of reduction—e.g. congestion pricing and slow growth could each provide a 10-15% reduction in PM peak SoMa VMT). Results found that no single strategy alone could achieve the level of reduction needed, and even all strategies combined may not be able to. The rest of this section contains definitions of each strategy represented as well as the methodological approach to quantify the benefit. It should be noted that the impacts of these strategies are not additive: each strategy is evaluated assuming that no other strategies are implemented. Overlap is likely although in some cases synergies between strategies are also possible.

10% - 15% VMT Reduction

Congestion Pricing: The reduction estimate for congestion pricing is based on travel forecasts conducted as a part of the Mobility, Access, and Pricing Study that explored the feasibility of implementing congestion pricing in Downtown San Francisco (*7*). The 10-15% reduction represents the AM/PM Northeast Cordon scenario, where motorists would be charged a $3 per crossing fee for crossing into or out of the area bounded by Laguna Street, Guerrero Street, 18th Street, and the waterfront during peak periods with net revenue reinvested in multi-modal mobility improvement. Such a policy is still under consideration for San Francisco, and has recently come back into policy and media attention in context of major growth planned in the Core and the resurgence of San Francisco's economy after the recession.

Slow Growth Scenario Test: This scenario test was intended to be a point-of-information were San Francisco's growth to happen at a slower pace, akin to the level of growth forecast for 2020. Under this slower growth scenario, PM peak VMT would need to be reduced by 11%. Of course, growth would continue towards 2040 projections and further reduction strategies would ultimately be needed to avoid perpetual gridlock.

3% - 5% VMT Reduction

Central Corridor Residential Parking Supply Restrictions: This strategy describes results of a model scenario in SF-CHAMP representing the effect of a set of policies that would aggressively limit the growth of parking supply in a part of SoMa known as the Central Corridor (bounded by 2nd, 6th, Mission, and Townsend Streets). The Central Corridor is currently undergoing a planning process to upzone the area as it is adjacent to the route of a major transportation investment (the Central Subway that will connect Southeast San Francisco, SoMa, Union Square, and Chinatown). This policy scenario was specified for the Central Corridor area because the opportunity to regulate parking more aggressively (relative to previous area plans) may be an option, since this area is in the process of being re-zoned.

Carsharing Expansion: This strategy estimates the impacts of an aggressive expansion of carsharing consistent with analysis done by the Metropolitan Transportation Commission (MTC) as a part of *Plan Bay Area (8)*. Such an expansion would be achieved by policies that increase set-aside for off-street parking for car-sharing (current San Francisco policy is one car-share space for every 50 housing units in new developments *(9)*) or expansion of on-street carshare parking spaces as is currently in its nascency *(10)*. Additionally, MTC proposes subsidizing new start-up carshare offices throughout the region. This assumes that 15% of the "eligible population" (defined as adults 20-64) will be become carsharing members by 2040.

1% - 3% VMT Reduction

Dynamic Ridesharing: Dynamic ridesharing explores the potential of heavily investing in outreach and technology to match current single occupant vehicle (SOV) trip-makers to share rides with those having similar trip origins and destinations. In the Planned Future, 59,000 PM peak VMT (60%) are from SOVs. The analysis assumes the market for dynamic ridesharing to be 5% of those who currently drive alone, based on survey results of City and County of San Francisco employees *(11)* and the market research potential of dynamic ridesharing from UC Berkeley *(12)* and MIT (*13).*

Shuttles: Employer-provided shuttles have emerged as a major new sector within San Francisco's transportation system recently, in particular for workers in certain employment sectors such as technology. According to a survey conducted for San Francisco's Transportation Demand Management (TDM) Partnership Project, regional shuttles represent at least 6,600 daily boardings, while intra-city shuttles account for at least 28,700 boardings *(14).* The analysis assumes the market is projected to grow by approximately 40% for regional providers and 39% for intra-

city providers based on forecast increase in employment in these categories. Using TDM Partnership Project survey results as to what mode would serve the trip if the shuttle was not an option, a Planned Future PM peak VMT reduction was calculated based on the share of shuttles that serve SoMa (27%). This strategy is intended to represent partnering with employers to enable the shuttle system to grow as it has been trending without interfering with public transportation, such as through the city's recent efforts to regulate use of bus stops for shuttles *(15).*

0.5% - 1% VMT Reduction

Vanpools*:* The Vanpool strategy applies the MTC *Plan Bay Area (16)* methodology of a strategy that would provide a $400/month/van subsidy to encourage ridesharing growth in the region. In SoMa, this translates to 1,800 new vanpool riders and 700 fewer vehicles in SoMa.

< 0.5% VMT Reduction

Bicycle and Pedestrian Program: This strategy represents major investments to the city's bike and pedestrian networks including building more than 100 miles of upgraded protected bike lanes or cycletracks, and improving pedestrian conditions through safer, redesigned streets and shorter crossing distances. Savings from the Bicycle and Pedestrian program were calculated using SF-CHAMP, which has recently been upgraded to better represent pedestrian *(17)* and cycling *(18)* trip-making behavior. The savings were calculated by comparing the Planned Future to a model scenario that represents upgraded cycletrack-level bike lanes city-wide, as well as representing improved pedestrian conditions through increasing the pedestrian environment factor and reducing facility type to represent slower streets. The resulting change in evening peak VMT in the core as a result of this strategy is forecast to be modest, which was initially surprising to some of the team members. Additional discussion to interpret this result included determining that many new bicycle riders and pedestrians in the modeling exercise were former transit riders, or those drivers who shifted to non-motorized modes, then freed up space for additional drivers, increasing the overall number of trips and biking and walking trips, rather than reducing SoMa VMT. Another point of information that was used to consider the potential effectiveness of this strategy was the short-trips analysis described in Part 1 of this section that found that in whole, removing all auto trips under a half-mile in SoMa/Mission Bay represents 7% of this desired reduction while trips under two miles (including under half-mile) represent 34%.

Safe Routes to School: This strategy models the effect of continuing and expanding the city's Safe Routes to School (SR2S) program. The San Francisco United School District (SFUSD) launched SR2S to increase the attractiveness and safety of walking or cycling to school beginning in the 2009-2010 school year with three schools and currently has 15 schools participating. Based on empirical evidence from the program and experience from SR2S programs in Marin and Alameda counties, an average family vehicle trip reduction of 14% is assumed to result from the program. Applying this to the 15 schools currently enrolled in the program results in 900 fewer daily vehicle trips in San Francisco. When extrapolated to all SFUSD schools plus private schools, 10,000 fewer daily vehicle trips are projected. The 2012-2013 program currently includes one school in SoMa. Therefore, the SoMa share of the current program translates to 100 fewer 2040 PM peak VMT. Accounting for expansion of the program plus private schools results in an additional 160 VMT decrease, or a total of less than 0.5% VMT decrease.

Bikeshare: This strategy represents the benefits from both a pilot program (500 bikes) that launched in San Francisco in August 2013 as well as a Phase 2 (2,750 bikes) that would launch at a later date (after this analysis was completed, the pilot program has sense been reduced to 350 bikes in San Francisco). The pilot project would have placed 360 bikes in SoMa while Phase 2 would place 538 bikes in SoMa. Using a methodology based on trips generated per bike observed in four cities *(19)* and modal diversions of those trips observed in six cities *(20),* ~40 VMT in the 2040 PM peak are expected to be saved as a result of the pilot and ~60 VMT are expected to be saved from Phase 2. This translates to <0.5% VMT reduction from bikeshare alone. However, one would expect bikeshare to be an integral part of an overall coordinated TDM strategy in SoMa and its value may extend far beyond its independent VMT reduction contribution.

Transit: Several transit-related strategies considered showed no notable change in VMT on SoMa streets. Two scenarios were analyzed using the SF-CHAMP model: 1) a second underground rail tube under the San Francisco Bay for the regional heavy-rail system BART that would run from the East Bay, through SoMa under Mission Street and continue under the Geary corridor to the Richmond; 2) a "capacity unconstrained" scenario, where there would be enough room on local San Francisco buses to accommodate everyone who desired to ride transit (SF-CHAMP was recently upgraded to represent transit crowding *(21)*, and essentially this "knob" was turned off in this scenario).

In both scenarios, change in PM peak period VMT on SoMa streets was flat. This is not to say that improved transit is not imperative to the functioning of the Core, but rather than on its own, will not result in a notable reduction in SoMa VMT. This finding highlights likely latent demand for driving in this part of the city. Road space given up by those who shift to improved transit service will be replaced by new drivers "filling in" newly available capacity.

Potentially Effective Strategies Not Analyzed

"Fix the Grid": This strategy represents an idea to "fix the grid" by reconnecting streets that do not currently connect well. SoMa/Mission Bay is ground zero for several street grids that interface in awkward ways where they meet including between Downtown and SoMa, between Downtown and Market/Octavia, between SoMa and Mission Bay, and between Mission Bay and Potrero Hill/the Mission District. Several opportunities to make these upgrades have been identified. Although analysis was not undertaken, the team expects such a strategy could contribute modest positive benefits towards SoMa congestion reduction by removing bottlenecks in the network.

Auto Trip Cap: Recently, San Francisco planners have discussed the idea of a private vehicle "trip cap" as a potential next-generation TDM strategy. The idea of such a strategy would be to set an allowance for a maximum number of auto trips that allow the network to continue to function, while charging a fee to trip generators who exceed their trip allowance, similar to a cap-and-trade scheme. While this strategy was not analyzed and would require more detailed specification, it may represent a similar magnitude of potential trip shifts as parking supply restrictions or congestion pricing strategies.

Convert Freeway Lanes and Ramps from General Purpose to Transit/Carpool Because SoMa is home to a series of on- and off-ramps to three major highways of I-80, US 101, and I-280, traffic associated with motorists trying to access those ramps is a notable contributor to PM peak congestion on SoMa streets as shown in Figure 4. A strategy that would close or re-purpose some ramps or travel lanes for use only by transit- or carpool-only may both increase the competitiveness of non-SOV modes, and improve the throughput of those facilities that may be degraded by closely spaced interchanges (0.5-0.7 miles apart through SoMa). Several potential options to operationalize this strategy were developed, but the team did not believe the VMT reduction benefits could appropriately be analyzed within the resources and analysis tools available for the current Study (future work is expected to analyze this strategy in a broader planning context).

DISCUSSION OF RESULTS AND POLICY IMPLICATIONS

The team struggled with how to interpret the result that the level of reduction in demand for auto travel would be challenging to achieve, concluding that in areas of above a certain threshold of high land use intensity, *demand* for auto travel at levels higher than available *supply* will always be present and can only be managed through strong demand management strategies that increase price or restrict vehicle access. In order to maintain mobility and economic vitality concurrently, demand management strategies must be paired with improvements in safety, capacity, and performance of other modes of transportation. Given that reality, there are two challenges and policy implications to discuss: 1) what the city can do to ensure effectiveness of other modes in a congested future; 2) how to evolve from typical forecasting/analysis approaches to long-range transportation planning while still having a rational basis for proposing transportation interventions.

Increasing the effectiveness of non-auto modes of transport in a congested future.

In the San Francisco policy context of a city that has made Transit First an official policy, pure auto congestion is not considered a problem in and of itself if it does not interfere with the ability to accommodate mobility for other modes of transportation, as well as if it allows for the city to maintain its economic competitiveness. But, on-the-ground conditions today are such that during peak commute periods auto congestion *does* interfere with other modes. While some of this interference can be addressed by strategies not yet in place such as greater protection for transit and cycling facilities, the team concluded that in a destination like the Core, that is highly attractive due to the concentration of residential, employment, and visitor uses, increasing intensification would require a transition to more active management of transportation conditions such as deploying resources in real-time based on on-the ground conditions and active enforcement of "don't block the box" (i.e. enforcement/ticketing of cars that remain in an intersection on a red light). Such an approach is already utilized effectively in special cases such as during major sports or cultural events. For example, a recent confluence of major events resulted in one million people converging on San Francisco (the so-called "event-maggedon" of America's Cup/Fleet Week, the Castro Street Fair, the Italian Heritage Parade, Giants and 49ers games, the Hardly Strictly Bluegrass Festival and the Double Ten Parade) on the weekend of October 6, 2012 *(22)*.

However, the team also posited maintaining transit speed and reliability would be increasingly challenging to do so at-grade as congestion and overall trip-making grows. While upgrading streets to provide protected transit facilities is important, challenges such as the need to accommodate access to curb space for goods movement loading and disabled persons and the need to allow private vehicles, pedestrians and cyclists to cross transit lanes, all create negative speed and reliability impacts. As a result, transit may only be truly effective as grade-separated after a certain intensity of trip-making. San Francisco already has underground transit including the regional BART heavy rail system and portions of the Muni Metro system that serves some parts of the city. In addition, the newly planned Central Subway under SoMa, Union Square, and Chinatown, and eventually the planned extension of the Caltrain regional commuter system to Downtown as a part of the California High-Speed Rail project will also contribute to addressing this need. Yet, other parts of San Francisco do not currently have fast or reliable access to any below grade opportunity and some below grade facilities are not providing the level of speed or reliability needed to attract or maintain riders. Of course, this problem is particularly challenging to address given the lack of funding for major capital investments relative to past decades. How to respond to these needs are one focus of the SFTP.

Evolving from typical forecasting/analysis approaches to long-range transportation planning

Historical and to some extent state of the practice approaches to travel forecasting and transportation project evaluation have led to problem-solution framing where an input of more people and more jobs indicate an output of demand for auto trip-making that can only be solved by adding roadway capacity. San Francisco has for some time used a more nuanced approach guided by the city's Transit First policy and prioritized improvements to transit, walking, cycling, and reduction in auto lanes. San Francisco's travel demand model, SF-CHAMP, has been created and upgraded to be sensitive to a broader array of multi-modal interventions. But, the finding about the excess of vehicle demand relative to supply indicates a condition that is not physically possible. While there is widespread recognition that the "solutions" of past--increasing vehicle capacity—are wrong, the now well-recognized candidate solutions related to demand management and multi-modal improvements, are not found to do enough to address the problem when applying empirical evidence about their effectiveness from other cities to San Francisco conditions (of course more stringent representation of strategies could be quantifiably demonstrated to be more effective such as a much higher congestion toll or extreme restriction of parking supply, but were not elected to be studied here).

As the team concluded this particular effort, there was a recognition that the analytic work needed to plan to meet transportation needs in San Francisco's core must evolve to utilize different problem-solution framings. Recent ideas about how else to frame long range planning analysis are to focus on quantifying the expected increase in trip-making from new growth, then planning to accommodate those trips based on policy-driven modal split, and planning for the characteristics (performance, safety, capacity) of transit, cycling, and walking networks that are known to be important factors in travel behavior decision-making in favor of those modes. Approaches such as these are sure to be tested in emerging transport planning work in San Francisco.

