Balboa Area Transportation Demand Management (TDM) Plan

Existing Conditions

FINAL

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NELSON
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EXECUTIVE SUMMARY

This Existing Conditions Report summarizes current transportation conditions in the Balboa Area to inform the Balboa Area Transportation Demand Management (TDM) Plan. This report provides a detailed narrative of the existing transportation setting and demand throughout the Balboa Area. The report's primary goal is to establish a shared understanding of the issues, opportunities, and challenges for various affected groups, including residents, businesses and public institutions, visitors, daily commuters traveling in and out of the area, and those traveling through the area on a daily basis.

This report contains a review of existing transportation conditions, population characteristics, and planned transportation and land use changes within the Balboa Area. The assessment of current conditions was developed using quantitative and qualitative data from various resources, including City College of San Francisco (CCSF) and neighborhood travel behavior surveys, intersection and roadway volume data, parking survey information, city planning reports and technical memoranda, feedback received from public engagement meetings, and field reconnaissance conducted by Nelson\Nygaard. The report also includes an introduction to TDM and conceptual TDM strategies that could form the basis of a Balboa Area TDM plan.

Auto, transit, pedestrian and bicycle traffic is heavily concentrated along Ocean Avenue, the main artery of the area, and there are a number of opportunities and constraints. The need for network connectivity between neighborhoods and access to key destinations such as CCSF, the Balboa Park BART Station, and local residences and businesses is evident. Using the understanding of the existing conditions presented in this report and ongoing community engagement to guide the development of a TDM plan, the forthcoming TDM plan will help provide a roadmap of how the community can manage their transportation investments, understand the tradeoffs, and create a more accessible, healthier, and livable community.

1 INTRODUCTION

This Existing Conditions Report was prepared to describe existing transportation conditions and to inform the Balboa Area Transportation Demand Management (TDM) Plan (or "Plan"). The Plan will analyze the neighborhood's existing and future transportation demand, recommend measures to better manage that demand, and develop a guide for implementing them. The Plan will support the goals of pedestrian safety and access to transit, affordable housing, and City College of San Francisco (CCSF) student enrollment.

This Plan was proposed as a response to much of the public input to the Balboa Park Station Community Action Committee (CAC), to the Balboa Reservoir CAC, and at public workshops in the neighborhood. The project is funded by District 7 Neighborhood Transportation Improvement Program (NTIP) funds, at the request of Supervisor Yee's office.

Nelson\Nygaard Consulting Associates has been retained to develop a TDM Plan for the area, building upon existing transportation infrastructure and facilities, and to identify and recommend strategies to improve transportation options for all constituents in the Balboa Area.

IDENTIFYING TRANSPORTATION NEEDS FOR BALBOA PARK AREA

The Balboa Area lies at a crossroads of transportation infrastructure, serves as a major education destination, and is poised for change. The neighborhood is continuing to grow and CCSF enrollment is increasing. A number of improvements in the Balboa Area are making transit more accessible including, San Francisco Municipal Transportation Agency (SFMTA) operation improvements and upgrades to pedestrian safety around the Balboa Park Bay Area Rapid Transit (BART) station and along Ocean Avenue. However, the limited roadway space, transit infrastructure, and financial resources create a need better manage transportation demand for CCSF and surrounding neighborhoods.

The TDM Plan will be the first effort to understand and coordinate the unique travel behavior of the Balboa Area. This Plan will take a close look at the demand for roadway space for all users and will consider all transit activity, vehicle travel, parking, safe and convenient walking, biking, and transit facilities, and other transportation demands. The Plan will also include measures to serve the diverse needs of all people coming to or living in the area including, commuters, families, seniors, employees, visitors, and students of all ages, means, and schedules. Finally, the TDM measures will consider future land use scenarios as the neighborhood grows, including on the Balboa Reservoir Public Site, CCSF Ocean Campus, and neighborhood corridors.

This Existing Conditions Report provides the existing transportation conditions, demand, goals, and community priorities. The information presented herein is the first step in the preparation of the Balboa Area TDM Plan and essentially "sets the stage" for what TDM strategies and supporting measures will be considered and how the TDM Plan will work to reach the goals and priorities of the Balboa Area community and visitors.

This report assesses baseline conditions of the existing transportation network within the Balboa Area, including existing transportation services and facilities, and the interaction of various modes and users. The information included in this report is based on various resources, including quantitative data gathered from past and present planning studies and field work, and qualitative input and feedback from site reconnaissance, surveys, and community meetings. Planned (future) transportation improvements to the current network are also included, and generally support enhancing access and mobility within the Balboa Area. The report concludes with an introduction on the fundamental elements of TDM and provides a broad range of conceptual TDM strategies that may be considered to shape the TDM plan for the Balboa Area.

The Balboa Area TDM Plan will create, define, and provide guidance to implement effective and meaningful TDM strategies. The forthcoming TDM Plan will include a suite of short- and long-term recommendations for the City, CCSF, and the future Reservoir Site that allow for the most efficient use of limited resources and minimize impacts on the Balboa Area community. The Plan will also recommend the best path to implement these recommendations and facilitate coordination between the City and CCSF.

APPROACH

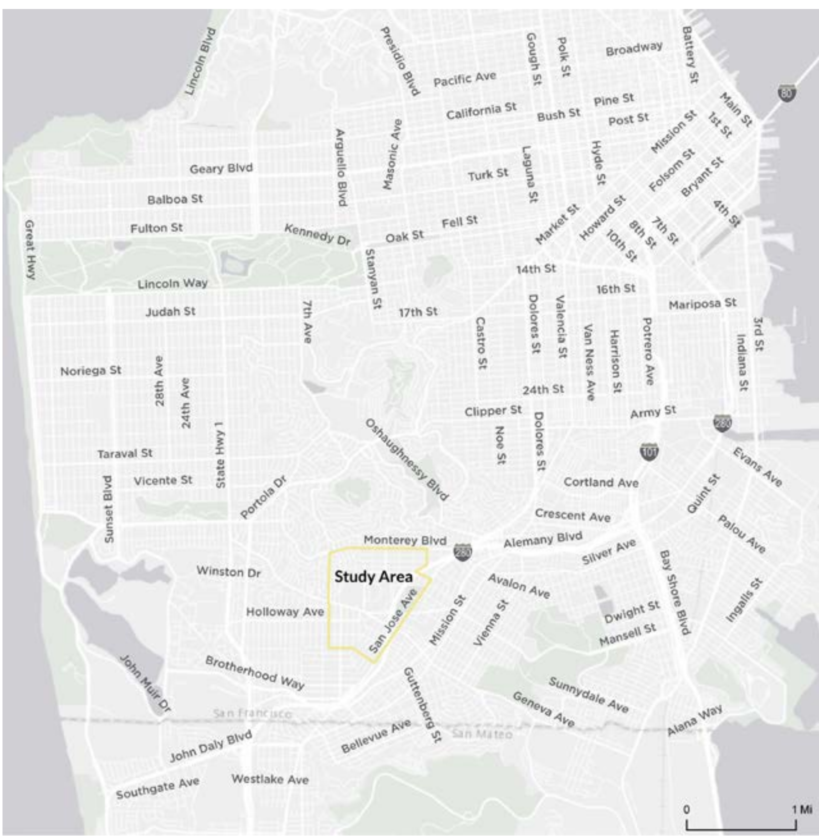
This report contains a review of existing conditions and offers strategy recommendations to create a robust, innovative, and cost-effective TDM program for the Balboa Area. The report includes the following chapters and sections:

- **Community Profile**. An overview of the current land use, household and socioeconomic makeup of the Balboa Area.
- **Multimodal Conditions.** An in-depth look at the infrastructure and travel characteristics of all users of the transportation network, including those who take transit, drive, bike, and walk. When possible, information is given on the area as a whole, and specifically to CCSF Ocean Campus. Also included in this section is a detailed review of vehicle travel and parking behavior in the area.
- **Community Engagement.** An overview of approach and findings of community engagement methods, including CCSF intercept travel survey, community surveys, and public meetings.
- **TDM Concepts.** An overview of Transportation Demand Management (TDM) and the impacts a TDM plan will have on the Balboa Area reaching its goals and priorities (e.g., improved access to transportation resources and managing growth), as well as conceptual strategies that may be used to shape the TDM plan. The section of the report also highlights next steps that and key considerations that will be used to develop the Balboa TDM Plan.

2 COMMUNITY PROFILE

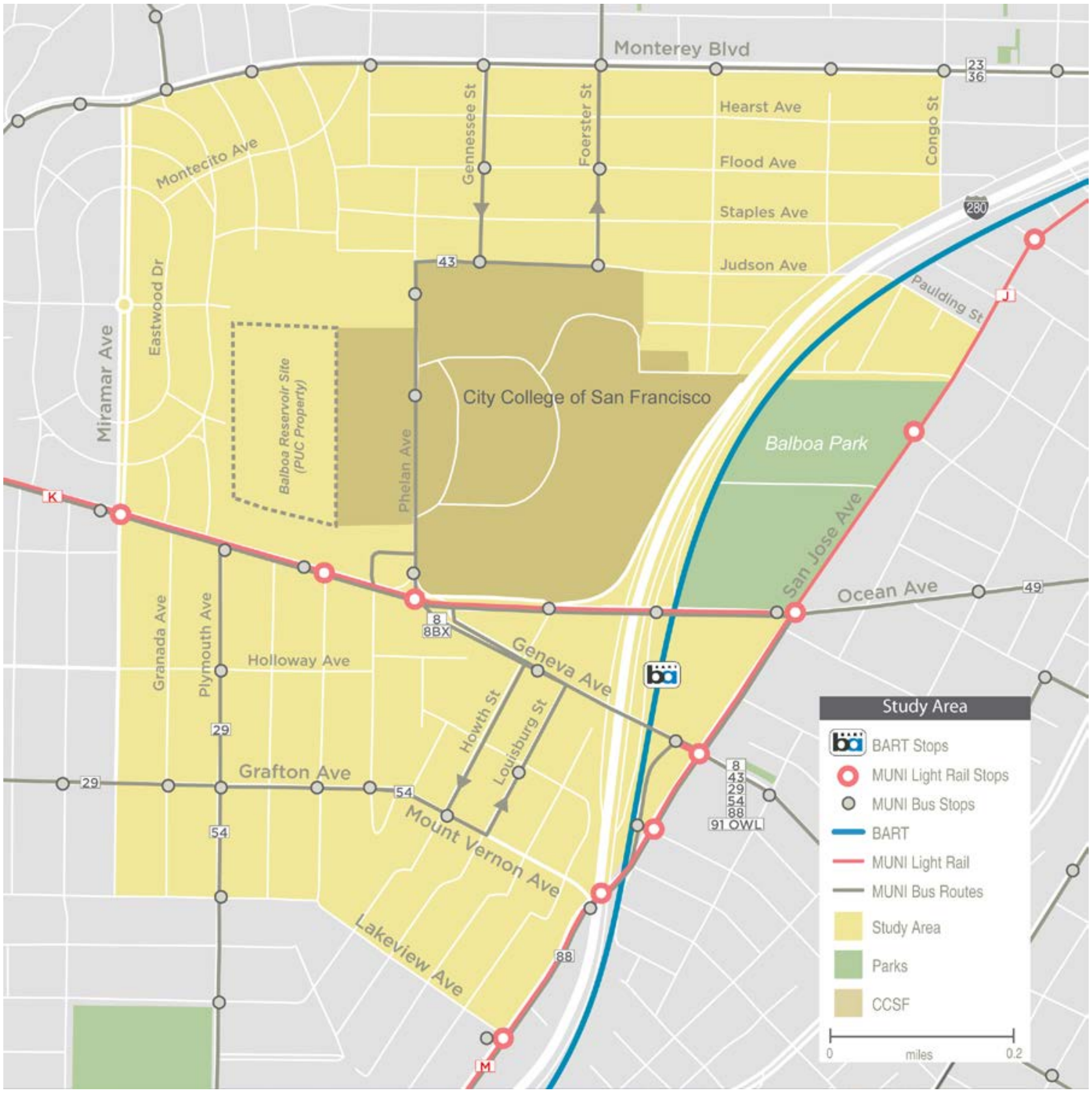
The project area (see **Figure 2-1** and **Figure 2-2**) comprises the Westwood Park, Ingleside, and Sunnyside neighborhoods, as well as the City College of San Francisco (CCSF) Ocean Campus. The study area is bound by Monterey Boulevard to the north, Miramar Avenue to the west, Lakeview Avenue to the South, and San Jose Avenue to the east. I-280 access on Geneva and Ocean avenues provides the area with regional vehicle access, and many north-south and east-west arterials in the area provide direct connections to downtown and other neighborhoods. The study area presents the highest concentrations of transportation activity and associated facilities, and the current circulation conditions assessed within the study area are representative of activities and conditions throughout the Balboa Area. The forthcoming Balboa Area TDM Plan will be designed to focus on managing transportation demand from CCSF Ocean Campus and the future of the Balboa Reservoir site (currently owned by the San Francisco Public Utilities Commission [SFPUC]), and the area as a whole, including the Balboa Park BART station.

Figure 2-1 Balboa Park Study Area



Source: Nelson\Nygaard, 2016.

Figure 2-2 Balboa Area – Study Area



Source: Nelson\Nygaard, 2016.

LAND USE

The Balboa Area is primarily residential and zoned for low and moderate density residential uses; **Figure 2-3** shows the general zoning in the Balboa Area. The CCSF Ocean Campus, zoned as public space, is located at the center of the study area and provides publically-accessible sports facilities. Ocean Avenue is the primary commercial/retail corridor and has a variety of services to accommodate the daily needs of residents and visitors to the area including, restaurants, schools, cafes, auto body shops, and churches.

The study area also includes Balboa Park, which is public open space located east of I-280, on San Jose Avenue between Havelock Street and Ocean Avenue. This amenity provides diverse athletic uses, including a skate park, a playground, tennis courts, a swimming pool, and baseball fields.

East of I-280, at the intersection of Ocean Avenue and San Jose Avenue, is a significant area of intermodal activity, with the Balboa Park BART Station, several Muni light rail and bus stops, and the Curtis E. Green Light Rail Center, which is a Muni light rail vehicle repair and storage facility.

Ocean Avenue, along with parcels on Monterey Boulevard, San Jose Avenue, and Howth Street are designated Mixed-Use Neighborhood Commercial Districts, and typically have commercial uses on the ground floor, with housing above. Section 733A of the San Francisco *Planning Code*, note that these areas are intended to serve as local neighborhood shopping districts that provide convenience retail goods and services for the immediately surrounding neighborhoods primarily during daytime hours.[1]

Figure 2-3 Balboa Park Area Zoning

Source: San Francisco Planning Department, Nelson\Nygaard, 2016.

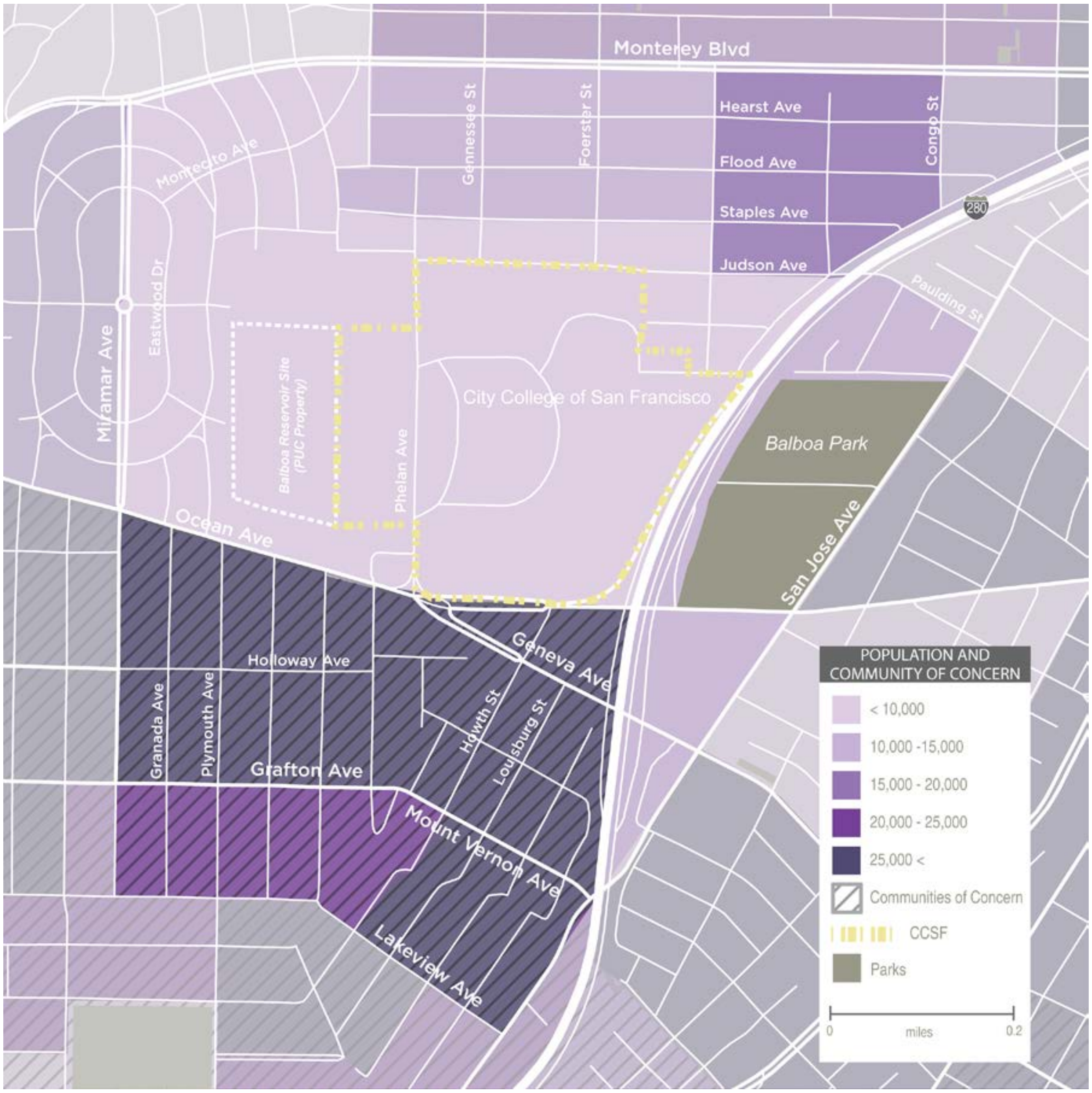
[1] San Francisco Planning Code, Section 733A.1, Zoning Code NCT-1.

COMMUNITIES OF CONCERN AND PRIORITY DEVELOPMENT AREAS

A long-range integrated transportation and land-use housing strategy titled *Plan Bay Area* was undertaken by the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC) in 2013. Examining the future of the Bay Area through 2040, the Plan also identified communities of concern and priority development areas (PDAs) to understand both current and potential impacts of future growth.[2] *Plan Bay Area* identified five equity issues facing all communities of concern: (1) housing and transportation affordability, (2) potential for displacement, (3) healthy communities, (4) access to jobs, and (5) equitable mobility. The study area contains one community of concern, shown in **Figure 2-4**, along with population by block group.

[2] Plan Bay Area available online at: http://planbayarea.org/plan-bay-area.html.

Figure 2-4 Community of Concern and Population by Block Group



Source: MTC Plan Bay Area, U.S. Census, Nelson\Nygaard, 2016.

The community of concern in the Balboa Area is overlapped by a larger Priority Development Area (PDA), also established by *Plan Bay Area*. The designated PDA in the study area is made up of both the Balboa Park and Glen Park Community PDAs. Generally, this area includes CCSF, Ocean Avenue, and the area surrounding the intermodal transit station. PDAs are areas where new development will support transit oriented development and the day-to-day needs of residents and workers. Because PDAs aim to focus residential and employment growth, and can thereby improve access to transit, they are a key part of planning for communities of concern. The PDAs identified in *Plan Bay Area* are largely located in or near communities of concern. This overlap emphasizes opportunities to address access and convenience to public and active transportation for communities of concern. This PDA's specific goals hope to build more rental and affordable housing units, revitalized streets, commercial uses, public spaces, and transit connections, relevant factors when considering the study area's ongoing development.[3]

HOUSEHOLD AND SOCIOECONOMIC INFORMATION

Household and socioeconomic information provides an understanding of where trips begin and end and why these trips are generated. Specifically, the number of households, household size and vehicle ownership are important elements to understanding vehicle trip generation. The study area has 590 households and most have at least two vehicles. The majority of households have a household size of three to four people, though the neighborhood south of Ocean Avenue and north of Holloway Avenue (part of the community of concern) has a slightly higher mean household size. The neighborhoods between Monterey Boulevard and CCSF and west of the Balboa Park intermodal station have lower mean household densities, with four to five people per household and two to three people per household, respectively.

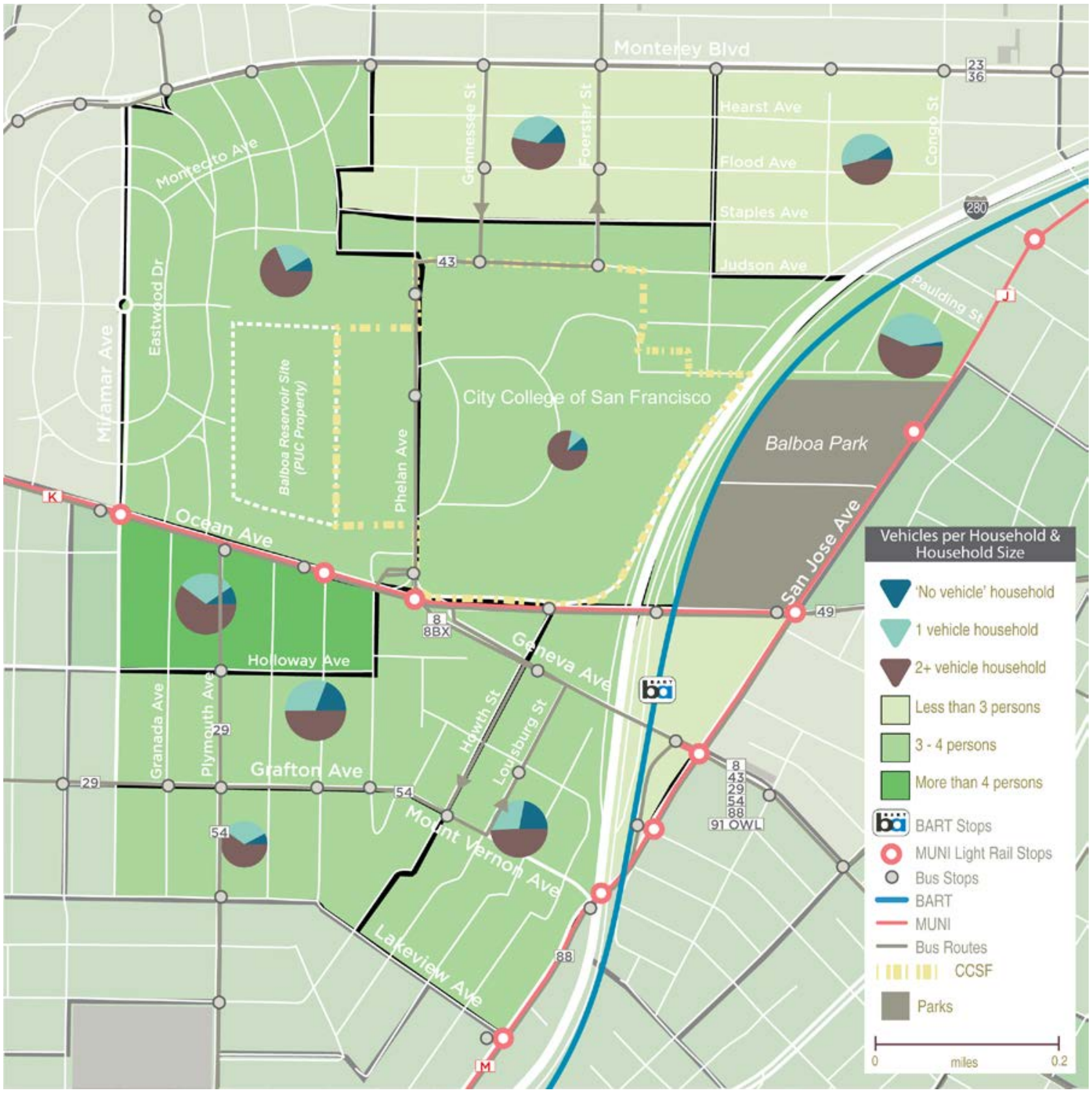
Although the study area has an established multimodal network with several bus transit and light rail routes, bikeways and transit centers, vehicle ownership per household is higher in comparison to the rest of San Francisco. U.S. Census data indicates that 72% of all households in San Francisco are 1-car and zero-car households. The majority of households in the study area are 3-4 person households and half of all households in the study area have 2 or more vehicles; about 13% of households in the study area are zero-car households and 34% of households are 1-car households, respectively. The highest concentration of zero-car households are closest to the Balboa Park BART Station, with an average of 20% of households without a vehicle; other areas have much lower percentages of zero-car households.

To put this in greater context, the number of persons per household and vehicles per households in the study area are consistent with neighborhoods bordering the study area. For example, for households that surround the Glen Park BART Station, about 46% are 1-car households, 35% are 2-car households, 9% have 3 or more vehicles, and 11% are zero-car households. In addition, there are relatively few zero-vehicle households in the study area as well as the surrounding areas (i.e., Glen Park, Outer Mission). U.S. Census data indicates that about 13% of all households are zero-vehicle households; 70% of households have 1 to 2 vehicles, and 17% of households have 3 or more vehicles. It is noted that although there are transit and bicycle facilities throughout the study area, there is only one car share station in proximity to the study area, located near the Ocean Avenue and Alemany Boulevard intersection.

Mean household size and vehicle ownership are shown in **Figure 2-5**.

[3] Plan Bay Area available online at: http://planbayarea.org/plan-bay-area.html.

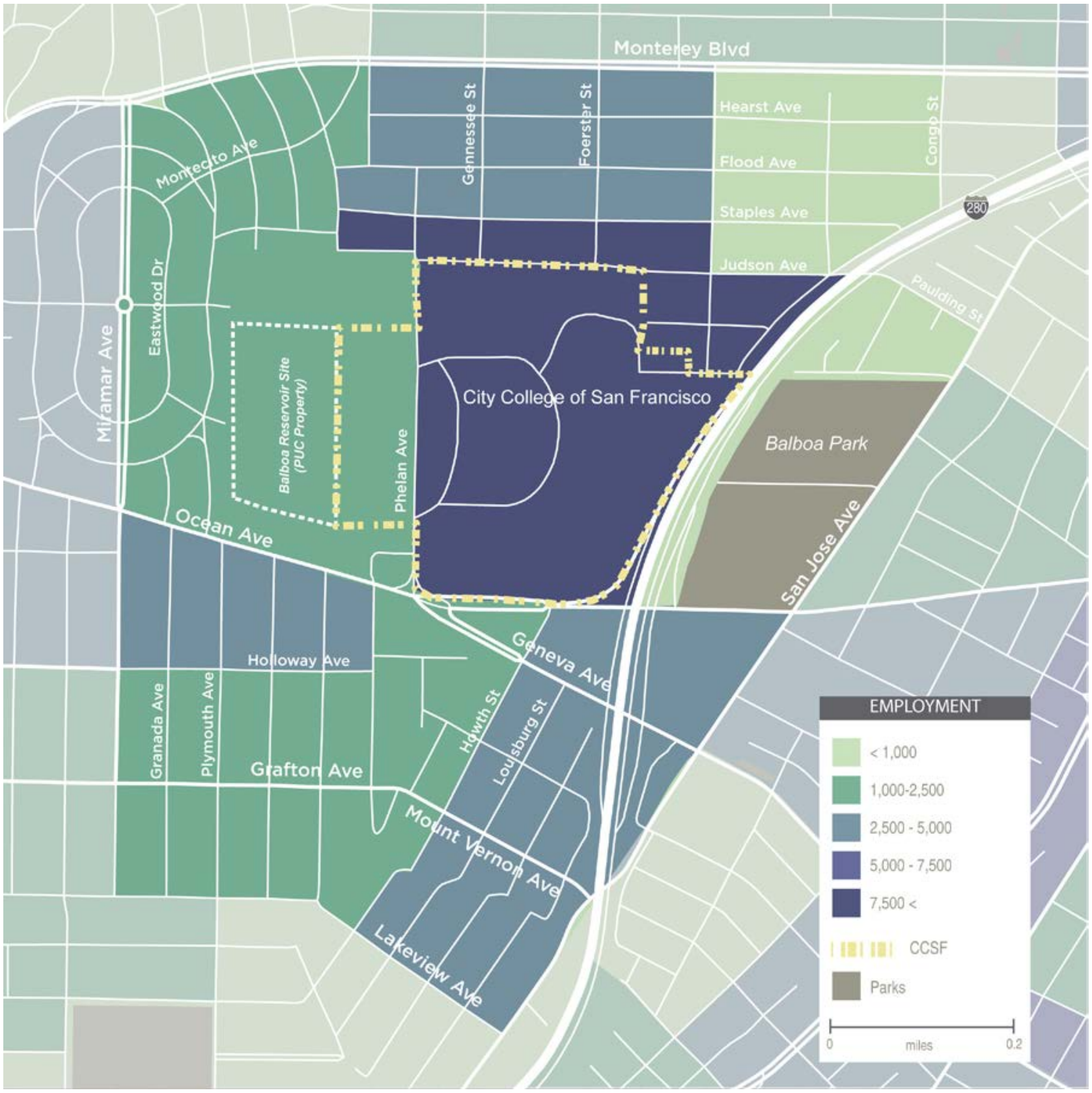
Figure 2-5 Household Size and Vehicle Ownership by Block Group



Source: U.S. Census, Nelson\Nygaard, 2016.

CCSF is the major employer and has the highest employment density in the study area, shown in **Figure 2-6**. Despite the commercial corridors on Ocean Avenue and Monterey Boulevard, the study area generally has low employment densities (i.e., low number of jobs), relative to other areas beyond the study area boundaries.

Figure 2-6 Balboa Area Job Density by Block Group



Source: U.S. Census, Nelson\Nygaard, 2016.

3 MULTIMODAL CONDITIONS

The following describes the existing transportation network and level of multimodal activity in the Balboa Area.

PEDESTRIAN WALKABILITY AND SAFETY

The study area is generally walkable with continuous sidewalk network and pedestrian traffic is controlled by both signalized and STOP-controlled intersections. High-visibility crosswalks are predominant along high pedestrian corridors, specifically along Ocean Avenue, Geneva Avenue, and near major destinations, such as CCSF Ocean Campus and Balboa Park BART Station. Street trees are lined along both sides of the streets along commercial corridors and non-arterial (residential) streets north of CCSF Ocean Campus; however, the streets south of Ocean Avenue are completely devoid of street trees.

Although the Balboa Area has an established street grid, there are a number of barriers within the pedestrian network. The hilly landscape and I-280 present barriers to walking, particularly in the southern and eastern areas of the study area. To traverse I-280, pedestrians have to walk along uninviting freeway overpasses that leave people exposed to fast moving traffic. Other barriers include narrow sidewalks crowded with trees and street furnishings along Ocean Avenue, particularly east of Phelan Avenue; long pedestrian crossings across Ocean Avenue without median refuges; lack of active street frontages along much of Ocean Avenue east of Phelan Avenue. Physical attributes such as the chain-link fence along Balboa Park, the fencing and walls around the light rail facility, and lack of "eyes on the street" around the station at night all discourage walking to transit. Crossing the I-280 freeway ramp intersection along the south side of Geneva Avenue also increases pedestrian vulnerability.

The pedestrian "experience" walking to and from the BART station is further degraded due to perception of distance to CCSF Ocean Campus and commercial core of Ocean Avenue. In addition, the presence of long pedestrian street crossings coupled with noticeable vehicle traffic and higher speeds, and lack of active frontages support this sense of a hostile environment for pedestrians. The pedestrian flow along Ocean Avenue can be inhibited near destinations and transit stops, particularly where sidewalks are constrained along the 1100 block of Ocean Avenue.

Several recent improvements to the BART plazas and entrances have added signage, lighting and accessible curb ramps at the station. The improvements are continuing and summarized below. However the design of the station and urban environment still present challenges; opportunities remain for improving wayfinding[4]. The two station plazas (on Ocean Avenue and Geneva Avenue)

[4] Wayfinding includes information at key decision making points, signage to note the most direct and secure path to various destinations, and a built environment that maintains clear sightlines to provide orientation and visibility of walking and biking paths. The Balboa Park BART Station lacks a robust wayfinding system and includes limited signage to provide information to people arriving on BART and walking to CCSF, Ocean Avenue, or other destinations in the area.

are not well connected and lack amenities, such as seating and related street furniture. BART station entrances are improving on Ocean Avenue, however Geneva Avenue and the general streetscape on approach to the station remain uninviting.

The BART station and study area in general lacks adequate pedestrian-scale lighting, which reduces the sense of security for those who walk at night and creates barriers to relying on walking or transit. For example, the street lights along Ocean Avenue are three stories above the sidewalk and do not project adequate lighting to illuminate the sidewalk at night. The Curtis E. Green Light Rail facility is not open to the public and creates an indirect travel path from Geneva Avenue to the BART station and Ocean Avenue.

Pedestrian Activity

To understand pedestrian activity within the study area, pedestrian counts from November 2015 and May 2016 were modeled by the San Francisco County Transportation Authority and Nelson\Nygaard, respectively[5]. **Figure 3-1** and **Figure 3-2** present pedestrian volumes at select intersections in the study area. During both the weekday morning (AM) and evening (PM) periods (generally 7:00 AM to 9:00 AM, and 4:00 PM to 6:00 PM), pedestrian activity was highest at the BART station entrance near San Jose Avenue and Geneva Avenue and at the City College entrance at Ocean Avenue across from the I-280 North on-ramp.

Ocean Avenue, from the intersection of Miramar Avenue to Phelan Avenue, is the primary commercial area within the study area and also has high pedestrian activity, though not as high as the BART station area. This corridor has a variety of daily services, including Whole Foods, commercial, retail, restaurants, and other businesses that contribute to an active street-front. This segment of Ocean Avenue also has 10-foot-wide sidewalks, corner bulb-outs, street trees, and frequent designated street crossings that make it easy for people to walk between businesses.

Monterey Boulevard, to the north of CCSF, is the other primary commercial corridor in the study area. This street has a mix of residential and commercial uses at the street level. The more sporadic presence of storefronts and wide, auto-oriented street, design of Monterey Boulevard reduce its walkability and perceived comfort of pedestrians.

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[5] San Francisco County Transportation Authority modeled pedestrian and bicycle volumes at the locations of: Monterey Blvd/Circular Ave/I-280 Ramps, Geneva Ave/Phelan Ave/Ocean Ave, Howth St/Ocean Ave, I-280 SB Off-ramp/Ocean Ave, I-280 NB On-ramp/Ocean Ave, San Jose Ave/Ocean Ave, Onondaga Ave/Ocean Ave, Alemany Blvd/Ocean Ave, San Jose Ave/Seneca Ave, Alemany Blvd/Onondaga Ave, Howth St/Geneva Ave, I-280 SB Ramps/Geneva Ave, I-280 NB Ramps/Geneva Ave, San Jose Ave/Geneva Ave, Cayuga Ave/Geneva Ave, and Alemany Blvd/Geneva Ave; Nelson\Nygaard modeled pedestrian and bicycle volumes at Monterey Blvd/Congo St, Monterey Blvd/Forester St, Monterey Blvd/ Plymouth Ave, Paulding St/ San Jose Ave, Miramar Ave/Ocean Ave, Miramar Ave/Grafton Ave, Plymouth Ave/Grafton Ave, San Jose Ave/Mt Vernon Ave, Miramar Ave/Lakeview Ave, Plymouth Ave/Lakeview Ave, San Jose Ave/Lakeview Ave.

Figure 3-1 AM Peak Period Pedestrian Volumes

Source: Nelson\Nygaard, 2016.

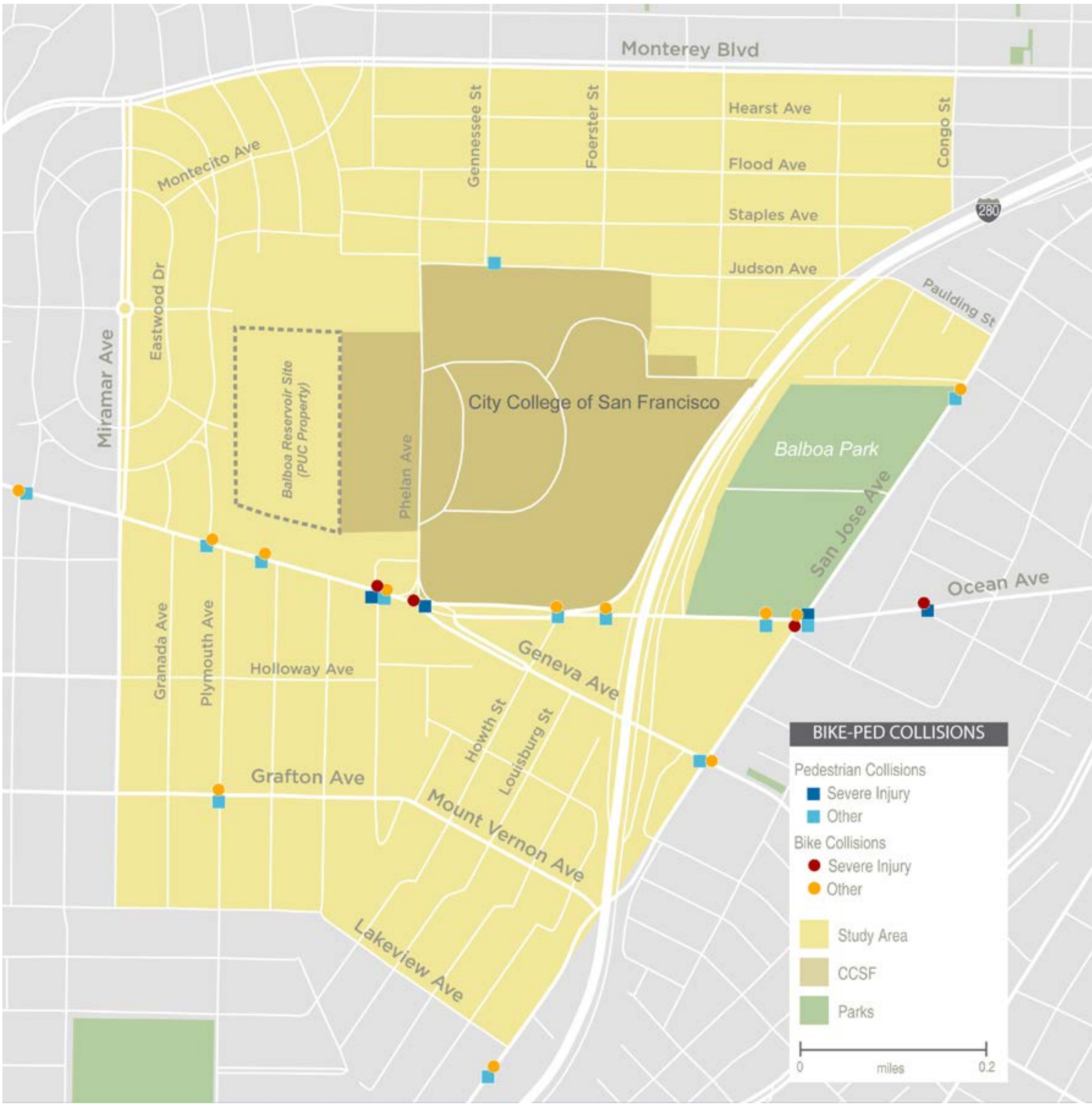
Figure 3-2 PM Peak Period Pedestrian Volumes

Source: Nelson\Nygaard, 2016.

