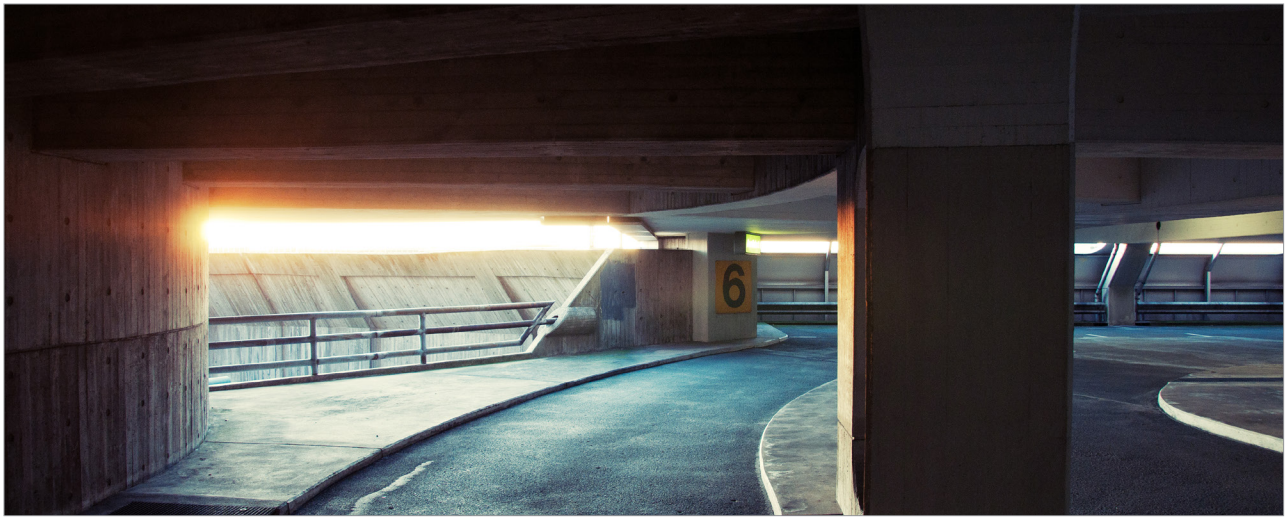

San Francisco Parking Supply and Utilization Study

SUMMARY REPORT

NOVEMBER, 2016

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ACKNOWLEDGEMENTS

This final report and study are the result of the hard work, dedication, and enthusiasm of a number of people and organizations.

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Introduction

PARKING SUPPLY AND UTILIZATION STUDY CONTEXT AND PURPOSE

Improving mobility and managing congestion are important elements in sustaining San Francisco's role as a growing social and economic center. According to the Texas Transportation Institute's 2015 Urban Mobility Scorecard, the San Francisco-Oakland urban area experienced the country's third-highest yearly hours of delay per auto commuter in 2014.[1] With high projected housing and job growth in northeastern San Francisco, travel demand will continue to increase. The core network can only accommodate approximately half of the motorized vehicle demand increase forecasted for 2040 before reaching perpetual gridlock during peak periods.[2] Managing congestion and encouraging alternative modes of travel is a core function of the San Francisco County Transportation Authority (Transportation Authority) and aligns with the City's Transit First Policy as well as the San Francisco Transportation Plan's Livability, Economic Competitiveness, and Healthy Environment goals.

Given these critical challenges, the Transportation Authority Board and stakeholders requested that the Transportation Authority staff explore how policies that address parking demand and supply could help manage congestion. The Study was funded by the Federal Highways Administration through the Value Pricing Pilot Program, the Metropolitan Transportation Commission, and the Proposition K Half-Cent Sales Tax for Transportation. This summary report provides an overview of the study, its methodology, and findings. A more extensive technical report elaborates more fully on the content included herein.

An earlier Transportation Authority effort, the Mobility, Access and Pricing Study (MAPS), examined the feasibility of cordon-based pricing, which involves charging drivers a user fee to drive into or out of specific congested areas or corridors during certain times of day, and using the revenue generated to fund transportation improvements. MAPS found that congestion pricing would be a feasible way to meet San Francisco's goals for sustainable growth.[3]

More recently, the San Francisco Municipal Transportation Agency (SFMTA) conducted the SFpark pilot program, which tested a new parking management system at many of San Francisco's metered on-street spaces and City-owned parking garages. The SFpark evaluation demonstrated that demand-responsive pricing can improve parking availability and yield secondary benefits, including reduced local congestion and mobile emissions.

1 http://d2dtl5nnlpfr0r.cloudfront.net/tti.tamu.edu/documents/ums/congestion-data/national/national-table-all.pdf.