LIMITATIONS

There are several limitations to the paper's technical analysis (all of which support the second discussion point regarding evolving from typical forecasting/analysis approaches):

- The paper suggests a particular level of auto traffic reduction needed to avoid perpetual gridlock. This level is based on a methodology of inputting auto traffic demand forecast by a travel demand model into microsimulation software. What is implied by the microsimluation finding is that the travel demand model is forecasting more demand than can be accommodated. Ultimately, the 26% VMT reduction should be interpreted to reflect that there would be that much demand for peak hour auto travel even in congested conditions, but in reality some of those trips would change their time of day, route, mode, or not make the trip at all. Given that SF-CHAMP also represents transit crowding, the level of transit demand would likely also not be able to be accommodated with the existing transit supply.
- The strategies specified could have been specified to be a stronger representation: for example, a congestion pricing policy with a higher priced toll would be expected to increase the VMT reduction of that strategy; similarly a higher number of bikes in a bikeshare program could also be more effective. However, the study aimed to represent strategies based on the current or proposed definitions.
- The strategies do not take into account unprecedented cultural shifts. For example, younger generations are not driving as much as past generations, and bicycling has become rapidly more popular. These trends may indicate a greater impact of some strategies than what is quantified here.
- The relative effectiveness of strategies analyzed via the model versus via off-model may not be perfectly comparable and may overestimate the benefit of off-model strategies. Modeled strategies

show the induced demand of new vehicle trips "filling in" freed up capacity, while off-model strategies do not.

CONCLUSIONS

This paper finds that in areas of high land use intensity, demand for auto travel at levels higher than available supply will always be present and can only be managed through strong demand management strategies that increase price or restrict vehicle access. In order to maintain mobility, such strategies must be paired with improvements in safety, capacity, and performance of other modes of transportation. In the near-term, San Francisco can reduce traffic congestion's impacts on other modes of transport through more regular active management of the transport network and continuing to re-purpose auto lanes for walking, cycling, and transit space. In the longer term, the city will continue to strategically consider additional below-grade/subway additions and upgrades to the local and regional transit network. Finally, future long-range transport analysis should explore new analytical frameworks for long-range transport planning that may be more apt to solve tomorrow's transport challenges.

AKNOWLEDGEMENTS

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1. State Laws, Local Codes, & Transit First Policy (City Charter). San Francisco City Charter, Section 8A.115.

2. San Francisco Planning Department as quoted in *San Francisco's Transportation Investment and Growth Strategy*, July 2013.

4 San Francisco's Transportation Investment and Growth Strategy. Op cit. Includes growth in pipeline, additional capacity zoned for, and projects under development for the Downtown-Van Ness-Geary, Eastern Neighborhoods, Market & Octavia, Mission Bay, Port of San Francisco, and Transbay Terminal/Transit Center Priority Development Areas.

5. Outwater, M. and B. Charlton. The San Francisco model in practice: Validation, testing, and application, in "Innovations in Travel Demand Modeling: Summary of a Conference", Vol. 2, Transportation Research Board, Washington, DC, 2006.

6. San Francisco County Transportaiton Authority. August 2013. *Off-Model Transportation Demand Management Representation and Quantification Methodology for San Francisco Transportation Plan White Paper.* <http://www.sfcta.org/downloads/SFTP/corecirc/Off-Model_TDM_Methodology_Documentation.pdf>

7. San Francisco County Transportation Authority. *Mobility, Access, and Pricing Study.* December 2010. http://www.sfmobility.org

8. Metropolitan Transportation Commission. *Plan Bay Area: Technical Summary of Proposed Climate Policy Initiatives*. Technical Report. Revised July 23, 2012.

9 San Francisco Planning Code, Section 166.

10. San Francisco Municipal Transportation Agency. "Car Sharing Policy and Pilot Project" July 2013. https://www.sfmta.com/sites/default/files/projects/SFMTA Car Sharing Policy_MTAB_20130716.pdf

11. San Francisco Department of Environment. *Employee Commute Survey Results.* 2011.

12. Deakin, E, Frick, K, and Shively, K. "Dynaimic Ridersharing. " Spring 2012. *Access: the Magazine of the University of California Transportation Center.* Number 40, Spring 2012. http://www.uctc.net/access/40/access40_dynamicridesharing.pdf

13. Andrew M. Amey. *Real-Time Ridesharing: Exploring the Opportunties and Challenges of Designing a Technology-based Rideshare Trial for the MIT Community.* Master's Thesis. Massachusetts Institute of Technology. June 2010. http://ridesharechoices.scripts.mit.edu/home/wp-content/papers/AMEY_Thesis_Final.pdf

14. San Francisco Municipal Transportation Agency. *Muni Partners Needs Assessment and Policy Recommendations,* 2013.

15. San Francisco Chronicle. "Muni seeks to bring order to shuttle bus chaos." July 19, 2013. http://www.sfchronicle.com/bayarea/article/Muni-seeks-to-bring-order-to-shuttle-bus-chaos-4673551.php. Accessed 7/21/2013

16. Metropolitan Transportation Commission. *Plan Bay Area: Technical Summary of Proposed Climate Policy Initiatives*. Technical Report. Revised July 23, 2012.

17. Bomberg, M, Zorn, L and Sall, E. "Incorporating user based perspective of livability projects in SF-CHAMP mode choice models." *Transportation Letters: the International Journal of Transportation Research,* Volume 5, Number 2, April 2013, pp. 83-85.

18. Hood, J, Sall, E, and Charlton B. "A GPS-based bicycle route choice model for San Francisco, California.' Transportation *Letters: the International Journal of Transportation Research,* Volume 3, 2011, pp. 63-75.

19 City of Cincinnati. *Cincinnati Bike Share Feasibility Study*. September 2012. Prepared by Alta Planning and Design. http://www.cincinnati-oh.gov/bikes/linkservid/241025ED-EFF8-8292-8C6AC74C67C3F7FA/showMeta/0/

20. University of Washington Department of Urban Design and Planning. *Seattle Bike-Share Feasibility Study.* http://seattlebikeshare.org/Seattle_Bike-Share_files/SeattleBikeShareChapter2.pdf

21. Zorn, L, Sall, E, and Wu, Dan. "Incorporating crowding into the San Francisco activity-based travel model. *Transportation.* Volume 39, Issue 4, pp. 755-771.

22. San Francisco Chronicle. "Transit strategy bodes well for '13 Cup." October 8, 2012. http://www.sfgate.com/bayarea/article/Transit-strategy-bodes-well-for-13-Cup-3927194.php Accessed 7/21/2013.

EXHIBIT 7

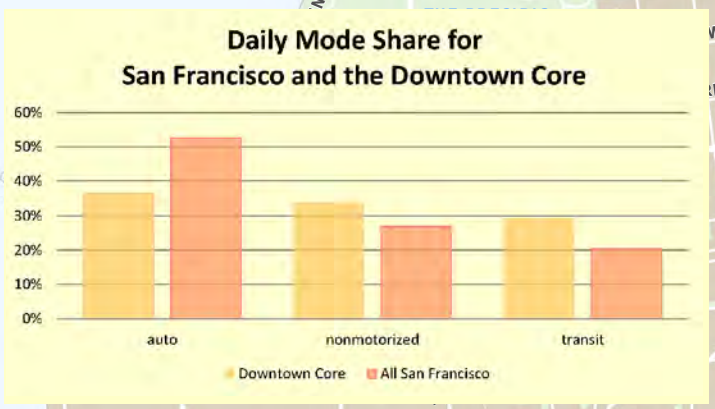
Appendix K

SF TRAVEL AT A GLANCE

San Francisco at a Glance: Daily Tripmaking to, from, and within San Francisco Now and 2040

3.2 Million trips of all modes were taken to, from, and within San Francisco every day in 2012. This is expected to grow 33% by 2040.

68% of all auto trips within San Francisco, or nearly 695,000 trips per day, were 3 miles or under in 2012. **Over half were under 2 miles.** Shifting only the trips under one mile to walking or bicycling would result in 160,000 fewer auto trips a day.



34% of daily auto trips in 2012 to, from, or within San Francisco were to, from, or within the Downtown Core.

+30% expected increase of Downtown Core auto trips by 2040. In 2012 there were **485,000** auto trips daily.

+82% expected increase of daily SoMa/Mission Bay auto trips by 2040, up from **125,000** in 2012.

+40% expected increase in Downtown Core transit trips from **500,000** per day in 2012.

+42% expected increase of Downtown Core nonmotorized trips. There were **580,000** per day in 2012.

8,000 auto trips were taken between Sunset and Bayshore per day in 2012. This is expected to increase to nearly 15,000 by 2040, resulting in the largest increase in auto tripmaking outside the Downtown Core.[1]

Increase in travel between neighborhoods

Increase in travel to or from neighborhood

Mi. 0 0.5 1 2

N

Three key travel trends that shaped the SFTP

Of the 3.2 million trips to, from, or within San Francisco every day, 53% are taken by private automobile. Growth is expected to put exceptional stress on the surface transportation network in coming years, particularly in the Downtown/SoMa Core, the US 101 Corridor, and the Eastern Neigborhoods. Over two-thirds of trips entirely within San Francisco are under three miles in length, and represent an opportunity to shift to non-motorized modes walking and bicycling.

[1]Refers to travel between neighborhoods.

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1455 Market Street, 22nd Floor, San Francisco, CA 94103
TEL 415.522.4800 FAX 415.522.4829
EMAIL info@sfcta.org WEB www.sfcta.org

Sources: Citywide trip and mode statistics come from the 2010 California Household Travel Survey. Neighborhood level trip and mode share, and projections for 2040 are from SF-CHAMP.

EXHIBIT 8

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2040

San Francisco Transportation Plan Update

SPUR Annie Alley Forum

May 21, 2013

www.sfcta.org/MoveSmartSF
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Purpose of the San Francisco Transportation Plan

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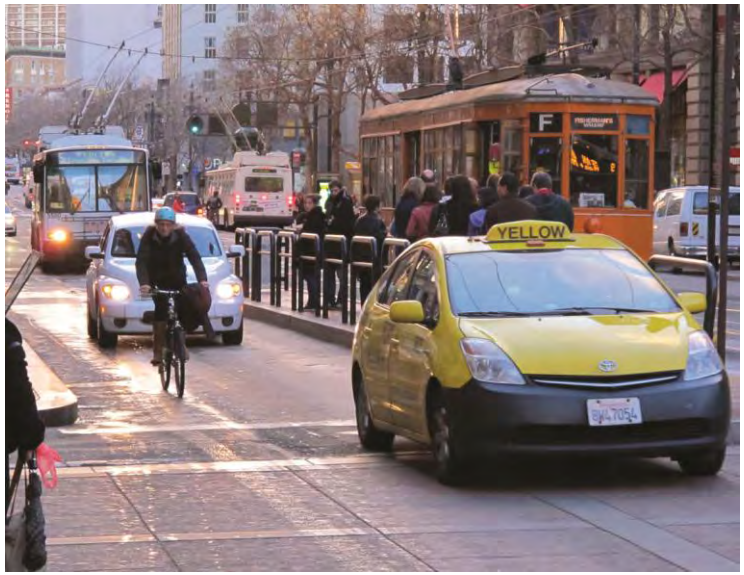
What is it?

- San Francisco's transportation investment program for all modes, operators to year 2040
- Supporting policies and strategic initiatives
- Funding and implementation strategy



How will it be used?

- Informs **local plans** and investments (Transportation Element Update, SFMTA and CCSF capital plans)
- Guides SF's input to **regional planning** efforts (BART Strategic Plan, 2017 RTP)
  - *Advocating together for San Francisco's fair share*
- Positions SF for future funding opportunities and policy discussions at **state, national** level

New transportation goals and city development objectives

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2013 Regional Transportation Plan: new projects

- Blended High Speed Rail/Caltrain Electrification/Transbay/Downtown extension
- BART Metro, Transit Effectiveness Project, SF Pricing Program

SB375, SF Climate Action Strategy

- SF goal: reduce GHGs to 80% below 1990 levels by 2050
- Regional Transportation Plan Update includes a Sustainable Communities Strategy

Bicycle and Pedestrian Safety Directives

- BoS: 20% Bicycle Mode Share by 2020
- Mayor's Directive: 50% reduction in pedestrian injuries by 2020

Demand Management to Support Approved Plans

- Bayview Waterfront, Treasure Island, Park Merced Plans
- SFMTA Parking and Shuttle Management policies

Developing the SFTP

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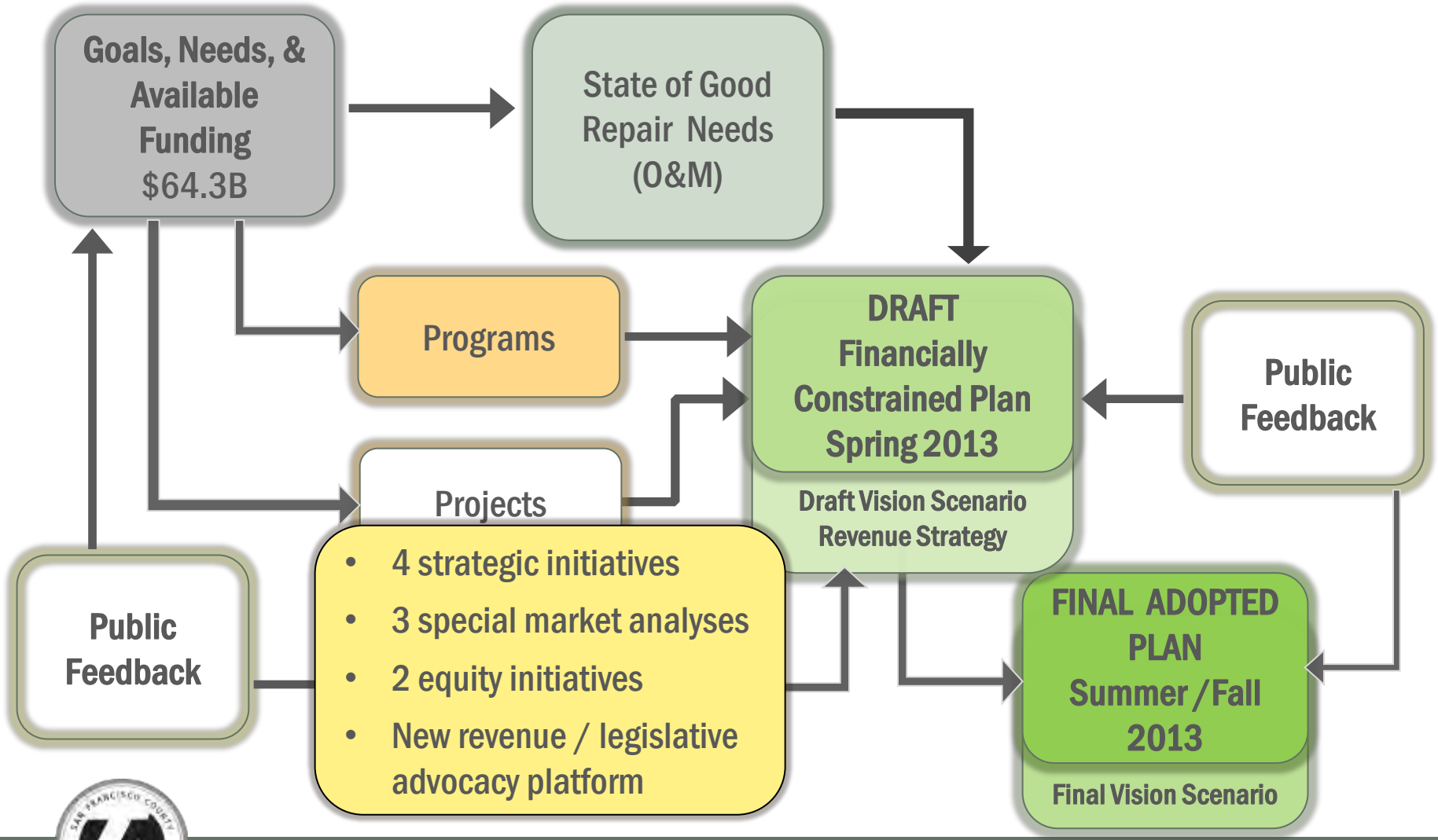

