FINAL SAR 06-1

STRATEGIC ANALYSIS REPORT

on the Feasibility of Redesigning Folsom Street

Initiated by Commissioner Daly

Adopted by the Authority on March 21, 2006

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I. SUMMARY

This SAR considers the role and design of Folsom Street given the changing nature of land uses in the South of Market Area. There is demand for more neighborhood services and amenities suitable for the established and emerging residential uses along with a desire to maintain the vitality of the many small production, distribution and repair businesses. There are also growing concerns about pedestrian/auto conflicts and safety issues, as well as a desire to develop neighborhood streets as more inviting and accessible public open spaces. Various neighborhood boulevard alternatives including one-way and two-way designs are examined. These designs reflect possible ways to balance the increasingly larger role of neighborhood land uses in SOMA with the strategic importance of Folsom in providing access to and from the freeway system and between downtown and other parts of the city. We conclude that while additional operational analyses are required to fully investigate and optimize each alternative, some redesign of Folsom is needed. Conversion to two-way operation may be most appropriate on the segments of Folsom west of 4th Street due to existing and projected congestion levels near the bridge approaches. The selection of a preferred alternative will depend on a balancing of policy goals, public and agency input and careful consideration of strategic choices for neighborhood and transportation system development.

A. About SARs: Purpose of Document

This Strategic Analysis Report (SAR), initiated at the request of Commissioner Daly, analyzes the transportation feasibility of a boulevard treatment for Folsom Street in response to the rapid redevelopment of the South of Market (SOMA) area of San Francisco as an active and growing neighborhood. This SAR focuses on the current and future transportation needs on Folsom, but also considers Howard Street, in recognition of their operation as a one-way pair. The SAR explores potential designs for Folsom that the City could pursue to better accommodate the transportation needs of people living and working in, traveling to and from, and passing through SOMA. Additional information is available from the sources cited, or by contacting Tilly Chang, Deputy Director of Planning, at (415) 522-4832.

B. The Issue

The South of Market Area of San Francisco (SOMA) is experiencing a rapid transition of land uses. Once primarily industrial, it has been experiencing redevelopment with higher and medium-high density housing, small businesses and a new office district at its eastern end, near the waterfront.

The new residential, commercial, and retail developments are causing a shift in the transportation needs within SOMA. Although there are still many automobiles passing through on their way to and from the multiple freeway access point, an increasing number of trips are beginning and/or ending within the neighborhood. There is a growing need to accommodate these local trips and to improve the desirability of making these trips by transit, bicycle, or on foot, as well as to improve the streetscape as a valued public space.

Much of the new residential development is occurring along or near Folsom and Howard Streets with Harrison and Bryant expected to experience much less residential development. Folsom and Howard are currently designed as one-way, auto-oriented streets, but do not carry the same volumes as other parallel streets in the neighborhood. This provides an ideal opportunity to reconsider the allocation of street right of way for local travel by residents and visitors to SOMA, particularly on foot, bicycle and transit.

Figure 1: Folsom Street

Many small businesses exist within the corridor and have their own set of needs and concerns. Most agree that pedestrian and streetscape improvements will be good for business by increasing both foot-traffic and visibility. As the neighborhood becomes denser, the provision of adequate loading/unloading zones and employee/customer parking will require close consideration. And, any changes to the street right-of-way must not forget the longstanding community events that take place on Folsom.

This report examines the opportunities and constraints of these improvements, with Folsom and Howard Streets acting as the backbone of established and emerging residential and commercial uses in SOMA. It includes a summary of existing conditions and needs and suggests potential alternative street configurations, along with service improvements, that might better serve the diversity of transportation needs within SOMA.

C. Review of Other Documents

Planning Department

San Francisco City Charter - Transit First Policy (1973)

The City's adopted Transit First Policy, adopted by ordinance in 1973, calls for the development of attractive multimodal options to facilitate the movement of people and goods, particularly via alternative modes to the private auto.

Section 16.102 of the City Charter

1. "The primary objective of the transportation system must be the safe and efficient movement of people and goods."
2. "Decisions regarding the use of limited public street and sidewalk space shall encourage the use of public rights of way by pedestrians, bicyclists, and public transit, and shall strive to reduce traffic and improve public health and safety."

Planning Department's Downtown Neighborhoods Initiative

The Downtown Neighborhoods Initiative seeks to provide strategies for encouraging housing production and creating livable neighborhoods in the downtown area of San Francisco. A key policy objective is to improve the public realm for pedestrians:

"It takes more than housing to make a livable place. … Here, more than anywhere, we need to make streets safe and attractive for those who walk and bicycle, and to make transit a truly convenient, reliable and dignified alternative to driving."

Community Planning: San Francisco Eastern Neighborhoods (2003 and ongoing) and Industrial Lands Report (2002)

This community planning effort's aim is to be the basis for zoning changes in San Francisco's Eastern Neighborhoods, which includes portions of the South of Market area, Showplace Square/Potrero Hill, the Mission District and Bayview/Hunter's Point. The Planning Commission recently voted to remove the western portion of SOMA from the Eastern Neighborhoods process and formed the Western SOMA Citizens Planning Task Force to run a community driven land use policy planning process.

The Industrial Lands Report highlights the need to maintain certain types of industrial uses in San Francisco, uses which tend to be threatened by higher rent residential and commercial development. Designated as Production, Distribution, and Repair (PDR), these uses include printing and publishing, wholesale distribution, auto repair, and construction businesses, etc. Some uses are compatible with residential uses, but many are not. The Industrial Lands Report, in combination with other land use planning efforts, recommends land in southern SOMA, closer to the freeways, should be zoned for PDR uses. Lands closer to Market, along the waterfront, and Folsom and Howard Streets, are identified as areas that should allow for residential redevelopment.

Transbay Redevelopment Area Design for Development (2003)

The Transbay Redevelopment Area includes Folsom and Howard Streets from Spear to 2nd Streets. It proposes high density residential and commercial development in the vicinity of a rebuilt Transbay Terminal, and calls for streetscape improvements to support this redevelopment. The explores changes to the street configuration, such as wider sidewalks and the inclusion of expanded open spaces but does not formally address them in the EIR. They were identified as potential future opportunities based on projected impacts from new development. Bus Rapid Transit on Folsom and one-way to two-way conversions were also mentioned as viable options to explore in the future and would require more comprehensive circulation planning for SOMA to better evaluate transit, bicycle and pedestrian public realm improvements in the vicinity of the Transbay Terminal.

Rincon Hill Plan (2005)

The Rincon Hill plan is closely integrated with the Transbay Plan and includes zoning for additional high-density residential development with ground floor retail opportunities adjacent to the Transbay Planning Area. It includes design guidelines to mitigate the impact of this development at street level, and recommendations for improved pedestrian, bicycle, and public transit facilities throughout the neighborhood, similar to those recommended in the Transbay Plan. Inclusion of a Bus Rapid Transit system on Folsom was not included as a possible design alternative, but was indicated as an option which could be explored as part of a larger SOMA circulation plan.

San Francisco County Transportation Authority
Countywide Transportation Plan and Prop K Funding Plan

The 2004 Countywide Transportation Plan describes the need to develop a citywide network of rapid transit services in conjunction with undertaking measures to manage demand for automobile travel and promoting alternative neighborhood transportation options, The Countywide Transportation Plan investment program is funded in part by Prop K the city's ½ cent transportation sales tax which includes funding for traffic calming, pedestrian and bicycle network improvements and streetscape amenities. Folsom Street is also designated as a Transit Preferential Street (TPS), which aims to increase the speed, reliability and comfort of bus transit through signal priority, lane priority measures, and upgraded waiting and pedestrian access facilities.

Prop K also includes significant funding for major transportation projects in the SOMA area. These include the Central Subway extension of the Third Street Light Rail line and construction of the Downtown Caltrain Extension to a rebuilt Transbay Terminal. The Central Subway alignment is proposed to proceed underground from 4th and King, through SOMA to Chinatown north of Market. Stations are planned for the Moscone Center area at 4th & Howard and at Market Street. This rail extension would provide a high quality transit link from within SOMA to the financial district and other neighborhoods north of Market, and to destinations south along the 3rd Street corridor. The Downtown Caltrain Extension/ Transbay Terminal project would construct Caltrain tracks from the current terminus at 4th and King Streets to the Transbay Terminal site bordered by Howard, Mission, Beale and 2nd Streets. The project will improve regional transit access for a variety of modes, providing connections between BART, MTA bus and rail, AC Transit (east bay), Caltrain and SamTrans (peninsula and further south). The Transbay Terminal will be within walking distance of many locations within SOMA, and could be served with improved bus service along the Folsom corridor, in addition to existing high-frequency bus service on Mission Street.

There is a growing need to accommodate local trips and to improve the desirability of making these trips on bus, bicycle, or on foot, as well as to improve the streetscape as a valued public space.

Central Freeway SAR (2003)

The Central Freeway SAR examined the feasibility of constructing a boulevard to replace the elevated freeway over Division St, connecting the 101/80 freeways to Market Street and Octavia Boulevard. The voter-approved design for the freeway extension touches down at Market Street and connects with the four-lane Octavia Boulevard. The report concluded that the number of lanes required to support existing capacity, combined with design challenges at several major intersections, presented a significant technical challenge for a boulevard to be a feasible alternative to the elevated freeway. In addition, legal, funding and environmental clearance requirements of the boulevard option would add significant delays to the project. However, it recognized the need to address the conflicts between local/regional transportation needs and to cultivate neighborhood development through a longer-term planning effort. The Octavia Boulevard/Central Freeway officially opened on September 9th, 2005.

Strategic Analysis Report on Traffic Impacts in SOMA (1998)

This SAR analyzed the demand for new trips due to expected new development in SOMA, focusing on a 5 year timeframe. It also made reasonable assumptions about new transportation infrastructure, private development and services expected to be in place over that period, and evaluated the resulting conditions on the roadway and transit networks. A key finding of the SAR is that a critical factor in determining how many people will actually drive in SOMA is the capacity of the freeway ramps, in addition to parking supply and demand. As more demands are placed on the Bay Bridge and freeways, p.m. peak back-ups onto SOMA streets could be exacerbated, impacting motorists with both regional and San Francisco destinations, and resulting in potentially significant impacts on intersections that are key to maintaining a reliable flow of surface transit. The report concludes that the existing limitations on freeway and intersection capacity dictate that only a multimodal approach, relying heavily on transit service, will provide an adequate response to the transportation challenges in SOMA.

Municipal Transportation Agency (MUNI and DPT)

MUNI Short Range Transit Plan (Draft 2005)

Folsom Street is identified as a future transit preferential street in the SRTP, which generally calls for increased transit priority measures to improve the productivity and effectiveness of Muni services. The SRTP acknowledges the need to conduct service planning citywide and proposes to do this for future updates of the SRTP. The Third Street Light Rail line is scheduled to begin service in mid 2006, with associated changes in bus and light rail services. The Transbay Terminal is planned to be rebuilt, with improved MUNI, AC Transit, and direct Caltrain service.