Reported crashes involving pedestrians in the study area, between 2012 and 2014 these are shown in **Figure 3-3**. The majority of reported crashes involving pedestrians occurred on Ocean Avenue, with two classified as "severe" near the Ocean Avenue and Phelan Avenue intersection, which is one of the primary access points to CCSF. The location of crashes align closely with the streets and intersections that are designated "high-injury corridors" and intersections as part of Walk First.[6] It is noted that Ocean and Phelan avenues experience some of the most pedestrian and vehicle activity (see discussion further below) in the study area, and these streets play an integral transportation role in the study area.

[6] San Francisco Planning, Walk First, accessed July 2016, http://walkfirst.sfplanning.org/index.php/home/streets.

Figure 3-3 Bicycle and Pedestrian Collisions between 2012 and 2014



Source: U.S. Census, SWTRS, TIMS, Nelson\Nygaard, 2016.

Planned Pedestrian Improvements

The San Francisco Municipal Transportation Authority (SFMTA) planned pedestrian improvements in the study area as part of the *Balboa Park Station Area and Plaza Improvements Plan and Unity Plaza Improvement Plan*. These improvements are primarily around the Balboa Park BART Station and aim to improve the comfort and security of people walking between Muni, BART, CCSF, and Ocean Avenue. The majority of these planned improvements have been completed, including a new crosswalk and signal at the I-280 northbound on-ramp and Ocean Avenue intersection, ADA-accessible curb ramps on Geneva Avenue and San Jose Avenue, repaving the east side crosswalk at Geneva Avenue and I-280 northbound on-ramp, and pedestrian wayfinding signs at the intersection of Geneva Avenue and San Jose Avenue.[7]

To improve safety for pedestrians crossing I-280 ramps, the pedestrian crossing at the southbound off-ramp is planned to receive a flashing beacon to improve visibility and increase awareness of people walking. The poles used for signage at this crossing are also planned to be relocated to improve accessibility.[8]

The Balboa Park Station Area will also undergo pedestrian improvements. New pedestrian lighting will be installed around the east and north sides of the Metro Rail Yard to improve visibility. The sidewalks on both sides of Geneva Avenue, at the BART station entrance, are being expanded to increase capacity at the pedestrian plazas and Muni passenger waiting areas, and reduce the crossing length across Geneva Avenue.[9]

Unity Plaza, adjacent to the CCSF Bus Terminal, improves the pedestrian connection between Ocean Avenue, Phelan Avenue, City College, and transit. The project will be open in the fall of 2016. It will include a fully accessible, landscaped public space and placemaking elements.[10]

BICYCLE ACCESS AND SAFETY

The study area has relatively low bicycle activity and, in comparison to other areas of the city, has limited bicycle connections. This is likely due to a variety of factors, including elevation changes, the volume and speed of vehicular traffic along the primary corridors, the general lack of bicycle connectivity between the Balboa Area and other neighborhoods in San Francisco, and the lack of protected bikeways to provide safe routes for bicycle activity. For example, Geneva Avenue has a steep incline, deterring bicyclists, and the inconsistent bicycle facilities on Ocean Avenue reduce the safety and comfort of bicyclists at the points of interaction with vehicles entering and exiting the I-280 ramps and close proximity to light rail tracks. Many of the streets in the project area, however, can accommodate bicycle activity due to their lower traffic volumes and speeds. However, there remains a need for increased safety and connectivity. There is little to no bicycle signage indicating bike routes or the presence of secure bicycle parking, nor is there signage for drivers to be aware of bicyclists sharing the road.

Bicycle Facilities

The primary bicycle facilities serving the study area are a mixture of bicycle lanes (Class II) and bicycle routes with signage and painted arrows indicating a shared roadway, also known as sharrows (Class III). Shown in **Figure 3-4,** the primary east-west bikeways serving the area are along Ocean Avenue, Geneva Avenue/Holloway Avenue, Monterey Boulevard and Hearst Avenue. Both Geneva Avenue and Ocean Avenue are designated bike routes, marked primarily by sharrows and sporadic signs. The primary north-south bikeway connection within the study area

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[7] A complete inventory and detailed map of Balboa Station Area improvements is publicly available by SFMTA: https://www.sfmta.com/projects-planning/projects/balboa-park-station-project-status-map

8 Balboa Park Station Area and Plaza Improvements. (2016). SFMTA. Retrieved 28 June 2016, from https://www.sfmta.com/projects-planning/projects/balboa-park-station-area-and-plaza-improvements

9 Balboa Park Station Area and Plaza Improvements. (2016). SFMTA. Retrieved 28 June 2016, from https://www.sfmta.com/projects-planning/projects/balboa-park-station-area-and-plaza-improvements

10 Unity Plaza. (2016). SFMTA. Retrieved 30 June 2016, from https://www.sfmta.com/projects-planning/projects/unity-plaza

consists of bike lanes along Phelan Avenue and Judson Avenue, which transitions into a bike route along Gennessee Avenue. These bicycle route improvements were constructed as part of the *San Francisco Bicycle Plan*.[11]

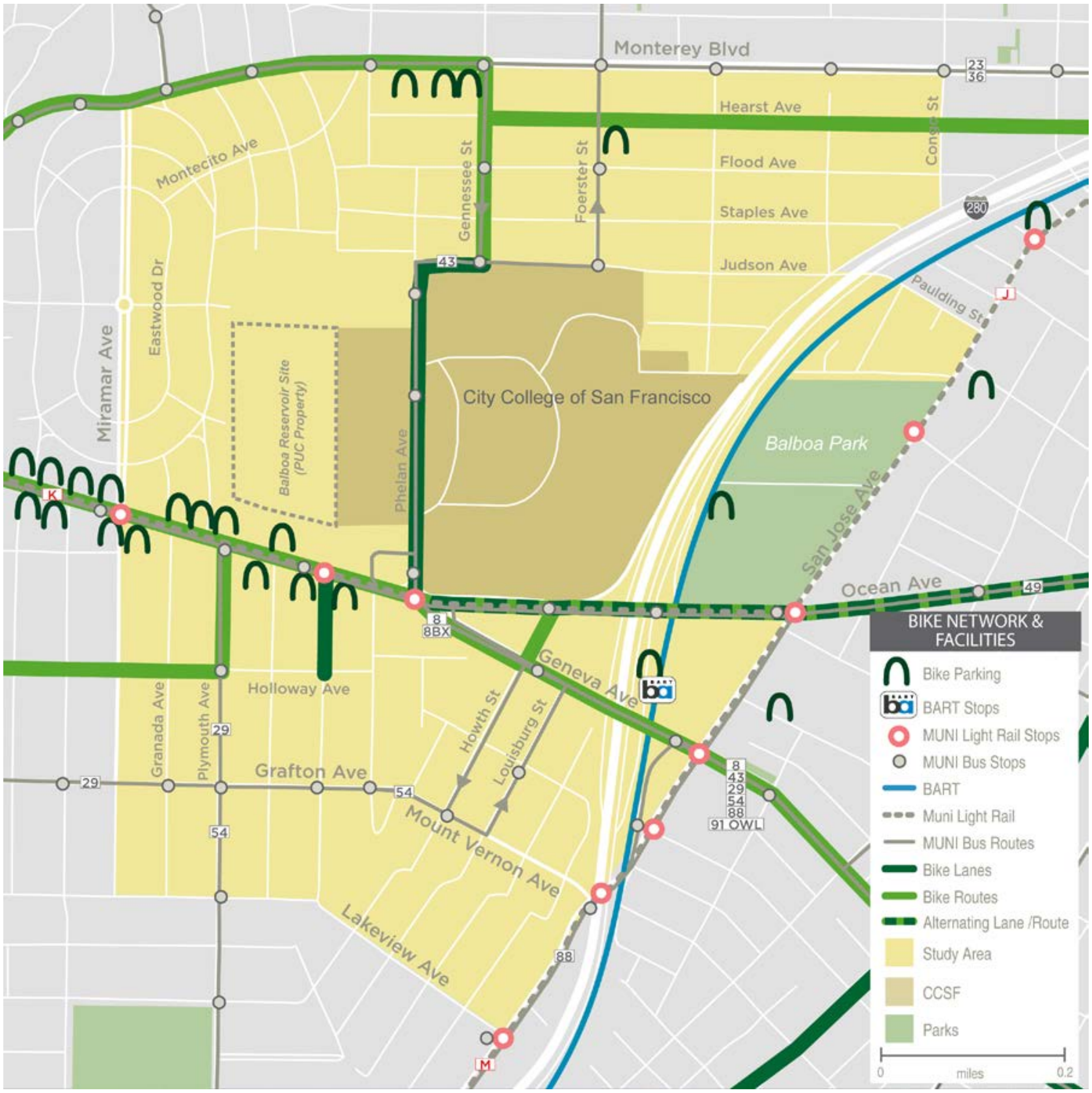
Bike parking primarily consists of outdoor racks located along these bicycle facilities, especially along the commercial sections of Ocean Avenue. Balboa Park BART Station currently has 12 electronic bike lockers, which provide secure bicycle parking that can be accessed by a BikeLink Card, a smart card with stored value to be used at any BikeLink electronic bike locker.[12] Also available are bike racks to store approximately 28 bikes outside the fare gates. Within the fare gates, the Balboa Park BART station has bike rack space for approximately 60 bikes.[13]

[11] San Francisco Bicycle Plan. SFMTA. June 2009. https://www.sfmta.com/sites/default/files/projects/San_Francisco_Bicycle_Plan_June_26_2009_002.pdf

[12] BikeLink, https://www.bikelink.org/help/how_it_works, accessed July, 2016. BikeLink cards can be purchased online or at a variety of vendor locations. Bike lockers cost three to five cents per hour depending on occupancy levels at a given station, and payment is automatically deducted from an amount stored on the BikeLink card

[13] This inventory is as of May 2011, according to the BART Bicycle Plan: Modeling Access to Transit. Bay Area Regional Transit. July 2012. http://www.bart.gov/sites/default/files/docs/BART_Bike_Plan_Final_083012.pdf

Figure 3-4 Bicycle Facilities, Balboa Park Study Area



Note: Bicycle parking is present on the CCSF Ocean Campus, however the exact locations of these facilities was not available at time of writing.
Source: U.S. Census, Nelson\Nygaard, 2016.

Bicycle Activity

To understand bicycle activity within the study area, bicycle counts were modeled in a similar fashion to the pedestrian counts discussed previously. **Figure 3-5** and **Figure 3-6** show bicycle volumes at select intersections in the study area. During both the weekday AM and PM periods, bicycle activity is heaviest around the BART station, along Ocean Avenue between Phelan Avenue and San Jose Avenue. In the AM period, the intersection of Monterey Boulevard and Congo Street also has high bicycle activity. The high activity at this intersection is likely a result of bicyclists wanting to use the most direct route, and biking along Monterey to reach San Jose Avenue.

Figure 3-5 AM Peak Period Bicycle Volumes

Source: U.S. Census, Nelson\Nygaard, 2016.

Figure 3-6 PM Peak Period Bicycle Volumes

Source: U.S. Census, Nelson\Nygaard, 2016.

Balboa Park BART station has a relatively small bicycle mode share, increasing from 1% to 2% between 1998 and 2008. In 2011, bike parking outside of the Balboa Park BART station had a 14% average occupancy rate, while bike parking within the station average occupancy was at 42%. The *BART Bicycle Plan* notes that of the bicyclists arriving to the station, approximately 15% parked their bike at the station and 85% brought their bike onto the train.[14] It is likely that those who bike to the station need their bike on the other end of their trip or perceive the available parking as un-safe for all day use, and therefore do not utilize the on-site bicycle parking.

[14] BART Bicycle Plan: Modeling Access to Transit. Bay Area Regional Transit. July 2012. http://www.bart.gov/sites/default/files/docs/BART_Bike_Plan_Final_083012.pdf

Between 2012 and 2014, there were 15 reported collisions in the study area that involved bicycles. Of the total recorded collisions, two were classified as "severe", and both occurred near the intersection of Ocean Avenue and Phelan Avenue, at similar locations to the severe pedestrian crashes (**Figure 3-3**).

Planned Bicycle Improvements

The *San Francisco Bicycle Plan* identifies various improvements to the bikeway network, several of which have been completed. Areas slated for long-term improvements include the following[15]:

- Monterey Boulevard between Circular Avenue and Gennessee Street
- Lee Avenue between Phelan Avenue and Holloway Avenue (an extension of Lee Avenue, north of Ocean Avenue, is likely to be implemented through the Balboa Reservoir project)
- Harold Avenue between Ocean Avenue and Holloway Avenue
- Holloway Avenue between Harold Avenue and Junipero Serra Boulevard

The *Ocean and Geneva Corridor Design Plan* recommends the following bicycle improvements[16]:

- Constructing a new southbound contra flow bike lane on Howth Street
- Constructing a new buffered bike lane in both the eastbound and westbound directions on Ocean Avenue between Phelan Avenue and San Jose Avenue
- Adding a new westbound bike lane along Geneva Avenue between Phelan Avenue and I-280
- Adding a new eastbound bike lane along Geneva Avenue between I-280 and Howth Street
- Adding green paint to existing bike lanes and sharrows along Ocean Avenue and Geneva Avenue

San Francisco's bike share program, Bay Area Bike Share, is currently planning a series of expansions in the coming years, but does not yet have any planned stations in the Balboa Area. The Balboa Park Station Area and Plaza Improvements project entails a variety of pedestrian and street design improvements, but no bicycle-specific elements. However, the overall streetscape improvements should also facilitate increased perceptions of security of bicyclists in the area.

TRANSIT SERVICE AND ACCESS

The study area is conveniently located in an area that is well-served by both regional and local transit including, Muni bus, Muni Metro light rail, and BART. The Balboa Park BART Station is less than one quarter-mile from CCSF Ocean Campus and provides connections to downtown San Francisco, the peninsula, and the East Bay. A number of Muni bus and light rail lines also serves the plan area primarily on Geneva Avenue, San Jose Avenue and Ocean Avenue, facilitating connections to BART and throughout San Francisco.

All Muni service can be accessed on street level. Muni Metro stops are primarily served by boarding islands and have raised platforms for ADA access. Signage at the loading platforms is not clearly positioned, and in some cases is missing, making it difficult for passengers to recognize

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[15] San Francisco Bicycle Plan. SFMTA. June 2009. https://www.sfmta.com/sites/default/files/projects/San_Francisco_Bicycle_Plan_June_26_2009_002.pdf

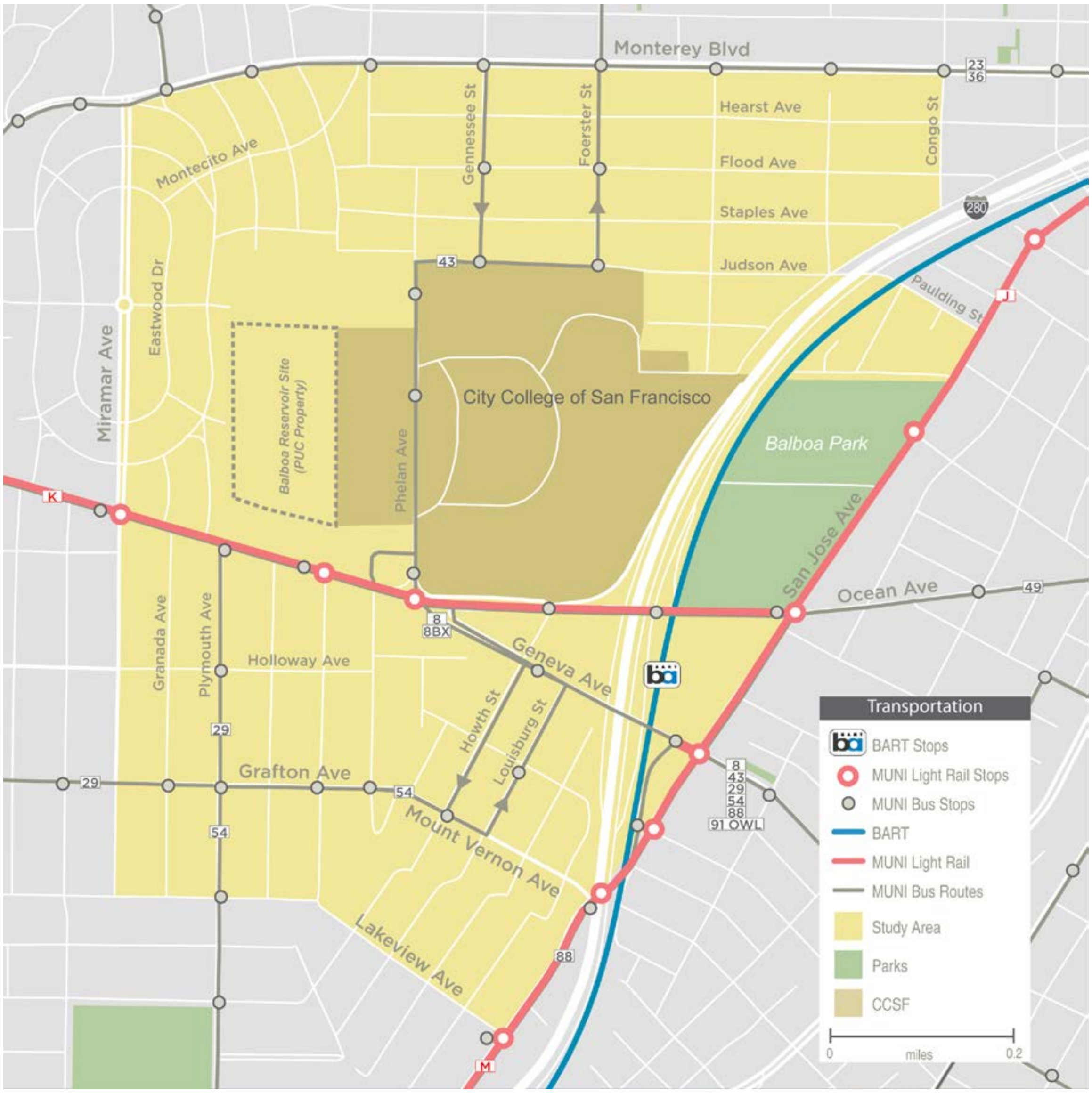
[16] Ocean and Geneva Corridor Design Final Report. City of San Francisco Planning Department. March 2015. <http://sf-planning.org/ocean-avenue-corridor-design>

which lines serve which stops. Additionally, these waiting areas generally lack shelters, transit maps, seating, lighting, and arrival information, all of which are amenities to improve the waiting experience and perceived comfort of passengers. Many bus stops in the plan area also lack these amenities, though shelters and signage are more common at bus stops than light rail loading platforms. Transferring between modes is not convenient or direct in many locations within the plan area due to a lack of pedestrian infrastructure and indirect pedestrian and ADA-accessible connections between Muni and BART.

Transit Service and Ridership

The Balboa Area is served by Muni and BART. Seven Muni bus lines and three Muni Metro lines stop within the study area, and are within walking distance to CCSF Ocean Campus. The Balboa Park BART Station is located on Ocean Avenue at I-280 and is served by four BART lines. **Figure 3-7** shows the transit facilities within the study area.

Figure 3-7 Balboa Area TDM Study Area Transportation Map



Source: San Francisco Municipal Transportation Authority, Nelson\Nygaard, 2016.

Each of the Muni bus and light rail lines that provides service to the Balboa Area is outlined below. Each route notes neighborhood connections and average weekday ridership (where available). Relative to all Muni lies in the system, the 8-Bayshore, KT-Ingleside/Third, and M-Oceanview have among the highest average weekday boardings; lines with under 2,000 average weekday boardings are very low compared to the overall Muni system.[17]

- **8-Bayshore and 8BX-Bayshore Express** connects Fisherman's Wharf and City College via Downtown and Visitacion Valley. The 8-Bayshore has 22,400 average weekday boardings. The 8BX-Bayshore Express has 6,467 average weekday boardings.

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[17] Average weekday boarding information provided by SFMTA Muni Forward; available online at: https://www.sfmta.com/projects-planning/projects/muni-forward-0

- **23-Monterey** runs along Monterey Boulevard and connects the Outer Sunset, at the Great Highway and Sloat Boulevard, to Hunters Point, at Palou Avenue and Crisp Road. There are 3,922 average weekday boardings on the 23-Monterey.
- **29-Sunset** connects Park Presidio to Candlestick Park. On average this line sees 18,860 weekday boardings.
- **36-Teresita** provides east-west access through the study area on Monterey Boulevard and connects the Twin Peaks/Clarendon Heights area to the Mission Neighborhood, at Cesar Chavez St and Mission St. This route has an average of 1,415 weekday boardings.
- **43-Masonic** travel along Monterey Boulevard and connects the Presidio Transit Center and Fort Mason to the north and to the Crocker-Amazon Neighborhood. This route has an average of 14,101 weekday boardings.
- **49-Van Ness/Mission** provides east-west access through the study area on Ocean Avenue and connects Fort Mason to the City College Terminal (formerly called Phelan Loop). This line has an average of 22,793 weekday boardings.
- **54-Felton** travels on Geneva Avenue and Grafton Street in the study area and connects Hunters Point and Park Merced. This line as an average of 7,459 daily boardings.
- **88-BART Shuttle** connects the area along Mission Street, south of the BART station to the Balboa Park BART station. The line has an average of 378 weekday boardings.
- **91 Owl** connect the Balboa Park BART Station to downtown, the Presidio, Golden Gate Park, the Sunset, and Park Merced. The line has an average of 617 weekday boardings.
- **J-Church** travels on San Jose Ave in the study area and connects Downtown and Balboa Park, via the Castro. This line has an average of 14,767 weekday boardings.
- **KT-Ingleside/Third** connects the Dogpatch and Balboa Park neighborhoods, via Downtown, and along Ocean Avenue in the study area. This line has an average of 33,752 weekday boardings.
- **M-Oceanview** travels north-south on San Jose Avenue in the study area and connects Downtown and Balboa Park, and provides access to San Francisco State and Stonestown Mall. This line has an average of 26,920 weekday boardings.

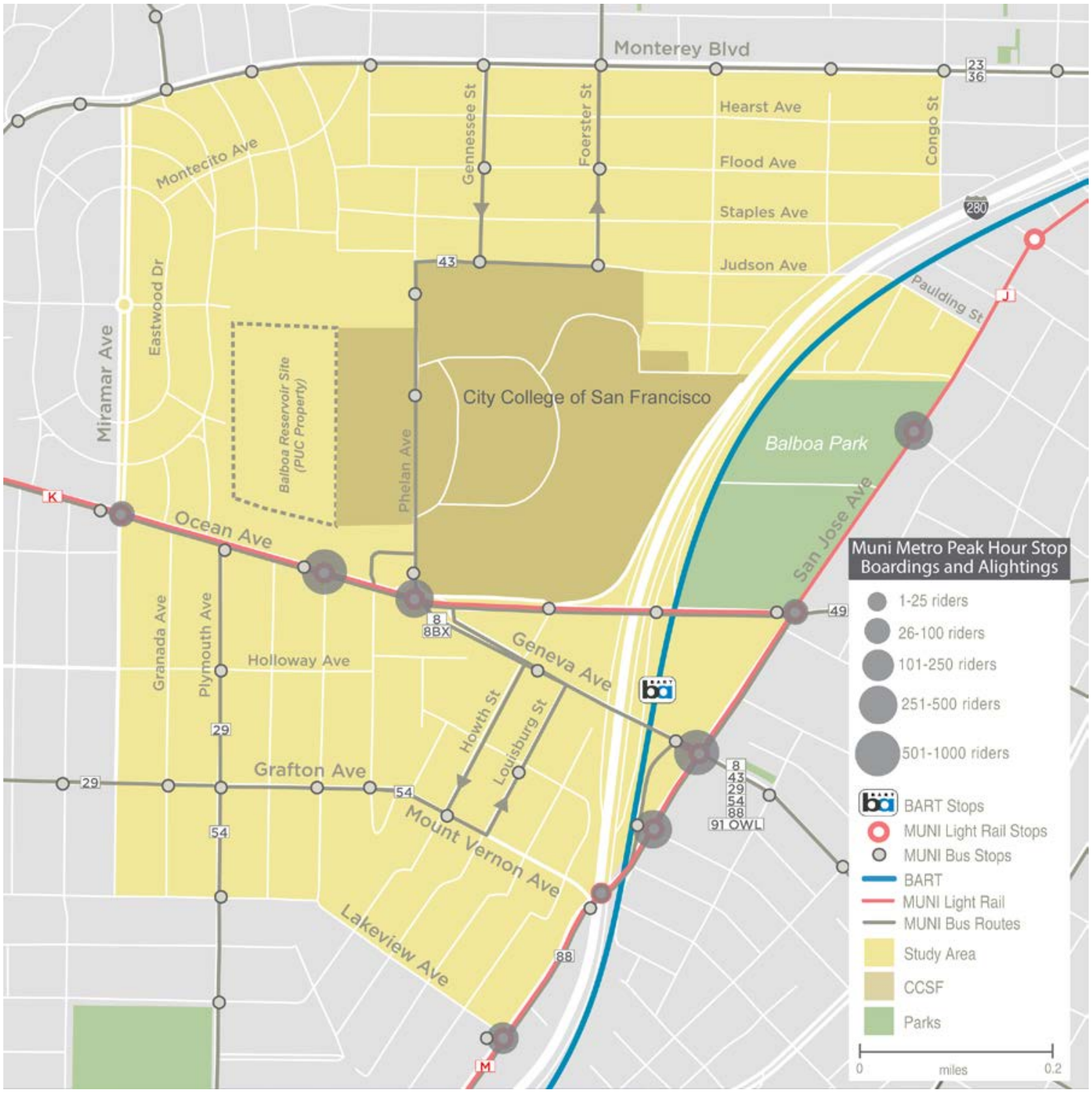
BART provides access to the Balboa Area from the Peninsula and East Bay. Service expansion to the South Bay is underway and will be accessible via an east bay line. BART access is to the South Bay is already available via a Caltrain connection at Millbrae station. The Balboa Park BART station has an average of 11,781 daily exits. This station has fewer exits than BART stations in San Francisco and Oakland downtown areas, and approximately 1, 000 to 2,000 fewer exits than BART stations just outside of these core, downtown stations. For comparison, the Daly City and Richmond BART stations have similar but approximately 2,000 fewer exits than Balboa Park BART Station.[18]

Figure 3-8 illustrates weekday peak-hour boardings and alightings at stops/stations in the study area. The Muni Metro boarding and alighting information presented in this report was estimated using data collected by SFMTA. Counts on Muni Metro were conducted by the SFMTA between 2007 and 2010 at all stations in the system, and SFMTA collected counts at one station along each line in 2015 (i.e., counts were done at the station with the highest load). The 2007 – 2010 counts

[18] BART Monthly Ridership Reports are available online at: http://www.bart.gov/about/reports/ridership

were adjusted to 2015 levels using the rate of change between the years per line in order to determine current ridership. Bus ridership was collected from the 2015 SFMTA ridership counts.

Figure 3-8 Muni Peak Hour Boarding and Alightings



Source: San Francisco Municipal Transportation Authority, Nelson\Nygaard, 2016.

Figure 3-9 provides additional detail of transit ridership at the closest stops to CCSF Ocean Campus and within the study area; also presented are planned Muni Forward services changes for each line. As shown, general *Muni Forward* improvements consists of increased frequencies for all Muni transit lines in the study area.

The *Ocean and Geneva Corridor Design Final Plan* (2015) highlights additional transit improvements in the study area, including relocation of the Muni transit stop to Ocean Avenue at Howth Street and transit access improvements.

Figure 3-9 Transit Route Service, Ridership, and Planned Improvements

Line	Stop/Station	Existing Peak Hour Headway (min)	Inbound Peak hour Ons	Inbound Peak Hour Offs	Outbound Peak Hour Ons	Outbound Peak Hour Offs	MUNI Forward Service Changes
Muni Metro							
J-Church	San Jose Ave & Ocean Ave	9.5	23	3	3	35	▪ Increased frequencies.
	San Jose Ave & Santa Ynez Ave		27	-	5	315	
KT-Ingleside/ Third	Balboa Park BART/Metro Terminal	9	225	-	-	338	▪ Increased frequencies.
	Ocean Ave/CCSF Pedestrian Bridge		153	15	3	103	
	Ocean Ave & Lee St		150	15	39	358	
M-Oceanview	San Jose Ave & Geneva Ave	9	422	-	4	4	▪ Increased frequencies.
	San Jose Ave & Lakeview Ave		4	38	71	10	
	San Jose Ave & Mt Vernon Ave		6	6	6	-	
Muni Bus							
8-Bayshore	City College Terminal (Phelan Loop)	7.5	119	-	-	107	▪ Increase AM peak hour frequency to 6-minute headways.
8BX-Bayshore Express	City College Terminal (Phelan Loop)	7.5	26	-	32	-	▪ Increase midday frequency to 7-minute headways.
23-Monterey	Forester St & Monterey Blvd	20	9	5	6	14	▪ Route alignment changes in the Hunters Point Area.

Line	Stop/Station	Existing Peak Hour Headway (min)	Inbound Peak hour Ons	Inbound Peak Hour Offs	Outbound Peak Hour Ons	Outbound Peak Hour Offs	MUNI Forward Service Changes
29-Sunset	Ocean Ave & Howth St	9	10	16	7	7	▪ Increase peak hour frequency to 8-minute headways.
36-Teresita	Forester St & Monterey Blvd	30	4	10	8	2	▪ Muni forward improvements are no longer being pursued.
43-Masonic	City College Bookstore	10	38	24	19	24	▪ Increase in peak hour frequency to 8-minute headways. ▪ Alignment changes in the Haight Ashbury neighborhood.
49-Van Ness/ Mission	City College Terminal (Phelan Loop)	9	59	-	-	56	▪ Rapid service as part of Van Ness BRT. ▪ Route alignment changes to accommodate Van Ness BRT.
	Howth St & Ocean Ave	20	15	-	2	36	
54-Felton	Geneva – Balboa Park BART Station	15	66	47	62	69	▪ Route alignment changes to use Ocean Avenue, Plymouth Avenue, and Persia Avenue.
88-BART Shuttle	Balboa Park BART Station	20 (peak hour)	-	58	32	-	▪ No proposed changes.
91 Owl	Geneva-Balboa Park BART Station	30 (late night)	7	-	-	-	▪ Route alignment changes would eliminate service to the project area.
BART							
BART	Balboa Park Station	1-15	11,781 Average Daily Exits				▪ N/A

Note: KT and M peak hours are in the PM, J peak hour is in the AM.
Source: SFMTA; 2016.

AUTO CIRCULATION

Auto circulation considers general vehicle travel patterns, the number of trips conducted by vehicles (trip generation), and the impacts of these trips on congestion, safety and parking. To understand auto circulation, studies of the street network and CCSF trip generation were conducted and are discussed in this section.

Roadway Network and Street Classifications

The roadway network within the study area includes a mix of four-lane major arterials and narrower, two-lane local (non-arterial) streets woven throughout each neighborhood. Arterials generally serve as commuter routes to other areas of San Francisco and beyond. Access to the I-280 freeway is provided along Ocean Avenue, Monterey Boulevard and Geneva Avenue. San Jose Avenue is also major north-south arterial that connects to several nearby neighborhoods and also serves as a regional route to communities south of San Francisco.

Street Classifications

The street infrastructure throughout San Francisco and the study area in particular is designed to accommodate multimodal activity. The San Francisco *General Plan* includes various street classifications applicable to all streets within City limits. These classifications are designated to respond to the needs of all transportation modes, and to emphasize transportation priorities. For example, major arterials are to be designed to support transit priority and focus on the movement of people, rather than solely on auto traffic. Key travel routes in the study area are classified as major arterials and “Transit Preferential Streets”. *General Plan* street classifications and streets within the study area that belong in each class are listed in **Figure 3-10**.[19]

[19] San Francisco General Plan, Transportation Element, accessed July 2016.

Figure 3-10 Classification of Streets, Balboa Park Study Area

Street Classification Category	Definition	Qualifying Streets
Major arterials	▪ cross-town thoroughfares that connect different neighborhoods within the city ▪ distribute freeway traffic citywide	▪ Ocean Avenue ▪ Geneva Avenue ▪ Alemany Boulevard
Secondary Arterials	▪ collector streets within neighborhoods connecting to major arterials ▪ often supplement major arterials	▪ Monterey Boulevard
Local (Non-Arterial) Streets	▪ two lane facilities connecting local streets to arterials	▪ Most residential streets within the Balboa Area
"Transit Preferential" Streets	▪ Primary transit function ▪ Contains elements that improve transit speeds and reduce impact of traffic on transit operations	▪ Ocean Boulevard (Transit Important) ▪ Geneva Avenue (Transit Important) ▪ San Jose Boulevard (Transit Oriented) ▪ Mission Street (Transit Oriented)
"Transit Conflict" Streets	▪ Primary transit function ▪ Experience significant conflicts with automotive traffic	▪ Mission Street

Source: San Francisco General Plan.

General Traffic Patterns

The streets in the study area have a mostly continuous grid layout with high connectivity, allowing most local traffic to be dispersed through the network rather than concentrated on arterials. However, CCSF Ocean Campus acts as a barrier, and adjacent east-west streets dead end at the campus property line.

Figure 3-11 shows average daily traffic volumes along major corridors in the study area. These volumes were estimated based on weekday evening PM peak period[20] traffic data collected between 2014 and 2016.[21]

The majority of east-west traffic in the study area branches out from I-280, making traffic volumes highest along Ocean Avenue and Geneva Avenue. Monterey Boulevard also experiences a relatively high volume of east-west traffic. Local north-south traffic primarily uses San Jose Avenue (and as a secondary route if traffic is heavy along I-280), though Phelan Avenue also has high north-south traffic, which reflects vehicle activity associated with CCSF Ocean Campus.

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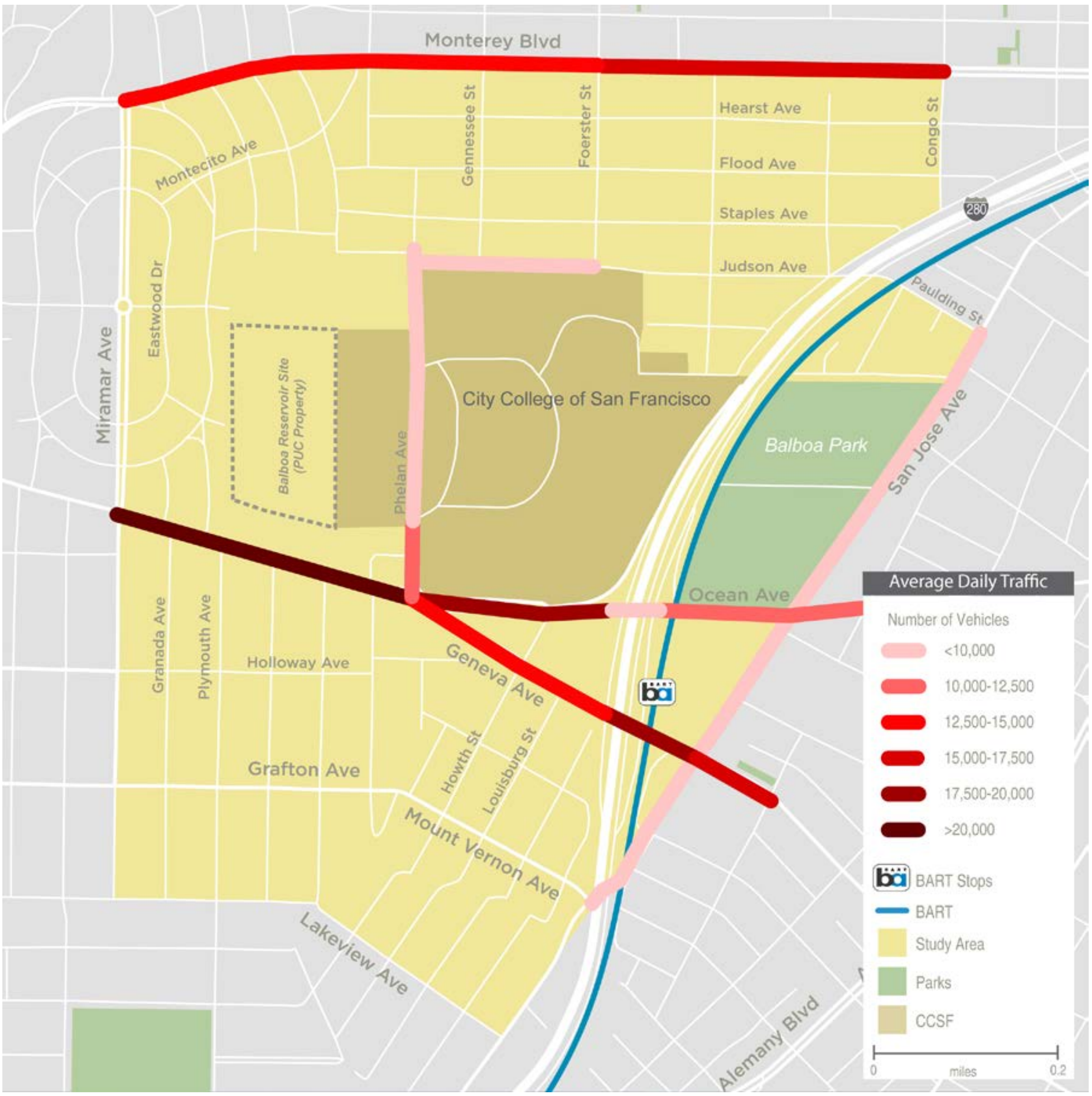
[20] As defined in San Francisco Planning Department's *Transportation Impact Analysis Guidelines*, weekday PM peak period conditions reflect the time when the maximum use of much of the transportation system occurs and it is the time when most of the transportation system capacity and service is at a maximum. Therefore, the estimated daily vehicle traffic counts that were derived from PM peak period counts reflect a conservative estimate of traffic conditions along area roadways.