2 San Francisco Transportation Plan 2040 – Appendix C: Core Circulation Study. The "core" refers to the Downtown, South of Market (SoMa), and Mission Bay neighborhoods.

3 http://www.sfcta.org/transportation-planning-and-studies/congestion-management/mobility-access-and-pricing-study-home.

FIGURE 1. San Francisco Parking Types

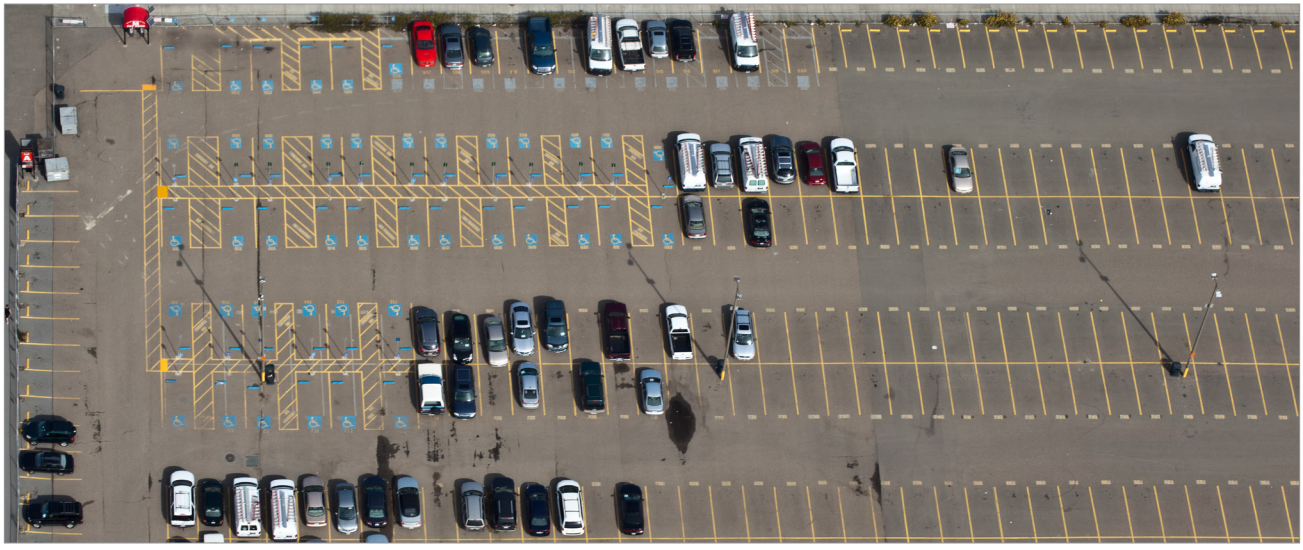
LOCATION	RESIDENTIAL/ NONRESIDENTIAL	OPERATOR/ MANAGER	ACCESS	NAME AND EXAMPLES	PARKING SUPPLY DATA SOURCES
Off-Street	Nonresidential	Private companies	Public	Publically accessible, privately operated parking (e.g., most garages advertising parking to street traffic)	Off-Street Census, Costar, Operator Survey, Supply Survey
Off-Street	Nonresidential	SFMTA	Public	Public parking garages (e.g., SFpark garages/lots)	Off-Street Census
Off-Street	Nonresidential	Private companies	Private/ public	Customer parking only (e.g., exclusive parking for retail customers); parking publicly available to anyone as a customer	Off-Street Census, Costar, Operator Survey, Supply Survey
Off-Street	Nonresidential	Private companies/ Government agencies	Private	Permit holder only (e.g., employee-only parking provided by private- or public-sector employers)	Off-Street Census, Costar, Operator Survey, Supply Survey
Off-Street	Nonresidential	Government agencies	Public	Free off-street parking (e.g., parking at public sites such as beach or parks)	Off-Street Census
Off-Street	Residential	Residences	Private	Residential parking (e.g., parking spaces in driveways or garages in or attached to private homes)	N/A
On-Street	Nonresidential	SFMTA	Public	On-street parking (e.g., metered or unmetered street parking)	On-Street Census, SFpark Meter Database

This study, the Parking Supply and Utilization Study (PSUS), evaluated the feasibility of several parking-related strategies for congestion reduction through shifting trips from auto to non-auto modes (mode shift) or shifting trips to less congested time periods (peak spreading). To better inform the evaluation, the Study also performed data collection and estimated the total supply of off-street nonresidential parking spaces.

