Plan for Bicycle Carriage on Caltrain

A Necessity for Caltrain's Bicycle Master Plan

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Executive Summary

A plan for bicycle carriage on trains is an indispensable part of Caltrain's Bicycle Master Plan, because 80% of bicycling passengers bring their bicycles onboard the train instead of parking them at the station. Bicycle passengers were Caltrain's fastest growing customer segment, until limited bike capacity nearly halted growth in 2006.

Financial modeling reveals that Caltrain and associated transit agencies would gain about $390 per day by adding a new bike car with 32 bike spaces instead of a new non-bike car, because bicyclists place the least demand on transit overall. Non-biking passengers generally require parking lots or garages, buses, and/or shuttles, burdening roads and transit systems.

The share of Caltrain passengers boarding with bicycles is currently 7%, but predictions show that if sufficient bike space were available today, latent demand would boost bicycle passengers to 10%, and 13% bike space would be needed to ensure no bumping. Bike capacity in 2015 when trains electrify should be about 20% to meet expected demand.

Bicycle carriage on trains is a major step toward the three-county transportation authorities' mandate to reduce the number of automobile trips. Far from being a "special interest" service for Caltrain, bicycle bring-along by Caltrain passengers serves the system's and region's goals more perfectly than almost any other trip type and should be supported and enhanced by Caltrain with energy and focus.

Revision History

Version	Description of Change
080807	Original draft document.
080811	• Added Section 6.4, *Seat Removal to Make Space for Bikes*, incorporating information presented at the August 7, 2008 Joint Powers Board meeting. • In response to cyclist's input, changed the example in Section 2.3.1 to Belmont exit station, instead of Hayward Park.
080819	• Added SFBC logo to cover page. • In response to cyclist's input, expanded the discussion in Section 6.1, *Dwell Time*.
080824	• Added a footnote on page 6 stating that Caltrain renamed its *Draft Bicycle Master Plan* to *Draft Bicycle Access and Parking Plan*. • In response to cyclist's input, added carbon cost to the caption for Table 5 in Section 5.3, *Reduction in Greenhouse Gas Emissions*. • In response to cyclist's query, added more information to reference number [3] in Section 9, *References*.
080929	• In response to cyclist's input, added Section 4.4, *Theoretical Maximum Onboard Bicycle Capacity.* Renumbered subsequent sections in Section 4, and renumbered subsequent tables in the document. • Added Section 5.2, *Subsidy Per Passenger*. Renumbered subsequent sections in Section 5. • In Section 5.3, *Addition of a New Bike Car vs. Non-bike Car*, updated Table 6 for financial outcomes, because Caltrain data reported in its *Key Findings* differed from data reported in its *Draft Bicycle Access and Parking Plan*. Also, took into account that the data reported are for all passengers, not just non-bike passengers. Updated Appendices A through D accordingly. • Added Section 5.4, *Historical Payback Period of Adding Bike Capacity*. • In Section 6.4, *Seat Removal to Make Space for Bikes*, revised the proposal for seat removal in Table 8 in accordance with Caltrain staff's report that there will be five Bombardier train sets and 15 gallery train sets running by the end of October. Added a paragraph after Table 8 with additional explanation supporting conversion of Bombardier cab cars 117 and 118 to bike cars.
081106	• In Section 6.1, *Dwell Time*, added a paragraph explaining that Caltrain's final Bicycle Access and Parking Plan omits the allegation that bicycles cause 250 hours of dwell time delay per year. • In Section 6.3, *Train Capacity*, added a reference to Appendix E. • Added Appendix E, *Representative Photos of Bicycle and Walk-on Passenger Load*.
081210	• Various minor clarifications made throughout. • In Section 4.3, clarified the explanation of Figure 5. • Added Section 6.5, *Seating Capacity and Peak Load*.
081229	• Added Section 1.3, *Public Support for Increased Onboard Bike Capacity*, including two new Figures. Renumbered Figures in subsequent sections. Added Appendices G and H. • In Section 4.3, added a sentence under Table 1 describing the number of bike spaces needed in 2009. Changed a row in Table 1 to correspond to 2015 instead of 2014, and corrected an error in bike capacity for year 2025. • Removed *Draft* from the title, because the plan is now complete.

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1 Introduction

1.1 Mission and Goals for Caltrain's Bicycle Master Plan

The mission statement for Caltrain's Bicycle Master Plan is [1]:
Make Caltrain a convenient and user-friendly transit service for bicyclists.

The goals for Caltrain's Bicycle Master Plan are [1]:

A. Promote bicycling as means of **access** to Caltrain stations.
B. Encourage the **parking** of bicycles at stations, rather than bringing bicycles on board
C. Improve **safety and security** for bicyclist-passengers
D. Communicate **information** to bicyclist-passengers

The Plan's goals do not include[1]:

- Increasing capacity for carrying bikes on board trains.

1.2 Purpose of this Plan

While the goals of Caltrain's Bicycle Master Plan are commendable, the Plan ignores the crisis faced today of insufficient bike space on trains, and does not address the need for increased bike capacity in the future. This Plan for Bicycle Carriage on Caltrain fills the conspicuous gap in Caltrain's Bicycle Master Plan. If the mission statement for the Bicycle Master Plan is to be achieved, bicycle carriage on trains must become an indispensable part of the Plan[a].

1.3 Public Support for Increased Onboard Bike Capacity

The comments that Caltrain collected on both its Draft Bicycle Master Plan Key Findings and its Draft Bicycle Access and Parking Plan (BAPP) demonstrate that the public strongly supports improvements to Caltrain's onboard bicycle service, particularly an increase in onboard bike capacity [30]. The preponderance of public comment toward more bike capacity is particularly remarkable, because neither the Key Findings nor the BAPP address the issue of increasing onboard bike capacity, showing that Caltrain's bicycle plan does not fulfill customer needs or expectations.

Caltrain compiled over 750 public comments (385 on the Key Findings and 372 on the BAPP), and created ten different categories for grouping the comments. We have produced pie charts in Figures 1 and 2, both of which illustrate that the public favors more bikes onboard trains instead of more bike parking. Public sentiment regarding Caltrain's bicycle plan did not change between the Key Findings (37-slide presentation, dated June 2008) and the Draft BAPP (153-page document, dated August 11, 2008), as public comments are consistent toward supporting more bike capacity onboard trains.

[a] In response to cyclists' strong criticism that Caltrain's *Draft Bicycle Master Plan* ignored bikes on board in favor of bike parking at stations, Caltrain staff renamed their plan the *Draft Bicycle Access and Parking Plan* on August 11, 2008.

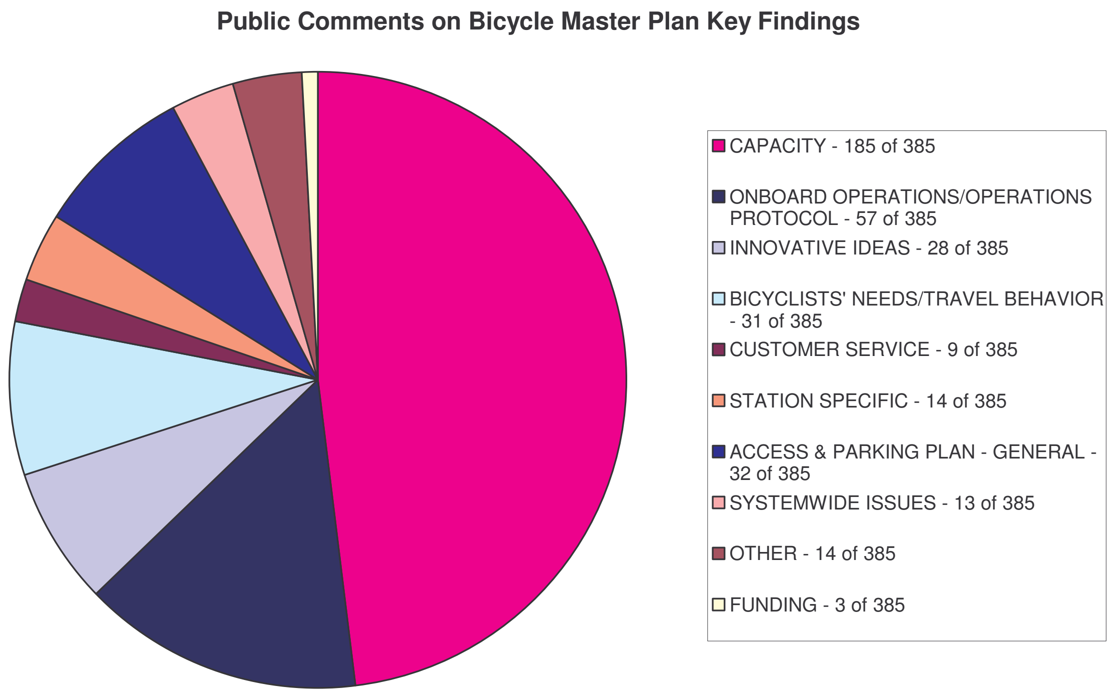

Figure 1: Caltrain's Draft Bicycle Master Plan Key Findings public comments divided into ten categories. The public favors increasing onboard bike capacity over anything else. The public comment period was June 10 through July 3, 2008. For detailed comments, see Appendix G.

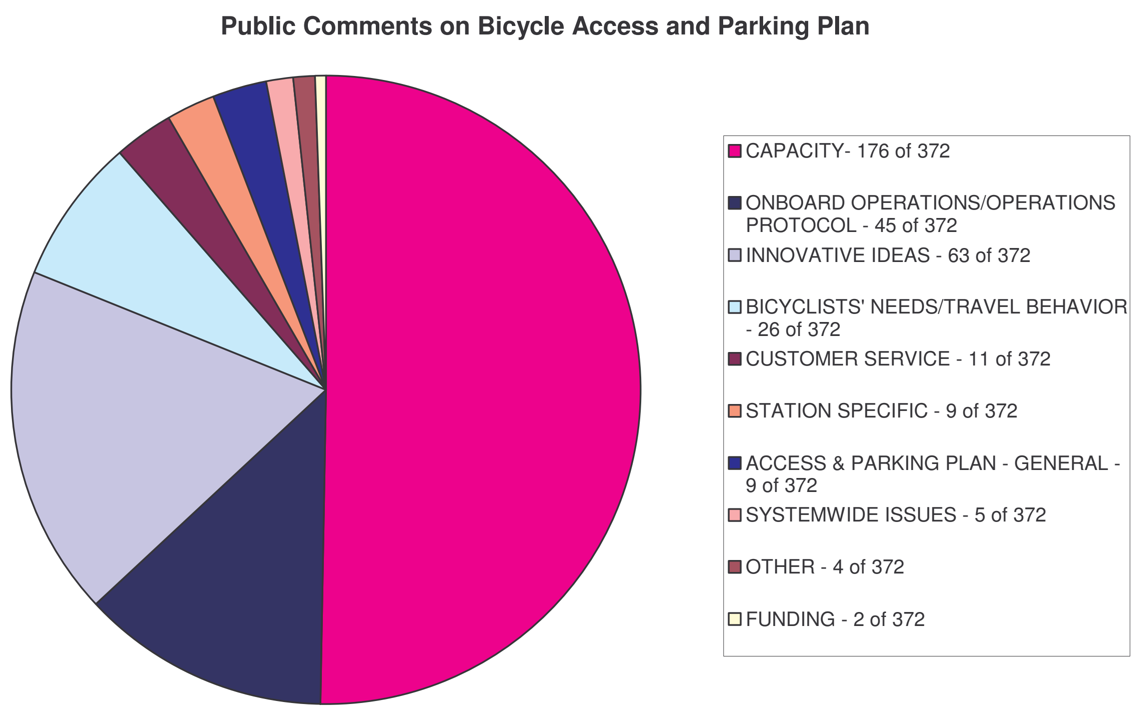

Figure 2: Caltrain's Draft Bicycle Access and Parking Plan (formerly Draft Bicycle Master Plan) public comments divided into ten categories. The public favors increasing onboard bike capacity over anything else. The public comment period was August 11 through September 9, 2008. For detailed comments, see Appendix H.

Additional public support for increasing onboard bicycle capacity was shown by over 2600 signatures on a petition that the BIKES ONboard project presented to the Joint Powers Board (Caltrain board) before it adopted the Bicycle Access and Parking Plan on October 2, 2008. The petition reads as follows:

Increase Bicycle Capacity on Caltrain *NOW*
We, the undersigned, recommend adoption of Caltrain's *Draft Bicycle Access and Parking Plan* by the Peninsula Corridor Joint Powers Board, but only on condition that no public funds, grants, or other monies are sought or allocated for implementation before and until bicycle capacity onboard Caltrain has been increased to meet current demand.

2 Bikes and Trains for Intermodal Transportation

2.1 Overview

Trains provide an essential transit service, but that service is rarely door-to-door. Commuters must find a way to get to the train station from their starting points, and to their destinations after exiting the train. Public transportation, even when available, does not provide 100% coverage. Proximity to transit is an important consideration. In the Bay Area, people who live within a half-mile radius of a transit station are three times more likely to use transit compared with those who live further away [2]. The average person can walk a half mile in about 10 minutes. In that same time, the average bicyclist can cover about two miles. Bicycling enables a 16-fold increase in the number of people within easy reach of a train station. The combination of bicycle and train represents a practical and environmentally friendly intermodal transportation solution.

2.2 Profile of the Bicycle Commuter

The bicyclist using Caltrain during commute hours is likely a professional, who has chosen to ride his or her bike as an alternative to driving for a variety of reasons including time savings, cost savings, and environmental concerns. These are not recreational riders; the bicycle commuter relies on Caltrain to get to work on time for important meetings and appointments. The bicycle commuter’s personal time is also valuable, and s/he depends on Caltrain for transport from work to evening engagements or to spend time with family. Delays caused by denied access cut into worker productivity and quality of life.

While the typical bicycle commuter using Caltrain may be a professional, Caltrain also serves low income workers. Low income workers ride bicycles, because a bicycle is significantly cheaper than local mass transit to get to the Caltrain station. These bicycle commuters rely on the train for transportation to and from work, and they may have few other commute options due to their financial situation.

2.3 Bikes Onboard

2.3.1 Reasons Cyclists Bring Their Bikes Onboard

Bike carriage on trains is a critical element for a complete transportation solution. Many cyclists need their bicycles at both ends of their commutes, because their starting points and final destinations are not near the train station. Bicycle commuters need their bicycles to complete their intermodal trips, because public transportation is either nonexistent, or riding a bicycle is faster and/or more reliable than the available public transportation.

The top four reasons cyclists cited for bringing their bike on board include [3]:

Having my bike with me gives me flexibility	58%
I need to have my bike with me	37%
I bike the other way for exercise	32%
Transit/shuttle connections don't work for me	31%

Only 18% of bicycle commuters cited unsatisfactory bike parking options as a reason for bringing their bikes onboard the train [3]. This indicates that more than 80% of bicyclists would still bring their bikes on board the train, even if satisfactory bicycle parking options were available. Therefore, providing secure bike parking at every station will not eliminate the need for bike carriage on board.

About 40% of cyclists vary their normal commute by sometimes starting or ending at a different station [3], a commute pattern that would be impossible if they had a bicycle parked at each end of their normal commute. The flexibility of having a bicycle with them allows irregular trip chaining, such as running an off-line errand on the way home or attending an engagement after work located by a different station than the normal destination station.

Today's train schedule results in some stations with infrequent service, but a bicycle enables a cyclist to use various stations. For example, train service to Belmont is once per hour. A cyclist traveling from San Francisco 4th & King to Belmont could exit at Belmont, but also at Hillsdale, San Carlos, or Redwood City and easily ride to Belmont. By adding the other exit stations for a morning commute, the cyclist can board any of ten trains between 7am and 9am instead of only two trains. Such flexibility would be impossible without being able to bring one's bike on board the train. It is particularly important to be able to bring bikes on board trains for destinations on the Peninsula, where public transport options can be limited and infrequent.

Over 60% of bicycle commuters ride their bikes to and from Caltrain to be environmentally friendly [3]. The ability to bring one's bike on board the train permits a bike commuter to complete their daily travel requirements without using an automobile at all.

There are some bicycle commuters, though a distinct minority, who need their bicycle at only one end of their commute. A limited number of others have the willingness, commute pattern, and financial means to own two bicycles, one stored at each end of their commute. For these cyclists, options such as bike lockers, bike cages, and attended bike parking facilities meet their needs. Caltrain's Bicycle Master Plan addresses this minority of cyclists, while this Plan for Bicycle Carriage on Caltrain addresses the vast majority of cyclists.

2.3.2 Folding Bikes

Caltrain does not limit the number of folding bicycles on board trains, but folding bicycles have several disadvantages for the bicycle commuter. Folding bicycles have a small wheel diameter, and are generally not as well suited for longer trips or fast riding. The small wheel diameter makes a folding bike less stable when going over railroad tracks and rough pavement. Drain grates present an extreme hazard, because the small wheel can drop in deeper than a full-size wheel. Folding bicycles are not suitable for heavy riders, because the frames are not as sturdy as a full-size bicycle.

Most cyclists own a regular bicycle for commuting, so Caltrain's repeated directive to "buy a folding bike" means that a cyclist would have to buy a second bicycle, just for commuting on Caltrain. A folding bike costs 20 to 30% more than a non-folding bike of comparable quality, and prices for folding bikes currently range from about $400 to over $3000. Marginalizing one group of commuters by telling them to purchase expensive, specialized equipment goes against the premise of public transportation accessible by all.

Finally, folding bikes are a solution to the bike capacity problem onboard trains if only a small minority of passengers use them. If folding bicycles were widely used, space set aside specifically for folding bicycles would be required, just as extra space is required to transport luggage, strollers, and other items.

2.4 The Effect of Bumping Bicyclists

In the one-year period ending June 2007, 64% of bicyclists reported having been bumped, most of them repeatedly [3]. Routine bumping discourages bicycle commuters from using Caltrain at all, because 80% of bicycle commuters rarely if ever take Caltrain without bringing their bicycle on board [3]. They find other ways besides the train to get to their destination, and the majority of them drive alone [3]. Routine bumping causes frustration, missed appointments, unreliable service, and wasted time standing on the platform, all of which compel the cyclist to find other commute options, resulting in lost revenue for Caltrain.

There is another group of bicycle commuters, the immigrant and/or low paid cyclists who cannot afford to be bumped because they are fired from their jobs if late for work. These cyclists may not use the train in the first place, not because they cannot afford the fare, but because they cannot afford to be fired.

3 Bike Commuters Are on the Rise

3.1 Municipal Transportation Agency Bicycle Count in San Francisco

The San Francisco Municipal Transportation Agency conducted bicycle counts in San Francisco in 2006 and 2007, with the intention of conducting annual counts to monitor cycling trends in San Francisco. The 2007 counts showed a 15% overall increase in the number of cyclists compared to the 2006 counts [4]. This increase is especially significant when viewed in light of the injunction against the City's Bicycle Plan. This injunction has stopped the City from installing any new bicycle facilities since June 2006. Despite a lack of improvements or additions to the City's bicycle route network, cycling use in San Francisco showed an increase.

3.2 Bicycle Traffic on Bike to Work Day in San Francisco

Bicycle counts are conducted each year on Bike to Work Day at the intersection of Market Street and Van Ness Street in San Francisco. While Bike to Work Day is a highly publicized event and draws more bicyclists than an average day, the trends in mode shift are telling and demonstrate a tendency for commuters to leave their cars at home in favor of commuting by bicycle. Figure 3 shows mode shift from automobiles to bicycles over a four year period [5].

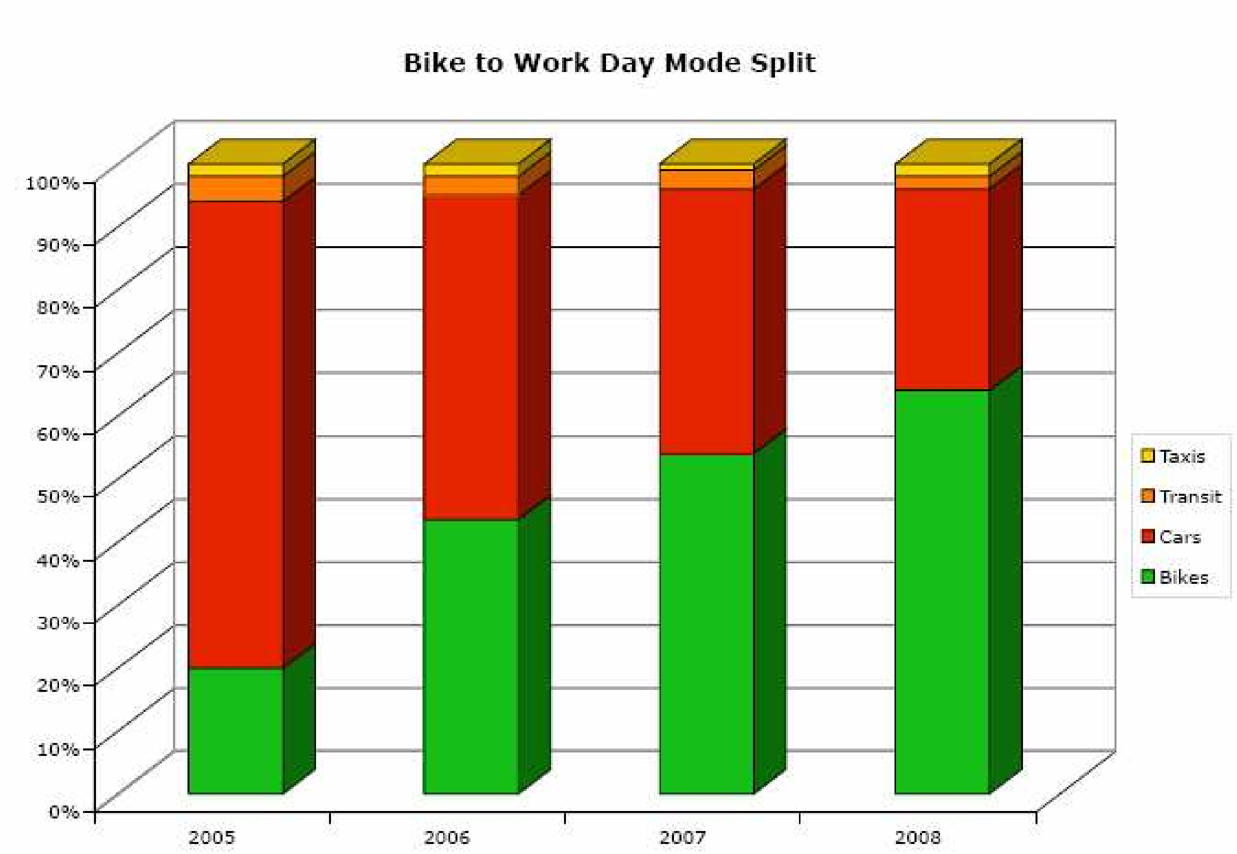

Figure 3: Vehicle and bicycle counts between 8am and 9am on Bike to Work Day at the intersection of Market Street and Van Ness Street in San Francisco.

3.3 San Francisco Bicycle Coalition Membership Trend

The San Francisco Bicycle Coalition (SFBC) has been steadily gaining membership. Figure 4 shows that the trend has been consistent, as more people choose to join the SFBC to support and participate in the bicycle advocacy of the organization [6].

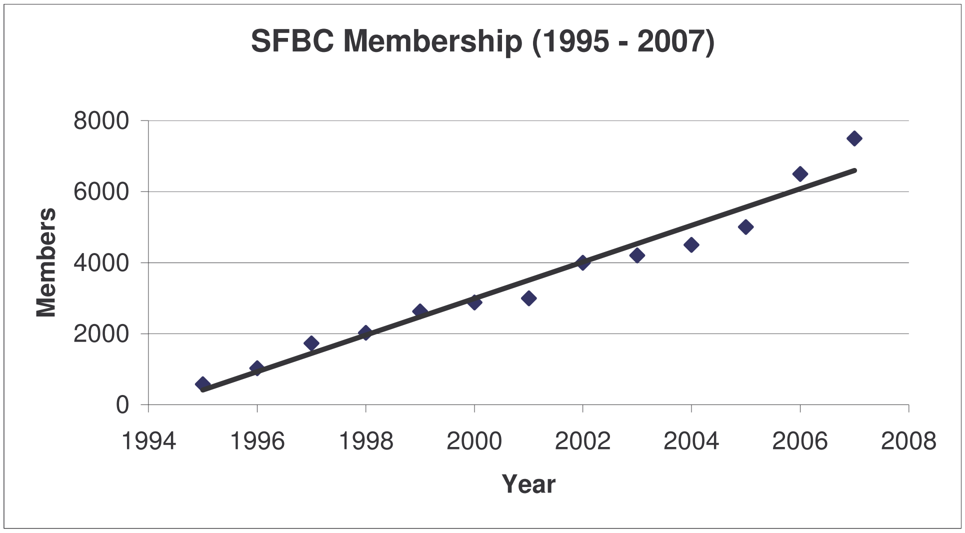

Figure 4: Historical trend in SFBC membership.

Membership in the Silicon Valley Bicycle Coalition (SVBC) has also increased dramatically. In October 2006, the SVBC had 427 members. By March, 2008, the membership had risen to 596, an annualized increase of 28% [7].

The spectacular increase in membership for local bicycle coalitions demonstrates that bicycling is rapidly gaining popularity among the general public.

3.4 Factors Affecting Future Increases

Other factors may cause even greater than expected increases in bike commuters in future years including:

- Rapidly increasing price of gas.
- Escalating public concern about global warming.
- Bicycle facilities such as bike paths, bike lanes, and specialized signal heads.
- Changing political climate about the positive benefits of bicycling for urban areas.
- Electrification is expected to increase demand for bicycles on Caltrain [8].

4 Bikes on Caltrain

4.1 History of Caltrain's Onboard Bicycle Program

Work to develop the onboard bicycle program predates the formation of Caltrain/Peninsula Corridor Joint Powers Board. Bicycle advocates worked with Southern Pacific Railroad for several years before winning a 4-month demonstration project in 1982 that permitted four bikes to be held in the aisle of the cab car. Despite the popularity of the service, Southern Pacific refused to continue the project.

It was not until Caltrain was established in 1992 that provision of the service was resumed; advocates were successful in identifying and allocating funding that allowed Caltrain to remove cab car seats and provide bike racks, resulting in 8 bike spaces per train. By 1996, 24 bikes were accommodated per train and by 2002, the current maximum of 32 had been reached (baby bullet trains accommodate 16 bikes in a single Bombardier car, but sometimes one or even two 32-bike galley cars are provided on a baby bullet train, resulting in irregular, unpredictable capacity, from 16 to 64 bikes).

With the success of the onboard bicycle program come challenges. As more cyclists use Caltrain, the system strains to keep up with demand, and paying passengers are left standing on the platform with their bicycles, even when there are plenty of empty seats.

4.2 Bike Boardings on Caltrain from 2004 to 2008

Caltrain made changes to its service by adding baby bullet trains in June 2004 [9] and adjusting its schedule to eliminate pure local trains from the peak in August 2005 [10]. Both these changes are reported to have increased ridership [10]. Bicycle boardings also increased at a rapid rate, until routine bumping began in 2006. Bumping causes bicyclists to find other commute options, and bicycle boardings suddenly leveled off starting in 2006, as shown in Figure 5.

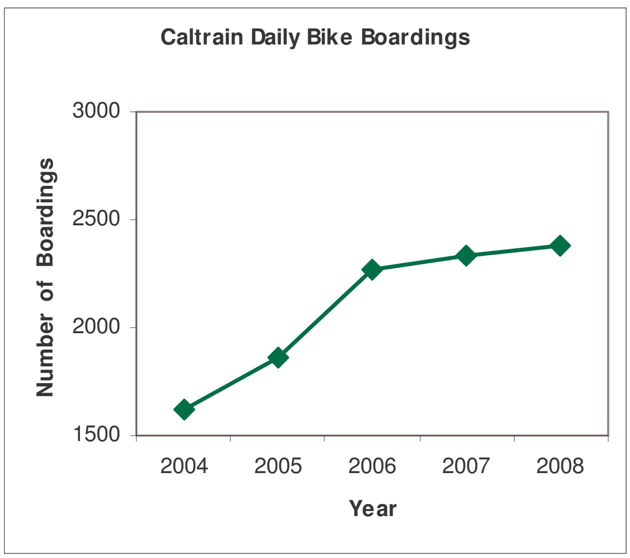

Figure 5: Weekday bike boardings as a function of year. [9,10,11,12,13]

From 2003 to 2006, walk-on passengers increased 16%, whereas bicycle passengers increased 41%. From 2006 to 2008, walk-on passengers increased another 16%, but bicycle passengers increased only 5%, presumably due to limited space for bicycles on trains [9,10,11,12,13,14]

4.3 Projected Bike Boardings on Caltrain to 2025

Prediction of future bike boardings necessarily requires use of a model for extrapolation into future years. Past bicycle boardings cannot be used for extrapolation, because limited capacity has restricted the number of bicyclists riding Caltrain. There is unmet demand for bicycle space on Caltrain today. The question is, exactly when did insufficient space start to hinder ridership? Because Caltrain increased bicycle spaces from 24 to 32 in 2002, bike boardings in years immediately following the increased capacity may be representative of actual demand. For the subsequent years, we use SFBC membership as an indicator of bicycle usage. Figure 6 shows remarkable correlation between SFBC membership and Caltrain bike boardings from 2003 through 2005. Bike boardings began leveling off in 2006, while SFBC membership continued to climb, suggesting that limitations in bike capacity began hindering ridership around 2006.

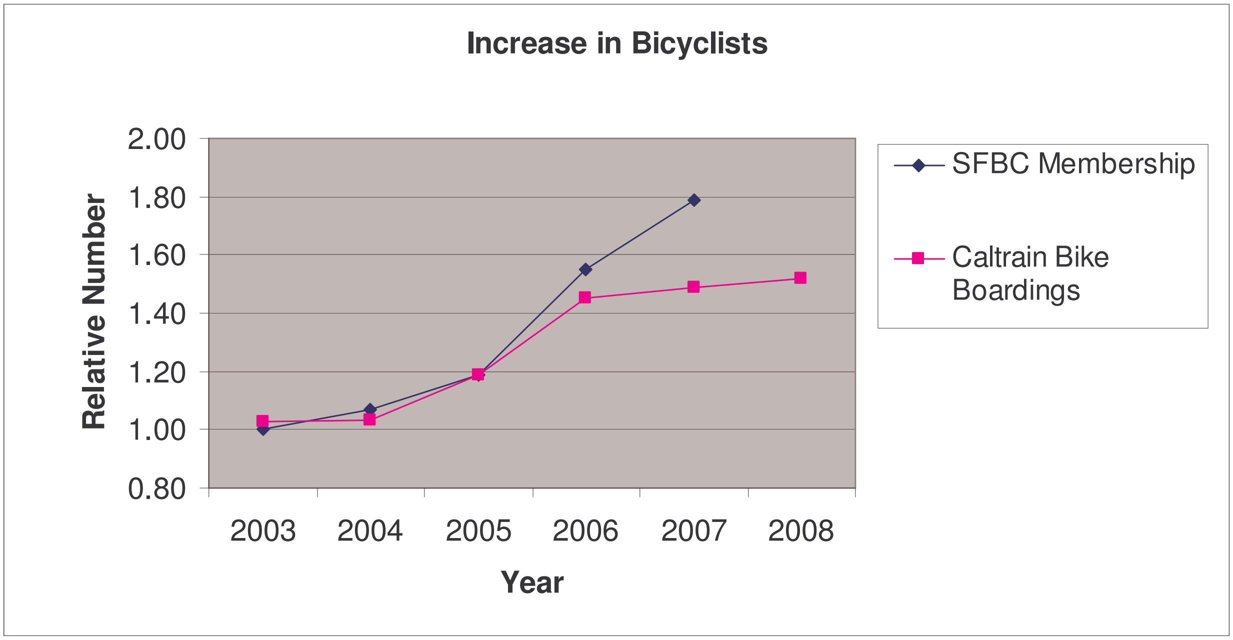

Figure 6: Correlation between SFBC membership and Caltrain bike boardings is strong, until bike capacity limitations on trains cause bike boardings to level off.

As further evidence of SFBC membership being a good predictor of bicycle usage, SFBC membership increased from 2006 to 2007 by 15%, the exact same rate as cycling increased in San Francisco [4].

To coincide with Caltrain's addition of baby bullet trains in 2004 [11], we consider a linear model based on SFBC membership from 2004 to 2007 as shown in Figure 7. We anticipate a linear model for bicycle boardings is an acceptable approximation of true demand in the future.

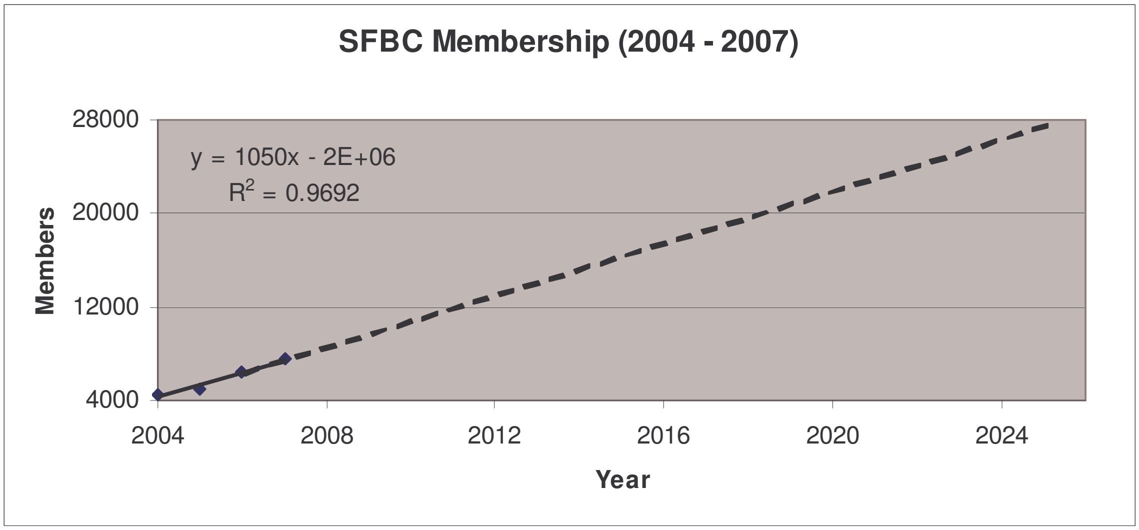

Figure 7: SFBC membership and extrapolation (dashed line) into the future.

Because 2006 is the year routine bumping began, we use 2006 as the baseline year. Caltrain has not increased bike capacity on trains since 2002, so we assume today's bike capacity of 7% averaged across all runs[b] is comparable to that in 2006. The percentage bike capacity is the number of bike spaces divided by the number of seats. Table 1 shows the projections for bike capacity required on Caltrain to the year 2025 to satisfy predicted bicycle demand.

Year	Minimum Average % Bike Capacity Required on Caltrain	Optimum Average % Bike Capacity Required on Caltrain
2006	7%	n/a
2009	10%	13%
2015	17%	21%
2020	23%	28%
2025	28%	35%

Table 1: Predicted future bike capacity requirements on Caltrain. Minimum assumes 100% load factor, and optimum assumes 80% load factor.

For Caltrain's current schedule of 98 five-car trains per day, 10% to 13% bike capacity corresponds to 65 to 85 bike spaces per train needed in 2009.

Caltrain staff continually state that there will be more bike capacity in the future, because there will be more trains running in future years. This is a misleading argument, because increased

[b] Taking March 21, 2008 as a typical day, there were 98 train runs comprised of 82 gallery car runs (33 with two bike cars; 29 four-car consists and 53 five-car consists) and 16 Bombardier car runs (12 with two bike cars; all 16 were five-car consists). Total bike space was 4128, and estimated number of seats per car was 130 [13] for a total of 59,930 seats, resulting in an average of 7% bike space per run.

frequency is in response to increased demand. As overall passenger demand increases, bike capacity demand is expected to increase proportionately. Therefore, percentage bike capacity is an objective way to represent future needs, independent of an increase in train frequency.

4.4 Theoretical Maximum Onboard Bicycle Capacity

The model presented in section 4.3 is an extrapolation based on past data, and the further into the future an extrapolation is carried, the less reliable it is. For example, continuing the extrapolation would eventually lead to 100% bicycle capacity, which is not reasonable. We show here an estimate of theoretical maximum bicycle capacity, based on distance traveled to the station. Several simplifying assumptions are made to calculate theoretical maximum bicycle capacity:

1. The population density is constant within a radius around a Caltrain station.
2. There are no natural barriers affecting population density or commute mode. In other words, we ignore the presence of the San Francisco Bay and coastal mountains.
3. All passengers within one-half mile of the station walk to the station.
4. All passengers between one-half mile and three miles of the station bike to the station.
5. All passengers between three and six miles of the station take motorized transport to the station.
6. People who live within one-half mile of the station are three times more likely to use Caltrain than those who live beyond three miles of the station [2].
7. People who live between one-half mile and three miles of the station are two times more likely to use Caltrain than those who live beyond three miles of the station.

Results of the analysis are shown in Table 2, where we see that the theoretical maximum bicycle capacity is nearly 40%. This estimate is intended to provide planners with a target goal for the future, and should be updated as accurate data become available to refine the assumptions in the calculation.

Travel Mode to the Station	Distance (mi)	Area (mi^2)	Unique Area (mi^2)	Factor	Adjusted area (mi^2)	% Train Capacity Required
walking	0.5	0.79	0.79	3	2.36	1.7%
biking	3	28.27	27.49	2	54.98	38.7%
motorized	6	113.10	84.82	1	84.82	59.7%

Table 2: Theoretical distribution of train capacity required to accommodate three different travel modes for reaching the station under the assumptions listed above. The table shows that maximum bicycle capacity is expected to be about 40% in the future.

4.5 Differences between Bicycle and Walk-on Boardings

4.5.1 Commute Patterns

Bicycle commuters have a more even daily commute pattern compared with walk-on passengers. More walk-on passengers take the northbound train in the morning, whereas morning bicycle boardings are about equally split between northbound and southbound trains, as shown in Table 3.

	All Boardings	Bicycle Boardings
Traditional peak	60%	49%
Reverse peak	40%	51%

Table 3: AM boardings for traditional peak (northbound morning and southbound evening) and reverse peak (southbound morning and northbound evening) [13,15]

Train service strives to accommodate peak load, so if peak load occurs in one travel direction, trains running in the other direction are underutilized. The more even commute pattern of bicyclists enables better utilization of train service.

4.5.2 Seasonal Variation

There is seasonal variation in Caltrain boardings, with bike boardings more strongly affected. Bike boardings in October were over 42% higher than in February [11]. In contrast, total passenger boardings in October increased only 11% compared with February [11]. Caltrain's annual passenger counts are conducted in February, a decreased riding time for bicycles due to the weather. As shown in Figure 4, bicycle boardings in February have been negatively impacted by limited capacity starting in 2006. If the annual passenger counts had been conducted in the warmer months instead of February, then bike capacity limitation would have shown a negative impact starting around 2004[c].

4.6 Bicycle Boarding Peak Demand

The system should be designed to meet peak demand, which occurs during morning and evening commute hours. Because current Caltrain train sets are used the entire day and assigned randomly to runs, there is no significant difference in average percentage bike capacity onboard trains throughout the day. Bike space per hour is higher during the peak period, because five trains per hour depart the terminal stations during peak hours versus two trains per hours during the off-peak. Nonetheless, as explained in Section 4.3, percentage bicycle space is the important parameter, because it is scalable and does not rely on a specific train schedule. The predictions shown in Table 1 apply to the peak demand period, and are over-capacity for the off-peak hours.

4.7 Random Scheduling of Bike Capacity

Bike capacity on trains today ranges from 16 spaces on a Bombardier train set with one bike car to 64 space on a gallery train set with two bike cars. Table 4 shows that baby bullet train capacity varies from 16 bikes to 64 bikes. With such wide variation in capacity, and no way to know beforehand how much capacity a train will hold, bicyclists are left playing a guessing game about whether they should attempt to board a baby bullet train, take a later or earlier train, or ride to another station to catch an express or local train. When a baby bullet train that generally has

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[c] Bike boardings from February 2004 to February 2006 increased about 40%, approximately the same amount as bike boardings from February 2004 to October 2004 [10,11].

32 or 64 spaces arrives with only 16 spaces, many bicyclists will be bumped during that run. Such randomness and lack of information leads to frustration and an intolerable unpredictability that forces some cyclists back into their cars [3]. If it is not practical to schedule trains with two bike cars during peak demand, then it is necessary to ensure all trains have sufficient bike capacity to handle peak demand.

train number	departure time	bike capacity on 1/15/08	bike capacity on 3/21/08	bike capacity on 6/4/08	bike capacity on 6/19/08
210	6:44am	32	64	32	32
312	6:59am	64	64	16	64
314	7:14am	32	32	16	32
216	7:19am	32	32	64	64
218	7:24am	64	32	32	32
220	7:44am	32	32	32	32
322	7:59am	64	32	32	16
324	8:14am	32	64	32	32
226	8:19am	32	32	32	32
228	8:24am	32	64	32	64
230	8:44am	32	32	32	64
332	8:59am	16	16	16	16

Table 4: Bike capacity for four days in 2008 on rush hour trains leaving San Francisco. Baby bullet trains are highlighted pink, and express trains are highlighted yellow. Bike capacity is generally unpredictable.

4.8 Caltrain's Bicycle Capacity Plan for the Future

4.8.1 2025 Plan

Caltrain's 2025 Plan [16] does not mention bicycle capacity on trains.

4.8.2 2023 Strategic Plan

Caltrain's 2023 Strategic Plan [17] does not mention bicycle capacity on trains.

4.8.3 2017 Short Range Transit Plan

Caltrain's 2017 Short Range Transit Plan [18] reports bicycle capacity on each car in the current fleet, but contains no stated plan for bicycle capacity on trains in the future.

4.8.4 Bikes on Cars Subcommittee Recommendation

Caltrain formed a Bicycle Technical Advisory Group (TAG) in January 2007 for public input on the Bicycle Master Plan. When the group was instructed that bikes on trains would not be addressed, the group repeatedly demanded that attention be directed to this issue. In response, Caltrain formed the Bikes on Cars Subcommittee in June 2007. No meeting minutes were published, and Caltrain staff running the meeting drove the group to make a recommendation of >5% bike capacity in 2014 [19]. This recommendation is alarming, because 5% is a reduction compared with the 7% bike capacity on the existing system, which is already severely under capacity.

5 Financial Analysis

5.1 Overview

All Caltrain passengers are subsidized, because ticket revenue accounts for around only 40% of operating costs [20]. A financial analysis of bicycle carriage on trains must consider not only ticket revenue, but also the additional amenities required by non-bicycling passengers to complete their commute. Most non-bicycle passengers are subsidized more than bicyclists, because most non-bicycling passengers require parking lots or publicly subsidized buses and/or shuttles at one or both ends of their commute. Bicyclists do not require any of these costly additions for their commute.

5.2 Subsidy Per Passenger

In considering subsidies for Caltrain passengers, one must take into account the mode by which the passengers travel to the station and to their final destinations. We evaluate here five different modes of traveling to and from the station: walking, biking, city bus, Caltrain shuttle, and personal automobile. Subsidies arise from the following:

- Caltrain ticket revenue does not cover operating costs, so every Caltrain passenger is subsidized to ride the train. We ignore train car depreciation cost in this calculation for simplicity; if included, it would add a constant amount to the subsidy for each passenger.
- Bicyclists bring their bikes on board the train without an extra charge, so each cyclist is subsidized by the cost of one seat removed to create space for their bike.
- Passengers pay a fare for the bus, but the fare does not completely cover operating expenses nor bus depreciation.
- The Caltrain shuttle is free to passengers, so the subsidy is even higher for shuttle riders.
- Caltrain charges only $2 per day to park a car in a station lot, which barely covers the maintenance cost of a parking space, and does not cover the lost opportunity cost of using the land for another purpose, for example to generate rental income.

Taking all these costs into consideration, we present the subsidies for each travel mode under three scenarios, i.e., most favorable, most probable, and least favorable for cyclists. Table 5 shows that cyclists are most probably subsidized less than any other mode besides walking. The financial data used to derive the values in Table 5 can be found in Appendices D and E.

Travel mode to station	Travel mode to destination	Most favorable	Most probable	Least favorable
walk	walk	$4.80	$5.03	$5.03
walk	bus	$11.03	$10.45	$6.79
walk	shuttle	$11.40	$11.03	$7.94
bike	bike	$12.80	$13.40	$13.40
bus	bus	$17.26	$15.88	$8.55
bus	shuttle	$17.63	$16.45	$9.70
shuttle	shuttle	$18.00	$17.03	$10.85
drive	walk	$62.05	$25.33	$9.19
drive	bus	$68.28	$30.76	$10.96
drive	shuttle	$68.65	$31.33	$12.11

Table 5: Estimated subsidies for Caltrain trip plus various methods of getting to and from stations. Cyclists are probably subsidized less than all other travel modes besides walking at least one leg of the trip (so long as driving is not the transportation mode at the other end).

If a bicycle passenger bikes to the station and then parks their bike at the station, the subsidy would be similar to walk/walk, walk/bus or walk/shuttle transportation modes, depending on the transportation mode the passenger uses to reach their destination. If a bus or shuttle is used, then the subsidy for a bicycle passenger parking their bike at the station is only marginally less than bringing a bike onboard the train. Depending on the bike parking method as for example, valet bike parking, the subsidy for parking a bike at the station could actually be higher than bringing a bike onboard, because of the cost of maintaining and operating bike parking equipment and facilities.

Not only do bicycle passengers receive lower subsidy than most other passengers, but bicycling does not add to traffic congestion or pollution. Furthermore, it is often faster to bike to and from Caltrain stations than to take public transportation, because a bicyclist does not have to wait for transit connections and is not delayed by heavy motorized traffic during commute times.

5.3 Addition of a New Bike Car vs. Non-bike Car

The analysis presented here compares the financial impact of adding a new bike car vs. adding a non-bike car. This analysis is especially timely, because Caltrain is adding eight new Bombardier cars to the fleet in 2008. We assumed no cost difference between purchasing a new bike car and a non-bike car. Therefore the model compares the financial impact once the bike car or non-bike car is operating in the current system, with the current train schedule.

We evaluated three scenarios, i.e., most favorable, most probable, and least favorable for cyclists. We collected publicly available data to support each scenario. As shown in Table 6 below, the model reveals that Caltrain and associated transit agencies most probably gain about $390 per day by adding a bike car with 32 bike spaces instead of a non-bike car. This amounts to annual revenue of over $140,000. The addition of a new bike car has a financially favorable impact that is fiscally imprudent to ignore.

Most favorable outcome	Most probable outcome	Least favorable outcome
$1098/day	$390/day	($118)/day

Table 6: Daily gain (loss) of adding a new bike car with 32 bike spaces compared with adding a non-bike car.

Detailed calculations for each scenario can be found in Appendices A, B and C. Appendix D contains a table showing the adjustable parameters and associated references.

5.4 Historical Payback Period of Adding Bike Capacity

Caltrain increased bike capacity to 24 bike spaces per train in late 1995 at a cost of $30,000 paid by San Francisco County and $30,000 paid by Caltrain. More than half of a ridership jump of 7 percent was attributable to bicyclists, and the cost to expand bike capacity was repaid in farebox revenue within 6 months [27]. This historical data support the model in section 5.3, which shows that Caltrain and transit agencies receive financial gain from removing seats to increase onboard bicycle capacity.

5.5 Reduction in Greenhouse Gas Emissions

The average cyclist commutes three miles one-way [21]. The number of weekday bike boardings on Caltrain in February 2008 was 2382 [13]. Therefore, passengers using a bicycle instead of an automobile to get to a Caltrain station keep about 7150 auto miles per weekday off Bay Area roads. That amounts to 1,860,000 miles per year of bicycling instead of driving, saving fuel and reducing greenhouse gas emissions.

The California legislature ordered that green house gas emissions in California be cut by 25% by 2020. Carbon dioxide (CO_2), a known as greenhouse gas, is a byproduct of burning fossil fuels, including gasoline. We consider here the amount of carbon dioxide emission reduction by bicycle passengers bringing their bikes onboard Caltrain. Carbon dioxide emissions depend on the make and model of the vehicle, and detailed emission information is readily available on the web [22]. It has been proposed, though not yet implemented in the United States, to impose a tax for polluting based on the amount emitted, commonly called a carbon tax. British Columbia currently imposes a carbon tax of $10 per ton of carbon emissions, rising to $30 per ton by 2012, though the true social cost may be closer to $50 per ton [23]. Table 7 shows the social cost savings per weekday by Caltrain passengers who bicycle to and from the station instead of driving.

car make	CO_2 emissions (g/km)	CO_2 emissions (tons/mile)	estimated social cost of carbon ($/mile)	total bicycle miles per weekday	estimated social cost savings per weekday
Toyota Camry	270	0.000479	$0.00593	7,150	$42
Ford Explorer	353	0.000626	$0.00775	7,150	$55

Table 7: Social cost savings per weekday from Caltrain's bikes-on-board program; cost savings are a result of reduced carbon emissions by bicycling instead of driving the car make shown. Carbon cost is estimated at $50 per ton, and carbon is 27.29% of CO_2 emissions.

The corresponding annual social cost savings are $10,900 to $14,300. This savings is not a direct benefit to Caltrain, but it benefits society as a whole.

6 Perceived Issues about Bikes on Trains

6.1 Dwell Time

Caltrain stated in its 2007 Progress Report [24], "The number one cause of Caltrain delays is from bicycles entering and exiting the trains." This statement appears on the same page as a graph (see Figure 8) that shows no significant change in on-time performance from 2003 to 2007. Yet bicycle boardings increased 45% from 2003 to 2007 [12,14]. On-time performance was unaffected during these years of staggering increase in bicycle boardings. The data do not support the assertion that bicycle boardings cause delays. Because bicycles are required to board last, any delay, no matter who causes it, gets blamed on bicycles. Caltrain is arbitrarily assigning bicycles as the number one cause of delays with no supporting evidence. Caltrain was unable to supply detailed dwell time statistics when requested [25].

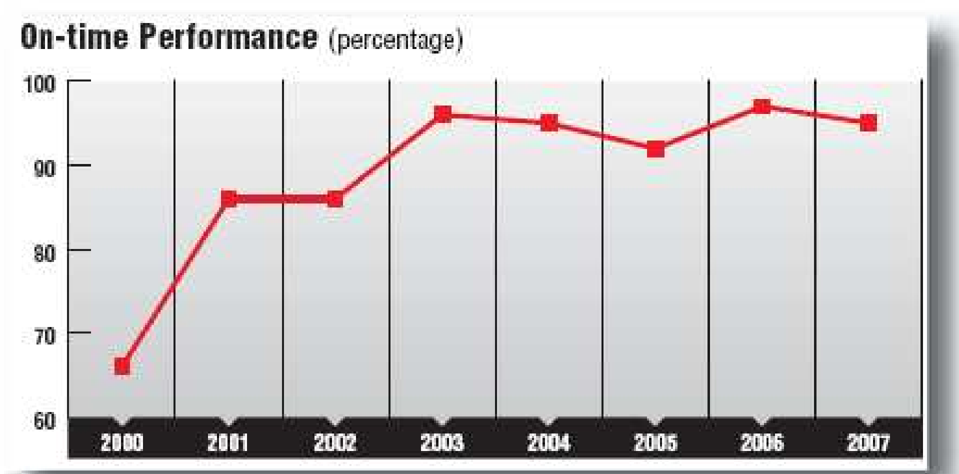

Figure 8: Caltrain's on-time performance, reproduced from Caltrain's 2007 Progress Report [24]

Caltrain reported in its Draft Bicycle Master Plan Key Findings that bicycle passengers cause an estimated 250 hours of dwell time delays per year, and the April 2008 Operations Report was referenced as evidence. To our knowledge, no detailed timing analysis has been conducted. Having no detailed data, we average the 250 hours over all train runs in a year, and we find the dwell time allegedly due to bicycle passengers boarding and alighting amounts to about 32 seconds per run, or about 1 second per stop for a local train.

Caltrain's draft Bicycle Access and Parking Plan (formerly Bicycle Master Plan) included the allegation that bicycles cause 250 hours of dwell time delays per year. After cyclists' repeated requests for supporting evidence, however, Caltrain removed that allegation from its final Bicycle Access and Parking Plan.

We acknowledge that it can take bicyclists extra time to board and exit when the bike car is completely packed. The question becomes - is this a bicycle-related dwell time problem, or a bicycle capacity problem, or a system design problem? Consider the following:

- If there were more bike cars and cyclists could reliably board at more places, then dwell time would be reduced.
- If sufficient bike spaces were available, then it would be easy to maneuver bikes to get in and out, reducing dwell time.
- The Bombardier cars have better design features than the older gallery cars, because the Bombardier cars have two doors and only one step. It is faster and easier to board Bombardier cars, not only for bicycle passengers, but for all passengers.

Caltrain frames the issue as bicycle-related dwell time delays, as though bike capacity and system design have nothing to do with it. Instead of blaming alleged dwell time delays on cyclists, Caltrain should be looking at increasing bike capacity and buying cars designed for universal access.

6.2 Safety

At the Bicycle Technical Advisory Group (TAG) meeting on January 14, 2008, Caltrain staff stated that safety is an overriding concern about bikes on trains. When asked for documented incidents of safety issues involving bicycles, Caltrain staff admitted there were no documented incidents. While Caltrain's concern about passenger safety is commendable, the "overriding concern" about bicycles causing safety problems appears exaggerated.

6.3 Train Capacity

Trains run with empty seats, while the bike car is over-capacity. Walk-on passengers get on, while bicyclists get bumped. The most readily available data are from the *February 2008 Caltrain Annual Passenger Counts*. The counts showed that only one northbound baby bullet train reached seating capacity at Redwood City. All other trains ran the entire line with empty seats. Appendix F shows representative photos of bicycle and walk-on passenger load for twelve different trains. These photos, taken in October 2008, highlight that Caltrain is not meeting the service needs of its passengers.

The packed bike car on train 220 leaving San Francisco on July 16, 2008. Photo courtesy of George Lane.

The current train seat configuration results in demand mismatch, with too few bike spaces and too many seats. If the number of bike spaces were increased to meet demand, it is possible that some passengers would need to stand for part of their commute during the summer months, given that ridership increases in the summer (see Section 4.5.2 above). Standing on public transit is common practice during rush hour, so removing seats for bikes does not necessitate losing a walk-on customer. As things are now, many paying customers have stopped using Caltrain, because they cannot bring their bicycles on board. Table 1 shows that bike space demand is approaching 10%, whereas capacity today is only 7%.

Cyclists bumped on train 268 at Palo Alto on September 4, 2007. Photo courtesy of Rob Robinson.

There is a fundamental difference between standing inside the train as a walk-on passenger and being denied boarding as a bicyclist. Bicyclists with paid tickets are left standing on the platform, not knowing if they will get on the following train either, while walk-on passengers are being transported to their destinations.

6.4 Seat Removal to Make Space for Bikes

Caltrain staff has repeatedly stated that seats cannot be removed to make space for bikes, because Caltrain would lose passengers. This assumption has been invalidated by an experimental trial inadvertently conducted by Caltrain in June 2008. On May 30, 2008, Caltrain announced that 14 gallery cars were removed from service for emergency repairs. Spares were put into service, but there were still more four-car train sets running in June than usual[d]. The missing gallery cars resulted in an effective loss of seating capacity in June compared with previous months, simulating removing seats to make space for bikes without actually doing so. There were on average about 1800 fewer seats (out of nearly 60,000) each weekday the month of June compared with May, yet ridership increased over 5% in June [26], as shown in Figure 9. Given that there is latent demand for bicycle space, removal of seats to create more bike space now that the gallery cars are back in service would be expected to increase overall ridership even further.

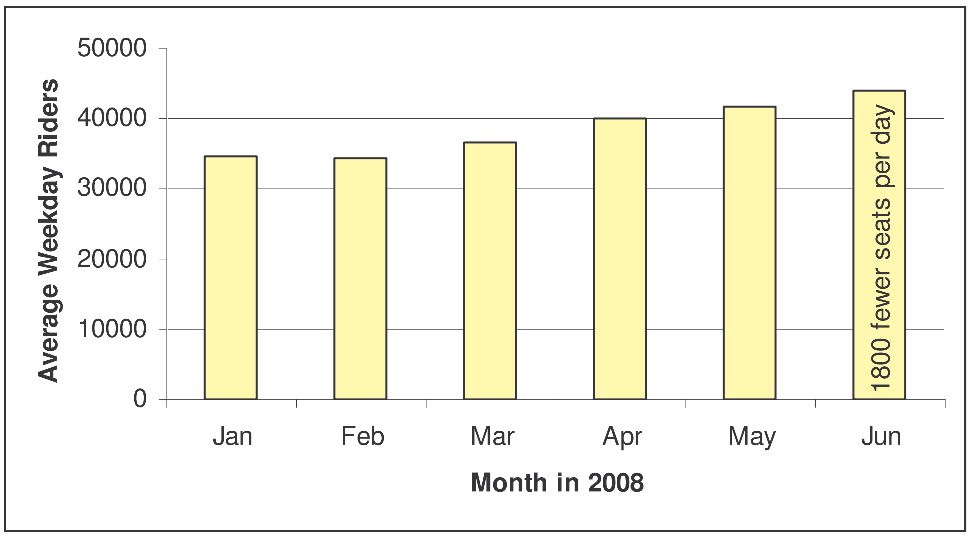

Figure 9: Average weekday ridership on Caltrain in 2008. Fewer seats in June had no negative impact on the number of riders.

Caltrain normally maintains about 15% spare cars, so the experimental trial corresponds to removing about 420 total seats from existing cars to create 420 new bike spaces[e]. The proposal in Table 8 accomplishes the objective. This proposal converts twelve Bombardier trailer cars to 16-space bike cars, and converts six gallery trailer cars to 32-space bike cars. There are two Bombardier cab cars that were never retrofitted to hold bikes, so they would be converted to 16-space bike cars. These conversions increase bike capacity from about 7% to nearly 10%, in close

[d] Caltrain was running a mixture of four-car and five-car trains sets. In early June, there were 10 four-car trains, and in late June, there were 8 four-car trains. Before gallery cars were removed from service, there were only 6 four-car trains.

[e] Caltrain currently runs 20 train sets and 98 runs per day. Therefore, 1800 seats per day corresponds to 357 total seats to remove plus 15% more to account for spare cars, or about 420 total seats to remove. Removal of four seats makes space for four stacked bikes on one bike rack.

alignment with the predicted minimum to meet current demand (see Section 4.3). The proposal in Table 8 will enable all train sets to have 64 bike spaces, assuming there are five Bombardier train sets and fifteen gallery train sets. Caltrain has added over 1000 physical seats with the eight new Bombardier cars, but only 32 additional bike spaces. With the gallery cars back in service and even more seating provided with the new Bombardier cars, we recommend following the proposal in Table 8 to increase bike capacity to meet current demand.

Car type	Number of cars	Seats to remove	Total number new bike spaces
Bombardier trailer car	12	16	192
Bombardier cab car numbers 117, 118	2	11	32
Gallery trailer car	6	32	192
		Grand total	416

Table 8: Proposal to remove seats to add more bike space. Number of seats removed corresponds to number of seats missing in June due to gallery cars being out-of-service.

There is an additional critical need to convert Bombardier cab cars 117 and 118 to bike cars, and that is to avoid the situation that occurred on August 6, 2008 of a train set running with no bike car at all. If all cab cars in Caltrain's fleet are bike cars, then it will be impossible for a train set to run without a bike car, because a cab car is required for train operation.

6.5 Seating Capacity and Peak Load

6.5.1 Maximum Passenger Load

Caltrain staff maintains that trains are full, many with standing room only. The photos in Appendix F show that the bike car is full, while there are hundreds of empty seats in the rest of the train for a number of different trains. To understand the severity of the capacity problem, both for walk-on and bicycle passengers, we analyzed the most recent passenger count data available, February 2008 Caltrain Annual Passenger Count. Weekday ridership headcounts for every train are collected Monday through Friday at all stations with weekday service. The total number of passengers riding each train is then averaged over the five weekdays to get a single average weekday ridership per train at each station [13].

Figures 10 and 11 show the number of empty seats at peak load for all weekday northbound and southbound trains. Both northbound and southbound trains generally have fewer empty seats during morning and evening commute periods compared with other times, as expected.

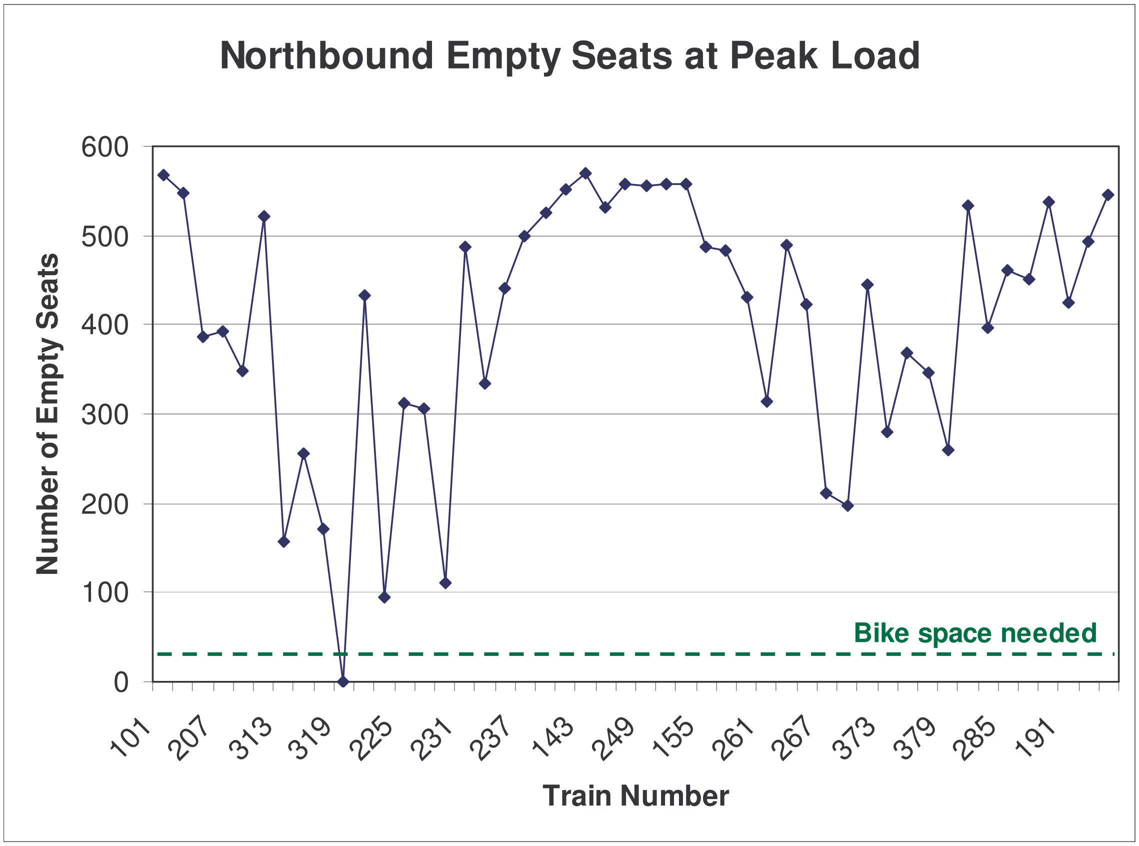

Figure 10: The average number of empty seats on northbound weekday trains leaving the station at which a train carried the maximum number of passengers. Trains are shown in the order of departure from San Jose Diridon station. The green dashed line shows the average number of seats that would need to be removed from each train to accommodate current demand for onboard bicycle space. The number of empty seats is based on an average of 657 seats per 5-car train set, and the passenger count data are from February 2008.

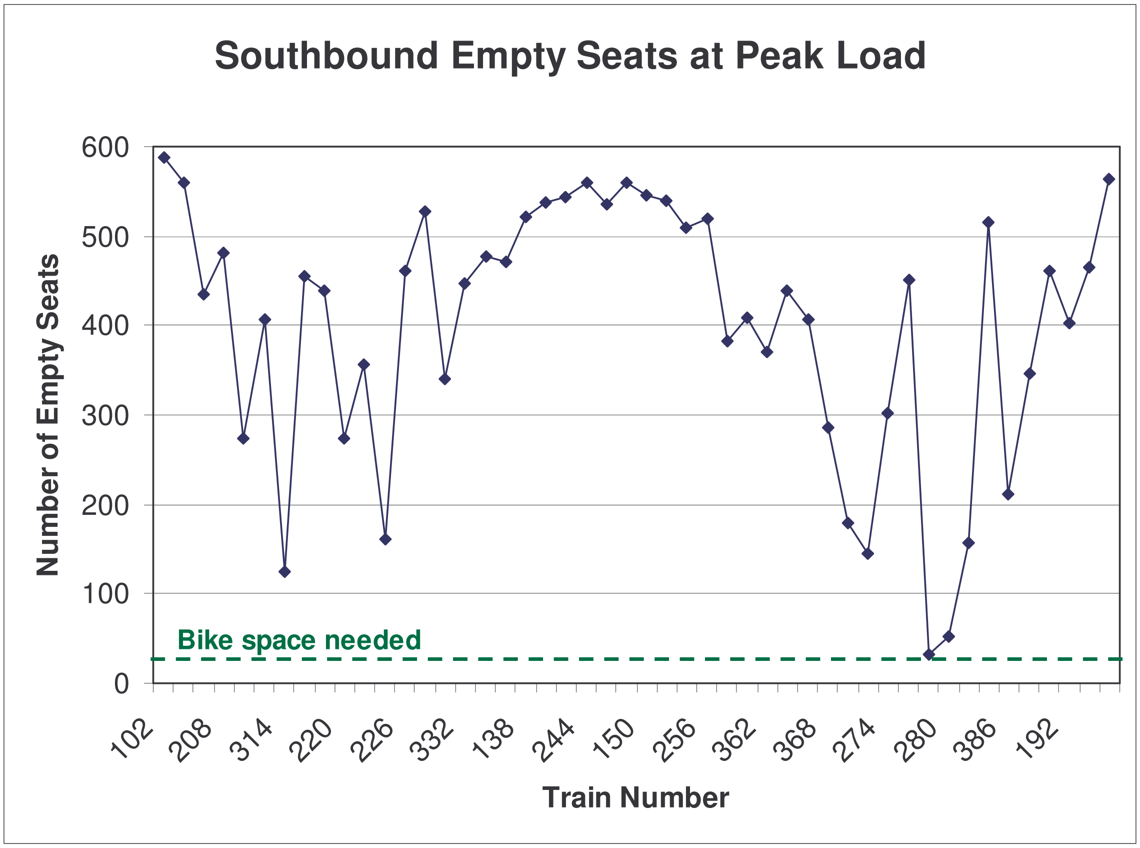

Figure 11: The average number of empty seats on southbound weekday trains leaving the station at which a train carried the maximum number of passengers. Trains are shown in the order of departure from San Francisco 4th & King station. The green dashed line shows the average number of seats that would need to be removed from each train to accommodate current demand for onboard bicycle space. The number of empty seats is based on an average of 657 seats per 5-car train set, and the passenger count data are from February 2008.

Figures 10 and 11 reveal that all but one northbound train ran the entire line with empty seats. Most trains ran with hundreds of empty seats, even at their peak load. Therefore, removing seats to make space for bikes would still permit nearly all walk-on passengers to find seats. There are three trains, however, that were at or close to seating capacity at their maximum load. We consider below the impact of removing seats on the top five fullest trains.

Caltrain attempts to assign Bombardier train sets to baby bullet runs (train numbers in the 300 series), but unexpected circumstances make it possible that any train set could be assigned to any run. Therefore, we consider two different train configurations, Bombardier and gallery, in assessing the impact of removing seats for bikes. Tables 9 and 10 show the number of seats available in each train set [28].

Bombardier Cars

Car Type	Number of Cars	Number of Seats	Total Seats	Features
trailer	4	148	592	ADA compliant
cab/bike	1	123	123	holds 16 bikes

Total seats in 5-car Bombardier train	715
Seats needed to be removed to hold 64 bikes	48
Seats remaining	**667**

Table 9: Determination of the seats remaining in a Bombardier train set, once it is retrofitted to hold 64 bikes. “ADA” refers to the Americans with Disabilities Act.

Gallery Cars

Car Type	Number of Cars	Number of Seats	Total Seats	Features
trailer	1	122	122	ADA restroom, wheelchair space
trailer	1	142	142	luggage racks
trailer	2	148	296	
cab/bike	1	82	82	holds 32 bikes, ADA restroom, wheelchair space

Total seats in 5-car gallery train	642
Seats needed to be removed to hold 64 bikes	32
Seats remaining	**610**

Table 10: Determination of the seats remaining in a gallery train set, once it is retrofitted to hold 64 bikes. “ADA” refers to the Americans with Disabilities Act.

Tables 9 and 10 show that the remaining seats after space is freed for bikes varies from a minimum of 610 seats to a maximum of 667 seats. Other possible train configurations result in intermediate seating capacity between these two extremes.

Figure 12 shows the peak passenger load for the five fullest weekday trains. The dashed lines indicate the number of remaining seats after train sets are retrofitted to hold 64 bikes, indicating both the minimum and maximum seating scenarios. The results show that some passengers may be required to stand for one stop on the two fullest trains, but then seats become available. All other 96 trains have many empty seats at all times.

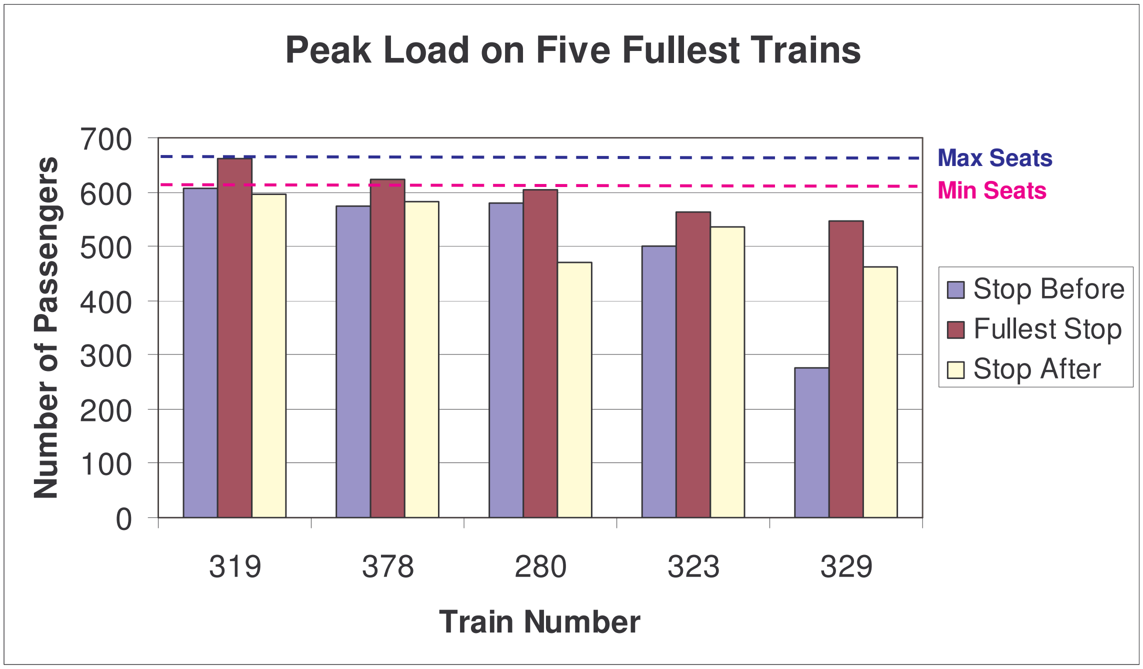

Figure 12: The average weekday passenger load on the five fullest trains in February 2008. The load at three adjacent station stops is shown, where the center bar for each train is the stop with peak passenger load. The dashed lines show the maximum and minimum number of seats per train, if sufficient seats were removed to meet current demand for onboard bicycle capacity. See text for further details.

Volunteers from the BIKES ONboard project have made a point to riding the fullest trains, and we have observed that some passengers choose to stand even when there are empty seats. Hence, trains that may appear to be "standing room only" to the casual observer can actually have empty seats.

6.5.2 Maximum Bicycle Load

Caltrain's bicycle count data are incomplete, because the bike capacity per train was not recorded, and the number of bumped bicycles was not recorded. Further, the inconsistency in bicycle capacity among trains and from day-to-day on the same run leads to erratic results that do not typify the true demand for onboard bicycle capacity.

Figures 13 and 14 show that bicycle load bounces around 16 bikes per train during commute periods. Any additional bikes onboard above the 16 capacity minimum is by chance that a train with greater bike capacity arrived for that run, or an empathetic conductor allowed extra bikes onboard. The occasional spike in bicycle count may reflect many cyclists being bumped from earlier trains, and a following train with two bike cars picking up the extra load.

Because only 16 bike spaces are guaranteed per train, bicycle passengers are generally capped by that amount during commute periods. Additional demand is squelched, because cyclists are not guaranteed a spot and may get bumped, forcing them to find other commute methods. The end result is poor utilization of bike capacity on trains with 64 bike spaces, even though there is latent demand.

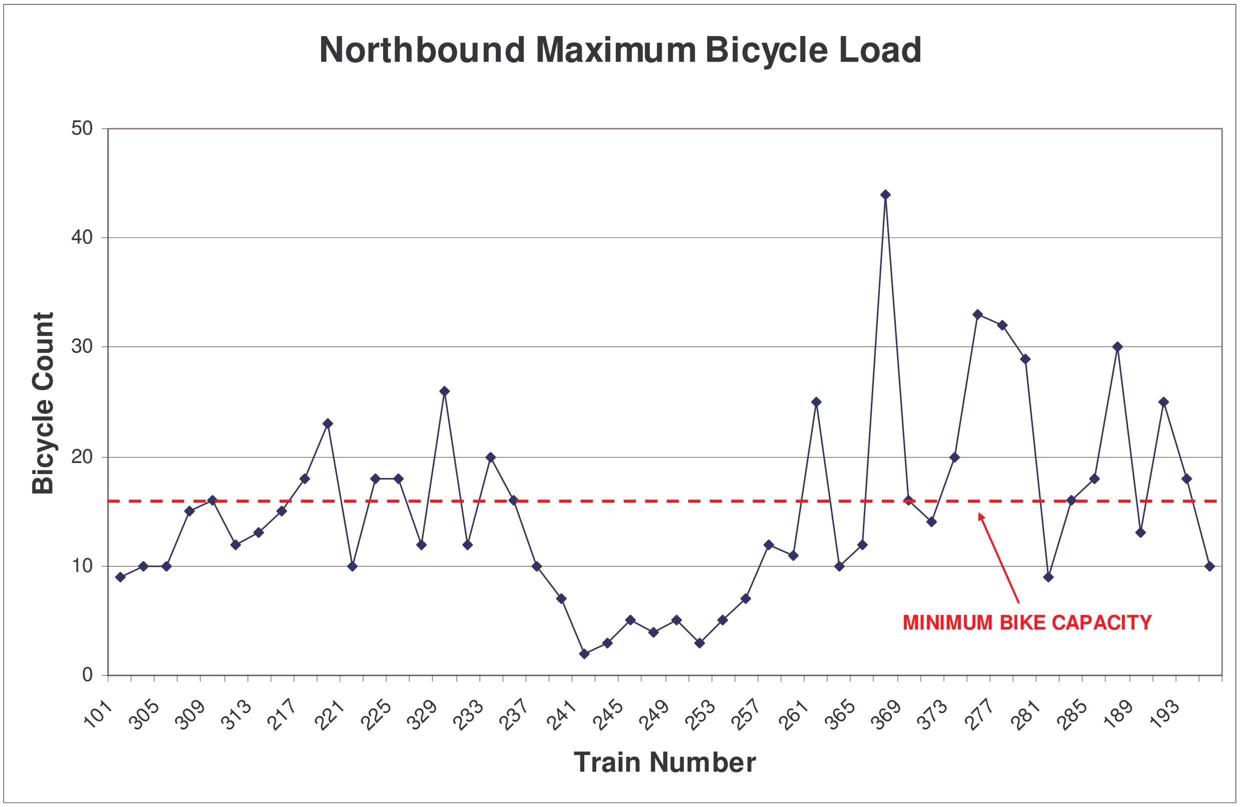

Figure 13: The average number of bicycles on northbound weekday trains leaving the station at which a train carried the maximum bicycle load in February 2008. Trains are shown in the order of departure from San Jose Diridon station. The red dashed line shows the minimum bicycle capacity per train. Actual bike capacity on any given train is unknown, because Caltrain's passenger count does not record that information.

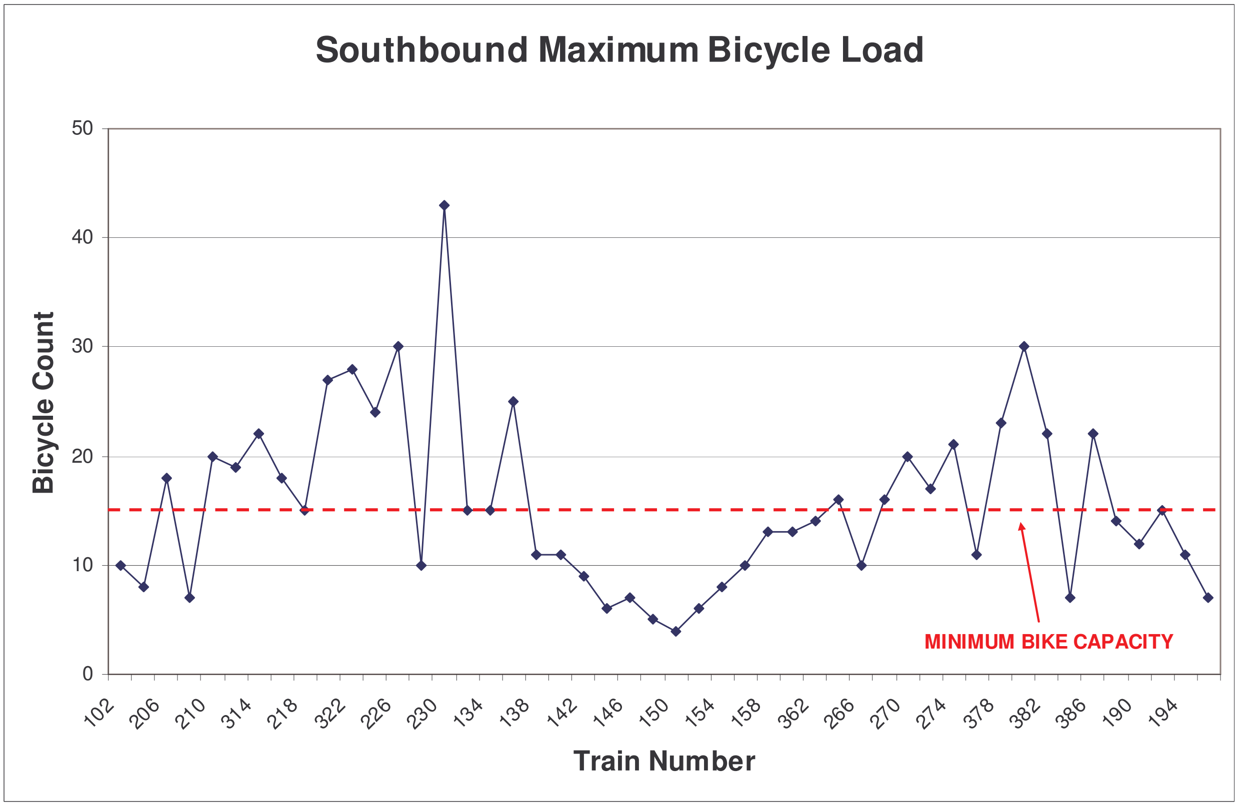

Figure 14: Average number of bicycles on southbound weekday trains leaving the station at which a train carried the maximum bicycle load in February 2008. Trains are shown in the order of departure from San Francisco 4th & King station. The red dashed line shows the minimum bicycle capacity per train. Actual bike capacity on any given train is unknown, because Caltrain's passenger count does not record that information.

Figure 15 shows the five trains that carried the most bicycles in February 2008. It is interesting to contrast Figure 15 with Figure 12. Bicycle load appears more as a plateau, because bike space on trains is frequently maxed out, whereas passenger load shows an actual peak. One can therefore deduce that bicyclists were being bumped from the trains, whereas walk-on passengers were not bumped from any train.

Another interesting observation is that none of the top five trains carrying the most bikes were baby bullet trains, but four of five trains carrying the most passengers were baby bullet trains. Bicyclists have been systematically excluded from the most desirable trains, because the Bombardier trains sets targeted for baby bullets have half the bike capacity of gallery train sets.

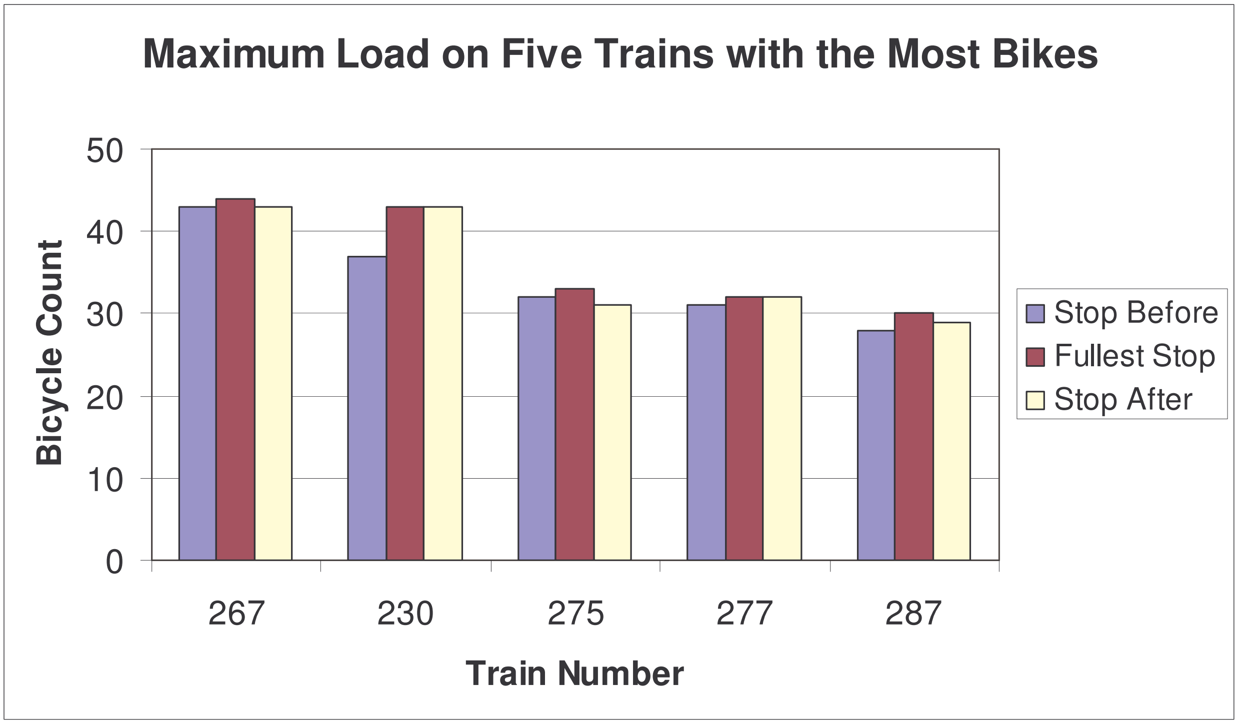

Figure 15: Average weekday bicycle load on the five trains carrying the most bikes in February 2008. The load at three adjacent station stops is shown, where the center bar for each train is the stop where maximum load was reached.

6.5.3 Seasonal Variation in Passenger Totals

Caltrain conducts annual passenger counts each February, and then estimates ridership the rest of the year based on revenue from ticket sales. Therefore, seasonally adjusted ridership does not distinguish between walk-on and bicycle passengers. Figure 16 shows that the highest estimated ridership in 2008 occurred June through August, a time when there were hundreds of seats missing from the fleet due to gallery cars removed from service for repairs, resulting in more four-car trains running during that period. This demonstrates that Caltrain can accommodate the increased demand in summer, even with fewer seats.

As of December 2008, all gallery cars are back in service, and Caltrain has added eight new Bombardier cars to its fleet. All trains are now five-car trains, so Caltrain can readily accommodate more space for bikes. See Section 6.4 of this document for more information supporting the removal of seats to meet current demand for onboard bicycle space.

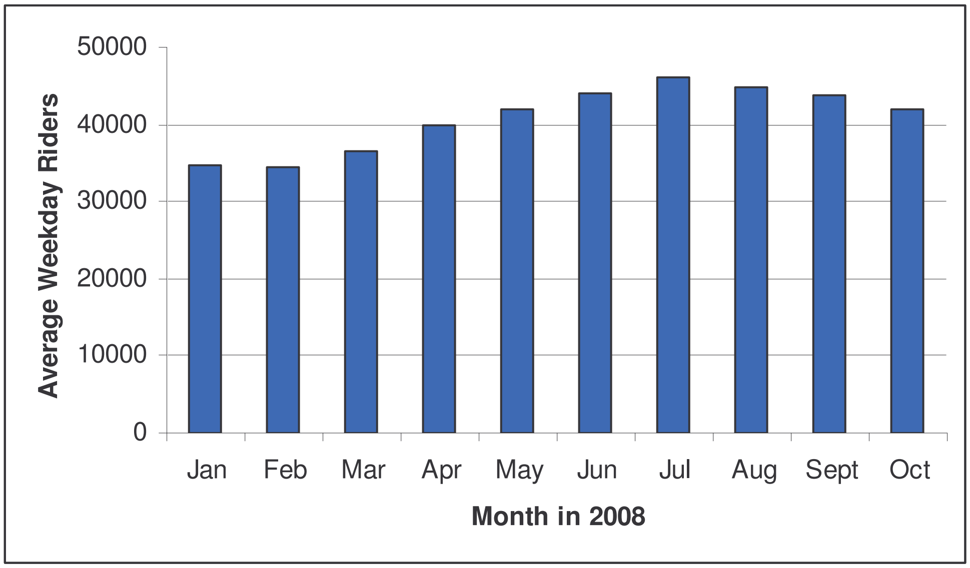

Figure 16: Average weekday ridership on Caltrain in 2008 [26,29].

7 Recommendations

We recognize that Caltrain has constraints on operations, and we encourage an open dialog between Caltrain operations staff and the San Francisco Bicycle Coalition and bicycle advocates to overcome obstacles to achieve Caltrain's Bike Master Plan stated goal of "Make Caltrain a convenient and user-friendly transit service for bicyclists."

In keeping with that goal, we recommend the following:

Immediate (<3 months)

- Post train assignment each morning on Caltrain's website to help distribute the load by alleviating the uncertainty in the number of bike spaces on each train.
- Schedule trains with 64 bike spaces during peak demand, i.e., commute hours and special events. This may require removing seats to increase the number of trains with 64 bike spaces.
- Caltrain staff delivers an annual rolling plan to the JPB articulating what it would take to meet bike demand now, in 1 year, in 5 years, and in 10 years.

Short term (6 to 12 months)

- Provide real-time information on bike spaces available on trains.
- Ensure non-peak trains have a minimum of 32 bike spaces.

Medium term (1 to 5 years)

- Reconfigure cars to maximize bike space and increase bike capacity during peak demand to 15%.
- Hire a full-time bicycle planner/coordinator (who actually commutes by bike and train).

Long term (>5 years)

- Provide unrestricted bike access on electrified trains.

8 Conclusions

Bikes on board is a service success that built Caltrain's ridership, enhanced its reputation, and has been studied and admired by transit systems all over the nation. Bikes on board is the central and essential element of Caltrain's bicycle service and must be addressed fully in any planning process. Far from being a "special interest" service for Caltrain, bicycle bring-along by Caltrain passengers serves the system's and region's goals more perfectly than almost any other trip type and should be supported and enhanced by Caltrain with energy and focus.

Caltrain’s Bicycle Master Plan misses the point, because it does not include anything about increasing bike capacity on board. To achieve Caltrain’s stated goal to make Caltrain a convenient and user-friendly transit service for bicyclists, an increase in bicycle carriage on board trains must be included in the Bicycle Master Plan.

9 References

[1] TAG 1/24/07 Meeting Summary, attached to the agenda for the March 13, 2007 meeting of the Caltrain Bicycle Master Plan Technical Advisory Group, contact Celia Chung.

[2] Metropolitan Transportation Commission's Resolution 3434, Transit-Oriented Development Policy, July, 2006.

[3] 2007 Caltrain Online Bicycle Survey: Selected Preliminary Results, reported in the agenda for the July 11, 2007 meeting of the Caltrain Bicycle Master Plan Technical Advisory Group, contact Celia Chung. Caltrain conducted the Online Bicycle Survey from May 21 to June 1, 2007. The number of respondents was 1571 including 1180 bike+Caltrain users, 169 former users, and 222 potential users.

[4] San Francisco Municipal Transportation Agency, 2007 Citywide Bicycle Counts Report, November 2007.

[5] Source: San Francisco Municipal Transportation Agency

[6] Source: San Francisco Bicycle Coalition

[7] Source: Silicon Valley Bicycle Coalition

[8] Caltrain Electrification Program Environmental Assessment/Draft Environmental Impact Report, April 2004, Section 3.15.8.

[9] Key Findings, February 2005 Caltrain Annual Passenger Counts

[10] Key Findings, February 2006 Caltrain Annual Passenger Counts

[11] Key Findings, October 2004 Caltrain Passenger Counts

[12] Key Findings, February 2007 Caltrain Annual Passenger Counts

[13] Key Findings, February 2008 Caltrain Annual Passenger Counts

[14] Key Findings, February 2003 Caltrain Annual Passenger Counts

[15] 2007 Onboard Bike Count Summary Report, prepared by Corey, Canapary & Galanis Research for Caltrain.

[16] Project 2025, Peninsula Corridor Joint Powers Board, November 30, 2006

[17] Caltrain 2004 2023 Strategic Plan

[18] Caltrain Short Range Transit Plan, Fiscal Years 2008 to 2017, adopted February 7, 2008

[19] The Bikes-On-Cars Subcommittee's Recommendations for Bicycle-related Specifications for Rolling Stock Procurement, October 2007; attachment to agenda dated February 5, 2008 for Caltrain Bicycle Master Plan - Technical Advisory Committee, contact Celia Chung.

[20] Peninsula Joint Powers Board Comprehensive Annual Financial Report, Fiscal Year Ended June 30, 2008, p. 49.

[21] Osborn, Lynn, (2003), "TDM Cost Effectiveness, How VMT Reduction Translates to Congestion Mitigation and Improved Air Quality", ACT International Conference, TDM Cost Effectiveness White Paper, p.7.

[22] The Society of Motor Manufacturers and Traders Limited, CO2 Emission Data, CO2 Search at http://www.smmtco2.co.uk/co2search2.asp.

[23] Tol, Richard, S. J., (2005) "The Marginal Costs of Carbon Dioxide Emissions: An Assessment of the Uncertainties", Energy Policy 33(16):2064–2074.

[24] Caltrain 2007 Progress Report, p. 5.

[25] Email dated May 22, 2008 from Martha Martinez, JPB Secretary, who wrote "There is no dwell time study report."

[26] JPB Meeting agenda packets, February 2008 through August 2008, Caltrain Performance Reports.

[27] U.S Department of Transportation, Federal Highway Administration, FHWA-HRT-05-085, Pedestrian and Bicycle Safety, Lesson 18: Bicycle and Pedestrian Connections to Transit.

[28] Caltrain Commute Fleet, http://www.caltrain.com/caltrain_commute_fleet.html

[29] JPB Meeting agenda packets, September 2008 through December 2008, Caltrain Performance Reports.

[30] Caltrain collected, summarized, and posted public comments on its *Draft Bicycle Master Plan* and *Draft Bicycle Access and Parking Plan*; http://www.caltrain.com/bicycle_access_and_parking_plan.html

10 Appendices

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Appendix A: Most Favorable Financial Outcome of Adding a New Bike Car

Current Schedule, Ridership, and Train Sets

	5	Number of trips per day per train set	*1*	20	train sets	*2*	98	runs/weekday
	35	Average number of bikes per trip	*3*	3382	bikes/weekday			
	410	Average number of non-bikers per trip	*4*	40,149	non-bikers/weekday			
	46	Average number of bikes spaces per trip						
	605	Avereage number of seats per trip						
	108%	Utilization of bike spaces averaged over the entire day						
	68%	Utilization of seats averaged over the entire day						
5	$ 3.20	Average Caltrain fare						

Adding a New Car

6	32	Number of passenger seats lost to bike space
	64	Number of passenger seats if no bike space

Ticket Revenue

$ 501.76	Daily ticket revenue due to bikers at 100% capacity
$ 1,003.52	Daily ticket revenue due to non-bikers at 100% capacity

Loss Due to Bikers from a New Bike Car

0.00	Dwell time delay in min/run due to bike (	*7*	0	annual dwell time delay in hours due to bikers
$ 29.28	Value of each minute	*8*	$ 1,757	operating cost per hour
$ -	Loss per run due to dwell time			
$ -	Total loss of dwell time per day			

Loss Due to Non-Bikers from a New Non-bike Car

Shuttle costs

	31	Number of daily shuttle passengers	*9*	9.9%	non-bikers use free shuttles
10	$ 6.60	Operating cost per passenger			
	$ 204.91	Total shuttle costs per day			

Transit costs (assume bus)

	72	Number of daily bus passengers	*11*	23.1%	non-bikers use buses	
12	$ 6.41	Operating cost per passenger	*13*	120	passengers/bus/day	
14	$ 1.13	Average bus fare		0.60	number of buses needed	
	$ 382.26	Total bus operating costs per day	*15*	$ 500,000	cost of new bus	
	$ 68.91	Daily depreciation of bus cost	*16*	$ 12	bus lifetime in years	4,380 days
	$ 451.18	Total bus costs per day (operating + depreciation)				

Parking spaces

			17	32%	non-bikers use parking spaces	
	20	Number of parking spaces needed	*18*	290	square feet per parking space	
	$ 55.58	Parking revenue loss per day	*19*	$ 5.75	monthly rent per square foot	
	$ 3.67	Parking maintenance costs per day		$ 1,668	rent per month	30 days
20	$ 2.00	Parking revenue per day	*21*	$ 110	parking space maintenance cost per month	
	$ 1,168.82	Total daily loss due to parking spaces (operating + land revenue loss)				

Adjustment Due to Expected Demand

$ -		Loss due to bikers if 100% capacity
$ -		Realistic loss due to expected demand
	#DIV/0!	due to dwell time
$ 1,824.90		Loss due to non-bikers if 100% capacity
$ 1,236.77		Realistic loss due to expected demand
	11%	due to free shuttles
	25%	due to buses
	64%	due to parking spaces
$ 501.76		Ticket revenue from bikers at 100% capacity
$ 541.19		Realistic ticket revenue from bikers due to expected demand
$ 1,003.52		Ticket revenue from non-bikers at 100% capacity
$ 680.10		Realistic ticket revenue from non-bikers due to expected demand
$ 541.19		Realistic net gain (loss) due to bikers
$ (556.66)		Realistic net gain (loss) due to non-bikers

Benefit of Adding a New Bike Car

$ 1,097.86	Daily gain (loss) of adding a new bike car compared with a non-bike car

Appendix B: Most Probable Financial Outcome of Adding a New Bike Car

Current Schedule, Ridership, and Train Sets

5 Number of trips per day per train set | 1 — 20 train sets | 2 — 98 runs/weekday
29 Average number of bikes per trip | 3 — 2882 bikes/weekday
381 Average number of non-bikers per trip | 4 — 37,380 non-bikers/weekday
46 Average number of bikes spaces per trip
605 Avereage number of seats per trip
92% Utilization of bike spaces averaged over the entire day
63% Utilization of seats averaged over the entire day
5 — $ 3.35 Average Caltrain fare

Adding a New Car

6 — 32 Number of passenger seats lost to bike space
64 Number of passenger seats if no bike space

Ticket Revenue

$ 525.28 Daily ticket revenue due to bikers at 100% capacity
$ 1,050.56 Daily ticket revenue due to non-bikers at 100% capacity

Loss Due to Bikers from a New Bike Car

0.00 Dwell time delay in min/run due to bike (| 7 — 0 annual dwell time delay in hours due to bikers
$ 31.04 Value of each minute | 8 — $ 1,862 operating cost per hour
$ - Loss per run due to dwell time
$ - Total loss of dwell time per day

Loss Due to Non-Bikers from a New Non-bike Car

Shuttle costs

28 Number of daily shuttle passengers | 9 — 9.0% non-bikers use free shuttles
10 — $ 6.00 Operating cost per passenger
$ 169.34 Total shuttle costs per day

Transit costs (assume bus)

66 Number of daily bus passengers | 11 — 21.0% non-bikers use buses
12 — $ 5.80 Operating cost per passenger | 13 — 244 passengers/bus/day
14 — $ 0.84 Average bus fare | 0.27 number of buses needed
$ 326.65 Total bus operating costs per day | 15 — $ 500,000 cost of new bus
$ 30.78 Daily depreciation of bus cost | 16 — $ 12 bus lifetime in years | 4,380 days
$ 357.43 Total bus costs per day (operating + depreciation)

Parking spaces | 17 — 29% non-bikers use parking spaces
19 Number of parking spaces needed | 18 — 243 square feet per parking space
$ 19.44 Parking revenue loss per day | 19 — $ 2.40 monthly rent per square foot
$ 2.87 Parking maintenance costs per day | $ 583 rent per month | 30 days
20 — $ 2.00 Parking revenue per day | 21 — $ 86 parking space maintenance cost per month
$ 376.89 Total daily loss due to parking spaces (operating + land revenue loss)

Adjustment Due to Expected Demand

$ - Loss due to bikers if 100% capacity
$ - Realistic loss due to expected demand
#DIV/0! due to dwell time

$ 903.66 Loss due to non-bikers if 100% capacity
$ 570.19 Realistic loss due to expected demand
19% due to free shuttles
40% due to buses
42% due to parking spaces

$ 525.28 Ticket revenue from bikers at 100% capacity
$ 482.77 Realistic ticket revenue from bikers due to expected demand

$ 1,050.56 Ticket revenue from non-bikers at 100% capacity
$ 662.88 Realistic ticket revenue from non-bikers due to expected demand

$ 482.77 Realistic net gain (loss) due to bikers
$ 92.69 Realistic net gain (loss) due to non-bikers

Benefit of Adding a New Bike Car

$ 390.08 Daily gain (loss) of adding a new bike car compared with a non-bike car

Appendix C: Least Favorable Financial Outcome of Adding a New Bike Car

Current Schedule, Ridership, and Train Sets

	5	Number of trips per day per train set	1	20	train sets	2	98	runs/weekday
	24	Average number of bikes per trip	3	2382	bikes/weekday			
	353	Average number of non-bikers per trip	4	34,611	non-bikers/weekday			
	46	Average number of bikes spaces per trip						
	605	Avereage number of seats per trip						
	76%	Utilization of bike spaces averaged over the entire day						
	58%	Utilization of seats averaged over the entire day						
5	$ 3.35	Average Caltrain fare						

Adding a New Car

6	32	Number of passenger seats lost to bike space
	64	Number of passenger seats if no bike space

Ticket Revenue

$ 525.28	Daily ticket revenue due to bikers at 100% capacity
$ 1,050.56	Daily ticket revenue due to non-bikers at 100% capacity

Loss Due to Bikers from a New Bike Car

	0.42	Dwell time delay in min/run due to bike c	7	250	annual dwell time delay in hours due to bikers
	$ 31.04	Value of each minute	8	$ 1,862	operating cost per hour
	$ 13.02	Loss per run due to dwell time			
	$ 63.78	Total loss of dwell time per day			

Loss Due to Non-Bikers from a New Non-bike Car

Shuttle costs

	25	Number of daily shuttle passengers	9	8.1%	non-bikers use free shuttles
10	$ 2.91	Operating cost per passenger			
	$ 74.04	Total shuttle costs per day			

Transit costs (assume bus)

	59	Number of daily bus passengers	11	18.9%	non-bikers use buses	
12	$ 2.22	Operating cost per passenger	13	554	passengers/bus/day	
14	$ 0.60	Average bus fare		0.11	number of buses needed	
	$ 96.02	Total bus operating costs per day	15	$ 350,000	cost of new bus	
	$ 8.55	Daily depreciation of bus cost	16	$ 12	bus lifetime in years	4,380 days
	$ 104.57	Total bus costs per day (operating + depreciation)				

Parking spaces

			17	26%	non-bikers use parking spaces	
	17	Number of parking spaces needed	18	180	square feet per parking space	
	$ 4.50	Parking revenue loss per day	19	$ 0.75	monthly rent per square foot	
	$ 1.67	Parking maintenance costs per day		$ 135	rent per month	30 days
20	$ 2.00	Parking revenue per day	21	$ 50	parking space maintenance cost per month	
	$ 69.60	Total daily loss due to parking spaces (operating + land revenue loss)				

Adjustment Due to Expected Demand

$ 63.78	Loss due to bikers if 100% capacity
$ 48.45	Realistic loss due to expected demand
	100% due to dwell time
$ 248.21	Loss due to non-bikers if 100% capacity
$ 145.01	Realistic loss due to expected demand
	30% due to free shuttles
	42% due to buses
	28% due to parking spaces
$ 525.28	Ticket revenue from bikers at 100% capacity
$ 398.99	Realistic ticket revenue from bikers due to expected demand
$ 1,050.56	Ticket revenue from non-bikers at 100% capacity
$ 613.78	Realistic ticket revenue from non-bikers due to expected demand
$ 350.54	Realistic net gain (loss) due to bikers
$ 468.77	Realistic net gain (loss) due to non-bikers

Benefit of Adding a New Bike Car

$ (118.23)	Daily gain (loss) of adding a new bike car compared with a non-bike car

Appendix D: Adjustable Parameters for the Financial Model

#	Parameter	Most favorable	Most probable	Least favorable	Reference for most favorable	Reference for most probable	Reference for least favorable
3	Caltrain bike boardings per weekday	3382	2882	2382	42% increase over Feb 2008; Caltrain October 2004 Annual Passenger Count showed 42% increase in cyclists over February 2004 Annual Passenger Count	Average of least and most favorable	Caltrain Feb 2008 Annual Passenger Counts
4	Caltrain passengers per weekday	40,149	37,380	34,611	Caltrain reports 16% higher ridership in summer months; Caltrain Feb 2008 Annual Passenger Counts	Average of least and most favorable	Total count minus bicycle boardings; Caltrain Feb 2008 Annual Passenger Counts
5	Average Caltrain fare	$3.20	$3.35	$3.35	FY06 average ticket price - Caltrain Short Range Transit Plan, table 3-1, p. 20.	JPB Monthly Meeting Minutes, Report of the Executive Director	JPB Monthly Meeting Minutes, Report of the Executive Director
7	Annual dwell time delay in hours due to bikers	0	0	250	Caltrain 2007 Progress Report shows 95% on-time performance 2003-2007, even though bike boardings increased 45%	Addition of a new bike car will not increase dwell time, it will reduce it by making another car for bicyclists to board.	Caltrain Bike Master Plan Key Findings state 250 hrs dwell time per year due to bikes
8	Caltrain operating cost per hour	$1,757	$1,862	$1,974	Caltrain Short Range Transit Plan, Table 3.1, operating cost per revenue hour in FY06	Assume 6% annual increase in operating expense based on JPB FY09 adopted budget	Assume 6% annual increase in operating expense based on JPB FY09 adopted budget
9	Non-bikers use free shuttles	9.9%	9.0%	8.1%	Assume 10% variation in metric	Caltrain Draft Bicycle Access and Parking Plan	Assume 10% variation in metric
10	Shuttle cost per passenger	$6.60	$6.00	$2.91	Assume 10% variation in CMEQ benchmark	C/CAG benchmark for shuttle operating cost per passenger, City/Count Association of Governments of San Mateo County, Congestion Management & Environmental Quality Committee, packet attached to the agenda for 7/28/08, p. 16.	Caltrain Short Range Transit Plan, Chapter 4, p.28, FY2008 shuttle ridership = 1344874; Adopted FY08 annual operating cost = $2,834,540 (pd by Caltrain) +$1,085,509 (pd by others), Caltrain Short Range Transit Plan,Chapter 4, p 28. and Caltrain FY2009 Budget
11	Non-bikers use buses	23.1%	21.0%	18.9%	Assume 10% variation in metric	Caltrain Draft Bicycle Access and Parking Plan	Assume 10% variation in metric
12	Bus operating cost per passenger	$6.41	$5.80	$2.22	VTA operating cost per boarding in FY07, VTA Short Range Transit Plan, Figure 2-11	Samtrans annual operating expense = $86,371,188 and annual passengers = 14,892, 745: http://www.samtrans.com/pdf/Facts_and_Figures/ST_Facts_Figures_2008_web.pdf	Muni FY2008 Q3 average bus operating cost per passenger; San Francisco Municipal Transportation Authority, Q3FY08 Service Standards Appendix (Jan-Mar 2008), p. 23
13	Passengers/bus/day	120	244	554	Samtrans has 341 buses: http://www.samtrans.org/facts_fleet.html, and carries 14,900,000 passengers per year: http://www.samtrans.org/facts_ridership.html	VTA has 471 active buses, VTA Short Range Transit Plan, section 1.8.1, p. 26, and carries 41,990,098 passengers in FY07, VTA Short Range Transit Plan, Figure 2-13.	Muni has 1005 service vehicles; SFMTA San Francisco Transportation Fact Sheet, May 2008, and 203,373,547 annual passengers excluding cable cars; SFMTA Short Range Transit Plan, p.4-13.
14	Average bus fare	$1.13	$0.84	$0.60	FY07 fare revenue = $16,262,073 and annual riders = 14,351,402; San Mateo County Transit District Short Range Transit Plan FY08-FY17, p. 34.	VTA average fare per boarding for the entire system in FY07, VTA Short Range Transit Plan, Figure 2-13	Muni average fare per passenger excluding cable cars; San Francisco Municipal Transportation Authority, Q3FY08 Service Standards Appendix (Jan-Mar 2008), p. 21
15	Cost of new bus	$500,000	$500,000	$350,000	Hybrid bus: http://www.sfmta.com/cms/mfleet/hybrids.htm	Hybrid bus: http://www.sfmta.com/cms/mfleet/hybrids.htm	Diesel bus: http://www.sfmta.com/cms/mfleet/hybrids.htm
16	Bus lifetime in years	12	12	12	Urban bus lifetime: http://64.233.167.104/search?q=cache:XDkoeuHBF-YJ:www.aqmd.gov/CEQA/documents/2000/aqmd/finalEA/1190/13_IndirectUB.xls+%22bus+lifetime%22&hl=en&ct=clnk&cd=1&gl=us	Urban bus lifetime: http://64.233.167.104/search?q=cache:XDkoeuHBF-YJ:www.aqmd.gov/CEQA/documents/2000/aqmd/finalEA/1190/13_IndirectUB.xls+%22bus+lifetime%22&hl=en&ct=clnk&cd=1&gl=us	Urban bus lifetime: http://64.233.167.104/search?q=cache:XDkoeuHBF-YJ:www.aqmd.gov/CEQA/documents/2000/aqmd/finalEA/1190/13_IndirectUB.xls+%22bus+lifetime%22&hl=en&ct=clnk&cd=1&gl=us

Adjustable Parameters for the Financial Model (cont.)

#	Parameter	Most favorable	Most probable	Least favorable	Reference for most favorable	Reference for most probable	Reference for least favorable
17	Non-bikers use parking spaces	31.9%	29.0%	26.1%	Assume 10% variation in metric	Caltrain Draft Bicycle Access and Parking Plan	Assume 10% variation in metric
18	Square feet per parking space	290	243	180	of 10' x 20' plus 10' x 9' feet maneuvering space: Nonpoint Education for Municipal Officials,	plus 9' x 9' feet maneuvering space: Nonpoint Education for Municipal Officials, Technical Paper Number 5, Parking	size of 7.5' x 15' plus 7.5' x 9' feet maneuvering space: Nonpoint Education for Municipal Officials,
19	Monthly rent per square foot	$5.75	$2.40	$0.75	Prime office space in Palo Alto, http://www.rofo.com/CA/Palo-Alto	Assume 33rd percentile between low and high end	Industrial space in Palo Alto, http://www.rofo.com/CA/Palo-Alto
21	Parking space maintence cost per month	$110	$86	$50	EPA Parking Spaces/Community Places, 2006, p 10	EPA Parking Spaces/Community Places, 2006, p 10	EPA Parking Spaces/Community Places, 2006, p 10

The financial model uses Caltrain weekday ridership counts, though weekend ridership is lower. Segregating weekday and weekend ridership would likely favor the bike car over the non-bike car. Fewer weekend passengers result in lower Caltrain ticket revenue from both bikers and non-bikers. However, non-bikers also result in lower parking and bus revenue, but comparable service-vehicle depreciation and parking-lot costs.

Appendix E: Parameters Used to Calculate Subsidies for Caltrain Passengers

Parameter	Most favorable	Most probable	Least favorable
Average Caltrain fare	$3.20	$3.35	$3.35
Average bus fare	$1.13	$0.84	$0.60
Fee for parking space per day	$2.00	$2.00	$2.00
Caltrain operating cost per passenger	$8.00	$8.38	$8.38
Bus operating cost per passenger	$6.41	$5.80	$2.22
Bus depreciation per passenger	$0.95	$0.47	$0.14
Shuttle operating cost per passenger	$6.60	$6.00	$2.91
Parking space maintenance cost per day	$3.67	$2.87	$1.67
Parking space lost rental income per day	$55.58	$19.44	$4.50

See Appendix D for references.

Appendix F:

Representative Photos of Bicycle and Walk-on Passenger Load

Trains 210, 220, 322

No Space For Bikes on Caltrain:
Representative photos of bicycle and walk-on passenger load.

Page 1

1a: Train 210 @ 22nd St, 6:49am

1b: Train 210 @ 22nd St, 6:49am

2a: Train 220 @ 22nd St, 7:49am

2b: Train 220 @ 22nd St, 7:49am

3a: Train 322 @ 4th & King, 7:59am

3b: Train 322 @ 4th & King, 7:59am

Submitted to JPB Nov 6, 2008 by Benjamin Damm
Photos by Benjamin Damm, Shirley Johnson, George Lane

Trains 226, 332, 365 | No Space For Bikes on Caltrain: | Page 2

Representative photos of bicycle and walk-on passenger load.

4a: Train 226 @ 4th & King St, 8:19am

4b: Train 226 @ 4th & King St, 8:19am

5a: Train 332 @ 4th & King, 8:59am

5b: Train 332 @ 4th & King, 8:59am

6a: Train 365 @ Millbrae, 5:05pm

6b: Train 365 @ Millbrae, 5:05pm

Submitted to JPB Nov 6, 2008 by Benjamin Damm
Photos by Benjamin Damm, Shirley Johnson, George Lane

Trains 267, 275, 277 | No Space For Bikes on Caltrain: | Page 3

Representative photos of bicycle and walk-on passenger load.

7a: Train 267 @ Millbrae, 5:43pm

7b: Train 267 @ Millbrae, 5:43pm

8a: Train 275 @ Burlingame, 6:15pm

8b: Train 275 @ Burlingame, 6:15pm

9a: Train 277 @ Redwood City, 6:25pm

9b: Train 277 @ Redwood City, 6:25pm

Submitted to JPB Nov 6, 2008 by Benjamin Damm
Photos by Benjamin Damm, Shirley Johnson, George Lane

Trains 373, 287, 193

No Space For Bikes on Caltrain:
Representative photos of bicycle and walk-on passenger load.

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10a: Train 373 @ Redwood City, 5:52pm

10b: Train 373 @ Redwood City, 5:52pm

11a: Train 287 @ Redwood City, 7:19pm

11b: Train 287 @ Redwood City, 7:19pm

12a: Train 193 @ Millbrae, 9:33pm

12b: Train 193 @ Millbrae, 9:33pm

Submitted to JPB Nov 6, 2008 by Benjamin Damm
Photos by Benjamin Damm, Shirley Johnson, George Lane

Appendix G: Public Comments on Caltrain's Draft Bicycle Master Plan Key Findings

Caltrain tabulated 386 public comments collected from June 10, 2008 through July 3, 2008 on its Draft Bicycle Master Plan Key Findings [30]. We categorized each comment using ten categories defined by Caltrain. Caltrain's tabulated list of public comments is reproduced below, along with an additional column showing the category for each comment. We used the data to generate Figure 1 in Section 1.3.

Category	Index
CAPACITY	1
INNOVATIVE IDEAS	2
BICYCLISTS' NEEDS/TRAVEL BEHAVIOR	3
ACCESS & PARKING PLAN – GENERAL	4
ONBOARD OPERATIONS/OPERATIONS PROTOCOL	5
STATION SPECIFIC	6
CUSTOMER SERVICE	7
FUNDING	8
SYSTEMWIDE ISSUES	9
OTHER	10

Count	Summary of public comments from Bike Plan – Key Findings July 2008	Category
118	Increase onboard capacity	1
18	Parking improvements don't help me	4
14	I need my bike on both ends	3
14	Charge a fee from bringing bike – I'm willing to pay	2
10	Please don't eliminate bikes from trains	1
5	Please don't reduce capacity	1
4	Reconfigure racks to hold more bikes	1
18	Want advance info of when there's a 2nd bike car	5
4	Transit/shuttle services don't serve me as well as a bike	3
2	Passengers w/o bikes sit in bike car cyclist' seats	5
7	Remove seats to increase racks	1
4	Appreciation for current Caltrain onboard	7
4	Make Bike Cars consistent, i.e. all have 2 or all have one, etc	1
5	No longer bring bike on due to bumping concerns	1
5	Conductors are rude to cyclists	7
2	Would require 2 bikes, one parked at each end	3
3	Europe is a good model	10
3	Bike tags need to be more available. Conductors should provide.	5
8	Will quit riding Caltrain if can't bring bike onboard	3
2	I'm wasting the value of my fare when bumped	3
2	Need more oversight (from conductors) to control bike car traffic	5
1	Dwell time minimized if non-cyclists don't get on/off from northern bike car	5
1	SF bike station schedule too limited	6

Count	Summary of public comments from Bike Plan – Key Findings July 2008	Category
1	(Perception of) AM SB trains are "empty"	1
1	Folding bike not an option if you weigh over certain amount	3
1	Need to provide more room for folding bikes, as luggage racks are filling up	1
8	Have rental bikes (bike share) at stations	2
3	Key findings presentation doesn't mention bikes on cars issue.	10
19	Every train [consist] should have two bike cars	1
1	Bike vandalized at Cal. Ave. Security an issue there so parking not an option.	6
3	Concern that lockers being moved at Palo Alto will not be replaced.	6
1	Bumping at Bayshore station. E.g. what about non-"top 10" stations.	6
1	Need to understand why focus on only Top 10 stations.	4
1	Folding bike – Denmark model for smaller size that fits under seats.	1
1	Conflicts with stair channels/ADA ramps too narrow.	4
3	The draft plan comment period should be 30 days, not 10 days.	10
1	22nd street needs lockers.	6
2	Commuter check should be used to buy bikes.	2
1	Keep Gallery car instead of Bombardiers. They have more bike capacity.	1
10	Conductors need to enforce bikes on board rules e.g. tags at all times.	5
1	Santa Clara station has no bike lockers.	6
3	Need valet bike station at Palo Alto.	6
9	Need bike queues at platforms.	9
6	Let bikes board first to reduce dwell time.	5
2	Charge an additional monthy [sic] fee for bringing your bike on board.	2
2	Need security cameras at bike racks.	9
1	Like monthly lockers at Hillsdale.	6
4	Need stairs ramps to board Gallery cars; difficult for women, short statured persons.	5
1	Likes folding bike subsidy.	2
3	Need take a number system for boarding.	5
1	Giants games riders are obnoxious and drunk.	9
4	Folding bikes don't fit under seats.	5
1	Please list pros and cons of innovative concepts.	2
1	Person doesn't believe 7% data is true. Thinks it's much more.	10
2	Should have foldable seats for bike storage when not in use.	5
4	Use ACE model- hooks instead of racks on bike cars for more space.	1
1	Need safer bike parking at Hillsdale.	6
1	How much does it cost to add another bike car.	1
1	Where do I purchase folding bikes?	10
2	Need a baggage car for folding bikes. Luggage car too full.	1
1	Incentivize increased locker use/parking by providing free bike lockers.	9
1	Have a design contest to see who comes up with most efficient use of bike car space.	1
6	It's not a bicycle master plan; it's parking and access plan.	4
2	It's not a bicycle master plan and Caltrain is misappropriating FTA funds by not using it for this purpose.	8
4	Bike master plan is not based on any real data or evidence on existing or future ridership. In addition, you are "cherry picking" data.	4
1	Bicycle Master Plan is not integrated into existing documents, such as the Caltrain strategic plan.	4

Count	Summary of public comments from Bike Plan – Key Findings July 2008	Category
1	The BMP should lead to development of a second document from which a priority list of projects should be developed.	4
1	BMP should identifiy [sic] potential funding sources and opportunities for enhancing the bicycle program.	8
1	Caltrain's bike boarding system is inconsitent [sic] and haphazard. Needs to address consistent level of onboard capacity.	5
1	SFBC does not support any of innovative concept ideas. Want focus to be on capacity.	1
1	Can we have bike racks on outside of trains, like buses do?	5
3	Don't believe 7% number is true, because not counting latent demand.	10
1	So. SF station also needs access improvements.	6
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Appendix H: Public Comments on Caltrain's Draft Bicycle Access and Parking Plan

Caltrain tabulated 372 public comments collected from August 11, 2008 through September 9, 2008 on its Draft Bicycle Access and Parking Plan (formerly Draft Bicycle Master Plan) [30]. Caltrain defined ten categories, and assigned each comment to a category. Caltrain's tabulated list of categorized public comments is reproduced below. We recommend re-categorizing comments with asterisks (*) from category 5 to category 1, because category 1 seems more appropriate. Using the recommended categories, we generated Figure 2 in Section 1.3.

Category	Index
CAPACITY	1
INNOVATIVE IDEAS	2
BICYCLISTS' NEEDS/TRAVEL BEHAVIOR	3
ACCESS & PARKING PLAN – GENERAL	4
ONBOARD OPERATIONS/OPERATIONS PROTOCOL	5
STATION SPECIFIC	6
CUSTOMER SERVICE	7
FUNDING	8
SYSTEMWIDE ISSUES	9
OTHER	10

Count	Draft Bike Plan Comments Tallied through 9.9.08	Category
13	don't think it will be effective to increase bike parking	1
22	unspecified comment on capacity	1
17	like SFBC's plan better	1
90	more bikes on board	1
1	prefer more bike capacity, even w/out seat in sight of racks	1
5	future plans should tackle capacity issue	1
12	support SFBC version of bike plan [which is all about capacity]	1
2	environmental benefit vs. financial bottom line – so support more bikes onboard	1
1	do NOT increase onboard capacity	1
27	don't like fees for bikes on board	2
9	likes fees for bikes on board	2
1	if fee for BOB during peak, then should be uniform peak surcharge	2
4	supports folding bike subsidy	2
7	likes bikeshare program idea	2
6	needs predictable info on capacity	2
6	support real time info; announce second bike car	2
3	doesn't support folding bike subsidy	2
18	needs bike on both ends	3
2	please increase train frequency	3
1	monthly pass holders should have priority and not get bumped	3
1	most Caltrain bike riders are low income	3
1	rides Caltrain instead of BART due to BART peak period bike restrictions	3
3	promote people using 2 bikes, one on each end	3

Count	Draft Bike Plan Comments Tallied through 9.9.08	Category
5	supports the Caltrain bike parking and access plan	4
2	likes plan to increase bike parking at station	4
1	support Caltrain plan for improved bike access to platforms	4
1	critique of capacity (7%) defining usage [doesn't count latent demand]	4
1	let bicyclists board whichever car they want	5
5	pls reconfigure cars to improve operations- general	5
1	conductors are rude about lack of capacity	5
5	pls improve on-off loading of bike process/conductor responsibilities	5
20	pls put 2 bike cars per train	5*
4	allow bikes to board first	5
10	enforce a rule to prevent people w/o bikes from riding in bike car	5
12	remove seats for more bike space	5*
1	narrow one of the two doors of bike cars to allow more room for bikes on board	5*
3	vertical storage for on board racks	5
1	bunch racks together on bombardier bike cars	5
1	do a good job, can do a bit better in explaining trade off of removing seats	5
5	can racks on board be redesigned?	5
2	don't eliminate bikes on board [SFBC communication indicated Caltrain was eliminating program altogether]	5
1	allow only bikers to board Gallery car – northern most car	5
2	make more space available on board for folding bike storage	5*
1	replace fixed seats with fold up seats	5
2	source of dwell time delay cost?	5
1	make train consists consistent	5
1	add designated storage area for folding bikes	5
1	relocate hand pole of Gallery car doors	5
1	allow electronic, secured access to valet bike station when valet hours are over	6
1	san mateo station needs a bike station (secured parking)	6
1	why bike lockers at 22nd street being reduced?	6
1	no access at SM on RR Ave so cyclists hopping fence	6
1	wants more bike racks at Palo Alto	6
1	what happened to lockers at Lawrence station?	6
1	add more bike parking on NB side of RC platform, crossing gate takes time	6
1	crosswalk at Arguello and Broadway needed as opposed to locker relocation	6
1	assessment of issues at Mtn View station is correct	6
1	education campaign needed for "rookie bikers" who increase dwell time	7
2	improve conductor enforcement of current policies	7
2	support for Caltrain plan for improved marketing/education	7
2	have more bike tags available	7
1	give a discount on bike locker rental if I buy a monthly pass	7
1	it's helpful when conductors announces there are 2 bike cars	7
1	thinks conductors should be able to manage capacity ahead of train stop	7
1	have folding bikes folded and not allow in bike car.	7
2	Funding the bike plan recommendations is a waste of public money	8
1	Chapter 3- clarify quickly securing bike if going to be bumped.	9
1	supports e lockers	9
1	supports e lockers. Plan should state support more strongly.	9

Count	Draft Bike Plan Comments Tallied through 9.9.08	Category
1	support abandoned bike abatement, so long as clear notification.	9
1	make bike parking free and secure.	9
1	Doesn't like current policy on basket/panier restriction. Not evenly enforced. Not in scope of plan	10
1	have a Caltrain dining/brewery car with flat screen tv's. not in scope of plan	10
1	build more passengers shelters, especially MV and PA not in scope of plan	10
1	distribute 10-ride validators more evenly throughout platforms not in scope of plan	10
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