[21] Counts used were extracted from the SFPUC Balboa Reservoir Site Plan Study (2015) and the SFCTA Balboa Park Station Area Circulation Study (2014). Nelson\Nygaard conducted counts at select locations in 2016.

Traffic levels along other non-arterial streets are generally lower, often under 10,000 vehicles daily, which is the typical carrying capacity of a local, two-lane street. These neighborhood streets experience between 1,500 and 4,000 daily traffic volumes, on average (or between 60 to 170 cars per hour spread over the course of a day). The presence of higher traffic levels along Ocean Avenue, San Jose Avenue, Geneva Avenue, Monterey Boulevard, and Phelan Avenue are indicative of the general traffic patterns in the area, as traffic generated from area residents (and non-residents [e.g., retail customers, CCSF students/employees]) along non-arterial streets spill onto these major corridors to access their destination. This funneling of vehicle trips onto major corridors creates a concentrated vehicle activity and a congested traffic environment for drivers.

Figure 3-11 Average Daily Traffic Volumes (Estimated)



Source: San Francisco Municipal Transportation Authority, San Francisco County Transportation Authority, Nelson\Nygaard, 2016.

CCSF Ocean Campus Vehicle Trip Generation

CCSF Ocean Campus is a major generator of person and auto traffic in the Balboa Area. To assess traffic demand at the campus during a typical day, vehicle traffic counts around the CCSF Ocean Campus were collected over a 24-hour period on Tuesday, May 10, 2016.[22] Vehicle activity was collected at all CCSF Ocean Campus vehicle access points, including all parking lot entrances and exits. Pneumatic, machine-tube counters and video traffic recorders were placed at five driveway locations, shown in **Figure 3-12**, to capture the number of inbound and outbound vehicles.

Figure 3-12 Driveway Count Locations at CCSF Ocean Campus

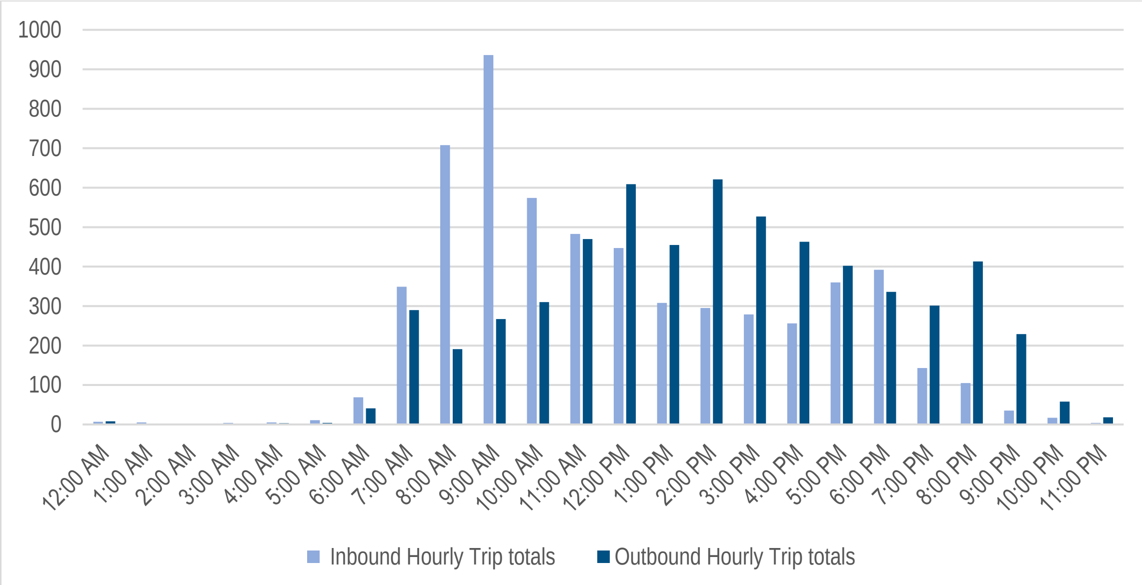
Source: San Francisco Municipal Transportation Authority, Nelson\Nygaard, 2016.

Figure 3-13, illustrates the hourly number of vehicles entering and exiting CCSF Ocean Campus during a typical weekday. The campus experiences a substantial amount of vehicle trips, with 5,794 vehicles traveling into the campus (inbound) and 6,021 traveling out of the campus (outbound) throughout the day. As shown, the peak number of inbound trips occur between 9:00 AM and 10:00 AM and the peak number of outbound trips occurs between 2:00 PM and 3:00 PM.

[22] Traffic volumes at CCSF Ocean Campus driveway locations were conducted on a day when classes were in session and no special events occurred or when any construction activities occurred that would limit normal access to/from the campus. Weather conditions were also normal. Based on these findings, the date/time of collection is representative of conditions in the study area.

This weekday trip pattern corresponds to the CCSF Ocean Campus class schedule and is consistent with recent attendance trends and statistics conducted in fall 2015 by CCSF.[23]

Figure 3-13 CCSF Ocean Campus – Total and Peak Hour Vehicle Trips



Note: **Bold** represents observed peak hour volumes.
Source: Nelson\Nygaard, 2016.

Vehicle Miles Traveled

Vehicle Miles Traveled (VMT) looks at how many miles are traveled by a vehicle within a specific geographic area and network. Factors such as density, diversity of land uses, design of the transportation network, access to regional destinations, distance to high-quality transit, development scale, demographics, and the presence of transportation demand management affect travel behavior. Essentially, development that is located in low-density areas with limited/poor access to non-driving modes would likely generate more automobile travel demand compared to denser, urban areas that contain more transportation options, including transit and non-auto modes.

Given these travel behavior factors, San Francisco has a lower vehicles miles traveled (VMT) ratio than the nine-county San Francisco Bay Area region. In addition, some areas of the city have lower VMT ratios than other areas of the city. These areas of the city can be expressed geographically through transportation analysis zones (TAZs). TAZs are used in transportation planning models for transportation analysis and other planning purposes. The zones vary in size from single city blocks in the downtown core, multiple blocks in outer neighborhoods, to even larger zones in historically industrial areas (e.g., Hunters Point Shipyard). For purposes of this analysis and because the Balboa Area comprises several TAZs, the VMT per capita per TAZ was aggregated by neighborhood and an overall average VMT per capita rate was produced. VMT

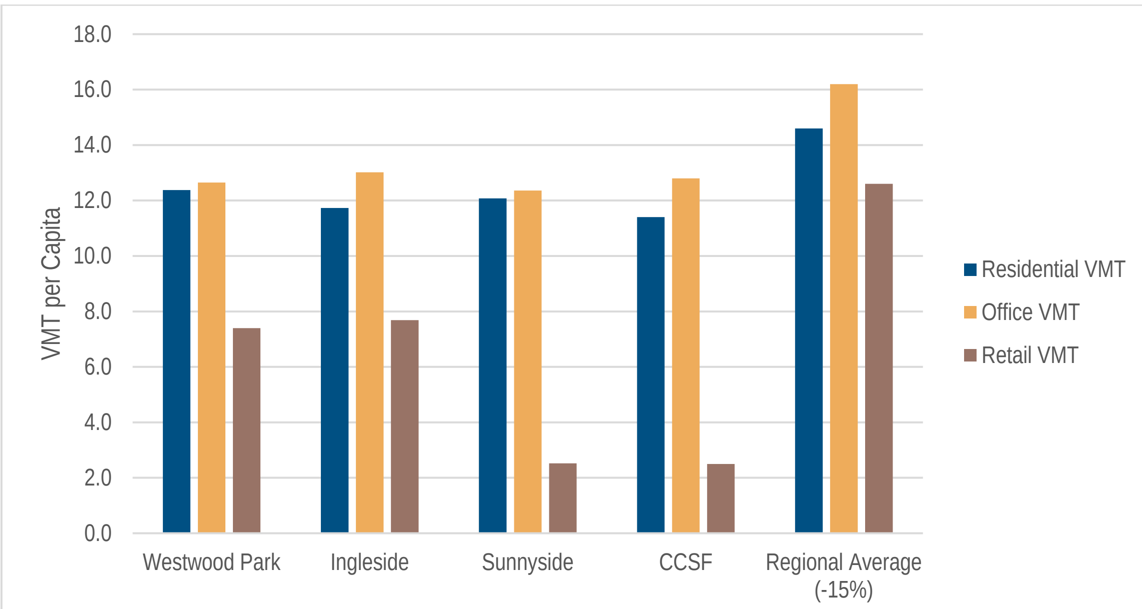
[23] Fall 2015 Ocean Student Campus Attendance memorandum provided by CCSF. Of the 18,224 students recorded in the survey, the majority of students attend classes on Tuesdays and Wednesdays, and the majority of students arrive to CCSF Ocean Campus before 12:00 PM.

methodology and application of the San Francisco County Transportation Authority travel demand forecasting model is presented in Appendix D.

Existing VMT for the San Francisco Bay Area (regional) and the Balboa Area was based on information provided in the City's Transportation Information Map (TIM).[24] As shown in **Figure 3-14**, for households and employment (office and retail), the average VMT per capita is substantially less than the regional averages.[25]

These data findings support the general understanding that the provision of multiple transportation choices, such as accessible transit, bicycle facilities and walkable streets, and a diverse mix of land uses and densities in the Balboa Area correspond to lower VMT rates compared to regional averages.

Figure 3-14 Regional vs Balboa Area Average VMT per Capita



Source: San Francisco Transportation Map; Nelson\Nygaard, 2016.

The average household (residential) VMT per capita in the City of San Francisco is 7.2. As shown in **Figure 3-15**, the household VMT per capita in the Balboa Area is considerably higher than the City average. This metric indicates that residents in the Balboa Area drive more frequently and longer distances on a daily basis than residents in San Francisco as a whole, on average.[26]

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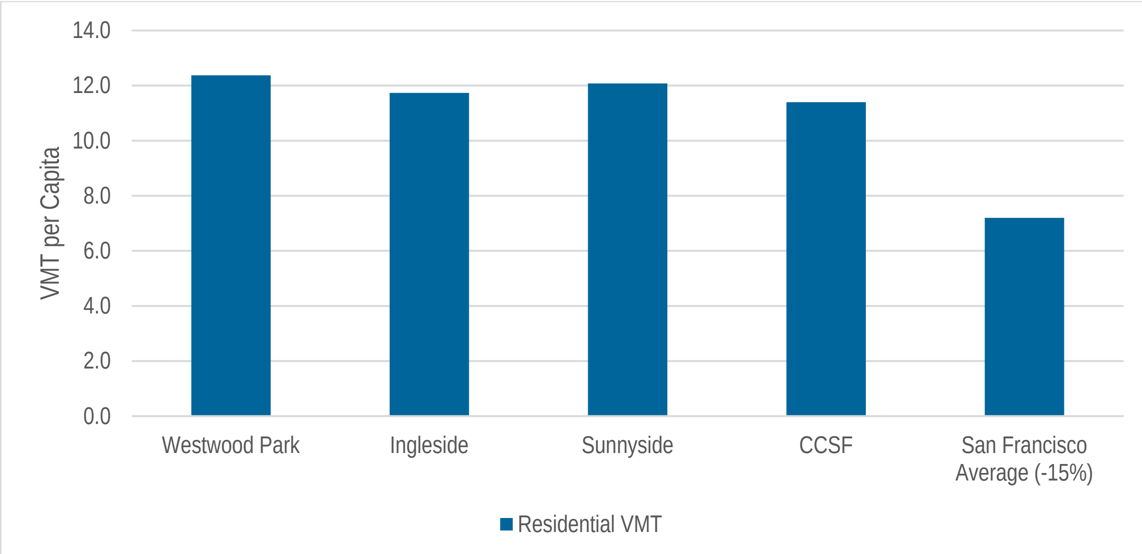
[24] San Francisco Transportation Information Map available online at: http://www.sftransportationmap.org/; accessed April 2016.

[25] The California Department of Transportation (Caltrans) has developed a statewide VMT reduction target per the *Strategic Management Plan* that specifically calls for a 15 percent reduction in per capita VMT, compared to 2010 levels, by 2020.

[26] It is noted that average VMT per capita for office and retail in San Francisco is not yet available.

Figure 3-15 San Francisco vs Balboa Area Average Household VMT per Capita



Source: San Francisco Transportation Map; Nelson\Nygaard, 2016.

Intersection Level of Service

Level of Service is commonly used to describe the operations of roadway facilities, with respect to motor vehicle traffic delays, using the concept of "automobile level of service" (a.k.a. "level of service" or LOS). LOS is a qualitative description of motor vehicle traffic flow based on factors such as speed, travel time, delay, and freedom to maneuver. It is important to note that LOS is generally a characterization of average vehicle delay experienced by an individual driver at a specific intersection location and during the peak 15-minute period of any given hour (typically the "commute peak hour"). LOS is categorized into six levels of service ranging from LOS A (i.e. free flowing operating conditions) to LOS F (most congested operating conditions). When volumes exceed capacity, stop-and-go conditions result and operations are designated as LOS F.[27]

This approach to transportation analysis historically prioritizes free-flowing traffic. While this may sound reasonable, relying on LOS analysis to understand transportation impacts creates substantial problems:

- **Shifts responsibility for traffic mitigation.** As development progresses in a given community, the initial development projects are not held accountable for the traffic they may generate over time. Rather, newer developments that cross a specific threshold must address overall traffic issues that have accumulate over time, not just the traffic associated with the project itself.
- **Narrows the scale of analysis.** LOS typically only looks at a limited number of intersections, even though many people traveling through the community may come from the larger region to work, shop, and study.
- **Focuses on the movement of vehicles, not people.** Delays for a single vehicle carrying one person is treated the same as the delay for a bus full of passengers.

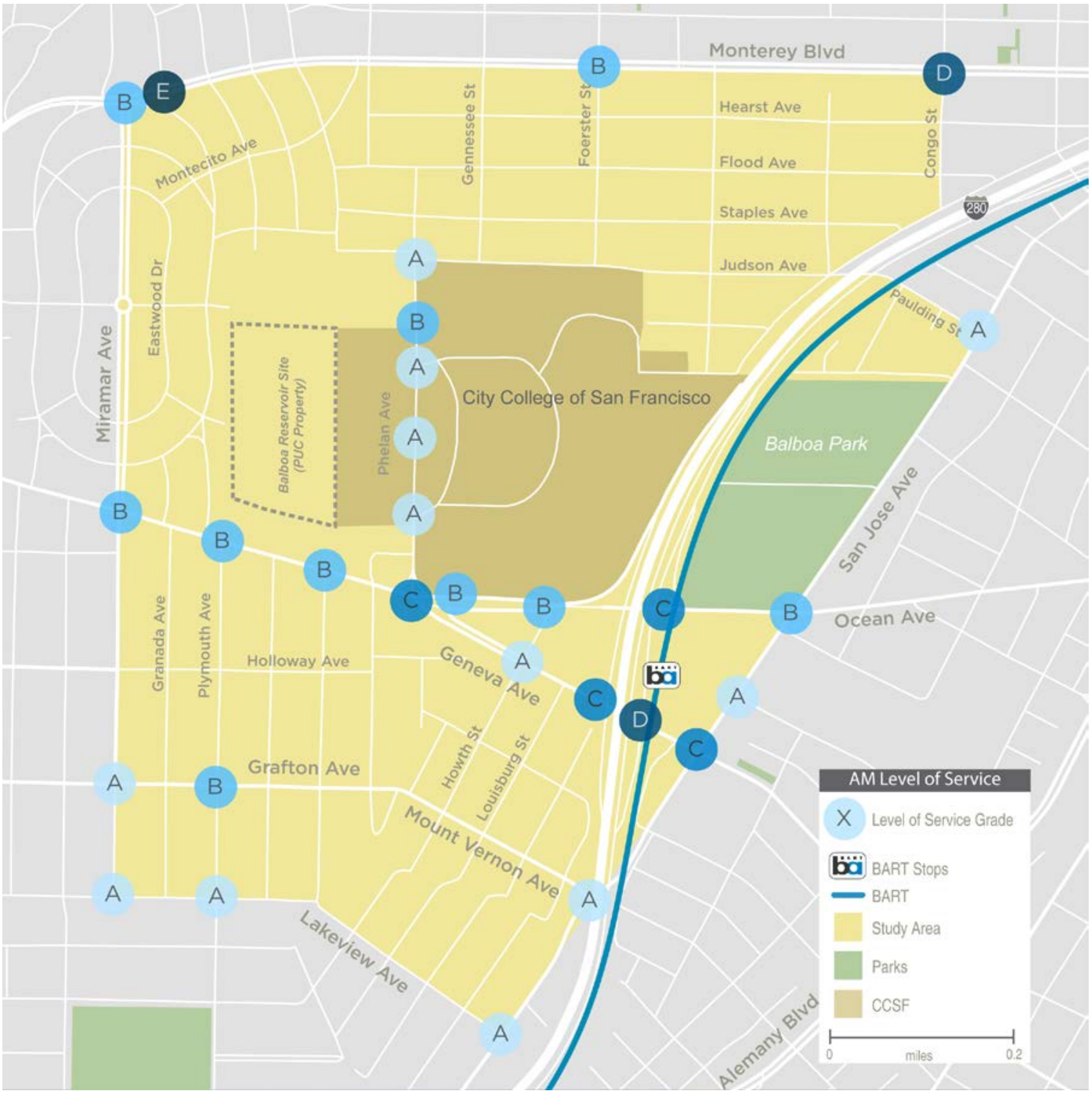
[27] San Francisco Transportation Analysis Impact Guidelines, 2002.

- **Views non-drivers as a source of delay.** Intersections with little to no accommodations for pedestrian crossings often have less vehicle delay, and thus are favored over those which allow for a safe and comfortable pedestrian experience.
- **Reinforces the problem.** Roadway improvements in response to poor LOS often resort to widening roads and intersections. This facilitates driving and thus encourages more cars, ultimately resulting in the same or worse level of congestion.

As of March 3, 2016, the San Francisco Planning Commission adopted a resolution to move forward with state-proposed guidelines to update the way the City measures transportation impacts. This will remove automobile LOS and delay as a significant impact and replace it with a vehicle miles (VMT) threshold for all CEQA environmental determinations, including active projects.

Figure 3-16 and **Figure 3-17** illustrate the AM and PM LOS conditions at all study intersections. As shown, the LOS results indicate that there is generally stable vehicle flow at the majority of intersections; however, the results show that vehicle movements are more restricted at specific intersections, where stopping times are longer due to longer build up in vehicles queueing (stopping) within traffic lanes and restricting drivers from passing other vehicles.. These instances occur mostly along Geneva, Ocean, and Phelan avenues, and other non-arterial streets (e.g., Miramar Avenue, Plymouth Avenue, Mount Vernon Avenue, and Lakeview Avenue). However, the LOS results show that intersections along the study area periphery experience relatively more congestion and higher vehicle delays during the weekday peak periods (along Monterey Boulevard). Intersections at the I-280 ramps also indicate unstable vehicle flow, with extended delays and stopping times, which result in backups and longer vehicle queues of vehicles waiting upstream of the intersection. This “bottleneck” of traffic at the I-280 ramps then results in residual vehicle delays at other nearby intersections and create a more congested environment for drivers.

Figure 3-16 AM Peak Period Intersection Level of Service



Source: Nelson\Nygaard, 2016.

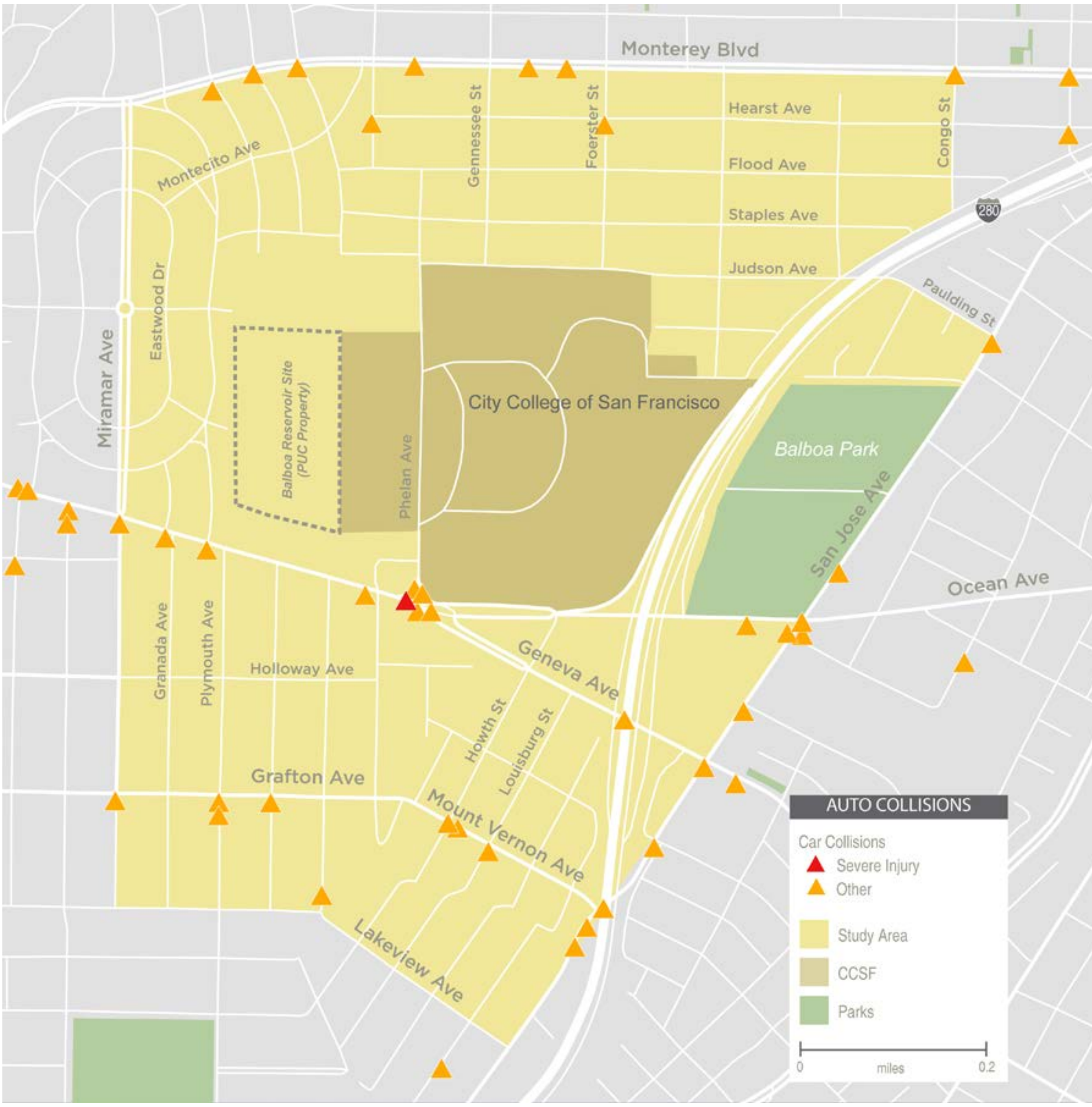
Figure 3-17 PM Peak Period Intersection Level of Service

Source: Nelson\Nygaard, 2016.

Auto-Auto Collisions

Collision data from the Statewide Integrated Traffic Reporting System (SWITRS) was evaluated for the previous five years. There were 228 collisions in the Balboa Area; all of which occurred on surface streets in the Balboa Area, with the majority of crashes occurred on Ocean Avenue, San Jose Avenue, and Monterey Avenue and were not considered severe; surface street collisions are shown in **Figure 3-18**. The intersection of Ocean Avenue and Phelan Avenue has a concentration of collisions, which coincides with the concentration of pedestrian and bicycle collisions previously discussed. Based on collision reports, more than one-third of auto collisions in the study area were caused by excessive speed. A detailed breakdown of collision factors is shown in **Figure 3-19**.

Figure 3-18 Auto Collisions, 2010-2015



Source: SWITRS, Nelson\Nygaard, 2016.

Figure 3-19 Primary Collision Factors

Primary Collision Factor	Collisions	Percentage
03 - Unsafe Speed	84	36.80%
09 - Automobile Right of Way	27	11.80%
12 - Traffic Signals and Signs	27	11.80%
08 - Improper Turning	22	9.60%
01 - Driving or Bicycling Under the Influence of Alcohol or Drug	16	7.00%
04 - Following Too Closely	15	6.60%
07 - Unsafe Lane Change	11	4.80%
Not stated	6	2.60%
21 - Unsafe Starting or Backing	5	2.20%
00 - Unknown	4	1.80%
05 - Wrong Side of Road	4	1.80%

Planned Auto Circulation Improvements

The *Balboa Park Station Area Circulation Study* was completed in 2014. Embedded within the document were a series of circulation improvements, including recommendations to realign the I-280 off-ramp at Ocean Avenue to a T-intersection, to improve pedestrian safety and slow vehicles exiting the freeway.[28] This effort is being further studied by the SFCTA[29] and alternative designs under review include: the elimination of the existing free right-turn lane for vehicles exiting the southbound I-280 off-ramp before the Ocean Avenue/Howth Street intersection; the realignment and widening of the existing Ocean Avenue off-ramp to a two-lane T-intersection on to Ocean Avenue; and installation of a traffic signal at the realigned southbound I-280 off-ramp/Ocean Avenue intersection to provide controlled crossings and access for pedestrians and bicyclists.

The *Balboa Park Station Area Plan*, adopted in 2009, encompassed several improvement areas in and around the Balboa Park BART station.[30] Specific roadway improvements included the redesign of Phelan Avenue, Geneva Avenue, and San Jose Avenue. The City's *Better Streets Plan* (2010) established a unified set of standards, guidelines, and implementation strategies for Ocean Avenue and call for a number of recommended streetscape improvements, including widen sidewalks, mid-block crosswalks, extended bulb-outs, center medians, street lighting, and street furniture.[31]

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[28] Balboa Park Station Area Circulation Study Final Report, April 2014, SFCTA and available online at: http://www.dot.ca.gov/hq/tpp/offices/orip/Grants/final_products/2014/4SFCTABalboaParkStnAreaCircStudy2014.pdf

[29] I-280 SB Ocean Avenue Off-Ramp Realignment Project at Balboa Park Traffic Forecast Memorandum, AECOM and SFCTA, April 27, 2016.

[30] Information on the adopted Balboa Park Station Area Plan is available online at: http://sf-planning.org/balboa-park-station-area-plan#final_docs

[31] San Francisco Better Streets Plan is available online at: http://www.sf-planning.org/ftp/BetterStreets/proposals.htm#Final_Plan

The *Ocean and Geneva Corridor Design Final Plan* (March 2015)[32] considered past planning efforts and comprises a community-based design for Ocean and Geneva Avenues to improve access, safety, and connectivity to and from the Ocean Avenue commercial corridor and the Balboa Park BART Station. This is an interagency effort led by the San Francisco Planning Department. Building an comprehensive community vision for the area, a number of design alternatives have been proposed (see exhibit), including realignment of the I-280 off-ramp at Ocean Avenue, expansion of the westbound bike lane along Ocean Avenue, between I-280 and Phelan Avenue, the addition of green paint to bike sharrows and bike lanes, the addition of sidewalk extensions at corners, relocation of Muni transit stop to Ocean Avenue at Howth Street, removal of CCSF pedestrian bridge, and upgraded fencing and the addition of other pedestrian amenities when the Ocean and Geneva freeway overpass is upgraded.

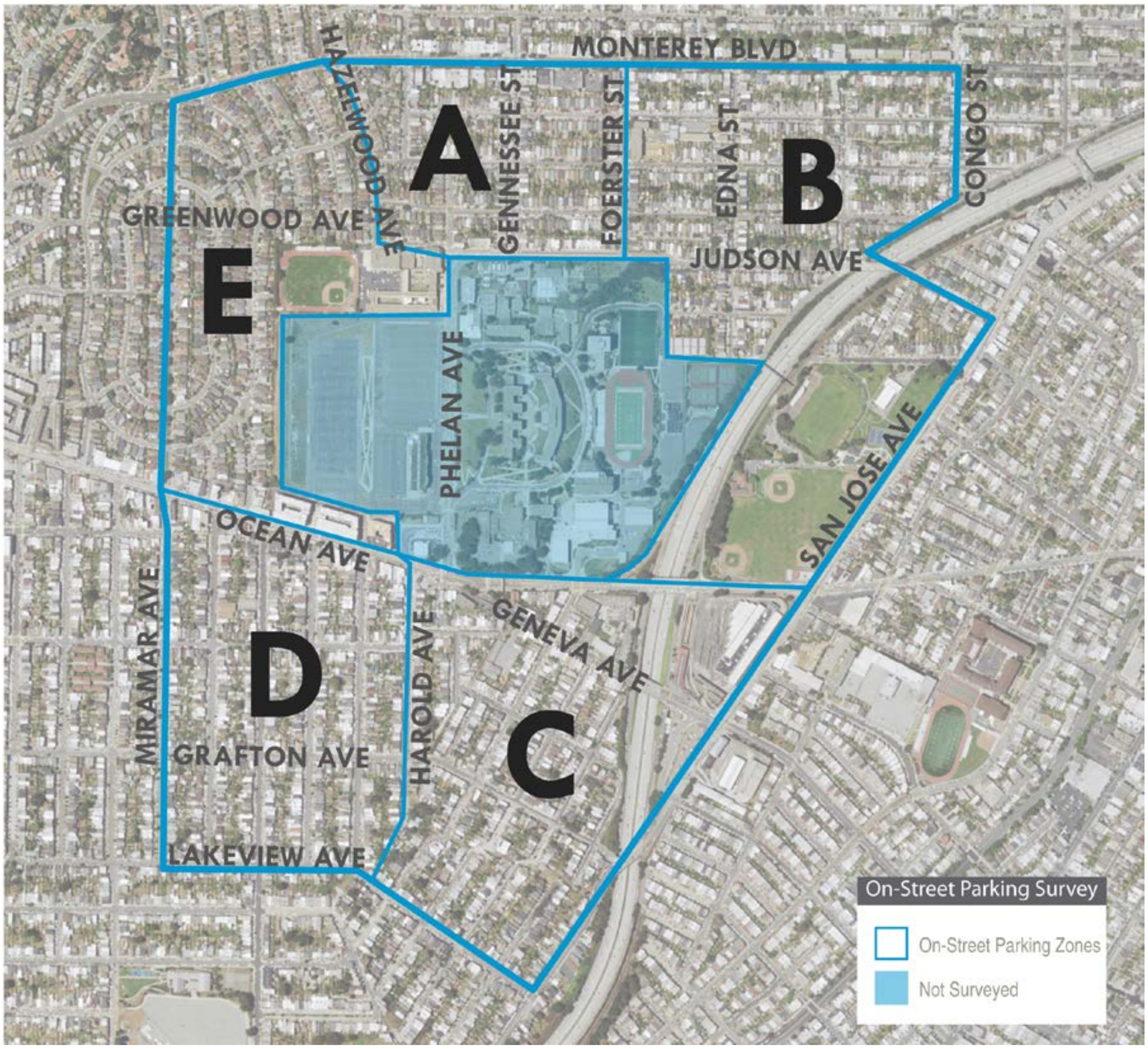
PARKING CHARACTERISTICS

Automobile parking in the study area consists of on-street parking along the majority of streets, and off-street parking lots for institutions and businesses. On- and off-street parking data in the study area was collected on Tuesday, May 10, and Wednesday, May 11, 2016. This data includes a survey of parking supply (number of parking spaces), inventory (type of space), and occupancy (number of parking spaces occupied by a parked vehicle). The surveys were conducted during two periods; midday, between 10:00 AM to 4:00 PM; and late evening, between 10:00 PM to 12:30 AM.

The purpose of conducting parking occupancy during two periods was to identify the fluctuation in parking demand associated with residences and businesses in the study area, and CCSF Ocean Campus. **Figure 3-20** and **Figure 3-21** the on-street parking survey area and the off-street parking areas at CCSF Ocean Campus, respectively. The on-street parking areas were divided into five zones to allow for a manageable way of interpreting parking conditions and to better understand parking conditions in different neighborhoods.

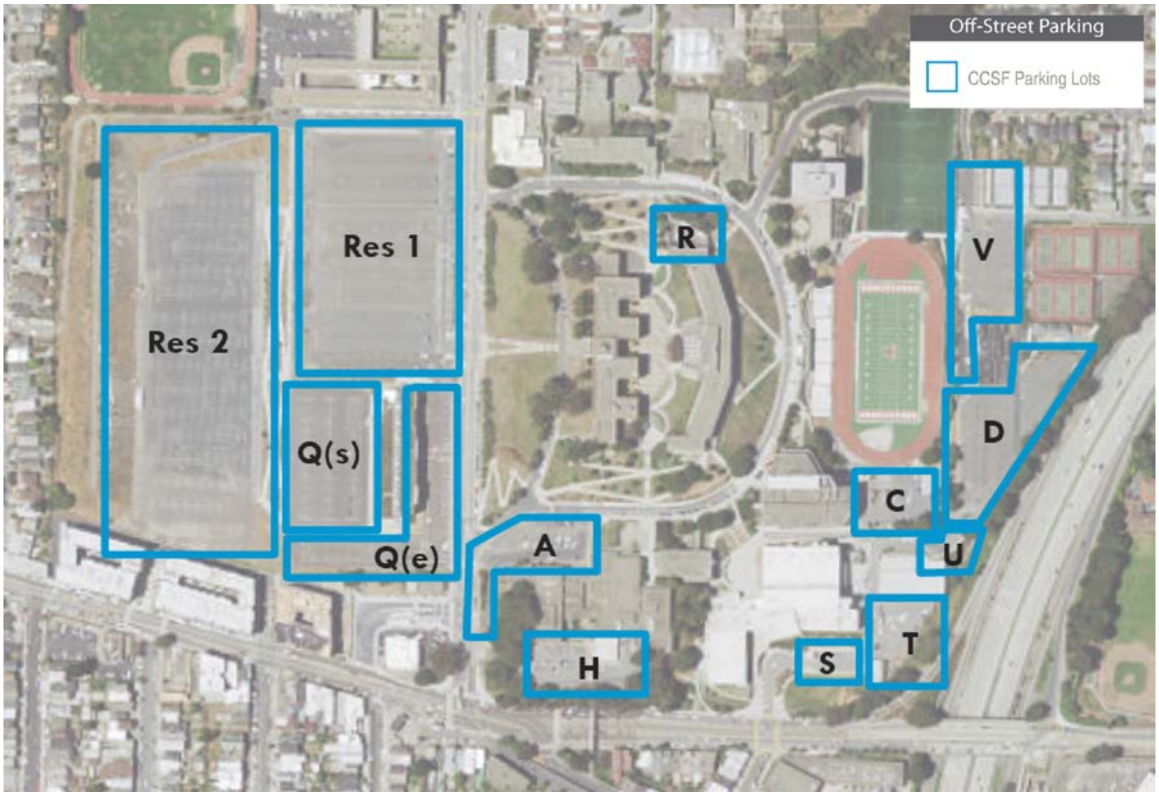
[32] Ocean and Geneva Corridor Design Final Plan (March 2015), San Francisco Planning Department; available online at: http://208.121.200.84/ftp/files/plans-and-programs/in-your-neighborhood/ocean_ave_corridor/OceanAvenueCorridorDesignFinalReport.pdf

Figure 3-20 Balboa Area On-Street Parking Survey Map



Source: Nelson\Nygaard, 2016.

Figure 3-21 CCSF Ocean Campus Off-Street Parking Survey Map



Note: Student parking is permitted in parking lots Res 1, Res 2, Q (s), and D.

Source: CCSF, Nelson\Nygaard 2016.

The parking survey determined a total parking supply of 4,521 on-street parking spaces and 2,719 off-street parking spaces within CCSF Ocean Campus (of which 117 are ADA-accessible spaces). **Figure 3-22** below provides a summary of the on-street parking utilization by zone and the total average parking utilization for the on-street parking study area, during the weekday midday and late-evening periods.[33] **Figure 3-23** and **Figure 3-24** show a visual comparison between midday and late evening parking occupancy in each of the five zones within the study and surrounding CCSF Ocean Campus.

On-Street Parking Conditions

A portion of on-street parking in the Balboa Area is generally regulated through established Residential Parking Permit (RPP) zones: RPP D which is north of CCSF Ocean Campus and stretches along Circular Avenue to areas northeast of the Balboa Area, north of Monterey Boulevard, and RPP V which is largely located south of Ocean Avenue, generally in the northern portion of the Ingleside Neighborhood and crosses over I-280 to the Outer Mission Neighborhood (see Figure 3-23 for RPP zone locations). Permits are provided to residents for a cost of $127 and allow for unrestricted parking for permit holders within the permit zone (with exception for street cleaning times). For non-permit holders, vehicles are allowed to park on street for up to two hours; parking beyond two hours is subject to a fine. On-street parking along Ocean Avenue, west

[33] Represents the average parking utilization over the two-day period.

of I-280, is regulated through smart parking meters that allow for parking up to two hours between 7:00/9:00 AM-6:00 PM and at cost$0.25-$2.00 per hour.[34] These smart meters allow for credit card transactions as opposed to coins or any hard currency. All other areas outside RPP zones and metered, commercial areas on Ocean Avenue are unregulated.