SFTP needs assessment framework

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Transportation System Performance

- Total trip-making
- Mode share
- Avg Occupancy (PMT/VMT)
- Transit: Auto Travel Time Ratio

Economic Competitiveness

- Congested Streets, Commute times
- Peak: Off-peak Drive Travel Time
- Goods movement needs and visitor access

Healthy Environment

- Vehicle miles traveled
- Greenhouse gas emissions
- Active Transportation (walking & biking) Trips

Livability

- Travel safety
- Transfers/Transit trip
- Non-auto trip shares
- School trip needs

State of Good Repair

- Crowded Transit Lines
- Pavement Condition Index
- Transit Reliability
- Structural Sufficiency

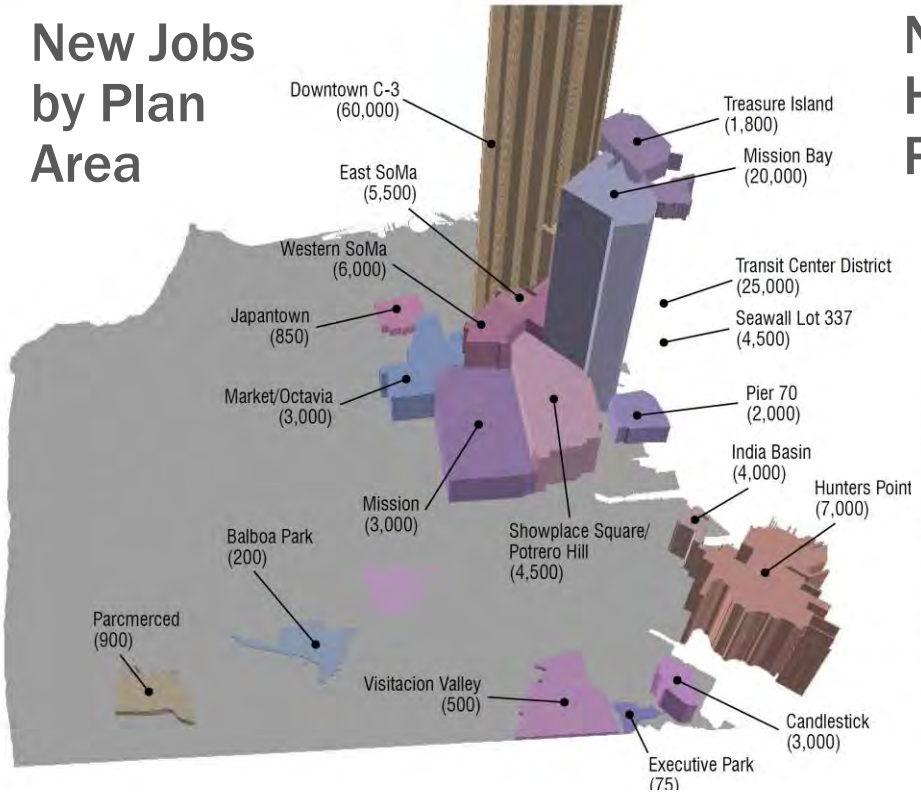
Equity

Public Input

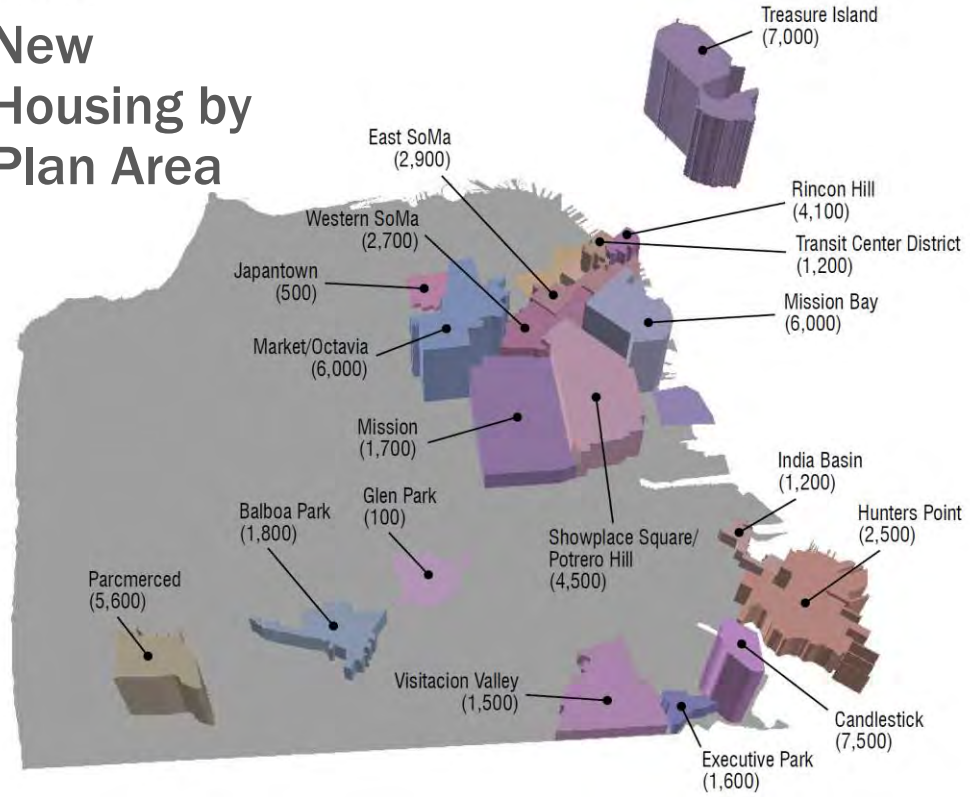
Our growth and transportation challenge

Planned growth through 2040

New Jobs by Plan Area



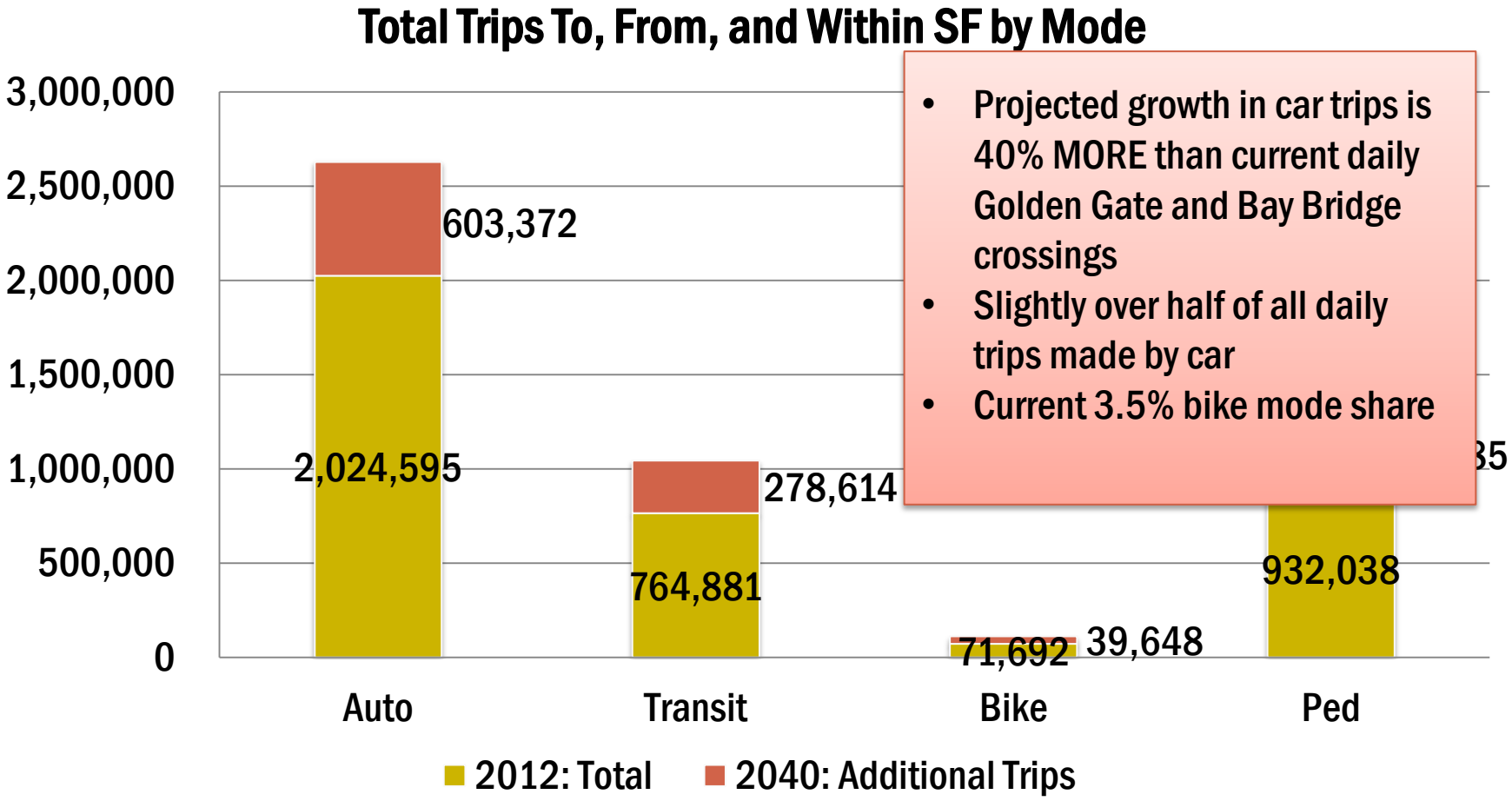
New Housing by Plan Area



- 101,000 new households
- 191,000 new workers
- 603,000 more daily car trips (more than the combined daily volume of Bay Bridge and Golden Gate Bridge crossings)

> 5 Million trips to/from/within SF by 2040

33% more trips than today



Source: SF-CHAMP 4.3

Change in local auto trips: 2012-40

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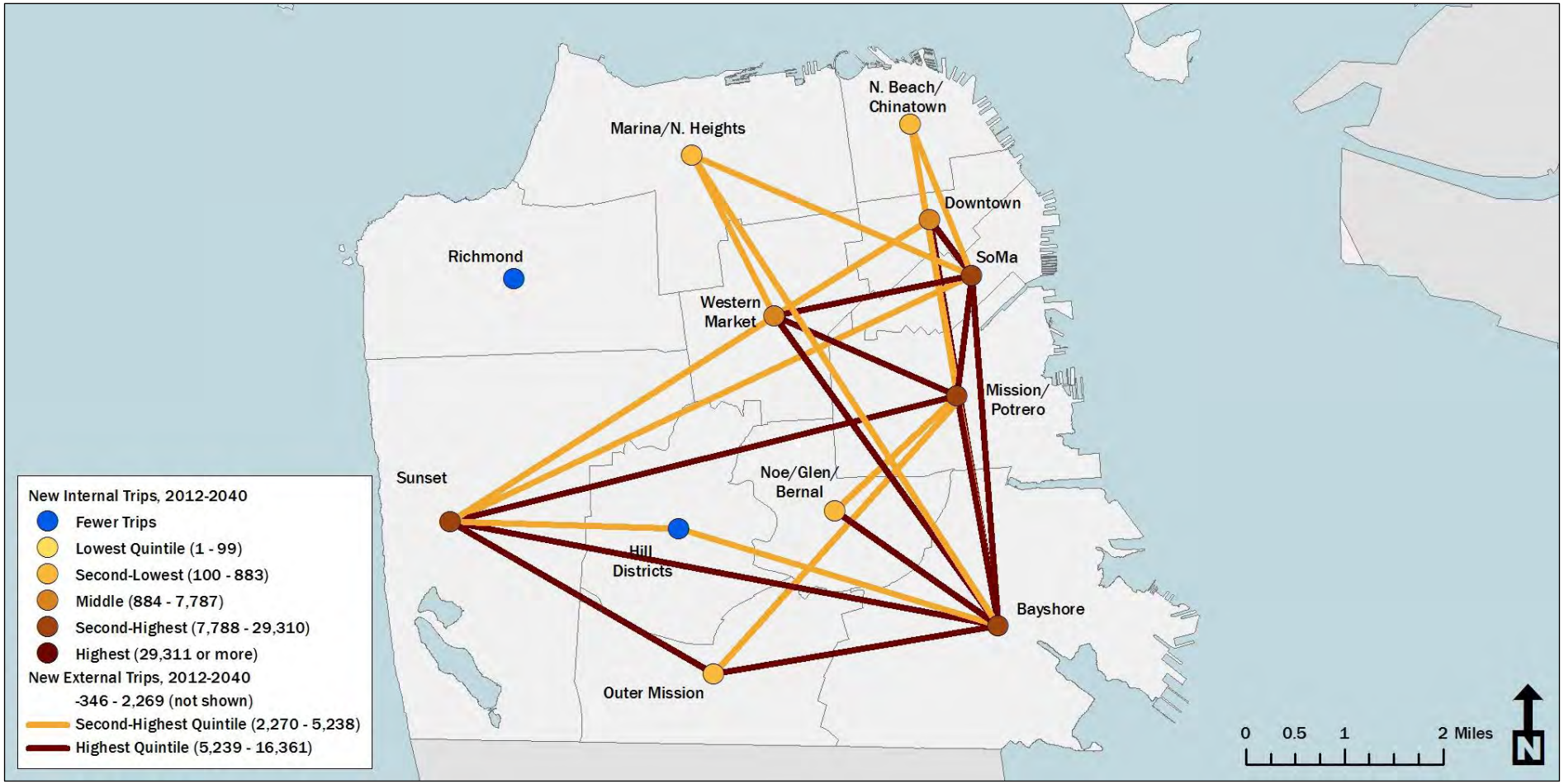

