SAN FRANCISCO PLANNING DEPARTMENT

Better Neighborhoods 2002

Market/Octavia Study Area

Existing Conditions Report

San Francisco Planning Department

BETTER NEIGHBORHOODS 2002

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and CHS Consulting

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Table of Contents

Summary

Better Neighborhoods 2002 is intended to take a fresh approach to neighborhood planning. It aims to involve residents right from the start in drawing up a blueprint for the neighborhood's future, through public discussions, community workshops, tours and other means. The potential for transit-oriented development is a key aspect to be considered in this plan.

Market/Octavia is one of the three neighborhoods selected for the Better Neighborhoods 2002 process. The study area includes Van Ness and Church Street Muni Metro stations, the current Central Freeway, and the planned Octavia Boulevard.

This Existing Conditions report brings together fundamental data on traffic patterns, parking, transit, bicycles and pedestrians, and roadway safety in Market/Octavia.

The report is organized as follows:

- **Traffic patterns** and level of service at study area intersections.
- **Parking** in the study area. This section sets out the broad principles that parking policy should seek to follow, and analyzes the experiences of other cities – both in the United States and abroad – that have sought to reduce parking provision. This section also discusses practice in several European cities regarding right-of-way allocation between different modes, and measuring the performance of the transportation system. A separate section reports the results of an analysis of parking supply in the Civic Center area, undertaken to determine the impact of removal of the surface lots on the Central Freeway parcels.
- **Transit.** This section details the results of surveys to determine on-time performance and passenger loads, and to gather information on transit passengers such as origin and destination and trip purpose.
- **Roadway safety.** This section details the collision history of the study area.
- **Bicycles and pedestrians.** This section outlines the challenges faced by users of these 'slow modes'.

This summary section brings together these data, and attempts to draw out the broad challenges and opportunities faced in the study area.

Market/Octavia at the junction between three grids

The study area is located at the intersection of three of the City's grid systems. For historical reasons, these three grids – Mission, South of Market and North of Market – developed along different alignments.

This means that many of the intersections along Market Street and South Van Ness Avenue are the meeting points for multiple streets, resembling the spokes of a wheel emerging from the center of the intersection. This configuration creates large, inefficient and intimidating intersections, especially for a pedestrian or cyclist.

The problems with these intersections are highlighted in several ways:

- **Poor intersection level of service** for motor vehicles at many points along Market Street and South Van Ness, such as the Church/Market/14th intersection (LOS E or F at peak times), and South Van Ness and Mission (LOS E). This is at least partly due to the physical size of the intersections – vehicles need more time to pass through – and the number of different signal phases needed.
- **High collision rates.** The Market/Church/14th intersection has the highest number of collisions involving pedestrians in the study area. Overall, both this and the Otis/Mission/Duboce intersection have 1.8 times the expected number of collisions, compared to the statewide average rate.
- **Circuitous routes for pedestrians.** At many of these intersections, pedestrians are forced to stop and wait twice, to cross the 'spokes of the wheel'.

Competing Priorities for Market Street

Market Street is a crucial transit route for the city, with its importance increasing towards the east (downtown) as more lines merge into it from streets such as Haight. While Muni Metro services run underground through the subway, the surface right-of-way within the study area is used by the F-Market historic streetcar, and numerous bus lines including the 6-Parnassus, 7-Haight and 71-Haight/Noriega.

These surface lines run in the center lanes and there are island boarding platforms, but there is no dedicated right-of-way. While most through passengers use the Metro lines, the surface lines – particularly the F-Market – serve an important role for riders living around Laguna and Octavia streets. These passengers might not want to walk the relatively long distance to the Metro station, caused by the wide spacing between Van Ness and Church Street stations. Thus, upgrading the speed of the surface lines might be a preferable alternative to the expensive option of a new Metro station at Octavia.

Market Street is a key bicycle route, due to its directness and gentle grade, and also its densely packed activity centers. This concentration of neighborhood retail and other activity centers mean the street also experiences high pedestrian volumes, particularly towards the western edge of the study area. Two important transit centers at Church Street and Van Ness Metro stations also create large pedestrian flows.

Finally, Market Street is a major arterial for motor vehicles.

These priorities are in competition with each other for the limited amount of right-of-way. Assuming that the right-of-way is not expanded through demolishing buildings to widen streets, there is a finite amount of space that needs to be allocated among various road users.

Central Freeway

The Central Freeway, which passes over Market Street to the touchdown on Fell, is scheduled for demolition. The new touchdown will be on Market Street, and Octavia will be transformed into a boulevard. This demolition creates a number of opportunities and challenges:

- The potential for new development, such as housing, on the parcels freed up. One issue here is the degree to which current minimum parking requirements limit the density of development and the affordability of housing. Another is how best to serve this development by transit, considering the relatively long distance to Muni Metro stations at Van Ness and Church Street. Both these issues are discussed in more detail below.
- Closure of the temporary parking lots on the former Central Freeway parcels, when new development takes place, and how users of these lots can be accommodated. This is discussed in more detail below.
- The new freeway touchdown, and the effect of traffic volumes and speeds on users of local roads such as Market Street. The safety of pedestrians and cyclists is a particular issue here.

Transit

The Market/Octavia study area is extremely well served by transit. Muni Metro lines run every few minutes under Market Street, providing fast links to downtown and regional transit services. The J-Church and N-Judah streetcars emerge from the Market Street subway at Church Street and run mainly on-street to the Sunset in the west and Balboa Park in the south. Four bus lines run east-west along the Haight Street corridor, the F-Market runs on-street along Market, the 22-Fillmore runs north-south, and the 37-Corbett provides neighborhood service to the hills to the west. On the fringes of the study area, the Van Ness and Mission corridors are among the city's most heavily patronized transit corridors.

The quantity of service is not, however, matched by good on-time performance. In the morning peak, just 22% of the lines serving Market/Octavia meet the voter-mandated performance standard that 65% of runs should be on time. In the afternoon peak, just one of the lines – the F-Market – meets this standard, and then only in the inbound direction.

Virtually every line experiences significant gaps between trips of more than 25 minutes. On some lines, such as the 22-Fillmore and 37-Corbett, there are gaps of an hour or more.

This poor on-time performance is generally due to bunching of services, rather than the number of runs being fewer than scheduled. This bunching is caused as much by early running as by late running.

This bunching has a serious impact on capacity. Average peak-hour loads are within capacity on virtually all lines. However, on many individual trips on the Metro lines and Haight Street bus lines, there is no room for passengers to board – a problem that is largely caused by late-running services. Thus, resolving on-time performance issues is likely to contribute greatly to resolving any current capacity constraints on the Muni system in the study area.

In the study area, there are three main factors affecting on-time performance:

- **Management issues,** such as adjusting layover times to ensure adequate spacing between trips. These are likely to be addressed to a great extent following the introduction of Global Positioning System-based tracking of Muni vehicles.
- **Congestion.** Apart from the Metro subway lines, there is virtually no dedicated right-of-way or signal pre-emption for Muni bus and streetcar lines in the study area. This means that the on-time performance of Muni vehicles is severely affected by congestion. These right-of-way issues are discussed in more detail below.
- **Upstream performance.** Since most lines do not terminate in the Market/Octavia area, on-time performance is governed greatly by conditions upstream. In other words, improvements such as a dedicated transit right-of-way along Ocean in Balboa Park, and along Haight between Stanyan and Masonic, are important to resolving performance issues in the study area.

Securing adequate transit capacity is an essential pre-requisite to new development and raised densities in the study area – particularly if parking requirements are to be lowered. As well as more subway services (particularly Castro Shuttle), this might be achieved through speeding up surface lines such as the F-Market to offer an attractive alternative to the Metro, particularly for people between Church and Van Ness stations.

Pedestrian Environment

The density of commercial uses in the study area, particularly along Market, Church and Hayes, lead to high pedestrian volumes. Conversely, if retail intensification is to be encouraged on Market between Church and Van Ness, then good pedestrian facilities – particularly to minimize delay at the wide intersections – are important.

Pedestrian improvements on the routes to existing Muni Metro stations might also be a preferable, low-cost alternative to a new station at Octavia. Survey results reported here indicate that people are willing to walk relatively long distances to access transit services, with one-third walking for more than three blocks to the stop or station.

The pedestrian environment is also crucial to ensuring a good interchange experience at the Van Ness and Church Street Metro stations. The Van Ness and Mission intersection in particular is one of the most important transit transfer centers in the city, but it is one of the most unpleasant and uncomfortable places to wait for a bus, especially for southbound Mission Street buses.

Traffic and Congestion

Currently, the City's only measurement of transportation system performance is intersection level of service for motor vehicles (LOS). This is graded on a scale from A (free-flow conditions with little or no delay) to F (long queues and delays where traffic flows exceed design capacity). According to City environmental review standards, LOS of D or better is considered acceptable.

According to measurements by the study team, the intersections in the study area that fail to meet this standard are:

- Church, 14th and Market (LOS F in morning peak, LOS E in evening peak)
- South Van Ness and Mission (LOS E in both peaks)
- 9th, Larkin and Market (LOS E in evening peak)
- Otis, Mission and US 101 northbound off-ramp (LOS E in morning peak)
- South Van Ness, Erie and US 101 northbound on-ramp (LOS F in both peaks)

In addition, a number of intersections along Market Street operate at LOS D.

The worst congestion thus occurs in many cases on streets that are heavily used by transit. As noted above, these streets do not have any dedicated right-of-way or other priority measures for transit, meaning that buses and streetcars are caught up in the congestion. The resultant increased running times and poorer reliability reduce the attractiveness of transit vis a vis the private automobile, encouraging more people to drive which in turn exacerbates congestion even more.

San Francisco's street system is approaching capacity. In the absence of new subways to expand the total right of way, or tearing down existing buildings to widen streets, the best way to insulate transit services from this congestion, and reduce transit travel times, is a dedicated right-of-way for transit – particularly on Market Street and Van Ness Avenue, and where street widths allow, along Mission.

While this might reduce the intersection level of service to private automobiles, the capacity of the street network to move people, rather than vehicle, would be increased. That LOS might decline is simply a reflection of the limitations of a performance measurement system that narrowly focuses on one class of road user. The indicator does not provide any mechanism to determine what modes are given priority. It does not suggest how the competing priorities of different road users – dedicated lanes for transit, space for transit stops and facilities, bicycle lanes, sidewalks, crossing facilities, lanes for general motor traffic and short- and long-term parking – should be resolved.

Many other cities use a far broader array of performance indicators. These are discussed in more detail in the section on parking.

Safety

Roadway safety is a particular concern in the study area. Measured against Caltrans data on average accident rates (albeit derived from records on State-operated highways), several intersections have collision records significantly in excess of what might be expected.

These intersections include:

- Oak and Gough (twice the expected rate)
- Otis, Mission, Duboce and US 101 (85% higher than expected)
- 11th and Mission (79% higher)

Many intersections along Market such as Church/14th, 9th/Hayes/Larkin, Gough/Haight, 10th/Polk, Van Ness/Oak and Sanchez/15th also had higher than expected accident rates.

Several of these intersections – particularly Church/Market/14th and Market/Van Ness/Oak – had large numbers of collisions involving pedestrians. Oak and Gough and Gough and Market rank highly for collisions involving cyclists.

Parking

With the major exception of the downtown core, current City zoning ordinances make no allowance for accessibility by public transit when determining minimum parking provision. Thus while Market/Octavia is easily accessible by transit, developers are required to provide the same number of off-street parking spaces as for development in locations where transit services are neither so frequent nor serve so many destinations.

These minimum parking requirements have a number of significant impacts:

- They force developers to provide more spaces than they might otherwise wish, artificially increasing the cost of development.
- They reduce the density to which developers are able to build. This affects the capacity of the neighborhood to absorb new development.
- They encourage use of the private automobile, and fail to maximize the potential of the neighborhood for transit-oriented development. Given that most transit lines in the study area do not currently benefit from a dedicated right-of-way, and that many intersections in the study area are at or near capacity at peak times, the increased traffic generated will also have a deleterious on transit running times.

In contrast, many other cities in both the United States and Europe set maximum parking standards that are related to the accessibility of the site by public transit.

Surface Parking on Former Central Freeway Parcels

The surface lots on the former Central Freeway parcels are scheduled for removal to accommodate new development. Consequently, an extensive analysis of parking supply, demand and management was undertaken in Spring 2001 to help develop a parking plan for the ("Civic Center Parking Strategy," Nelson\Nygaard Consulting, July 2001.) The full analysis and conclusions are detailed in the 'Civic Center Parking' section.

The study identified 1,040 total off-street surface parking spaces in the Plan Area, including 537 spaces on the parcels formerly covered by the Central Freeway. One of the primary conclusions of the study is that there is so much excess capacity in the Civic Center Garage during the evening – even when the Opera, Ballet and Symphony were running simultaneous performances – that the needs of the performing arts institutions can easily be accommodated without replacing any of the Central Freeway parcel spaces. In addition, there is considerable excess capacity in the Performing Arts Garage during the daytime, allowing flexibility in addressing the parking needs of shoppers and commuters.

Even if all surface lots in the study area – including privately owned parcels not on the former Central Freeway right-of-way – were to close, current demand could be managed through implementing the following key recommendations:

- Personal security concerns for evening parkers at the Civic Center Garage should be relieved through significant urban design changes at Civic Center Plaza, and/or security personnel stationed there during evening events.
- Current discounts offered at the Civic Center Garage should be eliminated, such as the provision for $5 all-day parking for all students.
- Pricing structures at the Civic Center and Performing Arts garages should be adjusted to be in line with those at the 5th/Mission Garage, including the elimination of the early-bird rate offered at Performing Arts.
- City departmental vehicles assigned to individuals should be eliminated and replaced with a City vehicle fleet or, more efficiently, by contract with City Carshare or other enterprise.
- Generous parking subsidies for performing arts, School District and International School staff should be eliminated in accordance with State law, or the equivalent cash subsidy should be paid to staff who do not drive to work.
- Reserved on-street parking around City Hall should be moved and reduced.
- Real-time information regarding parking availability in area parking garages should be implemented.

TRAFFIC AND PARKING

Introduction

The Market Octavia study area is located at the intersection of three of the City's grid street systems. Market Street bisects the northern grid from the two grids that meet south of Market Street, roughly at U.S. Highway 101. The study area is bounded by 9th Street to the east; Howard Street and 16th Street to the south; Noe Street to the west; and Turk Street to the north. South of Market Street, South Van Ness Avenue splits the grid system at a diagonal. Many of the intersections along Market Street and South Van Ness Avenue are the meeting points for multiple streets, resembling the spokes of a wheel, emerging from the center of the intersection. This configuration creates intersections that are large, inefficient, and intimidating, especially for a pedestrian or bicyclist. There is regional access to U.S. Highway 101 south of Market, and for the time being, there are off-ramps from the Highway onto Fell Street. Until recently, there were also on-ramps from Oak Street. This section describes local and regional access to the project area. Peak traffic conditions typically occur during the weekday morning and evening commute periods (7-9 AM and 4-6 PM).

Section 2: Traffic

Roadway Network

Transit

Market Street is a main artery for transit feeding into downtown to regional connections on BART, Caltrain, and the Ferry. East of Van Ness Avenue, the Transportation Element of the City's General Plan designates it a Transit Oriented Street because it has surface rail, a high frequency of service, and high transit ridership[1]. Mission Street in its entirety shares this designation as does Church Street and 16th Street from Church Street to Guerrero Street (in this study area).

Other Primary Transit Streets are Van Ness Avenue throughout the entire study area and Market Street west of Van Ness Avenue. Market Street has a dual designation is because it is considered a major arterial to the west of Van Ness Avenue. There are Transit Centers located at Market/Van Ness Streets and Market/Church Streets, the locations of the Van Ness Avenue and Church Street Muni stations, respectively.

Vehicles

Fell and Oak Streets are major one-way east-west cross-town streets. Franklin and Gough Streets are major one-way north and south streets. Van Ness Avenue, Webster Street, Church Street, Dolores Street, Guerrero Street, and Valencia Street each carry heavy traffic along north-south axes.

Many of the streets north of Market Street are one-way streets (most notably Fell and Oak Streets). The area bounded by Market Street ,Highway 101, and 9th Street has several small connector streets and dead-end alleys that carry small traffic volumes and are used primarily for deliveries.

[1] All Transit Preferential Street Designations are in the Transportation Element of the City of San Francisco's General Plan (I.4.42)

Because Market Street bisects a grid system, many of the Market Street intersections are multi-legged, and often the feeder streets are off-set, such as the intersection of Franklin Street and Market Street, pictured below.

Figure 2.1 Multi-legged Intersection at Franklin Street and Market Street

Access to the site for motorists coming from the South Bay is directly off Highway 101 via ramps at 9th, 10th, Mission, 13th, and Fell Streets. Access to the site for motorists coming from I-80 and the Bay Bridge is at the Mission/Duboce Street exit and Fell Street off-ramp.

The study area has several streets on the Congestion Management Program Roadway Network. They are as follows:

North/South Streets

- Market Street
- Franklin Street
- Van Ness Avenue (and South Van Ness Avenue)
- US 101
- 9th Street
- 10th Street
- Gough Street
- Mission Street
- Howard Street

East/West Streets

- Hayes Street
- Fell Street
- Oak Street
- Golden Gate
- Duboce Avenue
- Division Street

The following table contains a summary of local roadway characteristics, including street limits within the project area, number of lanes, and one-way segments. The accompanying figure highlights the streets and illustrates their designations in the Transportation Element of the City's General Plan[2].

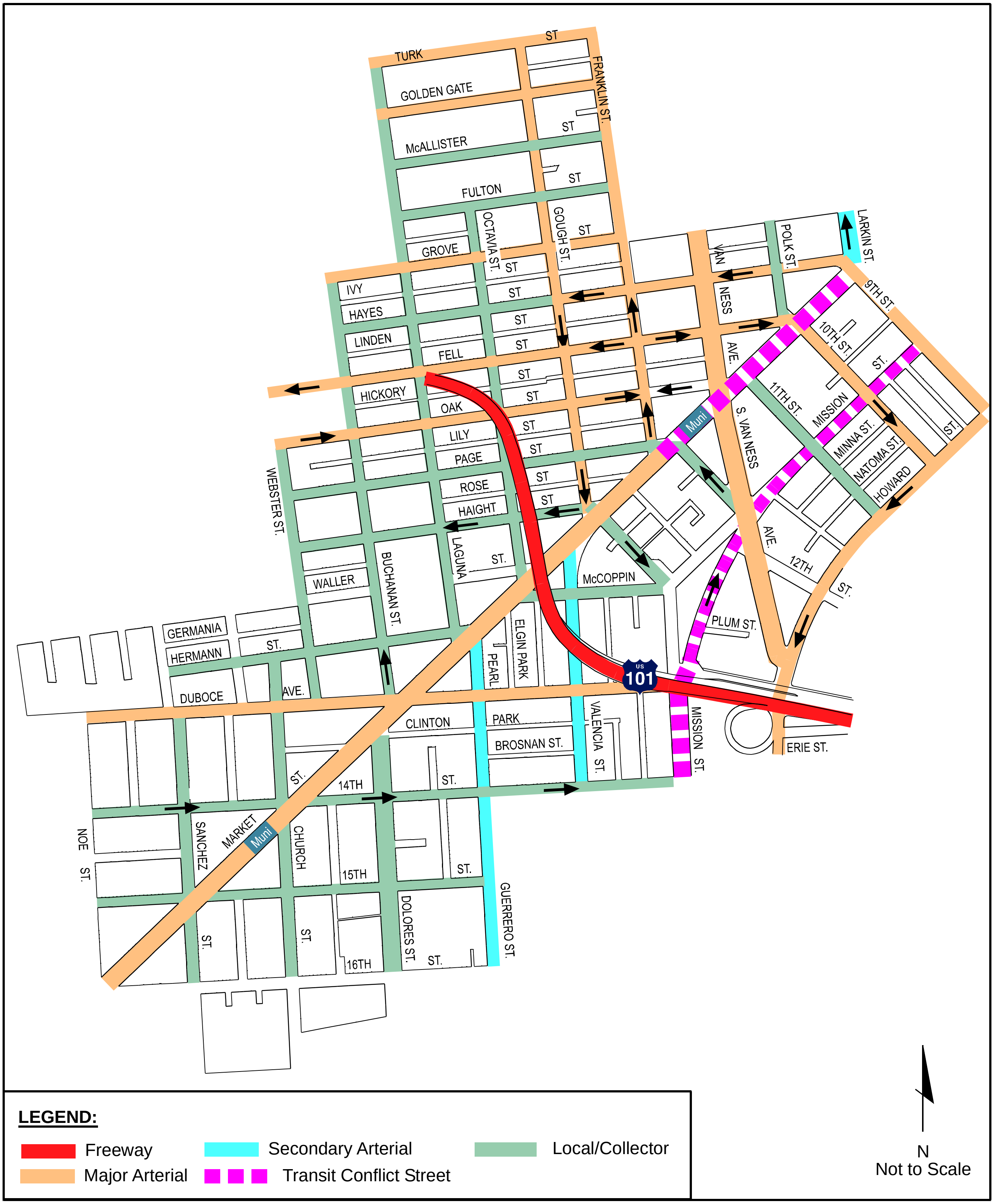
[2] The designations are taken from the Vehicular Street Map in the Transportation Element (I.4.32)

Table 2.1
Characteristics of the Local Roadway Network

Roadway	*Number of Lanes*	*One Way*	*Direction of Flow*	*Limits*	*Bicycle Facilities*
Market Street	4-5	No	Northeast/Southwest	Steuart St. Portola Dr.	Bike Lane #50 Noe-Octavia Sts.
Sanchez Street	2	No	North/South	Duboce St. 30th St.	Bike Route #45 14th-17th Sts.
Church Street	2-4	No	North/South	Hermann St. 30th St.	None
Dolores Street	4	No	North/South	Market St. San Jose Ave.	None
Guerrero Street	4	No	North/South	Market St. San Jose Ave.	None
Valencia Street	2	No	North/South	Market St. Mission St.	Bike Lane #45 14th-Market Sts.
Mission Street	4	Between 13th St and Van Ness Ave.	North/South (14th St.-Van Ness Ave.) East/West (Van Ness Ave.-10th St.)	Embarcadero San Jose Ave.	None
Gough Street	3-4	Southbound to Market	North/South	Marina Blvd. Mission St.	None
Franklin Street	3-5	Northbound	North/South	Marina Blvd. Market St.	None
Van Ness Ave	6-7	No	North/South	North Point St. Cesar Chavez St.	None
Polk Street	2-4	No	North/South	Beach St. Fell St.	Bike Lane #25 throughout study area

Roadway	*Number of Lanes*	*One Way*	*Direction of Flow*	*Limits*	*Bicycle Facilities*
Larkin Street	3-5	Northbound	North/South	Francisco St. Market St.	None
10th Street	4	Southbound	North/South	Market St. Potrero Ave.	Bike Route #25 Market-Mission Sts.
11th Street	2	No	North/South	Market St. Bryant St.	Bike Lane #25 Howard-Minna Sts.
Octavia Street	2	No	North/South	Birch St. Market St.	Bike Route #45 throughout area
Laguna Street	2	No	North/South	Marina Blvd. Market St.	None
Buchanan Street	2	Northbound between Duboce Ave. and Hermann St.	North/South	Grove St. Duboce Ave.	None
Webster Street	2-4	No	North/South	Chestnut St. Duboce Ave.	Bike Route #345 throughout area
15th Street	2	No	East/West	Park Hill Ave. Harrison St.	None
14th Street	2	Eastbound	East/West	Buena Vista Ter. Harrison St.	Bike Route/Lane #30 Sanchez-Mission Sts.
Duboce Avenue	3-5	No	East/West	Buena Vista Ave. Folsom St.	Bike Lane #30 Church-Market Sts.
Hermann Street	2	No	East/West	Steiner St. Market St.	None
McCoppin Street	4	No	East/West	Market St. Gough St.	Bike Route #545 throughout area
Haight Street	2	Westbound from Gough St. to Laguna St.	East/West	Stanyan St. Market St.	None

Roadway	*Number of Lanes*	*One Way*	*Direction of Flow*	*Limits*	*Bicycle Facilities*
Page Street	2	No	East/West	Stanyan St. Market St.	Bike Route #32 throughout area
Oak Street	3-4	Westbound from Franklin St. Eastbound from Van Ness Ave. to Franklin St.	East/West	Stanyan St. Van Ness Ave.	None
Fell Street	3	Eastbound from Franklin St. Westbound from Polk St. to Franklin St.	East/West	Stanyan St. Polk St.	None
Hayes Street	2-4	Westbound from Polk St. to Gough St.	East/West	Stanyan St. Polk St.	None
Howard Street	4-7	Westbound	East/West	Van Ness Ave. Embarcadero	Bike Lane/Route #30 throughout area



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ROADWAY CHARACTERISTICS

July, 2001
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FIGURE 2.2

Traffic Conditions
This section describes the existing traffic conditions at the study intersections.

Scope of Study
The Project Team conducted analyses at the following 30 intersections (also shown in Figure 2.3), all of which are signalized:

Table 2.2
Study Intersections

Intersection Number	*North/South Street*	*East/West Street*	*Other Cross-Streets*
1	Gough Street	Hayes Street	
2	Franklin Street	Hayes Street	
3	Van Ness Avenue	Hayes Street	
4	Laguna Street	Fell Street	
5	Gough Street	Fell Street	
6	Franklin Street	Fell Street	
7	Van Ness Avenue	Fell Street	
8	Laguna Street	Oak Street	
9	Gough Street	Oak Street	
10	Franklin Street	Oak Street	
11	Sanchez Street	Market Street	15th Street
12	Church Street	Market Street	14th Street
13	Dolores Street	Market Street	Clinton Park Driveway
14	Buchanan Street	Market Street	Duboce Avenue
15	Laguna Street	Market Street	Hermann Street Guerrero Street
16	Octavia Street	Market Street	Waller Street McCoppin Street
17	Valencia Street	Market Street	
18	Gough Street	Market Street	Haight Street
19	Franklin Street	Market Street	Page Street
20	Van Ness Avenue	Market Street	
21	Polk Street	Market Street	10th Street
22	Larkin Street	Market Street	Hayes Street 9th Street
23	Gough Street	Mission Street	McCoppin Street Otis Street

24	S. Van Ness Avenue	Mission Street	
25	11th Street	Mission Street	
26	10th Street	Mission Street	
27	Mission Street	Hwy 101 Off-ramp	Otis Street
28	S. Van Ness Avenue	Hwy 101 Off-ramp	Howard Street
29	Howard Street	Duboce Avenue	
30	Howard Street	Erie Street	

Analysis Methodology

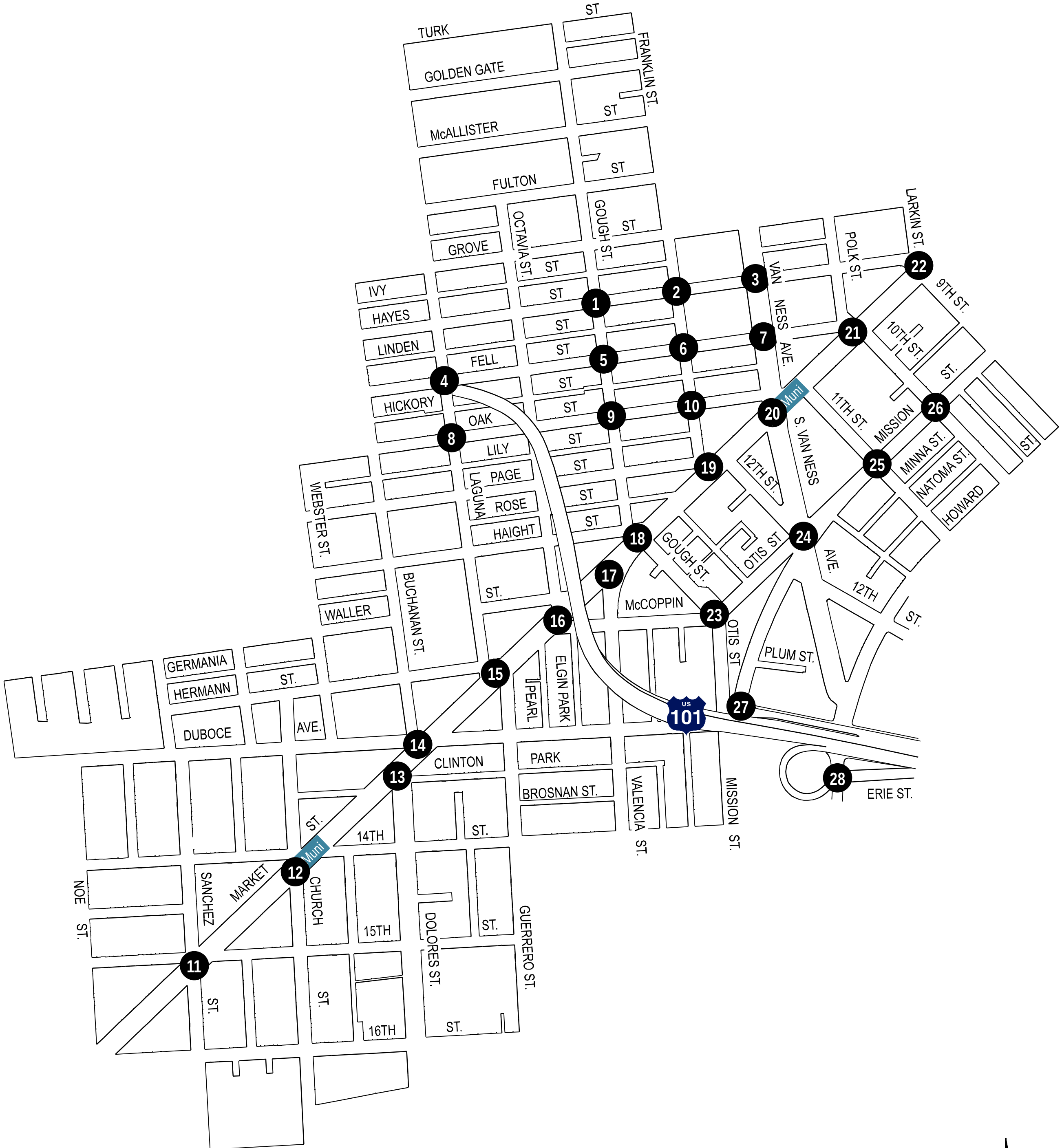
In order to determine the condition of operation at an intersection, a Level of Service (LOS) is determined. The LOS grading system is a rating scale ranging from LOS A, indicating free-flow conditions with little or no delay; to LOS E, representing unstable flow conditions with traffic volumes at or near design capacity, resulting in substantial delays. The lowest rating on the LOS scale is LOS F, which represents long queues and delays where traffic flows exceed design capacity.

At signalized intersections for operational analysis, the LOS rating is based on the weighted average control delay measured in seconds per vehicle. Peak hour traffic volumes, existing lane configurations, and signal timing/phasing are used as inputs in the level of service analysis. For this study, the 2000 *Highway Capacity Manual* (HCM) operations methodology, Synchro 5.0 software and CORSIM, were used for this analysis. According to City of San Francisco environmental review standards, LOS of D or better is considered acceptable.

The Project Team collected vehicle counts at all the study intersections during the morning and evening peak commute hours (7-9 AM and 4-6 PM) on November 29, 2000 and February 28, 2001. Using this data, the Team determined the peak hour, or hour when the highest number of vehicles passed through the intersection, for each intersection during each commute period. Because some intersections experienced the peak hour at different times, the Project Team balanced the numbers, meaning they used the data for the hour when *most* intersections experienced their peak volumes.

Existing Levels of Service

The lane geometry, vehicle counts, and Level of Service (LOS) for each intersection are shown in Figure 2.4. According to the analysis, during the morning peak period, several intersections along the Market Street and Van Ness Avenue corridors are operating at level D or lower, and a few intersections are operating at level F. The intersections of Church/14th/Market Street, Mission Street/Van Ness Avenue, and 13th Street/Van Ness Avenue are all operating at levels E and F. Throughout the rest of the study area, intersections are operating at levels B and C.



LEGEND:

1 = Study Intersection

N
Not to Scale

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STUDY INTERSECTIONS

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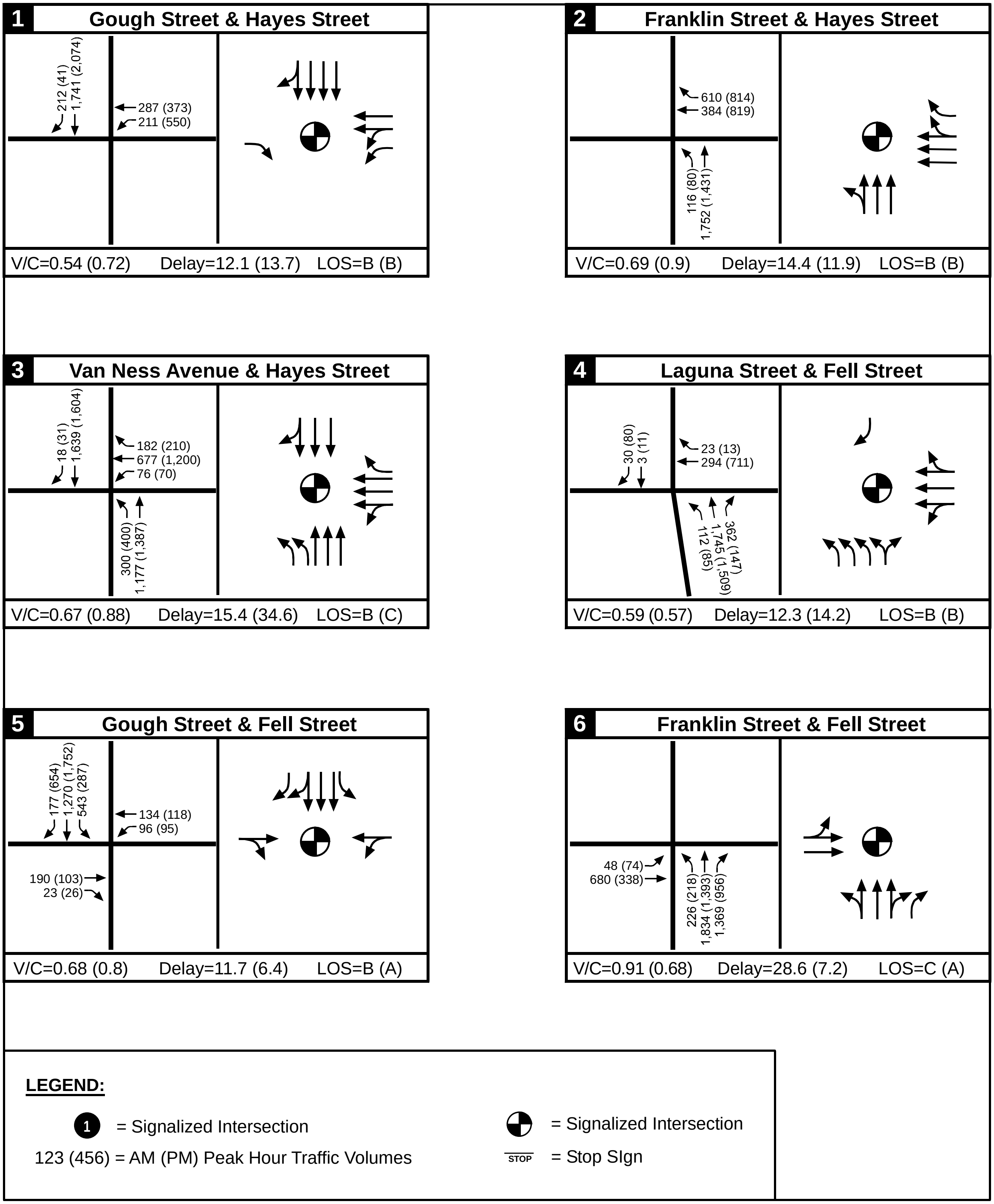
FIGURE 2.3



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EXISTING INTERSECTION CONDITIONS

July, 2001
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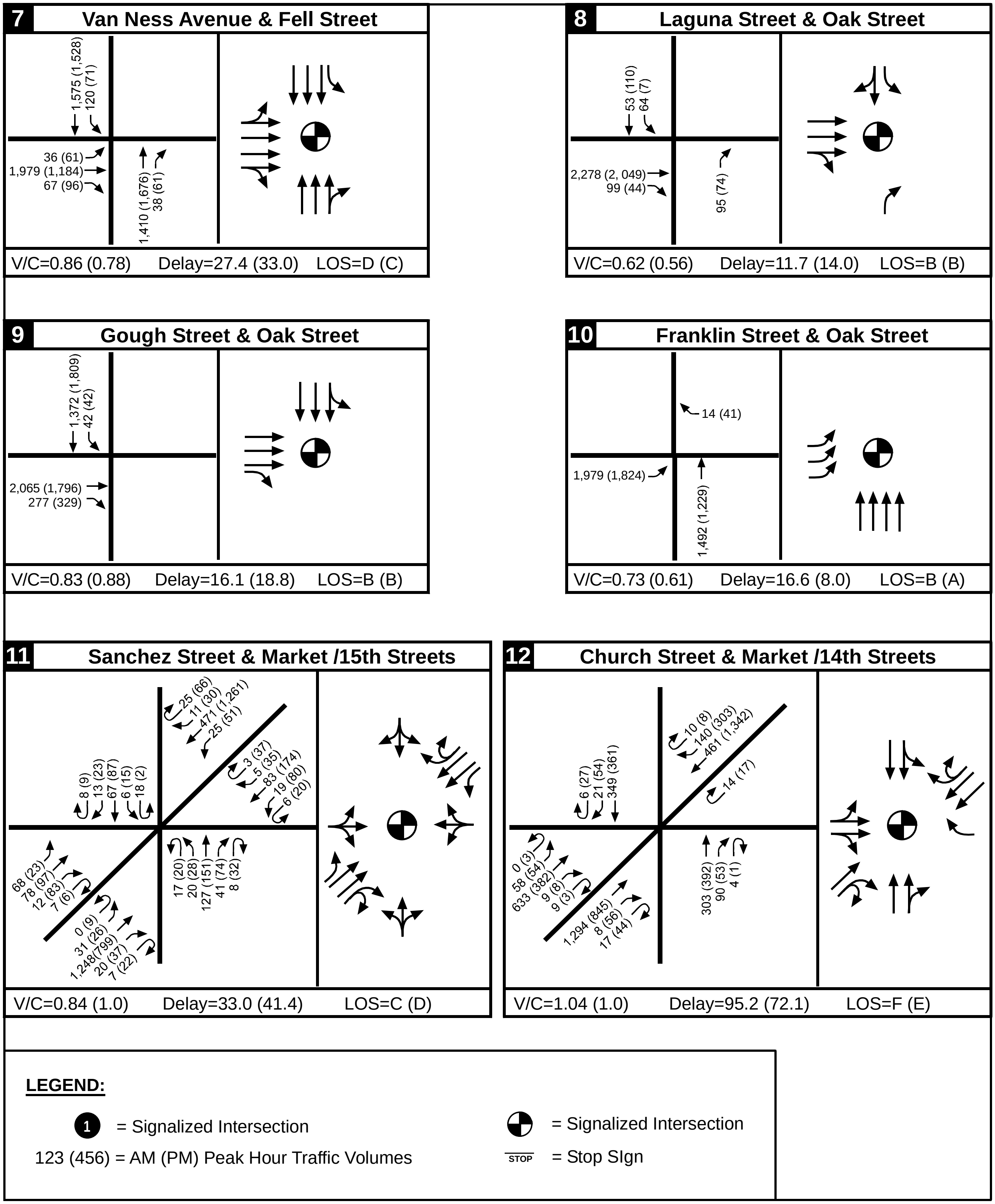
FIGURE 2.4



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EXISTING INTERSECTION CONDITIONS

July, 2001
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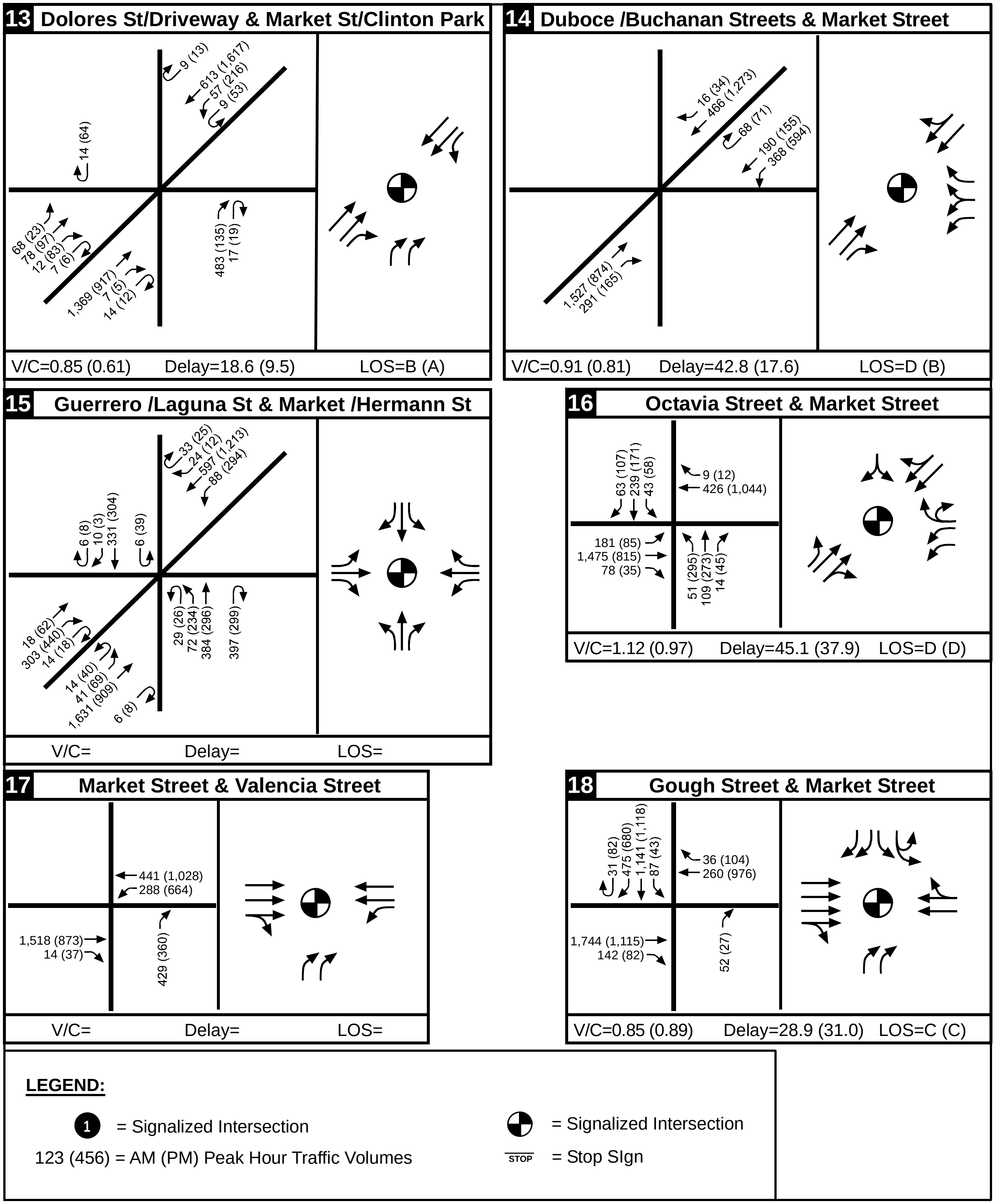
FIGURE 2.4



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EXISTING INTERSECTION CONDITIONS

July, 2001
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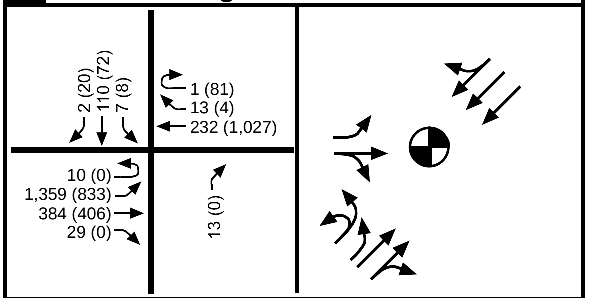
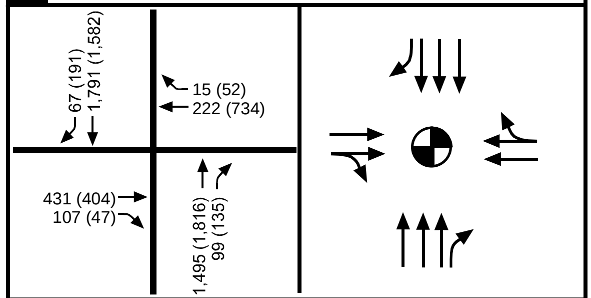
FIGURE 2.4

19 Franklin /Page Streets & Market Street



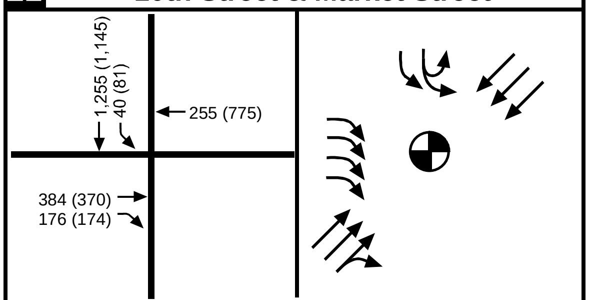
V/C=0.95 (0.81) Delay=54.6 (40.8) LOS=D (D)

20 Van Ness Avenue & Market Street



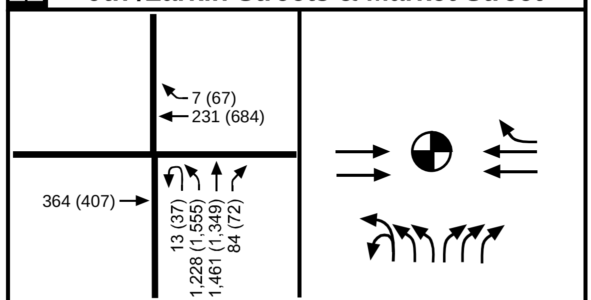
V/C=0.81 (0.98) Delay=10.9 (29.5) LOS=B (C)

21 10th Street & Market Street



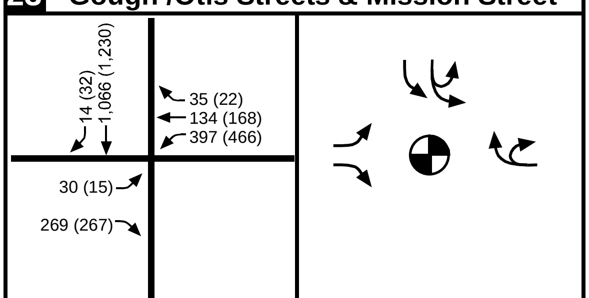
V/C=0.86 (0.80) Delay=36.4 (18.1) LOS=D (B)

22 9th /Larkin Streets & Market Street



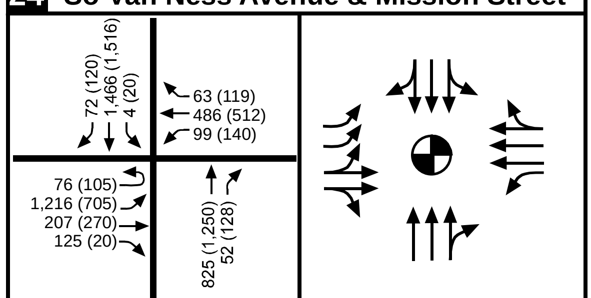
V/C=1.04 (1.21) Delay=45.4 (55.9) LOS=D (E)

23 Gough /Otis Streets & Mission Street



V/C=0.67 (0.74) Delay=23.0 (31.2) LOS=C (C)

24 So Van Ness Avenue & Mission Street



V/C=0.83 (0.85) Delay=68.9 (63.7) LOS=E (E)

LEGEND:

1 = Signalized Intersection

123 (456) = AM (PM) Peak Hour Traffic Volumes

= Signalized Intersection

STOP = Stop SIgn

San Francisco Better Neighborhoods 2002
Market/Octavia Existing Conditions Report

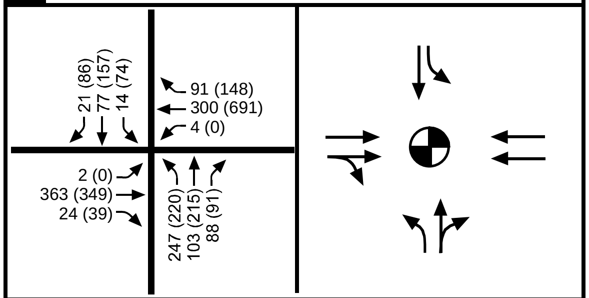
FEHR & PEERS ASSOCIATES, INC.
Transportation Consultants

EXISTING INTERSECTION CONDITIONS

July, 2001
\market\0001-92-4-4

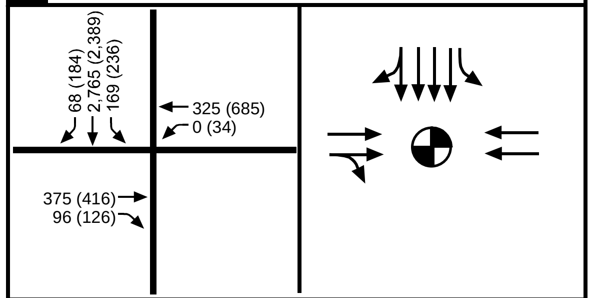
FIGURE 2.4

25 **11th Street & Mission Street**



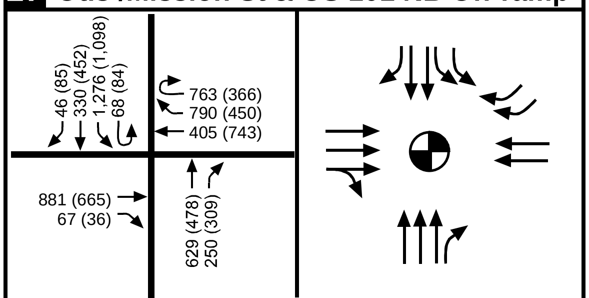
V/C=0.37 (0.41) Delay=11.7 (14.0) LOS=B (B)

26 **10th Street & Mission Street**



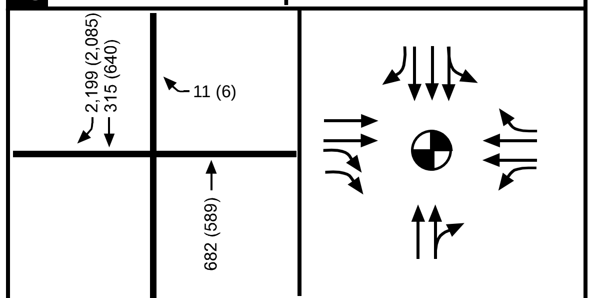
V/C=0.64 (0.72) Delay=8.2 (10.0) LOS=A (B)

27 **Otis /Mission St & US 101 NB Off-ramp**



V/C=1.26 (0.97) Delay=77.6 (43.4) LOS=E (D)

28 **US101 NB On-ramp/So Van Ness & Erie St**



V/C=1.38 (1.26) Delay=111.2 (103.3) LOS=F (F)

LEGEND:

1 = Signalized Intersection

123 (456) = AM (PM) Peak Hour Traffic Volumes

= Signalized Intersection

STOP = Stop SIgn

San Francisco Better Neighborhoods 2002
Market/Octavia Existing Conditions Report

FEHR & PEERS ASSOCIATES, INC.
Transportation Consultants

EXISTING INTERSECTION CONDITIONS

July, 2001
\market\0001-92-4-5

FIGURE 2.4

Section 3: Parking

This section summarizes the results from an analysis of parking in the Market-Octavia neighborhood.

Methodology

On March 12, 2001, data collectors from BayMetrics counted all of the available parking spaces in the area bounded roughly by Hayes Street, Octavia Boulevard, Fulton Street, Gough Street, Golden Gate Avenue, Franklin Avenue, Hayes Street, Van Ness Avenue, Mission Street, Duboce Street, and Dolores/Buchanan Street. They then counted actual occupancies of those spaces by block between noon and 2:00 p.m., noting all of the restrictions on parking such as meters, time limits, residential permits and so on. This data was used to analyze existing supply and occupancy of on-street parking.

Parking turnover data was also collected for five (5) street segments in the survey area:

1. Fell St between Octavia and Gough Street;
2. Haight Street between Buchanan and Laguna;
3. Valencia between Duboce and McCoppin;
4. Mission between 14th and Duboce; and
5. Otis between McCoppin and South Van Ness.

This data was used to calculate the average parking duration over the 12 hour survey period (from 7:00 a.m. to 7:00 p.m.) for each of the five street segments.

Survey Results

Figure 3-1 below provides a general summary the parking supply and occupancy survey.

Figures 3-2 to 3-9 show peak parking occupancies, parking restrictions, and average parking duration for the five street segments listed above.

As the figures show, parking throughout the Market/Octavia area is generally full, with occupancy rates at or approaching 100 percent on streets north of Market Street. Typically, parking is considered to have an "effective capacity" of approximately 85 percent of total supply. Effective capacity is the limit at which drivers are able to find parking relatively easily and close to their destination. The high occupancy rates throughout Market/Octavia area, especially north of Market Street indicate that there are few spaces available during the peak period of the day and that drivers traveling to the area have to drive around searching for a space, thus adding to local traffic congestion for short periods of time.

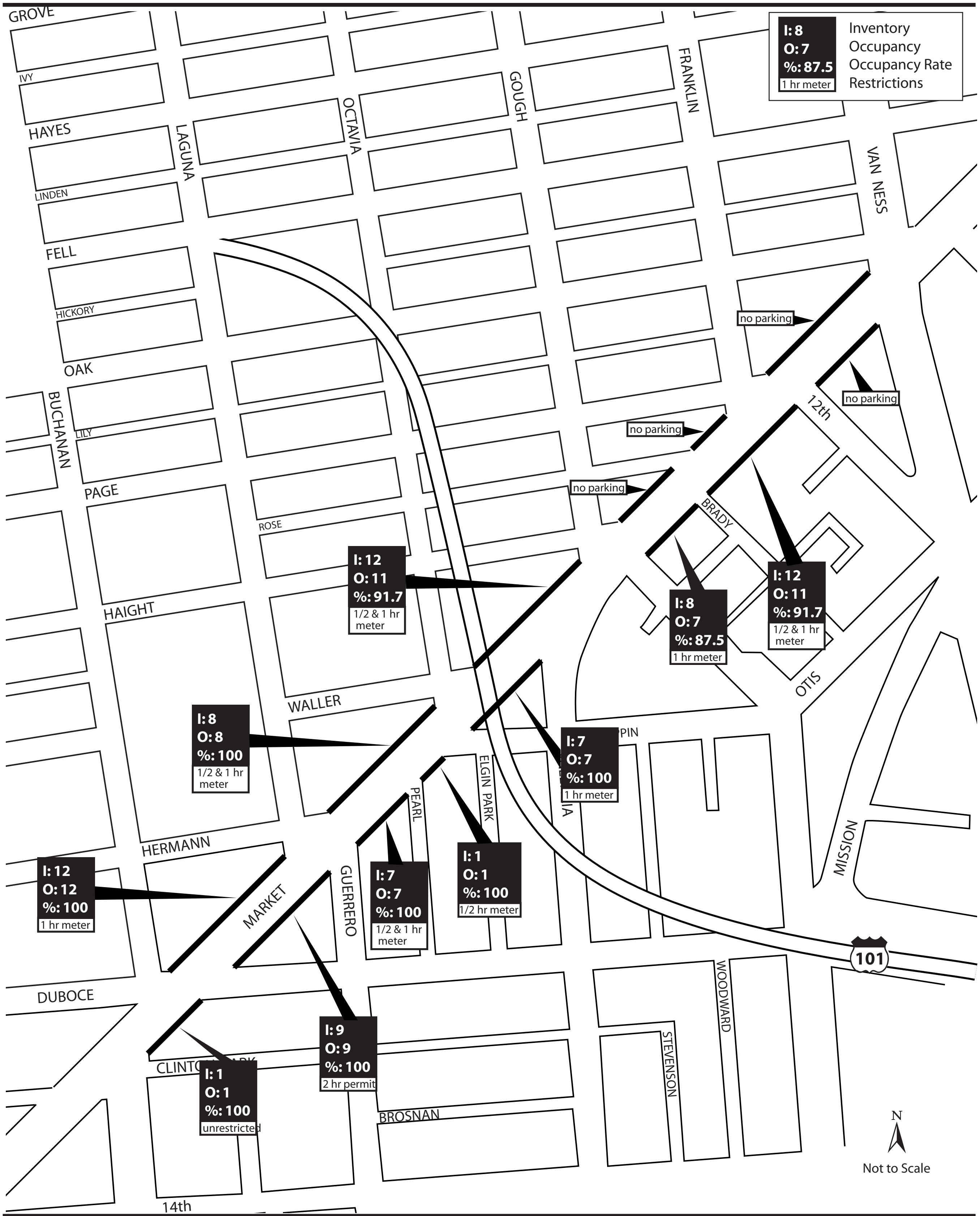
Turnover on streets north of Market is likely to vary since the types of on-street parking ranges from metered 30 minute, metered parking to unrestricted, free parking. However, the average parking duration along Fell between Octavia and Gough Streets (4.6 hours on the north side and to 4.0 hours on the south side) and Haight between Buchanan and Laguna Streets (3.1 hours on the north side and 4.5 hours on the south side) indicate that turnover is relatively low north of Market Street, especially on streets that front residential areas. These types of streets generally have unrestricted or 2-3 hour permitted parking.

South of Market Street, there are relatively more spaces available for drivers. However, parking is still scarce and there are time limit restrictions on many of the streets. Turnover south of Market Street is slightly higher than north of Market, as the average parking duration on Otis, Mission, and Valencia indicate. Average duration on Otis between 14th between McCoppin and South Van Ness is 3.0 hours on the north side and 2.8 hours on the south side. Average duration on Mission between 14th and Duboce is 2.9 hours on the west side and 2.5 hours on the east side. Average duration on Valencia between McCoppin and Duboce is 2.5 hours on the west side and 2.8 hours on the east side.

Market Street itself has few on-street parking spaces, and most are metered for either 1 hour or 30 minute time limits. People traveling to retail shops and offices on Market must either park in areas off Market Street or in off-street parking facilities in the vicinity of their destination.

Figure 3-1 Market-Octavia Neighborhood On-Street Parking Availability

Area/Street	Total Spaces	Spaces Occupied at Peak	Percent of Capacity
Market Street	75	73	97.3%
Octavia Street	137	136	99.3%
North of Market Street (including Octavia)	1731	1665	96.2%
South of Market Street	760	718	94.5%

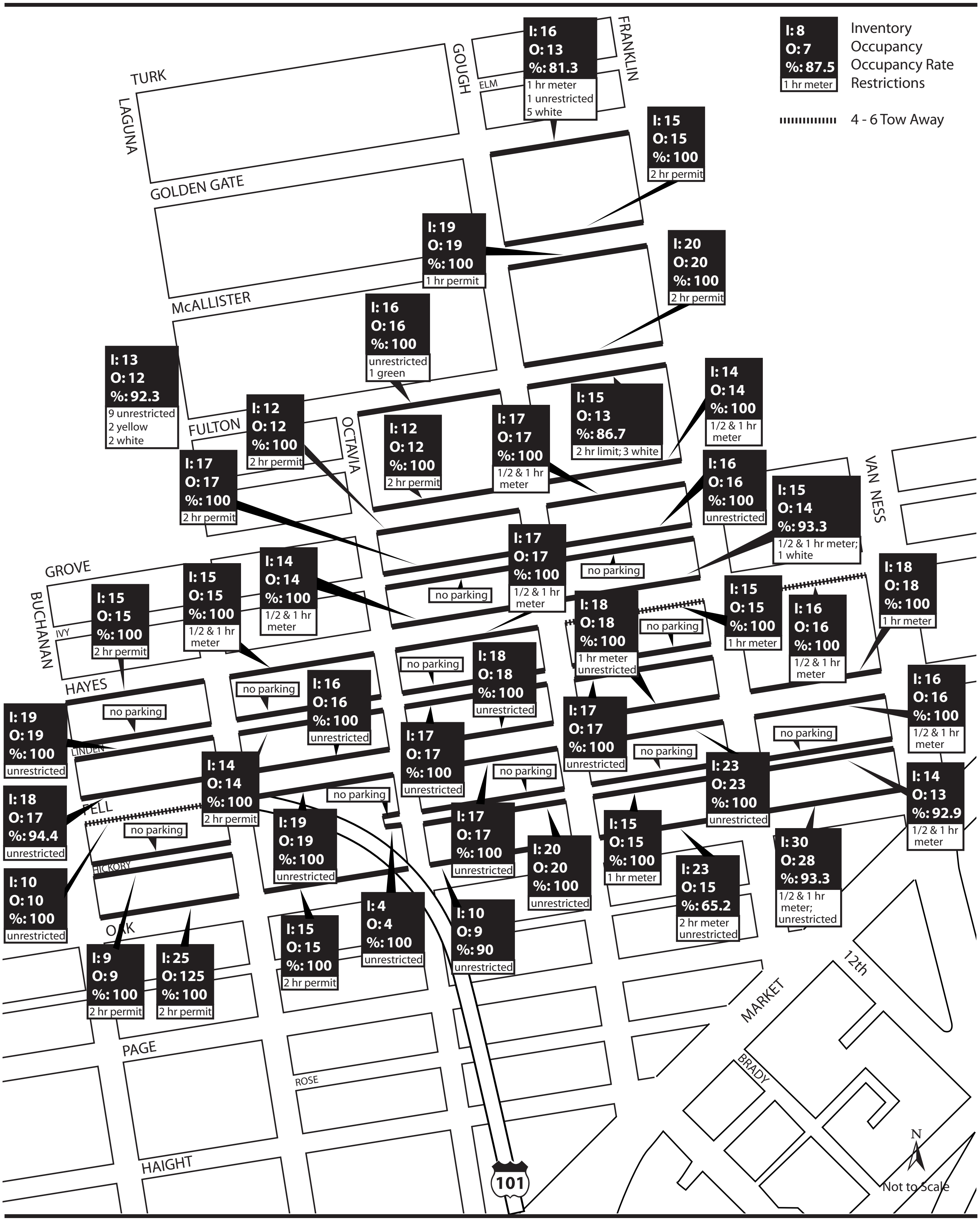


CHS Consulting Group

Figure 3-2
ON-STREET PARKING INVENTORY, OCCUPANCY, RESTRICTIONS
(Market Street)

CHS Consulting Group

Figure 3-3
ON-STREET PARKING INVENTORY, OCCUPANCY, AND RESTRICTIONS
(North-south streets north of Oak Street)



CHS Consulting Group

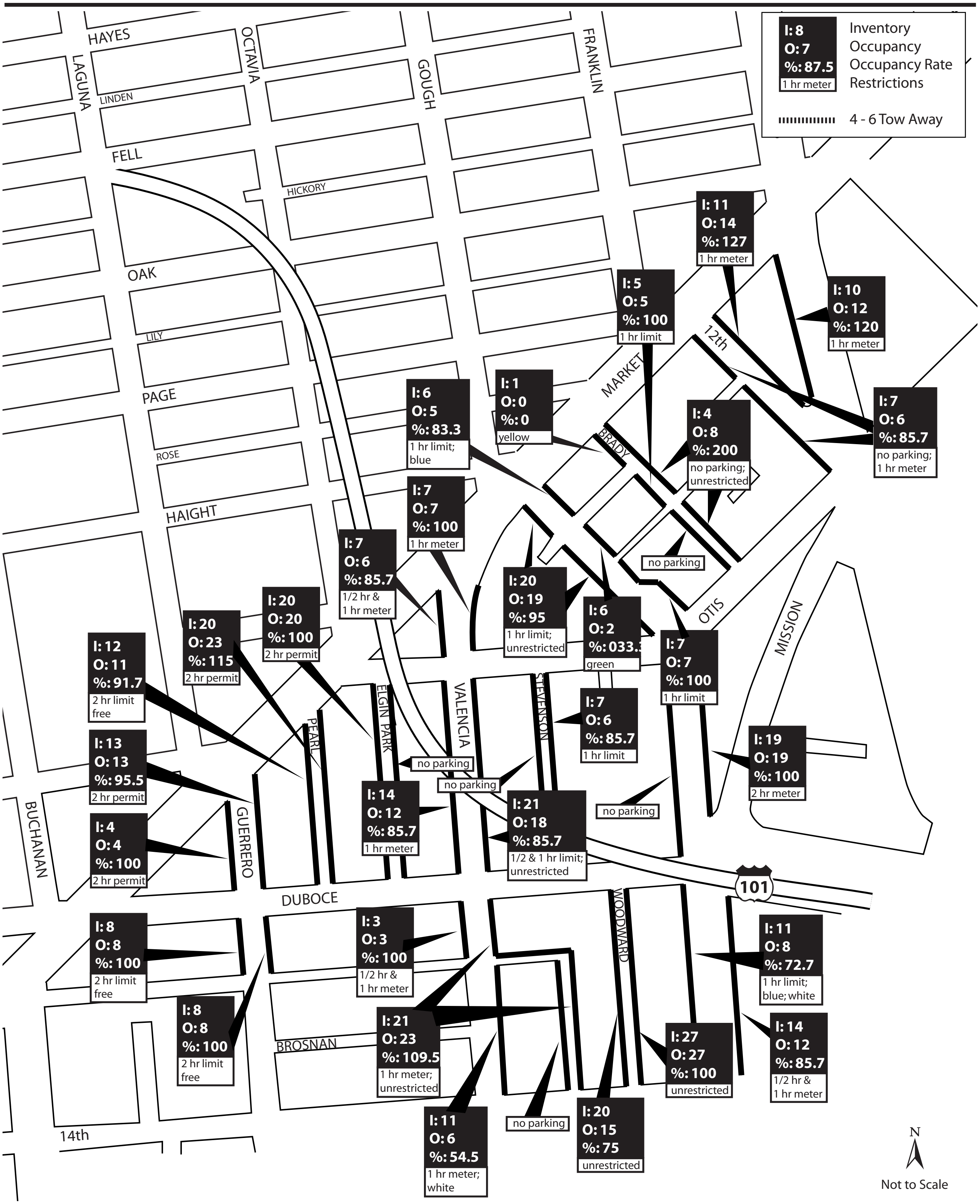
Figure 3-4
ON-STREET PARKING INVENTORY, OCCUPANCY, AND RESTRICTIONS
(East-west streets north of Oak Street)

CHS Consulting Group

Figure 3-5
ON-STREET PARKING INVENTORY, OCCUPANCY, AND RESTRICTIONS
(North-south streets south of Oak Street)

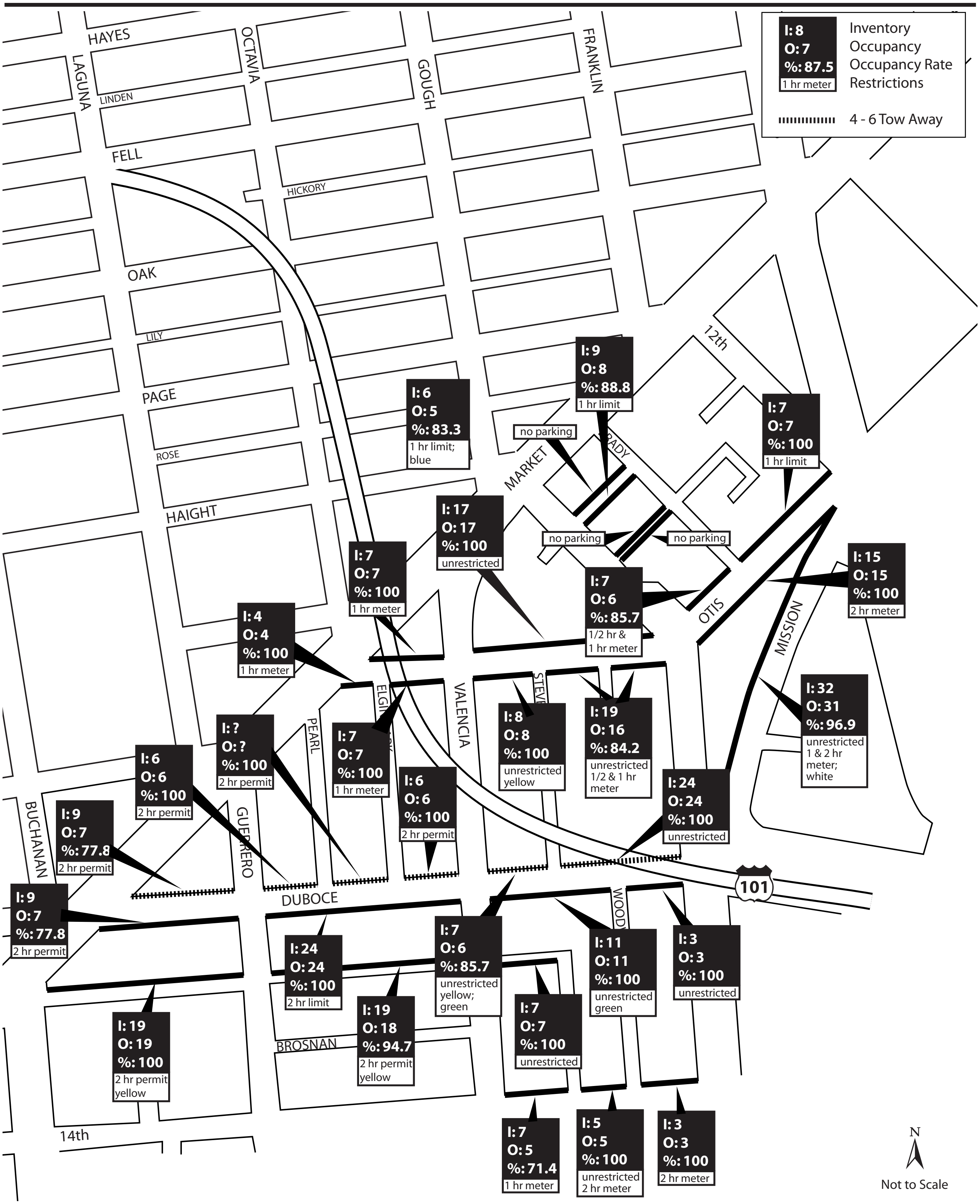
CHS Consulting Group

Figure 3-6
ON-STREET PARKING INVENTORY, OCCUPANCY, AND RESTRICTIONS
(East-west streets south of Oak Street)



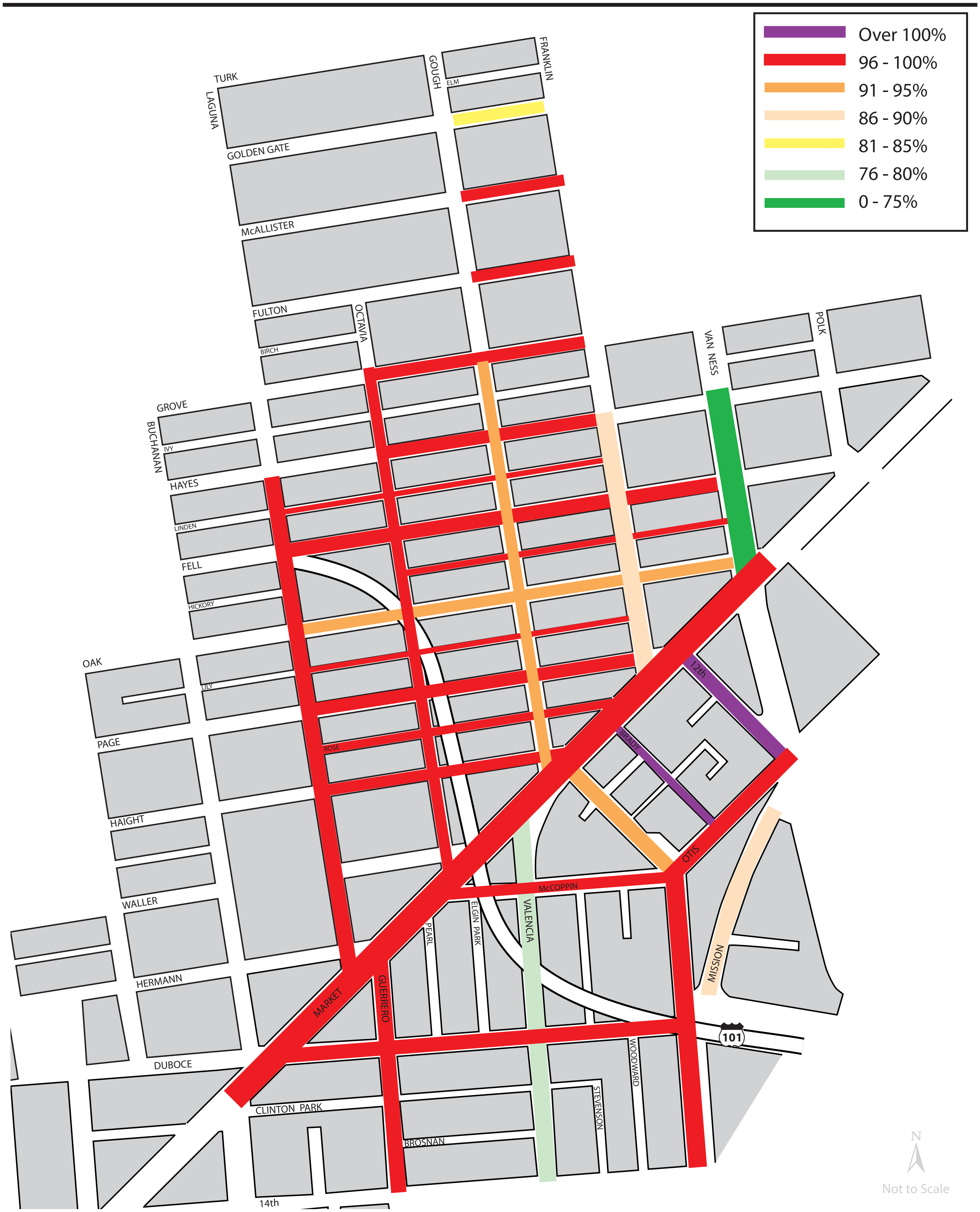
CHS Consulting Group

Figure 3-7
ON-STREET PARKING INVENTORY, OCCUPANCY, AND RESTRICTIONS
(North-south streets south of Market Street)



CHS Consulting Group

Figure 3-8
ON-STREET PARKING INVENTORY, OCCUPANCY, AND RESTRICTIONS
(East-west streets south of Market Street)



CHS Consulting Group

Figure 3-9
Peak Period Average Occupancy Rates (On-Street Parking)

PARKING AND TRAFFIC POLICY

Section 1 Summary

Currently, minimum standards for off-street parking are set for most new development in San Francisco outside the downtown core. These rigid standards are based purely on the type and size of development.

These standards do not account for the complexity of San Francisco's different neighborhoods in terms of land use, variety of parkers (e.g., residents, commuters, shoppers and tourists), transit availability, density, form, hours of operation, economic base, land constraints, and community goals. They assume that all parking is free to the user and that alternatives to driving are limited. Most importantly, they tie economic growth to growth in automobile trips in a straight-line manner: if there are more jobs, there will be more congestion.

An alternative approach would see the amount of parking required driven primarily by the values of the community. This would allow the positive values of parking, such as attracting trade for local businesses, to be set against the negative consequences, such as the land required by parking facilities, and the promotion of more car trips. Issues that could be considered include:

- Is there enough roadway capacity to serve an increase in parking?
- Is it cheaper to do something instead of providing parking?
- Why should developers be forced to provide more parking than they consider necessary?
- Does additional parking or a particular transportation demand management activity serve more people?
- Does additional parking or greater investment in transit fit better with the values of the community?

Parking principles

The principles of a revised parking policy would recognize:

- The severe impact of the automobile on urban quality of life.
- The potential to increase parking availability without increasing supply, through better management of existing resources – differential pricing, for example.
- The pressure that increased parking supply places on the city's limited roadway capacity, through generating more vehicle trips. This added congestion disproportionately affects transit travel time.
- The disruption caused to transit service by curb cuts, in particular left turns into off-street parking areas.

- That controlling parking is the City's most powerful demand management tool to tackle congestion.
- That travelers are rational decision-makers, and so travel choices will be affected by time, convenience and cost of all modes. Information, particularly on alternative modes, is important to allow rational choices. This also means that the full cost of parking must be made visible to parkers.
- That residents and business owners can currently be forced to rent parking they do not need, through the aggregation of the cost of parking within the overall rent.
- The negative visual and environmental impact of parking on a neighborhood, such as through blank garage doors, surface lots, and parking structures without active first-floor uses.
- The threats to new development posed by fears of scarcer residential parking.
- That minimum parking requirements prejudice the success of transit centers, through limiting the density of development around transit nodes.
- That minimum parking requirements significantly affect housing affordability, and are one of the greatest obstacles to the creation of new affordable housing.

Reduced parking requirements in San Francisco

Downtown San Francisco provides an excellent example of how parking requirements can be reduced without prejudicing development.

- Employment in downtown San Francisco doubled between 1968 and 1984, while the number of cars traveling into the downtown stayed the same. This was due to major investments in transit infrastructure, the promotion of a walkable, compact urban form, and requirements for new buildings to include little or no parking. Instead, the City developed ten public garages, with parking prices set to discourage long term commuter parking and to support shorter-term shopping, business and errand trips.
- Recent projects designed with little or no parking include the Sony Metreon, a four story, 350,000 square-foot entertainment center, and Pacific Bell Park.

Reduced parking standards in other US Cities

A number of cities elsewhere in the United States have successfully reformed their parking standards:

- Minimum parking requirements have been replaced by maximum ones in 13 jurisdictions in Washington State, following the passage of state Commute Trip Reduction legislation. Bellevue, WA, also requires the disaggregation of parking costs in commercial leases, and links long-term parking rates to the cost of a transit pass.

- In Seattle, lower parking requirements are set in areas with good transit access. Officials are also recommending establishing parking maximums in designated Light Rail Station Areas and other neighborhoods with transit-friendly characteristics. Changes in parking requirements would be linked to neighborhoods characteristics, including:
  - lower average car ownership rates
  - participation in location efficient mortgage programs
  - alternatives to single occupancy vehicle travel, such as transit
- Portland, OR, has introduced maximum parking requirements in order to promote the efficient use of land, enhance urban form, encourage the use of alternative modes, provide for better pedestrian movement, and protect air and water quality. The standards vary with land use and location, including distance from transit routes.
- Portland has also introduced ordinances to prevent facades being dominated by driveways and garages.
- The draft land use code update for Eugene, OR, provides for maximum parking requirements for non-residential uses, in addition to minimum requirements. The minimum requirements are waived in three high-density areas.

Reduced parking standards in Northern Europe

The shift to maximum parking standards is most apparent in Northern Europe. The explicit aims of these include curbing car use, allowing higher development densities, and reducing the costs of development by removing any requirement for developers to provide more parking spaces than they might otherwise choose. The standards are often related to public transport accessibility.

Examples include:

- In England, local authorities are now required to draw up and apply maximum parking standards for new developments. National maximum standards have been set as a guideline to local authorities.
- In the East Midlands, UK, regional maximum parking standards have been drawn up based on mode split targets for new developments.
- In London, UK, planning guidelines relate parking provision to housing type and the intensity of developments.
- British local authorities such as Edinburgh and Camden, London, have successfully introduced car-free housing.
- Helsinki, Finland, relates parking standards to the location of development. It uses maximum parking standards in the city center. In the rest of the inner city, the standards are both a minimum and a maximum core. In the suburbs, minimum

parking standards are employed, which are lower in sub-centers and around local rail stations.

- In Bern, Switzerland, maximum parking standards have been introduced in districts where air quality standards were being exceeded.

Allocation of right-of-way

This section considers techniques used in Northern Europe to allocate a limited amount of right-of-way to different modes. One key conclusion is that a reduction in the amount of right-of-way available to cars generally results in a reduction in vehicle traffic, and does not inevitably cause unacceptable congestion. In other words, much traffic "disappears". In addition, such right-of-way reallocation brings safety benefits in most cases.

Examples of policies regarding right-of-way allocation include:

- National policy in England, where major right-of-way reallocation schemes are appraised against the government's five broad objectives for transport — economy, safety, accessibility, environment and integration. Subsumed within these high-level objectives are more specific sub-objectives such as journey times, local air quality and community severance.
- Bristol and Gloucester, England, where the allocation of right-of-way is based on the city's road hierarchy. This classifies routes according to their intended use, such as through traffic, public transport or local movements within neighborhoods. In turn, the classification or position within the hierarchy determines whether transportation measures such as traffic calming or bus priority will be applied to that route, and thus the allocation of right-of-way to different modes.
- London, England, where disagreement over right-of-way allocation at a key intersection led to a phased, experimental process, in the expectation (so far borne out) that car traffic will gradually 'disappear'.

Benchmarking transportation policies

Currently, San Francisco's only measure of success for its transportation system is the same Level of Service – or LOS – standard that suburban communities use. LOS takes two forms: First and primary is a measurement of average seconds of delay motor vehicles experience at intersections; second is a measurement of the difference between potential speed and travel conditions for motor vehicles and the actual conditions.

Neither measurement takes into account the movement of people through the system, nor does it consider conditions for bicyclists, pedestrians, transit users, the disabled or other groups. Installing a transit-only lane, for example, is only counted as a negative project under current standards, even if it results in a doubling of the number of people the street will serve and a reduction in the travel time an average person experiences.

In contrast, many cities and counties in the UK and other parts of Northern Europe use a far wider range of indicators, on the basis that a single measure cannot possibly measure the range of impacts on the transportation system. Firstly, these cover non-auto modes, such as journey time indicators for both bus and car.

Secondly, the indicators cover a much wider range of impacts for each of these modes. Some examples include journey time, cost, casualties, access, modal share, travel time to local centers, crowding and congestion.

Thirdly, the indicators recognize that transportation policies can have a wider impact on issues such as economic performance and environmental sustainability. West Yorkshire, England, uses unemployment and rental values as transportation indicators, while in Amsterdam, transportation targets such as modal share are subsumed within the city's environmental policy plan.

Fundamentally, these authorities relate their indicators to their objectives for transportation policy. In other words, it is meaningless to select indicators without first defining the objectives. The best example of this West Yorkshire, where each indicator is specifically related to an objective. For example, the aim to "improve operational efficiency of the transport system" is measured by three indicators: journey times by bus and car, generalized cost and travel distance to work.

Section 2 Parking Principles

No great city is known for its abundant parking supply. San Francisco itself is one of the best examples in the United States of how limiting parking can create a compact, vibrant, walkable downtown. Reducing the space that needs to be given over to the private car allows development to take place at sufficiently high densities, creating a strong sense of urban place, and making walking, cycling and transit viable alternatives.

Outside the downtown core, however, San Francisco has followed a different path. Most new development is currently required to add off-street parking spaces, through the use of minimum parking standards calculated according to the number of dwelling units or occupied floor area.

As in most places, these rigid standards – set out in more detail below – are based purely on the type and size of the development. There is no concession for any Transportation Demand Management or similar program the building occupants may develop. The standards do not account for the complexity of San Francisco's different neighborhoods in terms of land use, variety of parkers (e.g., residents, commuters, shoppers and tourists), transit availability, density, form, hours of operation, economic base, land constraints, and community goals. They assume that all parking is free to the user and that alternatives to driving are limited. Most importantly, they tie economic growth to growth in automobile trips in a straight-line manner: if there are more jobs, there will be more congestion.

Such simplistic formulas may work in suburban communities elsewhere in California, where almost all trips are by car because there really is no other choice. In all three of the Better Neighborhoods 2002 study areas, however, where there are a multitude of travel options, there is no formula that uses as input community size, transportation resources, and economic activity and determines the appropriate amount of parking based on these variables.

For such diverse places the amount of parking needed is driven primarily by the values of the community. Decision-makers must ask, at what point do the positive values of parking outweigh the negative consequences? Is there enough roadway capacity to serve an increase in parking? Is it cheaper to do something instead of providing parking? Why should developers be forced to provide more parking than they consider necessary? Does additional parking or a particular transportation demand management activity serve more people? Does additional parking or greater investment in transit fit better with the values of the community?

The amount of parking to be supplied must be informed by community livability and economic goals. Some of the potential trade-offs are illustrated in the figure below.

Lack of parking encourages people to find alternatives to driving, thereby reducing cars and improving livability	**vs.**	Lack of parking encourages people to go elsewhere to shop, eat and be entertained, and thus negatively impacts economic vitality.
Increasing parking supply increases the number of cars on the road.	**vs.**	Additional parking will ease existing congestion caused by cars searching for parking spaces.
Decreasing parking supply will decrease the number of cars on the road.	**vs.**	There are many other factors requiring people to drive. Decreasing parking supply alone will not decrease traffic.
Increasing parking supply will make it easier to find parking in the Study Area.	**vs.**	Additional parking may ease short-term parking shortages. In the long-term, increased parking supply will encourage more people to drive, resulting in similar imbalances in supply & demand.
Parking should be market-priced so travelers can make informed economic decisions about its use.	**vs.**	Parking should be publicly subsidized, because it is part of the public infrastructure.
Parking supply should be increased to make access to the Study Area easier.	**vs.**	Practical barriers to increasing parking exist, such as lack of money and land, and increasing other transportation options is more effective.
Commuter parking is needed to attract and retain Study Area employees.	**vs.**	Adequate parking for visitors is required to maintain healthy business districts in the Study Area.

San Francisco Downtown Plan

In determining the principles of the parking policy to be followed in the neighborhoods, it is useful to look at the degree to which planners have successfully used parking to manage travel demand in the downtown core.

According to the San Francisco Planning Department, employment in downtown San Francisco doubled between 1968 and 1984, while the number of cars traveling into the downtown stayed the same. City planners recognized that constrained capacity in the regional highway system -- and particularly the Bay Bridge -- made it impossible to develop a downtown that promoted access by car. Completion of BART and Muni Metro subways and a Downtown Plan that encouraged a compact, walkable, highly dense pattern influence downtown's 500,000 employees to use alternatives to driving.

Parking was also controlled. New buildings were built atop existing surface parking lots and most were required to build little or no parking. Instead, the City developed ten public garages arranged in a ring around the far edges of the Financial District and Union Square area, totaling over 11,000 spaces. Parking prices at each of the garages are set to discourage long term commuter parking and to support shorter-term shopping, business and errand trips.

In recent years, San Francisco's parking restrictions have been challenged, largely because the City has failed to maintain and expand its investments in Muni. Nevertheless, recent major projects have been designed with little or no parking. The Sony Metreon, a four story, 350,000 square-foot entertainment center, opened in June 1999 amid predictions that it would create a parking crisis and gridlock. The project was built with no parking. The majority of users arrive by foot and transit, and the remainder can park in the existing, 2,600-space 5th & Mission Garage across the street. As of March 2000, peak utilization of the garage has averaged 78%, with not a single parking shortage period in the evening when visitation to Metreon peaks.

Pacific Bell Park faced dire predictions that it would create gridlock and parking shortages because everyone would drive there. Instead, the park's 5,000 space lots do not regularly fill. According to the Department of Parking and Traffic's Bond Yee, 60% of ballpark fans are taking transit even to the relatively remote Ballpark location, exceeding planners' initial goals.

The lesson here is that cities can change from car-dominated to transit-dominated as they urbanize. The shift can be accomplished by investing in alternative transportation strategies that support a long-term vision.

Current parking standards in the Better Neighborhoods 2002 study areas

Current parking standards in the Better Neighborhoods 2002 study areas exclusively take the form of minimum requirements. These are set out in the table below.

The aim of the parking standards, according to the Planning Code, is to ensure "needed facilities" are provided, but to "discourage excessive amounts of parking, to avoid adverse effects upon surrounding areas and uses, and to encourage effective use of public transit as an alternative to travel by private automobile." Despite this explicit aim, however, no maximum standards are employed at present.

A minimum residential parking standard of one space per dwelling unit is employed in virtually all parts of the study areas. The exception is a small commercially zoned section in the far eastern corner of the Market/Octavia study area, where the standard is one space per four dwelling units. There are also exceptions for group housing and dwellings for senior citizens and the physically handicapped.

For office and retail use, the minimum standard is generally one for each 500 sq ft of occupied floor space, wbere the occupied floor area exceeds 5,000 square feet. The standards are slightly higher for large retail developments in excess of 20,000 sq ft.

In the commercially zoned section of the Market/Octavia study area, off-street parking and loading requirements are waived for all uses except residential.

San Francisco minimum parking standards

Use	Parking requirement
Dwelling, except as specified below	One for each dwelling unit.
Dwelling, RC-4, RSD and C-3 Districts (Market/Octavia study area, north of Otis and east of Franklin)	One for each four dwelling unit.
Dwelling, specifically designed for and occupied by senior citizens or physically handicapped persons	One-fifth the number of spaces specified above.
Group housing of any kind	One for each three bedrooms or for each six beds, whichever results in the greater requirement, plus one for the manager's dwelling unit if any, with a minimum of two spaces required.
SRO units	In the South of Market base area, one for each 20 units, plus one for the manager's dwelling unit, if any, with a minimum of two spaces.
Hotel, inn or hostel in NC Districts (Neighborhood Commercial Districts in all three study areas)	0.8 for each guest bedroom.
Hotel, inn or hostel in districts other than NC	One for each 16 guest bedrooms where the number of guest bedrooms exceeds 23, plus one for the manager's dwelling unit, if any.
Motel	One for each guest unit, plus one for the manager's dwelling unit, if any.
Mobile home park	One for each vehicle or structure in such park, plus one for the manager's dwelling unit if any.
Hospital or other inpatient medical institution	One for each 16 guest excluding bassinets or for each 2,400 sq ft of gross floor area devoted to sleeping rooms, whichever results in the greater requirement, provided that these requirements shall not apply if the calculated number of spaces is no more than two.
Residential care facility	One for each 10 residents, where the number of residents exceeds nine.

Use	Parking requirement
Child care facility	One for each 25 children to be accommodated at any one time, where the number of such children exceeds 24.
Elementary school	One for each six classrooms.
Secondary school	One for each two classrooms.
Post-secondary educational institution	One for each two classrooms.
Church or other religious institutions	One for each 20 seats by which the number of seats in the main auditorium exceeds 200.
Theater or auditorium	One for each eight seats up to 1,000 seats where the number of seats exceeds 50 seats, plus one for each 10 seats in excess of 1,000.
Stadium or sports arena	One for each 15 seats.
Medical or dental office or outpatient clinic	One for each 300 sq ft of occupied floor area, where the occupied floor area exceeds 5,000 sq ft.
Offices or studios of architects, engineers, interior designers and other design professionals and studios of graphic artists	One for each 1,000 sq ft of occupied floor area, where the occupied floor area exceeds 5,000 sq ft.
Other business office	One for each 500 sq ft of occupied floor area, where the occupied floor area exceeds 5,000 sq ft.
Restaurant, bar, nightclub, pool hall, dancehall, bowling alley or other similar enterprise	One for each 200 sq ft of occupied floor area, where the occupied floor area exceeds 5,000 sq ft.
Retail space devoted to the handling of bulky merchandise such as motor vehicles, machinery or furniture	One for each 1,000 sq ft of occupied floor area, where the occupied floor area exceeds 5,000 sq ft.
Greenhouse or plant nursery	One for each 4,000 sq ft of occupied floor area, where the occupied floor area exceeds 5,000 sq ft.
Other retail space	One for each 500 sq ft of occupied floor area up to 20,000 where the occupied floor area exceeds 5,000 sq ft, plus one for each 250 sq ft of occupied floor area in excess of 20,000.
Service, repair or wholesale sales space, including personal, home or business service space in South of Market Districts	One for each 1,000 sq ft of occupied floor area, where the occupied floor area exceeds 5,000 sq ft.
Mortuary	Five.
Storage or warehouse space, and space devoted to any use first permitted in an M-2 District	One for each 2,000 sq ft of occupied floor area, where the occupied floor area exceeds 10,000 sq ft.
Arts activities and spaces except theater or auditorium spaces	One for each 2,000 sq ft of occupied floor area, where the occupied floor area exceeds 7,500 sq ft.
Other manufacturing and industrial uses	One for each 1,500 sq ft of occupied floor area, where the occupied floor area exceeds 7,500 sq ft.
Live/work units	One for each 2,000 sq ft of occupied floor area, where the occupied floor area exceeds 7,500 sq ft, except in

Use	Parking requirement
	[residential] RH or RM Districts, within which the requirement shall be one space for each live/work unit. RH and RM Districts account for the greater part of the Balboa Park and Market/Octavia, and a portion of the Central Waterfront, study areas.

Source: San Francisco Planning Code, Article 1.5

The Planning Code also set minimum requirements for off-street freight loading spaces. These are set out in the table below, as they apply to all districts except C-3 [commercial] and the South of Market Districts, in the far eastern part of the Market/Octavia study area. Here, slightly higher standards apply for some land uses.

Use or activity	Gross floor area	Off-street loading spaces required
Retail, wholesale, manufacturing, live/work units in new structures, other uses primarily engaged in the handling of goods	0-10,000	0
	10,001-60,000	1
	60,001-100,000	2
	over 100,000	3 plus 1 for each additional 80,000 sq ft
Office, hotels, apartments, live/work units not included above, and all other uses not included above	0-100,000	0
	100,001-200,000	1
	200,001-500,000	2
	over 500,000	3 plus 1 for each additional 400,000 sq ft

Source: San Francisco Planning Code, Article 1.5

Exemptions

A number of exemptions are specified in the Planning Code, allowing developers to provide fewer than the specified minimum number of spaces. These include:

- shared use. Where the hours of operation allow this, spaces may be pooled between two or more developments, counting towards the requirements for each.
- commuted payments. In neighborhood commercial districts, cash contributions towards the cost of public parking facilities may be made in lieu of meeting the minimum requirements. The total off-street parking supply in the area must still meet the minimum requirements for all buildings and uses in the area.
- arts activities. For evening and weekend arts activities in a small part of the Market/Octavia study area (the RED-zoned district at Lafayette and Natoma), the Zoning Administrator may waive the off-street requirement, provided that adequate on- and off-street parking will be available within 800 feet.

- South of Market District. Minimum requirements may be waived in the South of Market District, through various mechanisms including commuted payments and participation in an approved Parking Management Program.
- conditional use authorization. In neighborhood commercial districts, a reduction in the minimum requirements for dwelling units may be granted by the Planning Commission through the conditional use authorization process. This is subject to four criteria:
  - the reduction in the parking requirement is justified by the reasonably anticipated auto usage by residents and visitors
  - the reduction in the parking requirement will not be detrimental to the health, safety, convenience or general welfare of residents or workers in the vicinity
  - the project is consistent with the existing character and pattern of development in the area
  - the project is consistent with the description and intent of the neighborhood commercial district in which it is located

Parking principles

This section outlines some of the key principles that might usefully be followed in the Better Neighborhoods study areas. They recognize that parking policies are a key determinant of travel behavior, with the availability, cost and location of parking affecting an individual's mode choice. The automobile is the greatest single negative impact on urban quality of life. However, the principles also acknowledge that parking policies also have a direct impact on issues of quality of life in the city, through their effect on the streetscape, and housing availability and affordability.

The automobile is the greatest single negative impact to urban quality of life

Minimum parking standards have a significant direct effect on urban quality of life, through their land take and impact on streetscapes, and through the barrier they pose to affordable housing.

Management of existing resources should be optimized before increasing supply

Supply is just one of the ways to manage parking availability. A shortage of parking does not automatically mean the overall supply needs to be increased. If a key concern is customer parking, for example, then this can be prioritized through the introduction of two-hour metered spaces. Pricing is an effective mechanism to balance supply and demand, as the City has shown at the 5th and Mission Garage.

Limited roadway capacity limits the number of cars that can move through the city's street system

For every automobile parking space added in San Francisco, the potential for additional automobile trips is also added. Since the City's street system is approaching its ultimate capacity, in order to add more jobs and housing, San Francisco has only three options:

- It must tear down existing buildings in order to widen streets.
- It must *reduce* the number of cars on the streets in order to make way for more efficient modes of transportation, such as busways
- It must dig subways in order to expand its effective street rights of way

Adding additional parking will therefore create pressures for more space for automobile right of way.

Growth in automobile traffic and congestion disproportionately impacts transit riders, bicyclists and pedestrians.

Where the additional automobile trips generated by new parking occur on transit streets, the added congestion they create disproportionately affect transit travel time. That is, congestion has a greater travel time effect on transit than it does on automobile traffic. As more cars are added to the transportation system, the system's ability to move people is degraded steadily. It also can set in motion a vicious circle, by which deteriorating transit service encourages more people to drive, which increases congestion further.

Curb cuts disrupt transit service

In order to maintain transit running time, it is critical to limit the number of turning movements made by autos on transit priority streets. Left turns into off-street parking areas, in particular, have a significant negative effect on transit. New curb cuts should therefore not be allowed on transit priority streets. If off-street parking is necessary for a development project on a transit priority street, access should be from the side street, back alley or other adjacent street.

Controlling parking is the City's most powerful tool for managing congestion

There is a wide range of demand management tools that can be used to manage congestion. However, many of these – such as gasoline taxes and charging for the use of roadspace – are not available to the city. Parking policy is one of the key tools that lies under the City's control.

Travelers are rational decision makers

Travelers are transportation consumers, and they are looking at what is the best value for their needs. A traveler will not select a transportation mode if it is more time consuming, less convenient, less reliable and equally costly. Information, particularly on alternative modes, is important to allow rational choices. This also means that the full cost of parking must be made visible to parkers.

The factors that influence mode choice are:

- **Time** -- The time is takes for a person to use a particular mode is the most important factor a traveler considers. Travel time depends upon the distance between destinations, traffic conditions, and the available transportation infrastructure. The time a person spends looking for parking, and the walking distance from the parking space, will therefore affect the decision.
- **Convenience** -- Convenience entails access at the starting and ending points, the ease of using the mode, and related benefits to using the mode. These related benefits might include the ability to carry packages or transport children (as in the case of driving) or the ability to read while traveling (as in the case of riding transit).
- **Information** -- Customers cannot select a mode without being properly informed of their choices.
- **Reliability** – Knowing that the bus or a carpool partner will be on time and consistent is critical.

- **Customer Service** – Does using the mode make a person feel more or less frustrated, stressed, or valuable? Customer service also means that travelers feel that the mode is designed for them and their needs.
- **Cost** – Cost is a factor although most commuters do not consider the fixed-cost of owning an automobile. The influence of cost also depends on a person's income level.
- **Flexibility** – Travelers want to be able to leave at any time and access their mode. Bicycles, walking and the personal automobile have the most flexibility. The more frequent transit, the more flexible it is.

Residents and business owners can be forced to rent parking they do not need

The cost of parking is often aggregated within the overall rent for both residential and commercial property. This forces people to lease parking, even if they do not need it. This could be avoided if, for all types of development, City policy dictated that parking be rented separately from residential or commercial uses, with the costs disaggregated from rents. That is, residents and business owners should not be *required* to rent parking they do not need.

Parking has a negative visual and environmental impact on a neighborhood

Blank garage doors can have a significant negative visual impact on streets and can disrupt the character of neighborhood commercial districts. "Main Street" style retail planners know that the most successful neighborhood commercial districts have a *continuous* façade of retail storefronts. On commercial and primary pedestrian streets, interesting façades should not be disrupted by garage doors. The City could forbid garage doors on downtown and neighborhood commercial streets.

Where parking structures are provided, the first floor of these building might be required to have an active use in order to avoid creating a dead street space. The Polk/Bush Garage and the recent remodel of the 5th/Mission Garage are good examples.

Surface lots have an additional blighting effect on neighboring properties. Throughout the City, real estate speculators routinely use surface parking as a temporary land use while waiting for real estate conditions to change. The City could require parking lot owners to screen these lots from the street with vegetation and low walls.

New development is threatened by fears of scarcer residential parking

One of the most significant threats to new development in San Francisco is current residents' fears that new residents and jobs will mean scarcer parking. Most San Franciscans live in places built before minimum parking requirements were introduced in the 1950s, and many rely on existing curbside spaces. If new developments in their neighborhoods are built without a full complement of off-street spaces, existing residents will be especially fearful of their on-street parking supply.

This problem could be addressed through the creation of a true market for the City's on-street spaces. Street rights-of-way are the City's single most valuable asset, comprising 16% of the entire land area of San Francisco or 7 square miles (DPT figures). As such, this asset must be managed carefully. This could be achieved in the following way:

- Grandfather in existing Residential Parking Permit holders, retaining the existing $28 annual fee, adjusted annually by inflation.
- Limit the issuance of new RPPs based on available on-street parking capacity.
- Price new RPPs at market rate, allowing for only a short waiting list. Revenue in excess of the administrative fee could go to Muni.
- Extend the hours of RPP zones beyond the current 9 AM to 6 PM, if residents desire.
- Allow RPP residents to sell excess daytime parking capacity to businesses and commuters, with revenue (less an administration fee) going into a neighborhood benefit fund.
- The City should consider automatically establishing or extending an RPP zone when parking occupancy exceeds a certain percentage.

Minimum parking requirements prejudice the success of transit centers

The City's current parking and transportation policies form a significant impediment to housing and other developments around rail stations and other transit nodes. Minimum parking requirements at these locations limit the density of development. One option is for the City to adopt a Planning Code zoning overlay for all parcels within 1/2 mile of a BART, Caltrain or Muni LRT rail station, and 1/4 mile of any transit priority street, that converts existing parking *minimums* to *maximums*. Generally, parking would still be allowed, but developers would not be required to build any more parking than they deem necessary.

Minimum parking requirements significantly affect housing affordability.

According to the City's nonprofit housing developers and the Better Neighborhoods 2002 planning process, the City's current minimum parking requirements are one of the most significant barriers, and perhaps the greatest single obstacle, to the creation of new affordable housing and transit oriented development. Despite numerous studies that low income urban residents and residents of transit intensive neighborhoods own cars at a significantly lower rate, the Planning Code mandates minimum off-street parking similar to suburban communities. Affordable housing developers are either required to build more parking than they need – and pass the costs along to their tenants – or go through the contentious Conditional Use Permit process, opening up their projects to needless delay and NIMBY protests. One mechanism to avoid this is to convert existing parking *minimums* to *maximums* for all Below Market Rate, elderly and institutional housing units developed citywide.

Section 3 PARKING RESTRAINT IN NORTH AMERICA

If restraint-based parking standards were to be introduced in San Francisco, there is no shortage of models to follow. Most of the examples come from European cities, and their experiences are documented in the following chapter.

However, a number of North American cities that share San Francisco's positive approach to urban living have also begun to introduce maximum parking standards, particularly in the Pacific Northwest. Portland, for example, argues in its zoning code that parking maximums contribute to the efficient use of land, enhanced urban form, use of alternative modes of transportation, better pedestrian movement, and protected air and water quality.

Washington State Commute Trip Reduction Program

Under state legislation passed in 1991, 65 cities and counties are required to draw up Commute Trip Reduction plans. This must include a review of local parking policies, and any revisions to these necessary to comply with commute trip reduction goals and guidelines.

The case of Seattle is considered in more detail below. This section summarizes the results of a 1999 review of the program by the state Department of Transportation

Maximum parking standards had been adopted by 13 of the 65 jurisdictions affected by the Commute Trip Reduction legislation, as follows:

- Bellevue and Dupont, for non-residential uses. The Bellevue maximum ranges from 2.7 to 3.5 spaces per 1,000 square feet, depending on the zone within the downtown.
- Enumclaw, for commercial and office uses
- Fife and Renton, for commercial and industrial/manufacturing uses
- Kent, for non-structured parking
- Lacey, in the commercial business district
- Olympia, for all uses
- Redmond, for most non-residential uses
- Seattle, for major institutions and buildings over 10,000 square feet
- Sumner, for non-residential uses over 4,000 sq ft
- Tacoma, in designated mixed-use centers and transit overlay districts
- Tumwater, where the requirements are generally both a minimum and a maximum

Other jurisdictions, if not introducing maximum requirements, had reduced their minimum parking requirements, while others allowed developers to provide fewer parking spaces on payment of a commuted fee to a government fund for parking construction.

The Commute Trip Reduction Program has also led to the introduction of other parking policies, designed to favor alternative modes. Most notably, the owners of commercial office buildings in Bellevue must now identify parking costs as a separate line item in leases, and a minimum rate for monthly long-term parking. This rate may not be less than the cost of a current two-zone transit pass. This provision applies to buildings with 50,000 gross square feet or more of office space.

"The ramifications of this provision are significant," the Department of Transportation states in its review. "Not only does it mandate that new development publish the cost of leased parking by tenants, it legally establishes the relationship between parking price and transit usage cost, as well as a minimum parking price. [The Bellevue City Code] represents the first time in state history that a city has linked parking price and transit fares in its rules of governance."

Other new policies include a requirement to position parking facilities at the rear or side of new structures, where feasible, to improve pedestrian and transit access. This has been introduced in Bellevue, King County, Olympia and Tacoma.

Nine key recommendations resulted from the Department of Transportation review:

- impose off-street parking maximums
- require bicycle and rideshare parking when a site has more than 10 automobile parking spaces
- institute residential parking programs, to allay any fears of parking spilling over into residential neighborhoods
- streamline local administrative processes for permitting a developer to reduce parking supply
- educate the public about the role of parking, and its relationship to traffic congestion and auto-generated air pollution
- partner with salmon recovery efforts to reduce parking supplies, since the impervious surfaces of car parks increase the speed of runoff, endangering salmon habitats
- require more users to pay the real cost of off-street parking
- conduct new local parking demand assessments after users have begun paying the true cost of parking, rather than using parking demand ratios based on free parking
- adopt regional parking standards in order to reduce jurisdiction competition

Seattle

In Seattle, parking requirements for new development are related to transit access, and 20% of the spaces are set aside for carpools. The standards are set out in the table below.

Figure 3-1 Long Term Parking Requirements, Seattle

	High transit access			Moderate transit access		
	Unrestricted long term	Carpool	Total	Unrestricted long term	Carpool	Total
Office	0.54	0.13	0.67	0.75	0.19	0.94
Retail sales and service, except lodging	0.32	0.08	0.40	0.56	0.14	0.70
Other non-residential	0.16	0.04	0.20	0.16	0.04	0.20

Figures refer to parking spaces per 1,000 sq ft gross floor area

The city is also seeking to comprehensively reform parking requirements across the city, on a neighborhood basis. Following a study last year, city officials recommended revisions to the land use code, including consideration of parking maximums, flexible parking standards and reduced parking in city neighborhoods close to the city center and with good transit access.

In designated Light Rail Station Areas, and other neighborhoods with transit-friendly characteristics, officials recommended reducing or eliminating minimum parking requirements, and establishing maximums. This would aid in the creation of transit-oriented development and reduce the cost of development, and control the amount of long-term commuter parking by light rail riders. Changes in parking requirements would be linked to neighborhood characteristics, including:

- lower average car ownership rates
- participation in location efficient mortgage programs
- alternatives to single occupancy vehicle travel, such as transit

Maximum parking standards should be introduced together with 'preservation parking', officials recommended. This concept, used in Portland, OR, encourages new development to provide parking where parking is scarce, and compensates for the loss of parking resulting from the redevelopment of surface lots. As defined by the City of Seattle:

> Preservation parking allows new development to build additional parking to serve buildings with insufficient or no on-site parking or to provide public parking as surface parking lots are re-developed. Preservation parking works by assigning each building a certain amount of entitled parking and assigning maximum parking limits for various uses. Under this scenario, buildings with less parking than their entitlement allows would be able to transfer their parking entitlements to off-site locations, often as part of new development.

The City is also preparing legislation that would allow reductions in required parking for residential use, for sites within a quarter mile of a street with peak transit headways of 15 minutes or less in each direction, and where at least one parking space is reserved for a City-recognized car sharing program.

Portland, OR

Maximum parking requirements are laid down by the City of Portland in its latest Zoning Code. "Limiting the number of spaces allowed promotes efficient use of land, enhances urban form, encourages use of alternative modes of transportation, provides for better pedestrian movement, and protects air and water quality," it states.

The maximum ratios adopted vary with land use and location, and are set to accommodate most auto trips to a site based on typical peak parking demand. Areas that are zoned for more intense development or are easily reached by alternative modes of transportation have lower maximums than other areas.

In particular, there are less stringent maximums for sites that are poorly served by transit. Where the site is more than a 1/4 mile from a bus stop with 20-minute peak-hour service, or more than a ½ mile from a light rail or streetcar stop with 20-minute peak-hour service, the maximum parking standards are increased by 25%. This concession is separate from any zoning overlays.

For most zoning areas, developments are subject to both a minimum and a maximum requirement, as set out in the table below. In the city center, neighborhood commercial areas, and mixed-use residential and commercial areas, minimum requirements are generally waived, and maximums are tightened. For example, in some neighborhood commercial centers, the maximum for all uses is 1 space per 2,500 sq ft of site area.

Figure 3-2 Parking Standards for Key Uses, Portland, OR

Use	Minimum	Maximum
Residential	1 per unit. SROs are exempt.	None
Residential high-density	0 for 1 to 3 units 1 per 2 units for 4+ units	None
Retail	1 per 500 sq ft	1 per 196 sq ft
Restaurants and bars	1 per 250 sq ft	1 per 63 sq ft
Leisure	1 per 330 sq ft	1 per 185 sq ft
Lodging	1 per room	1.5 per room
Theaters	1 per 4 seats	1 per 2.7 seats
Offices	1 per 500 sq ft	1 per 294 sq ft (1 per 204 sq ft for medical/dental)
Manufacturing/warehousing/wholesale	1 per 750 sq ft (less for warehouses over 3,500 sq ft)	1 per 500 sq ft
Schools (grade, elementary, junior high)	1 per classroom	1.5 per classroom
High schools	7 per classroom	10.5 per classroom

Even where minimum parking requirements are in place, there are mechanisms to reduce these if the developer takes steps to improve access by alternative modes. These are:

- **Substitution by bicycle parking.** For every five nonrequired bicycle parking spaces, the motor vehicle parking requirement is reduced by one space, up to a maximum of 25%.
- **Substitution by transit-supportive plazas.** Sites where at least 20 parking space are required, and which are adjacent to a transit street, may substitute a "transit-supportive plaza" for up to 10% of the required parking spaces. The plaza must be open to the public, include a shelter or weather protection, and be at least 300 square feet in area.

Cascade Station Zone

In the areas around light rail stations, additional regulations have been introduced, to allow for a "more intense and efficient use of land at increased densities", and create a pedestrian-oriented and transit-supportive environment.

In particular, the city has restricted parking at the Cascade Station mixed-use development according to a "trip cap", based on available roadway capacity. This 3 million square foot development lies along the city's light rail extension, and will cater for around 10,000 jobs. It will be a mix of office and commercial space, entertainment and hotels.

The Code tries to limit development based on the number of trips each type of land use generates – the "trip cap". This trip cap is based on the future available extra capacity on the nearby roadway system, and takes into account factors such as the blend and sizes of different land uses, transportation demand management and light rail ridership.

Developers may choose from three options, offering varying degrees of flexibility:

- adhere to the Code's specifications for maximum square footage for each land use. No traffic capacity analysis is required if developers select this option.
- propose an increase in one land use if there is a proportionate decrease in another use, meaning there will be no overall increase in trips. This proportion is calculated according to specified trip generation rates for the different uses.
- submit alternative plans, together with a Transportation Impact Analysis, covering traffic forecasts, impacts on on-street parking, and impacts on transit operations, pedestrians and cyclists. A transportation demand management plan must also be submitted.

No minimum parking requirements are set, and maximum requirements for certain uses are slightly more stringent than in the rest of the city. In practice, developers are even building parking at below these maximums, in order to maximize density.

Development Standards

As well as maximum parking requirements, Portland has introduced a range of standards in its Zoning Code to ensure that parking does not overly detract from the urban environment and streetscape.

Residential parking spaces are not allowed within 10 feet of the front lot line. There are also limitations on the proportion of the land area between the front lot line and the building line that may be paved for vehicles – a maximum of 40% in single-dwelling zones, and 20% in multi-dwelling zones.

Parking lots of more than 3,000 sq ft are subject to detailed landscaping requirements, including the provision of trees and shrubs.

In 1999, the City added standards to its Zoning Code to prevent facades being dominated by garages. The move was in response to community concerns, particularly:

- Houses with front facades that are dominated by a garage
- Houses with the living area set behind the garage
- Houses with a main entrance that is secondary to the entrance for cars
- Front yards that are used primarily for automobile parking and maneuvering

Among the specific regulations introduced by the City to combat these concerns were:

- At least 15% of the area of the street-facing facade of the house must be windows. Windows in garage doors do not count toward the 15%
- The length of the garage wall facing the street may not be greater than 50% of the length of the facade. For houses less than 24 feet wide, a 12 foot wide garage is allowed if there is living space or a covered balcony above
- A garage wall that faces the street may be no closer to the street than the longest wall of the house, or a porch, that faces the street.

Under a separate regulation, no more than 50% of the frontage on a transit street or street in a pedestrian district may be used for vehicle areas, with exemptions for buildings smaller than 100 sq ft.

Eugene, OR

The City's draft land use code update provides for maximum parking requirements for non-residential uses, in addition to minimum requirements. This maximum level is set at 125% of the minimum requirement. The minimum requirements are waived in three areas: downtown, the West University area, and the Blair Boulevard historic district.

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Section 4 Restraint-Based Parking Standards: Lessons from Northern Europe

Introduction

As seen in the previous section, several other US cities, such as Seattle, have begun to question the wisdom of setting minimum parking standards to meet unconstrained demand. However, the contrast with San Francisco's minimum parking requirements is most notable in northern Europe. Here, there has been a shift to significantly reduced provision in the form of maximum parking standards. The explicit aims of these include curbing car use (restraint-based standards), allowing higher development densities, and reducing the costs of development by removing any requirement for developers to provide more parking spaces than they might otherwise choose.

This paper focuses on the UK, as the shift to restraint-based parking standards there has been relatively recent, within the past few years in most instances. It therefore offers the opportunity to examine the 'thought processes' behind the adoption of the new standards. In addition, cultural similarities mean the lessons learned and policies adopted may be more readily transferable to a US context.

The obvious lesson to be learned from these case studies is that maximum parking standards can be introduced, and do work. At national level in the UK, while there is still considerable debate about the actual levels the maxima should be set at, the principle has been accepted by many developers and business organizations as well as local authorities. According to the UK Government, public consultation on the draft statutory planning guidance showed "strong support" for the use of maximum parking standards.

Public transport accessibility emerges as a key factor when setting the actual levels of parking that will be permitted. London, the East Midlands, Helsinki and Bern (in its first incarnation) all provide examples of this approach. However, the danger of displacing development through strict standards in the urban core, compared to laxer standards in the suburbs, has to be borne in mind.

Most fundamentally, however, the examples suggest that restraint-based standards should be related to their aim. If this is modal shift, the targets for modal shift can relatively simply be converted into restraint-based parking standards, as in the East Midlands. If this is improving air quality, then maximum standards can be introduced in areas of poor air quality, and the degree of flexibility granted to developers made conditional on the air quality plan not being compromised, as in Bern. If this is increasing the residential density of an area, then guidelines relating parking provision to housing type and density may be appropriate, as in London. Parking standards are not an end in themselves; explicitly relating them to the objectives can only aid their introduction.

UK National Policy

The shift from minimum to maximum parking standards in the UK, although relatively recent, is now codified not least through central government planning policy guidance, which local authorities are statutorily bound to follow. This guidance, published in draft form in 1999, was finalized in March 2001.

As well as requiring local authorities to draw up and apply maximum parking standards to new developments, the guidance calls for regional planning organizations - essentially consortia of local authorities - to set out a consistent approach to parking, thereby avoiding towns competing with each other to attract new development through less stringent parking standards or cheaper parking.

The explicit reasoning set out by the government is to reduce congestion, act as a demand management tool, and allow higher development densities. "Maximum standards should be designed to be used as part of a package of measures to promote sustainable transport choices, reduce the land-take of development, enable schemes to fit into central urban sites, promote linked-trips and access to development for those without use of a car and to tackle congestion," the guidance states (Department of Environment, Transport and the Regions, 2001). "There should be no minimum standards for development, other than parking for disabled people."

While the emphasis has been on reducing parking standards at employment, leisure and retail facilities, seeking to manage demand from the non-home end of the trip, the guidance also advises the adoption of restraint-based standards with new residential development. As well as suggesting a maximum of 1.5 off-street spaces per housing unit, it advises that residential developments with limited or no off-street parking should be allowed in areas with good public transport accessibility and where effective on-street parking control is present or can be secured.

The planning guidance stresses that the standards are maxima. Developers should not be required to provide more parking than they wish to, other than in "exceptional circumstances" such as where there are significant implications for road safety, which cannot be resolved through on-street parking controls. The guidance also calls for local authorities to encourage the shared use of parking, such as with office and leisure uses, where the times of peak usage do not coincide. However, local authorities are warned to be cautious in prescribing different parking standards for town centers and peripheral locations, to avoid creating "perverse incentives" for out of center development through the attraction of additional parking.

The standards for England[1] are set out in the table below. The guidance suggests these are a minimum, and calls for regional and local authorities to adopt more rigorous standards where appropriate. The figures were derived from an analysis of parking levels at existing

[1] Separate standards are to be issued for Scotland and Wales.

developments, consideration of the potential for changed travel patterns through employer transport plans and other measures, and consideration of the potential effects on investment. For developments below the threshold size, local authorities are to use their discretion, reflecting local circumstances.

Figure 4-1 National Maximum Parking Standards for England

Use	National maximum parking standard	Threshold at which standard applies (gross floorspace)
Residential	1.5 spaces per dwelling	-
Food retail	1 per 151 sq ft (14 sq m)	10,764 sq ft (1,000 sq m)
Non-food retail	1 per 215 sq ft (20 sq m)	10,764 sq ft (1,000 sq m)
Cinemas, conference facilities	1 per 5 seats	10,764 sq ft (1,000 sq m)
Other leisure	1 per 237 sq ft (22 sq m)	10,764 sq ft (1,000 sq m)
Offices	1 per 323 sq ft (30 sq m)	26,910 sq ft (2,500 sq m)
Colleges/universities	1 per 2 staff plus 1 per 15 students	26,910 sq ft (2,500 sq m)
Stadia	1 per 15 seats	1,500 seats

Source: Department of the Environment, Transport and the Regions (2001).

For housing, the guidance goes into more detail:

- Local authority requirements for car parking, especially off-street car parking, are also a significant determinant of the amount of land required for new housing.
- Car parking standards for housing have become increasingly demanding and have been applied too rigidly, often as minimum standards. Developers should not be required to provide more car parking than they or potential occupiers might want, nor to provide off-street parking when there is no need, particularly in urban areas where public transport is available or where there is a demand for car-free housing. Parking policies should be framed with good design in mind, recognizing that car ownership varies with income, age, household type, and the type of housing and its location. They should not be expressed as minimum standards.
- Local authorities should revise their parking standards to allow for significantly lower levels of off-street parking provision, particularly for developments:
  - in locations, such as town centers, where services are readily accessible by walking, cycling or public transport;

  - which provide housing for elderly people, students and single people where the demand for car parking is likely to be less than for family housing; and
  - involving the conversion of housing or non-residential buildings where off-street parking is less likely to be successfully designed into the scheme.

- Car parking standards that result, on average, in development with more than 1.5 off-street car parking spaces per dwelling are unlikely to reflect the Government's emphasis on securing sustainable residential environments. Policies which would result in higher levels of off-street parking, especially in urban areas, should not be adopted. (Department of Environment, Transport and the Regions, 2000.)

East Midlands, UK

While all English regions are currently drawing up maximum parking standards as part of their wider regional land-use plans, the East Midlands is one that is particularly noteworthy, as it is linking the standards to local targets for modal shift. The plan rejects the past use of minimum standards, arguing that this "merely reinforces reliance on the private car".

Its draft parking standards are based on three criteria:

- Employee density for each of three broad employment uses (office, general industry and warehousing) in different locations. The location is a function of settlement type (city, urban town or rural town) and peripherality (city central core, town center/edge of city center, rest of city/town, or out of city/town).
- The targets for modal share set out in statutory local transport plans
- Utilization factors for parking spaces, applied on the basis that not all employees driving to work necessarily use the spaces provided for them

As an example, a proposed office in a town center in an urban town is estimated to have an employee density of 1 per 172 sq ft (1 per 16 sq m). A 10,764 sq ft (1000 sq m) development would thus house 62.5 employees. The target car mode share is 30%, and the utilization factor is 90%, so the parking standard is 62.5 x 0.3 x 0.9 = 16.9 spaces for the entire development. This equates to 1 space per 646 sq ft (60 sq m).

This methodology results in standards ranging from 1 per 269 sq ft (25 sq m) for out-of-town office use, to 1 per 4844 sq ft (450 sq m) for edge-of-city center warehousing and nil for city-center office developments. The authorities in the region consider the approach offers flexibility, allowing the standards to reflect local circumstances, and giving the option to tighten them to reflect changing modal split targets and public transport availability. They acknowledge the danger of creating "perverse incentives" for out of center development through linking parking standards to accessibility, but believe this will be countered by complementary measures such as pedestrianization and improved public transport.

The draft maxima represent a "significant degree of restraint" in urban centers where there is good accessibility to public transport, the authorities consider. In more rural areas, they acknowledge that the standards are less restrictive than the national planning guidance, but argue that this is necessary to compensate for the lack of alternatives to the private car.

Workplace parking is seen by planners as the priority for restraint in the region, as employment uses are major contributors to peak hour congestion. However, it is also considered that complementary measures, particularly the introduction of controlled on-street parking, are essential for the maximum standards to succeed.

The regional plan is currently going through the statutory consultation processes, and should be finalized in 2001. The details of the parking policy has yet to be finalized - for example, there is pressure for residential standards to be included, and more categories of employment use are likely. However, the general principles have withstood scrutiny at a public examination of the regional plan. The inquiry panel, which carries a great deal of statutory weight in the process of revising the draft plan, stated that it "fully endorses" the principle of including maximum standards within the plan.

London, UK

At least in UK terms, London was one of the pioneering cities in terms of both adopting maximum standards for private non-residential parking, and for relating these to public transport accessibility.

In the early 1970s, the Greater London Council replaced the minimum standards (1 space per 1776 sq ft/165 sq m of office space in inner London, 1 per 431 sq ft/40 sq m in outer London) with maxima for private non-residential (PNR) parking.

- 1 space to 4413 - 10,656 sq ft (410 - 990 sq m) in Central London
- 1 space to 1776 - 7104 sq ft (165 - 660 sq m) in Inner London
- 1 space to 355 - 1776 sq ft (33 - 165 sq m) in the rest of London

Following the abolition of the Greater London Council in 1986, London parking standards came under central government control. Although similar standards were retained for the central and inner areas, it allowed outer London local authorities to permit any level of parking provision they deemed appropriate, and the focus shifted away from managing traffic demand towards supporting new developments. Typical standards for offices in town centers were:

- 1 space to10,764 sq ft (1,000 sq m) - inner London restrictive
- 1 space to 4844 sq ft (450 sq m) or less - inner London permissive
- 1 space to 5382 sq ft (500 sq m) - outer London restrictive
- 1 space to 431 sq ft (40 sq m) or less - outer London permissive

In 1996, central government tightened its parking standards, in line with advice from local authorities. It adopted the following maximum standards:

- Central London - 1 space to 10,764 - 16,146 sq ft (1,000 -1,500 sq m)
- Inner London - 1 space to 6458 - 10,764 sq ft (600 - 1,000 sq m)
- Outer London - 1 space to 3229 - 6458 sq ft (300 - 600 sq m)

These were designed to be related to public transport accessibility. However, they were as much as ten times more restrictive than some existing standards, and several outer London authorities objected to them, on the grounds that public transport offered limited alternatives for orbital journeys and for trips from outside London, They also complained they were competing with out-of-London centers where standards were as low as one space to 215 - 269 sq ft (20-25 sq m). area. Since then, the standards for out-of-London centers have been tightened to up to 1 space per 1076 sq ft (100 sq m). In addition, the standards for outer London have been relaxed as an interim measure to 1 space per 1076 - 6458 sq ft (100-600 sq m), pending a full review of parking standards this year. Within this range, local authorities are expected to set standards against public transport accessibility levels.

For residential developments, there are no specific maximum standards. However, as part of the former London Planning Advisory Committee's work on sustainable residential quality, guidelines have been produced on how to relate parking provision to housing type and intensity of development.

- detached and linked houses, 1.5-2 spaces/unit
- terraced and flats, 1-1.5/unit
- mostly flats, <1/unit

London planners stress that these are not parking standards per se, but instead a guideline on how parking and urban form are interrelated.

In addition, some London local authorities have been successfully experimenting with car-free housing. In Camden, which lies slightly north of the city center, the first such development opened in 1998. Sixty schemes comprising 600 units had been approved by December 2000, in a bid to promote the better use of land, and further "environmentally sustainable travel" through high-density development.

No on-site parking is allowed, apart from that for people with disabilities, as a condition of the granting of planning permission. Nor are residents eligible for on-street parking permits. Such car-free developments are encouraged by the local authority in areas with good public transport and local facilities, and controlled on-street parking.

The units are set just below market price, and according to the Transport Research Laboratory, "subjective observations suggest they are selling well". It reports that developers have been accepting, and that the housing appears to be attracting primarily young professionals without families.

A development along similar lines opened in summer 2000 in Edinburgh. Here, however, on-street parking controls were not considered necessary, with the local authority believing that since residents had made a positive choice to move there, draconian enforcement was not required.

Helsinki

Helsinki has used restrictive non-residential parking standards in the inner city for about 25 years, particularly in the central business district.

The city is divided into three zones: Zone I, the city center; Zone II, the inner city; and Zone III, the suburbs. In the city center, the regulations specify the maximum number of parking spaces allowed. In the inner city, they specify the exact number of parking spaces to be provided. In the suburbs, minimum parking standards are used, which are more restrictive in sub-centers and around local rail stations. These are shown in the figure below.

Figure 4-2 Non-Residential Parking Standards in Helsinki

	Zone I (maximum standards)		Zone II (specified number)	Zone III (minimum standards)		
	CBD	Rest of city center	Inner city	Sub-centers	Local centers/rail stations	Rest of suburbs
Office	5382	3767	3014-2368	2691	807	646
Retail	2153	1615	1184-969	1076	646	538
Industry (hall)	5382	3767	3014-2368	2691	1615	1292
Industry (other)	3229	2153	1507-1292	1399	1076	861

Note: Figures refer to the development area in square feet per parking space.

Bern, Switzerland

Bern is notable for the explicit link between parking standards and air quality measures, introduced by the regional government in 1994. While these have evolved over the past six years, mainly to simplify the standards and introduce more flexibility, the principle remains and was reaffirmed in last year's air quality plan. The local authority claims that the flexible application of the standards means that the attraction of the city for business has only been reaffirmed.

Maximum parking standards were introduced in 1994 in districts where air quality standards were being exceeded. The number of permitted parking spaces ranged from 1 per 183 sq ft (17 sq m) to 1 per 12,917 sq ft (1200 sq m), and depended on:

- type of usage (residential, offices with or without public transport, retail outlets, etc.)
- distance from a station or bus stop
- service densities of public transport modes

The actual standards were not produced on a scientific basis; the process was more of political compromise between the environmental lobby and the chamber of commerce.

Experience showed, however, that the original regulations had the effect of pushing firms into suburban locations with poor public transport. They have therefore been revised as a uniform standard with no reference to public transport accessibility.

Residential Standards

Number of residences	Gross floor area up to 1292 sq ft (120 sq m)	Gross floor area over 1292 sq ft
1	1-3 spaces	1-4 spaces
2	2-4 spaces	2-5 spaces
3	3-5 spaces	3-7 spaces
4	4-6 spaces	4-8 spaces
5	5-7 spaces	5-10 spaces

For larger developments, the following formulas are used:

- 0.75-1.25 spaces per residence (up to 1292 sq ft)
- 1-2 spaces per residence (over 1292 sq ft)

Non-Residential Standards

The following formulae are used:

Towns and cities: maximum (0.6xGFA/n)+5
minimum (0.45 x GFA/n) -3

Other area: maximum (0.8xGFA/n)+5
minimum (0.6 x GFA/n)-3

GFA = gross floor area (sq m)

n is given as below: (the higher the n, the fewer spaces permitted)

Restaurants	n = 15
Shopping, leisure, culture	n = 20
Hotels	n = 30
Industrial	n = 50
Hospitals	n = 100
Schools	n = 120

These include provision for staff, visitors and disabled people, but not for deliveries, large vehicles (e.g. trucks or buses), or for motorcycles.

For large projects, additional spaces may be granted if it can be shown that this does not contravene the air quality plan. This reflects the heavy emphasis on the co-ordination of the air quality plan and the parking standards, which have been incorporated into building regulations.

Other exceptions are granted where car modal share is significantly higher than the average due to shift working; and where industrial buildings have a significantly higher or lower employee density than the average.

Moreover, developers are given the option of making commuted payments, which can be used either for public parking provision or public transport improvements.

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Section 5 Allocation of Roadspace and Benchmarking Transportation Policy. Lessons from Northern Europe

Allocation of Road Space

One of the key issues in the Better Neighborhoods 2002 study areas is how to allocate right of way, or road space, to the competing modes. San Francisco's street system is approaching capacity. In the absence of new subways to expand the total right of way, or tearing down existing buildings to widen streets, some mechanism needs to be introduced to determine which modes are given priority.

Closely related to this is the issue of how to measure success, regarding both decisions on road space allocation, and on transportation policies and initiatives more generally. How should policies be benchmarked?

To this end, this chapter presents the experience of a range of cities in northern Europe, that have introduced innovative policies that might be drawn on in San Francisco.

Road capacity in urban areas is a constrained resource, with decision-makers required to balance the requirements of cars, transit vehicles, freight, cyclists and pedestrians. A common fear is that reducing the capacity available for cars will result in major increases in congestion. However, a recent study by a team at University College London, which examined case studies from Europe, North America, Australia and Japan, concluded that the fears were difficult to justify:

> In some cases, road space for cars had been reduced because of deliberate policies like the introduction of bus lanes or pedestrianization. In others, it was because of problems like roadworks. Irrespective of the cause, in such circumstances, there were usually predictions that the changes would result in major traffic chaos.
>
> Examination of the evidence suggested that these predictions rarely, if ever, proved accurate. Prolonged, long-term gridlock was not reported, although there were cases of major short-term disruption, and some increases in problems on particular local roads.
>
> In many cases, there were actually significant reductions in the total amount of traffic on the networks studied. There was a wide range of different results. The mean overall reduction in traffic was 25%, and the median traffic reduction was 14%, in terms of the proportion of traffic which had previously used the affected road and which could not be found on the neighbouring streets. (Hass-Klau et. al., 1998).

The unweighted average reduction in traffic on the treated roads or areas was 41%. Less than half of this reappeared as increased traffic on alternative roads, either at the same or at different times of the day. Thus, on average, 25% of the traffic which had previously used an affected road or area 'disappeared' from the traffic networks studied

The study suggested that people adjust their travel habits following the introduction of bus or cycle lanes, or reductions in road capacity for other reasons such as maintenance. In policy terms, the conclusion was that measures which reduce road capacity for cars "need not automatically be rejected for fear that they will inevitably cause unacceptable congestion".

Road capacity reallocations may also have wider benefits. A follow-up study by Sally Cairns from University College London focused on road safety, and concluded that "there are a number of cases where there have been significant reductions in accidents as a result of well-implemented schemes to reallocate road space" (Cairns, 1999). Changes in accidents rates ranged from an increase of 13% on London's Oxford Street (albeit it with a 50% reduction in fatal and serious accidents) to a 66% reduction on Partingdale Lane, also in London. The case study of Gloucester below provides a further example of the road safety benefits of roadspace reallocation. Here, the measures were introduced as part of the authority's Safer City project.

Another recent study worth noting is a report by Carmen Hass-Klau and Environmental and Transport Planning on the relative merits of light rail, guided buses and bus priority (Environmental and Transport Planning, 2000). It concluded that the key to the success of any of these modes is the extent to which complementary measures such as roadspace reallocation are carried through. "Investing in new and expensive public transport systems without planning at the same time to implement strong complementary measures will certainly reduce the value of the investment and may even lead to a waste of money," it says.

The case studies below present some examples of how different authorities make decisions on the allocation of road space. In some cases, such as Bristol or Gloucester, this is based primarily on the route hierarchy. In other words, roads are classified according to their purpose — whether car commuting, public transport use or local trips on foot — which in turn determines the allocation of roadspace to different modes.

In other cases, a more quantitative cost-benefit appraisal can be used. Alternatively, an experimental approach can help to overcome the fears of objectors, by demonstrating that the traffic impacts are negligible before the scheme is made permanent.

UK national policy

English local authorities are formally encouraged by central government to consider the potential for roadspace reallocation, as part of their local transport plans. This could take the form of reversible experiments, it is suggested — allowing the reallocation of roadspace to take place, even if the impacts cannot be predicted with absolute certainty.

In addition, all major transport schemes and policies, including roadspace reallocation, are required to be appraised under the "New Approach to Appraisal" — essentially highway appraisal techniques adapted for multi-modal use. This aims to improve the consistency and transparency with which decisions on transport investment are taken, and draws together techniques such as cost-benefit analysis and environmental impact assessment. It has the advantage that decisions on major investments in bus or high-occupancy vehicle lanes, for example, are made on the same basis as any other transportation infrastructure option.

The New Approach to Appraisal involves consideration of the impacts under the government's five broad objectives for transport — economy, safety, accessibility, environment and integration. Subsumed within these high-level objectives are more specific sub-objectives such as journey times, local air quality and community severance.

Depending on the sub-objective, the appraisal can take the form of an in-depth quantitative analysis, such as with the accidents sub-objective where the present value of benefits is calculated. Alternatively, a simple score on a 1-5 or 1-9 scale can be used, such as with the personal security sub-objective. The depth of the analysis depends on the size of the investment, and the expected impacts.

The impacts for each sub-objective are then condensed into a one-page "Appraisal Summary Table". This is intended to give the decision-maker a clear overview of all the impacts, leaving it to him or her to weight the relative importance of the various sub-objectives.

English local authorities also receive more specific guidance from central government on appraising bus priority schemes. This places considerable stress on economic appraisal, with the gains to bus users generally required to outweigh any costs to other users and capital expenditure. However, the guidance suggests that the final decision on schemes that fail to meet this criterion may depend on wider considerations, such as overall transportation objectives.

This emphasis on economic appraisal allows schemes to go forward even if there is a large disbenefit to car drivers, provided the forecast improvements to bus services are sufficiently great.

The suggested framework for bus priority appraisals consists of the following:

- Context, including local traffic, environmental and economic conditions, and how priority measures contribute to relevant local policies
- Scheme description, and comparison to a do-minimum option
- Transport impacts, compared against the do-minimum option. This should include traffic levels for each mode, bus load factors, mode shift, accidents, and highway speeds and time savings for all modes (including pedestrians).
- Economic appraisal, comparing the costs (capital, operating and delays during construction) to the benefits (time and fuel savings for all modes, and time savings resulting from bus reliability). Different values of time are specified for work and non-work trips, and for different modes.

- Environmental appraisal
- Economic development impacts

Bristol

Bristol, a medium-sized city in south western England, has recently adopted an innovative approach to determining the allocation of roadspace, based on the city's new draft road hierarchy. This classifies routes according to their intended use, such as through traffic, public transport or local movements within neighborhoods. In turn, the classification or position within the hierarchy determines whether transportation measures such as traffic calming or bus priority will be applied to that route, and thus the allocation of roadspace to different modes.

The categories adopted in the draft hierarchy are:

- National Primary Route (including motorway and trunk roads)
- City Primary Route (including main links to the national primary routes and Principal Public Transport Corridors)
- Local Distributor Roads
- Roads within 'Environmental Cells' (for access traffic)
- Transport Greenways — traffic free off-road routes

"The principle is adopted that each different form of transport needs its own coherent, continuous network for movement," Bristol's policy states. " It is intended that these distinct but partially overlapping networks will be clarified by a program of revision of the highway signage system and supporting traffic management measures." For example, principal public transport corridors should not be through-signed to non-local destinations, thus discouraging through traffic from using the routes.

"Those radial National Primary Routes that also carry scheduled city bus services require bus priority traffic management," the policy states. One example of this in practice is a study commissioned by the local authority into the feasibility of introducing high occupancy vehicle, bus and/or freight priority lanes on one of these routes, the M32 which carries 80,000 vehicles per day.

Principal Public Transport Corridors are defined as major radials with bus flows of 700 or more buses per day. These roads are to be managed principally for buses, cycling and (within centers) loading. Widened footways and cycle priority are also to be considered on these routes. "These routes are also the most direct routes for cyclists commuting towards the city center, and are the focus of the Cycle Review process with its aim of improved cycle priority," says the policy.

Within environmental cells, roads are to be managed to cater for pedestrians, cyclists and access traffic in that order, plus in some instances local bus services. There is a presumption in favor of traffic calming on these routes.

Since the road hierarchy plan, although approved in principle, is still in draft form, it has not yet led to any specific bus priority measures itself. In addition, bus priority on major radials is relatively uncontroversial in the city; the routes already have major sections of bus lane, which were simply codified within the draft road hierarchy.

However, officials hope to be able to use the new hierarchy to press for bus priority on orbital routes, where there are currently few services. There are proposals for pump-priming an expansion of orbital services, potentially in the form of limited-stop services interchanging with radial routes at suburban centers. However, these would require priority measures if they were to be successful, council officers consider. Given the low bus flows, officers believe it would be easier to justify priority here if it were in the form of dedicated lanes for buses and freight vehicles, or high occupancy vehicle lanes.

Vauxhall Cross, south London

Vauxhall Cross is an example of a successful experiment in the reallocation of road capacity, inspired by the work at University College London into ‘disappearing traffic' discussed above.

The intersection is both one of the city's busiest strategic road junctions and a major regional transport interchange, providing connections between bus, heavy rail and subway. At present, the rail station lies in the middle of a giant gyratory system, making pedestrian access extremely unpleasant, bike access hazardous and interchange (especially to bus) difficult.

Lambeth, the local authority, has planned a redesign of the intersection for a number of years, to improve interchange, introduce bus priority and cycle lanes, and reduce the amount of space available to the private car. However, these plans were stalled by neighboring local authorities, who feared that they would increase delays at the intersection, reducing access for their residents and potentially causing queues back into their neighborhoods.

Consequently, Lambeth secured agreement to introduce a phased reallocation of roadspace, in the expectation (so far borne out) that car traffic will gradually ‘disappear'. The original opposition has been largely overcome through this phased or experimental approach. So far, temporary transit lanes, lane closures and reduced green signal time have combined to cut traffic by 10%.

This has cleared the way for the final stage, provisionally approved, which would see a futuristic ‘pod' housing a new bus and rail station, with transit lanes, bike lanes and at-grade pedestrian crossings.

Gloucester

Gloucester, a medium-sized city in western England, is another authority that bases many decisions on reallocation of roadspace on a new route hierarchy. Here, the reallocation is justified largely on safety grounds, with the aim of redirecting motorized traffic back onto the main road network. It forms part of the "Safer City" project — a three year nationally funded pilot scheme to tackle road safety in a holistic way. The challenging target is to cut casualties in the city by at least one-third by April 2002, based on the 1991-95 average.

The fivefold classification adopted was:

- **outer bypass,** carrying long-distance traffic
- **main roads**, carrying the bulk of traffic to and from the city center
- **mixed use roads** — less important arterial routes, which tend to have considerable numbers of pedestrians and cyclists. These often have shops and schools close by, and need to cater for vulnerable road users
- **residential access roads,** which should not be carrying through traffic
- **pedestrian routes,** forming a car-free retail core in the city center

The city's initial analysis concluded that an "indistinct road hierarchy" had led to too many drivers commuting to the city center through residential areas, along unsuitable roads that were not built to carry high traffic flows and fast commuter traffic. This was placing cyclists and pedestrians at a greater risk of injury, reflected in the accident records for mixed use and residential roads.

The aim, therefore, was to shift traffic on to the main road network, to help achieve casualty reduction aims and make residents feel safer when using roads. Main roads tend to have safer junctions and better traffic control, the city points out, so there is often less accident risk. In addition, the new hierarchy cut the number of routes into the city that were used as main roads, downgrading those that were deemed inappropriate for commuter motor traffic.

The city explicitly stated that it sought to shift traffic onto main roads through lengthening journey times on mixed use and residential roads. Measures included slowing the speed of motor traffic; creating longer queues for motorists; taking space away from the car through installing cycle and bus lanes; and installing pedestrian phases at traffic lights and reducing waiting times for pedestrians. Capacity on main roads, however, was to be maintained.

One street where this has been achieved is Cheltenham Road, which prior to the project carried around 12,000 vehicles per day — around half of which was estimated to be through traffic. This street forms part of the second busiest bus corridor in the city. Following its designation as a mixed use route, cycle and bus lanes were introduced and traffic has been cut by up to 30%.

Final results from the initiative are still awaited. However, so far, deaths and serious injuries have almost halved in the city, falling from 60 (1991-95 average) to 36 in 1999. While slight injuries have risen, from 419 to 451, the council attributes this to increased reporting of accidents to the police for insurance reasons.

Benchmarking Transportation Policies

Currently, the City's only measure of success for its transportation system is the same Level of Service – or LOS – standard that suburban communities use. LOS takes two forms: First and primary is a measurement of average seconds of delay motor vehicles experience at intersections; second is a measurement of the difference between potential speed and travel conditions for motor vehicles and the actual conditions. If a motorist must wait 60 seconds at an intersection, that intersection is rated LOS 'F' and is deemed 'unacceptable.'

Neither measurement takes into account the movement of people through the system, nor does it consider conditions for bicyclists, pedestrians, transit users, the disabled or other groups. Installing a transit-only lane, for example, is only counted as a negative project under current standards, even if it results in a doubling of the number of people the street will serve and a reduction in the travel time an average *person* experiences.

This approach is in marked contrast to that in many other authorities, particularly in the UK and other parts of northern Europe. These cities and counties use a far wider range of indicators, on the basis that a single measure cannot possibly measure the range of impacts on the transportation system. Firstly, these cover non-auto modes. Surrey in the UK, for example, has targets related to public transport, walking and cycling, while West Yorkshire uses journey time indicators for both bus and car.

Secondly, the indicators cover a much wider range of impacts for each of these modes. Some examples include journey time, cost, casualties and access (West Yorkshire), modal share and travel time to local centers (Surrey) and crowding and congestion (London). Highway conditions, modal share and safety are common themes.

Thirdly, the indicators recognize that transportation policies can have a wider impact on issues such as economic performance and environmental sustainability. West Yorkshire uses unemployment and rental values as transportation indicators, while in Amsterdam, transportation targets such as modal share are subsumed within the city's environmental policy plan.

Fundamentally, these authorities relate their indicators to their objectives for transportation policy. In other words, it is meaningless to select indicators without first defining the objectives. The best example of this West Yorkshire, where each indicator is specifically related to an objective. For example, the aim to "improve operational efficiency of the transport system" is measured by three indicators: journey times by bus and car, generalized cost and travel distance to work.

West Yorkshire, UK

All English local authorities are required to devise a set of performance indicators and targets within their statutory local transport plans, against which the success of their plans can be judged. To some extent, the degree to which these targets are achieved will affect the amount of central government funding in the subsequent year.

The key aim is that these indicators should be directly related to the strategy's objectives. They should also be comprehensible to the public, and focused to avoid excessive monitoring costs. In addition, under separate legislation, UK authorities are required to set targets for reducing road traffic levels or their rate of growth, or else justify why they do not consider it necessary to set a target.

West Yorkshire is one of those singled out by the UK government as an example of best practice in setting performance indicators, particularly for making clear linkages between these and its transport policy objectives. The indicators used are not strictly limited to the transport field; unemployment, for example, is used as one measure of the impact of transport on the economy.

Transport Objective	Key Indicator
To provide opportunities for fostering a strong, competitive economy and sustainable economic growth	Unemployment Trade levels Rental values Pedestrian activity Anecdotal evidence
To improve operational efficiency of the transport system	Journey times by bus and car Generalized cost Travel distance to work
To maintain and improve the transport infrastructure to suitable standards to allow safe and efficient movement of people and goods	District audit performance indicators Principal road maintenance program Local indicators Completed bridge assessments Bridges strengthened Principal inspections
To improve safety, security and health in particular to reduce the number and severity of road casualties	Road casualty trends Casualty trends for different groups of road user School children involvement in accidents Town center car parks with CCTV cameras CCTV cameras at rail station car parks/bus stations Car park spaces with gold or silver awards Town and city center streets covered by CCTV Health
To promote equal access to transport	AccessBus patronage Accessibility of bus fleets Accessibility of bus stations Accessibility of rail stations Accessibility of/at bus stops Provision facilities at controlled crossings
To improve environmental quality and reduce transport pollution	Air quality
To contribute to national and international efforts to reduce transport's contribution to greenhouse gas emissions	Traffic flow

Transport Objective	Key Indicator
To reduce the rate of growth of road traffic	Traffic flow
To encourage people to make a greater proportion of journeys by public transport, cycling and walking as alternatives to the car	Split between different forms of transportBus/car journey times All day commuter parking supply and cost Attitude surveys
To encourage more use of rail and waterways as alternatives to lorries	To be determined
To improve integration between forms of transport, between the various policy areas and between the strategies of different organizations	Not strictly measurable. Annual report to be produced

Surrey, UK

Surrey is a county in southern England, a mix of small towns and London commuter settlements. Its local transport plan, another highlighted in the UK government's good practice guide, set targets based on priorities which the council derived from:

- analysis of transport problems and opportunities;
- findings of public participation; and
- Government expectations about the use of capital resources.

The authority's public consultation, for example, led to it setting a target for zero traffic growth between 1998 and 2016 - significantly tougher than Surrey's original proposed target of 7% growth, and 20% under a ‘do nothing' scenario.

Surrey makes a clear linkage between its eight main objectives, and the performance indicators and targets for 5, 10 and 15 years time. As well as promoting modal shift, there is an emphasis on increasing accessibility, measured through the use of public transport, cycling and walking accessibility models.

Objective	Description	Targets 2006	2011	2016	Base level
Traffic reduction	To limit traffic growth to the 1998 level by 2016	10%	13%	0%	20m vehicle kms/AAWD
Improve accessibility by public transport, cycling and walking	To increase the proportion of the population who have good (within 20 minutes):				
	public transport access to town centers to:	40%	45%	50%	30%
	cycle access to town centers to:	60%	65%	70%	55%
	walking access to town centers to:	TBD	TBD	TBD	22%
More walking, cycling and public transport use	To increase the proportion of journeys by:				
	public transport to:	12%	15%	18%	9%
	cycling to:	4%	6%	8%	2%
	walking to:	22%	23%	24%	21%
	To increase the proportion of school trips by:				
	public transport to:	20%	25%	30%	18%
	cycling to:	9%	15%	20%	7%
	walking to:	21%	25%	30%	19%
Reduce road casualties (from 1994-98 baseline)	*Reduce killed and seriously injured by:*	29%	43%	57%	931
	Reduce children killed & seriously injured by:	36%	53%	71%	54
	Reduce slight casualties per 100m vehicle kms by:	7%	11%	14%	83
Reduce vehicle emissions	To meet national air quality standards	TBD	TBD	TBD	Not yet declared
Increase proportion of major developments located accessible to urban centers	To ensure that at least 50% of major developments are located within existing urban areas at sites which have good access by public transport, cycling and walking				
	Public transport:				
	Residential within 20 minutes	50%	50%	50%	25%
	...within 30 minutes	75%	75%	75%	82%
	Commercial within 20 minutes	50%	50%	50%	36%
	...within 30 minutes	75%	75%	75%	76%
	Cycling:				
	Residential within 20 minutes	TBD	TBD	TBD	TBD
	...within 30 minutes	TBD	TBD	TBD	TBD
	Commercial within 20 minutes	TBD	TBD	TBD	TBD
	...within 30 minutes	TBD	TBD	TBD	TBD
Improved condition of the highway network	To increase the proportion of principal and certain non-principal roads in good structural condition to:	75%	80%	85%	64%
Improve provision for freight transport	To develop one new Freight 'Quality Partnership' between the local authority, retailers, freight operators and other interested parties per year	5	5	5	1 agreed but not yet implemented

London, UK

The election of the mayor and Greater London Assembly in May 2000 brought a city-wide strategic authority back to London for the first time since the abolition of the Greater London Council (GLC) in the mid-1980s. One of its first tasks has been to draw up a transport strategy for the city, and an initial draft of this was published in October 2000, setting out the mayor's proposals on performance indicators.

The indicators are intended to help assess progress, and identify when intervention is required. "The principle of use of a range of indicators to measure progress in improving transport in London, and of publishing the key indicators, is fundamental to the Strategy, as it provides an important mechanism for driving implementation forward," the draft strategy states.

They will fit within a wider set of performance indicators currently being developed for the authority as a whole, which will include "overarching measures" of quality of life and sustainable development, and will also contribute to the authority's State of the Environment report.

The mayor sets out six criteria for selecting the proposed indicators:

- relevance to transport aspects of the principal purposes of the Greater London Authority, of economic and social development, and environmental improvement
- relevance to the transport strategy's key transport priorities
- addressing the requirements of national policy
- limiting the total number of indicators, to help maintain a high level focus
- the likely availability and cost of the required data
- the likely feasibility of acting or bringing influence to bear to address any unfavorable outcome or trends underlying a given performance indicator

The proposed indicators are:

- **public satisfaction with the transport system**, subdivided by key characteristics and user groups, including women and people with disabilities, with analysis of the causes of dissatisfaction
- **benchmarks of performance** against rival world cities, Paris, New York and Tokyo, on a range of criteria that could include speed and reliability of travel by mode, safety, accessibility and value for money for both fare payer and tax payer
- **a set of 'transport asset performance measures'**, which track changes in the reliability and quality of transport services across all modes, such as overall highway condition, and the quality and resulting reliability of bus, subway and commuter rail services

- **reliability, crowding and journey speed** on bus, subway and commuter rail services, segmented to give separate results for central, inner and outer London
- **road traffic levels and congestion,** segmented to give separate results for central, inner and outer London, and by broad time of day
- **modal share** in central, inner and outer London
- **casualties** across different modes, separately identifying traffic accidents to different road users, including adult and child pedestrians
- **travel times** to key economic development objectives (central London, town centers and regeneration areas and hubs), and to disadvantaged areas
- the **customer focus** of staff, and progress towards training in equalities issues and making staff more representative of the city's diverse population
- **efficiency and cost-effectiveness of spending** on transport in London, to ensure that resources are well-spent

According to the draft strategy, this set of indicators is judged to "strike a reasonable balance between completeness of coverage, and avoiding excessive data collection cost and effort". Various 'implementation agencies', such as Transport for London, the mayor's executive agency in charge of transport, and local authorities, will be expected to specify more detailed performance indicator requirements.

Amsterdam, the Netherlands

Amsterdam's Environmental Policy Plan makes an attempt to integrate the city's environmental policies with those on traffic and transport, urban planning, housing, the economy, and greenery and water, through the use of targets and indicators.

The plan sets out six themes: energy and carbon dioxide emissions; space; the decoupling of economic growth from emissions; nuisance; a cleaner and more attractive city; and health. These are linked to 15 key targets. Those related to transport are:

- **increasing** the density of the built environment to 20.2 inhabitants or workers per acre (50 per ha) by 2004
- **stabilizing** CO2 emissions to their current level by 2004, and reducing them by 5% by 2010
- **reducing** emissions with a negative effect on health by 5% by 2004, measured according to the number of kilometers of road where NO_2 levels are exceeded.

In turn, these targets are linked to lower level goals, with specific indicators and targets:

- *Reduction of nuisance caused by cars in town traffic.*

  The numbers of kilometers driven by cars in town are to be stabilized in the area inside the Amsterdam Orbital, increasing by a maximum 5% outside the orbital.

- *Stimulation of public transport*

  Modal shift: car use to decrease in favor of a 1% increase in the use of public transport.

- *Improve transport by bicycle and on foot*

  Stabilizing the cycle the modal share, reversing its steady decrease over the last years. By the year 2010, the number of cyclists is to increase again.

European Union benchmarking project (www.eltis.org)

This project involved authorities and operators from fifteen cities and regions in the European Union, distilling 132 potential indicators down to 38 where it was judged possible to make meaningful comparisons. The aim was to enable cities and regions to see what others have achieved and find examples of good practice, and see how they compared. The selected indicators are as follows:

A.1 Basic facts about the cities/regions (area, population, population density)

A.1.1 Surface area of the administrative area (km^2)

A.1.2 Population of the city/administrative area (most recent figure)

A.1.3 Population density of the city/area (inhabitants/km^2)

A.2 How people travel today, and how this compares with 10 years ago

Share of passenger trips for the most recent year and 10 years ago for:

A.2.1: private car

A.2.2 public transport

A.2.3 walking

A.2.4 bicycle

A.2.5 powered two wheelers, PTWs

A.2.6 'other' modes of transport

A.3 Are alternatives to individual motorized transport winning new users?

A.3.1 Average rate of change (%), over the past 10 years (approximately), in the share of passenger trips taken by alternatives to individual motorized transport

B.1 Level of use of public transport, today and 10 years ago

B.1.1 Proportion of trips made by public transport

B.1.2 Average annual rate of change (%), over the past ten years (approximately), in public transport's share of trips made

B.2 The availability of public transport

B.2.1 Number of public transport stops/stations (of all types) per km^2

B.2.2 Kilometers of public transport route (of all types) per km^2

B.2.3 Number of off-vehicle sales points for public transport tickets per 100,000 inhabitants

B.2.4 Proportion of low floor vehicles in the public transport fleet

B.2.5 Number of park and ride spaces (for cars and powered two wheelers) per 100,000 inhabitants

B.2.6 Number of taxis per 100,000 inhabitants

B.3 Priority for public transport

B.3.1 Proportion of road-based public transport routes that run along reserved lanes

B.3.2 Number of road junctions (per 100,000 inhabitants) equipped with devices which give priority to public transport vehicles

B.3.3 Average 'commercial speed' of buses in city center during peak traffic periods (km/hour)

B.4 Provision of information services for users of public transport

B.4.1 Annual expenditure on information services for public transport users (1000 euros per 100,000 inhabitants)

B.4.2 Availability of a public transport information service on the Internet, or on Minitel

B.5 Attractiveness of public transport

B.5.1 Normal cost (euro) for a month of public transport use

B.5.2 Liters of petrol that could be bought for the same amount as the cost of a month of public transport use (at the normal fare)

B.5.3 Availability of a single ticket for a single journey which involves changing from one type of public transport to another

B.5.4 Availability of a service guarantee, charter or compensation scheme for passengers using public transport

C.1 Levels of walking, today and 10 years ago

C.1.1 Proportion of trips made on foot

C.1.2 Average rate of change, over the past ten years (approximately), in walking's share of trips

C.2 Provision of pedestrianized areas

C.2.1 Pedestrianized area (1000 sq m per 100 000 inhabitants)

D.1 Levels of cycling, today and 10 years ago

D.1.1 Proportion of trips made by bicycle

D.1.2 Average rate of change (%), over the past 10 years (approximately), in cycling's share of trips

D.2 Provision of cycle lanes/ cycle parking

D.2.1 Kilometers of cycle path per 100,000 inhabitants

D.2.2 Public bicycle parking spaces per 100,000 inhabitants

E.1 Levels of car use, today and 10 years ago

E.1.1 Proportion of trips made by car

E.1.2 Average rate of change (%), over the past 10 years (approximately), in cars' share of passenger trips

E.2 Levels of car ownership

E.2.1 Cars per 1000 inhabitants

E.2.2 Level of car ownership, compared with the national average

E.2.3 Relationship between car ownership and car use

E.3 Cost of parking and motor fuel

E.3.1 Typical cost of an hour's parking in the city center on a weekday (in euro)

E.3.2 Average price (in euro) of a liter of petrol (unleaded, Euro super 95)

F. 1 Levels of use of powered two wheelers, today and 10 years ago

F.1.1 Proportion of trips made by powered two wheelers

F.1.2 Average annual rate of change, over the past 10 years (approximately), in powered two wheelers' share of trips

F.2 Level of ownership of powered two wheelers

F.2.1 Number of powered two wheelers (PTW) owned, per 1000 inhabitants

G.1 Trends in air quality

G.1.1 Have the number of days per year when fixed air pollution thresholds are breached been decreasing?

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TRANSIT

Section 1 Summary of Transit Services in Market/Octavia

Market/Octavia is a key transit node in San Francisco. It is served by five light rail lines, six bus lines and a historic streetcar line. The city's light rail lines converge at Church Street station, and Haight Street is a key east-west corridor with peak frequencies of four minutes or less.

In order to assess the capacity and adequacy of the transit system to cope with increased development in the study area, the following transit data were collected:

- pointcheck surveys at key transit stops
  - on-time performance
  - passenger loads
  - boardings and alightings
- intercept surveys of passengers at the same stops
  - origins and destinations
  - trip purpose
  - mode(s) used
  - distance traveled at each end of the transit journey

In summary, on-time performance is extremely poor. Just four of the 23 lines surveyed (counting inbound and outbound services as separate lines) meet the Proposition E standard, that 65% of runs should be on time.

While there is a large amount of spare capacity on most lines, this poor on-time performance leads to overcrowding, through bunching of services. The only major capacity constraint appears to be on Muni Metro light rail services at Church Street Station. Reducing bunching, improving travel time and running more or longer Castro Shuttle services could alleviate this.

No transit lines terminate in the Market/Octavia area. This means that service is largely dependent on upstream improvements, particularly in terms of on-time performance. Transit priority measures for the J-Church, K-Ingleside and M-Oceanview lines at Balboa Park, for the N-Judah line in the Sunset, and for the Haight Street bus lines in the upper Haight would significantly improve service in Market/Octavia.

Significant improvements to on-time performance should be forthcoming following the introduction of GPS[1]-based tracking of Muni vehicles. In addition, a proposed extension of the Transit Impact Development Fee to all non-residential development citywide would provide a major new funding source that could be used to increase capacity at Market/Octavia. Currently, the fee can only be used to add peak-period capacity to and from downtown.[2]

A number of residents favor the idea of a new Muni Metro station at Market and Octavia. However, the results here show that people are willing to walk relatively long distances to access transit services. One-third of those who walked to the transit stop or station traveled for more than three blocks. In addition, surface transit improvements – particularly a dedicated right-of-way for the F-Market streetcar line – and a better pedestrian environment along Market Street represent more cost-effective options for improving transit access in this area. A new station would also increase travel times for riders traveling to downtown from Church Street and beyond.

On-time performance

- On-time performance of bus and streetcar lines serving Market/Octavia is extremely poor. In the morning peak, just five of the 23 lines meet the Proposition E standard, that 65% of runs should be on time. In the afternoon, just one line – the F-Market inbound (which starts only three blocks away at Market and Castro) – meets this goal.
- On-time performance ranges from 14% on the 37-Corbett inbound to 100% on the 66-Quintara inbound.
- Virtually every line experiences a significant gap between trips of more than 25 minutes. On some lines, such as the 22-Fillmore, there are gaps of nearly one hour. On the 37-Corbett, there was one gap of more than two hours.
- Poor on-time performance is largely due to bunching of services, rather than the number of runs being lower than scheduled. Early running is as much a problem as late running.
- On some lines, the schedules themselves are extremely irregular. For example, several M-Oceanview outbound trips are scheduled

[1] Global Positioning System.

[2] Nelson\Nygaard Consulting (2001), Transit Impact Development Fee Analysis. Final Report for San Francisco Planning Department

within two minutes of each other. Even if trips were on time, this would give passengers a poor perception of on-time performance.

Capacity

- There is spare capacity on virtually all lines serving Market/Octavia. Average loads range from 2% on the J-Church inbound, to 67% on the 66-Quintara inbound. Taking the AM and PM peak separately, the line at the highest percentage of capacity is the L-Taraval inbound in the AM peak. This is at 108% of capacity, although the actual degree of overcrowding depends on the mix of one- and two-car trains used.
- Other lines close to capacity are the N-Judah outbound in the PM peak (88%); the M-Oceanview inbound in the AM peak (83%), and the 71(L)-Haight/Noriega inbound in the AM peak (78%).
- Loads on a number of individual trips are in excess of Muni capacity standards, particularly in the morning peak on the eastbound Haight Street lines, and on the subway lines and N-Judah at Church Street Station. In many cases, there is no room for passengers to board. This is largely due to poor on-time performance, with high loads following a gap in service, rather than an overall lack of capacity.

Travel time

- With the exception of the Muni Metro subway services, transit lines serving Market/Octavia do not benefit from a dedicated right-of-way, or other priority measures such as transit-preferential signals. At peak times, this significantly increases travel times for buses and light rail vehicles, and reduces their competitiveness compared to the private car.
- A clear example of this can be seen on the F-Market historic streetcar line. Despite overcrowding on Muni Metro services, the F-Market line is not utilized to its capacity, presumably because of longer travel times. In the morning peak, for example, the average load on inbound F-Market services is just 23.7, with a maximum load of 44.
- Van Ness Avenue is a key transit corridor, with Muni frequencies of six minutes or less, plus Golden Gate Transit services to Marin County. It is also severely congested, particularly at peak times. This indicates the corridor should be a priority for transit priority, such as a dedicated busway physically separated from other traffic lanes.

Interchange

- Market/Octavia is an important interchange point. Nearly one-third of people boarding at the survey points are transferring from bus, light rail or streetcar.

Characteristics of transit riders

- Virtually all riders (96%) are traveling to and from places within San Francisco.
- Origins are highly concentrated around Church Street Station, and along the Church-Fillmore corridor. Destinations largely lie downtown, and along the Church-Fillmore corridor.
- Commuting is the dominant trip purpose, whether to work (64%) or school (16%).
- Passengers are willing to walk relatively long distances to the transit stop or station. Nearly one-quarter of those walking to the stop or station traveled for 3-6 blocks, and 9% for a mile or more.

Section 2 Pointcheck Survey

This section presents the results of pointcheck surveys conducted on all Municipal Railway transit lines serving the Market/Octavia area, to collect data regarding on time performance and passenger loads.

Surveyors were stationed within Church Street Station, and at the adjacent surface stops at Church and Market and Church and Duboce. For the lines running along Haight Street, pointchecks were located at Haight and Laguna. Data were collected on Thursday January 25 in the morning peak between approximately 7 AM and 10:30 AM, and in the afternoon peak between approximately 3 PM and 6 PM.

Summary of results

Proposition E, passed by voters in 1999, sets a goal that 65% of runs should be on time. As discussed below, that standard is not strictly comparable to that used in the surveys here. However, it serves as a useful guide for comparison purposes. Only 4 of the 23 lines surveyed (counting each direction as a separate line) met this standard – the 7-Haight eastbound, the 66-Quintara eastbound, the F-Market eastbound and the N-Judah westbound. By this measure, then, on time performance was poor. Figure 1 shows the summary results for each line.

More than half the lines surveyed experienced significant gaps between trips, of 25 minutes or more, at some point during the survey period. On some lines, such as the 22-Fillmore, there were gaps of nearly an hour. On the 37-Corbett line, there was a gap between trips of more than two hours. In almost all cases, the delays were due to bunching, rather than the total number of trips being lower than scheduled.

These results are supported by data on headway adherence from the Transportation Authority. These show that only one line met the 65% standard for on time performance – the 66-Quintara westbound. For many of the light rail lines, fewer than 10% of trips arrived on time.

Regarding passenger loads, average loads for all lines were within the maximum load standards set by Muni itself, in its strategic plan. However, loads on a number of individual trips exceeded these standards. This was particularly the case in the morning peak on the eastbound lines running along Haight Street, and on the subway lines at Church Street Station and the N-Judah (eastbound in the morning peak and westbound in the afternoon peak). On some trips, there was insufficient capacity for all passengers who wished to board. The most spare capacity was available on the 37-Corbett, F-Market and J-Church lines and, to a lesser extent, the 22-Fillmore.

Figure 1 Summary of survey results

Line	Time	Mean frequency	Scheduled frequency	% on time	Maximum gap	Maximum load	Average load	Average load as % of capacity
6 WB	Total	10.7	10-13	48%	26	38	17.5	28%
	AM	11.0	10-13	40%	26	25	13.0	21%
	PM	10.3	10	57%	20	38	22.3	35%
6 EB	Total	10.3	10-12	50%	22	81	28.5	45%
	AM	10.3	10-12	44%	22	81	42.6	68%
	PM	10.4	10	56%	20	21	12.7	20%
7 WB	Total	11.9	10-12	59%	23	35	13.5	21%
	AM	11.3	10-12	73%	18	19	9.2	15%
	PM	12.7	10	42%	23	35	18.9	30%
7 EB	Total	10.5	10-12	66%	40	78	30.3	48%
	AM	10.1	10-12	83%	13	78	45.6	72%
	PM	10.9	10	43%	40	27	10.6	17%
22 NB	Total	10.4	6-11	36%	41	49	31.0	49%
	AM	9.9	6-11	55%	23	49	34.8	55%
	PM	11.2	6-7	8%	41	49	25.1	40%
22 SB	Total	8.9	6-9	51%	52	50	24.1	38%
	AM	8.0	6-9	48%	19	35	22.0	35%
	PM	10.4	6	57%	52	50	27.7	44%
37 NB	Total	43.9	15-30	14%	143	3	1.3	3%
	AM	42.7	15-30	0%	51	3	1.5	3%
	PM	44.8	15	25%	143	3	1.2	3%
66 WB	PM only	16.7	24	33%	26	55	39.3	62%
66 EB	AM only	21.3	18	100%	23	80	42.5	67%
71(L) WB	Total	12.8	9-11	52%	28	60	24.0	38%
	AM	12.8	9-11	54%	28	28	14.9	24%
	PM	12.7	10	50%	22	60	33.9	54%
71(L) EB	Total	11.5	8-13	55%	24	74	36.2	57%
	AM	11.5	8-11	53%	24	74	48.9	78%
	PM	11.5	10-13	57%	21	34	22.6	36%
F WB	Total	7.6	5-12	39%	26	35	9.1	-
	AM	7.6	5-12	44%	26	12	4.3	-
	PM	7.6	7-8	33%	21	35	14.5	-
F EB	Total	8.2	6-8	69%	19	44	18.6	-
	AM	8.3	6-8	69%	19	44	23.7	-
	PM	8.0	7	68%	17	29	12.5	-
J NB	Total	8.6	6-12	47%	49	14	4.4	2%
	AM	10.6	7-12	44%	49	14	4.2	2%
	PM	7.2	6-11	48%	32	14	4.6	3%
J SB	Total	4.8	6-12	28%	18	85	12.6	7%

Line	Time	Mean frequency	Scheduled frequency	% on time	Maximum gap	Maximum load	Average load	Average load as % of capacity
	AM	4.3	7-12	31%	16	32	6.5	4%
	PM	5.3	6-11	24%	18	85	19.9	11%
K WB	Total	8.0	8-17	31%	30	185	45.2	25%
	AM	6.9	9-10	18%	30	48	22.5	13%
	PM	9.4	8-17	48%	21	185	75.5	42%
K EB	Total	9.1	8-18	42%	25	320	84.6	47%
	AM	8.7	9-18	43%	25	320	133.0	74%
	PM	9.4	8-13	41%	21	90	34.0	19%
L WB	Total	8.5	5-12	54%	20	200	58.3	33%
	AM	9.1	7-12	45%	20	38	22.9	13%
	PM	8.0	5-10	62%	17	200	92.1	51%
L EB	Total	8.4	7-12	48%	26	339	113.1	63%
	AM	8.4	7-12	61%	18	339	194.3	108%
	PM	8.4	7-11	35%	26	100	32.0	18%
M WB	Total	10.2	1-12	41%	22	220	62.1	35%
	AM	10.2	1-10	45%	20	60	29.1	16%
	PM	10.2	8-12	35%	22	220	100.8	56%
M EB	Total	10.2	9-13	33%	28	320	104.0	58%
	AM	9.5	9-10	43%	24	320	149.4	83%
	PM	11.1	9-13	22%	28	150	51.2	28%
N WB	Total	8.0	4-12	69%	20	307	102.0	57%
	AM	7.7	6-12	76%	17	80	48.3	27%
	PM	8.3	4-11	63%	20	307	157.8	88%
N EB	Total	8.1	6-10	58%	21	260	98.3	55%
	AM	8.1	6-10	59%	19	260	130.7	73%
	PM	8.1	6-10	57%	21	105	60.2	33%

Note: Capacity is calculated using the maximum load standards given in the Muni Strategic Plan. These are not specified for the historic streetcars used on the F-Market line. For other streetcar lines, a mix of 50% one-car and 50% one-car and 50% two-car trains is assumed.

Survey methodology

Arrival time, departure time, boardings, alightings and load on departure were recorded for each trip at designated stops. Block numbers were also recorded in most cases.

The data was analyzed comparing actual headways (or the time between trips) to scheduled headways. While this type of analysis does not measure the on-time performance of any one trip, it does measure on-time performance from the passenger's perspective – "how long do I have to wait for a bus and does it come reliably."

Trips arriving up to one minute early or five minutes late were considered on time. This means that where trips were scheduled at irregular intervals, a larger on time window was used. For example, if trips were scheduled every 7 minutes, the on time window used was 6-12 minutes. If trips were scheduled at 6-8 minute intervals, the corresponding on time window was 5-13 minutes. In these cases of irregular frequencies, the 'scheduled frequency' line in the graphs shows the average headway – for example, 7 minutes with a 6-8 minute scheduled frequency.

For most lines, scheduled frequencies were not constant throughout the peak. In these cases, performance was calculated separately for each time period. Except at the terminus of a line, all times used were departure times. The full results are shown in Figure 2.

Regarding loads, the figures from the pointcheck surveys can be compared against Muni's own maximum loads for planning purposes, given in its 2000 Strategic Plan. These are:

- 30' coach 45
- 40' coach 63
- 60' coach 94
- Light rail vehicle 119

Data are available from Muni on the maximum load point for each line, and are shown in Figure 3. The time periods shown are those when loads are greatest. Generally, these are 7-9 AM and 4-6 PM, but in the afternoon in particular, many lines experience their maximum loads from 2-4 PM, or 6-7 PM. It should be noted that these data represent the maximum load point as designated by Muni, generally for historical reasons, which may not be the same as the actual maximum load point on the line. In addition, this data is up to two years old.

Data regarding on time performance are available from the Transportation Authority, based on Muni figures (Figure 4). This uses actual headway data from 1998 and 1999, and is only available for specific points on each line, generally the maximum load point. The following definitions are used:

- 'sharp': trips arriving more than one minute early
- 'exact': trips arriving to the exact minute
- 'on time': trips arriving one minute early, or one to three minutes late (this category excludes 'exact' arrivals)
- late: trips arriving more than three minutes late

Due to some discrepancies in the way the intervals were calculated, the percentages often add up to more than 100. However, the data still gives a useful guide to performance on the route as a whole. As with the data from the pointcheck surveys, on time performance was analyzed in terms of headways, rather than the on time performance of a specific trip.

Detailed data by line is summarized in Appendix Transit A.

Figure 2 On time performance and passenger loads for lines serving Market/Octavia

Location	Route	Time	Mean frequency	Scheduled frequency	n	% 'on time'	% early	% late	Maximum 'gap'	Mean ons	Mean offs	Mean load	Max load
Haight @ Laguna	6 WB	7:43-9:53 AM	10.8	10	14	36%	43%	21%	26	1.3	0.9	12.5	25
Haight @ Laguna	6 WB	9:53-10:30 AM	14.0	11-13	1	100%	0%	0%	14	0.0	0.0	20.0	20
Haight @ Laguna	6 WB	AM total			15	40%	40%	20%	26	1.3	0.9	13.0	25
Haight @ Laguna	6 WB	3-6 PM [PM total]	10.3	10	14	57%	36%	7%	20	0.4	1.0	22.3	38
Haight @ Laguna	6 EB	7-9:33 AM	9.6	10	14	43%	43%	14%	18	1.6	0.6	47.2	81
Haight @ Laguna	6 EB	9:33-10:30 AM	12.8	12	4	50%	25%	25%	22	0.5	0.3	25.5	42
Haight @ Laguna	6 EB	AM total			18	44%	39%	17%	22	1.4	0.5	42.6	81
Haight @ Laguna	6 EB	3:15-6 PM [PM total]	10.4	10	16	56%	31%	13%	20	0.4	0.6	12.7	21
Haight @ Laguna	7 WB	7:57-9:57 AM	10.8	10	14	79%	14%	7%	16	0.6	1.6	8.9	19
Haight @ Laguna	7 WB	9:57-10:21 AM	18.0	12	1	0%	0%	100%	18	0.0	0.0	13.0	13
Haight @ Laguna	7 WB	AM total			15	73%	13%	13%	18	0.6	1.5	9.2	19
Haight @ Laguna	7 WB	3-6 PM [PM total]	12.7	10	12	42%	25%	33%	23	0.4	0.9	18.9	35
Haight @ Laguna	7 EB	7-9:37 AM	9.9	10	15	80%	20%	0%	13	1.0	0.2	49.1	78
Haight @ Laguna	7 EB	9:37-10:30 AM	11.3	12	3	100%	0%	0%	12	0.3	0.0	27.3	35
Haight @ Laguna	7 EB	AM total			18	83%	17%	0%	13	0.9	0.2	45.6	78
Haight @ Laguna	7 EB	3:30-6 PM [PM total]	10.9	10	14	43%	43%	14%	40	0.4	0.4	10.6	27
Haight @ Laguna	66 WB	4:24-5:44 PM [PM total]	16.7	24	3	33%	67%	0%	26	6.3	1.3	39.3	55
Haight @ Laguna	66 EB	7-8:18 AM [AM total]	21.3	18	3	100%	0%	0%	23	1.5	0.5	42.5	80

Haight @ Laguna	71(L) WB	7:38-9:58 AM [AM total]	12.8	9-11	13	54%	23%	23%	28	0.2	0.9	14.9	28
Haight @ Laguna	71(L) WB	3-6 PM [PM total]	12.7	10	12	50%	25%	25%	22	0.4	1.9	33.9	60
Haight @ Laguna	71(L) EB	7-10 AM [AM total]	11.5	8-11	15	53%	27%	20%	24	0.6	0.5	48.9	74
Haight @ Laguna	71(L) EB	3:30-5:07 PM	11.4	10	10	50%	30%	20%	21	0.5	0.6	24.4	34
Haight @ Laguna	71(L) EB	5:07-5:47	11.8	10-13	4	75%	25%	0%	16	0.5	0.5	17.8	19
Haight @ Laguna	71(L) EB	PM total			14	57%	29%	14%	21	0.5	0.6	22.6	34
Church @ Market	22 NB	7-7:39 AM	5.3	0-11	4	100%	0%	0%	10	5.2	2.2	34.0	42
Church @ Market	22 NB	7:39-9 AM	9.1	7-8	9	33%	44%	22%	23	5.4	3.3	35.7	48
Church @ Market	22 NB	9-10:30 AM	13.4	8-10	7	57%	14%	29%	22	4.7	1.9	34.3	49
Church @ Market	22 NB	AM total			20	55%	25%	20%	23	5.1	2.6	34.8	49
Church @ Market	22 NB	3-6:01 PM [PM total]	11.2	6-7	13	8%	62%	31%	41	2.7	3.9	25.1	49
Church @ Market	22 SB	7-7:43 AM	10.5	7-9	4	25%	50%	25%	19	6.2	4.2	25.0	35
Church @ Market	22 SB	7:43-8:44 AM	6.9	6	8	75%	13%	13%	14	4.9	3.5	21.5	35
Church @ Market	22 SB	8:44-10:30 AM	8.0	7-9	13	38%	46%	15%	17	6.3	2.9	21.2	35
Church @ Market	22 SB	AM total			25	48%	36%	16%	19	5.8	3.3	22.0	35
Church @ Market	22 SB	3-6 PM [PM total]	10.4	6	14	57%	14%	29%	52	7.6	4.3	27.7	50
Church @ Market	37 NB	7-10:30 AM [AM total]	42.7	15-30	3	0%	0%	100%	51	0.3	1.3	1.5	3
Church @ Market	37 NB	3-6:30 PM [PM total]	44.8	15	4	25%	50%	25%	143	0.2	0.0	1.2	3
Market @ Church	F WB	7-7:37 AM	6.0	10-12	7	29%	71%	0%	12	0.1	1.5	1.6	3
Market @ Church	F WB	7:37-8:17 AM	9.2	8	4	50%	25%	25%	15	0.8	2.5	6.3	10
Market @ Church	F WB	8:17-9:40 AM	8.0	5-9	11	64%	27%	9%	24	0.2	1.7	3.5	10
Market @ Church	F WB	9:40-10:30 AM	7.8	6	5	20%	60%	20%	26	0.4	4.2	8.8	12
Market @ Church	F WB	AM total			27	44%	44%	11%	26	0.3	2.2	4.3	12
Market @ Church	F WB	3-4:50 PM	7.2	8	13	38%	54%	8%	21	0.8	4.1	11.9	35
Market @ Church	F WB	4:50-6:14 PM	8.2	7	11	27%	45%	27%	20	3.3	9.7	17.8	35
Market @ Church	F WB	PM total			24	33%	50%	17%	21	1.9	6.6	14.5	35

Market @ Church	F EB	7-9:17 AM	8.1	6	17	82%	6%	12%	15	6.5	0.6	28.2	44
Market @ Church	F EB	9:17-10:30 AM	8.6	8	9	44%	44%	11%	19	5.1	0.6	14.9	26
Market @ Church	F EB	AM total			26	69%	19%	12%	19	6.0	0.6	23.7	44
Market @ Church	F EB	3-6:12 PM [PM total]	8.0	7	22	68%	27%	5%	17	3.3	1.2	12.5	29
Church @ Market	J NB	7-10:30 AM [AM total]	10.6	7-12	18	44%	39%	17%	49	0.3	6.3	4.2	14
Church @ Market	J NB	3-6 PM [PM total]	7.2	6-11	25	48%	48%	4%	32	0.8	3.0	4.6	14
Church @ Market	J SB	7-10:30 AM [AM total]	4.3	7-12	45	31%	69%	0%	16	3.1	1.9	6.5	32
Church @ Market	J SB	3-4:02 PM	4.3	10	14	7%	93%	0%	10	6.9	4.4	14.1	30
Church @ Market	J SB	4:02-6 PM	5.9	6-11	24	33%	58%	8%	18	12.5	4.1	23.5	85
Church @ Market	J SB	PM total			38	24%	71%	5%	18	10.3	4.2	19.9	85
Church St Station	K WB	7:15-9:57 AM	6.0	9	24	17%	71%	13%	17	no data	2.8	22.1	48
Church St Station	K WB	9:57-10:30 AM	12.5	10	4	25%	50%	25%	30	no data	1.5	25.0	33
Church St Station	K WB	AM total			28	18%	68%	14%	30	no data	2.6	22.5	48
Church St Station	K WB	3-3:58 PM	11.5	10	4	25%	50%	25%	21	no data	12.2	60.4	98
Church St Station	K WB	3:58-5:19 PM	10.1	9	8	50%	38%	13%	18	no data	18.3	69.1	118
Church St Station	K WB	5:19-6:30 PM	7.8	8-17	9	56%	44%	0%	17	3.2	32.3	89.7	185
Church St Station	K WB	PM total			21	48%	43%	10%	21	no data	22.6	75.5	185
Church St Station	K EB	7-7:51 AM	9.3	17-18	4	25%	75%	0%	17	6.8	1.8	136.0	185
Church St Station	K EB	7:51-9:39 AM	7.6	9	14	57%	43%	0%	14	7.9	1.8	146.4	320
Church St Station	K EB	9:39-10:30 AM	11.4	10	5	20%	60%	20%	25	7.4	3.6	92.6	128
Church St Station	K EB	AM total			23	43%	52%	4%	25	7.5	2.2	133.0	320
Church St Station	K EB	3-3:56 PM	6.0	10	7	14%	86%	0%	10	4.6	5.4	32.0	76
Church St Station	K EB	3:56-4:59 PM	10.2	9	6	17%	50%	33%	18	5.3	3.7	28.2	42
Church St Station	K EB	4:59-6:30 PM	11.7	8-13	9	78%	11%	11%	21	6.6	3.6	39.6	90
Church St Station	K EB	PM total			22	41%	45%	14%	21	5.6	4.2	34.0	90

Church St Station	L WB	7-7:40 AM	9.0	9-11	2	50%	50%	0%	11	no data	2.7	22.3	27
Church St Station	L WB	7:40-9:32 AM	8.8	7	13	54%	31%	15%	20	no data	2.4	22.8	38
Church St Station	L WB	9:32-10:30 AM	9.6	9-12	5	20%	60%	20%	18	no data	4.0	23.4	35
Church St Station	L WB	AM total			20	45%	40%	15%	20	no data	2.8	22.9	38
Church St Station	L WB	3-3:31 PM	17.0	9-10	1	0%	0%	100%	17	no data	15.0	84.5	89
Church St Station	L WB	3:31-5:29 PM	8.1	7-8	14	64%	29%	7%	17	no data	16.1	86.9	200
Church St Station	L WB	5:29-6:30 PM	6.2	5-10	6	67%	33%	0%	11	4.2	25.0	106.7	180
Church St Station	L WB	PM total			21	62%	29%	10%	17	no data	18.4	92.1	200
Church St Station	L EB	7:30-9:18 AM	7.3	7	17	59%	35%	6%	16	6.8	3.4	210.3	339
Church St Station	L EB	9:18-10:30 AM	11.7	8-12	6	67%	17%	17%	18	9.7	4.5	146.3	200
Church St Station	L EB	AM total			23	61%	30%	9%	18	7.5	3.7	194.3	339
Church St Station	L EB	3-5:54 PM	7.7	7-8	19	37%	47%	16%	24	3.9	3.8	32.2	100
Church St Station	L EB	5:54-6:30 PM	11.5	10-11	4	25%	50%	25%	26	7.3	2.0	30.8	58
Church St Station	L EB	PM total			23	35%	48%	17%	26	4.4	3.5	32.0	100
Church St Station	M WB	7:15-8:18 AM	12.0	9	6	33%	17%	50%	15	no data	2.1	37.9	56
Church St Station	M WB	8:18-9:39 AM	8.8	1-7	9	67%	0%	33%	20	no data	2.9	23.4	35
Church St Station	M WB	9:39-10:30 AM	10.4	9-10	5	20%	40%	40%	19	no data	4.2	27.2	60
Church St Station	M WB	AM total			20	45%	15%	40%	20	no data	3.0	29.1	60
Church St Station	M WB	3-3:58 PM	9.7	10	3	0%	67%	33%	19	no data	8.8	78.0	98
Church St Station	M WB	3:58-5:55 PM	9.7	9	11	45%	36%	18%	22	no data	27.6	86.2	170
Church St Station	M WB	5:55-6:30 PM	12.3	8-12	3	33%	33%	33%	19	6.0	33.0	185.0	220
Church St Station	M WB	PM total			17	35%	41%	24%	22	no data	24.3	100.8	220

Church St Station	M EB	7-9:39	8.9	9	17	35%	53%	12%	24	6.7	3.3	155.8	320
Church St Station	M EB	9:39-10:30	12.0	10	4	75%	0%	25%	16	7.5	4.0	120.3	140
Church St Station	M EB	AM total			21	43%	43%	14%	24	6.8	3.4	149.4	320
Church St Station	M EB	3-3:39 PM	6.0	10	5	20%	80%	0%	11	6.5	5.8	48.8	150
Church St Station	M EB	3:39-5:45 PM	12.3	9	10	10%	40%	50%	28	5.0	7.1	51.5	70
Church St Station	M EB	5:45-6:30 PM	15.7	10-13	3	67%	0%	33%	21	3.3	5.7	54.7	88
Church St Station	M EB	PM total			18	22%	44%	33%	28	5.2	6.5	51.2	150
Duboce @ Church	N WB	7:22-9:01 AM	6.4	6-8	17	71%	29%	0%	13	11.9	4.3	44.6	80
Duboce @ Church	N WB	9:01-10:30 AM	10.5	8-12	8	88%	13%	0%	17	10.0	3.3	56.8	80
Duboce @ Church	N WB	AM total			25	76%	24%	0%	17	11.3	4.0	48.3	80
Duboce @ Church	N WB	3-4:01 PM	6.6	4-11	8	75%	25%	0%	12	7.2	8.4	85.4	155
Duboce @ Church	N WB	4:01-6:30 PM	9.1	6-8	16	56%	25%	19%	20	9.4	14.1	198.6	307
Duboce @ Church	N WB	PM total			24	63%	25%	13%	20	8.6	12.0	157.8	307
Duboce @ Church	N EB	7-9:31 AM	7.5	6-8	21	71%	29%	0%	13	10.6	7.0	132.7	260
Duboce @ Church	N EB	9:31-10:30	10.0	10	6	17%	50%	33%	19	10.7	8.7	123.3	200
Duboce @ Church	N EB	AM total			27	59%	33%	7%	19	10.6	7.3	130.7	260
Duboce @ Church	N EB	3-3:38 PM	8.0	6-10	3	0%	67%	33%	18	1.8	9.0	55.0	100
Duboce @ Church	N EB	3:38-6:30 PM	8.2	6-8	20	65%	25%	10%	21	5.3	9.9	61.3	105
Duboce @ Church	N EB	PM total			23	57%	30%	13%	21	4.7	9.7	60.2	105

Figure 3 Maximum load points for lines serving Market/Octavia

			Maximum load point					
Route	Date of data collection	Vehicle type	Location	AM Time	Load	Location	PM Time	Load
6 inbound	5/10/99	40' trolley	Market and 1st (A)	5-7 AM	21.6	Haight and Masonic	4-6 PM	24.7
6 outbound	5/10/99	40' trolley	Haight and Masonic (A)	7-9 AM	14.5	Market and Van Ness	4-6 PM	41.6
7 inbound	12/6/99	40' trolley	Market and 1st (A)	7-9 AM	53.9	Haight and Masonic	6-7 PM	16.7
7 outbound	12/6/99	40' trolley	Haight and Masonic (A)	7-9 AM	7.6	Market and Van Ness	6-7 PM	43.3
22 inbound	9/2/99	40' trolley	Fillmore and California	7-9 AM	45.2	Fillmore and Haight	6-7 PM	49.5
22 outbound	9/2/99	40' trolley	16th and Mission	7-9 AM	48.7	Fillmore and California	4-6 PM	44.7
37 inbound	3/15/00	30' coach	Market and Castro (A)	7-9 AM	32.3	14th and Church	6-7 PM	14.3
37 outbound	3/15/00	30' coach	14th and Church (A)	7-9 AM	6.4	Market and Castro		31.2
66 inbound	9/2/99	30' and 40' coach	Market and S Van Ness (A)	7-9 AM	42.8	9th Av and Judah (A)	2-4 PM	10.4
66 outbound	9/2/99	30' and 40' coach	9th Av and Judah	7-9 AM	2.7	9th Av and Judah	6-7 PM	12.0
71(L) inbound	2/28/00	40' coach	Market and 1st (A)	7-9 AM	56.8	Haight and Masonic	2-4 PM	35.4
71(L) outbound	2/28/00	40' coach	Haight and Masonic (A)	7-9 AM	15.4	Market and Van Ness	4-6 PM	54.1
F inbound	2/8/00	Historic streetcar	Market and Gough (A)	7-9 AM	36.2	Market and Gough (A)	2-4 PM	26.3
F outbound	2/8/00	Historic streetcar	Market and 5th	7-9 AM	11.3	Market and Van Ness	6-7 PM	37.4
J inbound	1/25/00	Light rail	Market and Van Ness	7-9 AM	93.0	Market and Van Ness	2-4 PM	30.6
J outbound	1/25/00	Light rail	Market and Van Ness (A)	7-9 AM	23.6	Market and Van Ness	6-7 PM	91.5
K inbound	1/25/00	Light rail	Market and Van Ness (A)	7-9 AM	82.0	Market and Van Ness	4-6 PM	38.8
K outbound	1/25/00	Light rail	Market and Van Ness (A)	7-9 AM	30.7	Market and Van Ness	6-7 PM	115.1
L inbound	1/25/00	Light rail	Embarcadero (A)	7-9 AM	102.5	Embarcadero (A)	6-7 PM	39.9
L outbound	1/25/00	Light rail	Embarcadero	7-9 AM	23.3	Embarcadero	6-7 PM	109.4
M inbound	1/25/00	Light rail	Embarcadero (A)	7-9 AM	89.7	Embarcadero (A)	2-4 PM	37.5
M outbound	1/25/00	Light rail	Embarcadero	7-9 AM	35.9	Embarcadero	6-7 PM	115.2
N inbound	1/25/00	Light rail	Market and Van Ness (A)	7-9 AM	106.8	Market and Van Ness (A)	4-6 PM	46.0
N outbound	1/25/00	Light rail	Market and Van Ness (A)	7-9 AM	33.5	Market and Van Ness	6-7 PM	118.6

A=load on arrival
Source: Municipal Railway

Figure 4 On time performance for lines serving Market/Octavia

Route	Location	Time	Sample size	Adherence percentages			
				Sharp	Exact	Ontime	Late
6 inbound	Haight and Masonic/Market and S Van Ness	7 AM-10:30 AM	40	15%	13%	55%	30%
		3 PM-6:30 PM	37	24%	16%	51%	24%
6 outbound	Haight and Masonic/Market and Van Ness	7 AM-10:30 AM	38	8%	11%	26%	66%
		3 PM-6:30 PM	39	10%	5%	44%	46%
7 inbound	Haight and Masonic/Market and S Van Ness	7 AM-10:30 AM	36	17%	14%	53%	31%
		3 PM-6:30 PM	44	16%	16%	70%	14%
7 outbound	Haight and Masonic/Market and Van Ness	7 AM-10:30 AM	30	10%	13%	47%	43%
		3 PM-6:30 PM	43	7%	19%	60%	33%
22 inbound	Fillmore and California/Fillmore and Haight	7 AM-10:30 AM	61	21%	18%	56%	23%
		3 PM-6:30 PM	94	33%	7%	50%	17%
22 outbound	16th and Mission/Fillmore and Haight	7 AM-10:30 AM	29	17%	21%	45%	38%
		3 PM-6:30 PM	38	24%	5%	45%	32%
37 inbound	14th and Church/Market and Castro	7 AM-10:30 AM	53	6%	23%	64%	30%
		3 PM-6:30 PM	44	16%	20%	50%	34%
37 outbound	14th and Church/Market and Castro	7 AM-10:30 AM	35	34%	26%	46%	20%
		3 PM-6:30 PM	41	39%	7%	51%	10%
66 inbound	9th Av and Judah/Market and S Van Ness	7 AM-10:30 AM	28	25%	14%	46%	29%
		3 PM-6:30 PM	24	25%	17%	46%	29%
66 outbound	9th Av and Judah/Market and Van Ness	7 AM-10:30 AM	29	17%	31%	72%	10%
		3 PM-6:30 PM	29	10%	21%	59%	31%
71 inbound	Haight and Masonic/Market and S Van Ness	7 AM-10:30 AM	19	0%	21%	47%	53%
		3 PM-6:30 PM	41	7%	5%	41%	51%

71 outbound	Haight and Masonic/Market and Van Ness	7 AM-10:30 AM	34	12%	12%	53%	35%
		3 PM-6:30 PM	22	36%	23%	55%	9%
71(L) inbound	Haight and Masonic/Market and S Van Ness	7 AM-10:30 AM	16	0%	6%	38%	63%
71(L) outbound	Market and Van Ness	3 PM-6:30 PM	21	24%	10%	48%	29%
F inbound	Market and S Van Ness	7 AM-10:30 AM	158	39%	8%	36%	25%
		3 PM-6:30 PM	190	52%	11%	28%	21%
F outbound	Market and 7th/Market and Van Ness	7 AM-10:30 AM	139	20%	7%	40%	40%
		3 PM-6:30 PM	148	42%	11%	39%	18%
J inbound	Embarcadero	7 AM-10:30 AM	65	78%	5%	12%	9%
		3 PM-6:30 PM	54	83%	4%	13%	4%
J outbound	Embarcadero	7 AM-10:30 AM	71	6%	3%	6%	89%
		3 PM-6:30 PM	67	10%	0%	3%	87%
K inbound	Embarcadero	7 AM-10:30 AM	61	85%	2%	8%	5%
		3 PM-6:30 PM	51	57%	2%	8%	35%
K outbound	Embarcadero	7 AM-10:30 AM	71	7%	4%	14%	79%
		3 PM-6:30 PM	49	6%	0%	0%	94%
L inbound	Embarcadero	7 AM-10:30 AM	128	88%	1%	6%	6%
		3 PM-6:30 PM	92	64%	2%	12%	24%
L outbound	Embarcadero	7 AM-10:30 AM	96	5%	1%	10%	84%
		3 PM-6:30 PM	106	12%	0%	2%	86%
M inbound	Embarcadero	7 AM-10:30 AM	108	87%	5%	6%	6%
		3 PM-6:30 PM	85	41%	4%	16%	42%
M outbound	Embarcadero	7 AM-10:30 AM	112	3%	1%	9%	88%
		3 PM-6:30 PM	110	12%	0%	3%	85%
N inbound	Embarcadero	7 AM-10:30 AM	108	87%	5%	6%	6%
		3 PM-6:30 PM	125	67%	3%	9%	24%
N outbound	Embarcadero	7 AM-10:30 AM	134	13%	1%	12%	75%
		3 PM-6:30 PM	148	14%	7%	27%	59%

Source: San Francisco County Transportation Authority

Section 3 Intercept Surveys

This section summarizes the results from an intercept survey of bus and light rail passengers in the Market/Octavia area. A total of 358 surveys were conducted at transit stops in the Church Street station area and at Haight and Laguna, and in Church Street station itself.

Surveys were conducted on Thursday January 25 in the morning peak, from approximately 7 AM until 10:30 AM, and in the afternoon peak, from approximately 3 PM to 6 PM. However, heavy rain in the afternoon meant that fewer surveys were completed, particularly at the stops at Haight and Laguna and those for the N-Judah and F-Market, where limited shelter was available.

The surveys gathered data on:

- origin and destination
- trip purpose
- mode(s) used
- distance traveled at each end of the transit journey

The time and location of the interview, and whether the passenger was boarding or alighting, were also recorded.

Figure 1 shows the number of surveys completed.

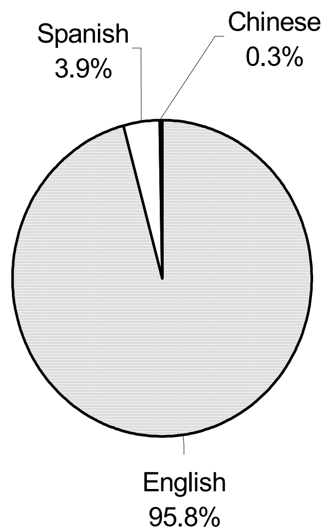
Figure 1 Total Surveys Completed By Location And Boarding/Alighting Status

Location	Lines Served	Number of surveys completed			
		Boarding or Alighting?			Total
		Boarding	Alighting	No answer	
Church @ Market	22, 37, J NB	45	0	1	46 (12.8%)
Church @ Market	22, J SB	43	3	0	46 (12.8%)
Laguna @ Haight	6, 7, 66, 71, 71L EB	13	0	0	13 (3.6%)
Haight @ Laguna	6, 7, 66, 71, 71L WB	28	2	1	31 (8.7%)
Market @ Church	F EB	35	0	0	35 (9.8%)
Market @ Church	F WB	11	6	0	17 (4.7%)
Church St Station	K, L, M NE	92	4	5	101 (28.2%)
Church St Station	K, L, M SW	27	1	0	28 (7.8%)
Duboce @ Church	N EB	22	0	0	22 (6.1%)
Duboce @ Church	N WB	19	0	0	19 (5.3%)
Total		335	16	7	358

For non-English speaking passengers, survey forms were available in Chinese, Tagalog and Spanish, although only a single Chinese and no Tagalog ones were actually used in practice.

Figure 2 shows the numbers of surveys completed by language. A sample survey form is shown in the Appendix. With the exception of the foreign-language versions, surveys were administered by field staff, rather than completed by the passengers themselves.

Figure 2 Number of Surveys Completed *(By Language)*



Origin and destination

Figure 3 shows the origin and destination cities cited by respondents, broadly classified by San Francisco, East Bay, North Bay and Peninsula. Overwhelmingly, people were traveling to and from places within San Francisco.

Figure 3 Origin and Destination Cited by Respondents

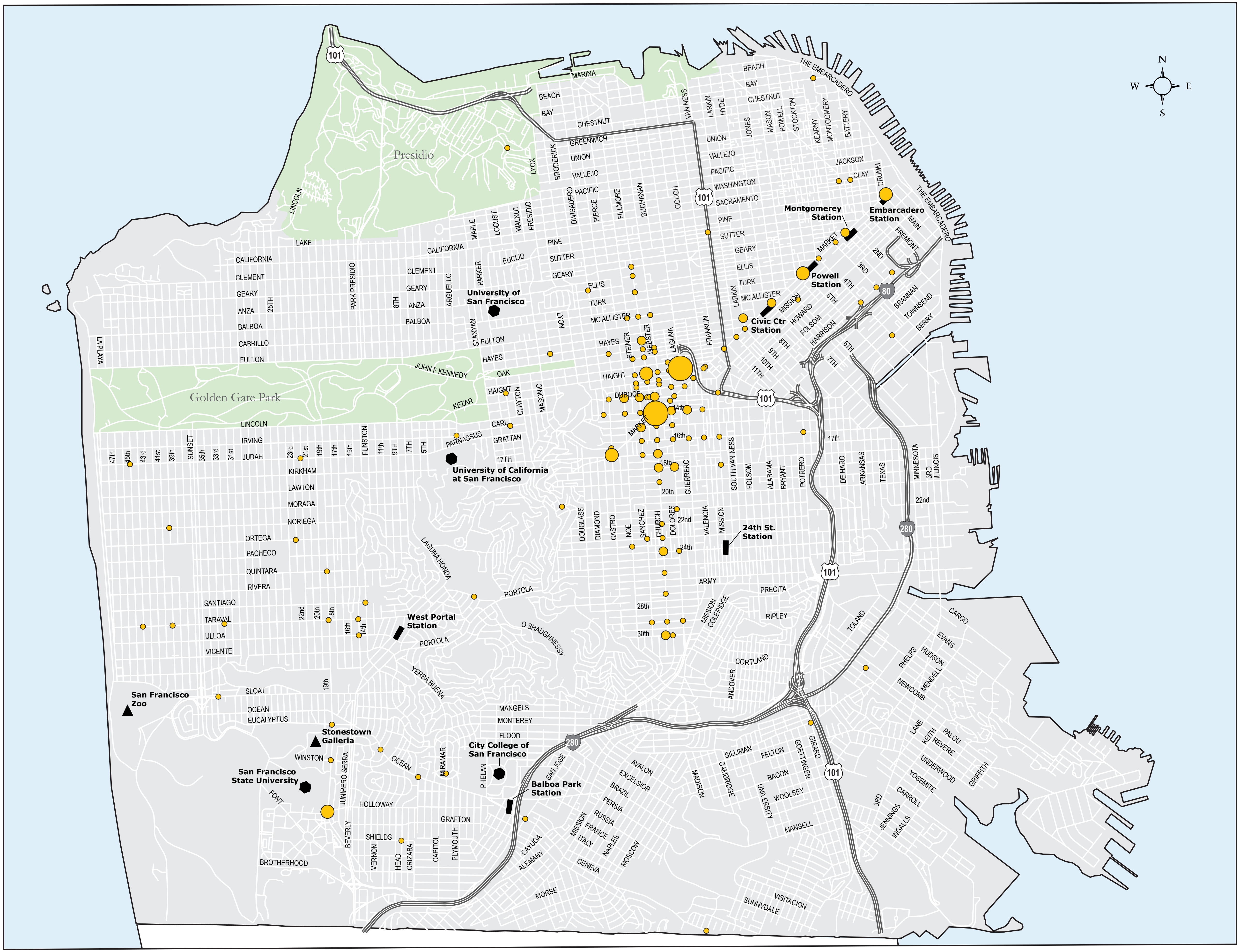
	Origin		Destination	
Origin/destination	Number	Per cent	Number	Per cent
San Francisco	356	99.4%	345	96.4%
East Bay	0	0.0%	8	2.2%
Peninsula	1	0.3%	3	0.8%
North Bay	1	0.3%	2	0.6%
Total	358		358	

Regarding specific destinations, the pattern was extremely diffuse. San Francisco State University was the most common origin, and City College the most common destination, but these were only cited by 5 and 9 respondents respectively.

Figures 4 and 5 show the origins and destinations that lie within San Francisco. Origins were highly concentrated around Church Street Station, and along the Church-Fillmore corridor. Destinations largely lay downtown, and along the Church-Fillmore corridor.

Figure 4:

Market Street: Origins within San Francisco



Legend

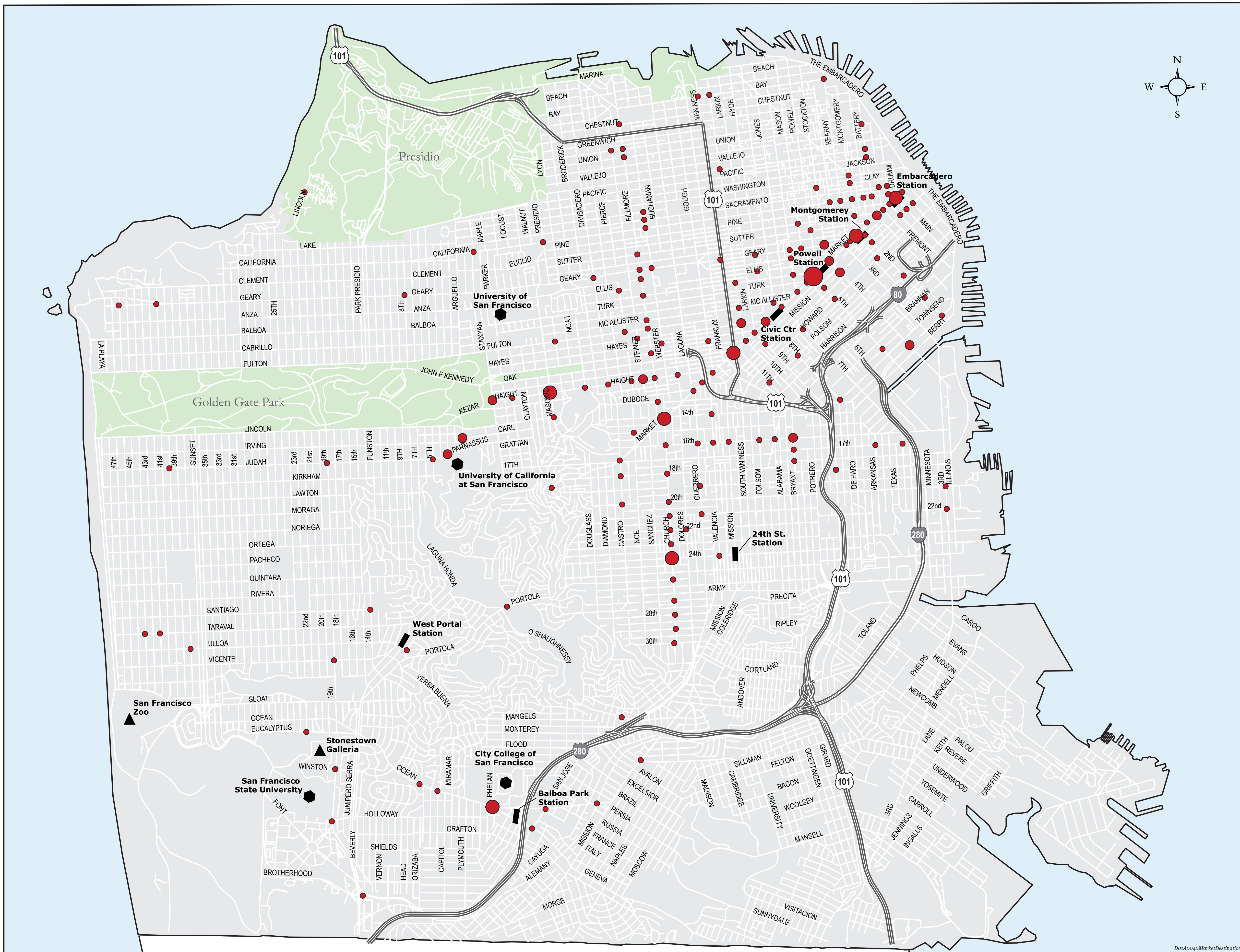
Origin Locations:

- 1-2 people
- 3-5 people
- 6-10 people
- 11-25 people
- 26-64 people

nelson\nygaard consulting associates

Figure 5:

Market Street: Destinations within San Francisco



Legend

Destination Locations:

- 1-2 people
- 3-5 people
- 6-10 people
- 11-19 people

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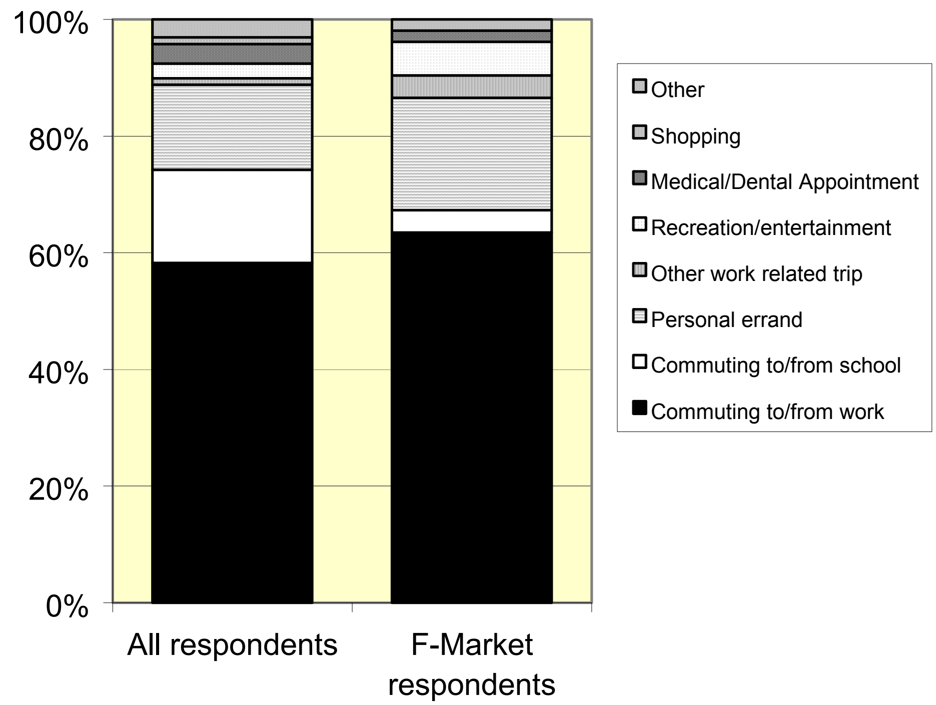
Trip Purpose

Figure 6 shows the trip purpose stated by each respondent. Commuting was by far the dominant trip purpose; 58% of respondents were commuting to work and 16% to school.

For people interviewed at the F-Market car stops, a much lower percentage of respondents (4%) were commuting to or from school. For other trip purposes, the proportions were similar, with commuting to or from work (64%) and personal errands (19%) accounting for the majority.

Figure 6 Primary Trip Purpose



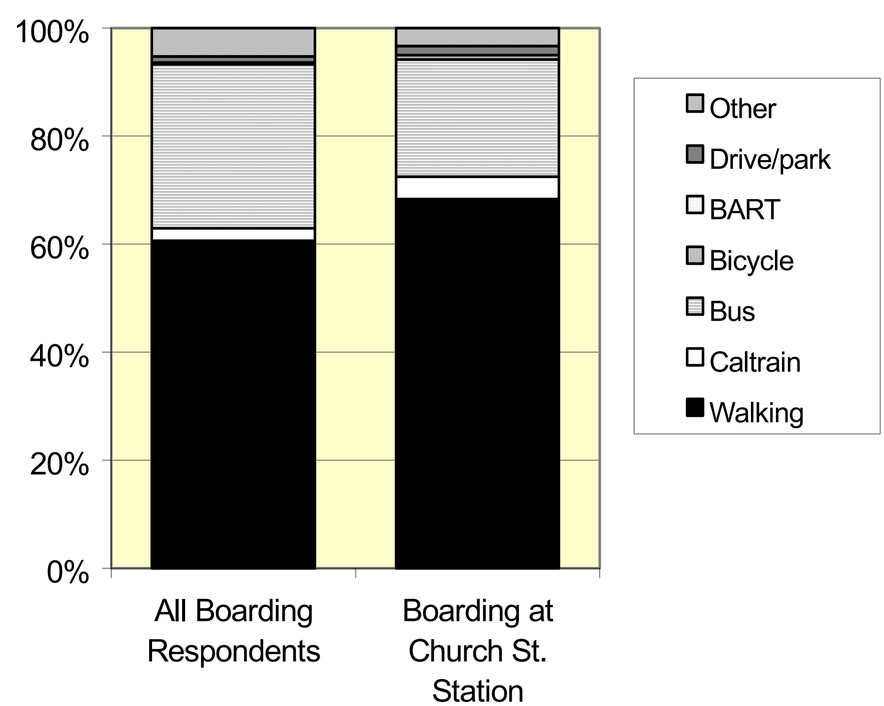
Mode Of Access

Respondents were asked what mode they used to get to the intercept location. Figure 7 below shows the results for boarding passengers only (alighting passengers would by definition have used bus). Walking was by far the dominant mode, with 62% of respondents selecting this option. Bus was chosen by 31% of respondents, suggesting a high degree of transfer activity at this location.

Eight respondents selected two options. Six chose walking and bus, and one each walking and drive/park, and walking and other.

The high degree of bus transfer activity is more pronounced for the surface lines than for the subway lines in Church Street Station. Figure 7 also shows the results for passengers boarding in the station. Here, only 22% of respondents selected bus, compared to 31% overall.

Figure 7 Mode Used to Get to Survey Location

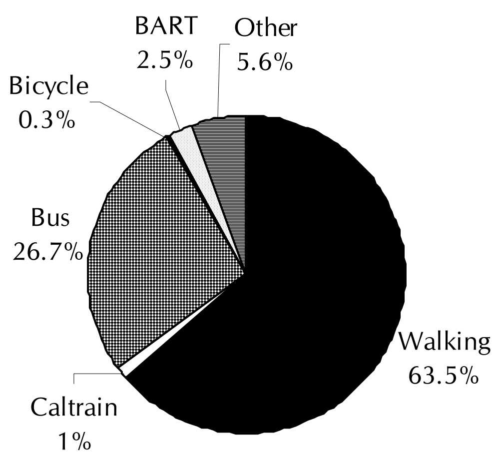


Note: Respondents could select more than one mode. Percentages refer to number of responses.

Mode Used To Reach Final Destination

The survey also asked how respondents would get from their bus to their ultimate destination. Figure 8 shows the results, for boarding passengers only to maintain consistency with earlier tables. Walking was the dominant mode, with 69% of respondents choosing this option. Bus accounted for most of the remainder, with 29% selecting this. Again, this suggests a high degree of transfer activity.

Figure 8 Mode to Reach Final Destination (Boarding Passengers)



Note: Respondents could select more than one mode. Percentages refer to number of responses.

Twenty-three respondents selected more than one mode, with three of these selecting three (Figure 9). Most of these selected walking and bus, or walking and other. Note that the responses were not given in any order, and the designation of 'mode 1' and 'mode 2' in Figure 9 is entirely arbitrary.

Figure 9 Mode Combinations Used To Get To Final Destination *(Boarding Passengers)*

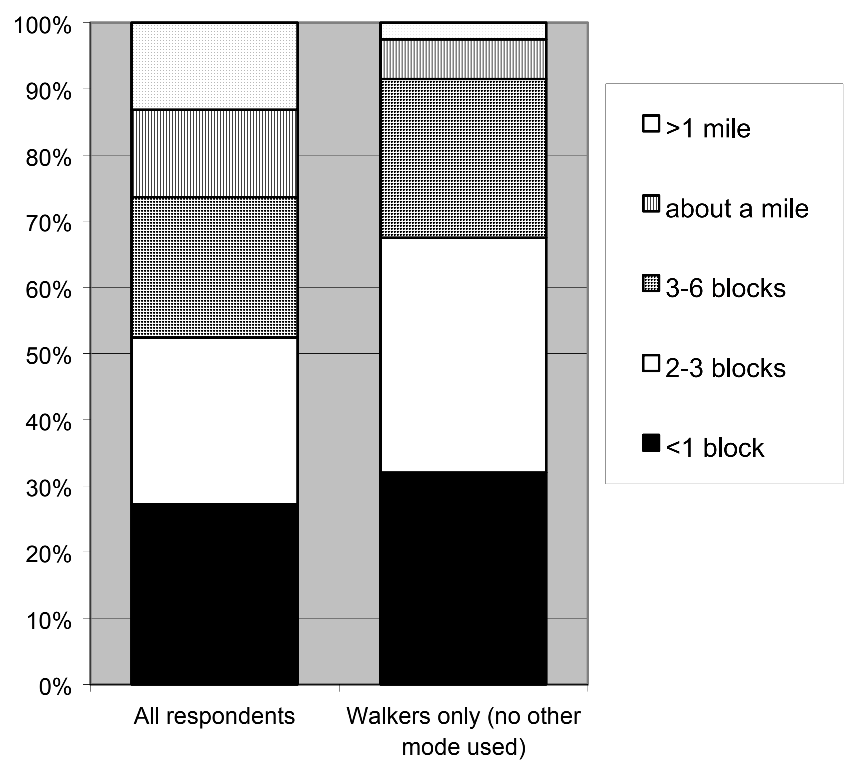
		Mode 1				
		bus only	bus and other	bike	other	Total
Mode 2	walking	9	3	1	9	22
	bus	0	0	0	1	1
	Total	9	3	1	10	23

Distance Traveled to Intercept Point

Respondents were asked how far they had traveled to get to the transit stop where they were interviewed. The results are shown in Figure 10. To maintain consistency with earlier tables, they are for boarding passengers only.

A large proportion of passengers traveled for only a short distance to the transit stop or station, with 27% coming from within a block, and a further 25% from 2-3 blocks. However, a significant number traveled for longer distances, with 21% traveling for 3-6 blocks and 26% for a mile or more. As Figure 10 shows, these longer distances are not merely due to people riding the bus to the transit stop or station. Among those who walked to the transit stop or station, and did not use any other mode, 24% traveled for 3-6 blocks, and 9% for a mile or more.

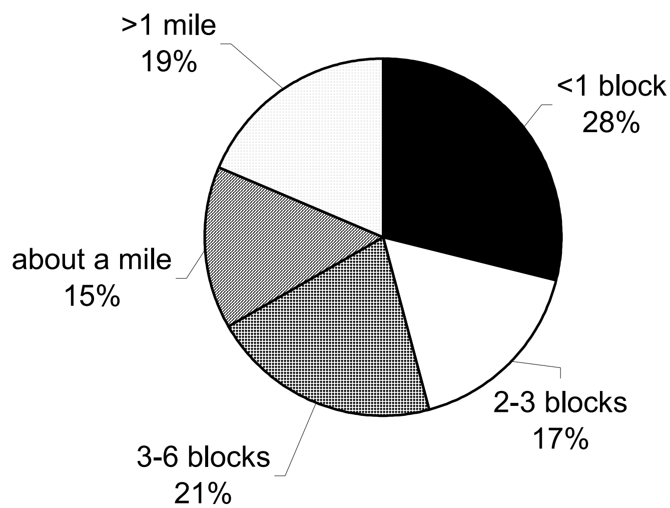
Figure 10 Distance Traveled to Transit Stop/Station at Survey Point *(Boarding Passengers)*



Distance To Final Destination

The survey asked how far respondents would need to travel from their bus to their ultimate destination. The results are shown in Figure 11, for boarding passengers only. Broadly speaking, respondents were evenly divided between the categories. Twenty-nine per cent of respondents would need to travel one block or less, and a further 17% for 2-3 blocks.

Figure 11 Distance to Final Destination (Boarding Passengers)



SAFETY

Introduction

Fehr & Peers Associates obtained the collision history for the Market/Octavia Area from the Department of Public Works. Accident data comes from the Statewide Integrated Record System (SWTRS), maintained by the California Highway Patrol. The data spans the time period of 1995 through 1999 (inclusive) and includes all reported accidents within this time period. It is not unusual for many accidents to be unreported and those accidents will not appear within these statistics. Unreported accidents are generally less severe with respect to the injury level of humans, but can often include property damage, minor injuries, and animal injuries or fatalities. Analyses of collisions occurring in the Market/Octavia area are summarized below.

Section 2: Safety

Collision Analysis

Intersections with the highest number of overall collisions were:

- Mission St./ Duboce Ave. (90)
- Howard St./13th St. (74)
- Hayes St./ Market St. (58)
- Church St./ Market St. (57)
- Gough St./ Market St. (57)

Aggregate Statistics

Between 1995 and 1999, 2,409 collisions occurred in the project area. Table 5.1 summarizes the accident statistics. Highlights are listed below.

- Slightly more than two-thirds of the 2,409 collisions occurred at intersections.
- Around 80% of all collisions involved two parties, about 10% involved three parties, and around 6% involved only one party.
- Of the total, 599 collisions (25%) caused damage to property only, 1151 (47.8%) resulted in complaints of pain, 648 (26.8%) resulted in severe injury, and there were 11 (less than 1%) fatal collisions.
- The most common types of collisions were broadsides (33.5%), rear-end collisions (17.4%), and sideswipes (16.2%).
- About 90% of the collisions involved a vehicle code violation. The largest violation categories involved traffic signal and sign violations (22%) and motorists traveling at unsafe speeds (17%).

Parties Involved in Collisions

Fehr & Peers Associates conducted a review of the parties involved in collisions in order to look more specifically at accidents involving bicycles and pedestrians.

- Approximately 65% (1,572) of all collisions involved another motor vehicle, 13.5% (327) involved a pedestrian, 6.6% (160) involved a parked car, and 6.5% (157) involved bicyclists. The remainder involved a fixed object such as a curb, light pole, or street tree.
- Of the 327 collisions involving pedestrians, just over half (168) of the pedestrians were hit while crossing in a crosswalk at an intersection exactly one-third (109) were struck while crossing outside of a crosswalk; and 3 were struck while crossing in a mid-block crosswalk (1%). Thirty-six (11%) were struck while in the road (these are normally people entering and exiting parked cars), and 9 (2.8%) were struck while not in the road.

Table 2.1
Market Octavia Collisions 1995-1999

Total Collisions: 2,409

	Total	% of Total
Collision Severity		
0-Property damage only	599	24.9%
1-Fatal	11	0.5%
2-Severe injury	93	3.9%
3-Other visible injury	555	23.0%
4-Complaint of pain	1151	47.8%
Parties		
1	141	5.9%
2	1,954	81.1%
3	250	10.4%
4	43	1.8%
5	15	0.6%
6	4	0.2%
7	1	0.0%
8	1	0.0%
Victims		
0	470	19.5%
1	1123	46.6%
2	460	19.1%
3	176	7.3%
4	105	4.4%
5	38	1.6%
6	21	0.9%
7	9	0.4%
8	1	0.0%
9	1	0.0%
10	2	0.1%
12	1	0.0%
13	1	0.0%
23	1	0.0%

Violation		
A-Vehicle code violation	2249	93.4%
B-Other improper driving	12	0.5%
C-Other than driver	16	0.7%
D-Unknown	21	0.9%
E-No response given	111	4.6%

Top CA Vehicle Code Violations		
0000-not listed	201	8.3%
21453-Circular Red or Red Arrow	502	20.8%
21650-Right Side of Roadway	17	0.7%
21658-Laned Roadways	128	5.3%
21703-Following Too Closely	84	3.5%
21801- Left-Turn or U-Turn	152	6.3%
21802- Stop Signs: Intersections	19	0.8%
21950- Right-of-Way at Crosswalks	116	4.8%
21954-Pedestrians Outside Crosswalks	52	2.2%
22100-Turning Upon a Highway	61	2.5%
22106-Starting Parked Vehicles or Backing	86	3.6%
22107-Turning Movements and Required Signals	78	3.2%
22350-Basic Speed Law	412	17.1%
22450-Stop Requirements	24	1.0%
23152- Driving Under Influence of Alcohol or Drugs	72	3.0%

Top Violation Categories		
00-Unknown	181	7.7%
01-Driving or Bicycling Under Influence of Alcohol	99	4.2%
03-Unsafe Speed	415	17.6%
04-Following too Closely	85	3.6%
05-Wrong Side of Road	30	1.3%
06-Improper Passing	54	2.3%
07-Unsafe Lane Change	128	5.4%
08-Improper Turning	200	8.5%
09-Automobile ROW (not 11)	237	10.1%
10-Pedestrian ROW	98	4.2%
11-Pedestrian Violation	140	5.9%
12-Traffic Signals & Signs	528	22.4%
17-Other hazardous violation	76	3.2%
21-Unsafe starting or backing	86	3.6%

Collision Type		
01-Head-on	72	3.0%
02-Sideswipe	391	16.2%
03-Rear-end	421	17.5%
04-Broadside	807	33.5%
05-Hit object	133	5.5%
06-Overturned	19	0.8%
07-Auto/Pedestrian	327	13.6%
08-Other	239	9.9%

Intersection		
At intersection	1577	65.3%
Not at intersection	837	34.7%

Motor Vehicle Involved With		
01-Non-Collision	35	1.5%
02-Pedestrian	327	13.6%
03-Other Motor Vehicle	1572	65.3%
04-Motor Vehicle on other Roadway	17	0.7%
05-Parked Motor Vehicle	160	6.6%
06-Train	8	0.3%
07-Bicycle	157	6.5%
08-Animal (not 10)	0	0.0%
09-Fixed Object	120	5.0%
10-Other Object	13	0.5%

Pedestrian Action		
0-Not Stated	2	0.6%
2-Crossing in Crosswalk at intersection	168	51.4%
3-Crossing in Crosswalk not at intersection	3	0.9%
4-Crossing not in crosswalk	109	33.3%
5-In road, including shoulder	36	11.0%
6-Not in road	9	2.8%

Intersections with the highest number of pedestrian collisions were:

- Church St./ Market St. (22)
- Market St./ Van Ness Ave. (21)
- 9th St./Mission St. (11)
- Mission St./ Duboce Ave. (10)
- Hayes St./ Market St. (10)

- The two intersections with the highest number of collisions involving pedestrians were Market/Church/14th Streets with 22 pedestrian collisions (6.7%) and Market Street/Van Ness Avenue with 21 (6.4%) pedestrian collisions.
- Figure 5.1 shows a pie chart for each intersection with six or more collisions during the study period. The pie charts illustrate how many collisions at each intersection involved pedestrians, cyclists, other automobiles, and fixed objects, including parked cars.

Collisions per Million Vehicles

Table 2.2 compares intersection accident rates within the study area with Caltrans' *Basic Average Accident Rate Table for Intersections*. It is important to note that the Caltrans data was derived from accident records on State-operated facilities, but similar data is not available tailored specifically to conditions in San Francisco.

Among intersections for which traffic counts exist, the intersections with some of the highest collision rates involve the Market and Van Ness Streets, but the highest collision rate occurs at Gough/Oak Streets. The intersection at Gough/Oak Streets experienced 41 reported collisions from 1995 to 1999. This level of collisions represents a collision rate twice Caltrans basic average accident rate for similar intersections statewide (0.86 collisions per million vehicles versus 0.43 collisions per million). The intersections of Duboce Avenue/Mission/Otis Streets as well as Market/Church/14th Streets, had 1.8 times more collisions than the statewide average rate. This high number may be a result of the atypical lane geometries and number of approaches at these intersections.

Collisions by Road Type

In order to better understand accident trends, the Project Team reviewed collisions according to road type. The Team also compared bicycle and pedestrian collision rates at study intersections by applying the same factors used to evaluate total collisions per million vehicles to the raw collision numbers. After the formula was tabulated, each intersection was ranked. While several intersections have high raw numbers of pedestrians, bicycles, and automobiles, this method allows analysis of the rate of collision, accounting for pedestrian volume.

According to this analysis, the intersection with the highest rate of pedestrian-related collisions is Market/Church/14th Streets, followed closely by Van Ness Avenue/Market Street. These two intersections also have the highest raw collision statistics, i.e. the highest number of pedestrian collisions before the factor is applied. Mission/11th Street follows these two intersections, although it does not have a particularly high number of collisions. Market/Valencia Streets, Mission/Otis Street, and Market/Guerrero/Laguna Streets have the highest rates for bicycle-related collisions.

No clear pattern emerges relating to skewed intersections and one-way streets. Four multiple-approach intersections rank in the top 10 while eight more are scattered throughout the rest of the list for pedestrians. The same is true for bicycles.

Intersections along the major one-way streets, Oak, Fell, Franklin, and Gough Streets, do not rank highly on the list. Gough Street intersections (one-way southbound to Market Street), fall in the bottom half of the list for pedestrians, although Oak/Gough Street and Market/Gough Street rank highly for bicycle accidents. Larkin and 14th Streets are both one-way streets. Larkin/Market/9th Street ranks highly for both bicycles and pedestrians, while Church/14th/Market Street is the highest-ranked intersection for pedestrians and in the top 10 for bicycles.

Table 2.2
Collisions per Million Vehicles

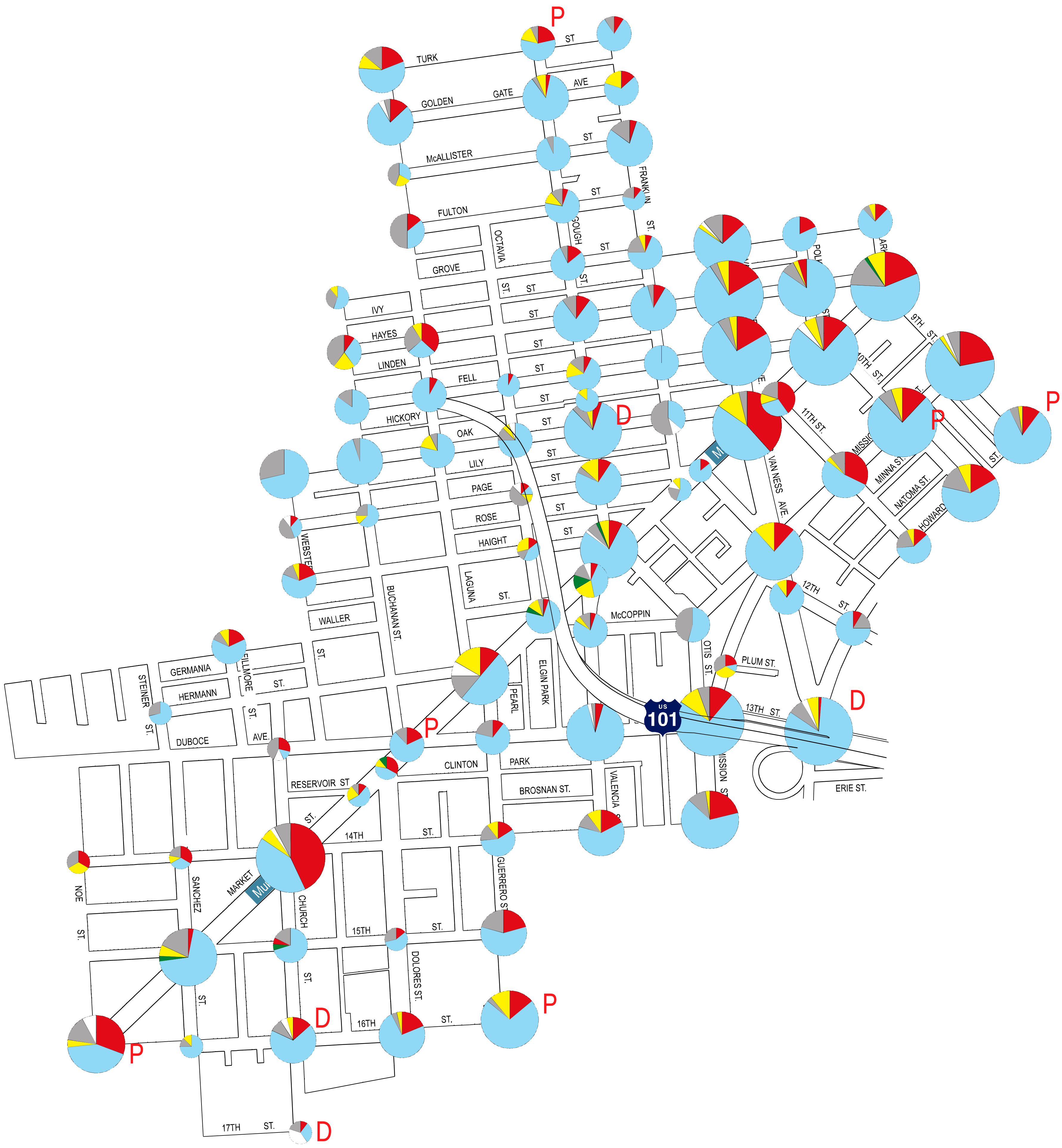
Caltrans Basic Average Accident Rates 4-Legged, Multi-Legged & Offset Urban Intersections		
Rate Group	Intersection Type	Base Rate
11	No control	0.06
12	Stop & Yield Signs	0.22
13	4 Way Stop	0.41
14	Signals	0.43
15	4 Way Flashers	0.62

Caltrans Basic Average Accident Rates T, Y and Other Urban Intersections		
Rate Group	Intersection Type	Base Rate
26	No control	0.1
27	Stop & Yield Signs	0.14
28	4 Way Stop	0.18
29	Signals	0.28
30	4 Way Flashers	0.35

Intersection	Collisions: 1995-1999	ADT	5-year Volume (ADT*350*5)	Collisions/million Vehic.	Rate Group	Statewide Base Collisions/million Vehic. Rate
Oak/Gough	41	27,221	47,636,816	0.86068	14	0.43
Otis/Mission/Duboce/101	98	70,250	122,937,876	0.79715	14	0.43
11th St/Mission	28	20,768	36,343,432	0.77043	14	0.43
Market/Church/14th	57	45,000	78,750,772	0.72380	14	0.43
9th/Market/Hayes/Larkin	58	47,300	82,774,325	0.70070	14	0.43
10th St/Mission	58	49,566	86,740,726	0.66866	14	0.43
Market/Gough/Haight	53	51,614	90,324,203	0.58678	14	0.43
10th St/Market/Polk	51	50,030	87,552,295	0.58251	14	0.43
Van Ness/Hayes	55	57,016	99,777,268	0.55123	14	0.43
Van Ness/Market/Oak	54	56,751	99,314,330	0.54373	14	0.43
Sanchez/Market/15th	33	35,588	62,279,350	0.52987	14	0.43
Fell/Van Ness	54	63,704	111,482,150	0.48438	14	0.43
Market/Guerrero/Laguna/Herm	38	51,478	90,085,743	0.39962	14	0.43
Valencia/Market	15	34,435	60,261,858	0.24891	29	0.28
Franklin/Hayes	24	37,384	65,422,751	0.36684	14	0.43
Gough/Otis/Mission/Mccoppin	16	25,595	44,790,609	0.24559	14	0.43
Gough/Hayes	20	33,401	58,451,212	0.34217	14	0.43
Market/Duboce/Buchanan	22	37,978	66,461,880	0.33102	14	0.43
South Van Ness/Mission	34	60,046	105,081,043	0.31404	14	0.43
Octavia/Market	17	35,085	61,399,197	0.30945	14	0.43
Dolores/Market/Clinton	12	34,765	60,839,100	0.19724	29	0.28
Oak/Laguna	14	31,276	54,732,259	0.25579	14	0.43
Laguna/Fell/hwy 101	13	30,045	52,579,116	0.24725	14	0.43
Gough/Fell	14	34,334	60,084,684	0.23300	14	0.43
Franklin/Market/Page	11	29,501	51,626,077	0.21307	14	0.43
Franklin/Fell	16	44,409	77,716,307	0.20588	14	0.43
Franklin/Oak	11	40,134	70,235,012	0.15662	14	0.43
South Van Ness/Erie/101 Ram	5	40,693	71,212,324	0.07021	14	0.43

Table 2.2
Collisions per Million Vehicles

Statewide Multiplier (X times base
200%
185%
179%
168%
163%
156%
136%
135%
128%
126%
123%
113%
98%
89%
85%
83%
80%
77%
75%
72%
70%
59%
57%
54%
50%
48%
36%
16%



LEGEND:

Collisions for 1995-99 Inclusive

- >50 Crashes
- 30-50 Crashes
- 20-29 Crashes
- 10-19 Crashes
- 0-9 Crashes

- Pedestrian
- Bicycle
- Auto
- Fixed Object/Other
- Train
- Non-Collison

- P Pedestrian Fatality
- D Driver Fatality

N
Not to Scale

San Francisco Better Neighborhoods 2002
Market/Octavia Existing Conditions Report

COLLISION SUMMARY

FIGURE 5.1

FEHR & PEERS ASSOCIATES, INC.
Transportation Consultants

April, 2001
\market octavia\0001-100

BICYCLES AND PEDESTRIANS

Introduction

Urban Planner Peter Calthorpe wrote, "Pedestrians are the lost measure of community."[1] Everyone becomes a pedestrian at some point in his or her journey, and the walking environment is one of the most basic public spaces where people interact in the urban landscape. The relative pleasure of walking or bicycling in a neighborhood is a good yardstick for determining everything from design guidelines to land uses.

The Market Octavia study area contains several key bicycle and pedestrian corridors. Pedestrians utilize Market Street as the prime connection between the Castro and Downtown. High numbers of bicyclists travel along the bicycle lanes on Market, Valencia, and 14th Streets. Many of the streets most heavily-used by bicyclists and pedestrians are also major transit and auto corridors, especially along Market Street where densely-packed activity centers, flat terrain, and the string of Muni stations create desirable route for all modes. The fact that all modes must share and sometimes compete for space affects and defines the pedestrian and bicycling environment as do land use and streetscape design. This section describes local and regional routes within the project area.

[1] Peter Calthorpe, The Next American Metropolis: Ecology, Community, and the American Dream, p.17. Princeton Architectural Press, 1993.

Section 2: Bicycles and Pedestrians

Pedestrian Network

Pedestrians and Transit

The heaviest pedestrian volumes in the study area are focused on Market Street around the Transit Centers at the Van Ness Avenue and Church Street Muni Stations.

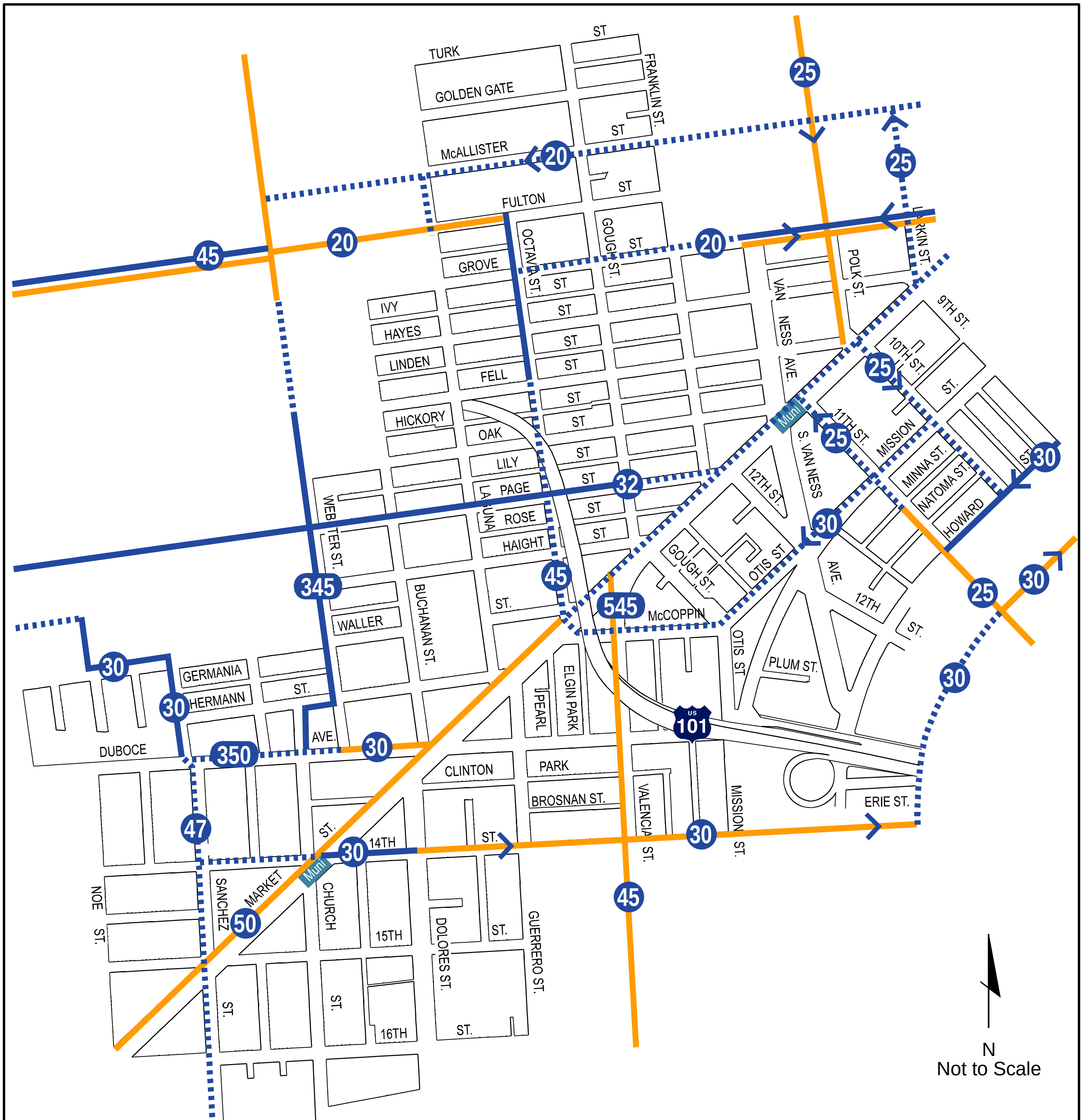
Many of the primary streets for autos and transit are also key pedestrian routes. As noted in Chapter 2, Market Street is a main artery for transit feeding into downtown to regional connections on BART, Caltrain, and the Ferry. Along this transit thoroughfare, Market Street/Van Ness Avenue and Church/Duboce Streets have heavily-used sidewalks, focused around the underground Van Ness Avenue and Church Street Muni stations. These intersections are also transfer points for above-ground trolleys and buses. Along Market Street, passengers must cross to the middle of the street where the trolleys and buses have dedicated lanes.

The Duboce triangle (the area bounded by Church, Market, Duboce, and 14th Streets) has two above-ground Muni rail stations (the Church Street and Castro Stations), a grocery store (Safeway), a commercial strip, and a movie theater, all utilized by the residents of the densely populated neighborhood nearby. All of the streets in the triangle are important pedestrian routes.

The mix of commercial and residential uses on Hayes Street makes it a heavily-used route for pedestrians.

There are several residential streets in the study area that are characterized by lower vehicle volumes and local pedestrian trips, such as Octavia north of Hayes Street, Laguna Street, Buchannan Street, Webster Street, Fillmore Street, and Steiner Street. East-west streets that have similar characteristics are Fulton, Grove, Hayes (west of Laguna), Page, Haight and Waller Streets

Some residential streets, such as Oak and Fell Streets, carry heavy automobile traffic but lower pedestrian volumes. These streets have sparse activity centers, making them less attractive pedestrian routes.



LEGEND:

= Bike Lane

= Wide Curb Lane Bike Route

= Bike Route

= arrows indicate travel in one direction

1 = Numbered bike routes are part of the Official San Francisco City Bike Route System

20 = Even numbers indicate east-west routes

45 = Odd numbers indicate north-south routes

345 = 3-digit numbers indicate connector routes

San Francisco Better Neighborhoods 2002
Market/Octavia Existing Conditions Report

FEHR & PEERS ASSOCIATES, INC.
Transportation Consultants

BIKE MAP

July, 2001
\market\0001-92-1

FIGURE 2.1

Market Street has intermittent bicycle lanes, but Valencia Street provides a major continuous bicycle route from Market Street to Tiffany Street, about two miles South.

Existing Conditions

This section describes the existing conditions at the same 30 intersections were studied to identify pedestrian and bicycling issues. The following table summarizes the team's field observations.

Table 2.2
Study Intersections

No.	*Intersection Cross Streets*	*Signals/Crosswalks*	*Other Issues*
1	Gough/Hayes Street	• No ped signals • No crosswalk on southern side	Difficult crossing due to high volume of traffic going to the freeway ramps south of Market Street
2	Franklin/Hayes Street	Yes	
3	Van Ness Avenue/Hayes Street	No ped signals on north and south side crossing Van Ness Ave.	
4	Laguna/Fell Street	No ped signals on east and south side crosswalks	
5	Gough/Fell Street	• Yellow school crosswalks • No ped signals • No crosswalk on westside	Difficult crossing due to high volume of traffic going to the freeway ramps south of Market Street
6	Franklin/Fell Street	• Yellow school crosswalks • No ped signals • Crossing prohibited on east side	Difficult crossing due to high volume of traffic going to the freeway ramps south of Market Street
7	Van Ness Avenue/Fell Street	No ped signals for north and south side crosswalks	
8	Laguna/Oak Street	No ped signals for north and south side crosswalks	
9	Gough/Oak Street	• Yellow school crosswalks • No ped signals	
10	Franklin/Oak Street	• No ped signals for east and west side crosswalks • No crosswalk on north side	Difficult crossing due to high volume of traffic going to the freeway ramps south of Market Street

No.	*Intersection Cross Streets*	*Signals/Crosswalks*	*Other Issues*
11	Sanchez/Market/15th Street	No wheelchair ramp or ped signal at the north corner of Sanchez/15th Street	
12	Church/Market/14th Street	No direct crosswalk on the north side of Market: pedestrians must make two crossings (14th and Church Streets)	• Major transit hub • Ped crossings are wide • Pedestrians must cross the street to reach transit islands
13	Dolores/Market Street/Clinton Park Driveway		Traffic entering Clinton Park from Market Street could conflict with pedestrians at the uncontrolled Clinton Park crossing
14	Buchanan/Market Street/Duboce Avenue	No crosswalk on the west side	
15	Laguna/Market/Hermann/ Guerrero Street	Yes	
16	Octavia/Market/Waller/ McCoppin Street	Crossing prohibited on west side	
17	Valencia/Market Street	Yes	
18	Gough/Market/Haight Street	No ped signals on north and west side crosswalks across Gough or Haight Streets	
19	Franklin/Market/Page Street		
20	Van Ness Avenue/Market Street	Intersection has "count down" ped signals	Blank Bank of America wall creates a less enjoyable walking environment
21	Polk/Market/10th Street		Difficult for southbound right-turning vehicles to see pedestrians crossing Market Street
22	Larkin/Market/Hayes/9th Street		• Ped signals on the east side Hayes Street crosswalk are difficult for pedestrians to see • Pedestrians must cross two crosswalks to get

No.	*Intersection Cross Streets*	*Signals/Crosswalks*	*Other Issues*
			from 9th Street to Larkin Street or the north side of Hayes Street
23	Gough/Mission Street	No marked crosswalk on south side crosswalk crossing Otis Street	
24	Mission Street/S. Van Ness Avenue	Yes	East and west side Mission Street is controlled by two separate phases (can be confusing to pedestrians)
25	Mission/11th Street	No ped signals	
26	Mission/10th Street	No ped signals	
27	Mission/Otis Street/Hwy 101 Off-ramp		Large number of pedestrians using this crossing to get to Smart and Final and the island bus stop
28	S. Van Ness Avenue/Howard Street/Hwy 101 Off-ramp	No ped signals for east and west side crosswalks	
29	Howard Street/Duboce Avenue	?	
30	Howard/Erie Street	?	

Person Delay
In order to get a rough estimate of the amount of delay experienced by people traveling by all modes (by transit, by bicycle, and on foot as well as by car), the Project Team developed a new measure of delay using counts and signal timing for each of the study intersections.

Highlights of the analysis include the following:

- 13th Street/Van Ness Avenue had the highest per person delay in the morning and the evening
- Pedestrians experience the most delay at Mission Street/Van Ness Avenue in the morning and the evening
- Bicyclists have the most delay at Franklin/Fell Street in the morning peak period and 13th Street/Van Ness Avenue in the evening peak period
- In the morning, autos experience the highest delay at 13th Street/Van Ness Avenue. This intersection does not rank highly for pedestrian delay, but it ranks in the top five for cyclists.
- In the evening, autos experience the highest delay at 13th Street/Van Ness Avenue. This does not rank highly for pedestrian delay, but it is ranked first for longest bicycle delay.

Analysis Methodology
The Team utilized the same signal timing used to determine the automobile Level of Service (LOS) in order to measure the number of seconds that transit, pedestrians, and cyclists wait to cross each intersection. Transit vehicle and passenger car occupancies were used to derive person-delay calculations for these modes. The average delay for each mode was used to create a weighted average per person during the AM and PM peak periods at each intersection.

Bicyclists
Bicyclists at each intersection were counted in 15-minute intervals during the AM and PM peak periods (7:00-9:00 AM and 4:00-6:00 PM). Bicyclists will experience the same amount of delay as autos, provided that they are obeying the rules of the road and behaving as a vehicle.

Transit
Since most buses carry many more passengers than a car, the delay experienced by each bus was multiplied based on the number of riders observed on each bus at a given intersection. These numbers were used to get a weighted average person delay for the entire intersection.

Pedestrians

Pedestrians were counted during 15-minute intervals in the AM and PM peak periods (7:00-9:00 AM and 4:00-6:00 PM). Although pedestrians are subject to the same delays as autos (they have the same amount of green time to cross the street as cars), they do not behave like cars. At certain intersections, they must traverse two crosswalks or none at all to make their desired movements. The project team used the number of pedestrians in the crosswalks at each location to determine the average delay per person, taking into account the intersection configurations that would affect delay.

Autos

At each intersection, the team noted the number of passengers in ten random vehicles. The team derived an average number of passengers per vehicle using these observations in order to take auto passengers into account in the person delay figure.