MUNI Vision Plan for San Francisco (2002)

Future Bus-Rapid Transit (BRT) is proposed for the Folsom Corridor. Likewise, the potential for Bus Rapid Transit along Mission, South Van Ness, and 8th or an adjacent street is identified. The South Van Ness/Mission line would be an extension of the Van Ness BRT corridor which is currently being studied by the Transportation Authority, with MTA participation. The Vision Plan also describes the Third Street Light Rail and Central Subway projects, as discussed above.

MUNI SOMA Service Plan (1999)

The SOMA Service Plan notes that bus service is already comprehensive and frequent within SOMA, from all areas of the city. Service along Folsom and adjacent streets is not as frequent, however, and this is especially so east of 5th Street. Howard Street is considered to be within a High-Service-Level Zone due to its proximity to the Mission and Market transit corridors but the area south of Folsom is considered a Low-Service-Level Zone. Development of a strong transit corridor along Folsom/Harrison Streets was a key objective of a stakeholder workshop on transit improvements in SOMA, as well as supporting and enhancing MUNI's Transit Preferential Streets program in the neighborhood.

San Francisco Bicycle Plan

Folsom Street (eastbound only) and Howard Street (westbound only) form an existing one-way pair of Class II dedicated bike lanes which extend through almost the entire east-west length of SOMA. Class II lanes are also striped along 7th and 8th Streets. The Authority is leading the development of bicycle lanes, with MTA participation, on 2nd, 5th and Townsend Streets.

II. STRATEGIC ANALYSIS

This SAR assesses the potential benefits and impacts of a range of possible street right-of-way configuration scenarios on the performance of the multimodal Folsom and Howard Streets network through the entire SOMA, but particularly between 4th and 11th Streets. These scenarios provide for local and through automobile travel, bus priority, bicycle and pedestrian use. All scenarios also seek to improve the livability and urban design of Folsom Street by calling for a "complete streets" design that rebalances and better integrates the transportation and public realm functions of the street. In this way, the SAR analysis methodology recognizes that the full spectrum of transportation functions along the Folsom and Howard Street corridor needs to be analyzed comprehensively as an integrated system. The various transportation modes function as an interdependent system - the operation of one mode directly affects the others in meeting overall mobility and accessibility needs of the area.

A. Existing Conditions

The SAR's existing conditions analysis focused on a literature review of relevant studies, plans, and data (e.g. Prop E MTA performance data), interviews with agency staff and developer representatives, a limited collection of data on bicycle usage and field checks on pedestrian conditions, parking conditions and land use (see photos in the report).

Although any potential redesign of Folsom or Howard Streets would require consideration of the full length of the corridor, as is done in the transportation analysis of this report, the existing conditions analysis focused on the segments of Folsom and Howard streets between 4th and 11th streets. The discussion also includes areas outside of the main corridors of analysis in order to bring context to the study and demonstrate that the focus area is in many ways representative of issues and opportunities in other high-growth sections of the city.

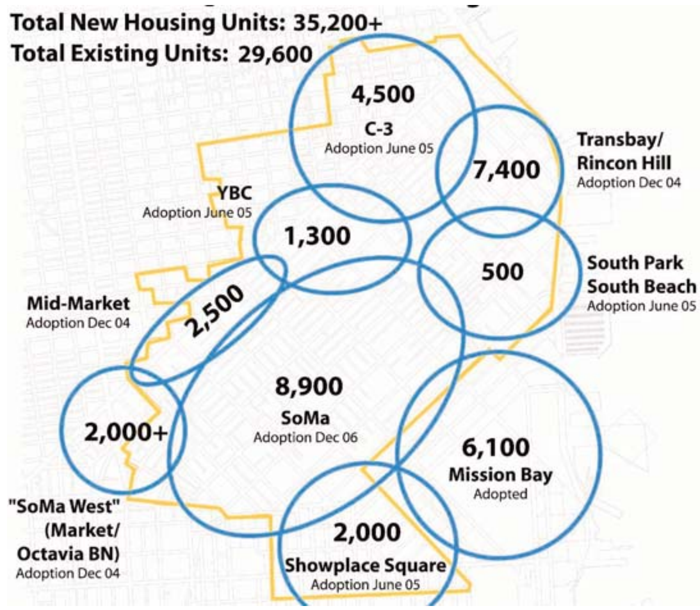
Land Use

SOMA historically has been a predominantly light industrial district, with an established and growing supply of housing along side streets and alleys. Significant Production, Distribution and Repair (PDR) and light industrial uses also characterize this neighborhood. SOMA has been experiencing dramatic changes over the past ten years following earlier redevelopment in areas such as Yuerba Buena Center. Much of the historic housing remains, but industrial space is rapidly being redeveloped into new housing, including residential towers towards the Embarcadero and mid-rise apartments and lofts to the west. The demand for both PDR space and housing is expected to continue, and significant new residential construction is expected in the near future (see Figure 2: Downtown Neighborhoods Housing Potential). Several reports from the Planning Department describe these changes in more detail, including Industrial Land in San Francisco: Understanding Production, Distribution, and Repair (July 2002), The Rincon Hill Plan: Draft for Public Discussion (Nov 2003) and Supplement (Sept 2004), Transbay Development Project Area Design for Development (Oct, 2003), and ongoing planning for San Francisco's Eastern Neighborhoods.

Demographics

Data from the 2000 Census was collected for SOMA, and compared with the city as a whole (see Table 1: Demographc Characterists of SOMA Census Tracts in the Appendix). In 2000, almost 20,000 people called SOMA home. This population is projected to increase significantly over time as new housing is constructed in the area. Compared to the city as a whole, SOMA has fewer children under 18 years of age. There are several schools in the area, however, and the current design of streets should encourage changes that increase safety for the children that do live there now, or who may move to the area in the future.

Figure 2: Downtown Neighborhoods Housing Potential



Source: San Francisco Planning Department

The ethnic diversity of the neighborhood is generally similar to the rest of the city, although a concentration of both African-American and Filipino residents does exist in the area. About one-fifth of residents speak English "less than very well."

Although the average household income levels in the SOMA are similar to the rest of the city, there is a higher rental population and the distribution of income in census tracts to the southwest have much lower median income than census tracts closer to the Embarcadero. This indicates that affordable transportation services and options (such as walking, bicycling and transit) are particularly appropriate and needed to meet the needs of the population within the SAR study area.

The transportation mode split (percentage of overall trips by each mode of transportation) for the SOMA bears this out. SOMA residents' travel modes are significantly different than for the city as a whole. Many more people walk to work; 34 percent, compared to nine percent for the entire city. Fewer drive or carpool; 30% combined, compared with 51% for the city. A similar, though slightly lower proportion takes transit; 25 percent in SOMA compared to 31 percent in the city. The remaining residents either bike to work or work from home at about the same rate as in the rest of the city.

The high percentage of those who walk to work is juxtaposed with streets that are not currently well designed to support pedestrians, the proximity to downtown employment locations and the concentration of lower income households. The influx of new residents, so close to downtown offices and retail districts, and proximity to high-quality public transit, indicates that even more people are likely to be walking within SOMA in the near future.

Street Grid

The street network is characterized by a grid of relatively large city blocks, 825 x 550 feet, with wide one-way arterials and a finergrained network of alleyways (Figure 3: SOMA Street Network). These large blocks discourage pedestrian circulation in the neighborhood, with long crossing distances across Howard and Folsom. Many alleyways intersect with Folsom and Howard at a much tighter grid than the major streets in the neighborhood, but there are no crosswalks at these intersections. Imrovement of the residential alleyways can increase accessibility for pedestrians and is especially appropriate given the community's interst in maintaining the Residential Enclave Districts.

Figure 4: Folsom and Howard Existing Cross Sections shows a typical street section for Folsom and Howard Streets. Both streets generally have an 82.5-foot public right-of-way and currently have four vehicle lanes, with Folsom configured as one-way eastbound towards the Embarcadero ("Inbound") and Howard one-way westbound ("Outbound"). They are typically composed of three 10 foot travel lanes, one 11.5 foot auto/bus lane, one 5 foot bicycle lane, two 8 foot parking lanes and two 10 to 12 foot wide sidewalks. These conditions generally exist through the length of the study area. Howard transitions to two outbound lanes and two inbound lanes east of Fremont Street and Folsom transitions to three inbound lanes and one outbound lane east of Main Street. Both Howard and Folsom transition to two inbound lanes and two outbound lanes west of 11th Street and will require that any reconfiguration also consider potential conflict issues at these transition points. As in the rest of SOMA, both streets are rather flat with Folsom rising slightly up Rincon Hill in the northeast quadrant of SOMA.

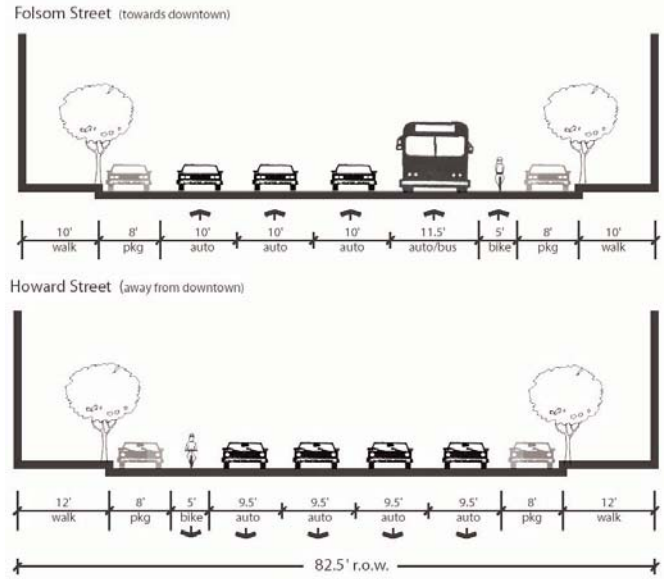
Traffic Operations

Arterials through SOMA provide access to and from the Central Freeway, Highways US 101, I-280, and the Bay Bridge (I-80) and are known for their high levels of peak period traffic (see Figure 5: SOMA Freeway Access). Closer examination of traffic volumes, however, reveals that only certain east-west arterials carry high volumes of traffic. Harrison and Bryant are designed

Figure 3: SOMA Street Network

Source: San Francisco County Transportation Authority

Figure 4: Folsom and Howard Existing Cross Sections



Source: San Francisco County Transportation Authority

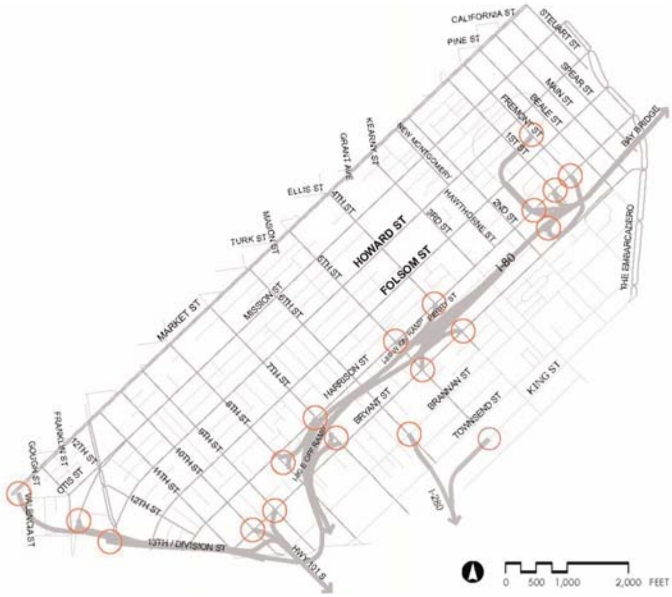
to feed and distribute regional freeway traffic and both experience heavy use. Folsom and Howard are not used as heavily, however, especially west of 5th Street.

When combined with the wide street width and long one-way block segments between intersections, the relatively low volume of traffic on Folsom and Howard leads to higher traffic speeds and negatively affects pedestrian and bicycle travel. The one-way streets also dictate a distinct circulation pattern in SOMA, which requires drivers to make more turns to reach local destinations. Searching for on-street parking may also require circuitous travel, thereby leading to increased vehicle miles traveled (VMT). Increased VMT negatively impacts air quality which is linked with health problems and increases the potential for conflicts with pedestrians wishing to cross the streets. One-way streets also increase the distance that cyclists need to travel and makes left turns difficult and unsafe.

The SF CHAMP model was used to examine existing traffic operations and the link (segment) level. PM peak period volume-to-capacity ratios (v/c) from the model are an indication of how congested streets are in the highest demand periods, with more crowded and congested conditions indicated by a v/c ratio closer to 1.

The link-level v/c ratios on Folsom Street are under a value of 0.50 and ratios on Howard average about 0.66 along the corridor. Observed conditions at the eastern end do reveal however, that there are chronic congestion problems at the bridge approaches betwwen 1st and 4th. These intersection effects are not captured by the SF CHAMP model. Tables 5 and 6 in the appendix show that for the most part, Howard Street also carries a higher volume of traffic than Folsom Street, but still provides for a fairly uncongested flow of traffic. Although there appears to a degree of excess capacity currently on both Folsom and Howard (suggesting that a traffic-calmed boulevard design may be feasible) it is important to note that the significant future development

Figure 5: SOMA Freeway Access



Source: San Francisco County Transportation Authority

planned for the area will generate trip demand and that any reconfiguration of the rights of way for both streets may also affect the operation of parallel and intersecting streets. We examine these issues in the context of future "No Build" and "Build" options in the Analysis of Alternative Scenarios section of the report.

Parking

There is ample on-street parking throughout SOMA, including along both Folsom and Howard. An inventory of on-street parking along Folsom between 11th Street and Embarcadero Street found 152 metered parking spaces, 170 un-metered spaces with a one-hour limit, 21 ten minute limit spaces, 75 commercial spaces, and a 14 unregulated or un-metered spaces without a time limit. Notably, all metered spaces are between 5th Street and the Embarcadero, whereas on-street parking beyond 5th Street is generally un-metered with a one-hour time limit. There is also significant off-street parking available in several surface lots and garages, especially in the northeastern area of SOMA. This indicates a potential need for parking management strategies. The gap between free or low-priced metered spaces may cause vehicles to cruise and circle for long periods of time in order to avoid paying for market-rate lot and garage spaces.

Double-parking occurs throughout the corridor. Both passenger and commercial vehicles double-park and impede through traffic flow. It also hinders transit vehicles, introduces a serious hazard for cyclists who must merge into moving traffic lanes in order to pass the parked vehicle and interferes with the proper use of designated parking lanes. During public input, PDR businesses stressed the need for more loading, unloading and parking storage space for businesses such as auto repair or equipment showrooms. For example, during field survey work, an auto mechanic was observed double-parking vehicles in the Folsom bicycle lane for extended periods of time. This reveals a need to reexamine the allocation of on-street spaces - potentially including alleyways - for business loading and unloading zones. More importantly, as the neighborhood considers rezoning and land use changes, it is important to require that new auto intensive businesses identify adequate supplies of available parking during the site planning process.

Transit

Several MTA bus routes travel through SOMA, including the 12-Folsom on Folsom and Harrison, the 27-Bryant on Harrison and Bryant, the 47-Van Ness on Harrison and Bryant, the 19-Polk on 7th and 8th Streets and the 30, 45 and 76 on 4th Street. MTA Routes N, 9, 9AX, 9BX, 10, 14, 14L, 14X, 15 and 26 also provide service within SOMA. The 12-Folsom bus used to travel westbound on Howard until several years ago when it was rerouted to run on Harrison. Approximately 7,400 passengers use the 12-Folsom each weekday with an average, ontime performace of 65% over the last few years according to MTA Prop E data. This means that only 2 out of 3 buses arrive between one minute early and four minutes late. Ridership has been relatively stable in recent years, with the greatest demands at the eastern and western ends of the line. The frequency of the 12 and 27 routes has also been reduced in recent years to 10 minutes between buses in the peak and 20 minutes in the off peak.

"When combined with the wide street width and long one-way block segments between intersections, the relatively low volume of traffic on Folsom and Howard leads to higher traffic speeds which negatively affect pedestrian and bicycle travel."

Folsom is included as a Transit Preferential Street in the Authority's Countywide Transportation Plan. In anticipation of the significant influx of residents to SOMA, MTA has included Folsom as an appropriate street for Bus Rapid Transit in their long term MUNI Vision Plan, or "X-Plan" . Figure 6: MTA Route 12-Folsom Bus Stops displays the route and stop locations for the 12-Folsom bus within the study area. The route runs on Folsom and Harrison and stops generally are located on the far side of each block. Most bus stops along Folsom do not have shelters, and associated services such as lighting, seating and maps are limited.

In addition to MTA bus service, Golden Gate Transit vehicles enter SOMA on First, Fremont, 7th and 8th and then travel along Folsom, Howard and Mission Streets on their way to and from the Transbay Terminal. SamTrans buses access the Transbay Terminal via 3rd, 6th, 9th, 10th, Folsom, Howard and Mission. Both systems provide limited service within the neighborhood, but they are regionally important transit systems that rely upon adequate levels of service through SOMA. A large regional bus yard is located at the intersection of 8th and Harrision that makes it possible to provide peak period bus commuting service. If residential and employment densities intensify, Folsom could be developed as a TPS or BRT corridor.

Figure 6: MUNI Route 12-Folsom/Howard Bus Stops

Source: San Francisco Municipal Transportation Agency

This would require service planning that considers the routing, frequency and reliability of the 12-Folsom and potentially other routes (such as the 47- Van Ness and regional routes) to ensure that service most efficiently meets meets the local and inter-district needs of residents and regional travelers.

Pedestrians

SOMA is often perceived to be an auto-dominated neighborhood with mostly industrial land uses. Despite the heavy traffic volumes, there are also many pedestrians, on both the arterials and side-streets. Many of the alleys are very enjoyable pedestrian environments, with historic homes, mature street trees, and low volumes of slow moving traffic. Some alleyways are underutilized and offer the potential for additional pathway development (or even pedestrian-only street treatments) off of the main arterials.

Folsom and Howard Streets are comparatively neither comfortable nor friendly pedestrian environments. Sidewalks tend to be narrow, especially so on Folsom Street. At 10 to 12 feet in width, this space is often encroached upong by newspaper boxes, trees, utility poles, bike racks, and furniture or accessories in front of local businesses. These pedestrian oriented items are highly desirable, but wider sidewalks could allow pedestrians to move past them more freely.

Lighting along Folsom and Howard is entirely auto-oriented (and not pedestrian-scaled), with tall lamps projecting light primarily into the road, leaving sidewalks dark at night. Street trees along some blocks are healthy and growing well, though only a few trees are mature. Many blocks lack anything but a few young trees while other street trees are in poor condition and require attention and care. Wider sidewalks and a cohesive landscaping and lighting scheme would benefit the pedestrian environment on both streets.

Certain intersections in SOMA have higher incidents of pedestrian/vehicle collisions, as shown on the map below (Figure 7: Pedestrian/Vehicle Collisions). The intersections of Howard with 6th and 3rd Streets have the highest rate of pedestrian/vehicle collisions within the study area, but the rate is much lower than is experienced on Market or Mission Streets. Safety improvements should focus on intersections such as these, but collisions occur throughout SOMA and simple safety improvements such as corner bulbs and other automobile traffic-calming techniques could benefit the entire area.

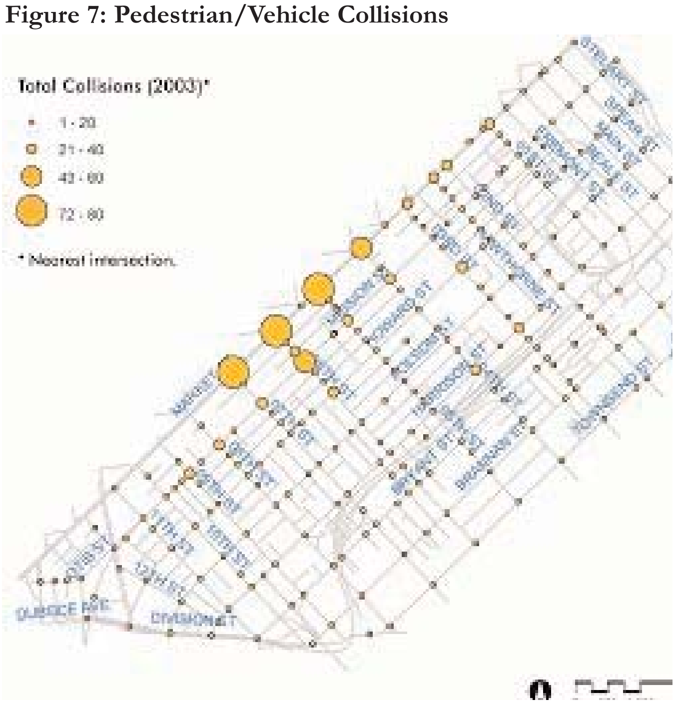
The south crosswalk across Howard at 8th Street and the west crosswalk across 3rd Street at Folsom explicitly prevent pedestrians from crossing. Most other intersections provide crosswalks across all four crossings, with pedestrian countdown signals, but the visibility of crossings (cross walks, limit lines) are worn and could benefit from a restriping program.

Despite the long block-lengths, jaywalking on Folsom and Howard is not a significant problem, probably due to the high speeds of traffic and the wide crossing distance from sidewalk to sidewalk. However, as density and pedestrian activity increases, demand to cross the street will also rise. Mid-block crossing opportunities for pedestrians could be explored along these long streets. Alleyways could be linked to develop pedestrian paths between arterials and mid-block crossing points could act as traffic calming measures.

Bicycles

Folsom and Howard each have one Class II dedicated bike lane, comprising a one-way couplet that is the primary east-west

Figure 7: Pedestrian/Vehicle Collisions



Source: San Francisco Department of Public Health and Statewide Integrated Traffic Records System (SWITRS), 2003 bicycle route through SOMA. These lanes connect with several existing and proposed cross-routes (Figure 8: SOMA Class II Bicycle Lanes). The Authority is currently working with MTA and others to develop Class II bicycle lanes on 2nd, 5th, and Townsend. As is the case with the neighborhood street grid as a whole, these bicycle lanes are laid out on straight and flat streets that rise slightly near Rincon Hill at the northeast end of SOMA.

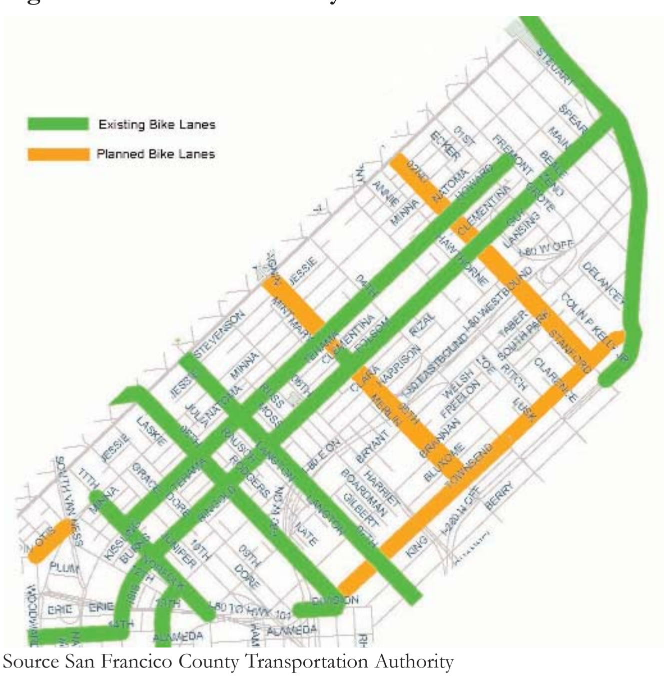
The bicycle lanes on Folsom and Howard are well used, especially during the AM and PM commute. Forty cyclists per hour were observed on Folsom, headed towards downtown, during the AM peak. This volume is consistent with the number of cyclists that was estimated for these streets during the data collection process for the Market Street Study.

Not all cyclists on Folsom and Howard were observed using the bicycle lanes, however. Some rode in other lanes of traffic, forced to weave across many lanes of high-speed motor traffic to make left-turns. Others rode against the one-way traffic flow, either at the edge of the road or on the sidewalk.

Multilane one-way street systems can be hostile to cyclists despite the presence of the bike lanes, due to the higher automobile traffic speeds that are facilitated on these types of streets. Cyclists also have great difficulty in making left turns on wide one-way streets as they are forced to merge across several lanes of heavy traffic. One-way streets also create circuitous and inconvenient routing to reach destinations. This may encourage cycling against one-way traffic or on sidewalks. Additionally, right-turning motorists may be less aware of potential conflicts due to the lack of on-coming left-turn movements. This presents a conflict as cars speed around corners and cross through bicycle lanes at high speeds.

As is the case with any side-running bicycle lane, obstructions are common even with well marked lanes. Motorists may be

Figure 8: SOMA Class II Bicycle Lanes



Source San Francico County Transportation Authority

enticed to stop in an open space of pavement, but double-parked vehicles and large trucks that extend into the bike lane are dangerous to cyclists who must divert into the travel lane. The existing bicycle lanes are a key transportation asset in SOMA and potential for further improvements to these on Folsom and Howard will be explored later in this report.

B. Conversion of One-Way Streets to Two-Way Operation

There has been significant community interest in reconfiguring the auto-oriented, one-way streets in SOMA to a more complete network of streets. The local non-profit organization Public Architecture convened a workshop in January 2004 to discuss their SOMA Open Space Strategy. This strategy's aim was to provide new public open space for the neighborhood. A concept for Folsom developed over the course of two years of work has received the encouragement of several city agencies and local stakeholders. The plan proposes to reconfigure Folsom and Howard streets as two-way, pedestrian-oriented, transit-intensive streets, in which generous sidewalks would provide space for a variety of outdoor activities. The plan intended for the incremental installation of diverse public amenities, keyed to the particular conditions of the area's varying uses, to make for a responsive, rather than prescriptive, urban plan.

A growing list of cities across North America has converted downtown city streets from one-way to two-way operation. Albuquerque, Buffalo, Calgary, Cincinnati, Kansas City, Sacramento, and most recently San Jose, have converted downtown one-way arterials in order to increase safety, decrease travel distances, reduce confusion and increase livability. Table 2: Pros and Cons of Conversion to Two-Way Operation summarizes case studies on these projects and discusses the highlighted pros and cons of conversion

Although there are pros and cons associated with converting one-way streets to two-way streets, the advantages generally outweigh the disadvantages when emerging neighborhood uses create new multimodal demands on the street network. It is important to note that many of the benefits of conversion may be achieved through traffic-calming one-way operations, but not all (such as lower VMT due to more direct accessibility). Some impacts may be avoided or minimized through design approaches, but some may require more specific and sophisticated measures and mitigations such as signal re-timings, parking management strategies and signage/wayfinding to direct local and through traffic more efficiently.

Complete Streets

"Complete Streets" is an emerging concept in urban street design which seeks to address the imbalance of highway-era street design that favored the automobile over other modes and considerations. A complete street is safe, comfortable, and convenient for travel via automobile, transit, bicycle and on foot. A complete street also accommodates the disabled, who may be

Table 2: Pros and Cons of Conversion to Two-Way Operation

Issue	Pros	Cons
Autos	Two-way traffic patterns encourage slower speeds.	Travel time for through traffic and local traffic may increase due to lower speeds and may divert through traffic to parallel streets.
	Provides increased accessibility within the neighborhood.	Greater difficulty to synchronize traffic signals on two-way streets and creates left-turn conflicts at intersections.
Pedestrians	Two-way traffic with narrowed lanes may encourage overall speeds to decrease and increase cues to drivers to heighten their awareness of potential conflicts. Broadly speaking, each 1 mph reduction in speed may reduce accident frequency by 5% with effects greatest for urban main roads and low speed residential roads. Collisions with autos may not be as serious, due to lower speeds.	More potential conflicts with left and right turns possible from all four directions of an intersection.
Transit	Bus lines could be consolidated, so that Folsom becomes a bi-directional bus route. This enables transit to serve key destinations more directly, concentrate service on streets with the most activity and makes the system more "legible" or easier for people to use.	Slower vehicles speeds would impact bus travel times if priority treatments are not provided.
Bicycles	Reduced auto speeds are safer for cyclists traveling alongside, or among autos.	
	Bike lanes could be consolidated onto a single street and create a bi-directional bicycle route that would provide more direct circulation, ease navigation and allow safer left-turns.	
Parking	Consolidating bus stops onto a single street and installing bus bulbs could free up parking as they require less space than a traditional curbside bus pull in zone.	Conversions need to consider issues of parking and provision of adequate commercial loading zones as the existing practice of double parking will cause more conflicts with fewer lanes.
Neighborhood-oriented retail	On large streets, two-way operation is considered better for local retail due to increased "visibility" with slower auto speeds and increased pedestrian activity. Conversions cited in the case studies were often initiated by local business organizations.	
Safety - Police, Fire, Emergency	Increased accessibility through neighborhood, and ability for fire and emergency vehicles to approach incidents from both directions.	Reduced turning radii for long fire-trucks (and reduced lane width). The case studies indicated, however, that initial resistance from police, fire and emergency staff eventual led to acceptance and a more positive attitude after implementation.
Noise	Slower speeds reduce noise, creating a more comfortable and healthy environment for adjacent businesses and residents and encourages pedestrian activity.	
Air Quality	Lower speeds may or may not increase local air pollution and this will depend on many variables. If congestion was to increase significantly, then stop and go traffic could cause an increase in pollution despite decreased VMT. However, if traffic then disperses due to increased congestion, this may spread-out localized pollution, reducing its impact at any particular point. Alternatively, lower VMT may reduce air pollution in aggregate, and possibly offset potential increases due to slower speeds	

Sources: "Looking Both Ways at Two-Way Traffic: Testimonial Research on North American Inner City Conversions of One-Way Streets back to Two-Way Traffic" by Tom Gardiner (10/24/03). Additional information based upon feedback from San Francisco Department of Parking and Traffic, San Francisco Planning Department, San Francisco Redevelopment Agency, San Francisco Department of Public Health traveling via any of these modes. One third of Americans do not drive, and soon half our population will be over 50 years old, representing an age group that in particular seeks more alternatives to driving.

The concept applies to individual streets as well as street networks. The latter is perhaps more important and relevant in dense urban areas with constrained street rights of way, such as San Francisco, where not every mode can or should be prioritized for every street. Lane widths on arterials in the city vary between 9 and 12 feet and provide an opportunity to reduce lane widths and reallocate right of way to non-motorized modes. While some streets are priority corridors for auto travel due to their role in distributing regional traffic, other streets may be optimized for pedestrian, transit or bicycle travel due to adjacent land uses or to encourage attractive neighborhoods development. However, streets should have a set of minimum elements that provide for safe and effective travel by all modes, ideally in an organic and not highly proscribed way.

The South of Market Area is highly urbanized, with sidewalks on all streets, comprehensive transit and a growing bicycle lane network. Many city streets are technically usable by pedestrians and cyclists, and accommodate transit to some degree, but most fall far short of their potential. The idea of complete streets and networks can be applied to San Francisco, and can be a highly effective tool for improving safety, access, and comfort for pedestrians, cyclists, and transit users, while still accommodating the needs of automobile users. The design goals of complete streets do not aim to promote a specific configuration but hope to bring the entire multi-modal system more into balance.

The Mayor's office recently launched a Better Streets initiative for San Francisco, which seeks to ensure that all projects affecting streets in San Francisco would comprehensively consider and accommodate, in the design phase, all modes of transportation, and, at the same time, improve the urban design and amenities of the street environment. Supervisor Mirkirimi has also introduced "Complete Streets" legislation which emphasizes opportunities to better coordinate among proposed projects.

Each of the street design configurations for Folsom and Howard Streets explored in the next section attempts to improve the balance of transportation needs, while improving the urban design and amenity level of the street. Good design of course requires more than simply placing these elements on the street. The community must decide how these concepts should be expressed to best respond to their needs and desires. City planners, urban designers and architects will also add their expertise in ensuring that these localized changes are in accordance with the urban fabric of the surrounding area. Transportation planners and designers must also work to ensure that the operations and services offered on the reconfigured streets are safe and efficient in meeting travelers needs while contributing to the neighborhood streetscape.

III. ANALYSIS OF ALTERNATIVE SCENARIOS

As noted in the Existing Conditions section of this report, both Folsom and Howard have lower traffic volumes than the parallel Harrison and Bryant Streets. The existing, wide automobile right-of-way still makes these streets unsafe and uncomfortable for pedestrians and cyclists. Alternative street configurations could improve conditions for these users, but the subsequent impacts on traffic flow must also be evaulated. Buses currently move relatively unimpeded along the corridor and the impacts of any potential increased traffic congestion might be offset by establishing priority bus lanes. Changes to transit routing and increased frequency of service may also generate increased ridership as land uses evolve and densify over time.

A variety of potential alternative street configurations are possible by varying allocations of space for pedestrians, bicycles, transit and automobiles. The SAR considered five distinct configurations for Folsom and Howard Streets, described in Table 3: Existing Street Configuration and Alternative Scenarios, and illustrated graphically on Page 13. Each of these configurations was quantitatively evaluated for their potential impact on traffic flow and transit demand. While a detailed operational analysis was not performed, the demand and capacity evaluation affords a preliminary order-of-magnitude look at the feasibility of each option from a transportation systems management standpoint.

The alternatives were also evaluated for their likely benefits to pedestrians and cyclists. The dimensions of each of the configurations are representative of feasible options for reallocating street space on Folsom and Howard Streets, but a more detailed set of analyses of street conditions and geometries would be necessary before any final determinations could be made.

Quantitative Analysis: Modeling Alternative Scenarios

The methodological approach was to estimate what traffic conditions and transit performance will be in the year 2025 if no changes to the existing street network are made and all transit improvements expected by that date are achieved. This is referred to as the "No Build" Scenario.

The primary tool used to quantitatively analyze the future impacts of the proposed street reconfiguration scenarios was the San Francisco - Chained Activity Modeling Process (SF-CHAMP) model. SF-CHAMP is the Authority's travel demand forecasting tool and is routinely used to evaluate travel demand and system performance levels for alternative future land use and transportation options.

The SF CHAMP link-level travel demand and capacity analysis was supplemented with analysis of intersection operations at select locations using MTA's 1999 Synchro model. The SAR also examined qualitative analyses that considered levels of service offered by each alternative for pedestrians and bicyclists and addressed other factors.

The Association of Bay Area Governments (ABAG) and the San Francisco Planning Department provided population and land use forecasts for use in the Authority's travel demand model. For the Folsom Street SAR, the Projections 2002 Year 2025 forecast was used for the alternatives analyses. The San Francisco Planning Department prepares land use allocations citywide and land use scenario "B" was assumed for all future alternatives. Many planned and proposed future developments in the South of Market area are anticipated in these forecasts.

After establishing the future 2025 No Build scenario, the model was used to explore the impact of a variety of potential changes to street configurations and transit service. These changes include reductions in the number of traffic lanes to allow dedicated bus lanes or wider sidewalks and partial or full conversion of Folsom and Howard Streets to two-way operation. Additional transit improvements tested included changes to bus routing, implementation of Transit Preferential Streets policies and/or Bus Rapid Transit.

Table 3: Existing Street Configuration and Alternative Scenarios summarizes the configuration details of each scenario that was considered. Scenarios are differentiated by the number and direction of auto, bus and bicycle lanes, along with travel lane, bicycle lane and sidewalk widths. In more detail, the tested scenarios were as follows;

No Build: No changes to street network; 3rd Street Light Rail and the Central Subway are assume to be completed;

A - One-Way Traffic Calmed: Reduce both Folsom and Howard by one-lane, widen bicycle lane to 7 feet and sidewalks to 15 feet;

B - Two-Way Street: Reconfigure both Folsom and Howard as two-way streets with two inbound lanes and two outbound lanes. The outbound leg of the 12-Folsom bus route is moved to Folsom from Harrison. One six foot bicycle lane is provided on Folsom with a five foot bicycle lane on Howard. No additional changes to the right-of-way are made;

C - Two-Way Transit Priority (Transbay Terminal Plan concept for Folsom Street): Folsom is reconfigured with two inbound auto lanes, one inbound auto/bus lane, one outbound auto/bus lane and 13 foot sidewalks. The outbound leg of the 12-Folsom bus route is moved to Folsom from Harrison. Howard Street is reconstructed with one inbound auto lane, two outbound auto lanes, two five foot bicycle lanes and 14 foot sidewalks. These changes to Howard Street were not proposed in the Transbay Termianl Plan, but were added by Authority staff to balance the changes on Folsom Street. An additional option considered was to place one five foot bicycle lane on Folsom and one seven foot bicycle lane on Howard. This option was not modeled as it did not result in any changes to the auto lane confiuration and it had limited pedestrian benefit to Folsom. In this option, sidewalks remained 10 feet wide on Folsom but were widened to 15 feet on Howard;

D - Two-Way Divided Transit Priority: Folsom Street is reconstructed with one inbound auto lane, one inbound auto/bus lane, one outbound auto/bus lane, a five foot median and 15 foot sidewalks. These medians may need to be discontinuous in places to allow for adequate circulation and loading / unloading. The outbound leg of the 12-Folsom bus route is moved to Folsom from Harrison. Howard Street is rebuilt with one inbound auto lane, two outbound auto lanes, two five foot bicycle lanes, a five foot median and 12 foot sidewalks;

E - Bus Rapid Transit: For the final scenario, Folsom street has one inbound and one outbound auto lane, two dedicated bus lanes, two variable medians and ten foot sidewalks. The median widths are widest at BRT stops where platforms would be offset to meet MTA's minimum 8' platform requirement. As with Scenario D, these medians may need to be discontinuous in places to allow for adequate circulation and loading / unloading. The outbound leg of the 12-Folsom bus route would be moved to Folsom from Harrison. Howard Street is rebuilt with one inbound auto lane, two outbound auto lanes, two five foot bicycle lanes and 14 foot sidewalks.

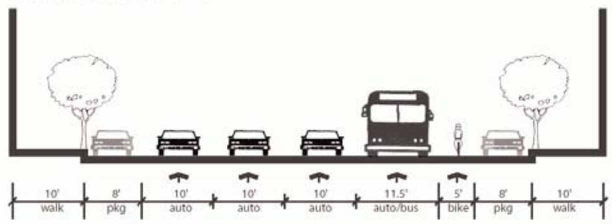
Table 3: Existing Street Configuration and Alternative Scenarios

	One-Way Scenarios		**Two-Way Scenarios** (Inbound : Outbound)			
	No Build	A	B	C	D	E
Directionality						
Folsom	1	1	2	2	2	2
Howard	1	1	2	2	2	2
Auto Lanes						
Folsom	4	3	4 (2:2)	4 (3:1)	3 (2:1)	2 (1:1)
Howard	4	3	4 (2:2)	3 (1:2)	3 (1:2)	3 (1:2)
Total lanes	8	6	8	7	6	5
Folsom Bus Lanes	1*	1*	1:1	1:1	1:1	1+:1+
Bicycle Lanes						
Folsom	1 (5')	1 (7')	1 (6')	-	-	-
Howard	1 (5')	1 (7')	1 (5')	2 (5')	2 (5')	2 (5')
Total feet	10	14	11	10	10	10
Sidewalk Width						
Folsom	10'	15'	10'	13'	15'	10'
Howard	12'	15'	12'	14'	12'	14'
Total feet	44'	60'	44'	54'	54'	48'

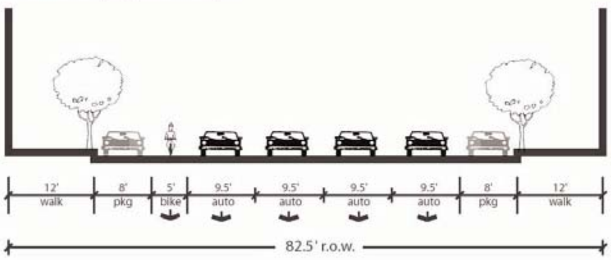
* Outbound bus lane on Harrison, 1 block southeast
\+ Bus-only lane (BRT)

EXISTING CONDITIONS

Folsom Street (towards downtown)



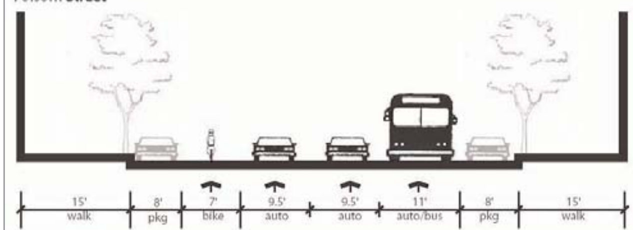
Howard Street (away from downtown)



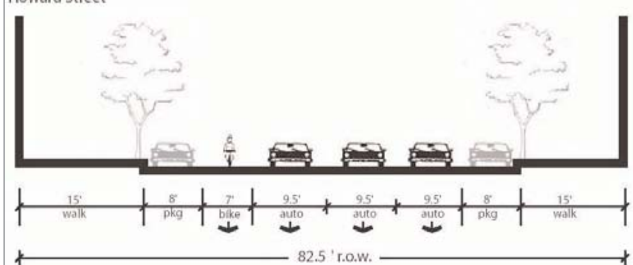
SCENARIO "**A**"

One-Way Traffic Calmed

Folsom Street



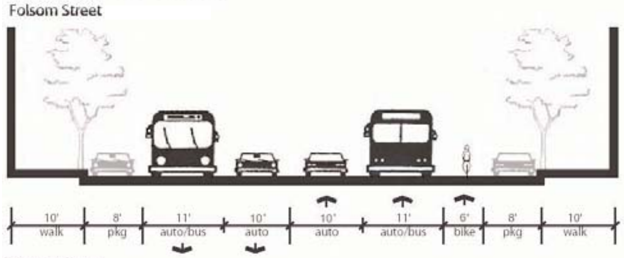
Howard Street



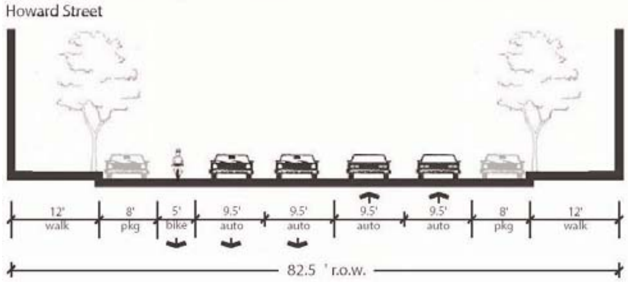
SCENARIO "B"

Two-Way Traffic-Calmed

Folsom Street



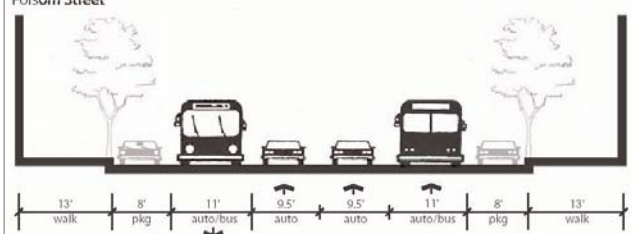
Howard Street



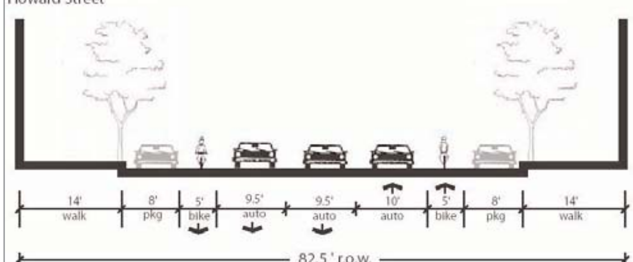
SCENARIO "**C**"

Transbay Terminal Plan - ***Ped and Bike Improvements***

Folsom Street



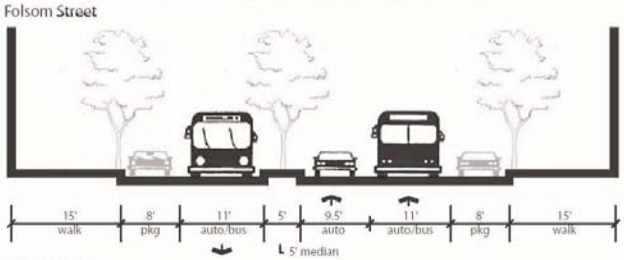
Howard Street



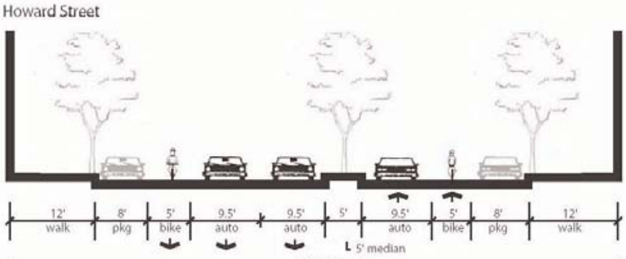
SCENARIO "**D**"

Transbay Terminal Plan - ***Optimize sidewalk on Folsom***

Folsom Street



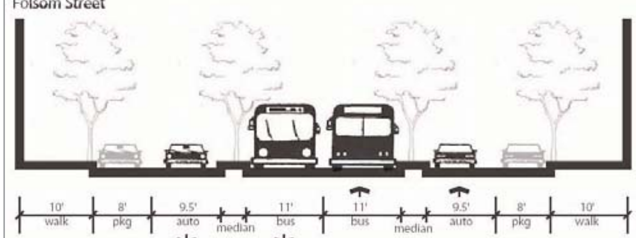
Howard Street



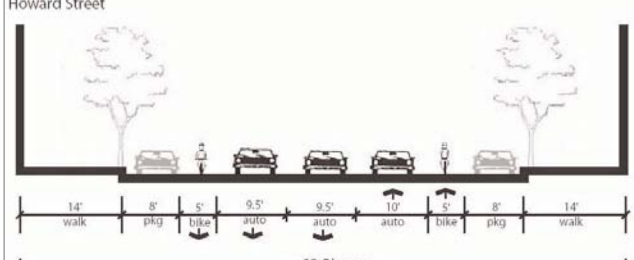
SCENARIO "**E**"

TBT Plan - ***Full BRT***

Folsom Street



Howard Street



Model Results

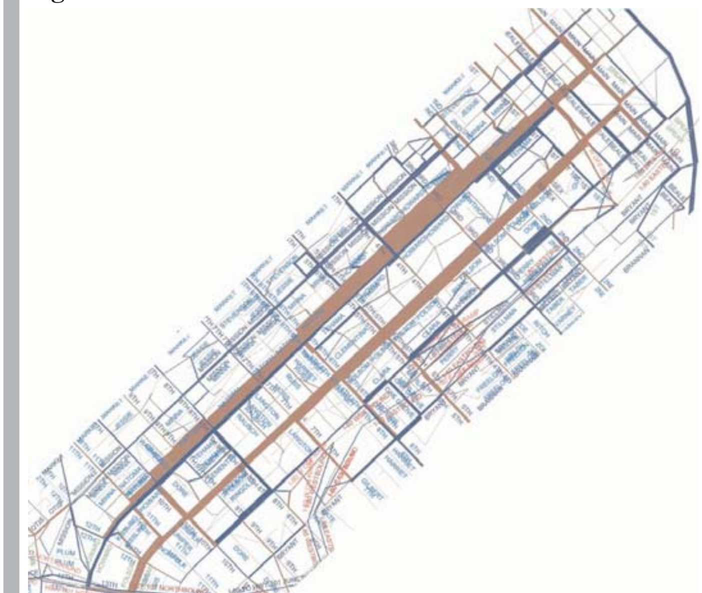
Scenarios A, C, D and E were modeled along with the No Build scenario. Scenario B did not sufficiently advance the multi-modal and beautification objectives of the boulevard concept as it simply converted the Folsom/Howard couplet into 2 two-way streets. It was dropped from further analysis in this SAR, but could be pursued in future planning efforts. An additional assumption was made concerning transit service by routing the 47-Van Ness line on Folsom Street to suggest that investment in these facilities would go hand-in-hand with such service changes to maximize the benefits of transit priority.

The SF CHAMP travel demand model results from four distinct build-scenarios are presented in detail in Tables 5 to 13 in the Appendix. Several performance measures were used to evaluate the scenarios at both the link and intersection levels. To measure the link-level impacts on Folsom and Howard, screenlines were chosen at Third, Seventh, and Eleventh Streets. Auto and transit volumes, link (not intersection) volume-to-capacity (v/c) ratios, and average trip lengths were measured across Folsom and Howard Street at these locations. Auto diversions to adjacent streets and auto v/c for the Bay Bridge approaches were also considered, along with travel times to SFO, downtown Oakland, and 16th/Mission. Transit mode share for two South of Market districts and transit ridership changes were also calculated. All scenarios were qualitatively evaluated for their performance in terms of pedestrian and bicycle levels of service (LOS) as well. The link level analysis appears to show satisfactory traffic operations on both Folsom and Howard, although congested conditions appear to worsen at some locations between First and Fourth Streets, especially under scenarios D and E.

Traffic impacts to parallel streets (Mission, Harrison, Bryant) appear to be an issue to some extent under all scenarios. Figure 9: Traffic Diversions of Scenario C vs. No Build shows diverted traffic volume decreases in brown and traffic increases in blue. Diversions from Folsom and Howard Streets are distributed throughout SOMA, but more traffic is loaded on to Mission, Harrison and Bryant Streets in all scenarios. The resulting link-level volume-to-capacity ratios are shown in Table 6 in the appendix. The greatest diversions are seen to Harrison and Bryant at Third Street, with v/c ratios increasing up to 25% in Scenario D. Mission at Third Street is forecast to see an increase of v/c by about 10% to 20% under all scenarios. Volume to capacity ratios at the maximum load points on Mission are forecast to be better or not much worse than what can be expected in the No Build Scenario, with a 7% decrease in the northeast direction at Second Street under scenario C and a 9% increase for Scenario E in the southwest direction at Fourth Street. The greatest maximum load point impacts of about 10% to 15% occur on Bryant Street in the southwest direction at Beale Street.

These potential impacts require more detailed operational modeling and analysis in order to evaluate the extent to which they could be mitigated by signal and traffic management techniques such as left turn prohibitions or other means such as congestion pricing. In the case of Mission Street, bus priority measures may also be necessary to protect both MTA and Golden Gate Transit bus speeds from eroding as a result of automobile traffic impacts.

Figure 9: Traffic Diversions of Scenario C vs. No Build



Source: San Francisco County Transportation Authority

In order to take a closer look at the congestion conditions on the eastern end of Folsom, intersection LOS was calculated at select locations using excerpts of the MTA's 1999 Syncro Model. The analysis assumed Year 2025 land use and PM peak hour traffic volumes from the Authority's travel demand model. Results from this preliminary traffic analysis are shown in Table 15 in the Appendix. The intersection-level analysis compared the LOS of Scenarios A and D relative to the baseline No Build LOS at a limited set of intersections east of Fourth Street. A more exhaustive evaluation of a greater number of intersections, at a more detailed level, optimizing intersection geometrics and traffic signal operations, would be needed to achieve a higher level of accuracy. For this broad, initial analysis, the intersections were analyzed in isolation of one-another with no smoothing of volumes across the network.

The analysis focused on the intersections of Folsom with First, and Fourth Streets; Howard with Fourth Street; and Harrison with First Street. All the intersections are located in the area bounded by First, Fourth, Harrison, and Howard Streets because there are regular traffic queuing problems at Bay Bridge on-ramps in this area.

The results of the analysis indicate that current gridlock conditions are expected to exist in the future even in the No Build Scenario. Scenario A would worsen conditions somewhat along both Folsom and Howard and Scenario D shows more significant delays and v/c degradation over Scenario A. For example, vehicle delay under Scenario D at the intersection of Howard with Fourth is forecast to more than double compared with Scenario A. This pattern is demonstrated at other intersections as well.

It appears that both Scenario A and D would likely create difficulties east of Third Street unless there was some reconfiguration to accommodate Bay Bridge traffic. It is important to note however that this analysis was very preliminary and simplified. It did not consider the potential benefits of turn restrictions, pricing or other engineering mitigation measures. Due to the extent of existing and projected congestion levels near the bridge approaches however, conversion to two-way operation may be most appropriate on the segments of Folsom west of 4th Street. Additional operational analyses are needed to confirm these results.

Transit Performance Evaluation

All of the designs provide positive urban design benefits and increased levels of service for persons who walk, take transit and/or bicycle. In terms of transit performance, Scenario E offers the greatest transit priority and predictably provides the greatest transit ridership and mode share benefits.

Both ridership and mode shares increase under Scenario E (see Tables 7 and 12 in the Appendix). The 12-Folsom increases its ridership at the maximum load point during the PM peak, from 399 to 412 for inbound trips and by about 22% from 320 to 464 outbound trips. Similarly, the 47-Van Ness ridership increases at the MLP by 63%, from 238 inbound and 423 outbound trips to 389 inbound and 545 outbound trips. The implementation of BRT allows transit's share of motorized traffic across the corridor screenlines to increase 4% - 7% in absolute terms, which represents an up to 20% increase relatively speaking. Even higher transit ridership on the 47-Van Ness bus would likely be possible if the Folsom BRT was operated in conjunction with the Van Ness BRT now undergoing conceptual planning.

The additional transit ridership generated by the improved travel times of BRT illustrates the latent demand for better transit services, and particularly the need for more frequent bus service in the Folsom Street corridor in the future. Transit overcrowding is apparent on both the 47-Van Ness and 12-Folsom routes in scenario E, with some load points up to 40% above MTA's maximum recommended load (see Table 8 in the Appendix). This highlights the need to increase transit service during peak hours, possibly by decreasing headways to 8 minutes, although this would need to be confirmed to be cost-effective in follow up service planning analyses.

While transit benefits are greatest under scenario E, impacts do emerge at major intersections and at the eastern end of the Folsom-Howard corridor and along parallel streets. Link-level automobile v/c ratios on Folsom and Howard under Scenario E are projected to exceed 1.0 slightly at one location on Folsom Street at the maximum load point near 4th Street in the NE direction (see Table 5). The same is true for freeway approaches and regional travel (see Table 11). A detailed intersection-level analysis was not completed for Scenario E as it was assumed to function reasonably similar to Scenario D.

Transit performance in Scenarios A and D was found to be similar to the No Build scenario. It would also be possible to apply TPS treatments and re-route the 47-Van Ness for these scenarios. Scenarios A and D would likely experience greater traffic impacts than scenario C due to being comprised of one fewer auto lane. As a result, Scenario A appears to be more promising than Scenario D, although this would need to be more firmly established through follow-on detailed operational studies. Ultimately, it may be more appropriate to judge the merits of these scenarios by considering their contribution to streetscape and livability improvements.

An interesting finding is that the BRT option in scenario E appears to attract more short-distance trips and this mode switch allows the remaining longer distance car trips to travel relatively un-impeded. The average auto travel time for scenario E increases by up to 17% when compared to the No Build option (see Table 9). Average trip lengths (distances) also increase, indicating that these average travel times are actually increasing due to longer average travel distances rather than slower speeds (see Table 10). Indeed, it appears that the improved BRT would attract many of the shorter trips in the corridor and alleviate local auto circulation and parking pressures. In this way, the finding suggests the potential of transit service improvements to not only attract trips away from automobiles but also to advance local economic development strategies.

It should be noted that implementation of a BRT line on Folsom Street with signal priority could cause direct conflicts with the AM and PM peak traffic exiting and approaching the bay bridge and other freeway ramps. Signal priority is an essential element of any BRT system; however, it would impact the signal timing of the various streets crossing the Folsom corridor at the detriment to freeway commuters. An alternatives analysis of the traffic signal timing for BRT was not performed as part of this SAR but should be examined in a follow up study. Evaluation measures such as intersection person-delay by mode would inform decisions about how to best allocate signal green-time for maximum person throughput.

Pedestrian and Bicycle Performance Evaluation

While all scenarios can be enhanced from an urban design standpoint with better landscaping, lighting and streetscape amenities, it is also important to evaluate the qualitative impacts of potential changes to pedestrians and cyclists. Improvements for pedestrians include treatments that could be applied to almost any street configuration, including sidewalk lighting, improved crosswalks, healthy mature street trees and street furniture. Widening sidewalks and constructing medians are key changes that would benefit pedestrians by narrowing crossing distances at intersections and support upgraded transit service along the corridor.

It should be noted that any improvements to the transit or pedestrian systems may effect the on-street parking supply in some way. Sidewalk bulb-outs (extensions) can be constructed so as to not remove parking spaces, and bus stop bulbs (boarding zones) can actually free up more parking spaces as they tend to be shorter than the typical bus pull-in zone. Furthermore, should transit routes be consolidated to a single street such as Folsom, with less space required for boarding, new parking spaces may be created on Howard or Harrison Streets. Several business owners within SOMA have also expressed a desire to install sidewalk seating and this could be accomplished by taking over parking spaces with planters and other non-permanent barriers. Additionally, at intersections, the inclusion of center lane bus boarding islands or right turn pockets to separate turning cars from bicycle lanes would both require removing parking spaces. In re-considering the allocation of remaining spaces, it would be important to ensure that loading and unloading areas are preserved (possibly shared by time of day) and balanced with the need for passenger uses, all of which should be metered or otherwise regulated.

The Class II bicycle lanes striped on Folsom and Howard are well used each day. Cyclists were observed riding outside the lanes, perhaps in anticipation of making left turns, as well as riding against one-way traffic, either in the street or on the sidewalk. The minimum width for a one-way bike lane is set at 1.5 meters by the Caltrans Highway Design Manual. The San Francisco Bicycle Plan advocates 6 to 8 foot wide lanes on streets with over 500 vehicles per hour per lane or speeds of 35 mph or more and suggests that special consideration should be given to travel lane widths on streets with high volumes of heavy trucks and MTA routes. While 5 foot lanes are not deficient, widening them could improve cyclist safety and reduce conflicts with both through traffic and parked cars. And as noted above, the addition of right turn pockets may also aid in reducing bicycle/auto conflicts and improve side bus lane operations.

Each of the scenarios was evaluated based on a set of pedestrian performance criteria. The assigned score is not an absolute value, but merely serves to compare scenarios on their relative value in improving pedestrian and cyclist safety and amenities. Overall scores are compared in Table 13: Pedestrian and Cyclist Design Factors. A break-down of the evaluation criteria is shown in Table 14. Clear differences between scenarios are apparent. The wide sidewalks of Scenario A are appealing to pedestrians, but the full collection of improvements contained in Scenario D allows it to stand out as potentially providing the best pedestrian and cyclist environment.

Conclusions

Thus, taking into account the quantitative transportation analysis of motorized modes and qualitative analysis of non-motorized modes, it is concluded that while several re-design alternatives appear to be desirable from a community development and multi-modal systems perspective, additional operational analysis is needed to confirm their feasibility from a traffic operations perspective. All of the alternatives raise the level of service for pedestrians and some provide improved bicycle and transit levels of service as well. In terms of traffic flow and operations, preliminary analysis suggests that one-way traffic-calmed configurations may perform better than two-way designs, though both would benefit from additional traffic engineering to optimize their operations. Due to existing and projected congestion levels near the bridge approaches, conversion to two-way operation may be most appropriate on the segments of Folsom west of 4th Street. We conclude that while additional operational analyses are needed to fully investigate and optimize each alternative, some redesign of Folsom is needed and likely justified. The selection of a preferred alternative will depend on a balancing of policy goals, public and agency input and careful consideration of strategic choices for neighborhood and transportation system development.

The specific findings of the SAR are:

1. Existing street configurations in SOMA are primarily designed for high automobile throughput. They do not prioritize transit or pedestrian use and while bicycle use is facilitated, the speed and volume of vehicles impacts rider comfort and safety.
2. It is particularly important and necessary to upgrade and provide affordable transportation services and options (such as walking, cycling and transit) in order to meet the needs of the population with in the SAR's study area. The transportation mode split (percentage of overall trips by each mode of transportation) for the SOMA bears this out. SOMA residents' travel modes are significantly different than for the city as a whole. Many more people walk to work; 34 percent, compared to nine percent for the entire City. Fewer drive or carpool; 30% combined, compared with 51% for the city. A similar, though slightly lower proportion takes transit; 25 percent in SOMA compared to 31 percent in the city. This presents an opportunity to raise the level of transit service today, and in the future.
3. No approved land use policy currently exists for the areas west of 4th Street. The Eastern Neighborhoods planning and rezoning process applies to the city's eastern quadrant, but does not include Western SOMA. The Western SOMA Citizens Planning Task Force is currently working to develop a preferred set of polices and has provided input on this SAR. The San Francisco Small Business Comission and the South of Market Business Association also were approached for review and comment and should continue to be involved. Future studies or deliberations about redesigning Folsom along the lines of the alternatives explored here must be thoroughly presented and vetted through an inclusive community-based process, with substantial participation from actual neighborhood residents and business representatives from Folsom and Howard Streets. Citywide representatives and stakeholders as well as transportation system managers and operators should also be involved.
4. The excess vehicle capacity that currently exists on both Folsom and Howard west of 5th Street suggested that a traffic-calmed boulevard design could be feasible. Subsequent modeling showed that impacts may emerge at specific intersections and locations along Folsom, Howard, and on parallel streets if a traffic calmed or transit priority boulevard were to be implemented. Existing severe traffic congestion at the eastern end of Folsom would likely be exacerbated and would require mitigation measures such as right-turn pockets, limits to left turns or the implementation of more pro-active demand management. Any potential redesign or conversion may be most appropriate west of 5th Street, though this would need to be confirmed through further study.

5. There is a need for more comprehensive parking management strategies in SOMA, especially the reconsideration of currently unregulated spaces through metering or other means. MTA could, for example, meter and reallocate parking to support the needs of local PDR businesses while encouraging high turnover of spaces for short duration trips. Parking policies that affect auto ownership and use, designing streets to promote walking and identification of resources to support additional transit services will also be key. Better signage directing motorists to available paid parking lots and garages is needed as is enforcement of double-parked vehicles.
6. Wider sidewalks and a cohesive landscaping and lighting scheme would benefit the pedestrian environment on both Folsom and Howard Streets. Simple safety improvements on auto-oriented streets such as corner bulbs and traffic-calming techniques could be incorporated in any of the tested scenarios and may be implemented in an incremental fashion. Alleyways could also be improved so as to create pedestrian pathways and facilitate increased circulation between arterials.
7. If Folsom is to be developed as a TPS or BRT corridor, it is necessary to conduct service planning that considers the routing of the 12-Folsom and 47-Van Ness along with Golden Gate Transit services to ensure that the facility meets the needs of residents and regional travelers most efficiently.

IV. RECOMMENDATIONS AND NEXT STEPS

It is recommended that an area-wide operational study be undertaken in order to assess the full impacts and benefits of each of these scenarios on the auto, transit bicycle and pedestrian systems. The direct impact to and diversions to parallel and cross streets was out of the scope of this study and should be a major focus of any future study. The current Authority work plan provides funding for just such an effort and a SOMA Transportation and Circulation Study is programmed in the Prop K Category D2 Land Use/Transportation Coordination Five Year Prioritized Program (FYPP) for FY2005/6.

Additionally, the current MTA service planning exercise should consider a potential rerouting of the 47-Van Ness on to the new Folsom Street TPS or BRT bus lanes, in concert with the planned BRT improvements on Van Ness Avenue. Schedule coordination and transfers with intersecting bus routes and further investigation of the influence of the 4th Street Central Subway alternative should also be considered in that study.

There are several simple initiatives that can be implemented in the short term. A pedestrian safety audit and program can be undertaken to re-stripe fading limit lines and cross walks, ensure the proper maintenance of sidewalks and curb ramps, install pedestrian scale lighting and improve landscaping and other streetscape features. Traffic-calming and improvements to alleyways could be implemented in the near term. Opportunities exist to better manage on-street parking spaces in the future through re-allocations or relocations of spaces, regulation and enforcement.

As this effort moves forward, an extensive outreach and education program should be undertaken as is typical of any proposed change to an existing roadway with a well established traffic pattern. Following the completion of a study, the city could pilot test the reconfiguration of one-way streets in the SOMA in a temporary way in order to evaluate changes before making them permanent. Two-way pilot programs could take the form of temporary restriping of lanes or perhaps the installation of temporary lane dividing jersey barriers. Each of these experiments would require significant signage and education and would most likely require the attention of traffic control officers to minimize dangerous situations caused by potential motorist confusion. These pilot programs would also have to consider the transition to existing traffic patterns at the limits of the experiment zone.

If a boulevard concept is pursued, a phasing and funding plan would need to be developed which takes into account Prop K and other public resources available for funding components of the design, such as traffic calming, pedestrian and bicycle facilities and transit priority facilities, as well as potential private sources of funding such as user fees and developer contributions.

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VI. AUTHORITY STAFF CREDITS

The Authority is indebted to a number of staff members for their contributions to making this SAR possible. Tilly Chang, Deputy Director for Planning, oversaw the study and guided the preparation of the report. Todd Vogel (Intern/Consultant) led the research, field work, and writing of the report, with Ryan Harris (Senior Transportation Planner) who provided additional writing and editing support. Billy Charlton (Principal Transportation Planner), and Ajay Martin (Planner) conducted the SF CHAMP modeling work and data analysis. Interns George Oliver, Aleksandr Prodan, and Planner Forest Atkinson contributed contributed data analysis, GIS mapping, and research.

JOSÉ LUIS MOSCOVICH, EXECUTIVE DIRECTOR

Table 1: Demographc Characterists of SOMA Census Tract

Populaltion	San Francisco	%	SOMA	%
Total	776,733	100%	19,825	100%
Under 18	111,955	14%	1,241	6%
18-65	557,820	72%	15,743	79%
Over 65	106,958	14%	2,841	14%
Household population	756,976	97%	15,973	81%
Households	329,700		9,552	
Average household size	2.30		1.65	
Race/Ethnicity				
White alone	385,325	50%	9,377	47%
Black or African American alone	59,060	8%	2,690	14%
American Indian and Alaska Native alone	3,524	0%	192	1%
Asian alone	239,938	31%	5,473	28%
Native Hawaiian and Other Pacific Islander alone	3,581	0%	28	0%
Some other race alone	49,990	6%	1,057	5%
Two or more races	35,315	5%	1,008	5%
Hispanic or Latino:	109,504	14%	2,075	10%
Foreign born	285,541	37%	6,922	35%
Speak English less than "very well"	186,401	24%	4,249	21%
Economic Status				
Median household income	55,221		56,842	
Below poverty level	86,585	11%	4,221	21%
Housing				
Housing Units	346,527	100%	10,242	100%
Occupied	329,700	95%	9,552	93%
Owner occupied	115,391	33%	1,629	16%
Renter occupied	214,309	62%	7,923	77%
Vacant	16,827	5%	690	7%
Built 1939 or earlier	172,804	50%	2,532	25%
Transportation - Commute to Work				
Workers	418,553	100%	9,524	100%
Drove Alone	169,508	40%	2,331	24%
Carpool	45,152	11%	600	6%
Public Transit	130,311	31%	2,368	25%
Bike	8,302	2%	167	2%
Walk	39,192	9%	3,216	34%
Other	2,761	1%	145	2%

Source: U.S. Census Bureau, 2000 Decennial Census. SOMA Census Tracts 176.01, 176.02, 178, 179.01, 180

Table 5: 2025 Link-Level Auto Volume to Capacity Ratios on Folsom and Howard

	Dir	No Build	A	C	D	E
Folsom & 3rd	NE	0.503	0.51	0.51	0.57	0.58
	SW	0	0	0.78	0.75	0
Folsom & 7th	NE	0.505	0.66	0.63	0.7	0.69
	SW	0	0	0.48	0.58	0
Folsom & 11th	NE	0.294	0.52	0.38	0.48	0.47
	SW	0	0	0.8	0.81	0
Folsom MLP @ 4th	NE	0.681	0.83	0.78	0.9	1.03
@ 1st	SW	0	0	1.17	1.62	0
Howard & 3rd	NE	0	0	0.07	0.19	0.24
	SW	0.982	1.1	1.02	1.08	1.07
Howard & 7th	NE	0	0	0.41	0.55	0.49
	SW	0.492	0.58	0.64	0.68	0.67
Howard & 11th	NE	0	0	0.58	0.6	0.61
	SW	0.508	0.45	0.37	0.4	0.65
Howard MLP @2nd	NE	0	0	0.73	0.79	0.89
@ 4th	SW	0.235	1.4	0.24	1.14	0.18

Table 6: 2025 Link-Level Auto Volume to Capacity Ratios on Mission, Harrison and Bryant

	Dir	No Build	A	% chg	C	% chg	D	% chg	E	% chg
MISSION										
1. 3rd	NE	0.56	0.65	16%	0.62	11%	0.66	18%	0.67	20%
	SW	0.97	1.1	13%	1.08	11%	1.11	14%	1.13	16%
2. 7th	NE	0.54	0.6	11%	0.57	6%	0.6	11%	0.6	11%
	SW	0.8	0.87	9%	0.85	6%	0.87	9%	0.85	6%
3. 11th	NE	0.32	0.38	19%	0.31	-3%	0.34	6%	0.34	6%
	SW	0.7	0.74	6%	0.7	0%	0.76	9%	0.73	4%
4. MLP @ 2nd	NE	0.87	0.93	7%	0.81	-7%	0.84	-3%	0.87	0%
@ 4th	SW	0.97	1.05	8%	1.02	5%	1.05	8%	1.06	9%
HARRISON										
1. 3rd	NE	0.42	0.49	17%	0.51	21%	0.53	26%	0.47	12%
	SW	0.82	0.97	18%	0.95	16%	0.99	21%	0.93	13%
2. 7th	NE									
	SW	0.74	0.75	1%	0.78	5%	0.76	3%	0.76	3%
3. 11th	NE									
	SW	0.77	0.8	4%	0.7	-9%	0.78	1%	0.8	4%
4. MLP @ Essex	NE	1.12	1.07	-4%	1.08	-4%	1.09	-3%	1.08	-4%
@ Essex	SW	1.15	1.27	10%	1.23	7%	1.26	10%	1.27	10%
BRYANT										
1. 3rd	NE	0.26	0.29	12%	0.27	4%	0.32	23%	0.3	15%
	SW									
2. 7th	NE	0.28	0.33	18%	0.3	7%	0.35	25%	0.32	14%
	SW									
3. 11th	NE	0.17	0.16	-6%	0.16	-6%	0.17	0%	0.17	0%
	SW									
4. MLP @ Beale	NE	0.55	0.56	2%	0.55	0%	0.58	5%	0.6	9%
@ Beale	SW	0.97	1.11	14%	1.07	10%	1.09	12%	1.1	13%

Table 7: Transit Ridership

	Dir	No Build	A	C	D	E
12-Folsom Bus						
3rd	NE	379	339	303	337	410
	SW	300	284	359	279	444
7th	NE	318	309	337	307	395
	SW	307	302	359	318	429
11th	NE	172	159	299	160	345
	SW	283	283	171	283	211
MLP	NE	399	132	345	357	412
	SW	320	316	408	322	464
47-Van Ness Bus						
7th	NE	379	390	434	359	509
	SW	193	198	248	199	337
11th	NE	384	363	381	386	485
	SW	238	247	305	248	389
MLP	NE	423	396	452	412	545
	SW	238	300	305	258	389

Table 8: Transit Volume to Capacity Ratios

	Dir	No Build	A	C	D	E
12-Folsom Bus						
3rd	NE	1.002	0.9	0.801	0.89	1.084
	SW	0.793	0.75	0.95	0.74	1.176
7th	NE	0.842	0.82	0.892	0.81	1.045
	SW	0.811	0.8	0.95	0.84	1.134
11th	NE	0.454	0.42	0.792	0.42	0.912
	SW	0.749	0.75	0.451	0.75	0.557
MLP	NE	1.056	0.35	0.913	0.95	1.089
	SW	0.846	0.84	1.081	0.85	1.226
47-Van Ness Bus						
7th	NE	1.004	1.03	1.149	0.95	1.346
	SW	0.51	0.53	0.656	0.53	0.893
11th	NE	1.016	0.96	1.008	1.02	1.284
	SW	0.63	0.65	0.808	0.66	1.029
MLP	NE	1.12	1.05	1.195	1.09	1.442
	SW	0.63	0.8	0.808	0.68	1.029

Table 9: Average Auto Trip Lengths (Time)

	Dir	No Build	A	C	D	E
Folsom & 3rd	NE	51.73	40.9	48.2	34.1	60.7
Folsom & 7th	NE	23.17	18.6	24.8	17.6	24.3
Folsom & 11th	NE	19.99	15.7	23.4	18.2	21.8
Howard & 3rd	SW	43.38	31.5	43.6	14.7	43
Howard & 7th	SW	20.15	15.9	18.6	14.9	18.3
Howard & 11th	SW	23.66	15.9	19.3		19.9

Table 10: Average Auto Trip Lengths (Distance)

	Dir	No Build	A	C	D	E
Folsom & 3rd	NE	16.43	12.5	15	10.6	18.7
Folsom & 7th	NE	7.05	5.67	7.53	5.26	7.51
Folsom & 11th	NE	5.809	4.66	7.07	5.58	6.61
Howard & 3rd	SW	15.11	10.8	15.3	4.03	14.9
Howard & 7th	SW	5.218	4.15	4.96	4.08	4.84
Howard & 11th	SW	6.752	4.22	5.21		5.34

Table 11: Regional Auto Travel Volume to Capacity Ratios and Travel Time

	Dir	No Build	A	C	D	E
Freeway Approach						
1st	SE	1.649	1.1	1.64	1.13	1.7
4th	SE	0.989	1.04	0.99	1.04	1.01
6th	SE	1.193	1.24	1.21	1.24	1.22
8th	SE	0.611	0.65	0.63	0.64	0.63
Point to Point Travel Time						
2nd and Market to Oakland (12th/Broadway)		42.8	43.6	43.1	43.1	43.5
2nd and Market to 16th and Mission		11	11.9	12	11.9	12.4
2nd and Market to SFO		38	38.5	38.8	38.5	39.2

Table 12: Transit Mode Share at Screenlines

	Dir	No Build	A	C	D	E
Screenlines (and bus routes)						
3rd: 12, 14, 14X	NE	0.312	0.32	0.31	0.31	0.35
	SW	0.21	0.23	0.24	0.23	0.26
7th: 12, 14, 26, 27, 47	NE	0.352	0.37	0.37	0.37	0.38
	SW	0.288	0.31	0.31	0.31	0.33
11th: 12, 14, 26, 27, 47	NE	0.363	0.39	0.39	0.38	0.36
	SW	0.401	0.43	0.42	0.43	0.47

Table 13: Pedestrian and Cyclist Design Factors

	No Build	A	B	C	D	E
Sidewalk Width						
Folsom	1	3	1	2	3	1
Howard	2	3	2	3	2	3
Crossing Distance*						
Folsom	0	2	0	1	2	1
Howard	1	2	1	2	1	2
Landscaped Medians	0	0	0	0	3	3
Bicycle Lane Width	1	2	1	1	1	1
Paired Bicycle Lanes	0	0	0	1	1	1
Total:	5	12	5	10	13	12

*Does not include medians or potential sidewalk bulb-outs

Table 14: Pedestrian and Cyclist Design Factor Scoring Criteria

	Value	Score
Sidewalk Width	10’	1
	12-13’	2
	14-15’	3
Crossing Distance	> 60’	0
	56-60’	1
	50-55’	2
Landscaped Medians	Not Present	0
	On Folsom	1
	Folsom + Howard	2
	One 5 foot or two 3 foot medians	3
Bike Lane Width	Total of 10’ to 12’ on both streets	1
	>13’ total on both streets	2
Bike Lane Paired on Howard	No	0
	Yes	1

Table 15: Selected Intersection Levels of Service, Delay and Volume to Capacity Ratios

Location	Cycle Length [1]	2025 No Build [2]			2025 Scenario A [2]			2025 Scenario D [2]		
		LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
Folsom/1st	60	F [3]			F [3]			F	224	1.2
Folsom/4th	90	F	171	1.26	F	185	1.22	F	226	1.8
Howard/4th	90	F	90	1.2	F	122	1.16	F	274	1.92
Harrison/1st	60	E	71.4	1.2	F	84	1.22	F	161	1.39

LOS = Level of Service
Delay = Average vehicle delay in seconds
V/C = Intersection traffic volume to capacity ratio
(1) 60 second signal cycles except at Folson/4th and Howard/4th where pedestrian phases require longer 90 second cycle lengths.
(2) Using existing signal cycle lengths and existing splits/offsets with future geometrics.
(3) Modeled LOS not reflective of actual conditions. Field observations show extended delay with LOS F due to bridge approach backups.