Source: SF-CHAMP 4.3

Change in regional auto trips: 2012-40

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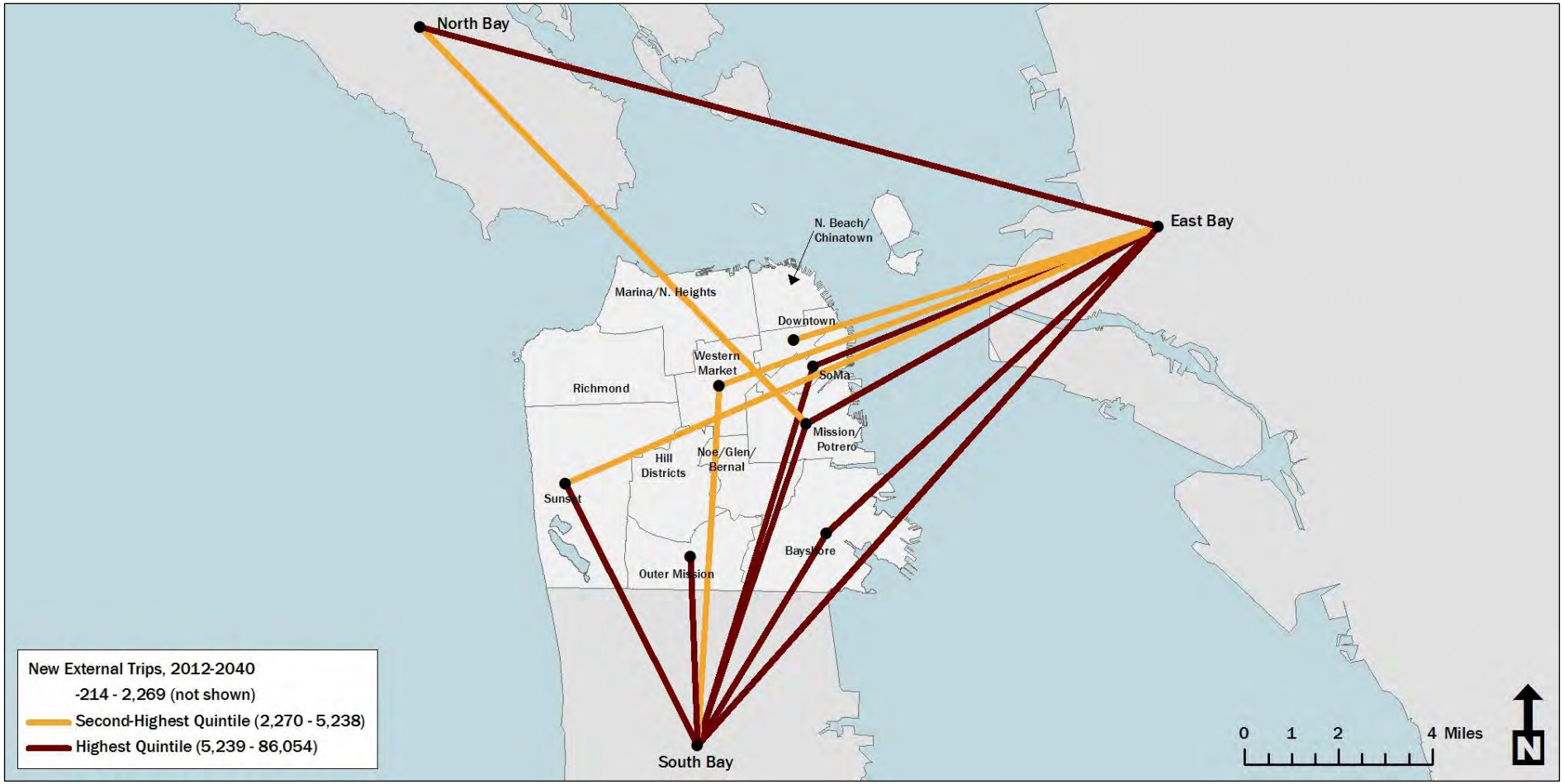

Source: SF-CHAMP 4.3

Muni crowding
Morning peak hour, 2012 and 2040

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Source: SF-CHAMP 4.3

Crowding on regional transit systems | Morning peak hour, 2012 and 2040

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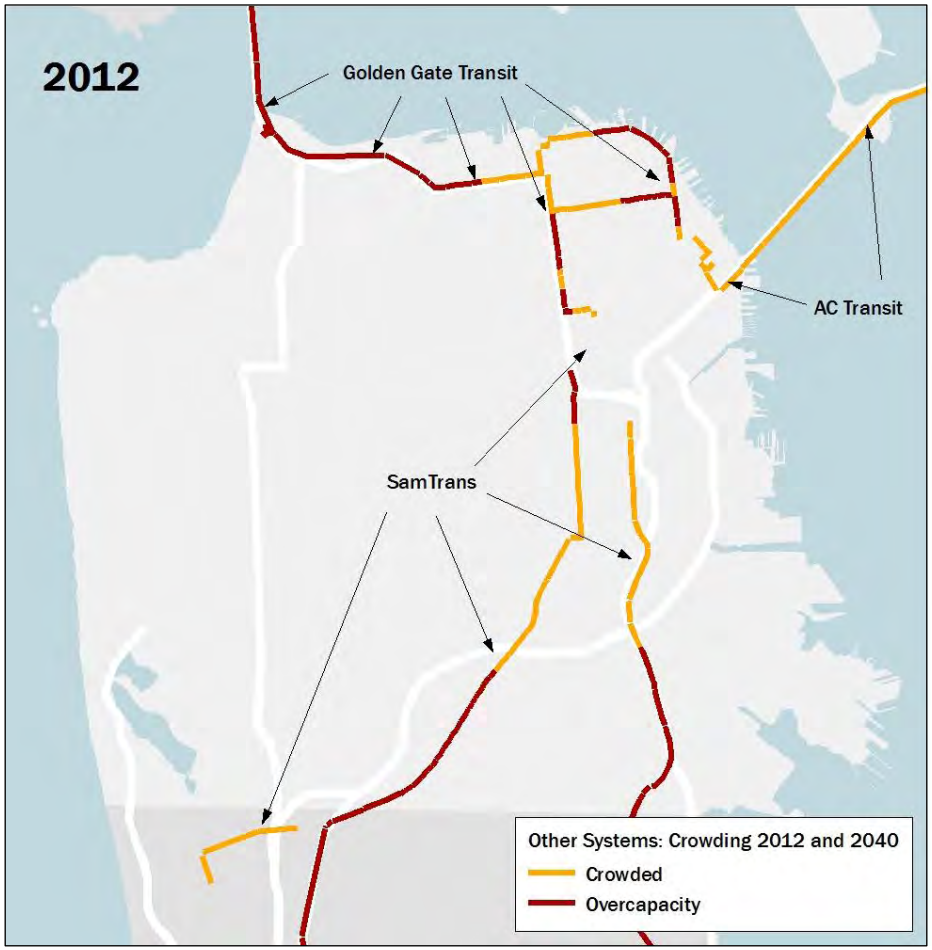
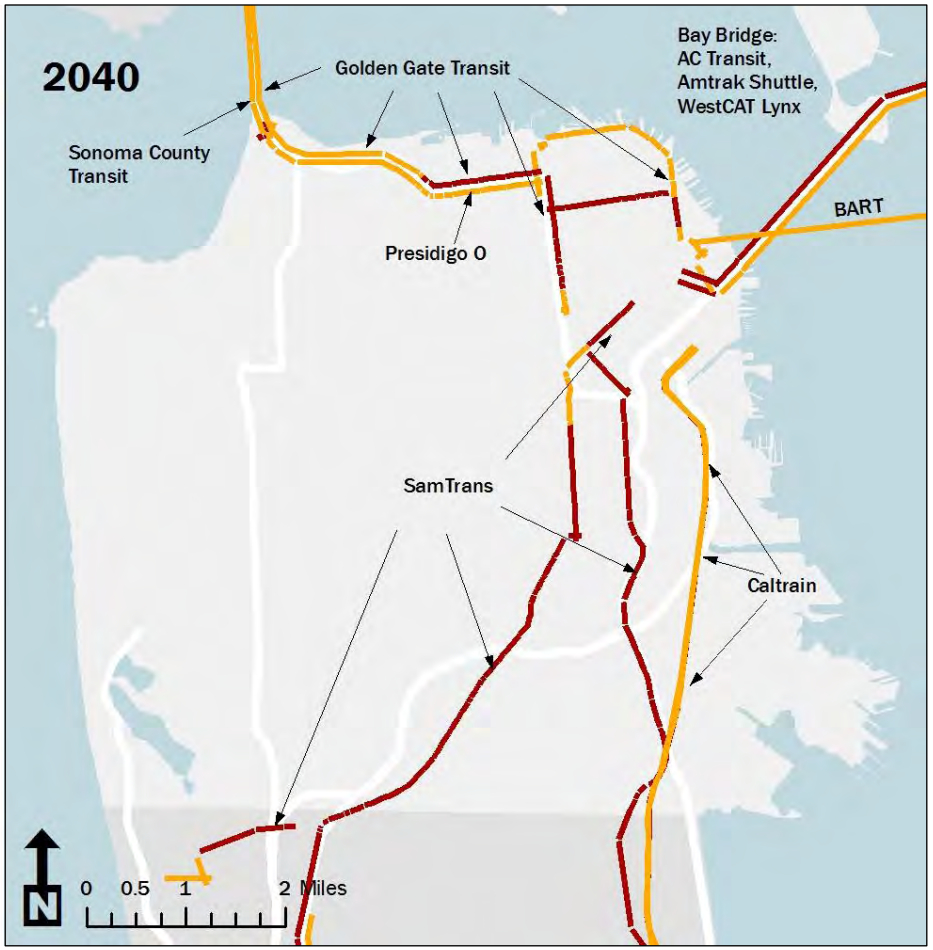
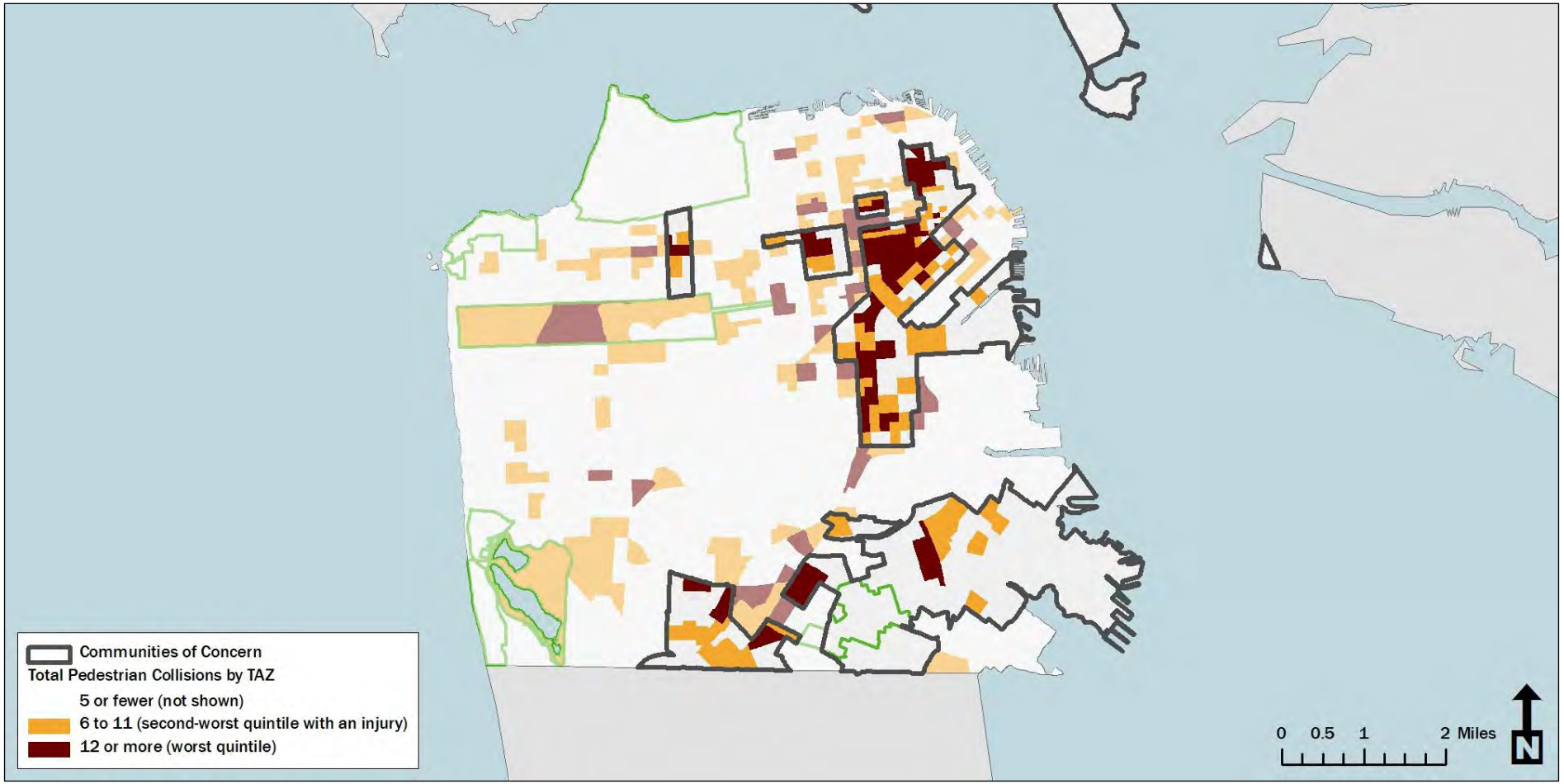




Source: SF-CHAMP 4.3

Pedestrian Injuries: Total number of injuries



Sources:
Tract Populations: American Community Survey, 2009
Ped Collisions (2007-11): Statewide Integrated Traffic Reporting System (SWITRS)