Parking Supply

In order to better inform the analysis of candidate strategies, PSUS developed a parking supply model to estimate the amount of off-street, nonresidential parking in a study area slightly smaller than the NE Quadrant (Figure 4, next page). The model estimated undocumented parking supply that might not be reflected within existing data sets, focusing particularly on privately accessible parking. The existing SFpark Off-Street Census extensively documents publically accessible parking lots and garages plus some privately accessible lots and garages. Additional data sources, including parking garage operator surveys, were collected as part of PSUS.[4] Figure 1 lists data sources (rightmost column) for the types of parking described in the Introduction. The supply model was based on regression analyses to estimate the number of parking spaces at nonresidential properties in the Study Area based on property character-

4 The PSUS Technical Report describes these datasets in greater detail.



istics and other available data. Basic assumptions about parking supply in the Study Area were used to extrapolate supply estimates to other parts of the City. More detail can be found in the PSUS Technical Report.

PARKING SUPPLY ESTIMATES

Figure 2 shows the number of parking spaces from existing data sources and as estimated by the model in an area slightly smaller than the NE Quadrant. The supply model predicted a relatively low number of nonresidential, off-street parking spaces and locations beyond what the extensive SFpark Off-Street Census and parking operator survey already documents in the Study Area. This parking is likely to exist at parking garages or lots that are not readily advertised as publically available parking, such as permit holder only or customer only parking.

Figure 3 estimates the number of spaces city-wide, extrapolating the findings of the model outside the study area.

FIGURE 2. Off-Street, Non-Residential Parking Supply in Study Area

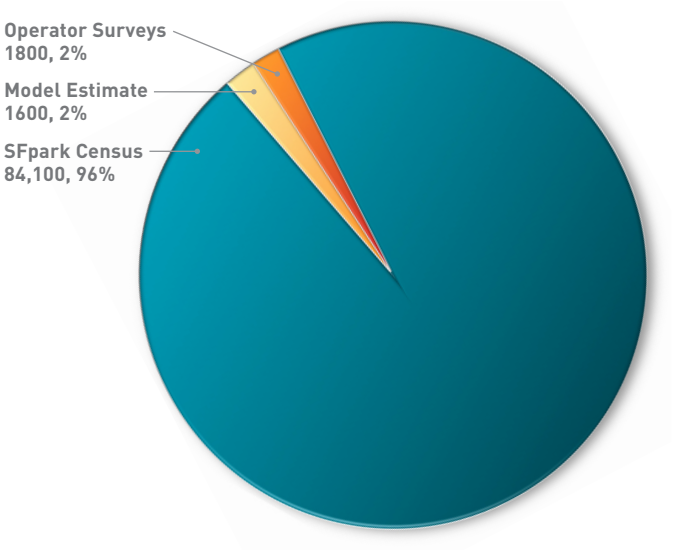


FIGURE 3. Estimated Number of Off-Street, Nonresidential Parking Spaces by Geography and Census Status, Median Supply Model Result

	CENSUS	MEDIAN UNDOCUMENTED ESTIMATE	TOTAL
Study Area	84,100	3,300	87,400
Outside Study Area (extrapolated)	81,500	3,100	84,600
Citywide (extrapolated)	165,600	6,400	172,000

Strategy Evaluation

In tandem with the parking supply analysis, the Study completed a process of strategy generation, screening, and evaluation. This section outlines the methodology and results of that process. More detail can be found in the PSUS Technical Report.

ANALYSIS GEOGRAPHIES AND TIMEFRAMES

This report frequently discusses analysis and results for the city as a whole and the Northeast Quadrant. The Northeast Quadrant is defined based on the cordon boundaries that the MAPS study identified in its top-performing scenario. This area is bounded by Guerrero Street/Laguna Street to the west, 18th Street to the south, and San Francisco Bay to the north and east. Using the same geographic boundaries here in this study offers the opportunity to examine selected differences in transportation performance outcomes between cordon pricing and parking strategies.

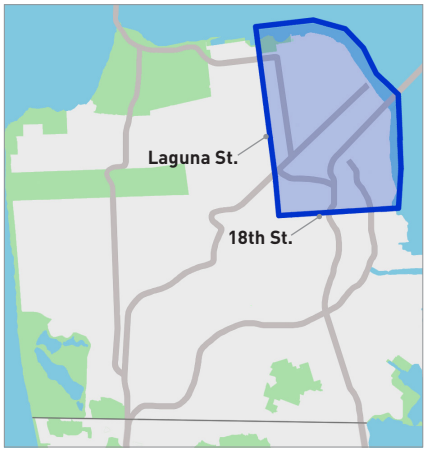


FIGURE 4. Northeast Quadrant Boundaries

The report also focuses on two different timeframes: the AM peak, which spans from 6:00 a.m. to 9:00 a.m., and the daily 24-hour total. Four "timeframe-geography pairings" refer to the unique combinations of these two variables. SF-CHAMP includes other timeframes and geographies. However, AM peak and PM peak results were similar; for simplicity purposes, this report discusses AM Peak only as a representation of peak travel rather than showing analysis for both timeframes.