During the weekday midday period, parking occupancy is higher in the southern portion of the study area, south of CCSF Ocean Campus; whereas other areas, especially north and west of CCSF Ocean Campus experience low parking occupancies (i.e., an average occupancy rate below 75%). During the late-evening period, the overall parking demand is generally higher relative to midday, most notably in areas north and west CCSF Ocean Campus; however, these areas do not exceed practical capacity of 85%, a level where one to two spaces per block can typically be found.[35] In areas south and southwest of Ocean Avenue, the average parking occupancies do not substantially change throughout the day. These areas generally experience high parking occupancies that are at, or above, practical capacity during the midday and late-evening periods.

Peak parking (non-average) utilization in each survey zone was observed to be below 80%; however, Zone D experienced parking occupancies above 100% during the weekday late-evening peak.[36] Therefore, these survey findings suggest that parking is constrained in areas south of Ocean Avenue and that parking turnover is relatively low, as most people that park along these streets are long-term parkers (i.e., vehicles with residential parking permits) and do not drive and/or re-park their cars regularly. In areas north of CCSF Ocean Campus, the increase in parking occupancies from midday to late-evening periods may indicate that there are a number of residents that drive to other areas and thus open up available parking for day-users or short-term parkers, and by the late evening, these spaces are available and occupied again by residents.

Figure 3-22 On-Street Parking Total Average Utilization

On-Street Parking Average Utilization					
Parking Zone *(Refer to Figure 3-20)*	Supply	10:00 AM – 4:00 PM (Midday)		10:00 PM – 12:30 AM (Late Evening)	
		Demand	Percent	Demand	Percent
Zone A	1,085	761	70%	861	79%
Zone B	957	684	71%	717	75%
Zone C	984	726	74%	999	102%
Zone D*	812	258	32%	369	45%
Zone E*	683	440	64%	446	65%
All Zones	4,521	2,869	63%	3,392	75%

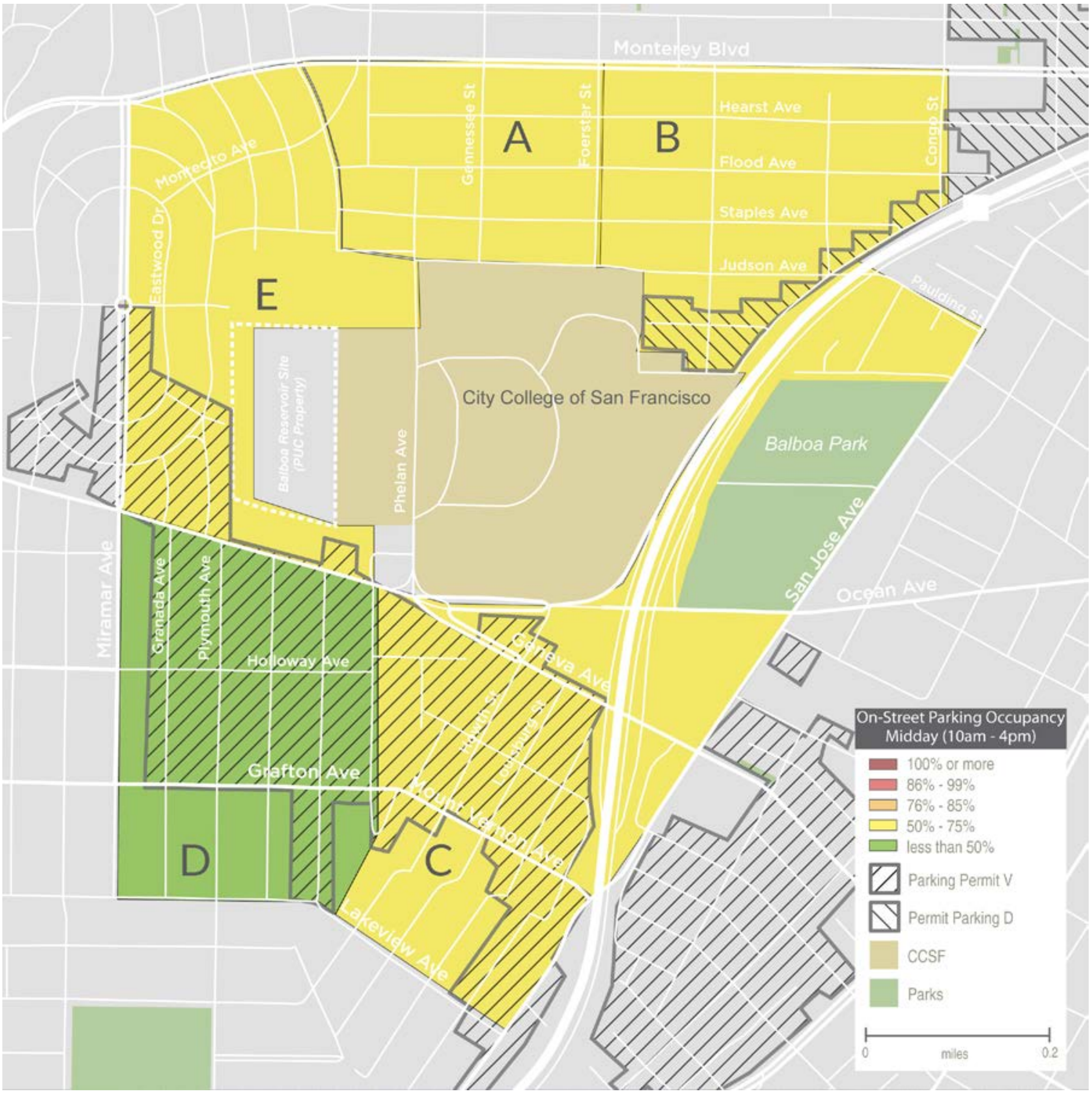
[34] SFMTA, Parking Meter Locations and Rates, accessed July 2016, https://www.sfmta.com/maps/parking-meter-locations-and-rates

[35] Occupancy during peak periods is the primary measure of parking usage and can identify the potential need for additional parking. A parking occupancy rate of 85 percent for on-street parking facilities is typically defined as "practical capacity" meaning that it has reached a balance point between supply and demand where there are sufficient empty spaces to assure parking availability. As occupancy rates climb towards 100 percent, drivers will resort to "cruising" for parking or may be tempted to park illegally, and such activities may result in adverse traffic and circulation effect (Shoup, Donald. *The High Cost of Free Parking*; Chapter 11: Cruising, p. 290 [2005]).

[36] Parking occupancy above 100% indicates incidents of illegal parking where vehicles were parked in non-designated parking spaces (e.g., driveways, red curb, etc.) and therefore, there were more parked vehicles on the street than available spaces.

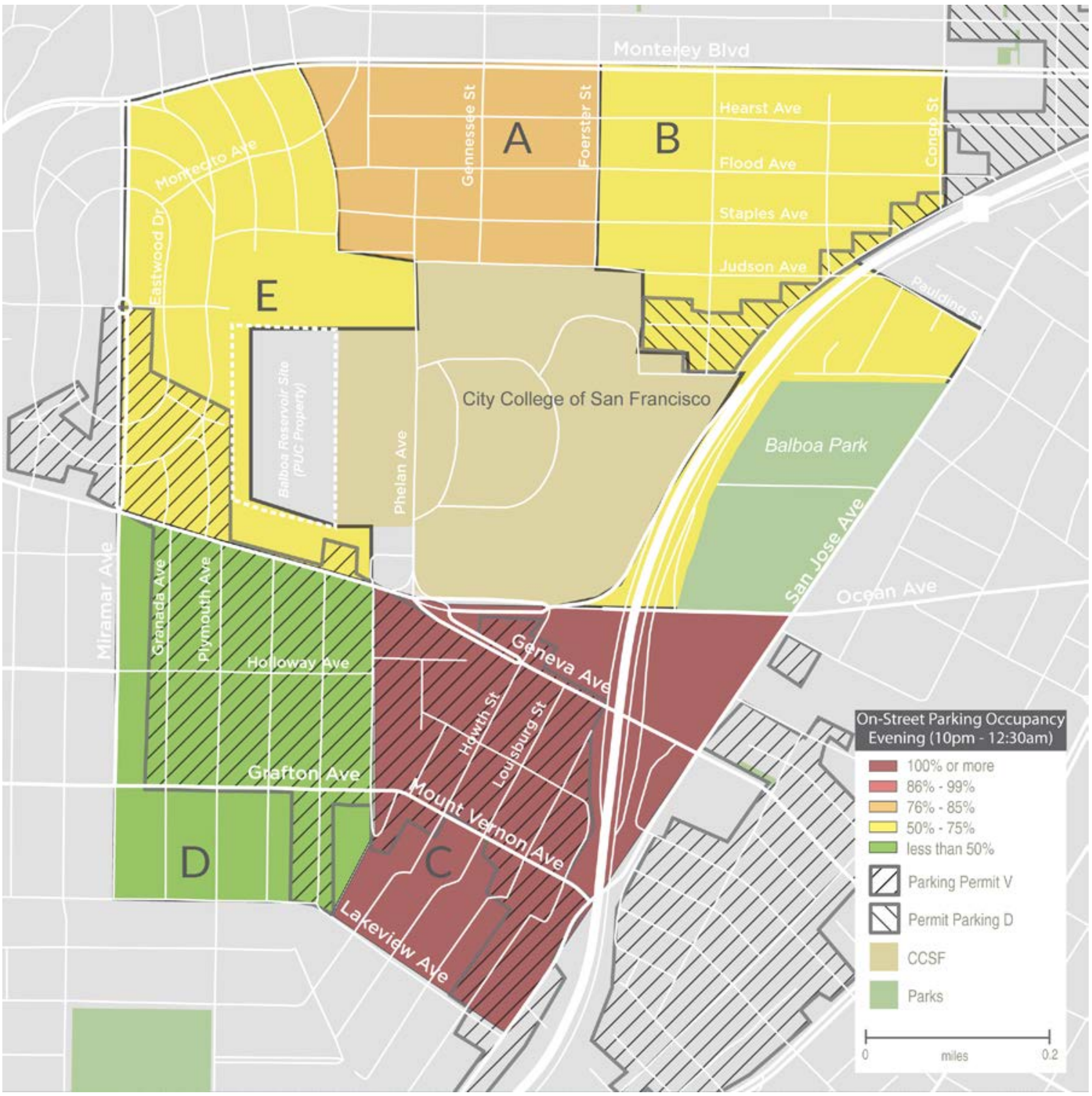
* Note: Some streets in these survey zones were closed during portions of the parking survey.

Figure 3-23 Midday, On-Street Parking Demand (Average)



Source: San Francisco Municipal Transportation Authority, Nelson\Nygaard, 2016.

Figure 3-24 Late Evening, On-Street Parking Demand (Average)



Source: Nelson\Nygaard, 2016.

Off-Street Parking Conditions (CCSF Ocean Campus)

Parking lots at CCSF Ocean Campus are accessible to CCSF employees, students and visitors. CCSF administers and manages a permit system that allows patrons to park at these off-street lots. Students are only allowed to park at Lots Res 1, Res 2, portions of Lot Q and Lot D; employees are allowed to park in all other lots and visitors are to park along Cloud Circle. The cost of a permit for student is $40 per semester (or $20 for students on financial aid) and employees do not pay for a semester or annual parking permit. Parking costs for other day-use parkers, such as visitors, costs $3 per day.

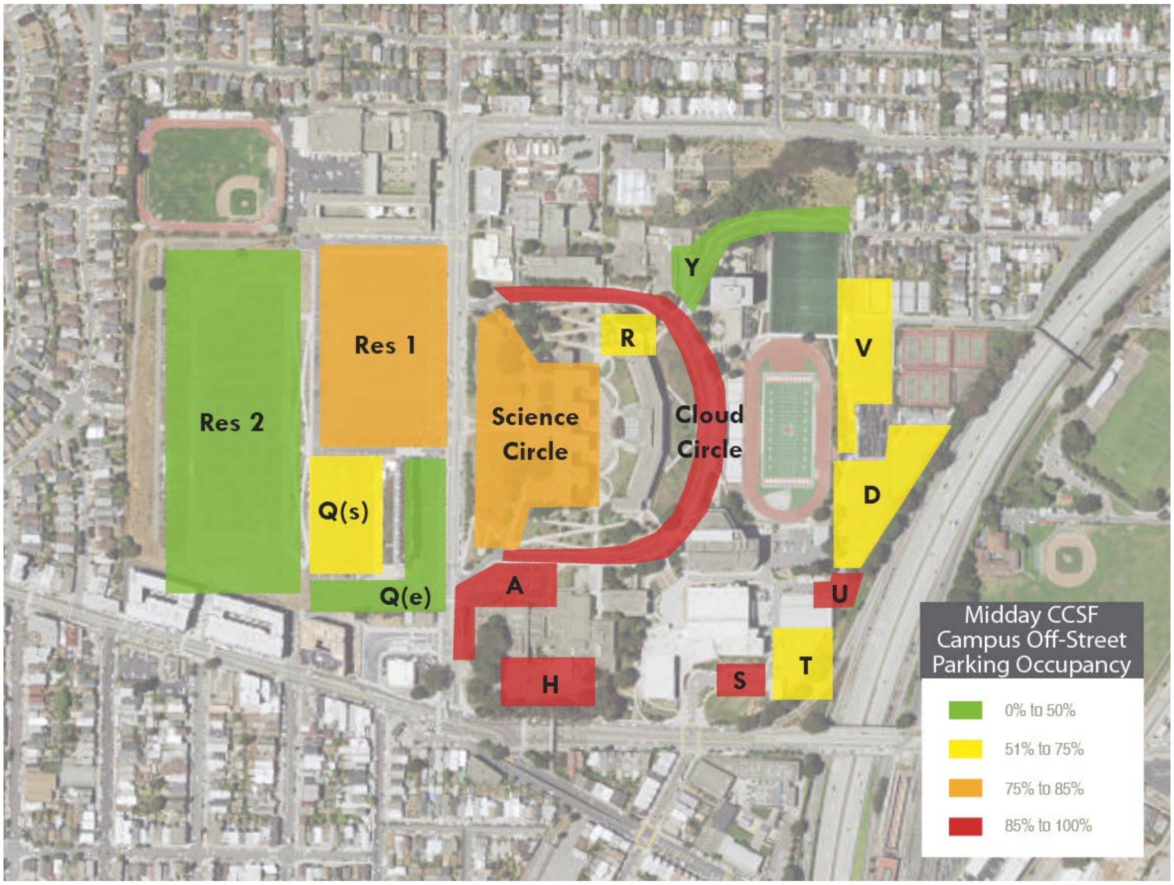
Figure 3-25 summarizes the average parking utilization for CCSF parking lots (off-street) during the midday and late-evening periods, and **Figure 3-26** and **Figure 3-27** show the parking demand graphically. Results show that approximately two lots are effectively full or at capacity during the midday period with respect to general, non-ADA supply and demand; the ADA-spaces are generally underutilized, with an approximate 38% occupancy during this time period. When looking at all available off-street parking, the average midday parking utilization is approximately 50%. This is well below the practical capacity for off-street parking, which is an approximate 90 to 95% utilization threshold. Additionally, Res. Lot 2, is one of the larger parking lots, is slated for development as part of the Balboa Reservoir Site, and experienced a very low average occupancy of approximately 8%. As expected, the parking demand at CCSF parking lots during the late-evening period is much lower than midday period, with an average utilization rate of 6% for general, non-ADA spaces and less than 1% for ADA-spaces, respectively. Because the late-evening period parking survey took place after CCSF classes finished, the low occupancy rate during this period shows the number of students or faculty who stay at the campus late or park overnight. The off-street parking occupancy findings are opposite from the on-street parking findings, where parking demand is higher on neighborhood street during the late evening, as discussed above.

Figure 3-25 CCSF Ocean Campus Off-Street Parking Average Utilization

Average Utilization by Lot					
		10:00 AM – 4:00 PM (Midday)		10:00 PM – 12:30 AM (Late Evening)	
Parking Lot	Total Supply	Total Utilization	ADA Utilization	Total Utilization	ADA Utilization
Res. 2	961	8%	0%	0%	0%
Res. 1	775	78%	0%	7%	0%
Lot Q (s)	242	56%	7%	2%	7%
Lot Q (e)	164	43%	26%	6%	3%
Lot A	85	86%	25%	22%	0%
Lot D	221	73%	-	4%	-
Lot H	69	87%	38%	5%	0%
Lot R	10	75%	-	100%	-
Lot S	15	94%	50%	32%	0%
Lot T	17	63%	-	30%	-
Lot U	19	95%	50%	21%	0%
Lot V	147	64%	40%	3%	0%
Lot Y	10	50%	-	55%	-
Cloud Circle	58	86%	71%	34%	0%
Science Circle	42	77%	44%	21%	0%
Average Utilization	2,840	50%	32%	6%	1%

All empty cells in ADA columns indicate that no ADA spaces are provided in this lot.
Source: Nelson\Nygaard, 2016.

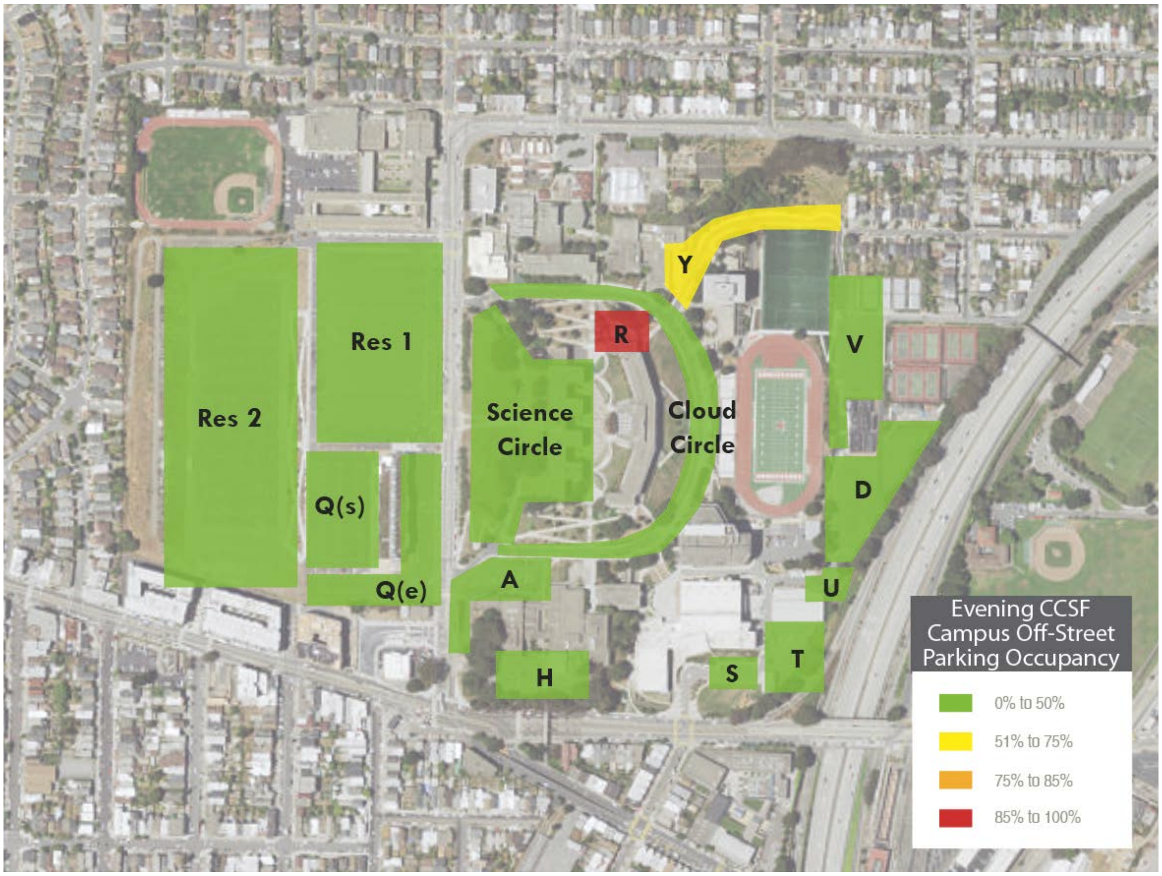
Figure 3-26 Midday, Off-Street Parking Demand (Average)



Note: Student parking is permitted in parking lots Res 1, Res 2, Q (s), and D.

Source: Nelson\Nygaard, 2016.

Figure 3-27 Late Evening, Off-Street Parking Demand (Average)



Note: Student parking is permitted in parking lots Res 1, Res 2, Q (s), and D.
Source: Nelson\Nygaard, 2016.

The above parking discussion describes the average parking demand over a two-day period to characterize typical parking conditions. Because parking can fluctuate, the survey findings also assessed peak utilization rates. They indicated that, during the midday period, five off-street parking lots at CCSF Ocean Campus experience peak utilization that are above the average peak parking demand. For example, the survey findings indicated that Res. 1 and Lots A, H, S, U all experience peak parking occupancies between 98% and 100%. Therefore, on any given day, the majority of employee-only lots and the student lot (Res. 1) are completely full during the midday period. The weekday peak parking utilization for Res. 2 Lot was 9%.

4 COMMUNITY ENGAGEMENT

A series of community meetings and surveys have been used to understand the existing travel behaviors, goals, and concerns of the community and key stakeholders in the Balboa Area. There are two Community Advisory Committees (CACs) that are established in the Balboa Area:

1. **Balboa Reservoir CAC** focuses on working and communicating with community members to provide feedback on what development objectives should be included in the Request for Proposals to be issued by the City for development of the Reservoir Site and prepare development parameters; this CAC meets regularly on the second Monday of the month.
2. **Balboa Park Station CAC** focuses on transportation improvements at the Balboa Park BART station and surrounding environs, and communicates with the public on ongoing and/or planned improvements for the area; this CAC meets regularly on the fourth Tuesday of the month.

These CAC meetings focus on several community issues, transportation being one of the issues commonly discussed. Specific to the Balboa Area TDM Plan, Nelson\Nygaard staff attended the Balboa Reservoir CAC meeting on April 13, 2016, and presented the general principles of TDM and addressed general comments from CAC members and the general public.

In addition to this engagement effort, three individual (yet collective) surveys were conducted between April and May 2016. The San Francisco Department of Environment distributed a travel survey by mail to residents of the study area and surrounding neighborhoods to understand which modes residents and employees use for different types of trips. Approximately 11,000 surveys were distributed. Nelson\Nygaard conducted an intercept travel survey on the CCSF Ocean Campus to understand what travel modes students and employees use, why these patrons make the travel choices they do, and where they are traveling to/from on a daily basis, among various other travel behavioral attributes. CCSF is currently preparing updates to their Ocean Campus Master Plan and in doing so, the CCSF Facilities Survey was distributed via online to all CCSF students; this survey included a number of the same transportation-related questions that were included in the survey conducted by Nelson\Nygaard. The primary needs and concerns resulting from each of these community engagement and survey efforts are discussed below.

CAC MEETING

On April 13, 2016, the San Francisco Planning Department presented an overview of the Balboa Area TDM plan approach at a Community Advisory Committee (CAC) meeting. In addition to discussing the Plan, the SFMTA discussed new transit projects in the Balboa Area, including BART station improvements, new light rail vehicles, and streetscape improvements along Ocean Avenue and Geneva Avenue. Representing San Francisco District 7, Supervisor Norman Yee reviewed the history of the CAC, touching upon past transportation and parking issues and previous efforts to address them.

Overall, CAC members acknowledged that there are trade-offs between the transportation needs of different users, with some people prioritizing driving and parking, and other prioritizing riding transit and bicycling. During the public comment period, concern was expressed over existing traffic issues, such as poor signal timing and congestion along the primary connections to I-280. The group also touched on the need for more robust bicycle infrastructure, specifically calling out separated bicycle lanes around the Balboa Park BART Station and the CCSF campus. Some attendees mentioned that parking may become more of an issue in light of the Balboa Reservoir construction. Pedestrian safety was a general concern, particularly around interactions between drivers and pedestrians.

In addition to the public comment period and feedback from CAC members, the audience was provided comment cards and asked to respond to the question, "what are your biggest concerns about transportation in the Balboa Area?" and provide any additional comments. This process provided immediate feedback from the community and provided an overview of general concerns. Similar to statements during the public comment period, the main concerns written by the public revolved around evident and increased congestion along Phelan Avenue, Judson Avenue, Circular Avenue and Monterey Boulevard to I-280; the need for adequate parking supply for CCSF students; potential expansion of current RPP zones; desire for increased frequencies along Muni Metro lines; the need for improved bicycle infrastructure; and the need for a more enjoyable walking experience to and from Balboa Park BART station.

CCSF OCEAN CAMPUS TRAVEL SURVEY

The CCSF Ocean Campus intercept travel survey was conducted over a two-week period and focused on collected travel behaviors, patterns, and interests from students and employees of the Ocean Campus. Intercept surveys were conducted between May 2nd and May 5th, 2016. Surveyors consisted of City staff from various departments, who were instructed by Nelson\Nygaard staff. The travel survey was web-based (hosted by TypeForm) and distributed to students at CCSF Ocean Campus. Surveyors were positioned in specific locations throughout Ocean Campus to allow for maximum capture of responses, and used iPads to collect responses from CCSF students and employees. Information slips were also handed out to CCSF students and employees that provided the survey link and instruction on how to access the survey online. The survey collected 462 responses, nearly 84% of which were CCSF students and 16% were CCSF employees.

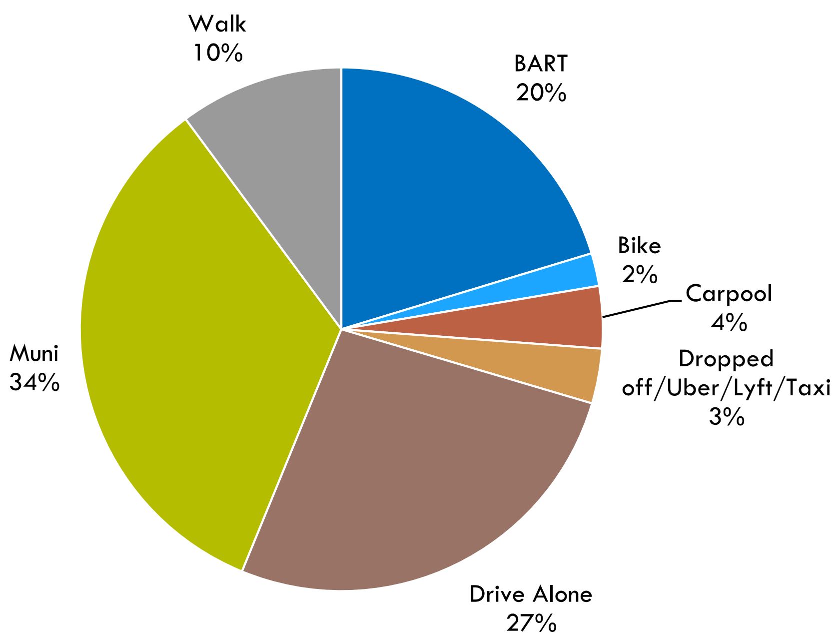
In June 2016, CCSF distributed a college-wide survey regarding campus facilities. This survey included 10 of the primary questions from the Ocean Campus intercept survey conducted by Nelson\Nygaard. Overall, CCSF received approximately 800 responses to those transportation questions. Although at this report's time of writing, Ocean Campus-specific data was not available, the overall college-wide responses reflected many of the results from the Ocean Campus intercept travel survey carried out as part of this study effort.

Travel Behavior

The CCSF intercept travel survey collected 462 responses, nearly 84% of the respondents were CCSF students and the remaining 16% were CCSF employees. The following figures summarize the current mode choice by CCSF students and employees who responded to the survey, representing their "typical" mode choice when traveling to CCSF Ocean Campus. The majority of respondents use public transit (Muni or BART) as their primary travel mode to campus (54%); 27% of participants drive and 12% walk or bike. The most common Muni lines used are the 29-

Sunset, 43-Masonic, and 49-Van Ness. A detailed breakdown of the overall travel modes (students and employees) to Ocean Campus is shown in **Figure 4-1**.

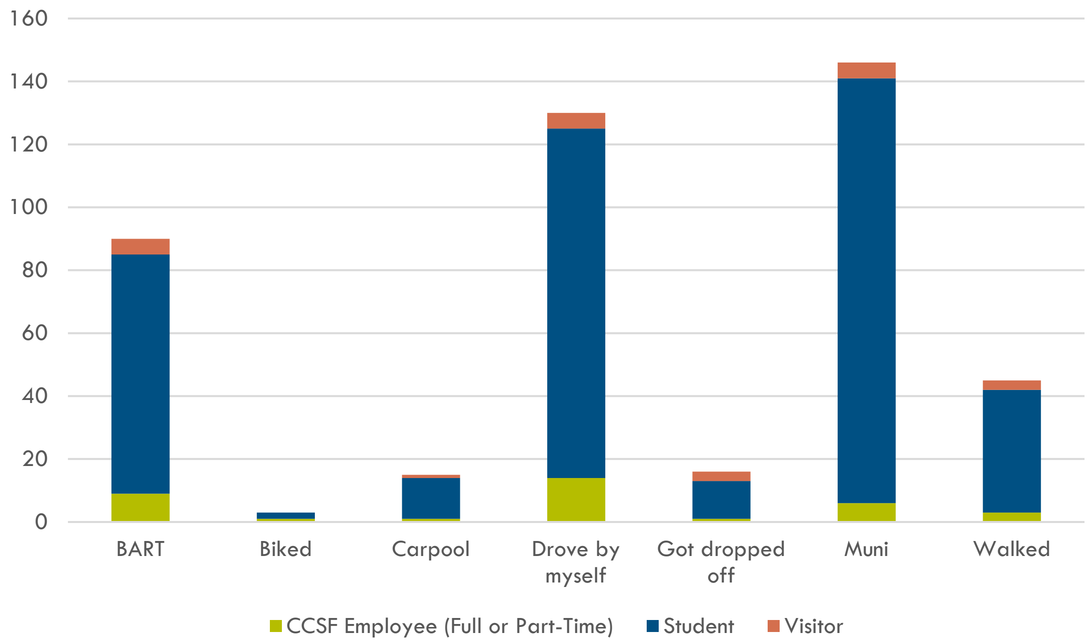
Figure 4-1 Overall Mode Split, n=443



Source: Nelson\Nygaard, 2016.

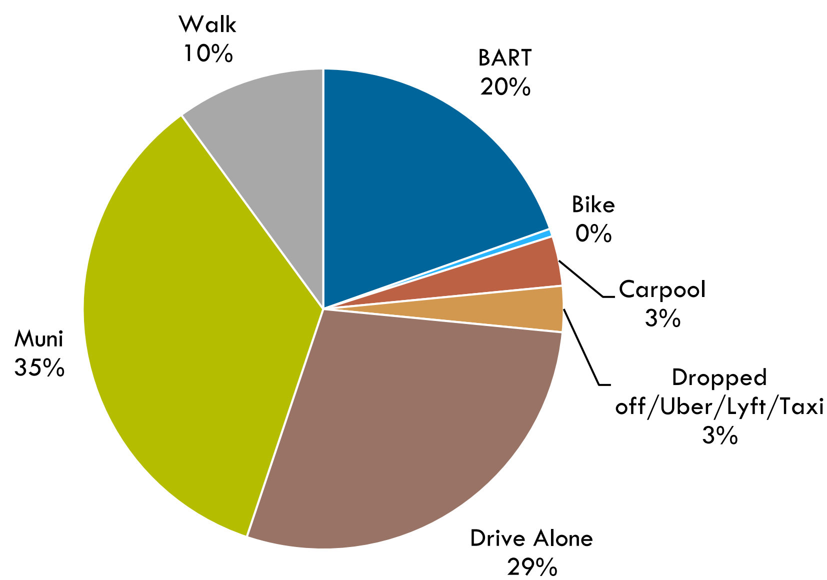
About one third of the students (35%) who responded to the intercept survey take transit to get to Ocean Campus. Of the remaining students, 20% take BART, 29% drive alone, and the remaining 16% either carpool, get dropped off, take rideshare (e.g., Uber, Lyft), or walk. None of the participating students use a bike to get to campus.

Figure 4-2 Mode Split by Respondent, n=443



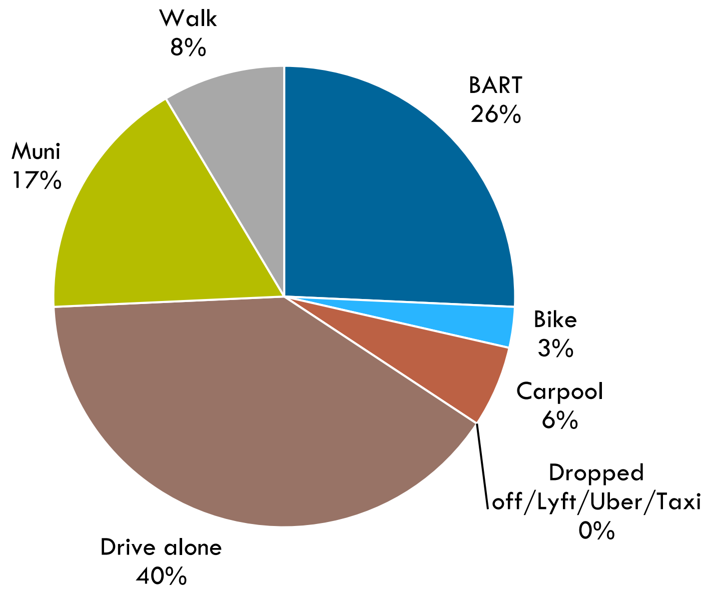
The employee mode split is very different from that of students. From the intercept survey, a significant number of employee respondents reported drive alone to campus (40%); 26% take BART; 17% take Muni; and the remaining carpool, get dropped off, take rideshare (e.g., Uber, Lyft), or walk; three percent of employees bike to campus.

Figure 4-3 Student Mode Spilt, n=388



Source: Nelson\Nygaard, 2016.

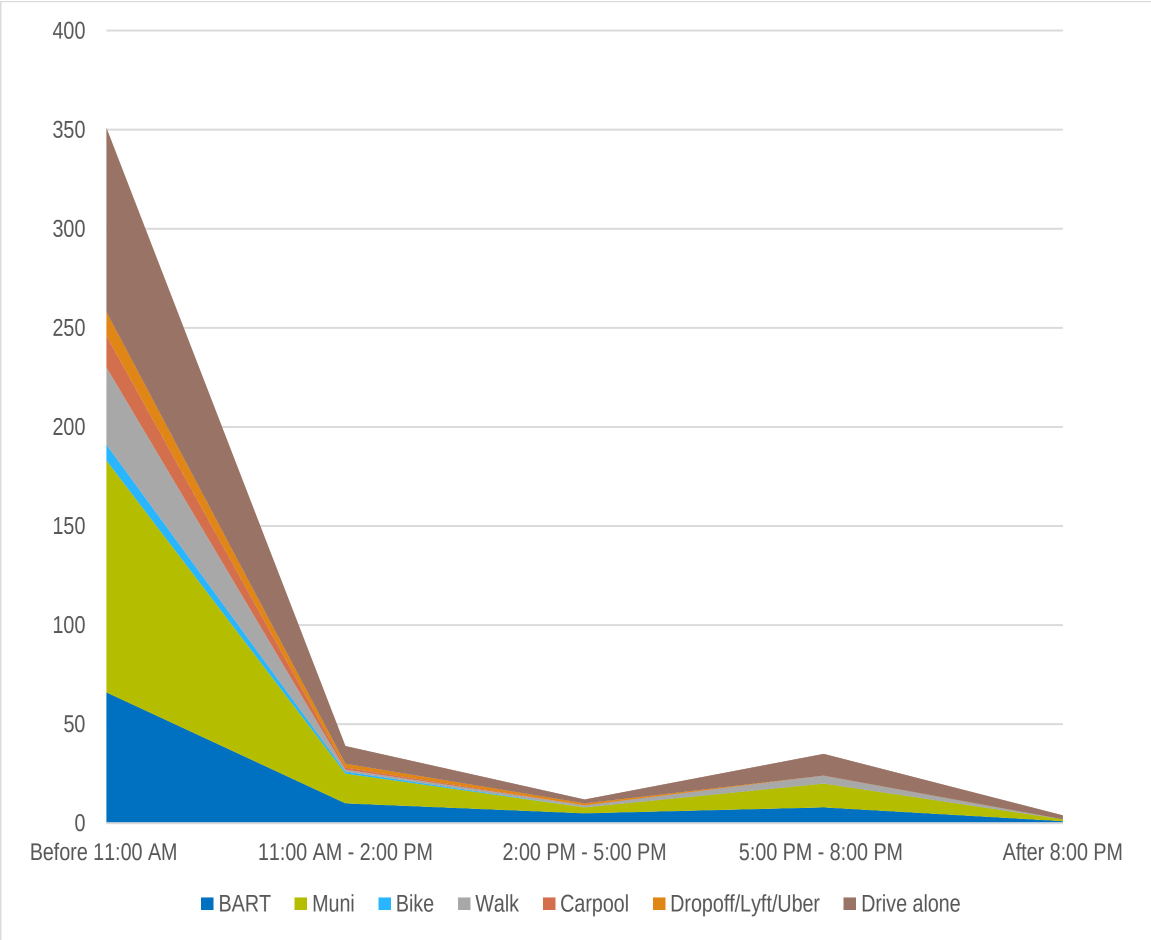
Figure 4-4 Employee Mode Split, n=35



Source: Nelson\Nygaard, 2016.

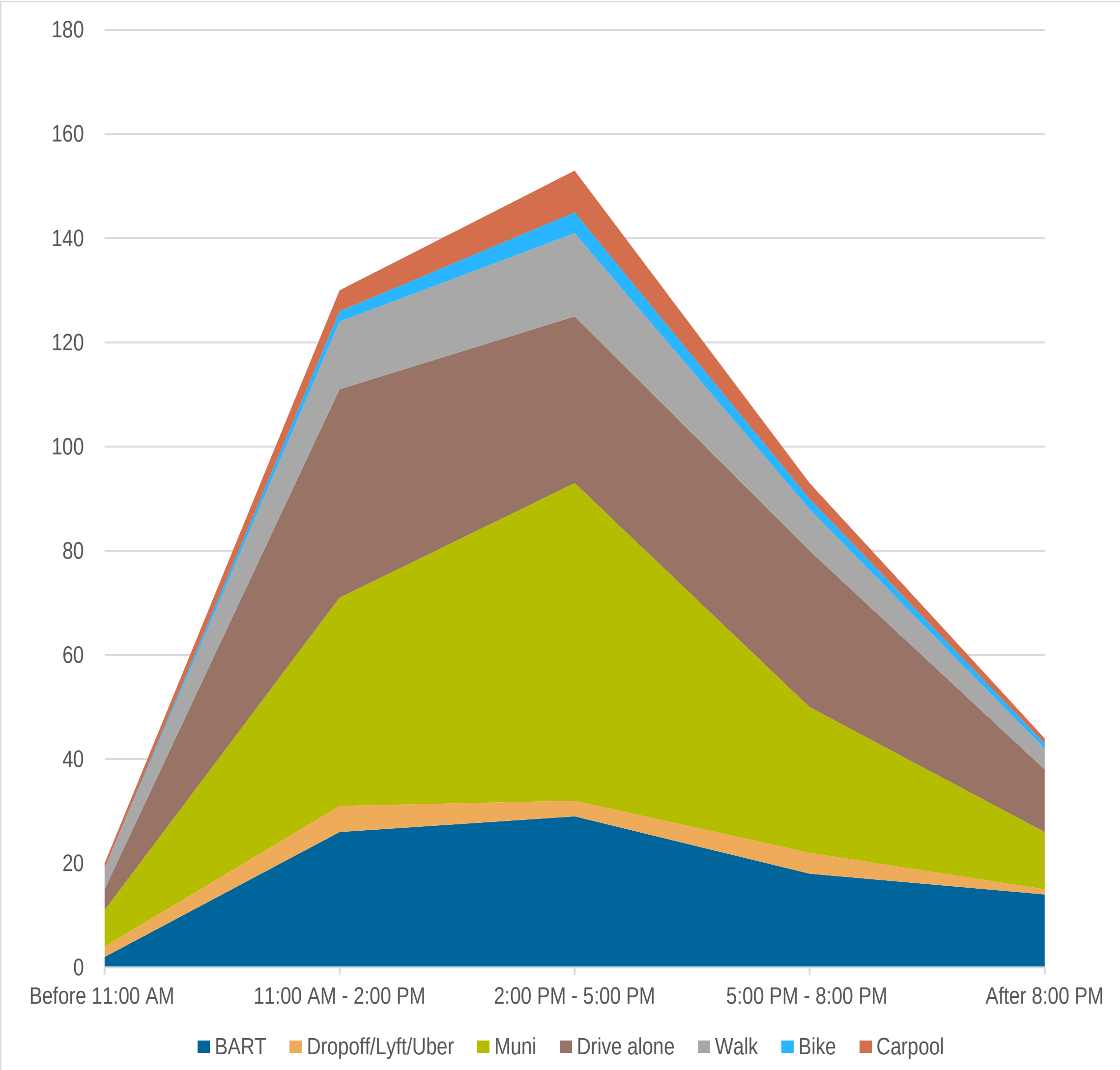
Figure 4-4 and **Figure 4-5** present the typical arrival and departure times for both CCSF student and employee respondents. As shown, the majority of CCSF students and employees arrive before 11:00 AM. The typical departure times vary more primarily due to class schedules, as there is a general split between 11:00 AM – 2:00 PM, 2:00 PM – 5:00 PM and 5:00 PM – 8:00 PM.

Figure 4-5 Typical Arrival time by Mode, n=441



Source: Nelson\Nygaard, 2016.

Figure 4-6 Typical Departure Time by Mode, n=440

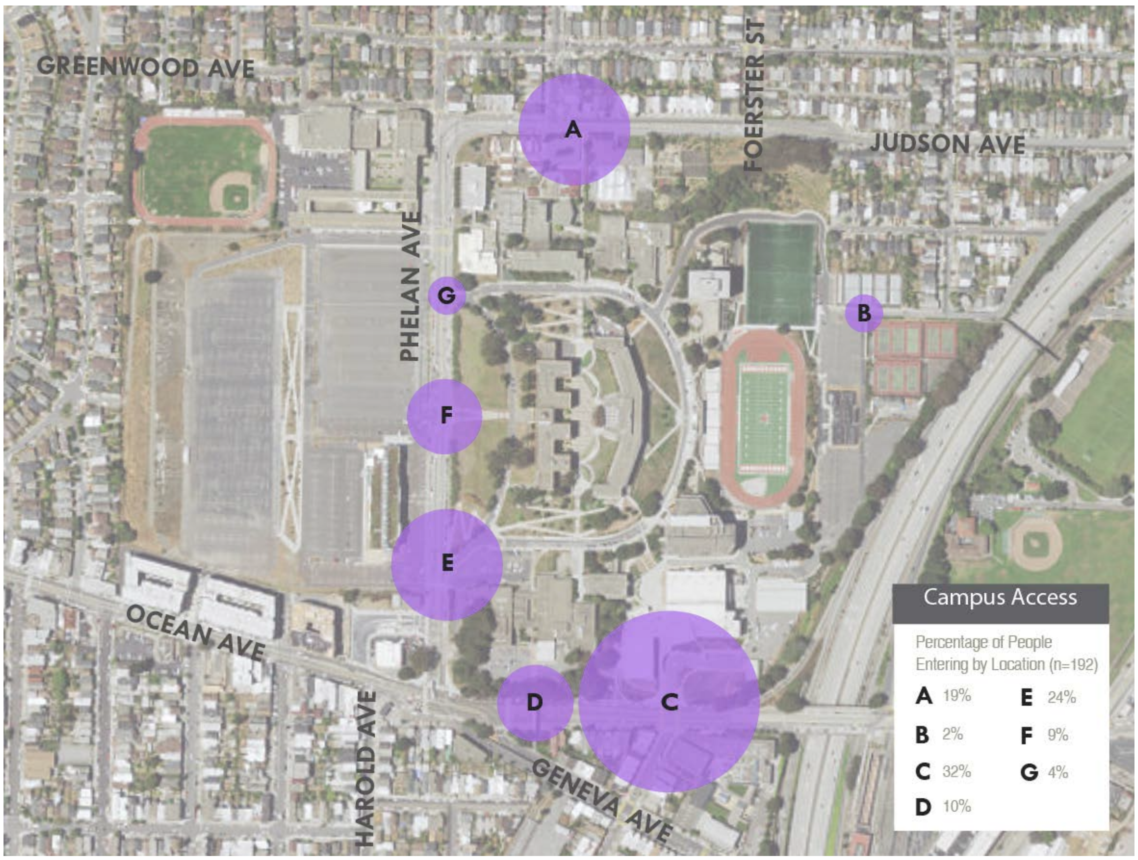


Source: Nelson\Nygaard, 2016.

The survey results show that the employees and students who typically drive to campus largely do not stop on the way to CCSF Ocean Campus, unless it is to get food or pick-up/drop-off children. Most of the respondents who drive to campus park in off-street campus parking lots (93%), particularly in the Res. Lot 1, which is the primary upper lot on the west side of Phelan Avenue.

Figure 4-6, shows where survey respondents who typically bike, walk, or take transit access the campus. This provides insights into where pedestrian and bicycle access improvements are most important. The most used entrances are on the north side of campus at Judson Avenue and Gennessee Street, which serves transit riders on the 43-Masonic; east of the campus at Phelan Avenue and the southern segment of Cloud Circle; and south of campus at Ocean Avenue and Howth Street, closest to the Balboa Park BART station. All of these locations have designated crossings, though the crossing on Phelan Avenue lacks a crosswalk on the northern side of the intersection

Figure 4-7 Typical Entrance Locations of Employees and Students who Walk, Bike or take Transit, n=192

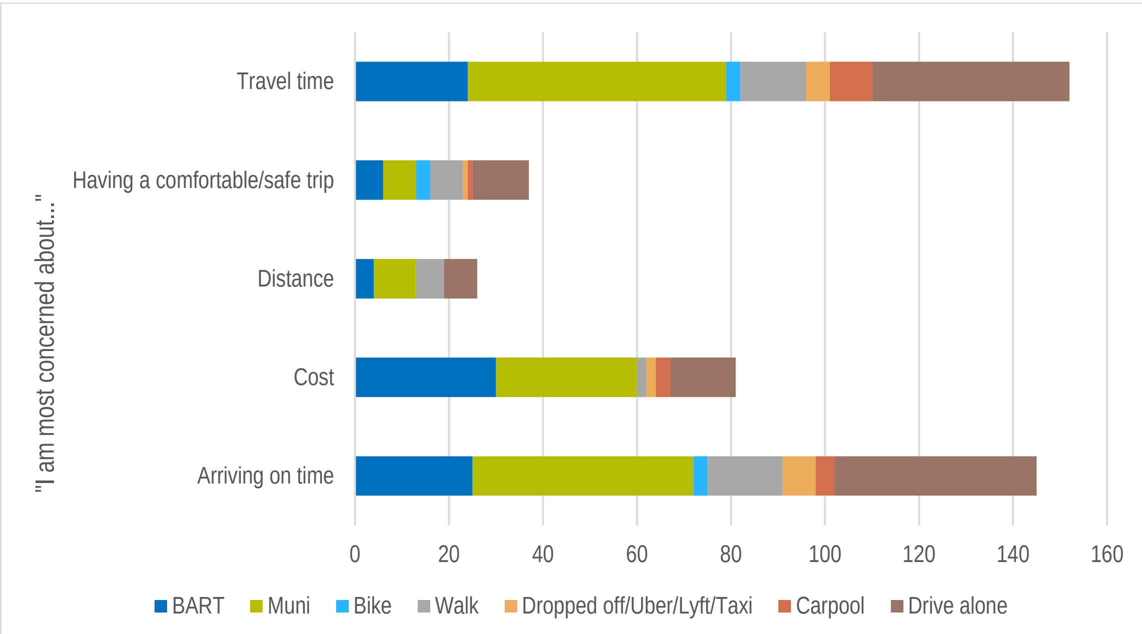


Source: Nelson\Nygaard, 2016.

Travel Preferences

This travel survey included questions to understand what people care most about when choosing how to get to the CCSF Ocean Campus. Across most of the travel modes, respondents cared most about travel time and consistently being able to arrive on time; BART riders cared most about cost. **Figure 4-7** shows the considerations made by users of all modes.

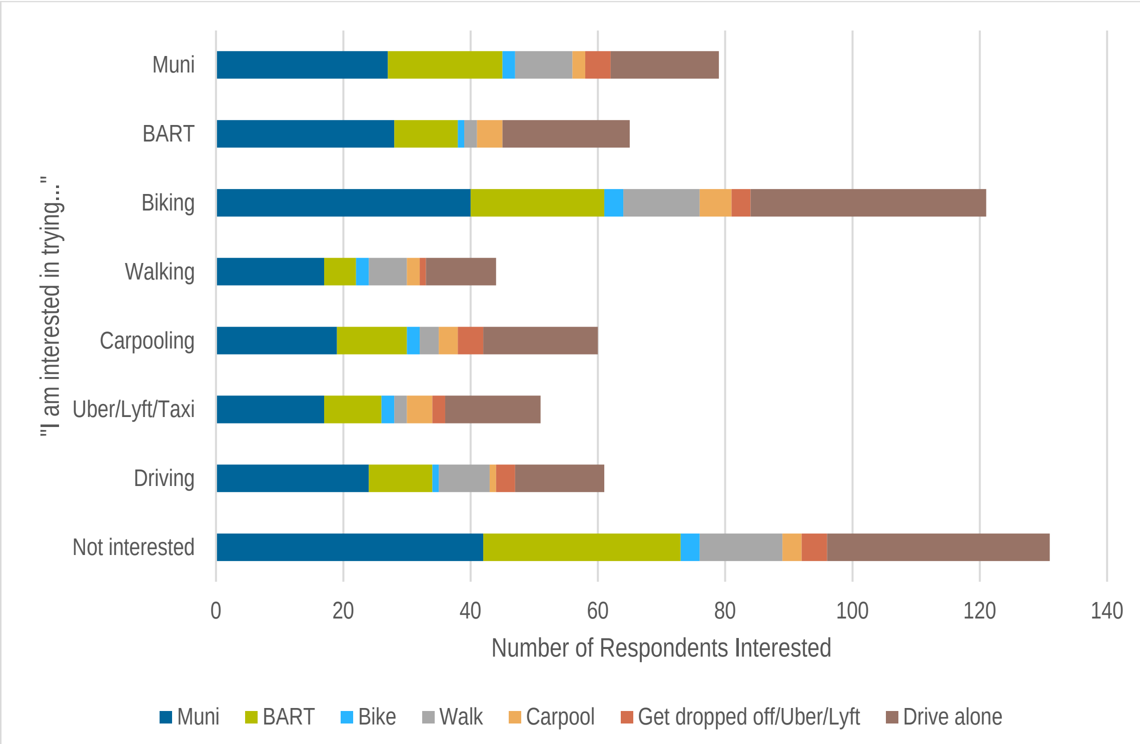
Figure 4-8 Concerns when Selecting Travel Mode, n=443



Source: Nelson\Nygaard, 2016.

Based on survey responses, there is a general interest in trying all possible modes to get to and from campus, shown in **Figure 4-8**. Bicycling was the most popular choice of new mode to try for people who typically travel by a variety of modes. The segment of respondents that did not express interest in switching from the current mode of travel are generally already using modes other than driving alone to get to campus.

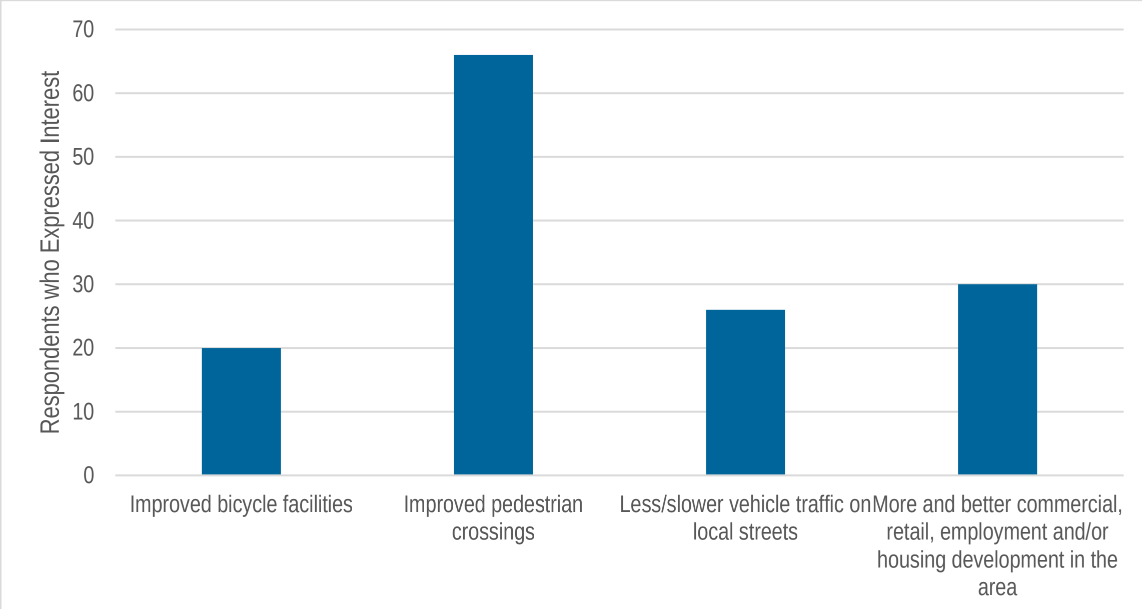
Figure 4-9 Interest by Current Travel Mode, n=441



Note: Muni riders interested in trying Muni may be interested in trying other Muni lines.
Source: Nelson\Nygaard, 2016.

Respondents who typically walk, bike, or take transit to campus generally responded that the walking or biking experience to get to the campus was good (74%). When asked which elements of the public realm would help improve the walking or biking experience, respondents noted that improving pedestrian crossings and having more and better land uses in the area would help. **Figure 4-9** shows the distribution of improvements that would improve the travel experience of people who walk or bike.

Figure 4-10 Public Realm Elements to Help Improve the Walk and Bike Experience, n=177



Source: Nelson\Nygaard, 2016.

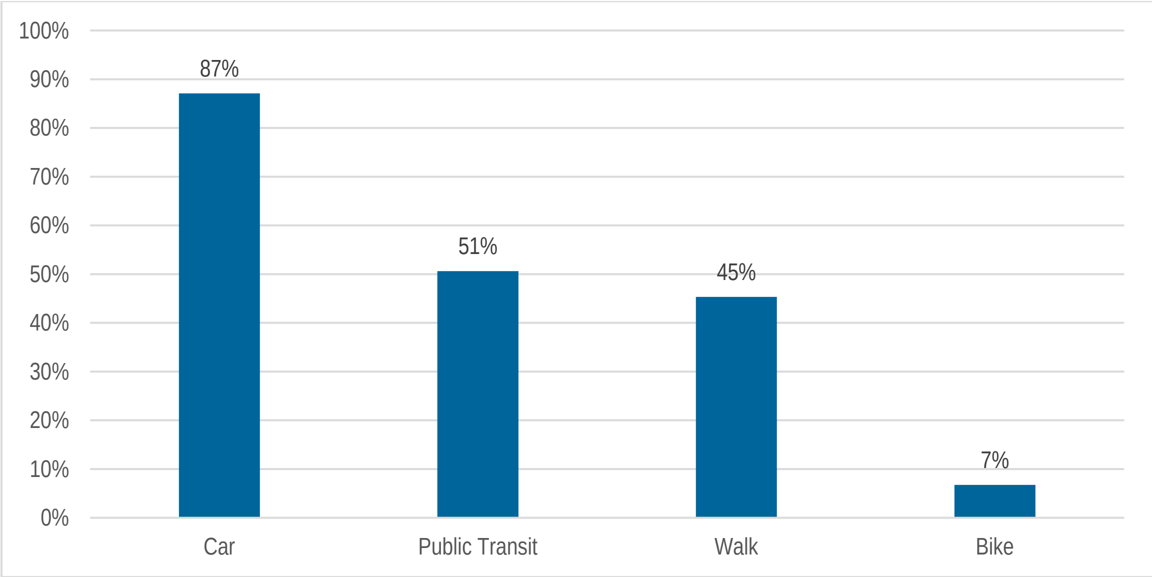
COMMUNITY SURVEY

In the spring and summer of 2016, San Francisco Department of Environment conducted a parallel travel survey of 11,000 residents in the following four zip codes: 94112, 94127, 94131, and 94132. These zip codes generally represent the Balboa Park, Ingleside, Sunnyside, Westwood Park, West Portal, and Diamond Heights neighborhoods.

The survey sought to understand residents' travel patterns and the impact of increased awareness and information on those patterns. There were two rounds of questionnaires as part of this survey. The first round, in spring 2016, asked residents about their travel behaviors. Following this survey, transit information was mailed to all of the same households. Then, in summer 2016, a follow up questionnaire was mailed to determine if travel behaviors changed after receiving transit information. Residents could respond either by mail or online. Overall, the survey generated approximately 1,600 responses, of which approximately 39% were from the 94112 zip code, which includes the Balboa Area. The results discussed and shown in this section include all responses from the survey.

The majority of households surveyed make above $50,000 per year (73%) and have two or more vehicles. Only 7% of the respondents do not own a vehicle. Driving was reported to be the most common mode of transportation in the area when asked about work, school errand, and recreation trips made in the past three day, whereas biking is the least commonly used. Nearly half (45%) of the respondents do not own a bike; shown in **Figure 4-10**.

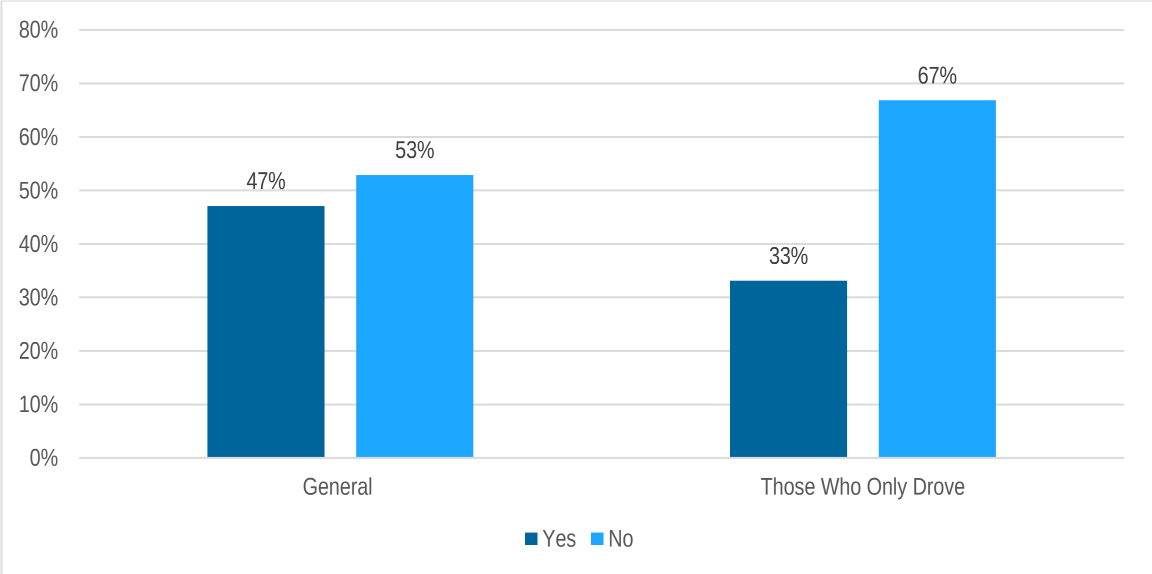
Figure 4-11 Mode Split based on Community Survey Responses , n=2,340



Source: San Francisco Department of Environment, Nelson\Nygaard, 2016.

Based on all survey responses, there is a strong willingness to try other modes of travel, though people who currently depend on a vehicle indicated a lower level of interest on average. This is shown in **Figure 4-11**. Of those interested in trying other modes of transportation, approximately 30% would be more likely to change their travel mode if Muni service was more reliable and convenient.

Figure 4-12 Willingness to Try Different Modes of Transportation, n=1,420



Source: San Francisco Department of Environment, Nelson\Nygaard, 2016.

5 TRANSPORTATION DEMAND MANAGEMENT CONCEPTS

This report presents many transportation challenges and opportunities in the study area. The pedestrian experience stands to be improved, through increased safety and network connectivity. Pedestrian conditions accessing Balboa Park Station are a barrier to all students, employees, households and future residents who may opt to take transit if only it were more safe, convenient or dignified to access. Safety and connectivity are also challenges for bicyclists, limiting local access and discouraging a viable transportation mode for many. Finally, the presence of free or low-cost parking in the Balboa Area creates an incentive to drive, yet there are not any measures providing equitable incentives to encourage other transportation choices.

A Transportation Demand Management (TDM) program is made up of strategies and measures that incentivize and support transportation choices. The strategies work together to incentivize transportation choices for residents, students and employees; taking into account those who need to drive while also supporting those who need or prefer travel options that include transit, walking, biking, carpooling, vanpooling, and other modes. Ultimately, a TDM program is more sustainable than the status quo. It helps improve access for students and employees, manage congestion, reduce risks to pedestrians and cyclists, and improve the overall efficiency of our transportation network.

Despite the challenges in the Balboa Area, the neighborhood is rich with transit options and opportunities for improving access. In addition to the many converging transit lines at Balboa Park Station, City College is a major destination for all modes of travel. While many students already take some form of transit, more expressed interest in walking, biking, or transit. A TDM program can outline several low-cost opportunities to support these students, as well as employees and local residents, in making the choices they seek. On a related note, while City College seeks to expand its enrollment many neighbors are already concerned with the levels of congestion in the area. Over the next several decades, a system that incrementally improves access through transit, walking and biking without increasing vehicle trips can address both these concerns.

Considering the unique needs, populations and land-use mix of the Balboa Area, the future developer of the Balboa Reservoir, the City and City College can implement a variety of TDM measures. After further review in public meetings and with local stakeholders, the forthcoming Balboa Area TDM Plan will recommend measures for each these entities in five general categories: parking management, policy change, infrastructure, information and marketing, and/or encouragement programs. The following sections present initial concepts in each of these categories.

Parking Management

The availability of parking is an important consideration for the Balboa Area. However, too much parking can encourage traffic, reduce available space for other community priorities, and impact community livability. Parking management strategies that effectively size, manage, and make efficient use of land have been shown to be the single most effective way to lower dependency on vehicle ownership and encourage transit, walking, bicycling, and other transportation options. Parking management strategies include unbundled parking costs (already part of San Francisco code), shared parking allocations, flexible parking provision strategies and technologies, demand-based parking pricing, and various policy changes.

The following should be considered in the development of parking management strategies:

- Parking management is most successful when coupled with other TDM measures– particularly those that facilitate other modes of transportation– in environments where transit, walking and bicycling facilities are present;
- Developers should provide parking appropriate for a transit-oriented neighborhood and for the populations being served, in order to maintain increase affordability, flexibility and the availability of resources for TDM programs that incentivize transportation choices;[37]
- Shared parking arrangements should be continuously monitored to ensure that parking is utilized efficiently; and
- Parking pricing should be developed to encourage parking turnover and allow for flexibility to adjust costs accordingly to maintain an effective parking supply.

Policy

San Francisco's draft TDM ordinance is already advancing support for transportation choices through the Transportation Sustainability Fee, CEQA Reform, and TDM requirements for new developments. The latter consists of a menu of options which can be tailored to the unique needs of each development.

The draft TDM Ordinance notes that projects with development agreements (such as the Balboa Reservoir) may use distinct approaches to meet the goals of the ordinance. In practice, the city expects more from projects with development agreements in terms of transportation obligations and commitments to minimizing new driving trips. The future developer of the Balboa Reservoir will be expected to draw on approaches recommended from the forthcoming Balboa Area TDM Plan, as well as work with City College to ensure student access, congestion and parking are well managed.

Encouragement Programs and Services

Encouragement and service programs are an important component of supporting individuals' decisions to own fewer cars or to complete more trips by foot, bike, or transit. There are a wide variety of complementary programs that can achieve these goals. A key component of developing encouragement programs and services is ensuring that barriers to changing travel behaviors are reduced and many options are provided to resonate with a diverse set of people. An example of an encouragement program may be providing car share vehicles to residents of new developments, paired with discounted or free access to these vehicles. Transit service changes may also be paired with encouragement programs to make transit a more accessible and desirable option.

[37] San Francisco Planning Department, Balboa Park Station Area Plan Policy 3.1.1, accessed August 2016, http://sf-planning.org/balboa-park-station-area-plan.

Communications, Marketing, and Program Management

Effective marketing and management of TDM programs are essential to their success. If residents, employees, and the general public are unaware of the available transportations options and programs, they will not take advantage of them. Ongoing and tailored marketing efforts will be needed to ensure that programs are well utilized. Similarly, active management of the TDM programs by dedicated staff is needed to implement, tailor, and refine the programs and services to best meet the needs of the community.

Wayfinding strategies seek to efficiently coordinate movement within a neighborhood, pointing users of all modes of travel to the best access routes for their destination and increasing awareness of the variety of transportation options. Simply providing information on non-motorized travel prominently can increase the likelihood that people will select biking or walking as their mode of transportation. Overall, communications and marketing represent an important part of a comprehensive TDM strategy, improving the customer-friendliness of a neighborhood or district.

Infrastructure

In the Balboa Area, low-density land uses, an auto-oriented street network, and traffic conflicts are the most significant challenges to supporting a variety of travel modes. Improved facilities for non-vehicle modes such as walking and biking can reduce vehicular travel demand and traffic congestion by making it safer, easier and more convenient for residents, employees, and visitors to take transit, walk or bike. Closing gaps in the local, non-motorized transportation network will make existing facilities more appealing to bicyclists of all skill levels and pedestrians. Over time, improved non-motorized transportation networks have escalating benefits because a wider range of destinations become accessible, and physical and cultural barriers to walking and cycling can be overcome. Pedestrian-friendly design can support retail areas, while amenities such as transit shelters and lighting can encourage transit use by improving the passenger experience. Infrastructure measures in support of TDM may include the following:

- Complete streets design;
- Intersection improvements such as shorter crossing distances, high-visibility crosswalks, corner bulbouts, bike boxes, and protected intersections;
- A connected network of safe bicycle routes or protected lanes; and
- Sidewalk improvements to comply with ADA requirements such as corner curb ramps, sidewalk clearance, and improvements to ensure appropriate cross slopes at driveways.

NEXT STEPS

Next steps will include the preparation of the complete Balboa Area TDM Plan. The TDM Plan will develop the concepts above into specific strategies designed to provide transportation choices, reduce vehicle miles and trips, and meet other policy or community goals, such as increasing student access to City College. Strategies will be tailored to three specific implementing entities, targeting a number of: (1) Neighborhood TDM Strategies which focus on area-wide measures applicable to residents, employees and customers, and neighborhood visitors, including specific populations and household types; (2) CCSF TDM Strategies tailored to students, employees and City College visitors; and (3) Developer TDM Strategies that emphasize transportation programs and designs to support future residents, employees, and visitors of the Balboa Reservoir. The Balboa Area TDM Plan and consultant-led process will describe each strategy, how it affects various user markets, its level of efficacy, and the timeline for implementation.

Lastly, the TDM Plan will provide a complete monitoring program to ensure that these strategies are administered and continue to meet performance goals, such as reduction of vehicle miles traveled. Moreover, the TDM Plan will illustrate how VMT can be reduced through the combination of measures and how TDM can materially affect local congestion and provide a comparative evaluation of transportation conditions with and without TDM measures. The Plan will also recommend land uses, capital improvements and any additional analysis needed to help reduce vehicle miles traveled and meet other TDM performance measures.

Appendix

Appendix A CCSF Ocean Campus Travel Survey

Note: Questions 5, 7, 8, 13, 18, 19, 20, 29, 30, and 31 were included in the CCSF-wide facilities survey.

1 Have you already taken this survey? *

- ○ Yes ○ No

2 Are you a student or CCSF employee?

- ○ Student ○ CCSF Employee (Full or Part-Time) ○ Visitor

3 Which best describes you?

- ○ I am a Student in Credit classes ○ I am a Student in Non-credit classes
- ○ I am a Student in both Credit and Non-credit classes ○ I am a high school student or visiting student

4 What CCSF Campus do you mostly attend? (Pick one)

[Ooops! You must make a selection ▼]

5 How did you get to Ocean campus **today**? (select the primary mode - walking to/from public transit or car does not count as walking)

[Ooops! You must make a selection ▼]

6 How much are you willing to pay per day for visitor parking?

[Ooops! You must make a selection ▼]

7 Which Muni line did you use to get to Ocean campus **today**?

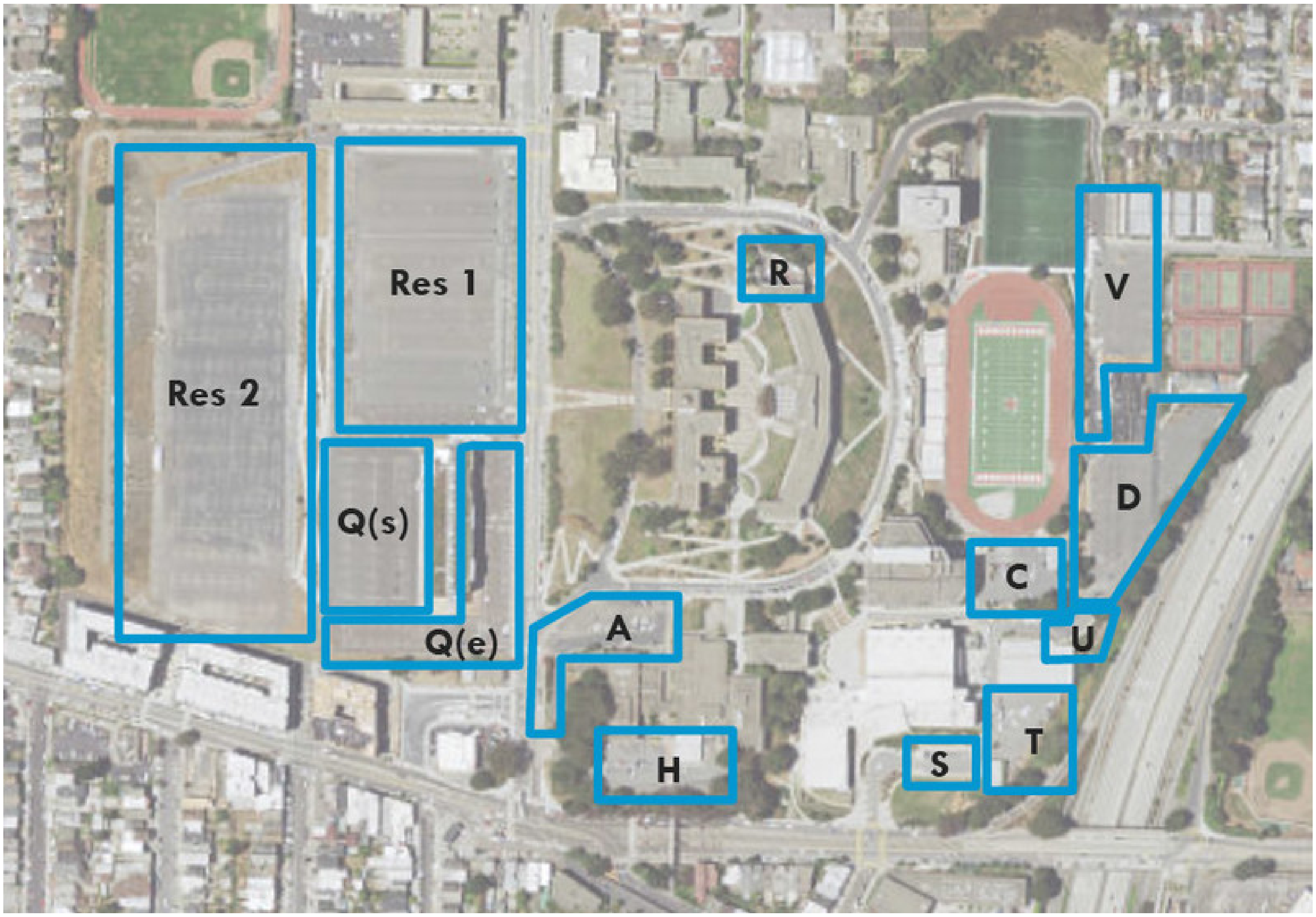
- ○ 8 ○ 8BX ○ 23 ○ 29 ○ 43 ○ 49 ○ 54 ○ 57 ○ 91 ○ J ○ KT ○ M

8 Where did you park?

○ CCSF Ocean Campus parking lot ○ Neighborhood around CCSF ○ Balboa Park BART parking lot
○ Other BART parking lot ○ I got dropped off ○ Other

---

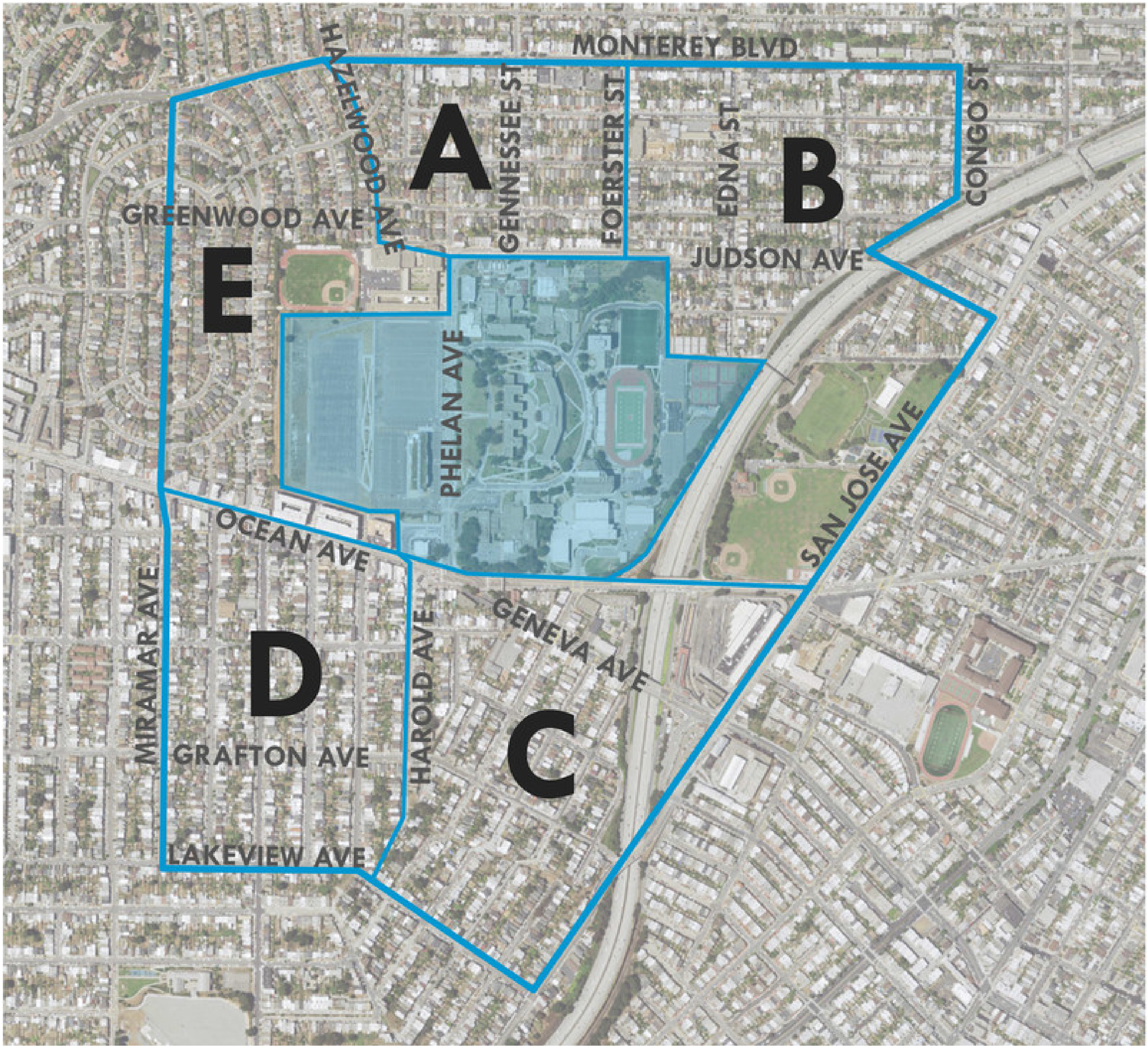
9 Which Ocean Campus Parking Lot did you park in?



○ Res 1 ○ Res 2 ○ A ○ C ○ D ○ H ○ Q (s) ○ Q (e) ○ R ○ S ○ T ○ U
○ V

---

10 Which area of Balboa Park did you park in?



- A
- B
- C
- D
- E
- Other

---

11 Where did you park your bike?

- Bike rack on campus
- Bike rack on street
- In a school building/lecture hall
- Bike locker/bike cage (on campus or at BART station)
- Other

---

12 Which entrance did you use to access CCSF Ocean Campus?

- ○ A ○ B ○ C ○ D ○ E ○ F ○ G

---

13 How comfortable is your walking or bike experience?

- ○ 1 ○ 2 ○ 3 ○ 4 ○ 5

---

14 Which of the following would make your bike/walk experience better?

- ○ Improved pedestrian crossings
- ○ Improved bicycle facilities
- ○ Less/slower vehicle traffic on local streets
- ○ Less/slower vehicle traffic on major streets
- ○ More and better commercial, retail, employment and/or housing development in the area

---

15 Do you have a Muni pass?

○ Yes, Muni Lifeline pass ○ Yes, free Muni for Senior/Disabled persons
○ Yes, Muni Fast Pass (monthly pass) ○ Yes, free Muni for youth ○ Yes, Muni + BART pass (A pass)
○ Yes, Discount Youth pass ○ Yes, Discount Senior/Person with Disabilities pass ○ No

---

16 On any given day, how did you **typically** get to Ocean campus? (select the primary mode - walking to/from public transit or car does not count as walking)

Ooops! You must make a selection ▼

---

17 Which Muni line do you **typically** use to get to Ocean campus?

○ 8 ○ 8BX ○ 23 ○ 29 ○ 43 ○ 49 ○ 54 ○ 57 ○ 91 ○ J ○ KT ○ M

---

18 How long does it typically take you to get to the CCSF Ocean Campus?

○ Less than 5 minutes ○ 5 - 10 minutes ○ 10 - 15 minutes ○ 15 - 20 minutes
○ 20 - 30 minutes ○ 30 - 45 minutes ○ 45 minutes - 1 hour ○ More than 1 hour

---

19 When determining how you typically travel to/from CCSF Ocean Campus, what are you **most** concerned about?

○ Cost ○ Distance ○ Travel time ○ Arriving on time ○ Having a comfortable/safe trip

---

20 What are your travel costs to attend classes at CCSF Ocean Campus during the semester? (select all that apply)

☐ Gas ☐ Muni fare (daily) ☐ BART fare ☐ Muni Monthly Pass ☐ Parking permit
☐ Bike cage/locker at BART station ☐ Other

---

21 What days do you typically come to CCSF Ocean Campus?

☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday

22 When do you **typically** arrive at CCSF Ocean Campus?

○ Before 11:00 AM ○ 11:00 AM - 2:00 PM ○ 2:00 PM - 5:00 PM ○ 5:00 PM - 8:00 PM
○ After 8:00 PM

23 When do you **typically** leave CCSF Ocean Campus?

○ Before 11:00 AM ○ 11:00 AM - 2:00 PM ○ 2:00 PM - 5:00 PM ○ 5:00 PM - 8:00 PM
○ After 8:00 PM

24 Where did you come from **today** to get to CCSF Ocean Campus?

○ Home ○ Work ○ Other CCSF Campus location ○ Other

25 Where do you **typically** come from to get to CCSF Ocean Campus?

○ Home ○ Work ○ Other CCSF Campus location ○ Other

26 Do you **typically** make any stops before arriving to CCSF Ocean Campus?

○ Yes ○ No

27 What type of stop do you **typically** make on your way to CCSF Ocean Campus?

○ Shopping ○ Meal or Snack ○ Social/recreation ○ pick-up/drop-off children ○ Other

28 Where do you **typically** go after leaving CCSF Ocean Campus?

○ Home ○ Work ○ Other CCSF Campus location ○ Other

---

29 What would encourage you to use other transportation options?

- ☐ Saving money
- ☐ Arriving closer to my destination
- ☐ Reducing my travel time
- ☐ Consistently arriving on time
- ☐ Having a more comfortable/safe trip

---

30 Are you open to using another mode of travel, other than what you currently use, to get to and from CCSF Ocean Campus?

- ☐ I am interested trying biking
- ☐ I am interested in trying walking
- ☐ I am interested in trying Muni
- ☐ I am interested in trying BART
- ☐ I am interested in trying carpooling
- ☐ I am interested in trying driving
- ☐ I am interested in trying Uber, Lyft, Taxi
- ☐ No, I am not interested in other transportation options

---

31 For statistical purposes, please enter your home zip code.

---

32 For statistical purposes, please enter your work zip code.

---

33 If you would like to be entered to for a chance to recieve a $100 Visa Gift Card, please enter your email address below.

Submit

Appendix B San Francisco Department of Environment Community Survey

TRANSPORTATION SURVEY English

Please take 3 minutes to complete this survey which will help us understand your commuting needs in order to provide better transportation options in the future.

If completing this paper form, please return it to your manager. If you have any questions, call the San Francisco Department of the Environment at 1-415-355-3721.

Thank you for taking the time to complete our survey!

1. Today's Date:			
2. What is your home zipcode?			
3. In the last 30 days, have you completed a transportation survey mailed to your home?	☐ Yes ☐ No / Don't remember		
4. In the questions below, you will be reporting on the last 3 days you worked at this location. Please specify which days you are reporting on:	☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday		
5. What time did you get ***to*** work the last 3 days?	☐ 12:00am-3:59am ☐ 4:00am-5:59am ☐ 6:00am-7:59am ☐ 8:00am-9:59am ☐ 10:00am-11:59am ☐ 12:00pm-3:59pm ☐ 4:00pm-5:59pm ☐6:00pm-7:59pm ☐8:00pm-9:59pm ☐10:00pm-11:59pm	☐ 12:00am-3:59am ☐ 4:00am-5:59am ☐ 6:00am-7:59am ☐ 8:00am-9:59am ☐ 10:00am-11:59am ☐ 12:00pm-3:59pm ☐ 4:00pm-5:59pm ☐6:00pm-7:59pm ☐8:00pm-9:59pm ☐10:00pm-11:59pm	☐ 12:00am-3:59am ☐ 4:00am-5:59am ☐ 6:00am-7:59am ☐ 8:00am-9:59am ☐ 10:00am-11:59am ☐ 12:00pm-3:59pm ☐ 4:00pm-5:59pm ☐6:00pm-7:59pm ☐8:00pm-9:59pm ☐10:00pm-11:59pm
6. What time did you ***leave*** work the last 3 days?	**Day 1** ☐ 12:00am-3:59am ☐ 4:00am-5:59am ☐ 6:00am-7:59am ☐ 8:00am-9:59am ☐ 10:00am-11:59am ☐ 12:00pm-3:59pm ☐ 4:00pm-5:59pm ☐6:00pm-7:59pm ☐8:00pm-9:59pm ☐10:00pm-11:59pm	**Day 2** ☐ 12:00am-3:59am ☐ 4:00am-5:59am ☐ 6:00am-7:59am ☐ 8:00am-9:59am ☐ 10:00am-11:59am ☐ 12:00pm-3:59pm ☐ 4:00pm-5:59pm ☐6:00pm-7:59pm ☐8:00pm-9:59pm ☐10:00pm-11:59pm	**Day 3** ☐ 12:00am-3:59am ☐ 4:00am-5:59am ☐ 6:00am-7:59am ☐ 8:00am-9:59am ☐ 10:00am-11:59am ☐ 12:00pm-3:59pm ☐ 4:00pm-5:59pm ☐6:00pm-7:59pm ☐8:00pm-9:59pm ☐10:00pm-11:59pm
7. How did you get ***to*** work the last 3 days? (If you used more than one way, please indicate the way for the longest part of your trip.)	**Day 1** ☐ Drove Alone ☐ Carpooled (2 - 6 people) ☐ Vanpooled (7 - 15 people) ☐ Took public transit ☐ Took a shuttle ☐ Rode a motorcycle ☐ Biked ☐ Walked ☐ Took a taxi ☐ Transporation network company (Uber/Lyft/etc.)	**Day 2** ☐ Drove Alone ☐ Carpooled (2 - 6 people) ☐ Vanpooled (7 - 15 people) ☐ Took public transit ☐ Took a shuttle ☐ Rode a motorcycle ☐ Biked ☐ Walked ☐ Took a taxi ☐ Transporation network company (Uber/Lyft/etc.)	**Day 3** ☐ Drove Alone ☐ Carpooled (2 - 6 people) ☐ Vanpooled (7 - 15 people) ☐ Took public transit ☐ Took a shuttle ☐ Rode a motorcycle ☐ Biked ☐ Walked ☐ Took a taxi ☐ Transporation network company (Uber/Lyft/etc.)

Please Turn Over -->

8. How did you depart ***from*** work the last 3 days? (If you used more than one way, please indicate the way for the longest part of your trip.)	**Day 1** ☐ Drove Alone ☐ Carpooled (2 - 6 people) ☐ Vanpooled (7 - 15 people) ☐ Took public transit ☐ Took a shuttle ☐ Rode a motorcycle ☐ Biked ☐ Walked ☐ Took a taxi ☐ Transporation network company (Uber/Lyft/etc.)	**Day 2** ☐ Drove Alone ☐ Carpooled (2 - 6 people) ☐ Vanpooled (7 - 15 people) ☐ Took public transit ☐ Took a shuttle ☐ Rode a motorcycle ☐ Biked ☐ Walked ☐ Took a taxi ☐ Transporation network company (Uber/Lyft/etc.)	**Day 3** ☐ Drove Alone ☐ Carpooled (2 - 6 people) ☐ Vanpooled (7 - 15 people) ☐ Took public transit ☐ Took a shuttle ☐ Rode a motorcycle ☐ Biked ☐ Walked ☐ Took a taxi ☐ Transporation network company (Uber/Lyft/etc.)
9. What is most important to you when you choose how you get to work? (Select up to 3)	☐ Ability to make stops on the way to work or home ☐ Comfort and Safety ☐ Convenience/Flexibility ☐ Cost ☐ Reliability ☐ Reducing pollution, conserving energy ☐ Stress ☐ Travel Time		
10. What other ways would you be willing to try to get to work? (Select up to 3)	☐ Bike ☐ Carpool ☐ Transit ☐ Vanpool ☐ Walk ☐ Work at home for a regular work day ☐ None		
11. What would encourage you to use the other ways selected above? (Select up to 3)	☐ Awards/prizes ☐ Better bike/walk access from your home to work ☐ Financial incentives ☐ Free ride home in an emergency ☐ Help with biking routes and equipment ☐ Help finding carpool/vanpool partners ☐ Help with transit routes and information ☐ Help with walking routes ☐ A safe place to park a bike ☐ Shuttle between transit station and work place ☐ Special parking for carpools/vanpools ☐ Nothing, I already use the other ways		
12. Feel free to share any additional comments about your trip to and from work:			
For statistical purposes only, please tell us a little about yourself			
13. What is your age?	☐ 16-20 ☐ 21-35 ☐ 36-50 ☐ 51-65 ☐ Over 65		
14. What is your gender identification?	☐ Female ☐ Male ☐ Trans*		

TRANSPORTATION SURVEY

The survey may be filled out by up to four members of your household who are 16-years or older. Others can complete the survey on the back page. The survey can also be found online at: www.sfenvironment.org/ingleside-survey-en.

Please return the survey by **January 15, 2016** in order **to receive $2 cash** for your participation. Forms can be returned in the enclosed envelope or addressed to:

San Francisco Department on the Environment
1455 Market Street, Suite 1200
San Francisco, CA 94103

Please write your address and contact information to receive the $2 in cash:

Address:

Name: ____________________ Phone/Email: ________________ Today's Date: ___________

PART 1

1. In the past three days (do not include today), how many trips did you make using the travel types listed below? (A "trip" is one-way. Driving to the store and then back home is 2 trips. When answering this question, please consider all trips you took.) Please use the table below to log your trips for the past 3 days:

Type of Trip	Car	Transit	Bicycle	Walk
Work				
School				
Errands (store, shopping, library, doctor, etc.)				
Other (social, recreational)				

2. Thinking of the trips you made by car (mentioned above), in how many were you:

The driver _______ A passenger _______ Did not drive _______

2a. Thinking of the trips you made by car (mentioned above), are you willing to try a different type of travel for any of them? ☐Yes ☐No

Comments:

3. Where do you get local/neighborhood information?

- ☐ **Newspaper** (Please specify which one: ________________________________)
- ☐ **Community group** (Please specify which one(s):____________________________)
- ☐ **Neighbors**
- ☐ **Café** (Please specify which one: ________________________________)
- ☐ **Online** (Please specify which one: ________________________________)
- ☐ **Phone Apps** (Please specify which one: ____________________________)
- ☐ **Other** (Please specify: ________________________________)

PLEASE CONTINUE TO THE OTHER SIDE →

PART 2:

For statistical purposes only, please tell us a little about yourself and your household.

What is your age? □16-20 □21-35 □36-50 □51-65 □over 65

What is your gender identification? □Female □Male □Trans*

Do you work outside the home? □Yes □No

Including yourself, how many people live in your household who are 16 years of age or older?

□1 person □2 people □3 people □4 people □5 or more people

How many working motorized vehicles does your household have direct access to? (Includes: cars, trucks, vans, motorcycles)

□0 vehicles (none) □1 vehicle □2 vehicles □3 or more vehicles

How many bicycles does your household have direct access to?

□0 bikes (none) □1 bike □2 bikes □3 or more bikes

(**Optional**) **What is your annual household income?**

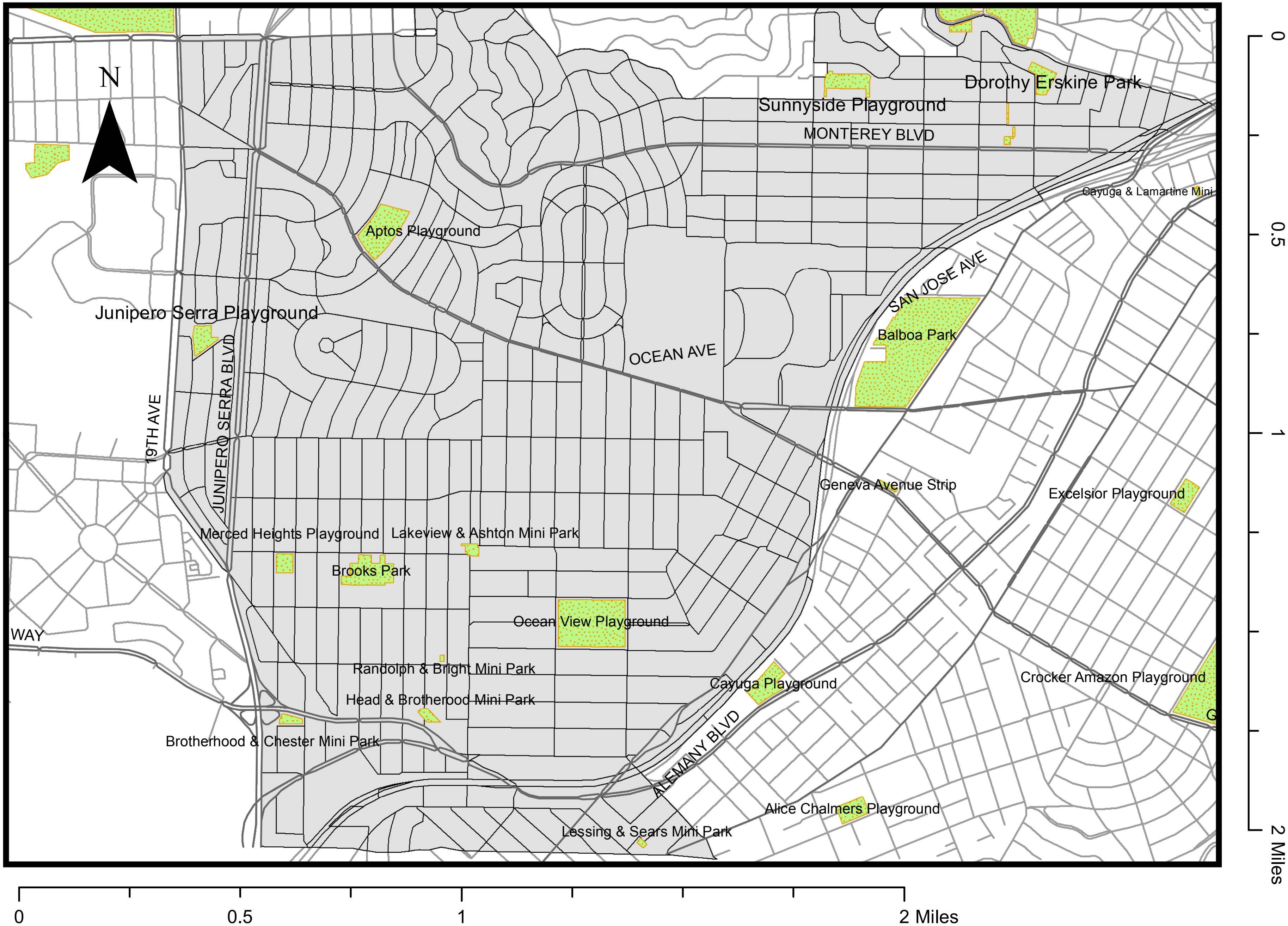
□Under $35,000 □$35-50,000 □$50-100,000 □$100 - $150,000 □$150-$200,000 □$200,000+

Additional comments:

PART 3:

Use the following to fill out surveys for additional household members (up to four total)

	Person 1	**Person 2**	**Person 3**
Today's Date:			
1. In the past three days (do not include today), how many trips did you make? (A "trip" is one-way. Driving to the store and then back home is 2 trips. When answering this question, please consider all trips you took.)	Car ______ Transit ______ Bicycle ______ Walk ______	Car ______ Transit ______ Bicycle ______ Walk ______	Car ______ Transit ______ Bicycle ______ Walk ______
2. Thinking of the trips you made by car (mentioned above), in how many were you:	The driver _______ A passenger _______	The driver _______ A passenger _______	The driver _______ A passenger _______



SF Moves Ingleside Project Area Parks and Playgrounds

Appendix C Intersection Level of Service Methodology and Outputs

Intersection Level of Service Analysis Methodologies

The operation of a local roadway network is commonly measured and described using a grading system called Level of Service (LOS). The LOS grading system qualitatively characterizes traffic conditions associated with varying levels of vehicle traffic, ranging from LOS A (indicating free-flow traffic conditions with little or no delay experienced by motorists) to LOS F (indicating congested conditions where traffic flows exceed design capacity and result in long delays). This LOS grading system applies to both roadway segments and intersections.

Signalized Intersections

For signalized intersections, traffic conditions were evaluated using the Highway Capacity Manual (HCM) methodology and the Synchro/Simtraffic software program. The HCM methodology incorporates various intersection characteristics (e.g., traffic volumes, lane geometry, and signal phasing/timing) to estimate the average control delay experienced by motorists traveling through an intersection (Transportation Research Board, 2010).

Unsignalized Intersections

For unsignalized (all-way stop-controlled and side-street stop-controlled) intersections, traffic conditions are evaluated using the HCM operations methodology and the Synchro/Simtraffic software program. With this methodology, the LOS is related to the total delay per vehicle for the intersection as a whole (for all-way stop-controlled intersections), and for each stop-controlled movement or approach only (for side-street stop-controlled intersections). Total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line. This time includes the time required for a vehicle to travel from the last-in-queue position to the first-in-queue position. **Figure 1** presents the relationships between delay and level of service for signalized and unsignalized intersections.

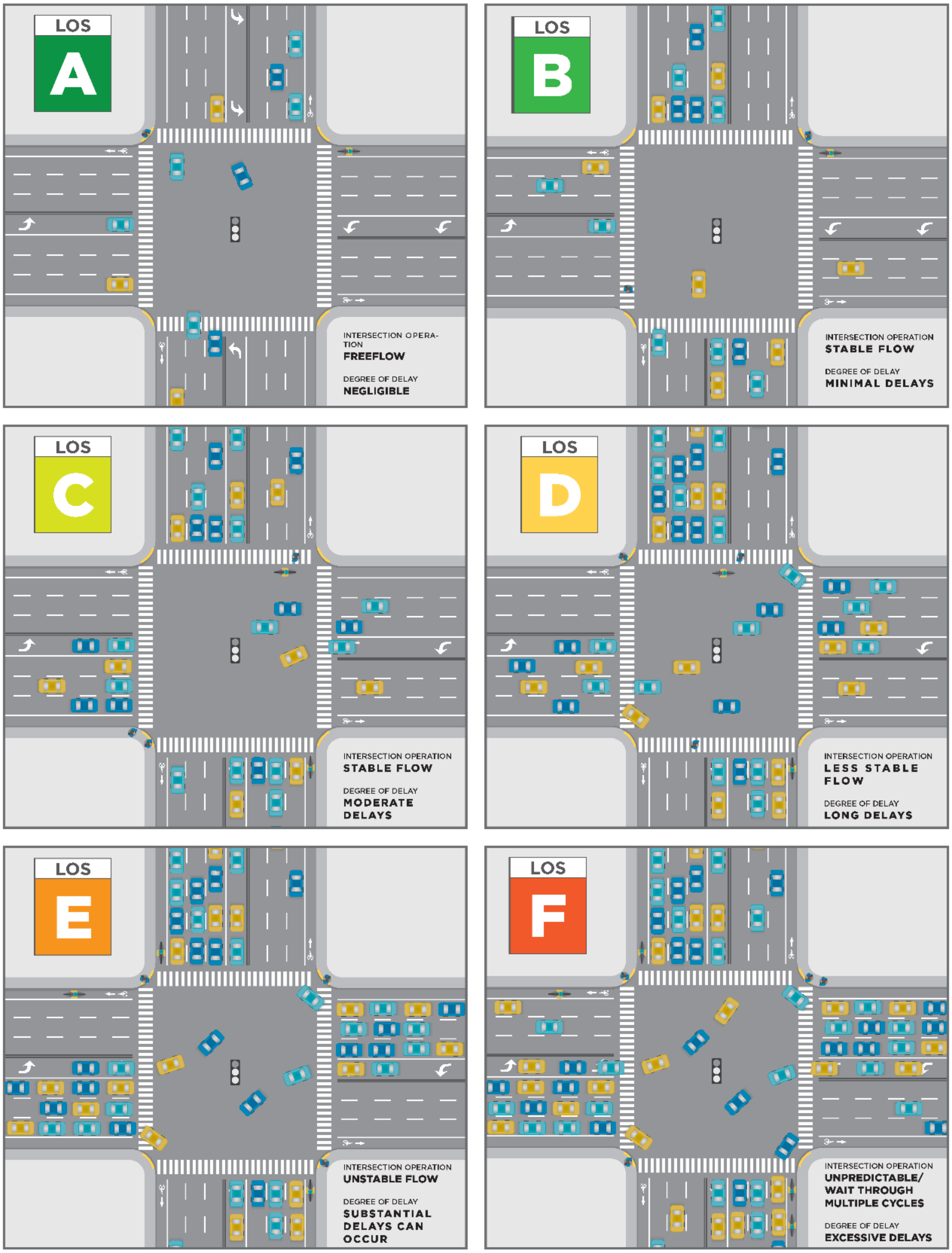
Figure illustrates LOS conditions at a signalized intersection.

Figure 1 Intersection Level of Service Definitions

LOS	Flow Type	Operational Characteristics	Intersection Control Delay (seconds/vehicle)	
			Signal Control	2-Way-Stop or All-Way Stop Control
A	Stable Flow	Free-flow conditions with negligible to minimal delays. Excellent progression with most vehicles arriving during the green phase and not having to stop at all. Nearly all drivers find freedom of operation.	< 10	0 – 10
B	Stable Flow	Good progression with slight delays. Short cycle-lengths typical. Relatively more vehicles stop than under LOS A. Vehicle platoons are formed. Drivers begin to feel somewhat restricted within groups of vehicles.	> 10 – 20	> 10 – 15
C	Stable Flow	Relatively higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear. The number of vehicles stopping is significant, although many still pass through without stopping. Most drivers feel somewhat restricted.	> 20 – 35	> 15 – 25
D	Approaching Unstable Flow	Somewhat congested conditions. Longer but tolerable delays may result from unfavorable progression, long cycle lengths, and/or high volume-to-capacity ratios. Many vehicles are stopped. Individual cycle failures may be noticeable. Drivers feel restricted during short periods due to temporary back-ups.	> 35 – 55	> 25 – 35
E	Unstable Flow	Congested conditions. Significant delays result from poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures occur frequently. There are typically long queues of vehicles waiting upstream of the intersection. Driver maneuverability is very restricted.	> 55 – 80	> 35 – 50
F	Forced Flow	Jammed or grid-lock type operating conditions. Generally considered to be unacceptable for most drivers. Zero or very poor progression, with over-saturation or high volume-to-capacity ratios. Several individual cycle failures occur. Queue spillovers from other locations restrict or prevent movement.	> 80	> 50

Source: Highway Capacity Manual (HCM) 2010

Figure 2 Level of Service Examples



Source: Nelson\Nygaard, 2016.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	985	0	0	970	575	10
Future Volume (vph)	985	0	0	970	575	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	5%			5%	0%	
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	0.95			0.95	0.97	
Frpb, ped/bikes	1.00			1.00	1.00	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	3336			3336	3311	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	3336			3336	3311	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1048	0	0	1032	612	11
RTOR Reduction (vph)	0	0	0	0	1	0
Lane Group Flow (vph)	1048	0	0	1032	622	0
Confl. Peds. (#/hr)			100		100	100
Turn Type	NA			NA	Prot	
Protected Phases	13			1	8	
Permitted Phases						
Actuated Green, G (s)	46.0			46.0	26.0	
Effective Green, g (s)	46.0			46.0	26.0	
Actuated g/C Ratio	0.58			0.58	0.32	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1918			1918	1076	
v/s Ratio Prot	c0.31			0.31	c0.19	
v/s Ratio Perm						
v/c Ratio	0.55			0.54	0.58	
Uniform Delay, d1	10.5			10.5	22.4	
Progression Factor	0.43			1.56	1.00	
Incremental Delay, d2	1.0			0.9	0.8	
Delay (s)	5.5			17.3	23.2	
Level of Service	A			B	C	
Approach Delay (s)	5.5			17.3	23.2	
Approach LOS	A			B	C	

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	804	0	0	950	50	10	50	140	50	0	10
Future Volume (vph)	0	804	0	0	950	50	10	50	140	50	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		1.00			0.99			0.91			0.98	
Flt Protected		1.00			1.00			1.00			0.96	
Satd. Flow (prot)		3421			3396			1626			1689	
Flt Permitted		1.00			1.00			0.99			0.75	
Satd. Flow (perm)		3421			3396			1613			1324	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	855	0	0	1011	53	11	53	149	53	0	11
RTOR Reduction (vph)	0	0	0	0	5	0	0	101	0	0	18	0
Lane Group Flow (vph)	0	855	0	0	1059	0	0	112	0	0	46	0
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		6			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		45.0			45.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Lane Grp Cap (vph)		1967			1952			524			430	
v/s Ratio Prot		0.25			c0.31							
v/s Ratio Perm								c0.07			0.03	
v/c Ratio		0.43			0.54			0.21			0.11	
Uniform Delay, d1		9.6			10.5			19.6			18.9	
Progression Factor		0.28			1.00			1.00			1.00	
Incremental Delay, d2		0.6			1.1			0.9			0.5	
Delay (s)		3.3			11.6			20.5			19.4	
Level of Service		A			B			C			B	
Approach Delay (s)		3.3			11.6			20.5			19.4	
Approach LOS		A			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	613	381	0	0	356	205	0	0	0	0	0	0
Future Volume (vph)	613	381	0	0	356	205	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0							
Lane Util. Factor	1.00	1.00			1.00							
Frpb, ped/bikes	1.00	1.00			0.91							
Flpb, ped/bikes	1.00	1.00			1.00							
Frt	1.00	1.00			0.95							
Flt Protected	0.95	1.00			1.00							
Satd. Flow (prot)	1711	1801			1541							
Flt Permitted	0.95	1.00			1.00							
Satd. Flow (perm)	1711	1801			1541							
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	632	393	0	0	367	211	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	17	0	0	0	0	0	0	0
Lane Group Flow (vph)	632	393	0	0	561	0	0	0	0	0	0	0
Confl. Peds. (#/hr)						100						
Confl. Bikes (#/hr)						10						
Heavy Vehicles (%)	2%	2%	100%	100%	2%	2%	100%	100%	100%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA							
Protected Phases	5	2		1	6			14				
Permitted Phases							14					
Actuated Green, G (s)	42.0	100.0			48.0							
Effective Green, g (s)	43.0	100.0			49.0							
Actuated g/C Ratio	0.43	1.00			0.49							
Clearance Time (s)	5.0	5.0			5.0							
Vehicle Extension (s)	0.2	0.2			0.2							
Lane Grp Cap (vph)	735	1801			755							
v/s Ratio Prot	c0.37	0.22			c0.36							
v/s Ratio Perm												
v/c Ratio	0.86	0.22			0.74							
Uniform Delay, d1	25.8	0.0			20.4							
Progression Factor	1.00	1.00			1.00							
Incremental Delay, d2	9.5	0.3			6.5							
Delay (s)	35.3	0.3			27.0							
Level of Service	D	A			C							
Approach Delay (s)		21.9			27.0			0.0			0.0	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	283	57	81	395	40	109	317	137	47	170	57
Future Volume (vph)	41	283	57	81	395	40	109	317	137	47	170	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00			0.95	
Frpb, ped/bikes		1.00	0.75	1.00	0.99		1.00	0.96			0.97	
Flpb, ped/bikes		0.99	1.00	0.88	1.00		0.91	1.00			0.99	
Frt		1.00	0.85	1.00	0.99		1.00	0.95			0.97	
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)		1777	1148	1501	1751		1564	1643			3157	
Flt Permitted		0.91	1.00	0.48	1.00		0.57	1.00			0.77	
Satd. Flow (perm)		1629	1148	757	1751		937	1643			2458	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	44	301	61	86	420	43	116	337	146	50	181	61
RTOR Reduction (vph)	0	0	22	0	5	0	0	21	0	0	31	0
Lane Group Flow (vph)	0	345	39	86	458	0	116	462	0	0	261	0
Confl. Peds. (#/hr)	100		100	100		100	100		100	100		100
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		37.0	37.0	37.0	37.0		29.0	29.0			29.0	
Effective Green, g (s)		37.0	37.0	37.0	37.0		30.0	30.0			30.0	
Actuated g/C Ratio		0.49	0.49	0.49	0.49		0.40	0.40			0.40	
Clearance Time (s)		4.0	4.0	4.0	4.0		5.0	5.0			5.0	
Lane Grp Cap (vph)		803	566	373	863		374	657			983	
v/s Ratio Prot					c0.26			c0.28				
v/s Ratio Perm		0.21	0.03	0.11			0.12				0.11	
v/c Ratio		0.43	0.07	0.23	0.53		0.31	0.70			0.27	
Uniform Delay, d1		12.2	10.0	10.9	13.0		15.4	18.8			15.1	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		1.7	0.2	1.4	2.3		2.1	6.2			0.7	
Delay (s)		13.9	10.2	12.3	15.4		17.6	25.0			15.8	
Level of Service		B	B	B	B		B	C			B	
Approach Delay (s)		13.3			14.9			23.5			15.8	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	110.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	393	8	90	448	88	0	0	0	0	0	0
Future Volume (vph)	16	393	8	90	448	88	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		5%			5%			0%			0%	
Total Lost time (s)		4.0		4.0	4.0							
Lane Util. Factor		0.95		1.00	0.95							
Frpb, ped/bikes		1.00		1.00	0.99							
Flpb, ped/bikes		1.00		0.97	1.00							
Frt		1.00		1.00	0.98							
Flt Protected		1.00		0.95	1.00							
Satd. Flow (prot)		3310		1612	3207							
Flt Permitted		0.93		0.49	1.00							
Satd. Flow (perm)		3089		839	3207							
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	17	418	9	96	477	94	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	444	0	96	571	0	0	0	0	0	0	0
Confl. Peds. (#/hr)	100		100	100		100						
Confl. Bikes (#/hr)			10			10						
Turn Type	Perm	NA		Perm	NA							
Protected Phases		4			8							
Permitted Phases	4			8								
Actuated Green, G (s)		13.1		13.1	13.1							
Effective Green, g (s)		13.1		13.1	13.1							
Actuated g/C Ratio		0.65		0.65	0.65							
Clearance Time (s)		4.0		4.0	4.0							
Vehicle Extension (s)		3.0		3.0	3.0							
Lane Grp Cap (vph)		2023		549	2100							
v/s Ratio Prot					c0.18							
v/s Ratio Perm		0.14		0.11								
v/c Ratio		0.22		0.17	0.27							
Uniform Delay, d1		1.4		1.3	1.4							
Progression Factor		1.00		1.00	1.00							
Incremental Delay, d2		0.1		0.2	0.1							
Delay (s)		1.4		1.5	1.5							
Level of Service		A		A	A							
Approach Delay (s)		1.4			1.5			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	1.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	283	295	674	550	0	0	0	0	90	0	41
Future Volume (vph)	0	283	295	674	550	0	0	0	0	90	0	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	11	11	11	12	12	12
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95					0.95	0.95	
Frpb, ped/bikes		1.00	0.68	1.00	1.00					1.00	0.91	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		1.00	0.85	1.00	1.00					1.00	0.91	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (prot)		2887	823	1540	3079					1513	1287	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (perm)		2887	823	1540	3079					1513	1287	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	295	307	702	573	0	0	0	0	94	0	43
RTOR Reduction (vph)	0	0	158	0	0	0	0	0	0	0	39	0
Lane Group Flow (vph)	0	295	149	702	573	0	0	0	0	67	31	0
Confl. Peds. (#/hr)			100	100								100
Confl. Bikes (#/hr)			30			30						
Parking (#/hr)		5	5									
Turn Type		NA	Perm	Prot	NA					Perm	NA	
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		19.8	19.8	51.0	73.8					9.2	9.2	
Effective Green, g (s)		19.3	19.3	50.0	73.3					8.7	8.7	
Actuated g/C Ratio		0.21	0.21	0.56	0.81					0.10	0.10	
Clearance Time (s)		3.5	3.5	3.0	3.5					3.5	3.5	
Vehicle Extension (s)		4.0	4.0	3.0	4.0					4.0	4.0	
Lane Grp Cap (vph)		619	176	855	2507					146	124	
v/s Ratio Prot		0.10		c0.46	0.19							
v/s Ratio Perm			c0.18							c0.04	0.02	
v/c Ratio		0.48	0.85	0.82	0.23					0.46	0.25	
Uniform Delay, d1		30.9	33.9	16.3	1.9					38.4	37.6	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		2.6	36.9	6.4	0.2					3.1	1.5	
Delay (s)		33.5	70.8	22.7	2.1					41.5	39.1	
Level of Service		C	E	C	A					D	D	
Approach Delay (s)		52.6			13.5			0.0			40.3	
Approach LOS		D			B			A			D	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	230	730	0	0	633	318	591	42	483	0	0	0
Future Volume (vph)	230	730	0	0	633	318	591	42	483	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	11	11	11
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0				
Lane Util. Factor		0.95			0.95	1.00	0.95	0.95				
Frpb, ped/bikes		1.00			1.00	0.77	1.00	0.90				
Flpb, ped/bikes		0.98			1.00	1.00	1.00	1.00				
Frt		1.00			1.00	0.85	1.00	0.88				
Flt Protected		0.99			1.00	1.00	0.95	0.99				
Satd. Flow (prot)		2989			3079	1061	1513	1248				
Flt Permitted		0.64			1.00	1.00	0.95	0.99				
Satd. Flow (perm)		1932			3079	1061	1513	1248				
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	237	753	0	0	653	328	609	43	498	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	137	0	102	0	0	0	0
Lane Group Flow (vph)	0	990	0	0	653	191	548	500	0	0	0	0
Confl. Peds. (#/hr)	100					100			100			
Confl. Bikes (#/hr)			10			10						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			8				
Permitted Phases	2					6	8					
Actuated Green, G (s)		39.5			39.5	39.5	28.5	28.5				
Effective Green, g (s)		39.0			39.0	39.0	28.0	28.0				
Actuated g/C Ratio		0.52			0.52	0.52	0.37	0.37				
Clearance Time (s)		3.5			3.5	3.5	3.5	3.5				
Vehicle Extension (s)		5.0			5.0	5.0	5.0	5.0				
Lane Grp Cap (vph)		1004			1601	551	564	465				
v/s Ratio Prot					0.21							
v/s Ratio Perm		c0.51				0.18	0.36	0.40				
v/c Ratio		0.99			0.41	0.35	0.97	1.07				
Uniform Delay, d1		17.7			11.0	10.5	23.1	23.5				
Progression Factor		1.00			1.00	1.00	1.00	1.00				
Incremental Delay, d2		25.2			0.8	1.7	31.0	63.3				
Delay (s)		43.0			11.7	12.3	54.1	86.8				
Level of Service		D			B	B	D	F				
Approach Delay (s)		43.0			11.9			71.2			0.0	
Approach LOS		D			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	43.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	106.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	686	119	21	696	62	94	259	20	26	126	183
Future Volume (vph)	200	686	119	21	696	62	94	259	20	26	126	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.95		1.00	1.00	0.44		1.00	0.64	1.00	0.80	
Flpb, ped/bikes	0.98	1.00		0.91	1.00	1.00		0.92	1.00	0.83	1.00	
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1513	2861		1402	3042	586		1435	881	1284	1009	
Flt Permitted	0.18	1.00		0.28	1.00	1.00		0.81	1.00	0.44	1.00	
Satd. Flow (perm)	279	2861		408	3042	586		1178	881	598	1009	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	213	730	127	22	740	66	100	276	21	28	134	195
RTOR Reduction (vph)	0	15	0	0	0	0	0	0	11	0	0	0
Lane Group Flow (vph)	213	842	0	22	740	66	0	376	10	28	329	0
Confl. Peds. (#/hr)	400		400	400		400	400		400	400		400
Confl. Bikes (#/hr)			30			30			10			10
Bus Blockages (#/hr)	0	0	6	0	6	6	0	6	0	0	6	0
Parking (#/hr)											5	5
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	36.3	36.3		27.3	27.3	27.3		43.2	43.2	43.2	43.2	
Effective Green, g (s)	37.3	37.3		28.3	28.3	28.3		44.7	44.7	44.7	44.7	
Actuated g/C Ratio	0.41	0.41		0.31	0.31	0.31		0.50	0.50	0.50	0.50	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	184	1185		128	956	184		585	437	297	501	
v/s Ratio Prot	c0.06	0.29			0.24						c0.33	
v/s Ratio Perm	c0.42			0.05		0.11		0.32	0.01	0.05		
v/c Ratio	1.16	0.71		0.17	0.77	0.36		0.64	0.02	0.09	0.66	
Uniform Delay, d1	24.9	21.9		22.4	28.0	23.8		16.7	11.5	12.0	16.9	
Progression Factor	1.00	1.00		1.06	0.93	0.99		1.00	1.00	1.00	1.00	
Incremental Delay, d2	115.2	3.6		2.5	5.3	4.6		2.4	0.0	0.1	3.1	
Delay (s)	140.1	25.5		26.3	31.4	28.2		19.2	11.6	12.1	20.0	
Level of Service	F	C		C	C	C		B	B	B	C	
Approach Delay (s)		48.3			31.0			18.8			19.4	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	34.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	118.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	SER
Lane Configurations	
Traffic Volume (vph)	0
Future Volume (vph)	0
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	0
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	400
Confl. Bikes (#/hr)	
Bus Blockages (#/hr)	0
Parking (#/hr)	
Turn Type	Perm
Protected Phases	
Permitted Phases	13
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	334	6	158	895	284	2	96	94	173	74	284
Future Volume (vph)	215	334	6	158	895	284	2	96	94	173	74	284
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	0.91	0.91			0.95			1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00			1.00			1.00	1.00		1.00	0.87
Flpb, ped/bikes	1.00	1.00			1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00			0.97			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00			0.99			1.00	1.00		0.97	1.00
Satd. Flow (prot)	1557	3245			3293			1799	1531		1740	1338
Flt Permitted	0.95	1.00			0.99			1.00	1.00		0.97	1.00
Satd. Flow (perm)	1557	3245			3293			1799	1531		1740	1338
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	226	352	6	166	942	299	2	101	99	182	78	299
RTOR Reduction (vph)	0	1	0	0	22	0	0	0	90	0	0	256
Lane Group Flow (vph)	190	393	0	0	1385	0	0	103	9	0	260	43
Confl. Peds. (#/hr)			50	50			50					50
Confl. Bikes (#/hr)			10									10
Turn Type	Split	NA		Split	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	2	2		6	6		8	8		4	4	
Permitted Phases									8			4
Actuated Green, G (s)	18.0	18.0			50.0			10.0	10.0		16.0	16.0
Effective Green, g (s)	18.0	18.0			50.0			10.0	10.0		16.0	16.0
Actuated g/C Ratio	0.16	0.16			0.45			0.09	0.09		0.15	0.15
Clearance Time (s)	4.0	4.0			4.0			4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	254	531			1496			163	139		253	194
v/s Ratio Prot	c0.12	0.12			c0.42			c0.06			c0.15	
v/s Ratio Perm									0.01			0.03
v/c Ratio	0.75	0.74			0.93			0.63	0.06		1.03	0.22
Uniform Delay, d1	43.8	43.8			28.2			48.2	45.7		47.0	41.5
Progression Factor	1.00	1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	18.1	9.0			11.2			17.2	0.9		63.9	2.7
Delay (s)	62.0	52.8			39.5			65.4	46.6		110.9	44.2
Level of Service	E	D			D			E	D		F	D
Approach Delay (s)		55.8			39.5			56.2			75.2	
Approach LOS		E			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	51.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	50	80	270	64	40	296
Future Volume (Veh/h)	50	80	270	64	40	296
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	53	85	287	68	43	315
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			373			584
pX, platoon unblocked	0.99	0.99			0.99	
vC, conflicting volume	722	321			355	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	699	309			343	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	86	88			96	
cM capacity (veh/h)	389	724			1203	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	138	355	29	329
Volume Left	53	0	29	14
Volume Right	85	68	0	0
cSH	544	1700	1203	1203
Volume to Capacity	0.25	0.21	0.04	0.04
Queue Length 95th (ft)	25	0	3	3
Control Delay (s)	13.9	0.0	8.1	0.7
Lane LOS	B		A	A
Approach Delay (s)	13.9	0.0	1.3	
Approach LOS	B			

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection Sign configuration not allowed in HCM analysis.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	113	2	2	271	40	1	18	4	13	3	8
Future Volume (Veh/h)	29	113	2	2	271	40	1	18	4	13	3	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	31	120	2	2	288	43	1	19	4	14	3	9
Pedestrians		3			9			14			18	
Lane Width (ft)		10.0			10.0			10.0			10.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	349			136			524	550	144	537	530	330
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	349			136			524	550	144	537	530	330
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			100	95	100	97	99	99
cM capacity (veh/h)	1195			1434			433	421	889	413	433	701

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	153	333	24	26
Volume Left	31	2	1	14
Volume Right	2	43	4	9
cSH	1195	1434	462	484
Volume to Capacity	0.03	0.00	0.05	0.05
Queue Length 95th (ft)	2	0	4	4
Control Delay (s)	1.8	0.1	13.2	12.9
Lane LOS	A	A	B	B
Approach Delay (s)	1.8	0.1	13.2	12.9
Approach LOS			B	B

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection Sign configuration not allowed in HCM analysis.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	727	10	12	725	42	15	124	44	67	76	21
Future Volume (vph)	22	727	10	12	725	42	15	124	44	67	76	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	11	10	11	11	10	11
Grade (%)		5%			0%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.99			0.97			0.98	
Flt Protected		1.00			1.00			1.00			0.98	
Satd. Flow (prot)		3318			3373			1661			1659	
Flt Permitted		0.92			0.94			0.97			0.83	
Satd. Flow (perm)		3055			3173			1621			1402	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	23	773	11	13	771	45	16	132	47	71	81	22
RTOR Reduction (vph)	0	1	0	0	5	0	0	14	0	0	7	0
Lane Group Flow (vph)	0	806	0	0	824	0	0	181	0	0	167	0
Confl. Peds. (#/hr)	78		76	76		78	28		17	17		28
Confl. Bikes (#/hr)			8			7						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		44.5			44.5			24.5			24.5	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		5.5			5.5			5.5			5.5	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1756			1824			526			455	
v/s Ratio Prot												
v/s Ratio Perm		c0.26			0.26			0.11			c0.12	
v/c Ratio		0.46			0.45			0.34			0.37	
Uniform Delay, d1		9.8			9.8			20.5			20.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.9			0.8			1.8			2.3	
Delay (s)		10.7			10.6			22.3			23.0	
Level of Service		B			B			C			C	
Approach Delay (s)		10.7			10.6			22.3			23.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑↱			
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	0	0	0	0	0

Direction, Lane #	EB 1	WB 1
Volume Total (vph)	0	0
Volume Left (vph)	0	0
Volume Right (vph)	0	0
Hadj (s)	0.00	0.00
Departure Headway (s)	3.9	3.9
Degree Utilization, x	0.00	0.00
Capacity (veh/h)	917	917
Control Delay (s)	6.9	6.9
Approach Delay (s)	0.0	0.0
Approach LOS	A	A

Intersection Summary			
Delay	0.0		
Level of Service	A		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	4	42	705	74	4	67	644	110	36	92	19	103
Future Volume (vph)	4	42	705	74	4	67	644	110	36	92	19	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0				4.0			4.0		
Lane Util. Factor			0.95				0.95			1.00		
Frpb, ped/bikes			0.99				0.99			0.99		
Flpb, ped/bikes			1.00				1.00			1.00		
Frt			0.99				0.98			0.98		
Flt Protected			1.00				1.00			0.99		
Satd. Flow (prot)			3344				3305			1734		
Flt Permitted			0.85				0.75			0.87		
Satd. Flow (perm)			2845				2505			1533		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	4	45	750	79	4	71	685	117	38	98	20	110
RTOR Reduction (vph)	0	0	11	0	0	0	19	0	0	8	0	0
Lane Group Flow (vph)	0	0	867	0	0	0	859	0	0	148	0	0
Confl. Peds. (#/hr)	30	35		27	40	27		35	30		40	40
Confl. Bikes (#/hr)				10				1			1	
Turn Type	Perm	Perm	NA		Perm	Perm	NA		Perm	NA		Perm
Protected Phases			2				6			8		
Permitted Phases	2	2			6	6			8			4
Actuated Green, G (s)			27.0				27.0			26.5		
Effective Green, g (s)			29.0				29.0			29.0		
Actuated g/C Ratio			0.44				0.44			0.44		
Clearance Time (s)			6.0				6.0			6.5		
Lane Grp Cap (vph)			1250				1100			673		
v/s Ratio Prot												
v/s Ratio Perm			0.30				c0.34			0.10		
v/c Ratio			0.69				0.78			0.22		
Uniform Delay, d1			14.9				15.8			11.5		
Progression Factor			1.00				1.00			1.00		
Incremental Delay, d2			3.2				5.5			0.8		
Delay (s)			18.1				21.3			12.2		
Level of Service			B				C			B		
Approach Delay (s)			18.1				21.3			12.2		
Approach LOS			B				C			B		

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR
Lane Configurations	✣	
Traffic Volume (vph)	147	61
Future Volume (vph)	147	61
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	1.00	
Frpb, ped/bikes	0.99	
Flpb, ped/bikes	0.99	
Frt	0.97	
Flt Protected	0.98	
Satd. Flow (prot)	1699	
Flt Permitted	0.85	
Satd. Flow (perm)	1461	
Peak-hour factor, PHF	0.94	0.94
Adj. Flow (vph)	156	65
RTOR Reduction (vph)	13	0
Lane Group Flow (vph)	318	0
Confl. Peds. (#/hr)		30
Confl. Bikes (#/hr)		3
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	26.5	
Effective Green, g (s)	29.0	
Actuated g/C Ratio	0.44	
Clearance Time (s)	6.5	
Lane Grp Cap (vph)	641	
v/s Ratio Prot		
v/s Ratio Perm	c0.22	
v/c Ratio	0.50	
Uniform Delay, d1	13.3	
Progression Factor	1.00	
Incremental Delay, d2	2.7	
Delay (s)	16.0	
Level of Service	B	
Approach Delay (s)	16.0	
Approach LOS	B	

Intersection Summary

Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	106	16	1	20	416	259	202
Future Volume (Veh/h)	106	16	1	20	416	259	202
Sign Control	Stop				Free	Free	
Grade	0%				0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	113	17	0	21	443	276	215
Pedestrians	100				4	2	
Lane Width (ft)	10.0				11.0	11.0	
Walking Speed (ft/s)	4.0				4.0	4.0	
Percent Blockage	7				0	0	
Right turn flare (veh)							
Median type					None	None	
Median storage veh)							
Upstream signal (ft)						1055	
pX, platoon unblocked			0.00				
vC, conflicting volume	749	350	0	591			
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	749	350	0	591			
tC, single (s)	6.8	6.9	0.0	4.1			
tC, 2 stage (s)							
tF (s)	3.5	3.3	0.0	2.2			
p0 queue free %	64	97	0	98			
cM capacity (veh/h)	316	600	0	913			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	130	169	295	184	307
Volume Left	113	21	0	0	0
Volume Right	17	0	0	0	215
cSH	336	913	1700	1700	1700
Volume to Capacity	0.39	0.02	0.17	0.11	0.18
Queue Length 95th (ft)	44	2	0	0	0
Control Delay (s)	22.3	1.3	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	22.3	0.5		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	98	20	38	375	201	62
Future Volume (vph)	98	20	38	375	201	62
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	104	21	40	399	214	66

Direction, Lane #	SE 1	NE 1	NE 2	SW 1	SW 2
Volume Total (vph)	125	173	266	143	137
Volume Left (vph)	104	40	0	0	0
Volume Right (vph)	21	0	0	0	66
Hadj (s)	0.10	0.15	0.03	0.03	-0.30
Departure Headway (s)	5.5	5.3	5.2	5.4	5.0
Degree Utilization, x	0.19	0.25	0.38	0.21	0.19
Capacity (veh/h)	598	659	676	645	689
Control Delay (s)	9.8	8.9	10.2	8.6	8.0
Approach Delay (s)	9.8	9.7		8.3	
Approach LOS	A	A		A	

Intersection Summary			
Delay	9.2		
Level of Service	A		
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Sign Control			Stop			Stop			Stop			Stop
Traffic Volume (vph)	1	11	144	5	16	256	34	40	150	21	8	26
Future Volume (vph)	1	11	144	5	16	256	34	40	150	21	8	26
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	12	153	5	17	272	36	43	160	22	9	28

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	170	325	225	58
Volume Left (vph)	12	17	43	9
Volume Right (vph)	5	36	22	21
Hadj (s)	0.03	-0.02	0.01	-0.15
Departure Headway (s)	5.2	4.9	5.3	5.4
Degree Utilization, x	0.24	0.44	0.33	0.09
Capacity (veh/h)	642	697	623	580
Control Delay (s)	9.8	11.8	10.9	8.9
Approach Delay (s)	9.8	11.8	10.9	8.9
Approach LOS	A	B	B	A

Intersection Summary			
Delay	10.9		
Level of Service	B		
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SBR
Lane Configurations	
Sign Control	
Traffic Volume (vph)	20
Future Volume (vph)	20
Peak Hour Factor	0.94
Hourly flow rate (vph)	21
Direction, Lane #	

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations		✣				✣				✣		
Sign Control		Stop				Stop				Stop		
Traffic Volume (vph)	9	44	8	2	8	35	11	2	19	186	17	2
Future Volume (vph)	9	44	8	2	8	35	11	2	19	186	17	2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	10	47	9	0	9	37	12	0	20	198	18	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	66	58	236	54
Volume Left (vph)	10	9	20	2
Volume Right (vph)	9	12	18	2
Hadj (s)	-0.02	-0.06	0.01	0.02
Departure Headway (s)	4.6	4.6	4.3	4.5
Degree Utilization, x	0.08	0.07	0.28	0.07
Capacity (veh/h)	721	726	818	761
Control Delay (s)	8.0	7.9	8.9	7.8
Approach Delay (s)	8.0	7.9	8.9	7.8
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.5		
Level of Service	A		
Intersection Capacity Utilization	31.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SBT	SBR
Lane Configurations	✣	
Sign Control	Stop	
Traffic Volume (vph)	47	2
Future Volume (vph)	47	2
Peak Hour Factor	0.94	0.94
Hourly flow rate (vph)	50	2

Direction, Lane #

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	858	43	33	755	0	107	0	78	0	0	0
Future Volume (vph)	0	858	43	33	755	0	107	0	78	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	10	11	11	11	11	11
Grade (%)		5%			0%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		0.95			0.95			1.00				
Frt		0.99			1.00			0.94				
Flt Protected		1.00			1.00			0.97				
Satd. Flow (prot)		3312			3414			1650				
Flt Permitted		1.00			0.89			0.83				
Satd. Flow (perm)		3312			3028			1404				
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	913	46	35	803	0	114	0	83	0	0	0
RTOR Reduction (vph)	0	5	0	0	0	0	0	33	0	0	0	0
Lane Group Flow (vph)	0	954	0	0	838	0	0	164	0	0	0	0
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		47.0			47.0			22.0				
Effective Green, g (s)		48.0			48.0			23.0				
Actuated g/C Ratio		0.61			0.61			0.29				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		2012			1839			408				
v/s Ratio Prot		c0.29										
v/s Ratio Perm					0.28			c0.12				
v/c Ratio		0.47			0.46			0.40				
Uniform Delay, d1		8.5			8.4			22.5				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		0.8			0.2			2.9				
Delay (s)		9.3			8.6			25.4				
Level of Service		A			A			C				
Approach Delay (s)		9.3			8.6			25.4			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	641	164	0	653	0	188
Future Volume (Veh/h)	641	164	0	653	0	188
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	682	174	0	695	0	200
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			856		1116	769
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			856		1116	769
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	42
cM capacity (veh/h)			780		201	344

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	856	348	348	200
Volume Left	0	0	0	0
Volume Right	174	0	0	200
cSH	1700	1700	1700	344
Volume to Capacity	0.50	0.20	0.20	0.58
Queue Length 95th (ft)	0	0	0	87
Control Delay (s)	0.0	0.0	0.0	29.1
Lane LOS				D
Approach Delay (s)	0.0	0.0		29.1
Approach LOS				D

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection Sign configuration not allowed in HCM analysis.

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Sign Control			Stop				Stop			Stop		
Traffic Volume (vph)	8	50	777	54	5	17	692	87	7	55	14	111
Future Volume (vph)	8	50	777	54	5	17	692	87	7	55	14	111
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	53	827	57	0	18	736	93	7	59	15	118

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	467	471	386	461	81	188
Volume Left (vph)	53	0	18	0	7	118
Volume Right (vph)	0	57	0	93	15	22
Hadj (s)	0.09	-0.05	0.06	-0.11	-0.06	0.09
Departure Headway (s)	7.0	6.9	7.1	7.0	7.9	7.5
Degree Utilization, x	0.91	0.90	0.76	0.89	0.18	0.39
Capacity (veh/h)	506	508	495	512	436	466
Control Delay (s)	46.6	44.1	28.5	42.6	12.6	15.2
Approach Delay (s)	45.4		36.1		12.6	15.2
Approach LOS	E		E		B	C

Intersection Summary			
Delay	37.5		
Level of Service	E		
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	SBT	SBR
Lane Configurations		
Sign Control	Stop	
Traffic Volume (vph)	45	21
Future Volume (vph)	45	21
Peak Hour Factor	0.94	0.94
Hourly flow rate (vph)	48	22

Direction, Lane #

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Sign Control			Stop			Stop			Stop			Stop
Traffic Volume (vph)	9	98	681	41	28	585	114	53	141	9	227	44
Future Volume (vph)	9	98	681	41	28	585	114	53	141	9	227	44
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	104	724	44	30	622	121	56	150	10	241	47

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	345	483	44	341	432	216	294
Volume Left (vph)	104	0	0	30	0	56	241
Volume Right (vph)	0	0	44	0	121	10	6
Hadj (s)	0.18	0.03	-0.67	0.08	-0.16	0.06	0.19
Departure Headway (s)	8.5	8.4	3.2	8.3	8.0	8.7	8.4
Degree Utilization, x	0.82	1.12	0.04	0.78	0.96	0.52	0.69
Capacity (veh/h)	413	432	1121	429	444	394	408
Control Delay (s)	38.7	108.1	5.1	34.2	61.4	20.7	27.8
Approach Delay (s)	75.4			49.4		20.7	27.8
Approach LOS	F			E		C	D

Intersection Summary			
Delay	54.1		
Level of Service	F		
Intersection Capacity Utilization	82.7%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	SBR
Lane Configurations	
Sign Control	
Traffic Volume (vph)	6
Future Volume (vph)	6
Peak Hour Factor	0.94
Hourly flow rate (vph)	6

Direction, Lane #

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	93	115	34	355	235	98
Future Volume (vph)	93	115	34	355	235	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1711	1531	1711	1801	1729	
Flt Permitted	0.95	1.00	0.54	1.00	1.00	
Satd. Flow (perm)	1711	1531	966	1801	1729	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	99	122	36	378	250	104
RTOR Reduction (vph)	0	101	0	0	11	0
Lane Group Flow (vph)	99	21	36	378	343	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	12.4	12.4	57.1	57.1	57.1	
Effective Green, g (s)	13.9	13.9	58.1	58.1	58.1	
Actuated g/C Ratio	0.17	0.17	0.73	0.73	0.73	
Clearance Time (s)	5.5	5.5	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	297	266	701	1307	1255	
v/s Ratio Prot	c0.06			c0.21	0.20	
v/s Ratio Perm		0.01	0.04			
v/c Ratio	0.33	0.08	0.05	0.29	0.27	
Uniform Delay, d1	29.0	27.7	3.1	3.8	3.7	
Progression Factor	1.00	1.00	1.15	1.21	1.01	
Incremental Delay, d2	0.7	0.1	0.1	0.5	0.5	
Delay (s)	29.7	27.8	3.7	5.1	4.3	
Level of Service	C	C	A	A	A	
Approach Delay (s)	28.6			4.9	4.3	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	75	314	0	0	350
Future Volume (Veh/h)	0	75	314	0	0	350
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	80	334	0	0	372
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			360			217
pX, platoon unblocked	0.97					
vC, conflicting volume	706	334			334	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	682	334			334	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	89			100	
cM capacity (veh/h)	403	708			1225	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	80	334	372
Volume Left	0	0	0
Volume Right	80	0	0
cSH	708	1700	1700
Volume to Capacity	0.11	0.20	0.22
Queue Length 95th (ft)	10	0	0
Control Delay (s)	10.7	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.7	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	27.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	3	52	261	314	373	14
Future Volume (vph)	3	52	261	314	373	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		0.98	1.00	
Satd. Flow (prot)	1711	1531		1761	1792	
Flt Permitted	0.95	1.00		0.66	1.00	
Satd. Flow (perm)	1711	1531		1184	1792	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	3	55	278	334	397	15
RTOR Reduction (vph)	0	49	0	0	1	0
Lane Group Flow (vph)	3	6	0	612	411	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	7.2	7.2		61.8	61.8	
Effective Green, g (s)	8.7	8.7		63.3	63.3	
Actuated g/C Ratio	0.11	0.11		0.79	0.79	
Clearance Time (s)	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	186	166		936	1417	
v/s Ratio Prot	0.00				0.23	
v/s Ratio Perm		c0.00		c0.52		
v/c Ratio	0.02	0.04		0.65	0.29	
Uniform Delay, d1	31.8	31.9		3.6	2.3	
Progression Factor	1.00	1.00		1.48	0.89	
Incremental Delay, d2	0.0	0.1		2.5	0.5	
Delay (s)	31.9	32.0		7.8	2.5	
Level of Service	C	C		A	A	
Approach Delay (s)	32.0			7.8	2.5	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	2	1	1002	6	1	835	8	25	2	147	15	4
Future Volume (vph)	2	1	1002	6	1	835	8	25	2	147	15	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			5%			0%			0%			0%
Total Lost time (s)			4.0			4.0			4.0			4.0
Lane Util. Factor			0.95			0.95			1.00			1.00
Frt			1.00			1.00			0.89			0.96
Flt Protected			1.00			1.00			0.99			0.97
Satd. Flow (prot)			3332			3416			1584			1688
Flt Permitted			0.95			0.95			0.97			0.86
Satd. Flow (perm)			3175			3259			1543			1489
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	2	1	1066	6	1	888	9	27	2	156	16	4
RTOR Reduction (vph)	0	0	1	0	0	2	0	0	18	0	0	4
Lane Group Flow (vph)	0	0	1074	0	0	896	0	0	167	0	0	23
Turn Type	Perm	Perm	NA		Perm	NA		Perm	NA		Perm	NA
Protected Phases			4			8			2			6
Permitted Phases	4	4			8			2			6	
Actuated Green, G (s)			16.0			16.0			16.0			16.0
Effective Green, g (s)			16.0			16.0			16.0			16.0
Actuated g/C Ratio			0.40			0.40			0.40			0.40
Clearance Time (s)			4.0			4.0			4.0			4.0
Lane Grp Cap (vph)			1270			1303			617			595
v/s Ratio Prot												
v/s Ratio Perm			c0.34			0.27			c0.11			0.02
v/c Ratio			0.85			0.69			0.27			0.04
Uniform Delay, d1			10.9			9.9			8.1			7.3
Progression Factor			1.00			1.00			1.00			1.00
Incremental Delay, d2			7.0			2.6			1.1			0.1
Delay (s)			17.9			12.6			9.2			7.4
Level of Service			B			B			A			A
Approach Delay (s)			17.9			12.6			9.2			7.4
Approach LOS			B			B			A			A

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	7
Future Volume (vph)	7
Ideal Flow (vphpl)	1900
Grade (%)	
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	7
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	194	294	457	218	106
Future Volume (Veh/h)	15	194	294	457	218	106
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	16	206	313	486	232	113
Pedestrians	11					
Lane Width (ft)	11.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					590	
pX, platoon unblocked						
vC, conflicting volume	1168	184	356			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1168	184	356			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	75	74			
cM capacity (veh/h)	136	821	1189			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	222	475	324	155	190
Volume Left	16	313	0	0	0
Volume Right	206	0	0	0	113
cSH	602	1189	1700	1700	1700
Volume to Capacity	0.37	0.26	0.19	0.09	0.11
Queue Length 95th (ft)	42	27	0	0	0
Control Delay (s)	14.4	6.9	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	14.4	4.1		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	207	691	292	0	605	562	0	0	0	103	300	96
Future Volume (vph)	207	691	292	0	605	562	0	0	0	103	300	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		5%			0%			0%			0%	
Total Lost time (s)	4.0	4.0			4.0						4.0	4.0
Lane Util. Factor	1.00	0.95			0.91						0.95	1.00
Frt	1.00	0.96			0.93						1.00	0.85
Flt Protected	0.95	1.00			1.00						0.99	1.00
Satd. Flow (prot)	1668	3187			4561						3378	1531
Flt Permitted	0.95	1.00			1.00						0.99	1.00
Satd. Flow (perm)	1668	3187			4561						3378	1531
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	220	735	311	0	644	598	0	0	0	110	319	102
RTOR Reduction (vph)	0	58	0	0	210	0	0	0	0	0	0	69
Lane Group Flow (vph)	220	988	0	0	1032	0	0	0	0	0	429	33
Turn Type	Prot	NA			NA					Perm	NA	Perm
Protected Phases	5	2			6						4	
Permitted Phases										4		4
Actuated Green, G (s)	13.0	46.0			29.5						26.0	26.0
Effective Green, g (s)	12.5	46.0			29.5						26.0	26.0
Actuated g/C Ratio	0.16	0.58			0.37						0.32	0.32
Clearance Time (s)	3.5	4.0			4.0						4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0						3.0	3.0
Lane Grp Cap (vph)	260	1832			1681						1097	497
v/s Ratio Prot	c0.13	0.31			c0.23							
v/s Ratio Perm											0.13	0.02
v/c Ratio	0.85	0.54			0.61						0.39	0.07
Uniform Delay, d1	32.8	10.5			20.6						20.9	18.6
Progression Factor	1.24	1.36			1.44						0.88	0.98
Incremental Delay, d2	15.0	0.7			1.4						0.2	0.1
Delay (s)	55.7	15.0			31.1						18.6	18.3
Level of Service	E	B			C						B	B
Approach Delay (s)		22.1			31.1			0.0			18.5	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	985	0	0	970	462	4
Future Volume (vph)	985	0	0	970	462	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	5%			5%	0%	
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	0.95			0.95	0.97	
Frpb, ped/bikes	1.00			1.00	1.00	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	3336			3336	3320	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	3336			3336	3320	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1048	0	0	1032	491	4
RTOR Reduction (vph)	0	0	0	0	1	0
Lane Group Flow (vph)	1048	0	0	1032	494	0
Confl. Peds. (#/hr)			100		100	100
Turn Type	NA			NA	Prot	
Protected Phases	13			1	8	
Permitted Phases						
Actuated Green, G (s)	46.0			46.0	26.0	
Effective Green, g (s)	46.0			46.0	26.0	
Actuated g/C Ratio	0.58			0.58	0.32	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1918			1918	1079	
v/s Ratio Prot	c0.31			0.31	c0.15	
v/s Ratio Perm						
v/c Ratio	0.55			0.54	0.46	
Uniform Delay, d1	10.5			10.5	21.4	
Progression Factor	0.42			1.31	1.00	
Incremental Delay, d2	0.8			0.9	0.3	
Delay (s)	5.2			14.6	21.7	
Level of Service	A			B	C	
Approach Delay (s)	5.2			14.6	21.7	
Approach LOS	A			B	C	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	760	0	0	976	50	48	44	61	50	0	10
Future Volume (vph)	0	760	0	0	976	50	48	44	61	50	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		1.00			0.99			0.95			0.98	
Flt Protected		1.00			1.00			0.98			0.96	
Satd. Flow (prot)		3421			3396			1677			1689	
Flt Permitted		1.00			1.00			0.90			0.74	
Satd. Flow (perm)		3421			3396			1537			1293	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	809	0	0	1038	53	51	47	65	53	0	11
RTOR Reduction (vph)	0	0	0	0	5	0	0	30	0	0	18	0
Lane Group Flow (vph)	0	809	0	0	1086	0	0	133	0	0	46	0
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		6			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		45.0			45.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Lane Grp Cap (vph)		1967			1952			499			420	
v/s Ratio Prot		0.24			c0.32							
v/s Ratio Perm								c0.09			0.04	
v/c Ratio		0.41			0.56			0.27			0.11	
Uniform Delay, d1		9.5			10.6			20.0			18.9	
Progression Factor		0.36			1.00			1.00			1.00	
Incremental Delay, d2		0.5			1.2			1.3			0.5	
Delay (s)		4.0			11.8			21.3			19.4	
Level of Service		A			B			C			B	
Approach Delay (s)		4.0			11.8			21.3			19.4	
Approach LOS		A			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	497	416	7	9	532	186	7	0	0	0	0	0
Future Volume (vph)	497	416	7	9	532	186	7	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0				
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00				
Frpb, ped/bikes	1.00	1.00		1.00	0.93			1.00				
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00				
Frt	1.00	1.00		1.00	0.96			1.00				
Flt Protected	0.95	1.00		0.95	1.00			0.95				
Satd. Flow (prot)	1711	1769		872	1614			872				
Flt Permitted	0.95	1.00		0.95	1.00			0.95				
Satd. Flow (perm)	1711	1769		872	1614			872				
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	512	429	7	9	548	192	7	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	0	0
Lane Group Flow (vph)	512	436	0	9	730	0	0	7	0	0	0	0
Confl. Peds. (#/hr)						100						
Confl. Bikes (#/hr)						10						
Heavy Vehicles (%)	2%	2%	100%	100%	2%	2%	100%	100%	100%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA		Perm	NA				
Protected Phases	5	2		1	6			14				
Permitted Phases							14					
Actuated Green, G (s)	32.8	84.2		2.4	51.8			2.4				
Effective Green, g (s)	33.8	85.2		1.4	52.8			1.4				
Actuated g/C Ratio	0.34	0.85		0.01	0.53			0.01				
Clearance Time (s)	5.0	5.0		3.0	5.0			3.0				
Vehicle Extension (s)	0.2	0.2		0.2	0.2			0.2				
Lane Grp Cap (vph)	578	1507		12	852			12				
v/s Ratio Prot	c0.30	0.25		0.01	c0.45							
v/s Ratio Perm								0.01				
v/c Ratio	0.89	0.29		0.75	0.86			0.58				
Uniform Delay, d1	31.3	1.5		49.1	20.3			49.0				
Progression Factor	1.00	1.00		1.00	1.00			1.00				
Incremental Delay, d2	14.7	0.5		118.4	10.8			38.9				
Delay (s)	46.0	1.9		167.5	31.2			88.0				
Level of Service	D	A		F	C			F				
Approach Delay (s)		25.7			32.8			88.0			0.0	
Approach LOS		C			C			F			A	

Intersection Summary			
HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	348	40	102	475	48	115	255	86	52	286	109
Future Volume (vph)	33	348	40	102	475	48	115	255	86	52	286	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00			0.95	
Frpb, ped/bikes		1.00	0.75	1.00	0.99		1.00	0.96			0.96	
Flpb, ped/bikes		1.00	1.00	0.90	1.00		0.94	1.00			0.99	
Frt		1.00	0.85	1.00	0.99		1.00	0.96			0.96	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)		1787	1148	1532	1751		1603	1669			3135	
Flt Permitted		0.93	1.00	0.42	1.00		0.43	1.00			0.87	
Satd. Flow (perm)		1673	1148	685	1751		722	1669			2738	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	35	370	43	109	505	51	122	271	91	55	304	116
RTOR Reduction (vph)	0	0	15	0	5	0	0	16	0	0	41	0
Lane Group Flow (vph)	0	405	28	109	551	0	122	346	0	0	434	0
Confl. Peds. (#/hr)	100		100	100		100	100		100	100		100
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		37.0	37.0	37.0	37.0		29.0	29.0			29.0	
Effective Green, g (s)		37.0	37.0	37.0	37.0		30.0	30.0			30.0	
Actuated g/C Ratio		0.49	0.49	0.49	0.49		0.40	0.40			0.40	
Clearance Time (s)		4.0	4.0	4.0	4.0		5.0	5.0			5.0	
Lane Grp Cap (vph)		825	566	337	863		288	667			1095	
v/s Ratio Prot					c0.31			c0.21				
v/s Ratio Perm		0.24	0.02	0.16			0.17				0.16	
v/c Ratio		0.49	0.05	0.32	0.64		0.42	0.52			0.40	
Uniform Delay, d1		12.7	9.9	11.5	14.1		16.3	17.0			16.0	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		2.1	0.2	2.5	3.6		4.5	2.9			1.1	
Delay (s)		14.8	10.0	14.0	17.7		20.8	19.9			17.1	
Level of Service		B	B	B	B		C	B			B	
Approach Delay (s)		14.3			17.1			20.1			17.1	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	112.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	534	38	361	693	130	0	0	0	0	0	0
Future Volume (vph)	23	534	38	361	693	130	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0							
Lane Util. Factor		0.95		1.00	0.95							
Frt		0.99		1.00	0.98							
Flt Protected		1.00		0.95	1.00							
Satd. Flow (prot)		3382		1711	3340							
Flt Permitted		0.92		0.41	1.00							
Satd. Flow (perm)		3130		742	3340							
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	24	568	40	384	737	138	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	632	0	384	875	0	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA							
Protected Phases		4			8							
Permitted Phases	4			8								
Actuated Green, G (s)		20.0		20.0	20.0							
Effective Green, g (s)		20.0		20.0	20.0							
Actuated g/C Ratio		1.00		1.00	1.00							
Clearance Time (s)		4.0		4.0	4.0							
Lane Grp Cap (vph)		3130		742	3340							
v/s Ratio Prot					0.26							
v/s Ratio Perm		0.20		c0.52								
v/c Ratio		0.20		0.52	0.26							
Uniform Delay, d1		0.0		0.0	0.0							
Progression Factor		1.00		1.00	1.00							
Incremental Delay, d2		0.1		2.6	0.2							
Delay (s)		0.1		2.6	0.2							
Level of Service		A		A	A							
Approach Delay (s)		0.1			0.9			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	0.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	20.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	336	180	476	713	0	0	0	0	487	1	185
Future Volume (vph)	0	336	180	476	713	0	0	0	0	487	1	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	11	11	11	12	12	12
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95					0.95	0.95	
Frpb, ped/bikes		1.00	0.69	1.00	1.00					1.00	0.91	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		1.00	0.85	1.00	1.00					1.00	0.92	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (prot)		2887	830	1540	3079					1513	1305	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (perm)		2887	830	1540	3079					1513	1305	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	350	188	496	743	0	0	0	0	507	1	193
RTOR Reduction (vph)	0	0	139	0	0	0	0	0	0	0	53	0
Lane Group Flow (vph)	0	350	49	496	743	0	0	0	0	360	288	0
Confl. Peds. (#/hr)			100	100								100
Confl. Bikes (#/hr)			30			30						
Parking (#/hr)		5	5									
Turn Type		NA	Perm	Prot	NA					Perm	NA	
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		23.8	23.8	32.4	59.2					23.8	23.8	
Effective Green, g (s)		23.3	23.3	31.4	58.7					23.3	23.3	
Actuated g/C Ratio		0.26	0.26	0.35	0.65					0.26	0.26	
Clearance Time (s)		3.5	3.5	3.0	3.5					3.5	3.5	
Vehicle Extension (s)		4.0	4.0	3.0	4.0					4.0	4.0	
Lane Grp Cap (vph)		747	214	537	2008					391	337	
v/s Ratio Prot		c0.12		c0.32	0.24							
v/s Ratio Perm			0.06							c0.24	0.22	
v/c Ratio		0.47	0.23	0.92	0.37					0.92	0.86	
Uniform Delay, d1		28.1	26.3	28.1	7.2					32.5	31.7	
Progression Factor		1.00	1.00	0.90	0.90					1.00	1.00	
Incremental Delay, d2		2.1	2.5	19.2	0.4					27.0	19.3	
Delay (s)		30.2	28.7	44.6	6.9					59.5	51.0	
Level of Service		C	C	D	A					E	D	
Approach Delay (s)		29.7			22.0			0.0			55.4	
Approach LOS		C			C			A			E	

Intersection Summary			
HCM 2000 Control Delay	33.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	730	0	0	709	195	468	5	616	0	0	0
Future Volume (vph)	108	730	0	0	709	195	468	5	616	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	11	11	11
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0				
Lane Util. Factor		0.95			0.95	1.00	0.95	0.95				
Frpb, ped/bikes		1.00			1.00	0.73	1.00	0.87				
Flpb, ped/bikes		0.99			1.00	1.00	1.00	1.00				
Frt		1.00			1.00	0.85	1.00	0.86				
Flt Protected		0.99			1.00	1.00	0.95	1.00				
Satd. Flow (prot)		3032			3079	1005	1513	1185				
Flt Permitted		0.72			1.00	1.00	0.95	1.00				
Satd. Flow (perm)		2194			3079	1005	1513	1185				
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	111	753	0	0	731	201	482	5	635	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	49	0	186	0	0	0	0
Lane Group Flow (vph)	0	864	0	0	731	152	434	502	0	0	0	0
Confl. Peds. (#/hr)	100					100			100			
Confl. Bikes (#/hr)			10			10						
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)		46.8			46.8	46.8	36.2	36.2				
Effective Green, g (s)		46.3			46.3	46.3	35.7	35.7				
Actuated g/C Ratio		0.51			0.51	0.51	0.40	0.40				
Clearance Time (s)		3.5			3.5	3.5	3.5	3.5				
Vehicle Extension (s)		5.0			5.0	5.0	5.0	5.0				
Lane Grp Cap (vph)		1128			1583	517	600	470				
v/s Ratio Prot					0.24							
v/s Ratio Perm		c0.39				0.15	0.29	0.42				
v/c Ratio		0.77			0.46	0.29	0.72	1.07				
Uniform Delay, d1		17.5			13.9	12.5	23.0	27.1				
Progression Factor		1.57			0.47	0.14	1.00	1.00				
Incremental Delay, d2		2.6			0.7	1.1	5.3	61.0				
Delay (s)		30.1			7.2	2.9	28.2	88.1				
Level of Service		C			A	A	C	F				
Approach Delay (s)		30.1			6.3			65.0			0.0	
Approach LOS		C			A			E			A	

Intersection Summary			
HCM 2000 Control Delay	35.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR	SER
Lane Configurations												
Traffic Volume (vph)	186	962	159	23	622	64	148	29	33	130	183	0
Future Volume (vph)	186	962	159	23	622	64	148	29	33	130	183	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0		
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00		
Frpb, ped/bikes	1.00	0.95		1.00	1.00	0.44	1.00	0.64	1.00	0.80		
Flpb, ped/bikes	0.97	1.00		0.95	1.00	1.00	1.00	1.00	0.72	1.00		
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.85	1.00	0.91		
Flt Protected	0.95	1.00		0.95	1.00	1.00	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1498	2870		1458	3042	586	1582	881	1111	1013		
Flt Permitted	0.22	1.00		0.18	1.00	1.00	1.00	1.00	0.64	1.00		
Satd. Flow (perm)	344	2870		271	3042	586	1582	881	753	1013		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	198	1023	169	24	662	68	157	31	35	138	195	0
RTOR Reduction (vph)	0	13	0	0	0	0	0	17	0	0	0	0
Lane Group Flow (vph)	198	1179	0	24	662	68	157	14	35	333	0	0
Confl. Peds. (#/hr)	400		400	400		400		400	400		400	400
Confl. Bikes (#/hr)			30			30		10			10	
Bus Blockages (#/hr)	0	0	6	0	6	6	6	0	0	6	0	0
Parking (#/hr)										5	5	
Turn Type	pm+pt	NA		Perm	NA	Perm	NA	Perm	Perm	NA		Perm
Protected Phases	7	4			8		2			6		
Permitted Phases	4			8		8		2	6			13
Actuated Green, G (s)	41.6	41.6		27.5	27.5	27.5	37.9	37.9	37.9	37.9		
Effective Green, g (s)	42.6	42.6		28.5	28.5	28.5	39.4	39.4	39.4	39.4		
Actuated g/C Ratio	0.47	0.47		0.32	0.32	0.32	0.44	0.44	0.44	0.44		
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.5	5.5	5.5	5.5		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	292	1358		85	963	185	692	385	329	443		
v/s Ratio Prot	0.08	c0.41			0.22		0.10			c0.33		
v/s Ratio Perm	0.24			0.09		0.12		0.02	0.05			
v/c Ratio	0.68	0.87		0.28	0.69	0.37	0.23	0.04	0.11	0.75		
Uniform Delay, d1	16.1	21.2		23.1	26.9	23.8	15.8	14.4	14.9	21.2		
Progression Factor	1.28	1.24		0.90	0.85	0.87	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.6	0.8		7.1	3.5	4.9	0.2	0.0	0.1	7.1		
Delay (s)	21.3	27.0		28.0	26.4	25.5	16.0	14.5	15.1	28.3		
Level of Service	C	C		C	C	C	B	B	B	C		
Approach Delay (s)		26.2			26.4		15.7			27.0		
Approach LOS		C			C		B			C		

Intersection Summary			
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	109.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	334	6	158	895	284	2	96	94	173	74	284
Future Volume (vph)	215	334	6	158	895	284	2	96	94	173	74	284
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	0.91	0.91			0.95			1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00			1.00			1.00	1.00		1.00	0.87
Flpb, ped/bikes	1.00	1.00			1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00			0.97			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00			0.99			1.00	1.00		0.97	1.00
Satd. Flow (prot)	1557	3245			3293			1799	1531		1740	1338
Flt Permitted	0.95	1.00			0.99			1.00	1.00		0.97	1.00
Satd. Flow (perm)	1557	3245			3293			1799	1531		1740	1338
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	226	352	6	166	942	299	2	101	99	182	78	299
RTOR Reduction (vph)	0	1	0	0	22	0	0	0	90	0	0	256
Lane Group Flow (vph)	190	393	0	0	1385	0	0	103	9	0	260	43
Confl. Peds. (#/hr)			50	50			50					50
Confl. Bikes (#/hr)			10									10
Turn Type	Split	NA		Split	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	2	2		6	6		8	8		4	4	
Permitted Phases									8			4
Actuated Green, G (s)	18.0	18.0			50.0			10.0	10.0		16.0	16.0
Effective Green, g (s)	18.0	18.0			50.0			10.0	10.0		16.0	16.0
Actuated g/C Ratio	0.16	0.16			0.45			0.09	0.09		0.15	0.15
Clearance Time (s)	4.0	4.0			4.0			4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	254	531			1496			163	139		253	194
v/s Ratio Prot	c0.12	0.12			c0.42			c0.06			c0.15	
v/s Ratio Perm									0.01			0.03
v/c Ratio	0.75	0.74			0.93			0.63	0.06		1.03	0.22
Uniform Delay, d1	43.8	43.8			28.2			48.2	45.7		47.0	41.5
Progression Factor	1.00	1.00			1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	18.1	9.0			11.2			17.2	0.9		63.9	2.7
Delay (s)	62.0	52.8			39.5			65.4	46.6		110.9	44.2
Level of Service	E	D			D			E	D		F	D
Approach Delay (s)		55.8			39.5			56.2			75.2	
Approach LOS		E			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	51.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	50	80	270	64	40	296
Future Volume (Veh/h)	50	80	270	64	40	296
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	53	85	287	68	43	315
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			373			584
pX, platoon unblocked	0.93	0.91			0.91	
vC, conflicting volume	722	321			355	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	582	209			246	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	89			96	
cM capacity (veh/h)	426	759			1205	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	138	355	29	329
Volume Left	53	0	29	14
Volume Right	85	68	0	0
cSH	584	1700	1205	1205
Volume to Capacity	0.24	0.21	0.04	0.04
Queue Length 95th (ft)	23	0	3	3
Control Delay (s)	13.1	0.0	8.1	0.7
Lane LOS	B		A	A
Approach Delay (s)	13.1	0.0	1.3	
Approach LOS	B			

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection has too many legs for HCM analysis.

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	17	138	6	1	9	212	26	6	19	7	19	20
Future Volume (Veh/h)	17	138	6	1	9	212	26	6	19	7	19	20
Sign Control		Free				Free			Stop			Stop
Grade		0%				0%			0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	18	147	6	0	10	226	28	6	20	7	20	21
Pedestrians		1				9			11			9
Lane Width (ft)		10.0				10.0			10.0			10.0
Walking Speed (ft/s)		4.0				4.0			4.0			4.0
Percent Blockage		0				1			1			1
Right turn flare (veh)												
Median type		None				None						
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked				0.00								
vC, conflicting volume	263			0	164			498	480	170	481	469
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	263			0	164			498	480	170	481	469
tC, single (s)	4.1			0.0	4.1			7.1	6.5	6.2	7.1	6.5
tC, 2 stage (s)												
tF (s)	2.2			0.0	2.2			3.5	4.0	3.3	3.5	4.0
p0 queue free %	99			0	99			99	96	99	96	96
cM capacity (veh/h)	1293			0	1404			434	468	862	457	475

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	171	264	33	70
Volume Left	18	10	6	20
Volume Right	6	28	7	29
cSH	1293	1404	511	560
Volume to Capacity	0.01	0.01	0.06	0.12
Queue Length 95th (ft)	1	1	5	11
Control Delay (s)	0.9	0.3	12.5	12.3
Lane LOS	A	A	B	B
Approach Delay (s)	0.9	0.3	12.5	12.3
Approach LOS			B	B

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	27.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	27
Future Volume (Veh/h)	27
Sign Control	
Grade	
Peak Hour Factor	0.94
Hourly flow rate (vph)	29
Pedestrians	
Lane Width (ft)	
Walking Speed (ft/s)	
Percent Blockage	
Right turn flare (veh)	
Median type	
Median storage veh)	
Upstream signal (ft)	
pX, platoon unblocked	
vC, conflicting volume	250
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol	250
tC, single (s)	6.2
tC, 2 stage (s)	
tF (s)	3.3
p0 queue free %	96
cM capacity (veh/h)	783

Direction, Lane #

Intersection Sign configuration not allowed in HCM analysis.

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	30	705	36	1	26	774	64	12	95	50	54	102
Future Volume (vph)	30	705	36	1	26	774	64	12	95	50	54	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	11	11	10	11	11	10
Grade (%)		5%				0%			0%			0%
Total Lost time (s)		4.0				4.0			4.0			4.0
Lane Util. Factor		0.95				0.95			1.00			1.00
Frpb, ped/bikes		0.99				0.98			0.99			0.98
Flpb, ped/bikes		1.00				1.00			1.00			0.99
Frt		0.99				0.99			0.96			0.97
Flt Protected		1.00				1.00			1.00			0.99
Satd. Flow (prot)		3282				3323			1631			1627
Flt Permitted		0.89				0.91			0.97			0.88
Satd. Flow (perm)		2938				3035			1592			1452
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	750	38	1	28	823	68	13	101	53	57	109
RTOR Reduction (vph)	0	4	0	0	0	7	0	0	21	0	0	12
Lane Group Flow (vph)	0	816	0	0	0	913	0	0	146	0	0	198
Confl. Peds. (#/hr)	207		107	28	107		207	79		28	28	
Confl. Bikes (#/hr)			4				4					
Turn Type	Perm	NA		Perm	Perm	NA		Perm	NA		Perm	NA
Protected Phases		2				6			8			4
Permitted Phases	2			6	6			8			4	
Actuated Green, G (s)		44.5				44.5			24.5			24.5
Effective Green, g (s)		46.0				46.0			26.0			26.0
Actuated g/C Ratio		0.58				0.58			0.32			0.32
Clearance Time (s)		5.5				5.5			5.5			5.5
Vehicle Extension (s)		3.0				3.0			3.0			3.0
Lane Grp Cap (vph)		1689				1745			517			471
v/s Ratio Prot												
v/s Ratio Perm		0.28				c0.30			0.09			c0.14
v/c Ratio		0.48				0.52			0.28			0.42
Uniform Delay, d1		10.0				10.3			20.1			21.1
Progression Factor		1.00				1.00			1.00			1.00
Incremental Delay, d2		1.0				1.1			1.4			2.7
Delay (s)		11.0				11.5			21.4			23.8
Level of Service		B				B			C			C
Approach Delay (s)		11.0				11.5			21.4			23.8
Approach LOS		B				B			C			C

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	41
Future Volume (vph)	41
Ideal Flow (vphpl)	1900
Lane Width	11
Grade (%)	
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	44
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	79
Confl. Bikes (#/hr)	1
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	0	0	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total (vph)	0	0	0	0
Volume Left (vph)	0	0	0	0
Volume Right (vph)	0	0	0	0
Hadj (s)	0.00	0.00	0.00	0.00
Departure Headway (s)	4.5	4.5	4.0	3.9
Degree Utilization, x	0.00	0.00	0.00	0.00
Capacity (veh/h)	806	806	900	917
Control Delay (s)	6.3	6.3	7.0	6.9
Approach Delay (s)	0.0		0.0	0.0
Approach LOS	A		A	A

Intersection Summary			
Delay	0.0		
Level of Service	A		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (vph)	10	67	486	92	5	54	787	101	39	99	15	87
Future Volume (vph)	10	67	486	92	5	54	787	101	39	99	15	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0				4.0			4.0		
Lane Util. Factor			0.95				0.95			1.00		
Frpb, ped/bikes			0.99				0.99			1.00		
Flpb, ped/bikes			1.00				1.00			1.00		
Frt			0.98				0.98			0.99		
Flt Protected			0.99				1.00			0.99		
Satd. Flow (prot)			3298				3331			1738		
Flt Permitted			0.67				0.86			0.88		
Satd. Flow (perm)			2229				2888			1543		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	71	517	98	5	57	837	107	41	105	16	93
RTOR Reduction (vph)	0	0	20	0	0	0	14	0	0	6	0	0
Lane Group Flow (vph)	0	0	677	0	0	0	992	0	0	156	0	0
Confl. Peds. (#/hr)	39	25		26	49	26		25	39		49	49
Confl. Bikes (#/hr)				4				5			1	
Turn Type	Perm	Perm	NA		Perm	Perm	NA		Perm	NA		Perm
Protected Phases			2				6			8		
Permitted Phases	2	2			6	6			8			4
Actuated Green, G (s)			27.0				27.0			26.5		
Effective Green, g (s)			29.0				29.0			29.0		
Actuated g/C Ratio			0.44				0.44			0.44		
Clearance Time (s)			6.0				6.0			6.5		
Lane Grp Cap (vph)			979				1268			677		
v/s Ratio Prot												
v/s Ratio Perm			0.30				c0.34			0.10		
v/c Ratio			0.69				0.78			0.23		
Uniform Delay, d1			14.9				15.8			11.5		
Progression Factor			1.00				1.00			1.00		
Incremental Delay, d2			4.0				4.9			0.8		
Delay (s)			18.9				20.7			12.3		
Level of Service			B				C			B		
Approach Delay (s)			18.9				20.7			12.3		
Approach LOS			B				C			B		

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBT	SBR
Lane Configurations	✣	
Traffic Volume (vph)	109	73
Future Volume (vph)	109	73
Ideal Flow (vphpl)	1900	1900
Total Lost time (s)	4.0	
Lane Util. Factor	1.00	
Frpb, ped/bikes	0.99	
Flpb, ped/bikes	0.99	
Frt	0.96	
Flt Protected	0.98	
Satd. Flow (prot)	1673	
Flt Permitted	0.85	
Satd. Flow (perm)	1450	
Peak-hour factor, PHF	0.94	0.94
Adj. Flow (vph)	116	78
RTOR Reduction (vph)	20	0
Lane Group Flow (vph)	267	0
Confl. Peds. (#/hr)		39
Confl. Bikes (#/hr)		
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Actuated Green, G (s)	26.5	
Effective Green, g (s)	29.0	
Actuated g/C Ratio	0.44	
Clearance Time (s)	6.5	
Lane Grp Cap (vph)	637	
v/s Ratio Prot		
v/s Ratio Perm	c0.18	
v/c Ratio	0.42	
Uniform Delay, d1	12.7	
Progression Factor	1.00	
Incremental Delay, d2	2.0	
Delay (s)	14.7	
Level of Service	B	
Approach Delay (s)	14.7	
Approach LOS	B	

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	83	41	20	255	543	176
Future Volume (Veh/h)	83	41	20	255	543	176
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	88	44	21	271	578	187
Pedestrians	52			1	3	
Lane Width (ft)	10.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					1055	
pX, platoon unblocked						
vC, conflicting volume	904	436	817			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	904	436	817			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	66	92	97			
cM capacity (veh/h)	259	548	778			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	132	111	181	385	380
Volume Left	88	21	0	0	0
Volume Right	44	0	0	0	187
cSH	314	778	1700	1700	1700
Volume to Capacity	0.42	0.03	0.11	0.23	0.22
Queue Length 95th (ft)	50	2	0	0	0
Control Delay (s)	24.5	2.1	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	24.5	0.8		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SER	NEU	NEL	NET	SWT	SWR
Lane Configurations							
Sign Control	Stop				Stop	Stop	
Traffic Volume (vph)	53	31	2	46	220	478	103
Future Volume (vph)	53	31	2	46	220	478	103
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	56	33	0	49	234	509	110

Direction, Lane #	SE 1	NE 1	NE 2	SW 1	SW 2
Volume Total (vph)	89	127	156	339	280
Volume Left (vph)	56	49	0	0	0
Volume Right (vph)	33	0	0	0	110
Hadj (s)	-0.06	0.23	0.03	0.03	-0.24
Departure Headway (s)	5.6	5.6	5.4	5.1	4.8
Degree Utilization, x	0.14	0.20	0.23	0.48	0.37
Capacity (veh/h)	586	621	643	693	733
Control Delay (s)	9.5	8.8	8.8	11.5	9.5
Approach Delay (s)	9.5	8.8		10.6	
Approach LOS	A	A		B	

Intersection Summary			
Delay	10.0		
Level of Service	A		
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Sign Control		Stop			Stop				Stop			Stop
Traffic Volume (vph)	18	142	22	28	236	28	1	19	108	25	18	73
Future Volume (vph)	18	142	22	28	236	28	1	19	108	25	18	73
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	19	151	23	30	251	30	0	20	115	27	19	78

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	193	311	162	120
Volume Left (vph)	19	30	20	19
Volume Right (vph)	23	30	27	23
Hadj (s)	-0.02	0.00	-0.04	-0.05
Departure Headway (s)	5.1	5.0	5.4	5.4
Degree Utilization, x	0.27	0.43	0.24	0.18
Capacity (veh/h)	650	687	601	592
Control Delay (s)	10.0	11.7	10.1	9.6
Approach Delay (s)	10.0	11.7	10.1	9.6
Approach LOS	B	B	B	A

Intersection Summary			
Delay	10.6		
Level of Service	B		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SBR
Lane Configurations	
Sign Control	
Traffic Volume (vph)	22
Future Volume (vph)	22
Peak Hour Factor	0.94
Hourly flow rate (vph)	23

Direction, Lane #

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations			✥			✥			✥			✥
Sign Control			Stop			Stop			Stop			Stop
Traffic Volume (vph)	1	8	45	20	18	42	8	22	124	22	11	92
Future Volume (vph)	1	8	45	20	18	42	8	22	124	22	11	92
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	9	48	21	19	45	9	23	132	23	12	98

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	78	73	178	121
Volume Left (vph)	9	19	23	12
Volume Right (vph)	21	9	23	11
Hadj (s)	-0.10	0.01	-0.02	0.00
Departure Headway (s)	4.6	4.7	4.4	4.5
Degree Utilization, x	0.10	0.10	0.22	0.15
Capacity (veh/h)	725	708	786	763
Control Delay (s)	8.1	8.2	8.6	8.3
Approach Delay (s)	8.1	8.2	8.6	8.3
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.4		
Level of Service	A		
Intersection Capacity Utilization	29.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SBR
Lane Configurations	
Sign Control	
Traffic Volume (vph)	10
Future Volume (vph)	10
Peak Hour Factor	0.94
Hourly flow rate (vph)	11

Direction, Lane #

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	750	58	35	821	0	68	0	44	69	0	18
Future Volume (vph)	0	750	58	35	821	0	68	0	44	69	0	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	10	11	11	11	11	11
Grade (%)		5%			0%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.99			1.00			0.95			0.97	
Flt Protected		1.00			1.00			0.97			0.96	
Satd. Flow (prot)		3300			3414			1655			1684	
Flt Permitted		1.00			0.89			0.79			0.75	
Satd. Flow (perm)		3300			3054			1351			1318	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	798	62	37	873	0	72	0	47	73	0	19
RTOR Reduction (vph)	0	7	0	0	0	0	0	30	0	0	20	0
Lane Group Flow (vph)	0	853	0	0	910	0	0	89	0	0	72	0
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		47.0			47.0			22.0			22.0	
Effective Green, g (s)		48.0			48.0			23.0			23.0	
Actuated g/C Ratio		0.61			0.61			0.29			0.29	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		2005			1855			393			383	
v/s Ratio Prot		0.26										
v/s Ratio Perm					c0.30			c0.07			0.05	
v/c Ratio		0.43			0.49			0.23			0.19	
Uniform Delay, d1		8.2			8.7			21.3			21.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.7			0.2			1.3			0.2	
Delay (s)		8.9			8.9			22.6			21.2	
Level of Service		A			A			C			C	
Approach Delay (s)		8.9			8.9			22.6			21.2	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	454	197	0	689	0	189
Future Volume (Veh/h)	454	197	0	689	0	189
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	483	210	0	733	0	201
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			693		954	588
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			693		954	588
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	56
cM capacity (veh/h)			898		257	452

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	693	366	366	201
Volume Left	0	0	0	0
Volume Right	210	0	0	201
cSH	1700	1700	1700	452
Volume to Capacity	0.41	0.22	0.22	0.44
Queue Length 95th (ft)	0	0	0	56
Control Delay (s)	0.0	0.0	0.0	19.2
Lane LOS				C
Approach Delay (s)	0.0	0.0		19.2
Approach LOS				C

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Sign Control			Stop				Stop			Stop		
Traffic Volume (vph)	10	32	570	17	12	7	861	77	7	29	7	115
Future Volume (vph)	10	32	570	17	12	7	861	77	7	29	7	115
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	34	606	18	0	7	916	82	7	31	7	122

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	337	321	465	540	45	204
Volume Left (vph)	34	0	7	0	7	122
Volume Right (vph)	0	18	0	82	7	48
Hadj (s)	0.08	-0.01	0.04	-0.07	-0.03	0.01
Departure Headway (s)	7.0	6.9	6.5	6.4	7.7	7.0
Degree Utilization, x	0.65	0.62	0.84	0.96	0.10	0.40
Capacity (veh/h)	504	504	540	554	435	495
Control Delay (s)	21.1	19.1	34.2	53.2	11.6	14.6
Approach Delay (s)	20.1		44.4		11.6	14.6
Approach LOS	C		E		B	B

Intersection Summary			
Delay	32.1		
Level of Service	D		
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	SBT	SBR
Lane Configurations		
Sign Control	Stop	
Traffic Volume (vph)	32	45
Future Volume (vph)	32	45
Peak Hour Factor	0.94	0.94
Hourly flow rate (vph)	34	48

Direction, Lane #

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Sign Control			Stop			Stop			Stop			Stop
Traffic Volume (vph)	14	85	512	32	31	634	155	35	58	8	148	128
Future Volume (vph)	14	85	512	32	31	634	155	35	58	8	148	128
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	90	545	34	33	674	165	37	62	9	157	136

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	272	363	34	370	502	108	299
Volume Left (vph)	90	0	0	33	0	37	157
Volume Right (vph)	0	0	34	0	165	9	6
Hadj (s)	0.20	0.03	-0.67	0.08	-0.20	0.05	0.13
Departure Headway (s)	7.8	7.6	3.2	7.5	7.2	8.4	7.5
Degree Utilization, x	0.59	0.77	0.03	0.77	1.01	0.25	0.63
Capacity (veh/h)	457	466	1121	471	502	394	466
Control Delay (s)	20.0	30.2	5.1	30.5	68.4	14.1	22.3
Approach Delay (s)	24.8			52.3		14.1	22.3
Approach LOS	C			F		B	C

Intersection Summary			
Delay	36.1		
Level of Service	E		
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	SBR
Lane Configurations	
Sign Control	
Traffic Volume (vph)	6
Future Volume (vph)	6
Peak Hour Factor	0.94
Hourly flow rate (vph)	6

Direction, Lane #

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	84	85	50	372	242	96
Future Volume (vph)	84	85	50	372	242	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1711	1531	1711	1801	1732	
Flt Permitted	0.95	1.00	0.54	1.00	1.00	
Satd. Flow (perm)	1711	1531	971	1801	1732	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	89	90	53	396	257	102
RTOR Reduction (vph)	0	77	0	0	10	0
Lane Group Flow (vph)	89	13	53	396	349	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	9.8	9.8	59.7	59.7	59.7	
Effective Green, g (s)	11.3	11.3	60.7	60.7	60.7	
Actuated g/C Ratio	0.14	0.14	0.76	0.76	0.76	
Clearance Time (s)	5.5	5.5	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	241	216	736	1366	1314	
v/s Ratio Prot	c0.05			c0.22	0.20	
v/s Ratio Perm		0.01	0.05			
v/c Ratio	0.37	0.06	0.07	0.29	0.27	
Uniform Delay, d1	31.1	29.7	2.5	3.0	2.9	
Progression Factor	1.00	1.00	1.40	1.31	1.00	
Incremental Delay, d2	1.0	0.1	0.2	0.5	0.5	
Delay (s)	32.1	29.9	3.6	4.4	3.4	
Level of Service	C	C	A	A	A	
Approach Delay (s)	31.0			4.3	3.4	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	14	161	159	334	344	14
Future Volume (vph)	14	161	159	334	344	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00		0.98	1.00	
Satd. Flow (prot)	1711	1531		1772	1791	
Flt Permitted	0.95	1.00		0.77	1.00	
Satd. Flow (perm)	1711	1531		1378	1791	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	15	171	169	355	366	15
RTOR Reduction (vph)	0	142	0	0	1	0
Lane Group Flow (vph)	15	29	0	524	380	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	12.0	12.0		57.0	57.0	
Effective Green, g (s)	13.5	13.5		58.5	58.5	
Actuated g/C Ratio	0.17	0.17		0.73	0.73	
Clearance Time (s)	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	288	258		1007	1309	
v/s Ratio Prot	0.01				0.21	
v/s Ratio Perm		c0.02		c0.38		
v/c Ratio	0.05	0.11		0.52	0.29	
Uniform Delay, d1	27.9	28.2		4.7	3.7	
Progression Factor	1.00	1.00		1.65	0.92	
Incremental Delay, d2	0.1	0.2		1.1	0.6	
Delay (s)	28.0	28.4		8.8	3.9	
Level of Service	C	C		A	A	
Approach Delay (s)	28.3			8.8	3.9	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	858	13	2	989	18	18	1	77	70	21	36
Future Volume (vph)	0	858	13	2	989	18	18	1	77	70	21	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		5%			0%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		1.00			1.00			0.89			0.96	
Flt Protected		1.00			1.00			0.99			0.97	
Satd. Flow (prot)		3328			3412			1590			1685	
Flt Permitted		1.00			0.95			0.95			0.82	
Satd. Flow (perm)		3328			3254			1522			1424	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	913	14	2	1052	19	19	1	82	74	22	38
RTOR Reduction (vph)	0	2	0	0	3	0	0	31	0	0	19	0
Lane Group Flow (vph)	0	925	0	0	1070	0	0	71	0	0	115	0
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		16.0			16.0			16.0			16.0	
Effective Green, g (s)		16.0			16.0			16.0			16.0	
Actuated g/C Ratio		0.40			0.40			0.40			0.40	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1331			1301			608			569	
v/s Ratio Prot		0.28										
v/s Ratio Perm					c0.33			0.05			c0.08	
v/c Ratio		0.69			0.82			0.12			0.20	
Uniform Delay, d1		10.0			10.7			7.6			7.8	
Progression Factor		1.00			1.51			1.00			1.00	
Incremental Delay, d2		3.0			3.5			0.4			0.8	
Delay (s)		13.0			19.7			7.9			8.6	
Level of Service		B			B			A			A	
Approach Delay (s)		13.0			19.7			7.9			8.6	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	126	133	266	665	76
Future Volume (Veh/h)	41	126	133	266	665	76
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	44	134	141	283	707	81
Pedestrians	14					
Lane Width (ft)	11.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					590	
pX, platoon unblocked						
vC, conflicting volume	1185	408	802			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1185	408	802			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	70	77	83			
cM capacity (veh/h)	148	586	809			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	178	235	189	471	317
Volume Left	44	141	0	0	0
Volume Right	134	0	0	0	81
cSH	339	809	1700	1700	1700
Volume to Capacity	0.52	0.17	0.11	0.28	0.19
Queue Length 95th (ft)	72	16	0	0	0
Control Delay (s)	26.8	7.0	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	26.8	3.9		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	833	396	0	1165	469	0	0	0	152	304	110
Future Volume (vph)	107	833	396	0	1165	469	0	0	0	152	304	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		5%			0%			0%			0%	
Total Lost time (s)	4.0	4.0			4.0						4.0	4.0
Lane Util. Factor	1.00	0.95			0.91						0.95	1.00
Frt	1.00	0.95			0.96						1.00	0.85
Flt Protected	0.95	1.00			1.00						0.98	1.00
Satd. Flow (prot)	1668	3175			4704						3365	1531
Flt Permitted	0.95	1.00			1.00						0.98	1.00
Satd. Flow (perm)	1668	3175			4704						3365	1531
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	114	886	421	0	1239	499	0	0	0	162	323	117
RTOR Reduction (vph)	0	71	0	0	86	0	0	0	0	0	0	79
Lane Group Flow (vph)	114	1236	0	0	1652	0	0	0	0	0	485	38
Turn Type	Prot	NA			NA					Perm	NA	Perm
Protected Phases	5	2			6						4	
Permitted Phases										4		4
Actuated Green, G (s)	10.4	46.0			32.1						26.0	26.0
Effective Green, g (s)	9.9	46.0			32.1						26.0	26.0
Actuated g/C Ratio	0.12	0.58			0.40						0.32	0.32
Clearance Time (s)	3.5	4.0			4.0						4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0						3.0	3.0
Lane Grp Cap (vph)	206	1825			1887						1093	497
v/s Ratio Prot	0.07	c0.39			c0.35							
v/s Ratio Perm											0.14	0.02
v/c Ratio	0.55	0.68			0.88						0.44	0.08
Uniform Delay, d1	33.0	11.8			22.1						21.3	18.7
Progression Factor	1.10	1.50			1.14						0.91	1.07
Incremental Delay, d2	2.9	1.8			5.5						0.3	0.1
Delay (s)	39.1	19.6			30.8						19.7	20.1
Level of Service	D	B			C						B	C
Approach Delay (s)		21.1			30.8			0.0			19.8	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Appendix D Vehicle Miles Traveled (VMT) Methodology

The San Francisco County Transportation Authority (SFCTA) uses the San Francisco Chained Activity Model Process (SF-CHAMP) to estimate VMT by private automobiles and taxis for different land use types. Travel behavior in SF-CHAMP is calibrated based on the California Household Travel Survey 2010-2012, Census data regarding automobile ownership rates and county-to-county worker flows, and observed vehicle counts and transit boardings. SF-CHAMP uses a synthetic population, which is a set of individual actors that represents the Bay Area's actual population, who make simulated travel decisions for a complete day. The SFCTA uses tour-based analysis approach for office and residential uses, which examines the entire chain of trips (i.e. the series of trips made within a day) over the course of a day, not just trips to and from one specific location. For retail uses, the SFCTA uses trip-based analysis, which counts VMT from individual trips to and from one specific site (as opposed to entire chain of trips). A trip-based approach, as opposed to a trip-chain approach, is necessary for retail projects because a tour is likely to consist of trips stopping in multiple locations, and the summarizing of tour VMT to each location would over-estimate VMT.[1,2]

Existing VMT for the San Francisco Bay Area (regional), City of San Francisco (local) and multiple Traffic Analysis Zones (TAZs) within the Balboa Area was based on information provided in the City's Transportation Information Map (TIM).[3] Figure 1 illustrates the location of each TAZ in the Balboa Area that was considered for the analysis.

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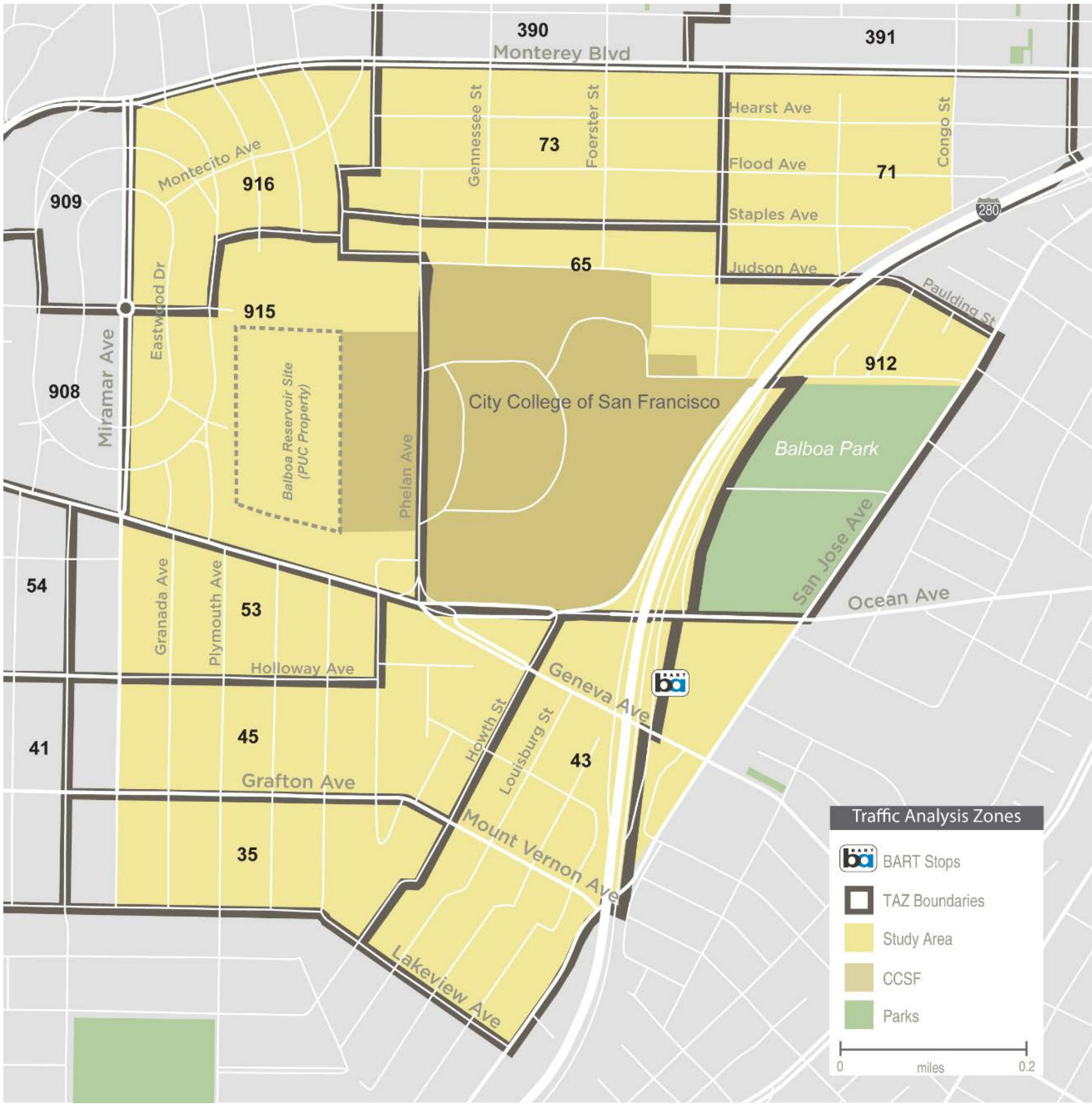
[1] To state another way: a tour-based assessment of VMT at a retail site would consider the VMT for all trips in the tour, for any tour with a stop at the retail site. If a single tour stops at two retail locations, for example, a coffee shop on the way to work and a restaurant on the way back home, then both retail locations would be allotted the total tour VMT. A trip-based approach allows us to apportion all retail-related VMT to retail sites without double-counting.

[2] San Francisco Planning Department, Executive Summary: Resolution Modifying Transportation Impact Analysis, Appendix F, Attachment A, March 3, 2016.

[3] San Francisco Transportation Information Map available online at: http://www.sftransportationmap.org/; accessed April 2016.

Figure 1: Balboa Area - TAZ Map



Source: San Francisco Transportation Information Map, 2016; Nelson\Nygaard, 2016.

The Figure 2 below presents the existing residential, office and retail VMT by TAZ in each neighborhood. The VMT per individual TAZ was then aggregated by neighborhood and compared to the regional VMT average[4], as shown in Figure 3.

Figure 2: Residential, Office and Retail VMT per Individual TAZ in Balboa Area (Existing)

Neighborhood	TAZ	Residential VMT	Office VMT	Retail VMT
Westwood Park	908	12.5	12.7	12.8
Westwood Park	909	12.7	12.3	12
Westwood Park	915	11.7	13	1.9
Westwood Park	916	12.6	12.6	2.9
Ingleside	35	11.6	13.7	11.9
Ingleside	41	11.9	13.5	12.4
Ingleside	43	11.3	13	2.9
Ingleside	45	11.6	12.6	3
Ingleside	53	11.9	13.1	3
Ingleside	54	12.1	12.2	12.9
Sunnyside	73	13	13.2	2.4
Sunnyside	71	11.4	12.2	2.7
Sunnyside	390	13	13	2.5
Sunnyside	391	12.1	12.6	2.5
Sunnyside (Balboa Park)	912	10.9	10.8	2.5
CCSF	65	11.4	12.8	2.5

Source: San Francisco Transportation Information Map, 2016.

Figure 3: Residential, Office and Retail VMT per Individual TAZ in Balboa Area (Existing)

Neighborhood	Residential VMT	Office VMT	Retail VMT
Westwood Park	12.4	12.7	7.4
Ingleside	11.7	13.0	7.7
Sunnyside	12.1	12.4	2.5
Balboa Park	10.9	10.8	2.5
CCSF	11.4	12.8	2.5
Regional Average (-15%)	14.6	16.2	12.6

Source: San Francisco Transportation Information Map, 2016.

[4] The California Department of Transportation (Caltrans) has developed a statewide VMT reduction target per the *Strategic Management Plan* that specifically calls for a 15 percent reduction in per capita VMT, compared to 2010 levels, by 2020.