Pedestrian Injury Rate

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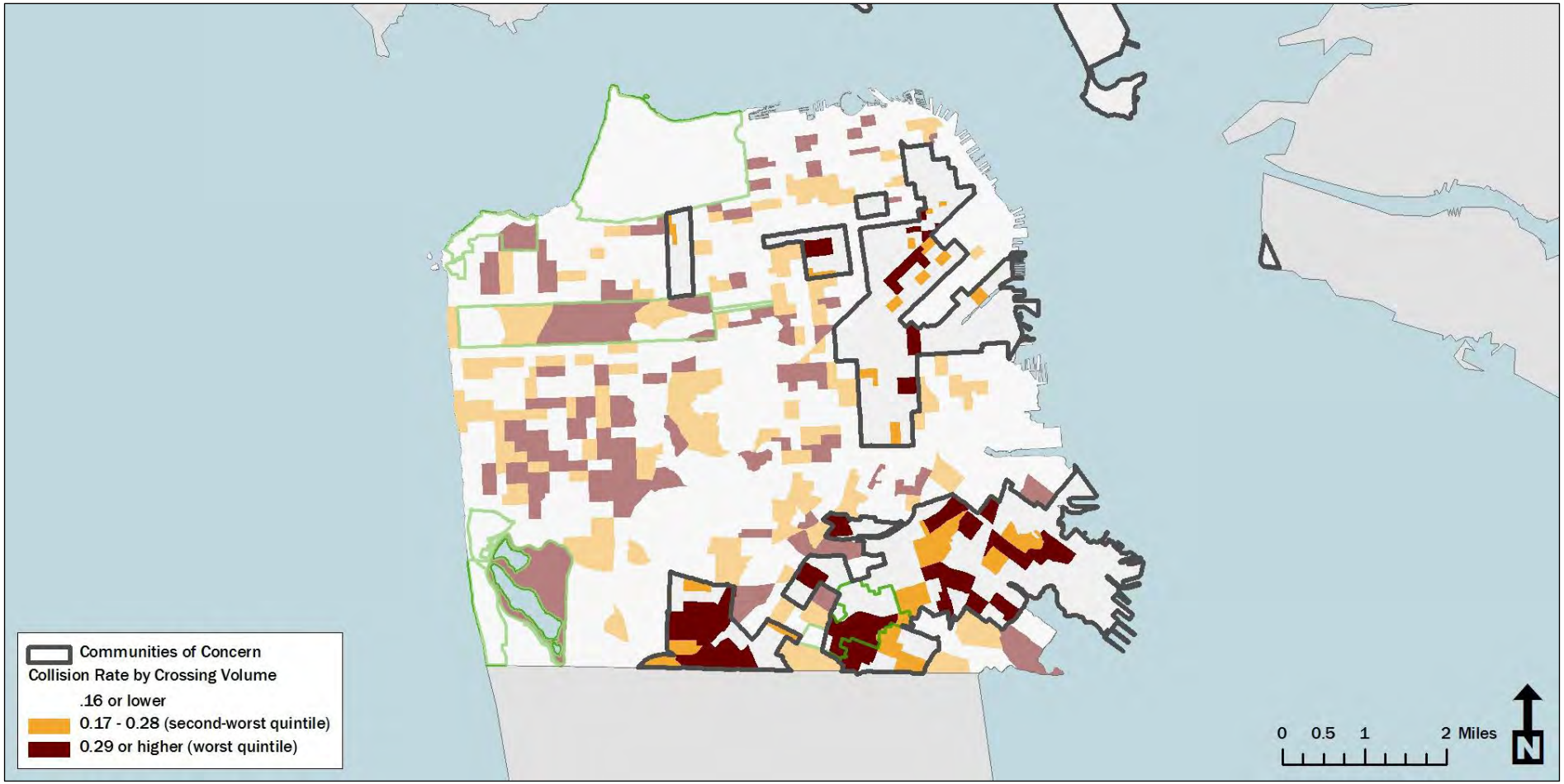
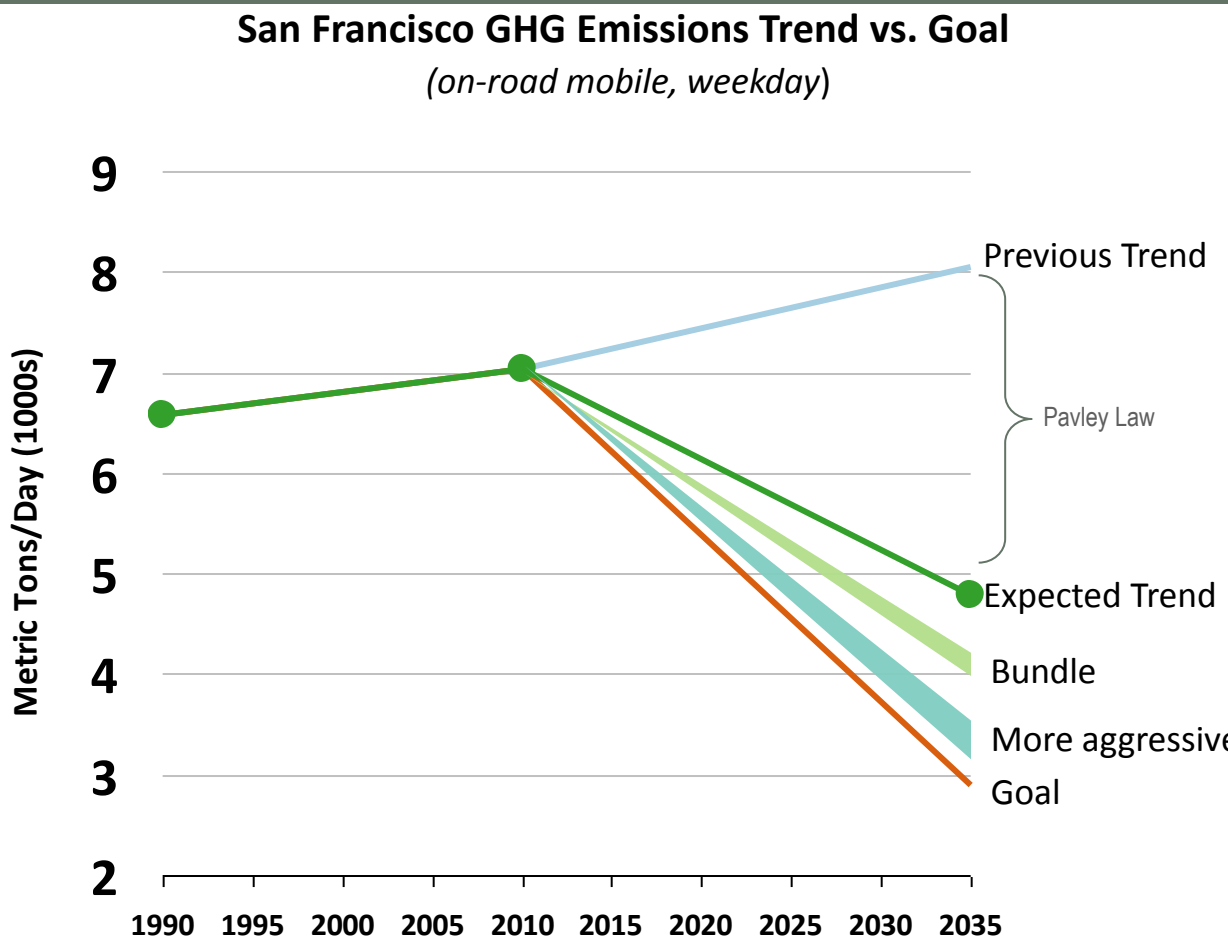


Sources:
Predicted Crossing Volume: San Francisco Pedestrian Volume Model (2011)
Ped Collisions (2007-11): Statewide Integrated Traffic Reporting System (SWITRS)

Example: Healthy Environment Scenario
can only approach goal w/aggressive policy change



- $10B infrastructure
- Local road user pricing
- Up to 16% EV fleet

- $10B+ infrastructure
- Regional pricing at 2x today's operating costs
- Up to 25% EV fleet

Source: SF CHAMP 4.1 Draft SCS, SFCTA, 2011

Response to calls for projects: public input

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300 submittals from both agencies and the public

- Support for "Fix It First"
- Support for projects to improve transit reliability and provide dedicated right-of-way
- Demand for traffic calming, pedestrian safety and enhancement, and bicycle improvements
- Demand for more frequent transit service (to alleviate crowding)

Draft SFTP Financially Constrained Investment Scenario

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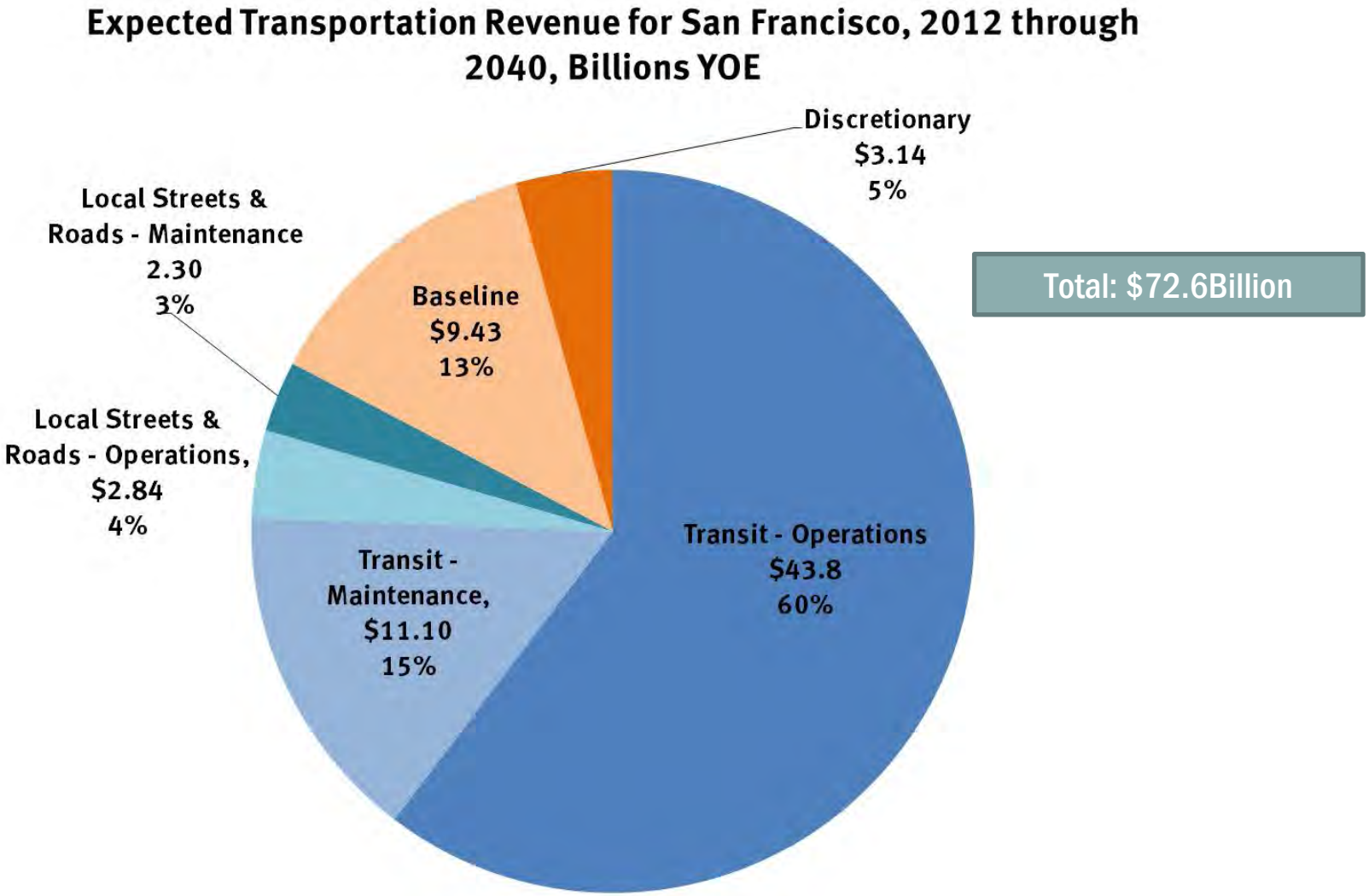

SFTP Baseline Projects

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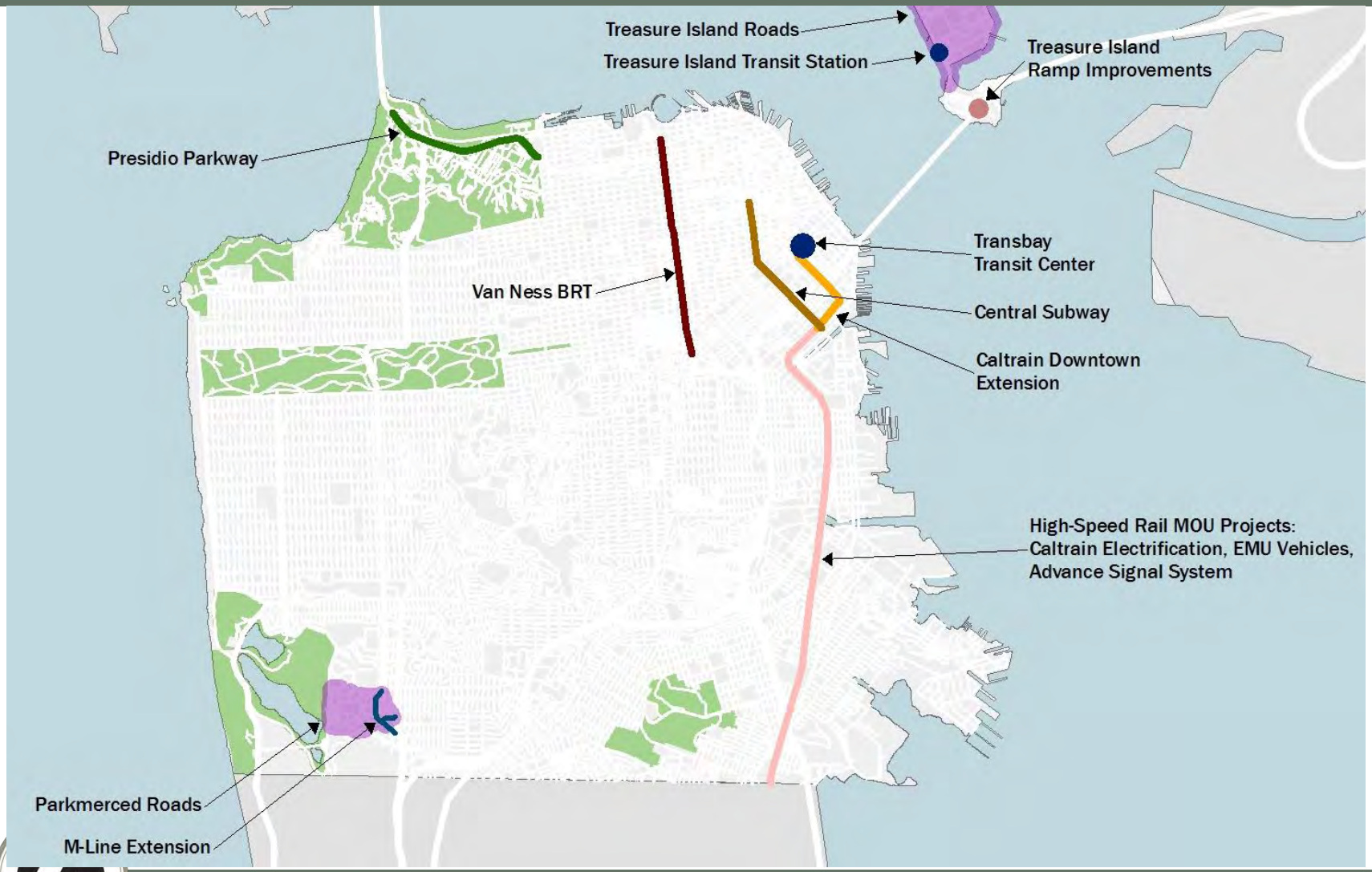

Prioritizing discretionary revenue

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How should we prioritize $3.14 billion in uncommitted funds?