EVALUATION METRICS

The evaluation focused on metrics that reflect the study's goals of 1) shifting trips from drive alone to other modes, including transit, carpool, and active transportation, and 2) reducing congestion. The study emphasized three transportation performance metrics to assess the extent to which parking strategies helped move the City towards those two goals: drive-alone trip mode share, vehicle miles traveled (VMT), and vehicle hours of delay (VHD). Mode

shifts are described as percentage point changes[5] and VMT and VHD reductions are described as percent changes. All evaluation was conducted in the 2015 base year.

The report also discusses parking-related revenue. The report refers to public revenue (i.e., City and County of San Francisco revenues), which include estimated parking tax revenue (i.e., the existing 25% parking sales tax[6]) and fee revenue associated with the evaluated strategies. Baseline revenue refers to the estimated public revenue in the SF-CHAMP baseline scenario, not actual dollar amounts collected; revenue associated with particular strategies are often compared to baseline revenue, and percent change is more important than actual dollar amount. Garage operator revenue refers to the sales generated by privately and publically operated garages; the parking tax revenue constitutes 25% of this amount. The study assumed that all fees associated with an evaluated strategy would first offset the strategy's implementation cost and then fund a transportation expenditure plan. However, the study did not explore the components of these potential expenditure plans.

PARKING STRATEGIES

At its onset, PSUS compiled a list of candidate parking strategies through literature review, discussions with San Francisco stakeholders and other City agencies. The team then screened the strategies based on 1) effectiveness—i.e., a strategy's potential to meaningfully reduce drive-alone mode share and congestion, and 2) ability to evaluate— i.e., the availability of tools (e.g., travel demand model, analytical best practices) and data to sufficiently measure a strategy's impact. Figure 5 lists the 13 strategies carried forward for evaluation, grouped into four categories discussed in the remainder of this section: Fee-Based, Bulk Discount Elimination, Supply, and Cashout. The PSUS Technical Report contains a more extensive list and more detailed description of all candidate strategies considered and the screening process.

Parking Fee Strategies

The study evaluated several types of parking fee strategies which involve a flat surcharge to the driver or the owner of a parking space. The Annual Parking Space Fee strategy levies an annual fee for parking spaces and assumes landlords will pass on this increased fee to drivers in the amount they pay. The All-Day Fee strategy, charges a flat fee each time that paid parking is consumed in the Northeast Quadrant during the AM peak, midday, and PM peak periods. The Peak Fee strategy charges a flat fee each time that paid parking is consumed in the Northeast Quadrant during only the AM peak and PM peak periods. For both of the all day and peak period flat fee, it is assumed that drivers who have parking subsidized by their employers would

5 A 1.0 percentage point reduction in a 15 percent drive alone mode share is roughly a 6.7 percent reduction.

6 SFMTA receives 80 percent of parking tax revenues. These parking tax revenues do not include sales from on-street meters or SFMTA owned/operated garages and lots, the proceeds of which go 100% to the SFMTA operating budget .

FIGURE 5. Strategy Evaluation Reference

CATEGORY	STRATEGY	TRIPS AFFECTED	TIME PERIOD
Fee-Based	Annual parking space fee: fee passed onto driver	Unsubsidized work, Nonwork trips that park in NE zone	24-Hour
Fee-Based	Flat all-day fee	Unsubsidized work, Nonwork trips that park in NE zone	All-Day
Fee-Based	Flat peak fee	Unsubsidized work, Nonwork trips that park in NE zone	AM/PM Peak
Fee-Based	Universal parking access fee	All non-residential trips that park in NE zone	AM/PM Peak or All-Day*
Bulk Discount Elimination	Monthly discount elimination	Unsubsidized work, Nonwork (all of SF)	24-Hour
Bulk Discount Elimination	Monthly and hourly discount elimination	Unsubsidized work, Nonwork (all of SF)	24-Hour
Bulk Discount Elimination	Parking sales tax bulk discount elimination incentive	Unsubsidized work, Nonwork (all of SF)	24-Hour
Bulk Discount Elimination	Parking fee bulk discount elimination incentive	Unsubsidized work, Nonwork (all of SF)	24-Hour
Supply	SFMTA garage redevelopment	All trips that park in SF	24-Hour
Supply	Parking supply cap	All trips that park in SF	24-Hour
Supply	Parking supply cap and trade	All trips that park in SF	24-Hour
Cashout	Increased cashout enforcement	All trips that park in SF	24-Hour
Cashout	Expanded cashout law	All trips that park in SF	24-Hour

* The all-day timeframe spans the AM Peak, Midday, and PM Peak (6:00 a.m. 6:30 p.m.).

also have the fee subsidized (i.e., they would not experience the increased fee). The Universal Access Fee is similar to the other flat fees except that it assumes that all drivers, including those who have parking subsidized by employers, would pay the increased fee amount.

The study focused on two fee amounts: $3 and $6. Based on past analysis of pricing strategies and the intercept survey results from this study, a $3 fee is likely to be high enough to influence travel behavior at meaningful levels, while still being relatively modest compared to other costs of transportation use. The $6 fee, at twice the level of the $3 fee, represents a high book-end estimate of how parking fees could influence transportation performance.

Bulk Discount Elimination Strategies

Bulk discount elimination based scenarios involve removal of long term (either monthly or daily) parking pricing offerings. When drivers have to pay incrementally for their parking usage, the mode choice decision better reflects the true costs to the traveler for that trip because they are able to save money on days when they don't drive.[7] Therefore, the team developed several bulk discount elimination strategies. The Monthly Discount Elimination strategy would mean that drivers could not receive a discounted cost for purchasing parking for periods of greater than a day (i.e., 20 days of parking would be 20 times the daily rate). The Monthly and Daily Discount Elimination strategy would work similarly, except that drivers would be required to purchase parking on an hourly basis without any discount for longer term parking (e.g., all day parking would be at least eight times the hourly rate). The other two strategies involve using incentives through sales tax or fee reductions for garage operators who eliminate bulk parking rates rather than requiring these parking pricing structures legislatively.

Supply Strategies

While the other strategies evaluated in this study focus on managing parking demand through direct manipulations of price, this set of strategies would attempt to manage travel demand by changing the available parking supply in San Francisco. SFMTA Garage Redevelopment strategy would involve removing all SFMTA public garages from the parking supply. Parking Supply Cap strategy caps parking supply at 2015 levels so that it does not grow in future years and the final strategy allows buildings to trade the rights to build parking spaces among themselves.

7 The transportation performance results assume that hourly pricing remains the same after discount elimination. In reality, garage operators might be able to maximize revenue by lowering hourly rates in order to attract more customers, though this section's findings suggest that this might not necessarily be the case.

Cashout Strategies

The study examined two strategies involving parking cashout, which is the practice whereby employers that subsidize employee parking offer these employees the option of taking a cash subsidy in lieu of a parking space. Increased Cashout Enforcement involves a broader enforcement of the existing California cashout law while the Expanded Cashout Law strategy examines the idea of extending the cashout requirements to firms not currently covered by the law (e.g., smaller firms).

EVALUATION APPROACH

PSUS sought to evaluate how parking strategies affect congestion through changes in mode share and peak spreading in San Francisco. It focused on parking strategies related to nonresidential, off-street parking. Data collection and analysis, plus the SF-CHAMP travel demand model capabilities, shaped the evaluation approach. Ultimately, a combination of SF-CHAMP model outputs and other quantitative and qualitative analyses (informed in part by estimates of parking supply), were used to evaluate the individual parking strategies. More details can be found in the PSUS Technical Report.

FINDINGS

This section includes a comparison of the various strategies representing each of the categories rather than the results for every strategy. A detailed description of the methodology and results for all strategies can be found in the PSUS Technical Report. The study evaluated strategies based on their impact on mode share, VMT, and VHD for different time periods and geographies and then determined the resulting changes in parking-related revenues.

Across the different strategy types, the parking scenario model results showed modest performance improvement

The travel demand model results showed that driver response to parking scenarios was somewhat modest. Parking price changes alone may play a relatively minor role in underlying trends in congestion and delay, but they may be an effective tool as part of a larger demand management

of a relatively similar amount. Figure 6 depicts the overall mode splits for each scenario, including the baseline, during the AM Peak in the Northeast Quadrant. The bars show how reduced drive-alone trips redistribute among remaining modes. In the $6 peak fee scenario, for instance, drive-alone and carpool trips decreased by 2.5 and 0.7 percentage points whereas transit and nonmotorized trips increased by 2.2 and 1.0 percentage points. Under the strategy scenarios, carpool trips tended to decrease along with drive-alone trips rather than absorb them. Transit tended to absorb more reduced auto trips than nonmotorized.

Figure 7 (next page) shows percent change in VMT, and Figure 8 (next page) shows percent change in VHD. The re-

The combined monthly and daily bulk discount elimination achieved mode shift and congestion reductions that rival or exceed those of the $3 fees in some timeframe-geography pairings.

sults indicated that changes in VMT and VHD are proportional; for a given scenario, VMT reduction performance relative to other scenarios tended to be the same as VHD performance relative to other scenarios. Similarly, results tended to be proportional to mode shift results for each scenario. The $6 peak fee reduced VMT by 4.2 percent and VHD by 7.3 percent in the Northeast Quadrant during the AM peak, higher than the other scenarios. Eliminating employer-paid parking had lower VMT and VHD reductions in the SF-CHAMP output than most of the other scenarios.

Figure 9 (next page) compares City and County of San Francisco revenues for each scenario in two components: the existing 25 percent parking sales tax and parking fees associated with the scenarios. The three parking fee scenarios would substantially increase public revenue. The $6 peak fee captured more revenue than the $3 fees, increasing baseline public revenue by 131 percent. The $3 all-day fee would increase baseline public revenue by 118 percent, significantly more than the $3 peak fee, which showed a 71 percent increase. For most of the scenarios, existing parking tax revenue decreased slightly as individuals shift modes or timeframes. However, the no monthly discount scenario increased tax revenue compared to the baseline (SF-CHAMP does not account for parking operators changing the cost of hourly/daily parking to maximize profits; this would minimize the effect of increased revenues in this scenario).

Supply Based Approaches

For the supply based approaches, PSUS used an analysis that examined parking occupancy versus the overall supply, and then looked at how a reduction in the number of spaces could meet remaining demand. The Study found that it may be challenging to affect a significant amount of parking supply to equal the breadth of demand strategies which easily encompass a large share of existing parking spaces, particularly in the near term. For example, a redevelopment of all the SFMTA garages could effect a mode shift of less than 0.1% from drive alone vehicles. In addition, the Transportation Sustainability Program's Transportation Demand Management effort (tsp.sfplanning.org; Shift) was presumed to encompass San Francisco's strategy for managing parking supply in future development as part of a larger demand management approach,

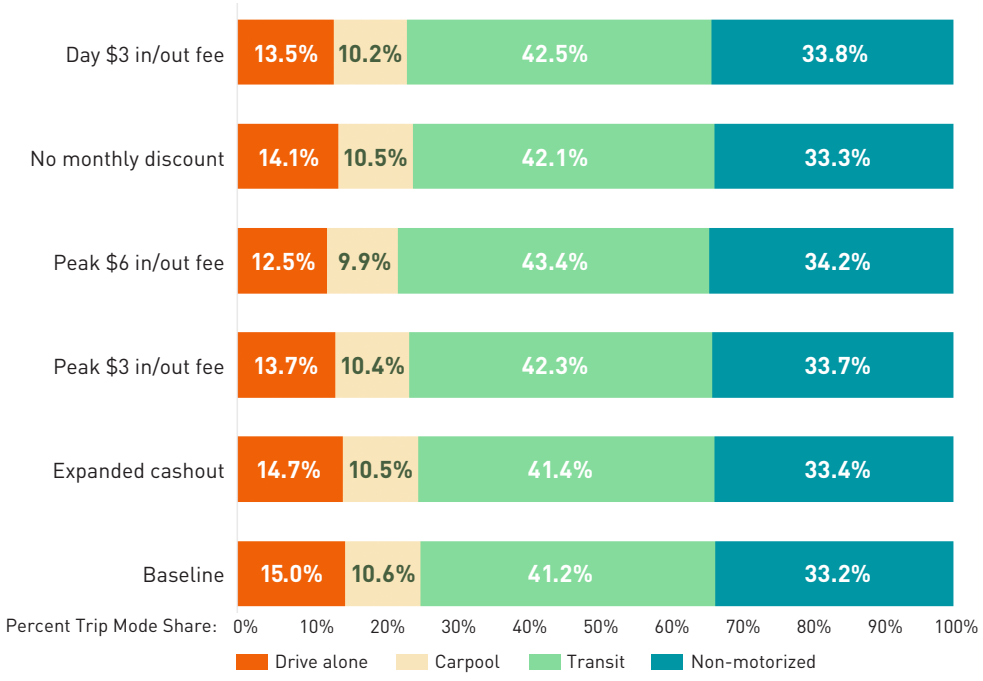
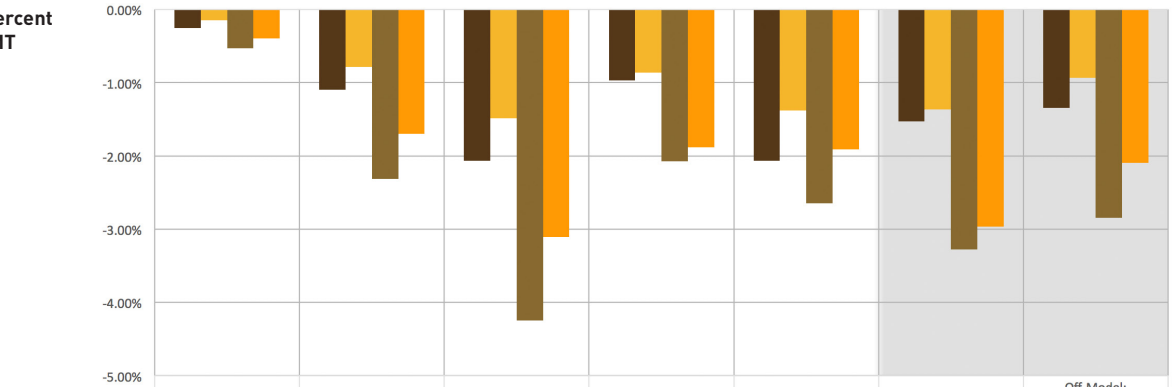


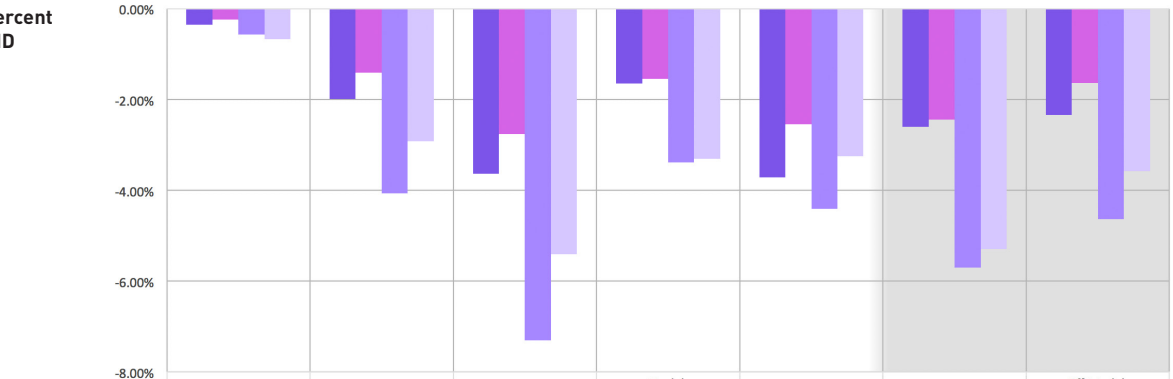
FIGURE 6. AM Peak, To/From/Within Northeast Quadrant Trip Mode Share by Scenario

FIGURE 7. Percent Change in VMT



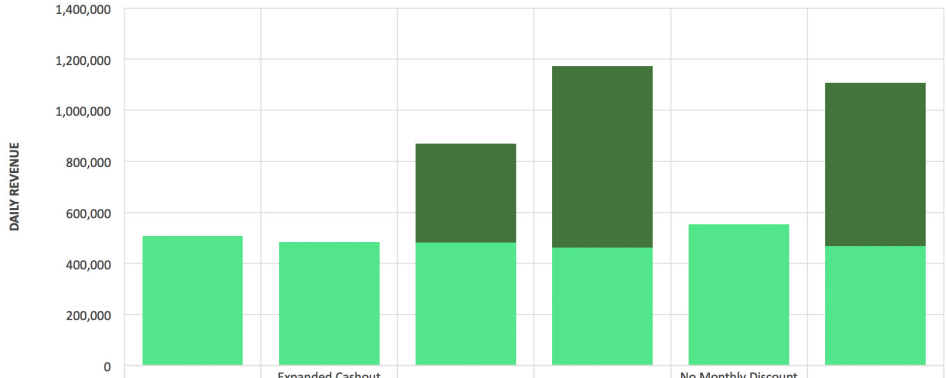
	Model: Expanded Cashout (7B)	Model: Peak $3 Fee (4Bi)	Model: Peak $6 Fee (4Bii)	No Monthly Discount (2B)	Model: All-Day $3 Fee (4A)	Off-Model: No Discount (2A,2C,2D)	Off-Model: Univ. Acc. Peak $3 Fee (3)
24-Hour, NE SF	-0.3%	-1.1%	-2.1%	-1.0%	-2.1%	-1.5%	-1.3%
24-Hour, All SF	-0.1%	-0.8%	-1.5%	-0.9%	-1.4%	-1.4%	-0.9%
AM Peak, NE SF	-0.5%	-2.3%	-4.2%	-2.1%	-2.6%	-3.3%	-2.8%
AM Peak, All SF	-0.4%	-1.7%	-3.1%	-1.9%	-1.9%	-3.0%	-2.1%

FIGURE 8. Percent Change in VHD



	Model: Cashout (7B)	Model: Peak $3 Fee (4Bi)	Model: Peak $6 Fee (4Bii)	Model: No Monthly Discount (2B)	Model: All-Day $3 Fee (4A)	Off-Model: No Discount (2A,2C,2D)	Off-Model: Univ. Acc. Peak $3 Fee (3)
24-Hour, NE SF	-0.3%	-2.0%	-3.6%	-1.6%	-3.7%	-2.6%	-2.3%
24-Hour, All SF	-0.2%	-1.4%	-2.8%	-1.5%	-2.5%	-2.4%	-1.6%
AM Peak, NE SF	-0.6%	-4.1%	-7.3%	-3.4%	-4.4%	-5.7%	-4.6%
AM Peak, All SF	-0.7%	-2.9%	-5.4%	-3.3%	-3.2%	-5.3%	-3.6%

FIGURE 9. City and County of San Francisco Daily Revenue by Scenario



	Baseline	Expanded Cashout (7B)	Peak $3 Fee (4Bi)	Peak $6 Fee (4Bii)	No Monthly Discount (2B)	All-Day $3 Fee (4A)
Fee	0	0	$386,387	$711,413	0	$640,889
25% Parking Tax	$508,078	$483,064	$482,895	$462,019	$553,664	$467,353

and PSUS therefore did not pursue the larger parking cap approach in detail.

Comparison of Cordon Pricing versus Parking Pricing

Comparing the parking strategies to the MAPS preferred scenarios is challenging since the modeled cordon pricing scenarios had significant transportation investments, which made alternative modes more attractive than the baseline. However, the study team did analyze the performance of a cordon pricing scenario ($3 peak fee for autos crossing the cordon during the AM and PM peak periods, $6 max per day.) without the transportation investments in order to compare the performance of a cordon based approach versus a parking fee based approach. The results indicate that cordon based pricing would likely be significantly more effective (more than twice) in reducing VMT and VHD as well as having a greater influence over mode shift for fees of a similar amount (i.e., Strategy 4B). The higher effectiveness of cordon based strategies can be explained by the fact that the downtown parking strategies do not apply directly to the approximately 110,000 daily vehicle through trips with origins and destinations outside the pricing or policy area (close to 50,000 of which occur during the AM and PM peak periods, representing approximately 16% of all driving trips.). In addition, those pass-through driving trips may be more sensitive to price changes since they are not paying the higher parking costs typical for downtown destinations. Therefore, from a technical standpoint, a cordon based pricing tool may be more effective than a parking based pricing approach.

Technical and Other Considerations

While this summary report only discusses technical performance, the PSUS Technical Report includes discussions on implementation considerations such as technologies, required approvals, and public perception of each of the strategies. Had the Study recommended advancement of any of the strategies, more discussion of these factors would have been included in this summary report.

Conclusion

PSUS found that the evaluated parking strategies perform modestly in mitigating area-wide congestion, and were less effective than the preferred cordon pricing scenario examined in MAPS. This may, in part, be a reflection on the off-street parking environment in downtown San Francisco. Parking is already priced high due to market demands, made even more expensive by a 25% parking tax. As a result, much of the impact on demand that could be made using off-street parking pricing has already happened. While some of these strategies could be part of a larger congestion management effort within a changed political context, this study recommends continued support of parking related initiatives such as the Residential Parking Permit Evaluation and Reform Project[8] and implementation of the Transportation Demand Management (TDM) Ordinance as part of the Transportation Sustainability Program.[9] The latter program requires land use developers to include onsite demand management measure to reduce VMT and project related transportation impacts by offering alternatives to single occupancy driving. The most effective measure (and therefore the most incentivized) is to reduce on-site parking. However, as part of the larger TDM approach, the changes to parking are likely to be even more effective. This Study also recommends continued piloting and evaluation of pricing based approaches to demand management such as the Treasure Island Mobility Management Program,[10] the Freeway Corridor Management Study,[11] and BART Perks[12] pilot program. Based on the results of those programs and the near and long term approaches to congestion, San Francisco agencies could consider further pursuit of other pricing initiatives, including revisiting cordon based pricing.

8 https://www.sfmta.com/projects-planning/projects/residential-parking-permit-evaluation-reform-project
9 www.tsp.sfplanning.org
10 www.sfcta.org/timma
11 www.sfcta.org/fcms
12 www.sfcta.org/BART-perks