State of Good Repair / Operations & Maintenance (O&M)

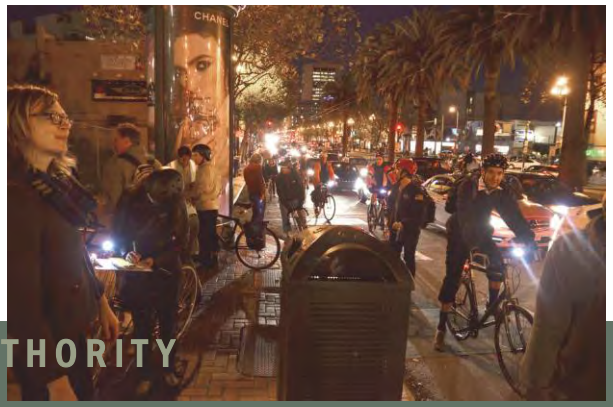
- Improve transit reliability
- Pavement quality, state and local structures

Transportation enhancements and programs

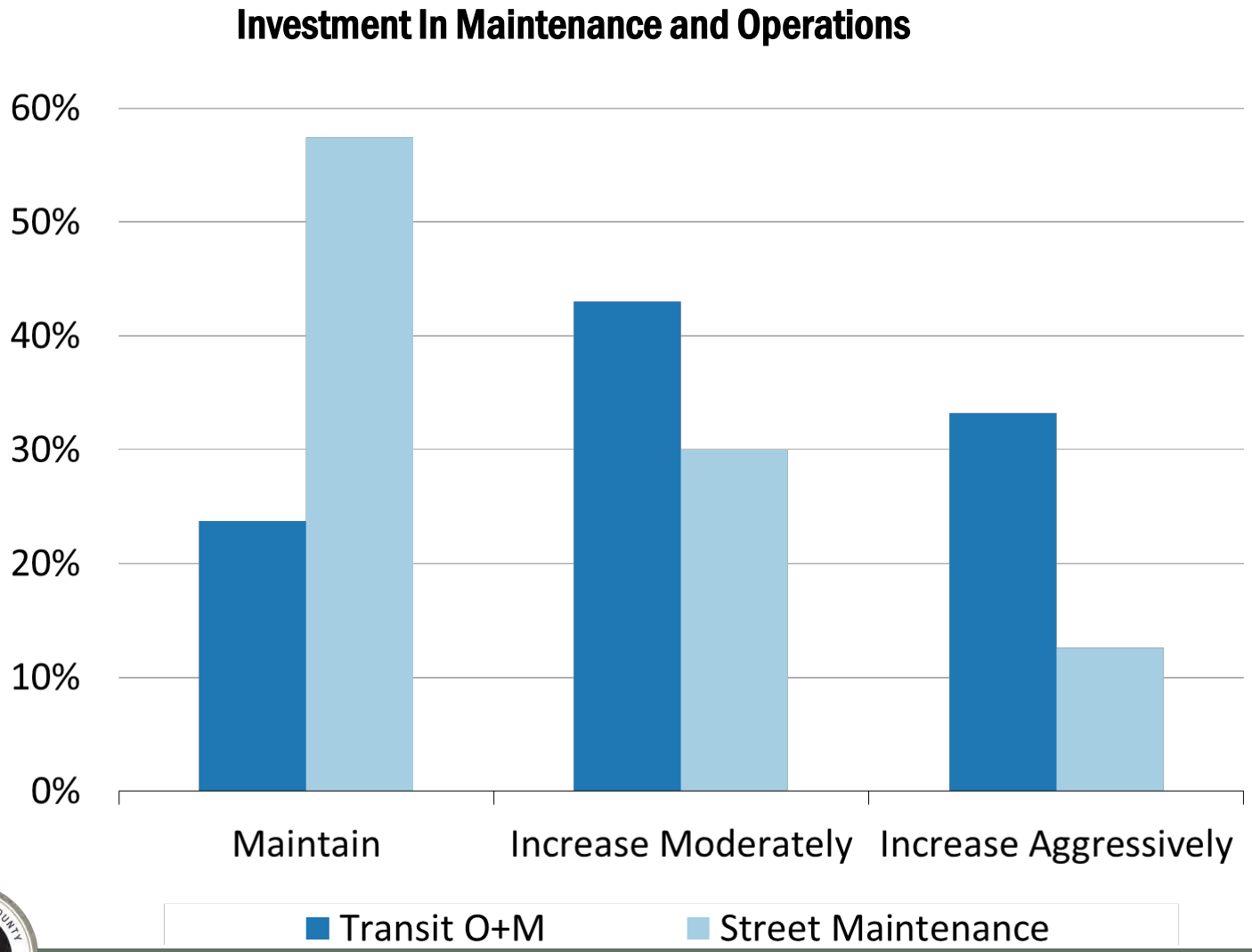
- Pedestrian safety, traffic calming
- Bicycle facilities, Rapid Transit network

Expansion projects

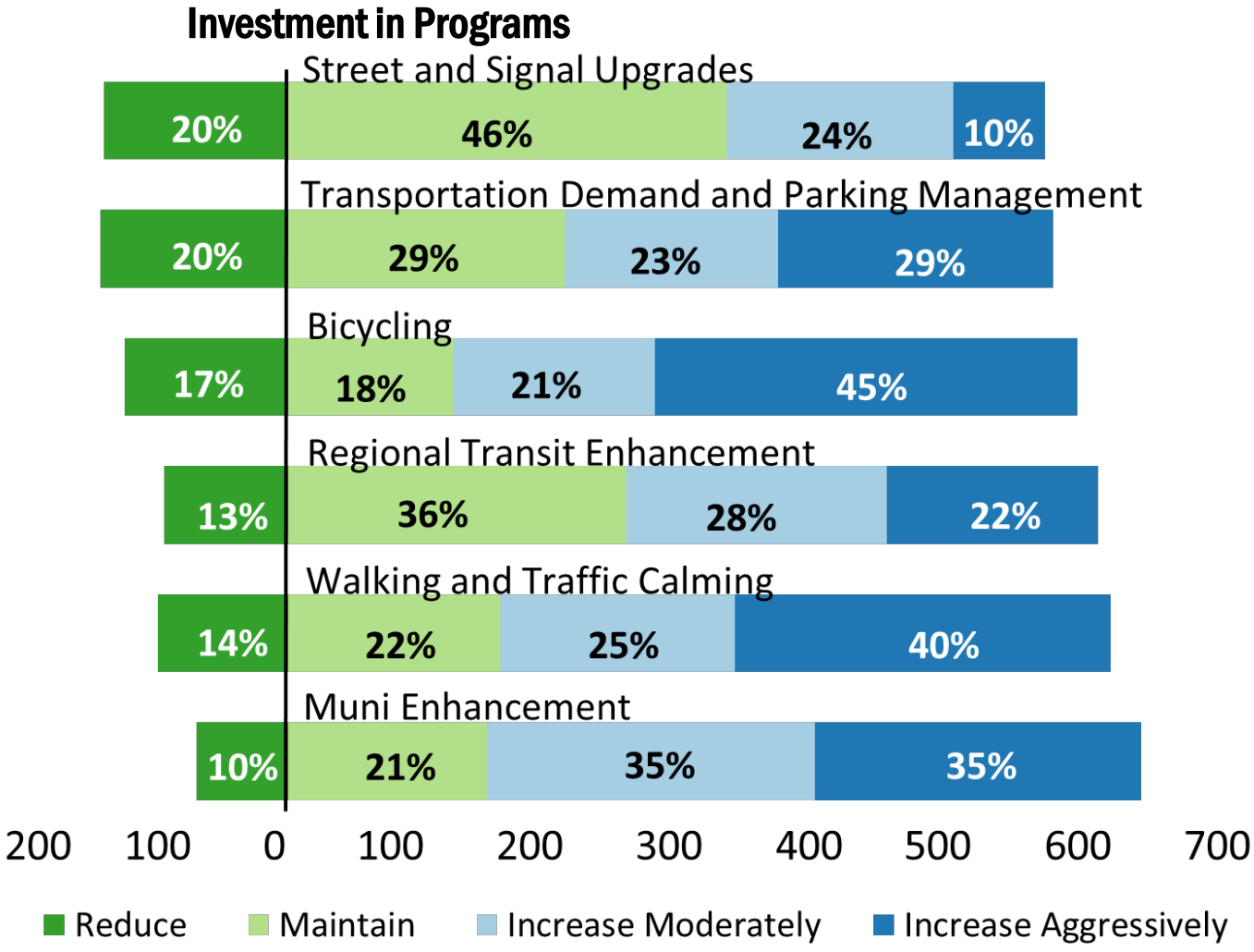
- Relieve crowding; long range strategic rail investments
- Develop freeway management strategies (US101, HWY280)



Desire for increase in transit O&M



Desire for more investment in walking, cycling, + Muni enhancements



Support for high-performing transit efficiency projects

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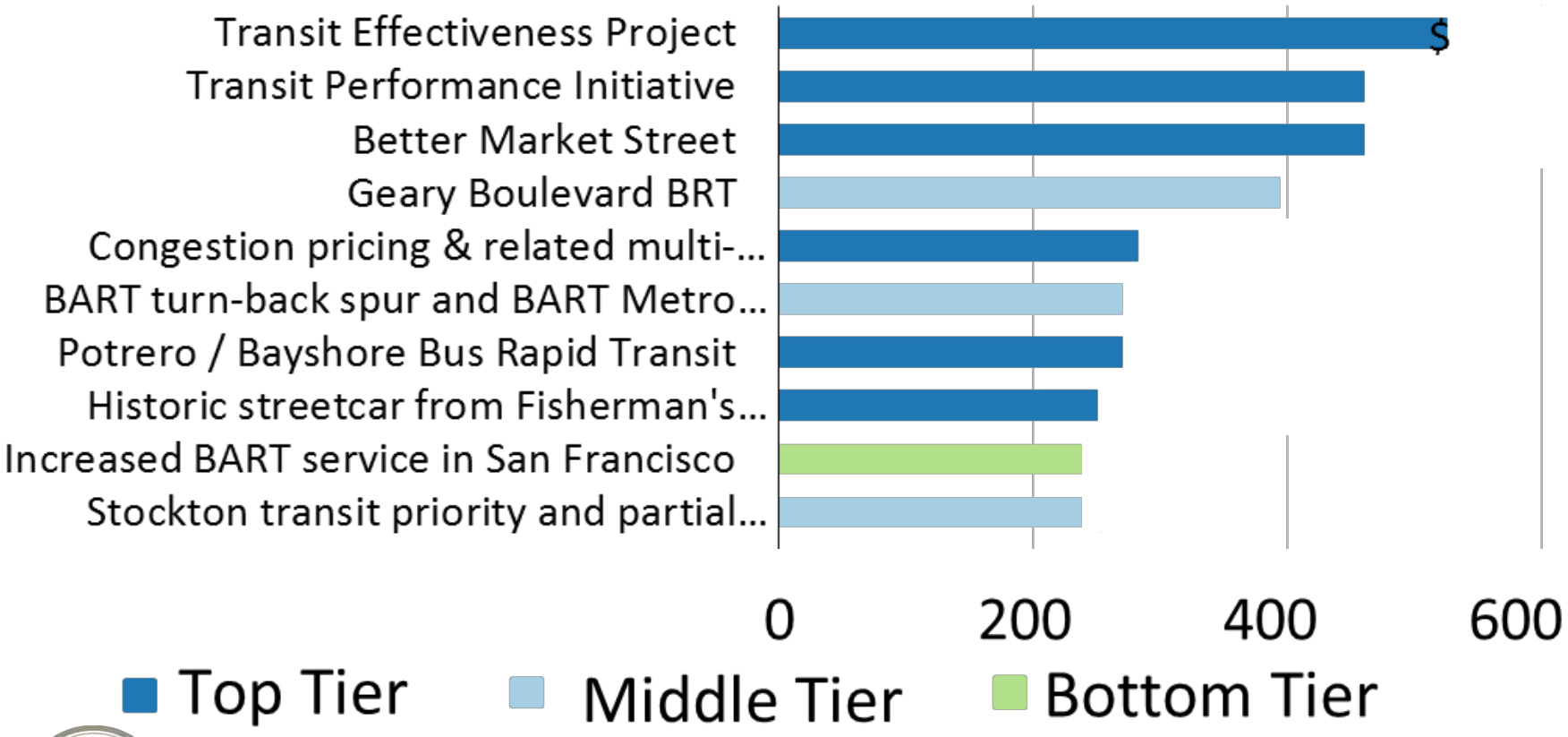
Demand for Projects (top 10 vote-getters)



Project performance evaluation

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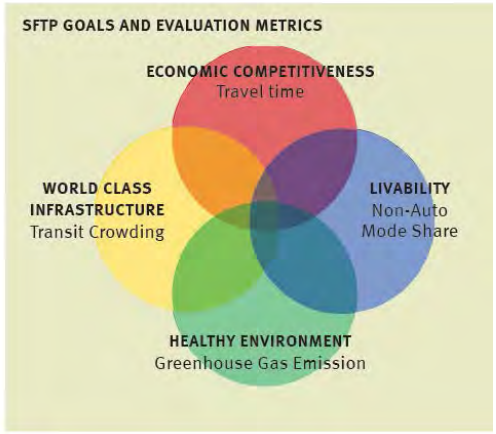
Nearly 50 projects and programs were evaluated for cost effective contribution to plan goals

BENEFIT SCORE



ANNUALIZED COST

CAPITAL COST / PROJECT LIFE
+
ONE YEAR OF OPERATING COST
=
ANNUALIZED COST

=

BENEFIT-COST SCORE
BENEFIT SCORE DIVIDED BY ANNUALIZED COST

Benefit-cost proxy index – Top tier

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Projects with Highest Benefit-Cost Proxy Scores (Listed alphabetically)	Total Cost (cap + op, $YOE)
Better Market Street	$258
Bicycle Program	$252
Congestion Pricing – Cordon and Treasure Island	$119
Historic Streetcar Expansion – E Turnaround	$149
HOV Lane on Central Freeway	$15
New Caltrain Station at Oakdale Avenue	$62
Potrero / Bayshore BRT	$128
Transit Effectiveness Project	$178
Transit Performance Initiative	$400+
Travel Demand Management Program	$73M
Total Cost of Top Tier of Projects	$1,561

Top tier projects

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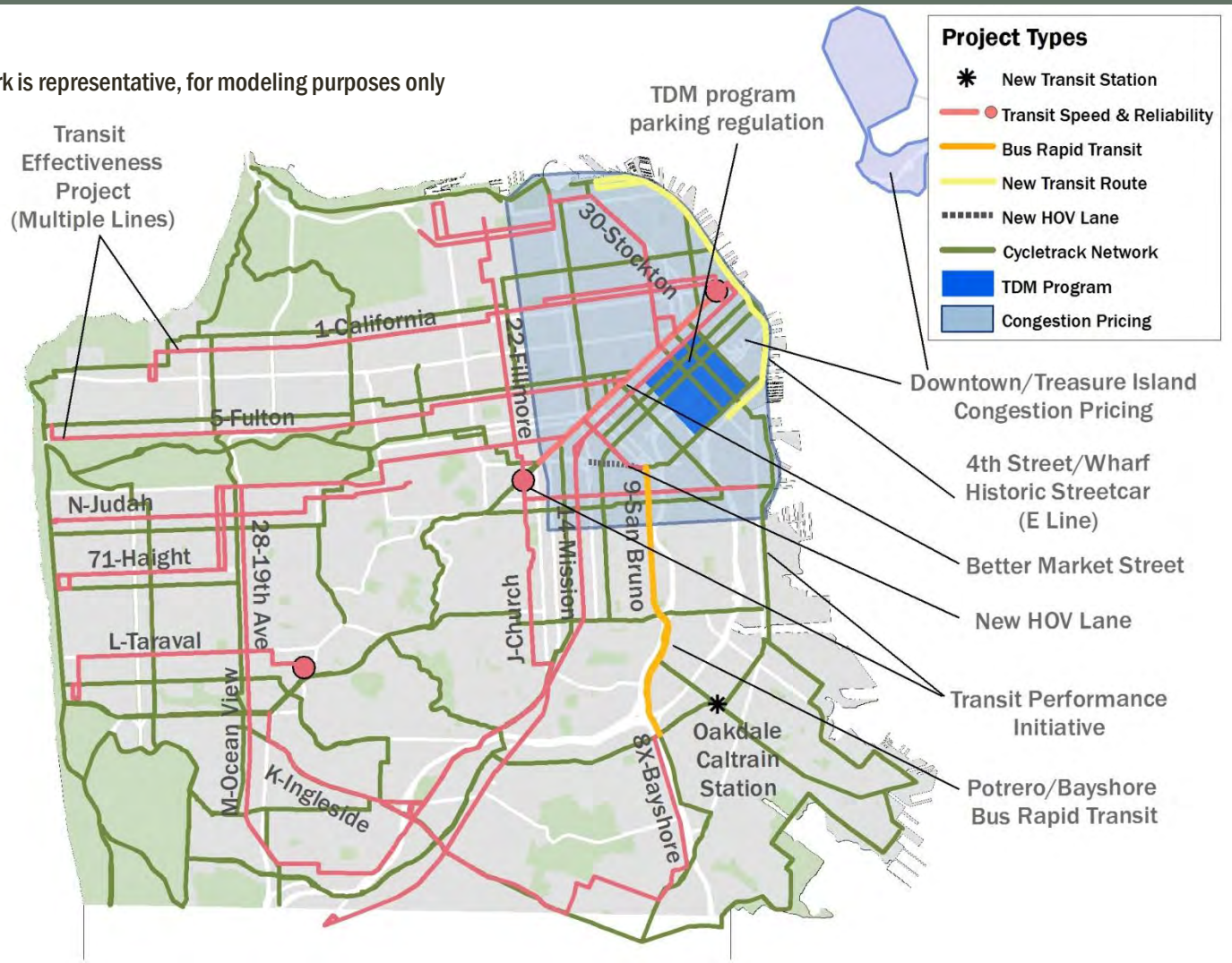
Notes
- Cycletrack network is representative, for modeling purposes only



SF priorities are top RTP performers

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	Project	Quantitative B/C ratio	Qualitative (out of 10)
1	BART Metro Program	>60	8.5
2	Treasure Island Congestion Pricing	59	4.0
3	Congestion Pricing Cordon Pilot	45	6.0
4	AC Transit Grant-MacArthur BRT	18	5.5
5	Freeway Performance Initiative	16	4.0
6	ITS Improvements in San Mateo County	16	4.0
7	ITS Improvements in San Clara County	16	4.0
8	Irvington BART Station	12	5.5
9	SFMTA Transit Effectiveness Project	11	7.5
10	Caltrain Electrification + 6 train/hour service	5	7.5
11	BART to San Jose, Phase 2	5	7.0
12	Van Ness Avenue BRT	6	6.5
13	Better Market Street	6	6.0

Needs far exceed expected revenue

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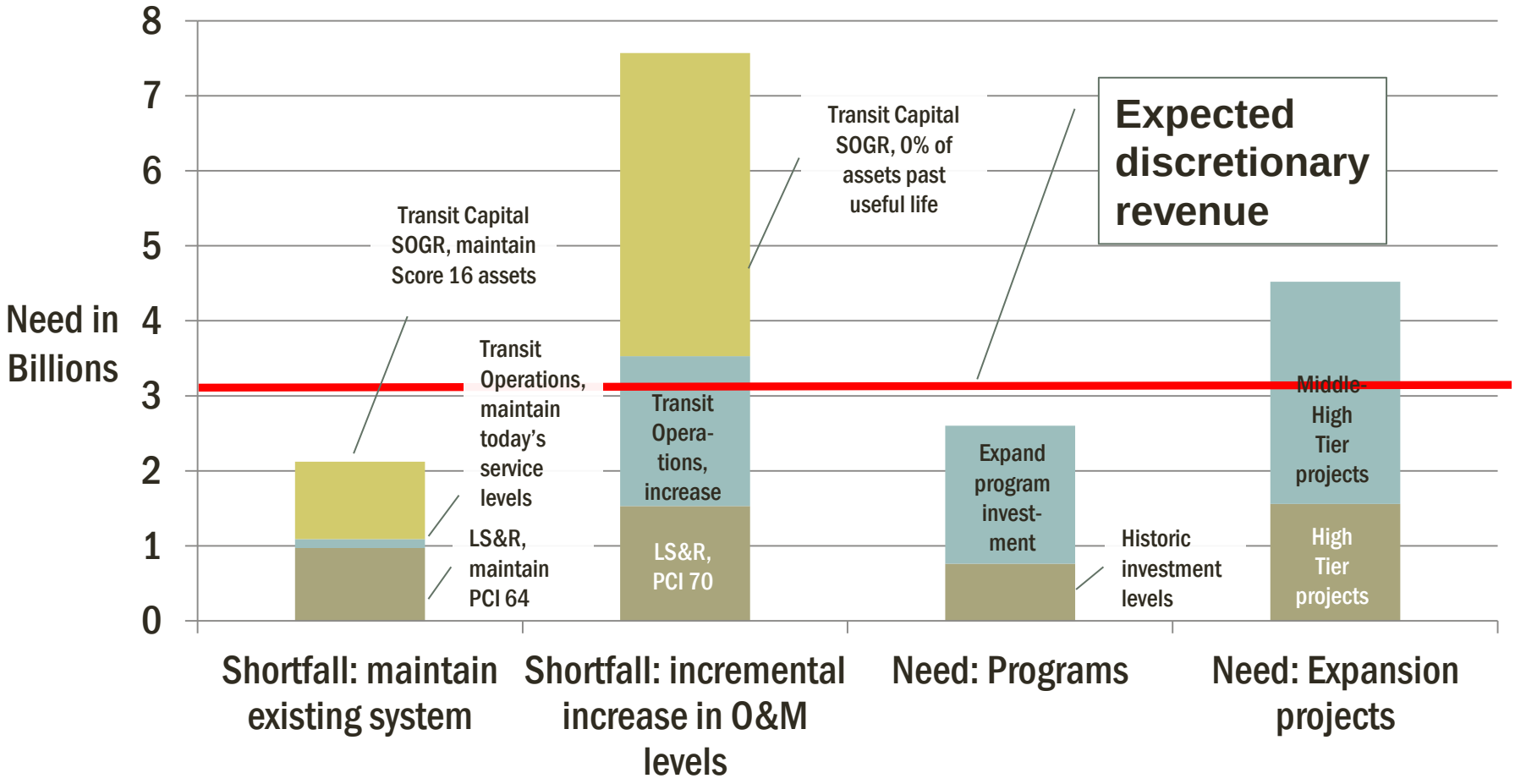

Knitting it all together

Investment Scenario Options

- Complementary choices among investment types (e.g. replacement vehicles, rapid transit network development can increase effective level of transit service)

But also:

- Tradeoffs between and within investment types (e.g. Operations, Maintenance, Programs, Expansion), modes, geographic areas and

Plan development should consider multiple factors: Need, Performance, Cost-Effectiveness, Public Input , Policy/Plan status, Equity

Draft SFTP Financially Constrained Investment Scenario

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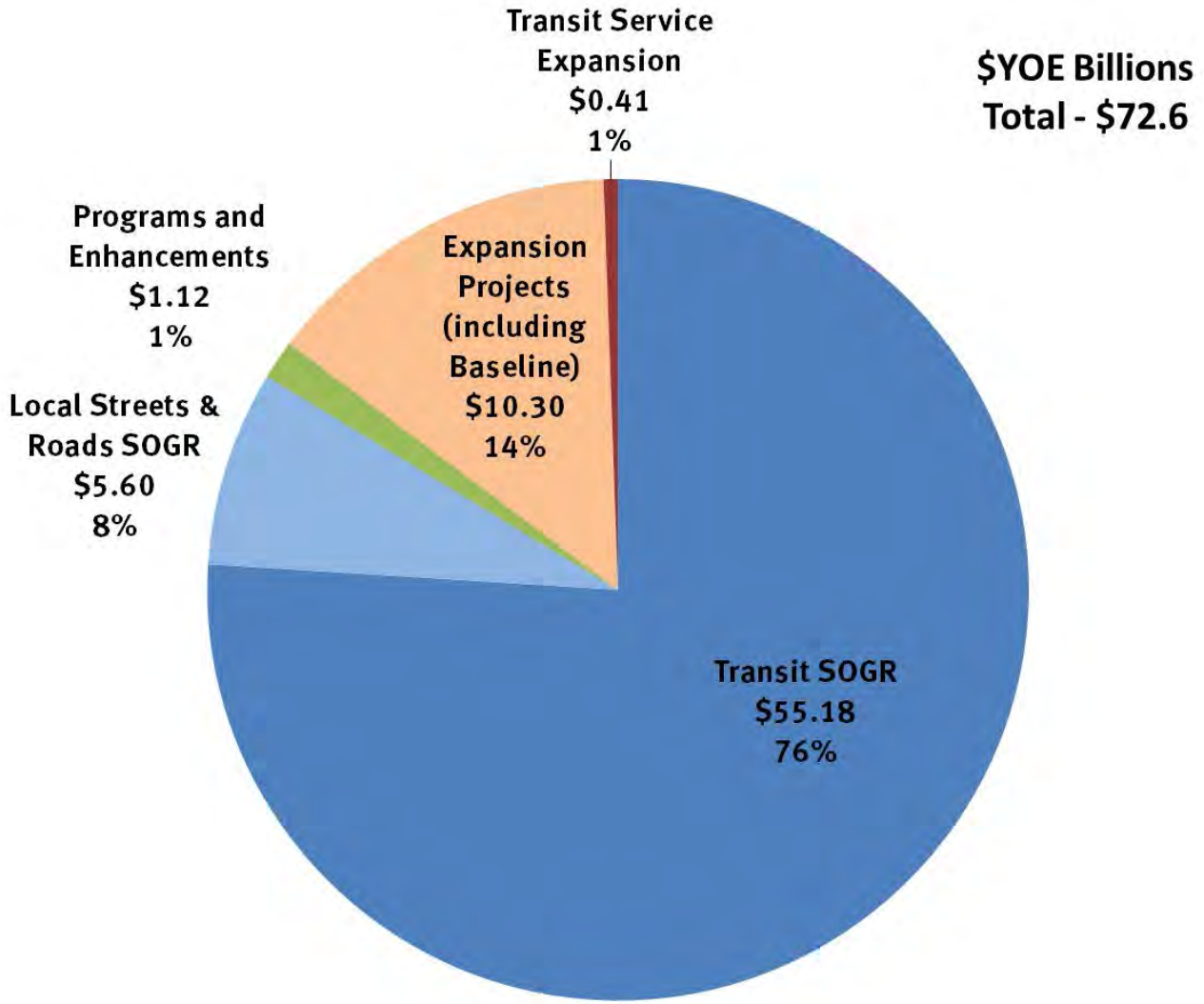

Draft SFTP Financially Constrained Investment Scenario

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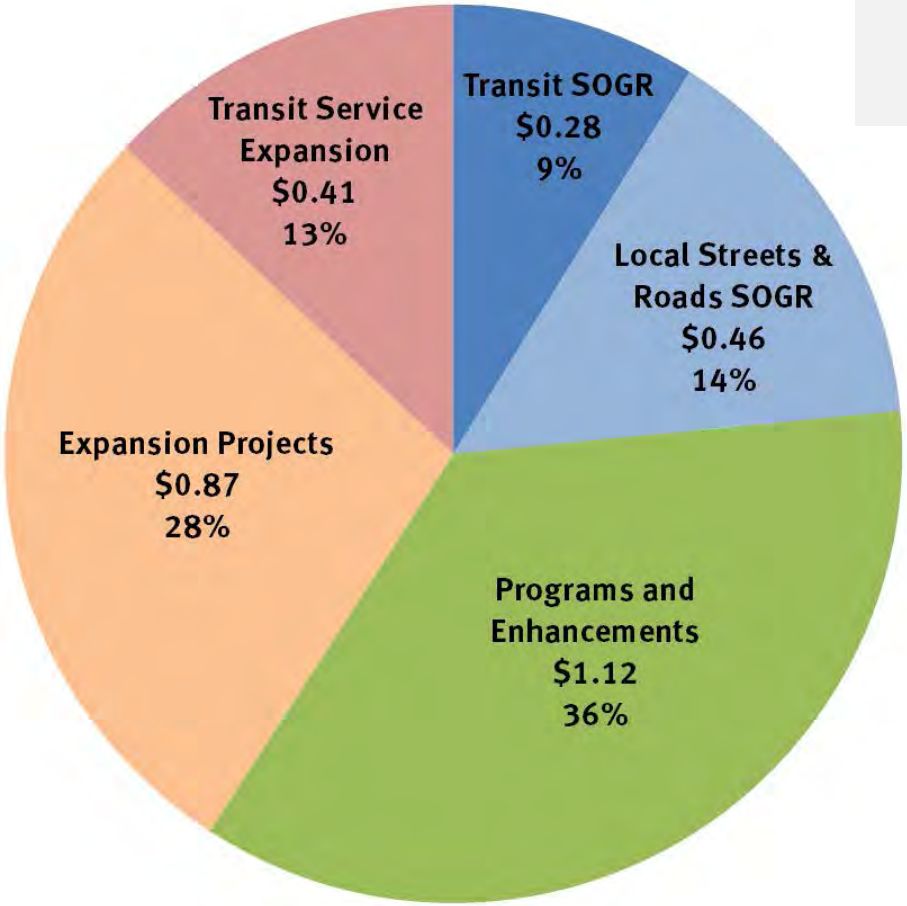
Discretionary Revenue Investment by Type, YOE Billions



Total discretionary revenue: $3.14Billion

Transit service expansion and SOGR

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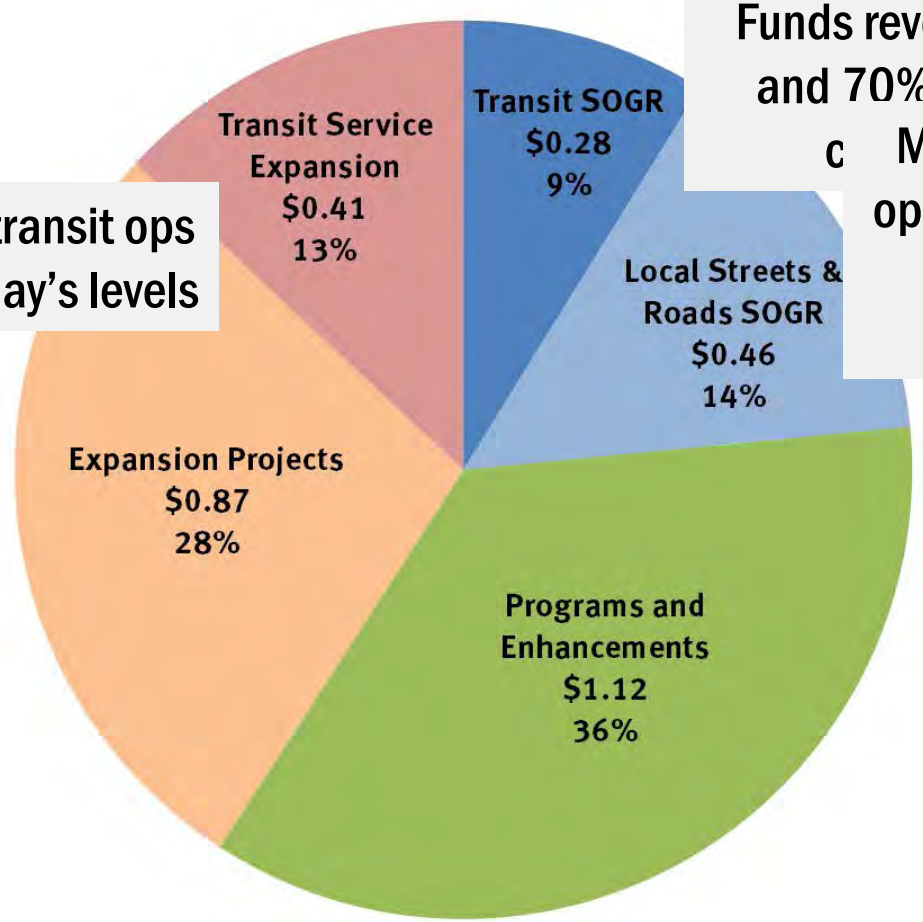
Discretionary Revenue Investment by Type, YOE Billions



Funds revenue vehicles and 70% of Score 16

c Maintains current road operations levels, but not today's pavement condition

1% increase in transit ops funding over today's levels

Programs and enhancements

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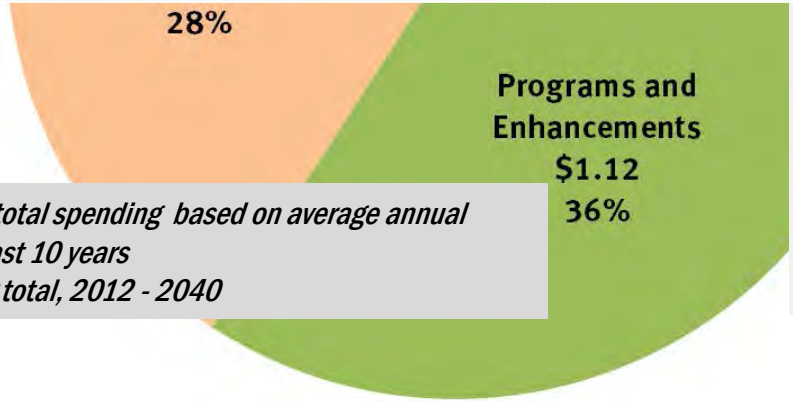
Discretionary Revenue Investment by Type, YOE Billions

Program	Historic funding level*	Proposed funding level**	% Increase over historic
Complete streets, signals and signs	$0.14	$0.20	43%
Walking and traffic calming	$0.19	$0.28	47%
Bicycling	$0.05	$0.15	200%
Demand management	$0.05	$0.06	20%



** Estimated 28 year total spending based on average annual funding levels from last 10 years*
*** Proposed 28 year total, 2012 - 2040*

Increased funding for local streets, walking and traffic calming, bicycling, and demand management

Draft SFTP Financially Constrained Investment Scenario

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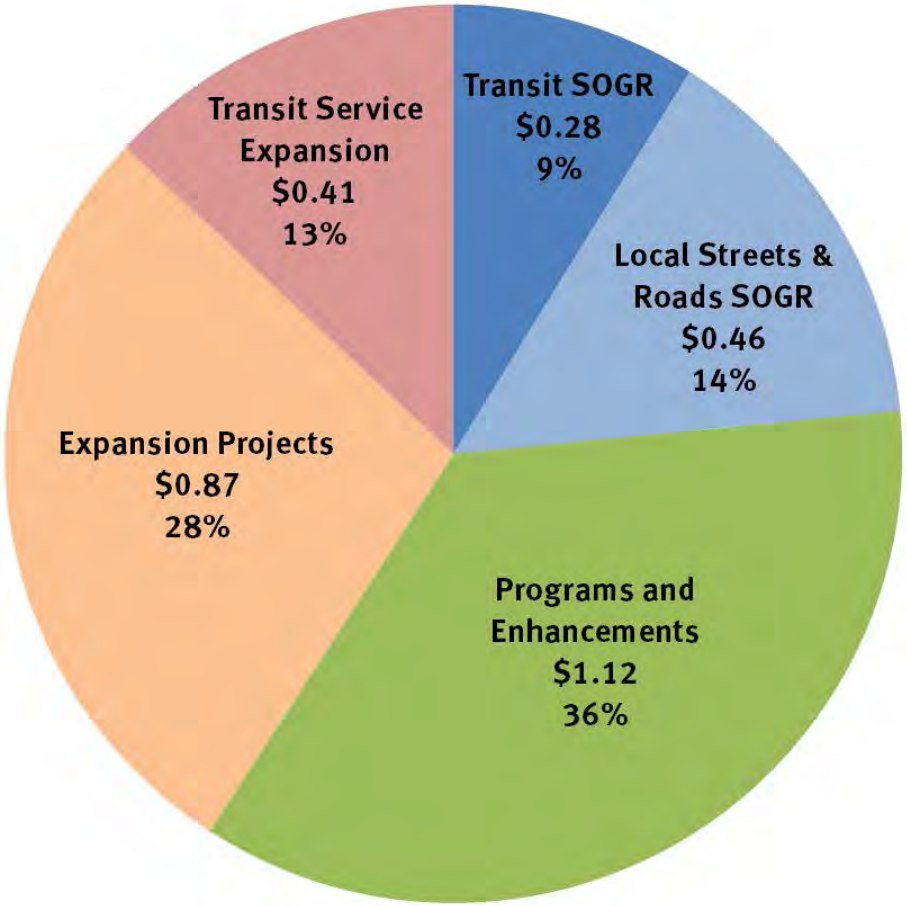
Discretionary Revenue Investment by Type, YOE Billions



Expansion projects inclusion criteria

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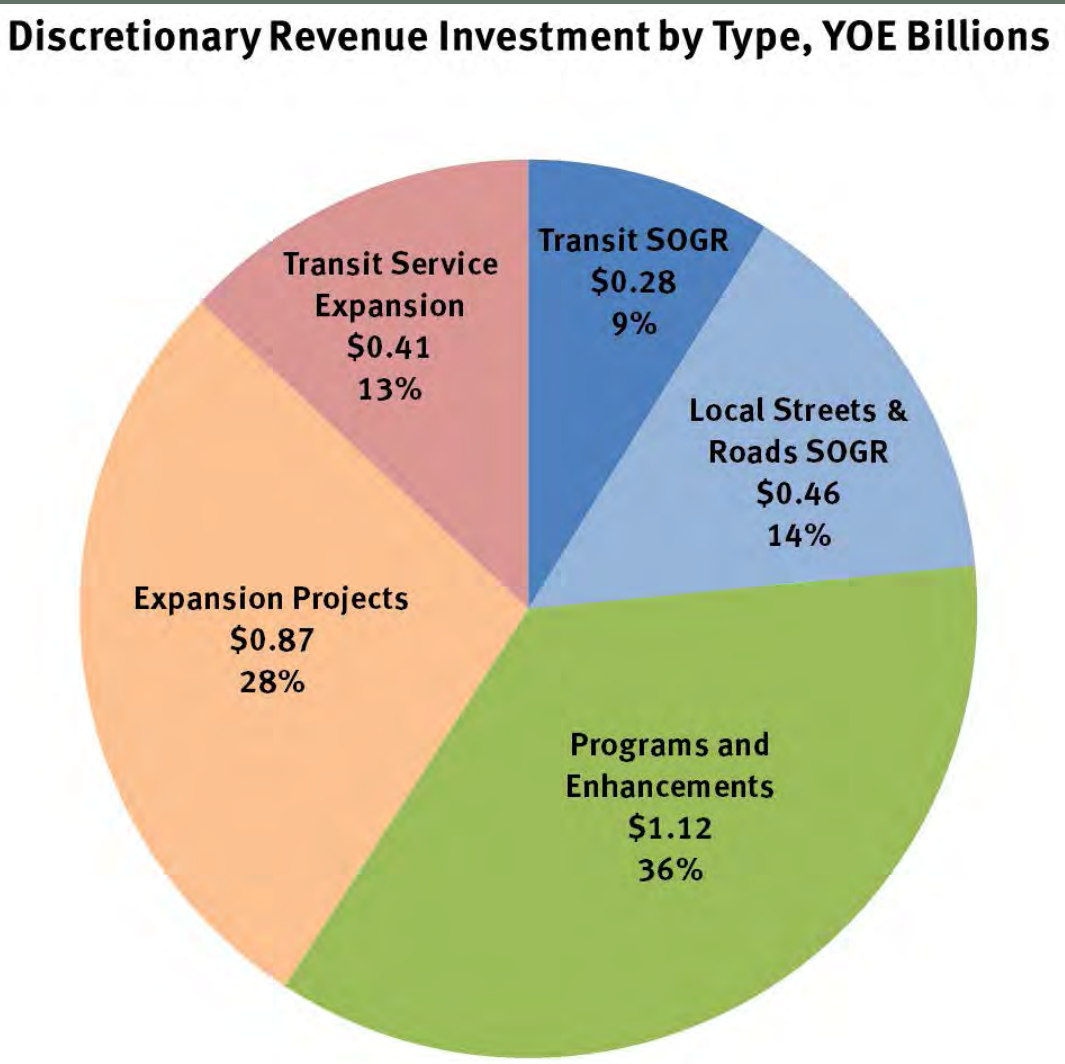
- All projects from "High" cost-effectiveness tier receive funding

- Additional projects from Middle-High Tier included based on:
  - Ability to address equity issues
  - Approval in Prop K Expenditure Plan or City Development Agreement
  - Support for Priority Development Area (PDA) growth

High Tier Projects
Better Market Street
Congestion Pricing
Caltrain Oakdale Station
E-line extension to Caltrain
Freeway Performance Initiative (FPI)
Potrero / Bayshore BRT
Transit Effectiveness Project
Transit Performance Initiative (TPI)
Middle-High Tier Projects
Bayshore intermodal station
Express buses - Hunter's & Candlestick Points
Geary Boulevard BRT
Geneva TPS / BRT
M-line west side alignment

Questions for feedback

- Level of investment by type – are we on the right track?
- How to prioritize within SOGR and Programs?
- How to incorporate equity findings into the investment strategy?



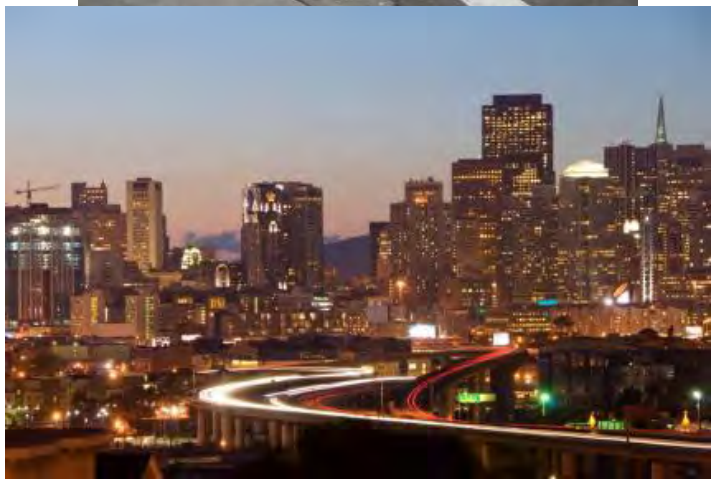
Strategic policy initiatives

❶ **Complete Streets:** Clarify policies, create a cost-effective complete streets approach

❷ **Next-generation TDM:** Broaden, deepen TDM efforts including new ways to leverage Employer/Community-initiated efforts

❸ **Local-to-regional connection:** Re-imagine freeway, transit interfaces with region

❹ **Project delivery / performance effectiveness:** Improve project and program delivery, leverage private investment



Developing the SFTP

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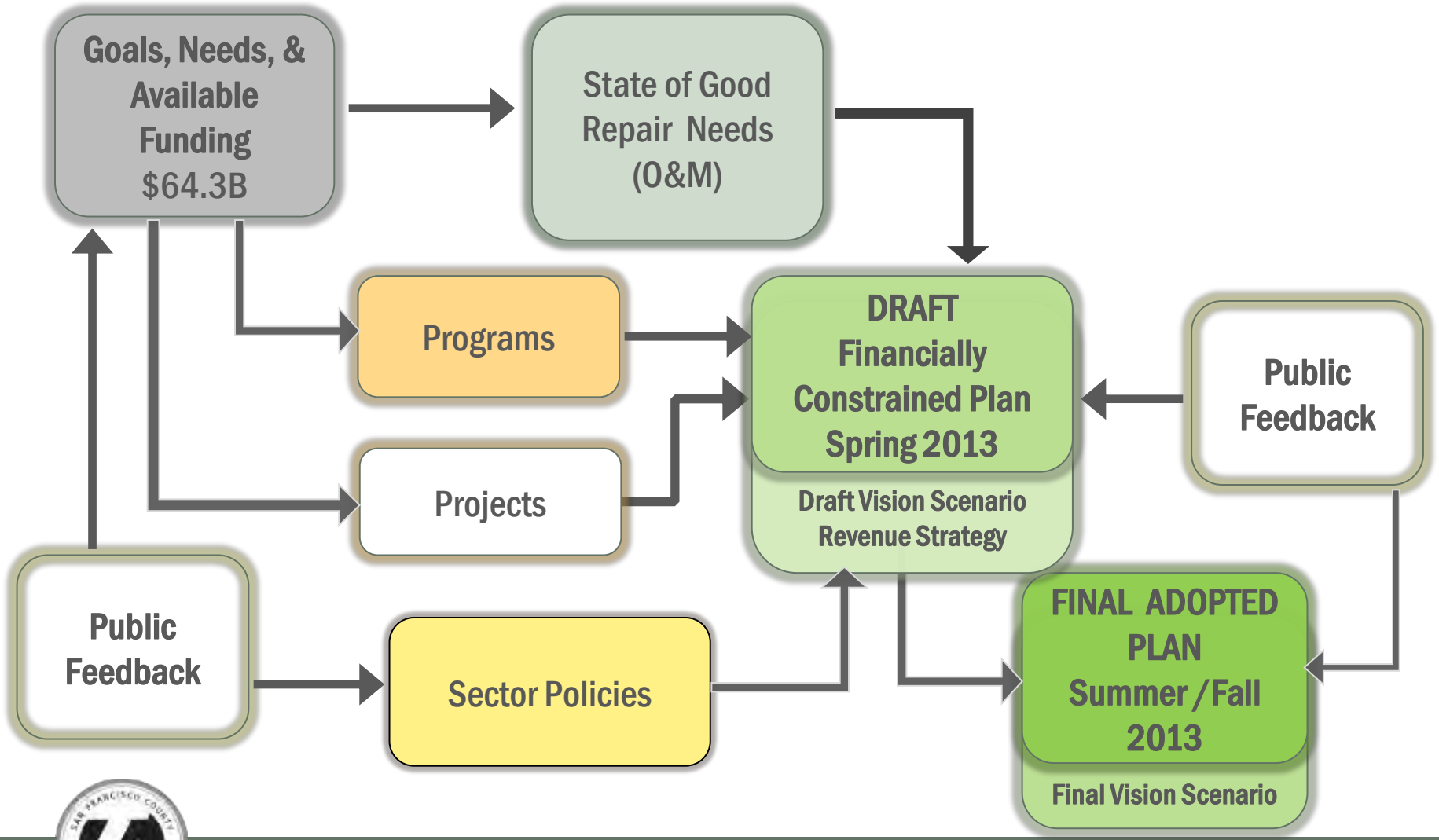

SFTP adoption timeline

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Fall 2012 and earlier	▸ Revenue Estimate ▸ Investment Needs/Shortfall Analysis ▸ Public Outreach, Budget Game ▸ 3 Sub-market analyses
Winter 2012/13	▸ Project Performance Assessment ▸ Core Network Circulation Study ▸ 4 Strategic Initiatives Development
Spring 2013	▸ Draft SFTP Preferred and Vision Scenarios ▸ 2 Equity initiatives analysis ▸ New Revenue Strategy / legislative advocacy platform ▸ Authority Board Workshop on SFTP, May 30th
Summer 2013	▸ Public Outreach ▸ Revised SFTP Preferred and Vision Scenarios ▸ Final SFTP + Plan Adoption in September/Oct, 2013

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Thank you!

For meeting schedule through July, see:

www.movesmartsf.org

www.sfcta.org/MoveSmartSF
SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY