

A Transit Oriented Development Proposal for the Fourth and King Caltrain Station in San Francisco

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Bachelor of Science

By

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Approval Page

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Executive Summary

The South of Market and Mission Bay neighborhoods have seen an explosion in growth over the last decade because of the high cluster of technology company opportunities in the area and the Bay Area's high housing cost. These two neighborhoods are home to a public transportation hub with two San Francisco Muni metro and bus lines, Caltrain service, and Amtrak intercity bus service to Oakland and other parts of California. The existing Caltrain Fourth and King Station and railyards have massive potential for prime real estate development. San Francisco has seen a 10% increase in population over the last ten years. With the median cost of rent in San Francisco being between \$2,000 to \$3,000 in 2020 depending on the number of bedrooms, new homes are needed to lower the cost of rent (McLean, 2020). Furthermore, Caltrain's ridership has been on the rise since 2010 with San Francisco being the most used station in the network with 15,000 riders in 2019 (Caltrain, 2019). A new station is necessary as the original 1970s station building approaches 50 years of service.

With the high cost of living in the Bay Area, Caltrain ridership at its highest levels, and the need to build more housing and a new station, the Fourth and King Station can be a viable place for new development. This project addresses how a new Caltrain terminus station could be built while also accounting for Caltrain expansion, high speed rail connectivity, new market rate and affordable housing, and urban design of the South of Market and Mission Bay Neighborhoods.

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Chapter 1: Background and Existing Conditions

1.1 Background and History

The establishment of San Francisco began in 1776 but the story of the Fourth and King Railyards did not start until more than a century later in 1915. According to wx4.org, a site of rail historians on the Southern Pacific Railroad in the Bay Area, San Francisco's recovery from the 1906 earthquake was rather quick and the city was ready to show its recovery after less than a decade. The 1914 to 1915 World's Fair was coming to town and a new "temporary" station was needed to greet guests and travelers since railroads were the primary form of transportation on land. The Southern Pacific Railroad, the primary railroad which operated the peninsula corridor at the time, built a new station and railway yards to make San Francisco the primary center of operations for Northern California. The new station and platforms would be built a block away from the site of this project at Third and Townsend Streets (wx4.org, 2012). Figure 1.1 shows the Third and Townsend Station in the 1950s.



Figure 1.1 The Third and Townsend Depot During the 1950s.

The Third and Townsend Depot was made the new primary railway station for San Francisco and would fulfill that role up until 1975. Designed by the Southern Pacific Architectural Board, the station building had a mission-style architecture and became a landmark for a neighborhood that was filled with trains, industry, and shipping. Long distance train service to Monterey, CA and Los Angeles, CA were common, and the station would serve as an inspiration for such other mission revival architecture style stations that were serviced by Southern Pacific as Los Angeles Union Station. According to the wx4.org database, Southern Pacific on many occasions wanted to replace the 3rd and Townsend station with a downtown station that would connect with the ferries much like the modern-day Salesforce Transit Center. Unfortunately, a new downtown station back then cost too much, so the Third and Townsend became the primary rail station up until the 1970s (Wx4.org, 2012).

In the 1970s, the collapse of passenger rail travel began due to the emergence of aviation and the automobile. With Amtrak taking over passenger service in 1971, the peninsula corridor service between San Francisco and San Jose became the only rail line out of San Francisco because all long-distance services out of San Francisco were cut due to cost cutting by Amtrak. Southern Pacific also had many financial issues and sold off the railyards to developers. According to Caltrain's Deputy Director of Planning, Sebastian Petty, Prologis (a real estate trust company) currently owns the Fourth and King site but has been working with Caltrain for decades now to develop the site while providing good service. During the 1970s, the State of California established Caltrain to save the peninsula corridor service between San Francisco and San Jose. In the process, the modern-day Fourth and King Station would be built, and the original Third and Townsend Depot that served a city for nearly 50 years was demolished. Meanwhile, the neighborhood around the railyards would not see much development until the 1990s.

The 1990s saw the area around the 4th and King station explode with development. According to the San Francisco Board of Supervisors, the Mission Bay Master Plan was launched in 1998 to make a new transit-oriented neighborhood out of the old railyards. A new light rail line, baseball stadium, and multi-

story mixed use development were all constructed between 1998 and the present day. (SF Board of Supervisors, 2014). Today, the area surrounding the Caltrain station is one of the best transit-oriented neighborhoods in the city. With a great mix of shops, entertainment, work, and housing, the Mission Bay Master Plan launched over 20 years ago brought a renaissance to a neighborhood which was struggling but now has a bright transit-oriented future ahead. Figure 1.2 shows the modern state of the transit-oriented development neighborhood around our study area.



Figure 1.2 Present Day 4th and King Street's from Above.

1.2 Demographics

Today the current 4th and King Station sits in zip code 94107 within San Francisco, CA. Some neighborhoods which are a part of the zip code include South of Market, South Beach, and Dogpatch neighborhoods. Some of these neighborhoods have major growth in recent years with the redevelopment of the Embarcadero and new entertainment centers and with businesses moving in. As of 2018, according to the US Census, zip code 94107 had a population of about 29,689 residents with an average income of about \$79,699 per resident. (US Census, 2018)

As of October 2020, we did not have reliable data on how the coronavirus pandemic would impact housing, rent, and other factors critical to the demographics of the study area. However, we can infer from previous American Community Survey Findings and the 2010 US Census about the potential pre-pandemic picture of San Francisco’s demographics. According to the 2018 American Community Survey of the US Census, zip code 94107 had the following demographic composition by race: 15,668 whites, 1,551 African Americans, 83 American Indian/Alaskan natives, 8,968 Asians, 5 Hawaiians, and 1,683 residents of mixed race (US Census 2018). Figure 1.3 is a pie chart of the racial makeup of the 94107 neighborhoods from the 2018 American Community Survey. According to the same American Community Survey data, approximately one in ten residents claimed Hispanic origin. Appendix A has additional details.

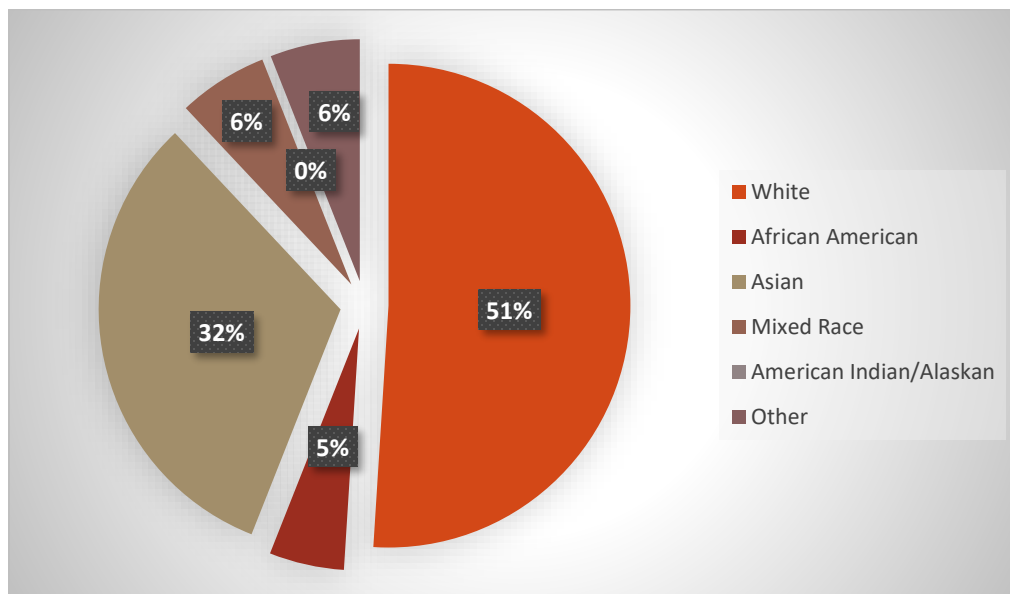


Figure 1.3: Demographics of Zip Code 94107.

American Community Survey 2018

According to the 2019 American Community Survey, San Francisco had a median rent of \$1,805 and a monthly home ownership cost with a mortgage of about \$3,473. The median cost to buy a home in San

San Francisco was over \$1,000,000 and about 37.6% of residents owned their homes. Finally, San Franciscans were very well educated with 88.5% having a high school diploma and about 57.1% having a college degree. Figure 1.4 shows the median housing costs in the City of San Francisco in comparison to the State of California and the United States. In every single metric according to the bar column chart, San Francisco had some of the highest housing costs in the entire nation.

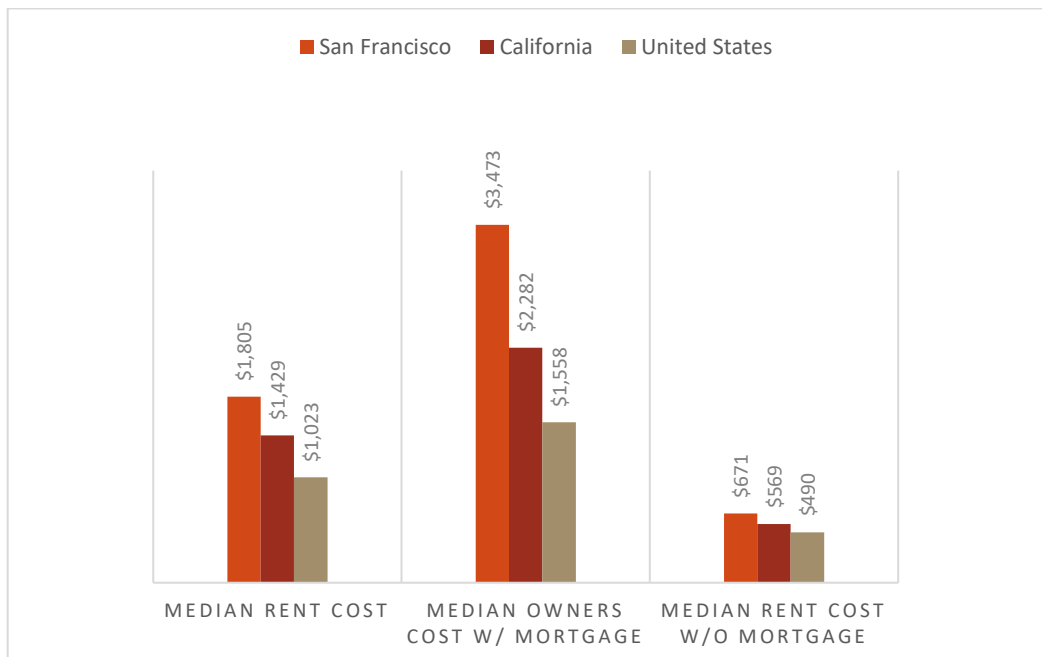


Figure 1.4: Median Housing Cost in San Francisco Compared to California and the United States

American Community Survey 2018

Reasons why San Francisco is in a housing shortage include the high cost of living, limited buildable land to build new housing, and the constant demand for housing in San Francisco and the surrounding Bay Area. While rent prices dropped in 2020 during the pandemic, it remains unclear whether the coronavirus would cause a temporary or a permanent change on the San Francisco Bay Area's housing market.

1.3 Zoning

According to the San Francisco Planning Department, the site of the 4th and King railyards is currently zoned as MB-O or Mission Bay Office Space. This means that now, residential development is not allowed. However, it is possible to change the existing land use zoning to a mixed-use development by using either a specific plan, community plan, a planned unit development, or a straightforward rezoning ordinance to switch general plan zoning designations (SF Planning, 2020).

1.4 Project Area

The project area being considered under this proposal is the existing 4th and King railyards and station which occupies the one-block area between King Street and Townsend Street and extends over three blocks from Fourth Street to 7th street. The actual new transit-oriented development area however is to be clustered in between 4th Street and 6th Street because of obstacles such as the Sixth Street overpass of Interstate 280 and needed space for trains to enter and exit the station. Figure 1.5 is a map of the project area in relation to the surrounding area.

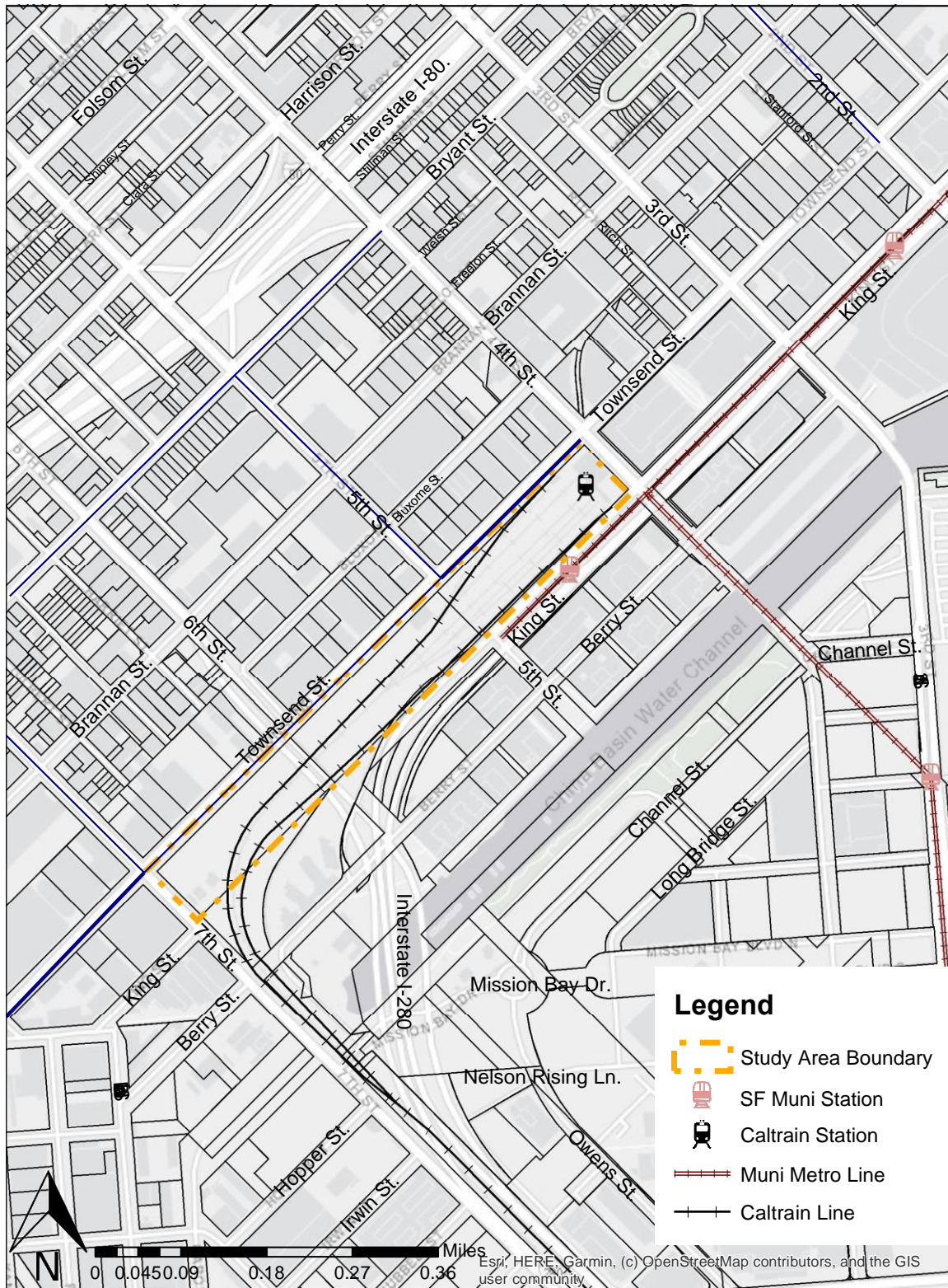


Figure 1.5: Project Area Map (ArcGIS)

1.5 Existing Services & Amenities

1.5.1 Site Conditions

The project site is a parcel which occupies the one block between King Street and Townsend Street and the three blocks between 4th Street and 7th Street. The site has the San Francisco 4th and King Caltrain Station, a small transit center for Muni Metro trains and buses, and a light maintenance facility for Caltrain Operations. Across the site is a freeway overpass connecting Interstate 280 with the sixth street exit, which divides the site into two sections. Within a mile of the site, there are many landmarks, including Oracle Park and Chase Center entertainment facilities, Mission Bay Hospital, Union Square, and Downtown San Francisco. The central location of the site provides a strategic and excellent location for a mixed-use station area development.

The site falls under the Mission Bay neighborhood of San Francisco. Because the Mission Bay redevelopment is relatively new, the neighborhood does not have a specific neighborhood character. According to San Francisco Bay Area Planning and Urban Research or SPUR, the Mission Bay neighborhood has a conflicting reputation and personality. There is the notion that the development of Mission Bay and the surrounding area is so far not a success. An Urbanist Article from SPUR in 2005 noted:

"Have we created another charming San Francisco neighborhood, with shops and a history? No. Was the process a model of community-based planning? No. Was the plan showered with planning awards? No. However, the area is on the right track to becoming a big success with new developments coming very soon" (SPUR, 2005).

The 1998 Mission Bay General Plan acknowledged that within the previous five years the area saw new high-rise developments, a new University of California San Francisco (UCSF) campus, and a new entertainment venue with Chase Center. Vacant parcels in Mission Bay such as the Caltrain railyard and

Oracle Park parking lots are prime opportunities for mixed-use development because of the prime real estate in the vicinity of many transportation options, food and restaurants, and entertainment venues and with opportunities for new parks and open spaces. Figure 1.6 shows the various amenities from restaurants, hotels, shopping, offices, and attractions within close proximity of the site.

In comparison to other municipalities and neighborhoods around the San Francisco Bay Area, zip code 94107 of South of Market, Dogpatch, and Mission Bay has a diverse transportation system offering many options to users. The San Francisco Municipal Transportation Agency (SFMTA) oversaw the implementation of this diverse system in 2014 to reduce car usage to 50% of transportation needs and enable fulfillment of the other 50% of transportation needs by bicycles, walking, or public transportation (SFMTA, 2015). As of October 2020, the most recent U.S. Census Data for 2018 reflects San Francisco's goals of reducing auto trips. The American Community Survey estimates that only 31% of commuters use their automobile for commuting. The U.S. Census Bureau data shows the shares for modes used in commuting, in decreasing, order as 26.9% taking public transportation, 22.6% walking, 5.6% bicycling, 3.9% using a taxicab or rideshare service, and 9.1% working at home (U.S. Census Bureau, 2018). Figure 1.7 shows the various San Francisco Muni Bus services and Muni Metro Lines in the surrounding area. Figure 1.8 maps and shows auto traffic by street along with busy intersections near and around the site.

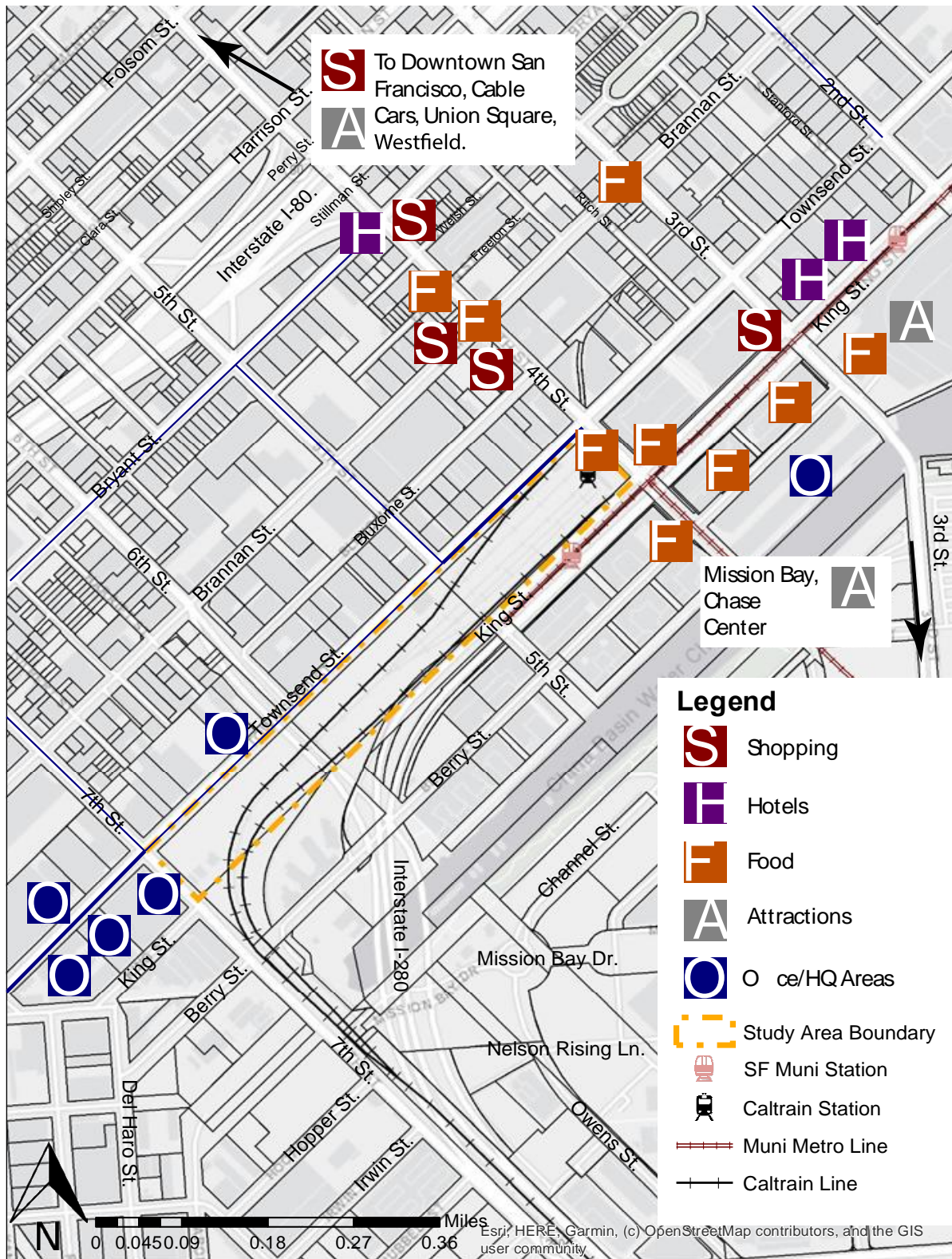


Figure 1.6 The Landmarks and Points of Interest Map

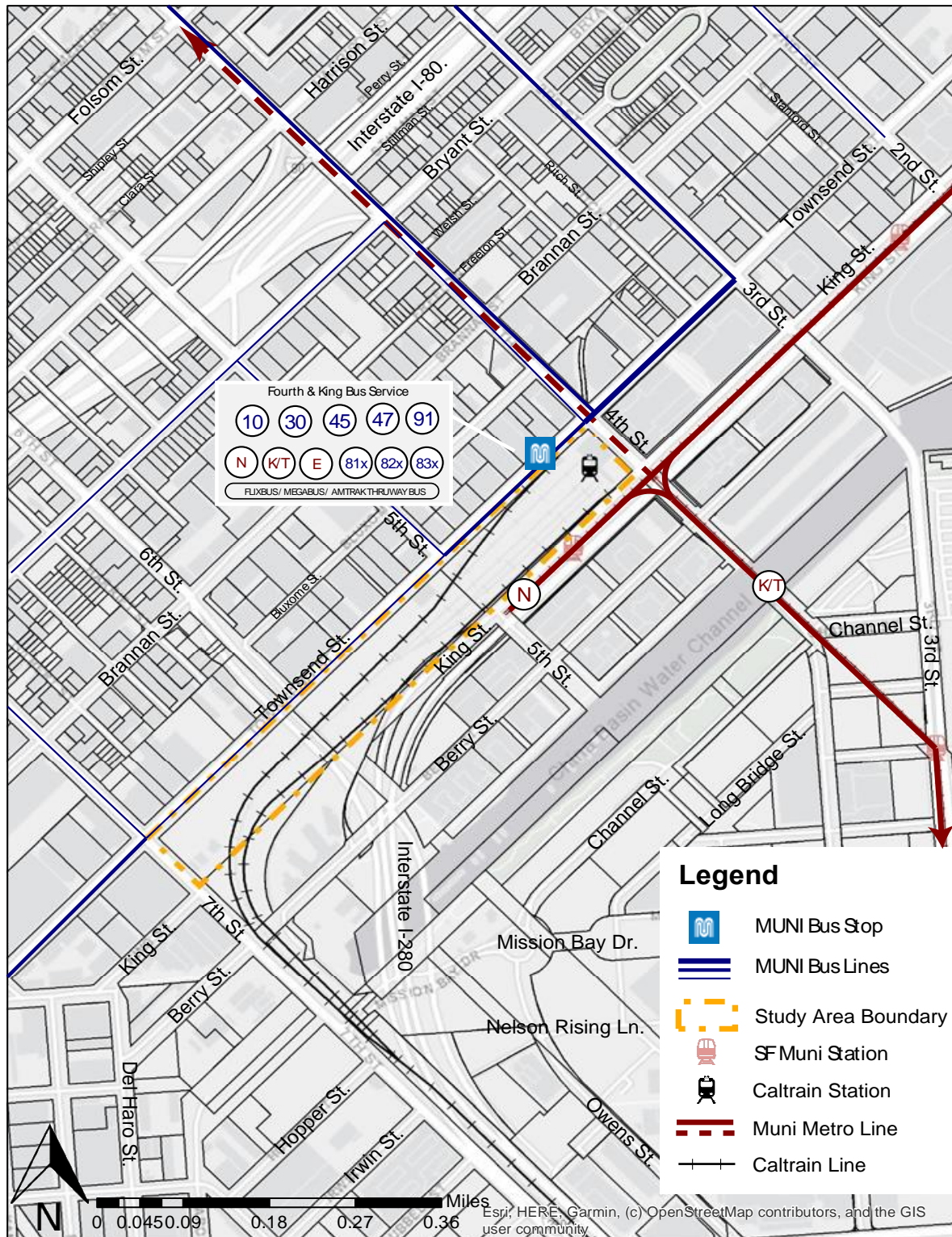


Figure 1.7: The Public Transportation Map for Muni & Caltrain Lines

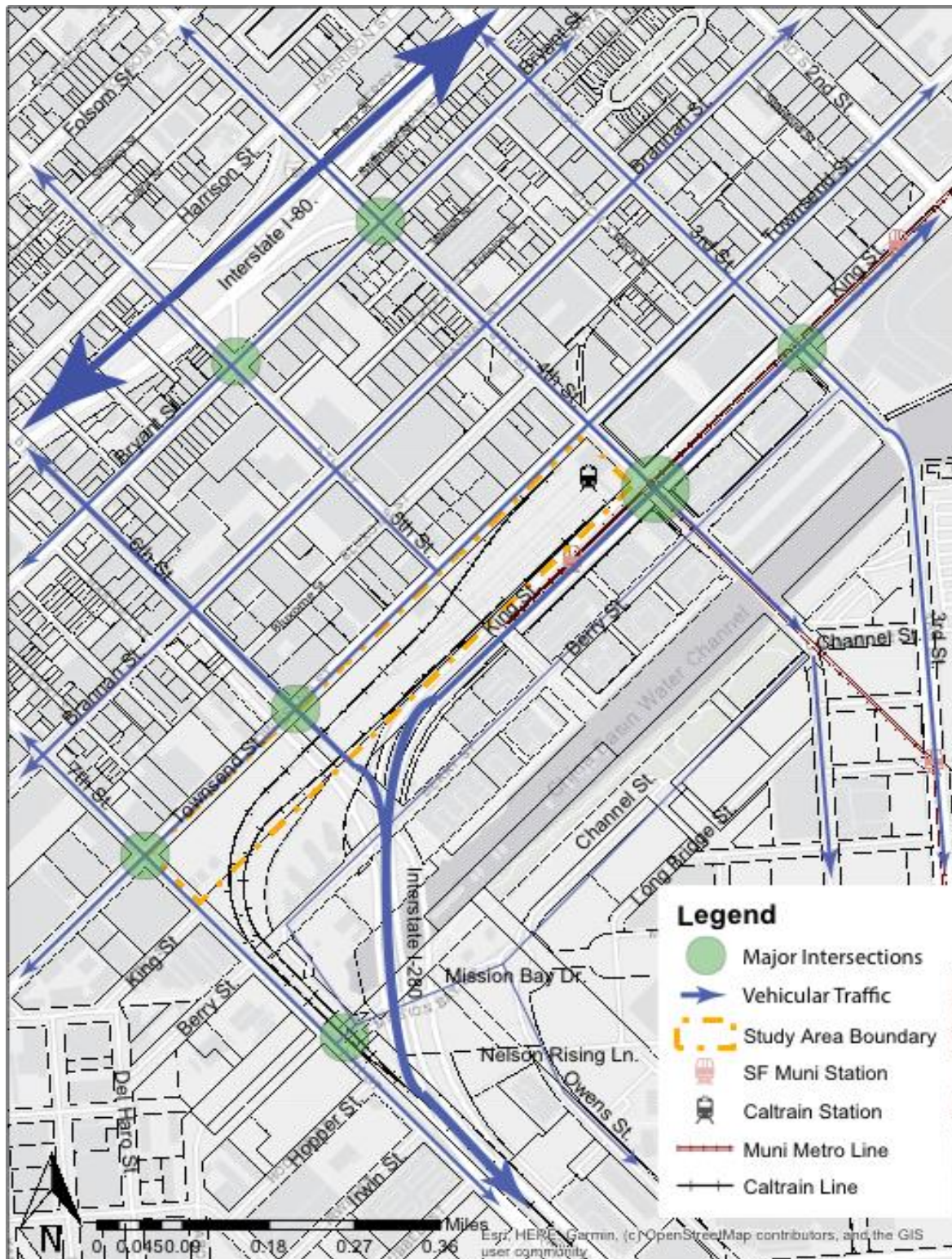


Figure 1.8: The Vehicular Traffic Map for the Mission Bay – South of Market Neighborhoods.

1.5.2 Current Levels of Transportation and Movement

For the movement of people either for commuting or for leisure purposes, the U.S. Census Bureau often records high commuting traffic within the city from Downtown to Mission Bay for work or business.

Suppose a resident of zip code 94107 were to commute outside for work or business purposes, according to the mobyus.com, a site that uses U.S. Census data and creates map visualizations, the following counties are where San Franciscans commonly commute to in order of greatest to least include: Santa Clara County, San Mateo County, Contra Costa County, Alameda County, and Marin County (mobyus.com, 2010). Unfortunately, there is not any recent updates to the American Community Survey on this specific set of data, the last section update was in 2010. Major reasons why San Mateo and Santa Clara Counties are number one and two in terms of commute relate to land use and transportation access. These destinations fall within Silicon Valley with Technology Companies and jobs. Neighborhoods in zip code 94107 benefit from relatively easy access to these top destinations with Interstate 280 nearby and availability of the Caltrain Commuter Train Service.

Finally, according to the most recent U.S. Census LEHD (Longitudinal Employer-Household Dynamics) statistics in 2017, neighborhoods in zip code 94107 have a positive inflow of workers with over 50,809 people from outside coming to work in the neighborhoods. Among the labor force resident within the neighborhoods, 14,688 people often travelled to other nearby zip codes or counties (outflow) for work (U.S. Census, 2017). Only 1,342 workers lives and worked in the study area neighborhoods.

The 4th and King development area is a transit-friendly neighborhood with a diversity of options for commuting or leisure, according to the SFMTA and the U.S. Census. If residents must work outside the county, they would be in proximity to Alameda, San Mateo, or Santa Clara counties. Finally, creating additional opportunities for alternative modes of transportation is an essential objective for this project.

1.5.3 Neighborhood Safety

According to the City of San Francisco Mission Bay Redevelopment Plan, the site is in the Mission Bay neighborhood. As a result, Mission Bay is the primary neighborhood for crime statistics. According to DataSF, from January 2018 to May 2021, the Mission Bay neighborhood had 7,848 crime incidents (DataSF, 2021). While this number may seem significant for crime incidents, it accounts for almost three and a half years of data, and there are 18 other neighborhoods ahead of Mission Bay with higher total numbers of incidents in San Francisco. Figure 1.9 is a comparative breakdown of crimes per 1,000 residents by types in Mission Bay and San Francisco as a whole. Appendix B has data and additional details. The following are notable:

- Compared to San Francisco as a whole, the Mission Bay neighborhood has about half the incident of all crimes in comparison to the entire San Francisco.
- The prevalent types of crimes in Mission Bay over the last 4.5 years are larceny/theft, fraud, and other-miscellaneous crimes.
- Fraud and other-miscellaneous crime rates in Mission Bay are higher than that of the entire San Francisco.
- These comparisons would portray the Mission Bay Neighborhood as considered relatively safer overall in terms of crime than the City as a whole.

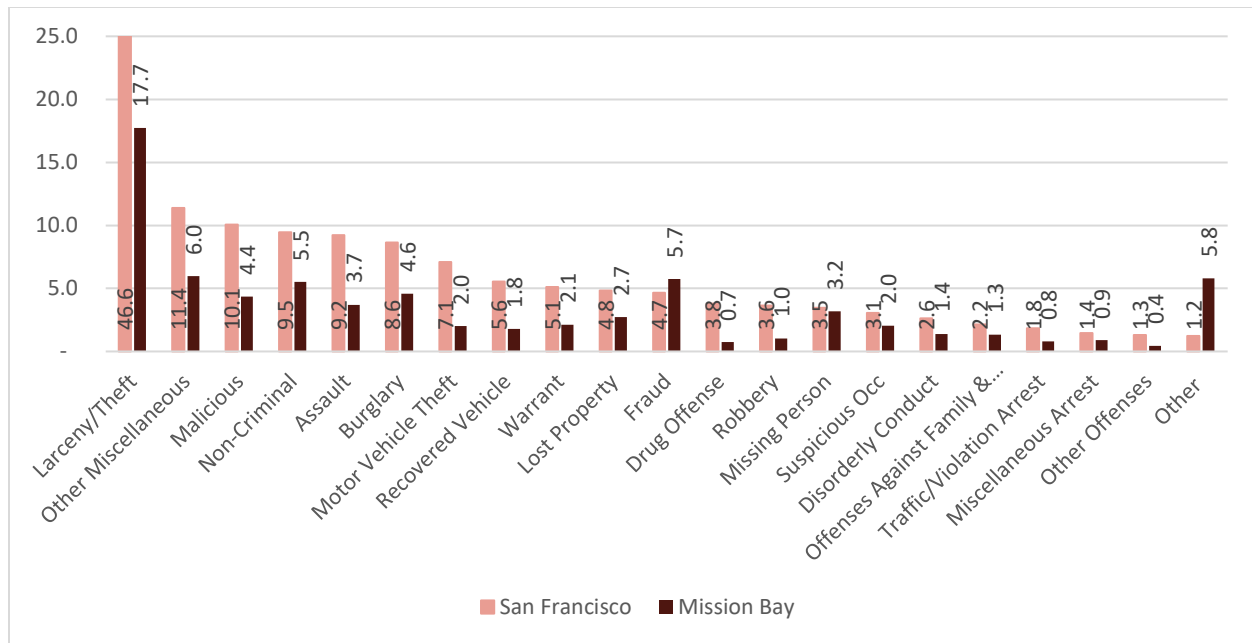


Figure 1.9: Comparative Average Annual Rates of Crime per 1000 Residents (2018 to 2021) by Type (SF Data, 2021)

1.5.4 Project Need & Importance:

This project can address multiple essential needs for Caltrain, the City of San Francisco, and such private parties and businesses as Prologis. The issues to address include the shortage of affordable housing in San Francisco, the need for Caltrain to upgrade its mainline stations and facilities for future expansion and high-speed rail, and new opportunities for housing and commercial development.

The most pressing need for the railyard site involves the affordable housing crisis. Factors contributing to the housing problem in San Francisco includes competition from technology workers with high incomes, a growing Not-in-My-Back-Yard (NIMBY) movement in San Francisco, and the limited construction of new housing to accommodate demand. San Francisco has few vacant sites available for development, and the Caltrain Railyards Site is one of those sites. San Francisco Mayor, London Breed, said this best: "San Francisco has become more popular as more people were working here" (Breed,

2020). So, the need to build more housing is essential to retain existing residents or encourage new residents to move to San Francisco.

Caltrain has many vital needs for this site, which is the northern terminus of the San Francisco Peninsula Corridor. The site serves as a light maintenance and storage area and a terminus station for trains coming from San Jose & Gilroy. Caltrain's essential needs include upgrading or reconstructing the existing or current 4th and King Station because it is nearing 50 years old. Caltrain also has critical needs to enhance or expand the station to accommodate services for California High-Speed Rail and commuter rail expansion, possibly to Union City, CA or Salinas, CA. Finally, Caltrain's Modernization or CalMod is underway for electrifying the corridor and bringing in new trains. Because of the upgrades occurring along the line, the time is right to modernize the station and railyards to prepare for future growth.

Finally, Prologis owns the 4th and King railyard site and is open to development of housing and businesses. If Prologis develops the site, it will look for it to be a profitable venture. This project's significant critical need is to make sure private parties, including Prologis, are satisfied with the project's terms and likely outcomes.

Other important factors for consideration in project development include:

- Safe streets and streetscape

- Neighborhood layout and landmarks

- Past environmental concerns

- The creation of a public transportation hub for the Mission Bay and South of Market neighborhood

Chapter 2: Typology and Principles

2.1 Transit-Oriented Development

2.1.1 Overview

Transit-oriented development has been on the rise in cities and suburbs in the United States over the last few decades. What is transit-oriented development (TOD)? According to the Transit-Oriented Development Institute, TOD is "the creation of compact, walkable, pedestrian-oriented, mixed-use communities centered around high-quality train systems" (TOD.org, 2020). In building communities with housing, shops, and other amenities together rather than separately, the principal idea is that people can depend less than usual on their cars and increase their use public transit or alternative transportation modes. To better promote this concept, most transit-oriented developments in the United States are built near light-rail, commuter rail, or frequent bus service corridor stations to facilitates access to services without a car. To better understand why transit-oriented development is popular in cities, a historical perspective is needed. Figure 2.1 shows a TOD station and adjacent development next to a rail stop.



Figure 2.1: A Transit Oriented Development Site in San Jose, California.

2.1.2 Emergence in the United States

According to the Berkeley Institute of Urban and Regional Development, modern transit-oriented development in California began in the 1990s with architect Peter Calthorpe. The first instance of transit-oriented development in the State is at Laguna West near Sacramento, CA. This concept involved building dense housing and commercial uses around frequent and reliable public transportation stations. The goal of this concept is to reduce trips by automobiles and encourage use of alternative modes of transportation. Transit-oriented development has since become popular in many urban regions, including the San Francisco Bay Area, Portland, Seattle, the Northeastern United States, and other urban metropolitan areas where permitted.

2.1.3 Transit-Oriented Development Benefits and Problems

Transit-oriented development has many transportation, environmental, and urban design benefits. Residents living within the transit-oriented development are less likely to use the automobile because these neighborhoods are far more walkable and more compact compared to a traditional single-family home neighborhood. Transit-oriented neighborhoods are typically newer neighborhoods and can be built more sustainably with renewable energy. With reliable public transportation connecting high traffic neighborhoods, a reduction in trips by car can occur in favor of public transportation and alternative transportation modes.

According to tod.org, other benefits include a possible reduction in energy use, encouragement for public transit infrastructure, and better-designed neighborhoods that can operate as a central hub for both the transit-oriented neighborhood and surrounding areas.

While the benefits of transit-oriented developments are numerous, there are also credible drawbacks that should be up for consideration. For one, according to curbed.com, transit-oriented development can often lead to higher rents and maybe gentrification because the transit-oriented development is

built around many amenities such as businesses and transportation that can drive up costs. Also, there may be questions on whether people would go carless. Since many neighborhoods in the United States are built around the car, transit-oriented development neighborhoods could reduce vehicle trips but may not eliminate them. Despite these drawbacks, the benefits of transit-oriented development far outweigh the risk for the environment, sustainability, transportation, and urban design.

2.1.4 Relation to the Project Site

The 4th and King Railyard site has a mixed-use transit-oriented development design influence around most of the site. Building a dense transit-oriented development is adjudged best practice to provide more housing and maximize the usefulness of land around the station area.

2.2 Complete Streets

2.2.1 Overview

Complete streets have been a prevalent new strategy to produce traffic calming and promote use of alternative transportation modes. According to the U.S. Department of Transportation, complete streets are "designed and operated to enable safe use and support mobility for all users. Those include people of all ages and abilities, regardless of whether they are traveling as drivers, pedestrians, bicyclists, or public transportation riders" (US DOT, 2015). Complete streets are excellent methods to promote health and safety on roadways that do not utilize all the traffic by reducing car lanes to accommodate other modes. Amenities on a complete street can include a middle turn lane, new street landscaping, and new bike and bus lanes on wide and main streets. Figure 2.2 depicts a complete street treatment in New Jersey.



Figure 2.2: A complete street located in New Jersey.

2.2.2 Emergence in the United States

According to the American Planning Association, the National Complete Streets Coalition was founded in 2005 to better inform local governments and states about the benefits of complete streets. America Bikes, the American Planning Association, Smart Growth America, and other nonprofits and planning organizations introduced standards and amendments since 2005 that "include ample sidewalks, improved standards for street tree planting and other landscape elements, bike lanes, dedicated bus lanes, comfortable and accessible transit stops, frequent crossing opportunities, median islands, and curb extensions" (APA, 2015). By 2012, nearly 500 communities had complete street plans implemented, including Boston, San Francisco, and New York City. Since the 2005 debut, most cities all over the United States have some form of the complete street initiative because of all the safety, environmental, and multimodal benefits.

2.2.3 Complete Streets Benefits and Problems

According to the American Planning Association, there are many benefits and a few problems with complete streets. Some benefits with complete streets include an increase in multimodal

transportation, complete streets are more environmentally friendly, and complete streets are often safer than a typical street (APA, 2015). Since complete streets either shrink car lanes or eliminate some lanes all together for drivers, drivers usually drive slower because of bike lanes or pedestrian-friendly impediments. This leads to safer conditions for bicycles, public transit, and pedestrians. The implementation of bike lanes and access to a cycling network could lead to an increase in bike ridership. Finally, complete streets are often greener both with landscaping and in reducing emissions with better implementations of multimodal transportation.

Other benefits associated with complete streets include better health benefits, including addressing chronic disease and physical activity, reducing human exposure to vehicle emissions, and reducing motor vehicle-related injuries and fatalities.

Despite all the benefits of complete streets, some drawbacks relate to drivers. Because the roads change to reduce or eliminate parking and traffic lanes, journey times for cars may take longer than the old style of streets, according to the Victoria Transport Policy Institute (VTPI). According to the same report, there could be a period of transition relating to construction, planning, and costs of implementation (VTPI, 2015). Finally, not all streets are made for a complete street makeover as complete streets are best implemented on main thoroughfares that have seen a decrease in traffic. If a complete street proposal is to be implemented on a major thoroughfare, strategies to ensure all transportation modes are safe and travel efficiently should be included in its design.

2.2.4 Relation to the Project Site

Townsend Street borders the study site to the north of the 4th and King railyards and is a prime candidate for a complete street makeover. While bike lanes and public transit exist already on the street, half the street bordering the railyard does not have a sidewalk or vegetation. Therefore, a

recommendation for complete streets must have a consideration if a development is to be built on the railyard site.

2.3 Pedestrian Mall

2.3.1 Overview

Over the past seventy years, there have been many attempts to bring walkable downtowns into the mainstream with pedestrian malls. These outdoor pedestrian malls have boosted commercial activity and increased property values. Pedestrian malls, according to the National Association of City Transportation Officials (NACTO), pedestrian malls often associate with closing off downtown streets to vehicle traffic in favor of pedestrians and bicycles only (NACTO, N.D.). These pedestrian malls and places can provide a public park-like space in urban areas which have very few open space areas. Amenities with these spaces include special lighting and pavement, trees and gardens, public art and sitting areas and amenities for bicycles, and alternative transportation modes. Figure 2.3 is an example of a pedestrian mall in Charlottesville, Virginia.



Figure 2.3 The Downtown Pedestrian Mall at Charlottesville, Virginia.

2.3.2 Emergence in the United States

According to a NACTO report conducted by Jessica Schmitt, pedestrian malls began their emergence in the 1960s and 1970s. With the significant decline in pedestrian traffic downtown due to suburbanization and white-flight, pedestrian malls at the time were seen as a solution to bring back people to downtowns and revitalize empty streets. At first, this concept was thought to be successful; early pedestrian malls were often modeled out of their indoor counterparts, people can walk out of cars and enjoy the shops and amenities, and at one point, over 200 pedestrian malls were built to revitalize downtowns (Schmitt, 2020).

However, Schmitt reported that pedestrian malls were considered a failure. Most of the streets were converted to street traffic by the 1980s, with a few remaining today. A large reason for the failure is that these streets lacked foot traffic and that most cities just expected one downtown pedestrian mall to fix all of an old downtown's problems. Much of the successful pedestrian malls, according to the report, are often "in university towns or are adjacent to large institutions and academic centers" (Schmitt, 2020).

Finally, these towns did not make the economic development and general promises to the local businesses any better. With the rise of suburban shopping malls and automobile-oriented development, old downtowns were unfortunately left behind. Underutilized downtowns are still an issue that many cities across America still face today.

With the lessons learned from past mistakes, modern city and transportation planners have slowly brought a renaissance to the failed concept. There were many problems with the original pedestrian malls, such as a lack of maintenance, shutting down major thoroughfares, and not implementing enough activities to make pedestrian malls lively throughout the day. It is quite clear that a pedestrian mall's success is directly correlated to high foot traffic and a lack of outdoor open space. Also, with many cities

wanting to have residents use alternative modes of transportation over cars, the study and implementation of one of these pedestrian malls could become more common in the coming years.

2.3.3 Pedestrian Malls Benefits and Problems

There are many benefits to implementing a pedestrian mall or plaza. According to Michelle Wallar of culturechange.com, pedestrian malls can often bring better air quality and improve a neighborhood's image and appearance. When done correctly, this can significantly benefit local businesses by providing better amenities for customers and visitors. (Wallar, N.D.) Furthermore, if significant cities lack open space, pedestrian malls can be a great alternative and, in the process, promote walking, biking, and other sustainable modes of transportation.

However, there are also many issues that the public associates with pedestrian malls. For one, the past failures of pedestrian malls from the 1960s and 1970s, according to Jessica Schmitt and NACTO, can be a significant issue. Furthermore, sometimes there are better and more equitable options than implementing a pedestrian mall. In quite a few cases, complete streets can often bring a balance of amenities while still being open to cars. Furthermore, there needs to be a plan to make sure there is plenty of foot traffic. Otherwise, there is a creation of dead space, and the mall will not be a success for the businesses and the public.

Since its introduction in the 1960s, pedestrian malls have had both plenty of successes and failures. Previous studies have revealed that doing studies on the potential for foot traffic and having a good plan to draw in visitors can help pedestrian malls yield benefits to a community rather than become a failed afterthought.

2.3.4 Relation to the Project Site

Why add a pedestrian mall/plaza to this project proposal? If implemented correctly, this could add a significant element of success to the Mission Bay and South of Market Neighborhood. For one, these

two neighborhoods do not have much open space with a few narrow parks and plazas within a mile.

Adding a pedestrian plaza can bring the transit-oriented development and new station together. With foot traffic from nearby entertainment facilities such as Oracle Park and Chase Center and foot traffic from the dense development, adding a plaza or mall can create a space for hosting neighborhood events and bringing the neighborhood together.

Chapter 3: Case Studies

3.1 Chapter Introduction

The case studies chapter reviews projects that are either in the process of being completed or have been complete in their respective communities. The purpose for conducting case studies is acquire lessons from these examples that can apply to this report. This chapter divides the case studied into two categories: primary examples and other examples. Figures 3.1 through 3.4 depict the intensity of land use around major rail stations in the US, Japan, and France. These images can help visualize how the development of the Fourth and King Caltrain Station could look like at completion.

3.2 Primary Examples:

Washington Union Station – Washington D.C. USA.

Overview

Washington Union Station is Amtrak's second-busiest station in its entire nationwide network. It serves as the terminating station for many nationwide routes including the famous Northeast Corridor. It is also a terminal for many local and regional transportation options. Since completion of construction in 1903, Washington Union Station had many iterations over the years to cater to passenger needs. Today, Washington Union Station requires a renovation to keep rail competitive throughout the Washington area and the Northeast Corridor. The goals for the renovation include improving the existing customer service, expanding capacity for all trains, and enhancing the station's future vitality. Enhancements to the improvement project includes the development and expansion of the train shed to allow for more trains during peak periods, develop and utilize the air-rights above the station to develop new housing

and shops, and turn Washington Union Station into a transportation and cultural hub in one of America's finest cities. Figure 3.1 is a rendering depicting a bird's eye view of the station area.



Figure 3.1 The Washington Union Station Master Plan Rendering.

Statistics

Washington Union Station is the second busiest station in the Amtrak network, with about 4.5 million passengers using the facility in 2019, according to the Rail Passengers Association (RPA) & Amtrak. (RPA & Amtrak, 2019) Overall, Washington Union Station has about 37 million overall visitors every year, according to the Great American Stations Organization in 2019 due to the station's architectural significance, home to lots of restaurants and shops, and being a central transportation hub for Washington D.C. and the entire



Figure 3.2 Washington Union Station during the 2009 Inauguration Ceremonies.

beltway region. The station hub makes Washington Union Station the third most visited station globally due to the amount of retail, transportation connections, and other amenities available (Amtrak, 2020).

Figure 3.2 shows a throng of people going through the Washington Union Station during the historic presidential inauguration of 2009.

Walkability

In terms of walkability, Washington Union Station is one of the most walkable stations in the country. The station is within a mile of the United States Capitol Building and the National Mall of Washington D.C. The station is also within walking distance of major companies such as Google D.C., CNN's D.C. Headquarters, and many federal offices. For downtown access and other transportation means, the facility can access the metro and rental car services to get to a place fast. In other words, Washington Union Station is one of the best centrally located stations in the United States.

Scale

Washington Union Station's scale is massive in terms of its importance and influence throughout the area that surrounds it. The station is so expansive as to have rental car services, metro station, and a shopping complex. This station's economic development impact is so massive that major businesses and companies in Washington are often located around the station for ease of



Figure 3.3 A Concept Drawing of New Washington Union Station from the Amtrak Master Plan.

commute and the central location from the Capitol and Downtown Washington D.C. The scale and impact of the station will be increased further with the implementation and construction of the 2012 Washington Union Station Master Plan, which seeks to add transit-oriented development on-site,

reutilize dead space through the station, and make the neighborhood around the station into a transit-oriented development mega-hub. Figure 3.3 shows a concept drawing of the planned interior.

Transition

The future of Washington Union Station lies with the 2012 Washington Union Station Master Plan from Amtrak. This future master plan seeks to triple capacity for existing intercity and regional rail traffic, improve the station's quality of experience, and improve vitality in the surrounding area with business and technology support through transit-



Figure 3.4 The overhead site plan for the future Washington Union Station with transit-oriented development included.

oriented development and other various tactics. Currently, the Amtrak Master Plan for Washington Union Station is in phase 2 of 4. Phase 2 upgrades existing new tracks and platforms, creates a new bypass track on the east side of the station, and adds a below-grade parking area. Phase 2 is expected to be completed in 2022, with phases 3 and 4 focusing on development over the station air-rights, building a new station development, and growing capacity on an as-needed basis. Figure 3.4 shows the overhead site plan. Any development or upgrades to platforms and tracks on the west side of the station will be complete during this time. This project's final results will be completed in 2028, with the possible expansion of more tracks and concourses after phase 3. Finally, the entire cost for phases 1, 2, and 3 will be approximately 7.5 billion in 2012 dollars, and at the moment, Amtrak has the money to conduct the phased plan and create a better experience for Washington Union Station (Amtrak, 2012).

Conclusions

While construction of this case study example is not fully completed yet, we can still learn quite a bit from this case study example. Both San Francisco 4th and King and Washington Union Station are terminus stations with relatively high traffic. Both stations face similar problems of keeping operations ongoing during construction, improving the customer experience, and increasing the station's vitality and impact on the surrounding area. Taking inspiration from the master plan of Washington Union Station can be an excellent start in creating the development plan for Fourth and King Station.

Miami-Central Brightline Station – Miami, Florida. USA.

Overview

Miami Central Station in Miami, Florida, was designed by Skidmore, Owings, and Merrill. The station was built on an abandoned old station site beginning in 2014 and was completed in 2018 with three tracks for now with five tracks planned to expand commuter rail and high-speed rail expansion services. The leading company known as Brightline (formerly All Aboard Florida and Virgin Trains) is responsible for rebuilding the old station to bring modern high-speed train service from Miami to Orlando, Florida. To better maximize usage and the air-rights above the station, the platforms and tracks are all elevated. On top of this, there are multiple offices and residential high-rise towers above the station to create a transit-oriented development project in the heart of Miami. Figure 3.5 is an aerial view of the station area. This modernist and creative station has prompted many architectural and infrastructure awards to Brightline and Skidmore, Owings, and Merrill on their work for the stations.



Figure 3.5 Miami Central Station nearly competing construction in 2017-2018.

Statistics

In 2019, Brightline operations carried just over one million passengers across its entire network. The number of passengers is expected to increase when Tri-Rail (the regional commuter rail service of Miami) moves into the station within the coming years and Brightline's high-speed extension to Orlando and Disneyworld opens within the next 2-5 years. Brightline calls this the "ramp-up" period to win over riders from using airlines and autos.

Walkability

Miami Central Station has an excellent walkability score as the station is located close to downtown Miami. On average, most of downtown Miami with restaurants and other amenities is about a 20-minute walk away from the station. Within a twenty-minute walk of the station, local amenities include Bayfront Park, the American Airlines Arena, the City of Miami and Miami-Dade County buildings, and other local businesses. The station is also home to a world-class transportation hub, helping make

traveling to the surrounding Miami region easier. Tri-rail, Brightline, and Metrobus services are all located nearby for ease of connection.

Scale

In comparison to Washington Union Station and San Francisco 4th and King Station, the Miami Central Brightline Station scale is a medium-sized railway station. The most significant factors for its size are the land size and air rights over the old station site. At the moment, the station has three platforms with plans for two more in the future. However, the station's



Figure 3.6 Brightline's Miami Central Station under construction in Downtown Miami

scale is in its height. Other than the check-in counters and a few shops, almost everything is elevated above the Street. Some of the central elevated items include all the railway platforms, office space, and housing. Figure 3.6 shows items elevated above ground during construction of the station. Currently, the station is home to two 30 story towers with 816 apartments and 322,000 square feet of office space with a new food hall on the way. The new station will likely also be an anchor for new transit-oriented development built in the coming years.

Transition

For expansions and other transitional elements, the area to the west of the station is primarily built out with parks, missing middle housing type buildings and developments, and other new construction near the



Figure 3.7 Possible transition and expansion plans if Tri-Rail decides to partner with Brightline (Formerly Virgin Trains).

station. The real transition occurs to the east of the station with high-rise luxury condos, offices, and government facilities. If there is a future transition for development to the east, transit-oriented style development would be the best bet. Figure 3.7 shows possible transition and expansion of the station. As for the station itself, the station is primarily complete with only platform expansion in the works for the inclusion of tri-rail commuter rail services. Figure 3.8 is a rendering of the complete station complex (Skidmore et al, 2021).

Conclusions

Miami Central Station is an excellent example of a modern new railway station built in a dense environment. Since Brightline and its stations are privately financed, this shows the possibility of private finance to incorporate transit-oriented style development into a new redevelopment project. However, it is essential to consider that this development is relatively new and may need



Figure 3.8. The full completed rendering of the Miami Central Station Complex.

a few years to fill out tenants and become more integrated with the City of Miami. Also, Miami Central Station is built differently from other sites as the platforms and development are built above ground and not below. The station's construction may have to do with the rising threat of hurricanes and flooding due to climate change. The examples from this project show that projects such as these are possible and, with proper action, can attract private sector financing.

Capitol Hill Light Rail Station – Seattle, Washington. USA.

Overview

The Capitol Hill transit-oriented development was built on the light rail station of the same name.

Completed in Spring 2020, the Capitol Hill development is the newest of the case studies. Figure 3.9 is a rendering of the completed station. This development aims to develop the land along the light rail line into a developable central hub for the capitol hill neighborhood of Seattle and introduce transit-oriented development for possible future stations in Soundlink's expansion plans.



Figure 3.9 Seattle's Capitol Hill Station Rendering which completed construction in Spring 2020.

Statistics

The Capitol Hill Station is located close to the University of Washington. The station recorded consistent ridership of about 8,408 average riders a day in 2019. The ridership had increased by 8.5% from the previous year's ridership of



Figure 3.10 The interior of the Capitol Hill Light Rail Station in Seattle, Washington.

about 7,752 riders in 2018. Figure 3.10 shows the interior of the station. (Sound Transit, 2019)

Sound Transit (Seattle's Transportation Agency) created a development plan for 418 apartments with at least 38% of the units being affordable to low-income households. Also, 34% of the units have at least two bedrooms, and the buildings are built to LEED Gold Standards.

Walkability

The area located around the Capitol Hill Light Rail Station is very walkable. The station is situated along the East Broadway Economic Corridor, home to many restaurants and amenities for a very walkable environment. Other walkable landmarks include Carl Anderson Park and Pine and Pike Streets. Finally, the station is within walking distance of schools, hospitals, and other government services, making the neighborhood very walkable.

Scale

Compared to the two previous examples and our study site, this is the smallest case study. This station is a subway/underground light rail station with two platforms. At the moment, there seems to be no plans for further expansion of the station as the mixed-use development on top was recently completed in 2020.

The new mixed-use development from Sound Transit contains 418 apartments, with 38% affordable. Also, the site contains pedestrian plazas and commercial space for new businesses on the lower floors. The new development

also blends in with the neighborhood around it, only going up to 7 stories maximum on the tallest mixed-use building. Figure 3.11 shows a site plan for the station. (Sound Transit, 2021)

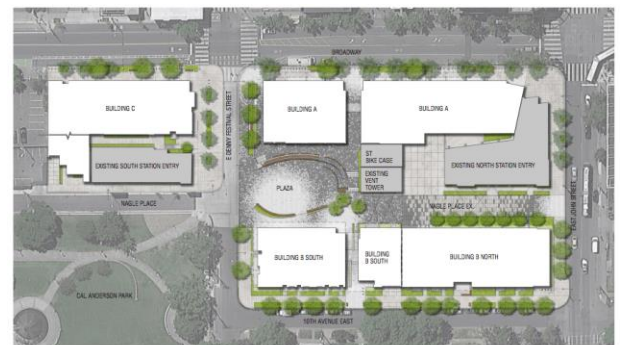


Figure 3.11 Site Plan for the Capitol Hill Light Rail Station TOD as proposed by Sound Transit.

Transition

The new station development increases the Capitol Hill Neighborhood scale in examples of missing middle housing and creating an unofficial central hub to host neighborhood events and activities. This development has the potential to be a central hub due to its proximity to the neighborhood center and being in the economic corridor. For the general layout



Figure 3.12 Construction of the Capitol Hill Light Rail Station

of the surrounding neighborhood, the area is more urban to the west of the station, with multi-story buildings and nearby businesses. The area to the east contains more residential and missing middle housing style apartments and houses. Figure 3.12 shows the station area at the start of construction (Sound Transit, 2021).

Conclusions

This station, while small, contains lots of lessons for the Fourth and King Street Station. The best example is how Sound Transit constructed the station first before building above it. The method used to create the original station was the cut-and-cover method for tunnel excavation before the mixed-use development was built on top. Taking inspiration on how construction crews conducted this project can provide an example for the Fourth and King Station. Also, Sound Transit did a great job making sure the transit-oriented development blends in with the surrounding neighborhood. The 4th and King station has a similar problem with the east and south of the site containing high-rise apartment buildings while the density is much lower to the north and west. Finding a way to blend densities and have the development blend to the surrounding area will be essential to the project's success.

3.3 Other Examples

This section describes briefly other project examples that did not make the cut for inclusion in the primary case studies. However, the designs and inspirations deserve recognition as examples of how countries outside the United States tackle problems that the Fourth and King Street station would face.

Birmingham New Street Station – Birmingham, England, UK

Initially built in 1854, rebuilt from 1964 to 1967, and now redone again from 2010 to 2015, Birmingham New Street station has remained central to rail travel for Birmingham, England, and England's northwest region. For the 2010-2015 redevelopment, some plans called for a complete overhaul of the station, which would have included two new office

towers, a new façade, and new shops and track improvements in order to keep the station running up to standard for another 50 years and to prepare the station for possibly welcoming High Speed Two (HS2) Trains in the future.

However, due to budget cuts and the ballooning costs of HS2, the station will not be home to new high-speed trains. That privilege will go to nearby Curzon Street Station instead. The two original office and residential towers known as the "twin towers" in the plan were eventually scrapped as well. The renovation to the station did help revitalize the surrounding area. Figure 3.13 shows the station under construction in 2012 (ARUP, BBC News 2019).



Figure 3.13 Birmingham New Street under renovation in 2012. (2019)

Osaka Station City – Osaka, Japan

While the modern-day station was built in the 1970s, this case study of Osaka Station would have focused on the major renovation that took place from 2007 to 2011 with the Osaka Station City Expansion Project. The station project added a new shopping center, offices and added transportation improvements for buses and local trains that service the station. While the world-famous Shinkansen trains do not service the station, they are located a few stops away by local transit services (Osaka Station, 2021). Figure 3.14 shows an aerial view of the station area. A key takeaway from this case study was the seamless transition of construction while the station continued to operate during construction.



Figure 3.14 Osaka Station City with the North Gate and South Gate Office Buildings. (2019)

Paris Gare Montparnasse – Paris, France

Originally built-in 1840, the modern Paris Gare Montparnasse was not built until the 1960s. A new station was built down the tracks from the original station, and a new office building and shopping facility with gardens were built above the station. The original station building was torn down for the now infamous building Tour Montparnasse. The current station was expanded for TGV service in the 1990s, and improvements were made to keep up with the times (EU Touring, SNCF, 2019). Figure 3.15 is a view of the station area.



Figure 3.15 Paris Gare De Montparnasse from the nearby Tour Montparnasse office building.

Key takeaways that can be included in Fourth and King Street station project are:

- converting an above-ground station to below ground,
- using urban design practices in the station such as skylights and open-aired lobbies to reduce claustrophobia, and
- making sure that the space benefits both the public as well as the travelers.

Chapter 4: Project Study Area

4.1 Current Conditions

This chapter describes and analyzes site conditions in existence within and in the vicinity of the study area for the Fourth and King Station development project. Figure 4.1 is an annotation of various points of interest nearby. Subsequent paragraphs provide a close look at individual points of interest.

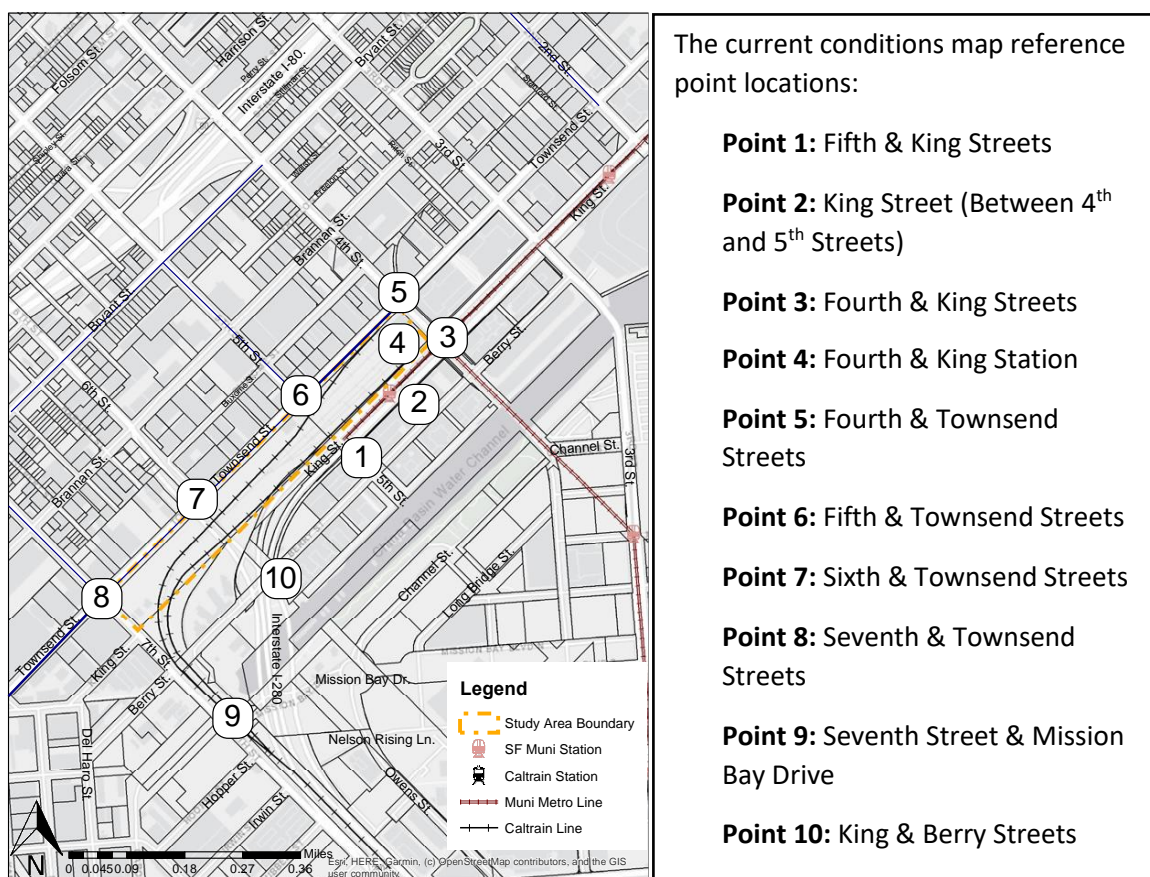


Figure 4.1 Current Conditions Map for Reference Context

The Fourth and King Caltrain Station makes a strong case for development due to its rich public transit infrastructure, nearby amenities, and location. The following pages annotate the developments around the site for context and guidance.

Point 1: Fifth & King Streets

Existing Uses: Condos, Leasing Offices

Uses: Mixed-Use

Zoning Designation:

MB-O - Mission Bay – Office (North of King)

MB-RA - Mission Bay – Redevelopment Area (South of King)

**Point 2: King Street (Between 4th & 5th Streets)**

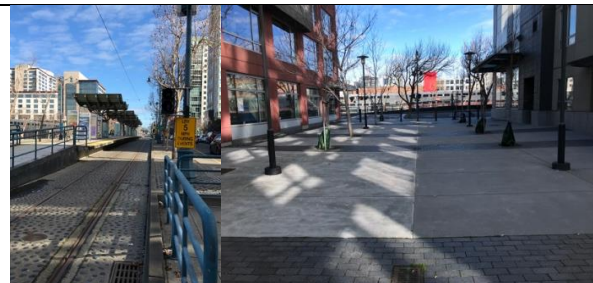
Existing Uses: Muni Metro Transit Station, Dog Daycare Center, Condos.

Uses: Commercial and Residential Mixed Use

Zoning Designation:

MB-O - Mission Bay – Office (North of King)

MB-RA - Mission Bay – Redevelopment Area (South of King)



Point 3: Fourth & King Streets

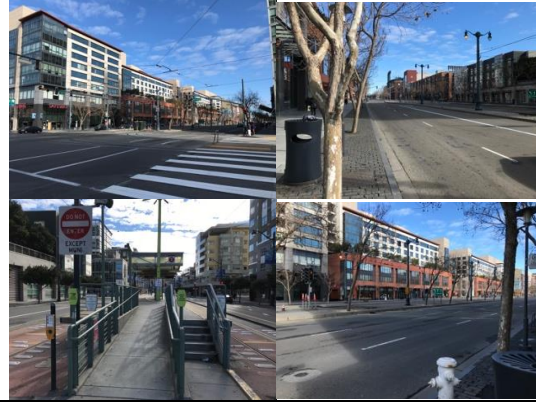
Existing Uses: Panera Bread, Philz Coffee, Safeway, Avalon Leasing Offices, Caltrain 4th & King Station, Muni K/T & N Train Platforms

Uses: Public/Quasi Open Space, Mixed-Use

Zoning Designation:

MB-O - Mission Bay – Office (Caltrain Yard)

MB-RA - Mission Bay – Redevelopment Area



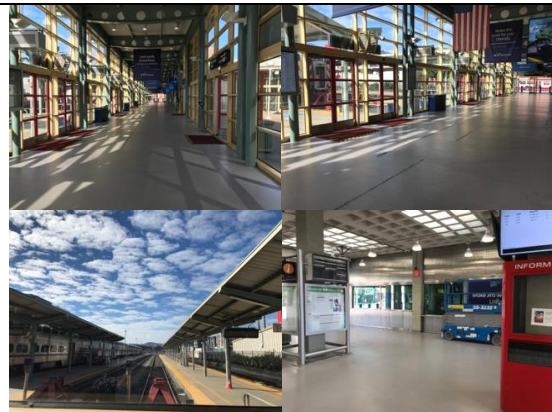
Point 4: Fourth & King Street Station


Existing Uses: Caltrain 4th & King Station, Transportation Hub, Subway

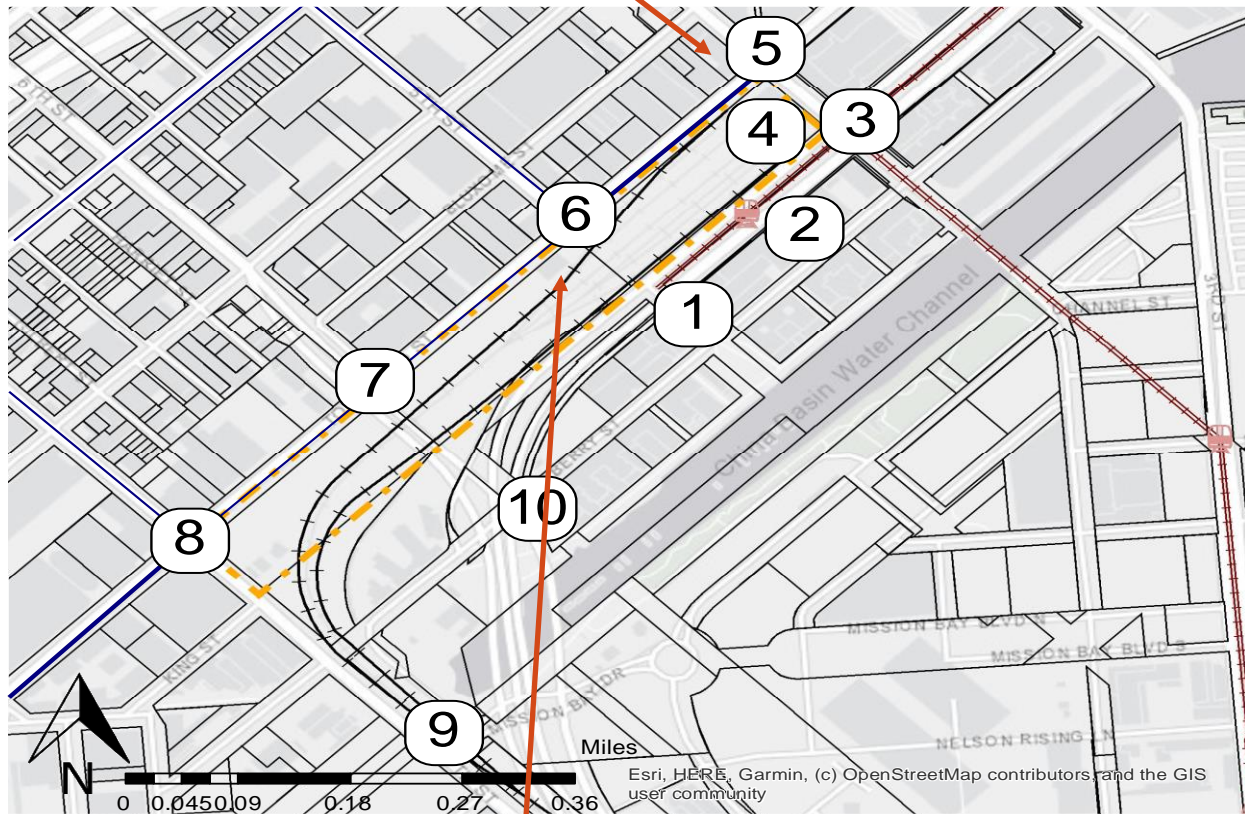
Uses: Public/Quasi Open Space, Commercial.


Zoning Designation:

MB-O - Mission Bay - Office



Point 5: Fourth & Townsend Streets	
Existing Uses: Walgreens, The Creamery Outdoor Café, Safeway, Subway, Furniture Outlet.	
Uses: Mixed-Use, Offices, Commercial	
Zoning Designation: MB-O - Mission Bay – Office (Caltrain Yard) CUMO - Central Soma Mixed-Use Office (North of Townsend)	



Point 6: Fifth & Townsend Streets	
Existing Uses: Apartment Building, User Testing Offices, Caltrain Light Maintenance Yard	
Uses: Apartment Building & Office Space	
Zoning Designation: MB-O - Mission Bay – Office CUMO - Central Soma Mixed-Use Office (North of Townsend)	

Point 7: Sixth & Townsend Streets Existing Uses: Stripe HQ, Academy of Art University Extension Campus Uses: University, Commercial-Office Zoning Designation: MB-O - Mission Bay – Office (Caltrain Yard) CUMO - Central Soma Mixed-Use Office (East of Onramp, North of Townsend) WUMO – W. Soma Mixed-Use Office (West of On-ramps, North of Townsend) P Public (For Freeway On-ramps)	
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Point 8: Seventh & Townsend Streets Existing Uses: Adobe SF Office, Multiple Furniture Stores, Airbnb HQ, Zynga HQ, Caltrain Yard Uses: Commercial and Office Zoning Designation: MB-RA - Mission Bay Redevelopment Area (Caltrain Yard) UMU - Urban Mixed-use (West of 7 th Street) WUMO – W. Soma Mixed-Use Office (East of 7 th Street, North of Townsend)	
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Point 9: Seventh Street & Mission Bay Drive

Existing Uses: Adobe – 100 Hopper Office Complex,
Parking Lots, Caltrain Right of Way

Uses: Commercial & Office, Public Space

Zoning Designation:

PDR-1-D - Production, Distribution & Repair - 1 -
Design (West of 7th Street)

MB-RA – Mission Bay Redevelopment Area (East of 7th
Street)



Point 10: King & Berry Streets

Existing Uses: Apartments and Condos

Uses: Residential

Zoning Designation:

MB-RA – Mission Bay Redevelopment Area



4.2 Opportunities and Constraints

4.2.1 Opportunities:

More Housing

The metropolitan area that includes the City of San Francisco and the surrounding Bay Area is in a housing crunch due to high demand fueled by growth in technology companies and jobs, foreign investments in the face of limited buildable land for new development. Eventually, there is not going to be many options to build new housing. The situation demands action. Furthermore, San Francisco's latest RHNA (Regional Housing Needs Allocation) requires about 70,000 new units to be built by 2050. This site could benefit many workers as the railyards are near many technology offices and public transportation options for getting around. Figure 4.2 is an aerial view of the development site and its surrounding environment. Building housing near the workplace could create a more walkable and bikeable neighborhood that could reduce travel times and pollution.



Figure 4.2 An aerial view of the Fourth and King Railyards before development

A Better Station for the Future

The existing station at Fourth and King is nearing 50 years old and is in dire need of an upgrade.

Furthermore, since the coronavirus pandemic has dropped public transportation ridership, this is an opportune time to conduct upgrades to the Caltrain system while ridership is down. In addition, the station will eventually need to have an upgrade to accommodate future expansion from Caltrain and California High-Speed Rail. Finally, a new station can bring benefits to the neighborhood when it brings a new center to two neighborhoods that do not have a core at the moment.

A Benefit in Economic Development

The economic development potential is rich on this site because of its transit-rich location and proximity to restaurants, attractions, and shopping. The site could be home to many new businesses, residential units, and even special uses such as hotels, office space, etc. Suggesting that the City of San Francisco and many other municipalities are having to cut budgets due to the pandemic, a new economic hub can help revitalize the neighborhood.

Government Support

There is broad support from all government parties for a project of this magnitude. The City of San Francisco supports this project because of new housing opportunities and the opportunity to create a new train station for the City. Caltrain supports this project to not only have a new station and maintenance facilities, but the project would allow Caltrain to be better prepared for additional trains and future expansion. Finally, state officials are looking at this project for high-speed rail due to 4th and King Station being the temporary home of high-speed rail and because of the state's RHNA numbers for housing. Every level of government has a reason to like a development project on the Fourth and King site. It is action to create a plan and execute it that are next steps to make it a reality.

A Perfect Location

Mission Bay and San Francisco are running out of developable land for housing, offices, and businesses. The site is near attractions such as Oracle Park, Chase Center, and the Embarcadero. Additionally, with the new T-Street Central Subway opening in 2022, Union Square, Chinatown, and Downtown San Francisco are quick ten-minute rides away. New neighborhoods being built around the site are biker and pedestrian friendly, and the site is even auto accessible with two freeways close by. In other words, the site is easy to access and exit by multiple forms of transportation, it is close to all the shopping, food, and attractions, and the City needs to build more housing with very few options for developable land left. The location therefore checks off multiple priorities with the development project. Figure 4.3 shows the site within the larger context of the City of San Francisco.



Figure 4.3 An aerial view of the Mission Bay Neighborhood and Downtown San Francisco.

4.2.2 Constraints:

Costs

Cost is the most challenging aspect of many projects. Who will fund the project? Doing construction in San Francisco is typically expensive. In addition, any delay in the planning and approval process can

make a project unfeasible if not approved fast enough. Securing funding and creating a game plan to ensure the project's success is the key to its successful.

Noise

Already, the site is plagued by noise from the 280 Freeway on and off ramps and the noise from the Caltrain depot and engines. There is also noise from the auto traffic on King Street and from the nearby Oracle Park during event days or nights. In addition, there is likely to be additional noise from construction if the project passes all the hurdles which, depending on how fast construction is complete, can be a major annoyance to surrounding neighbors. Figuring out how to mitigate existing noise issues that are already there, and future complaints are necessary to resolve during planning and designing.

Environmental Issues

It is no secret that the Fourth and King Railyards have served as San Francisco's rail hub since the 1970s. However, while the original station was made in the 70s, the railyard has a history of over 100 years running on coal or diesel-powered locomotives. The problem at hand is that we do not know the environmental impact the railyard has had on the surrounding site. However, this is an obstacle that can be overcome. Oracle Park and its surrounding development were once part of the railyards as well and were subsequently developed when given the green light. The main problem at hand is how much environmental damage did the railyard cause, and how much it will cost to clean it up.

Neighborhood Activist Groups

San Francisco has a housing crisis, and while technology companies, foreign investments, and a lack of housing are issues, the event of the rising cost of living has led to a growing NIMBY (Not In My Back Yard) movement in the City of San Francisco. These groups are very powerful and often have friends in high places within the City of San Francisco. In fact, these groups may be indirectly responsible for the delay of some housing projects. It is quite clear that working with these groups to ensure that everyone

has a fair voice and to encourage community support is a major need for this project to succeed. If not, the neighborhood activists groups could delay the project by years, maybe even decades in some cases.

Caltrain's Daily Operations

Caltrain currently uses the Fourth and King railyards for three purposes: a terminus station, a storage area, and light maintenance area for locomotive equipment and rolling stock if the train cannot get down to San Jose. Development of any type on the site could disrupt the normal operations of Caltrain which can lead to delays, angry customers, and more headache for a critical piece of the Bay Area's public transportation. Creating a plan that would minimize disruptions is critical for Caltrain to successfully maintain daily operations while also preparing to move into a new home for the future.

4.3 Goals and Objectives

Because of the many moving parts and complexity of this project proposal, there needs to be a set of goals and objectives for organizational purposes. The purpose of this is to provide the framework for the design proposals.

Goal 1: Multimodal Transportation Access Within and Around the Project Site Area.

Objective 1: Improve rail ridership with a new underground railway station for Caltrain and other interested users (Amtrak, California High Speed Rail, etc.)

- The idea to move the Fourth and King Station underground is possible, thanks to the Caltrain Modernization Project (Cal Mod) which is to electrify the corridor by 2022.
- By developing the station underground with zero emissions from electric power, this allows the valuable land above to be developed to a more suitable need.
- This can also open the door to future upgrades and expansion from Caltrain, Amtrak, and California High Speed Rail when ready.

Objective 2: Improve bus ridership with a new bus transit center for San Francisco Muni, Amtrak, and other operators along Townsend Street.

- San Francisco Fourth and King Station is already a major bus hub for Muni, Amtrak, and other special operators throughout the city, region, and state.
- Creating a new boarding zone with better signage, public furniture, and bus shelters can help increase ridership and create a more suitable transport hub.

Objective 3: Improve pedestrian connectivity throughout and around the project site.

- San Francisco Fourth and King Railyards cover the two blocks straddling fifth and sixths streets. This can make it difficult to navigate to the other side.
- Connecting these railyards and improving the area's pedestrian connectivity around the site can help make the Mission Bay and South of Market neighborhoods into a walkable area.

Goal 2: A Sustainable Community and Economic Growth for the Surrounding Mission Bay and South of Market Neighborhoods.

Objective 1: Promote and encourage mixed-use development on the Fourth and King Railyards Site.

- At the moment, the development along King Street near our site is mixed-use development.
- Mixed-use development makes the most sense for our site as it maximizes residential and commercial growth for the surrounding neighborhood.

Objective 2: Create an anchor tenant in the form of a hotel, office, or tech headquarters on site.

- The surrounding project area is home to many tech companies such as Adobe, Airbnb, Lyft, and Zynga.

- In addition, the neighborhood is centrally located for a hotel or office space for a headquarters at the center.
- An anchor tenant can help keep the project financially sustainable while also creating more foot traffic for public transit, local businesses, and new housing.

Objective 3: Create and foster opportunities for local businesses with a food pavilion for restaurants and a shopping hub for other businesses.

- The area lacks a number of shops and restaurants compared to nearby neighborhoods.
- Creating an opportunity for local businesses to set up shop through either a food pavilion or small shopping hub can create foot traffic and a new core in the neighborhood.

Goal 3: An Equitable New Neighborhood Design and Planning Process.

Objective 1: Encourage the development of affordable housing to help combat the San Francisco-Bay Area's housing crisis.

- San Francisco and the surrounding Bay Area region is in a housing crisis. Because of this, it is recommended to build as much housing as possible on the railyards site.
- It is further recommended that a certain percentage of the units be allocated for affordable housing in order to reduce the strain on occupants.

Objective 2: Include live-work units in the urban design for the site.

- Live-work spaces are a type of mixed-use development where a family or individual's business is on the lower floor while the residence is on the upper floor.
- This has the benefit of shorter commute times, less dependence on a car, and enable a wider variety of businesses.

Objective 3: Promote and prioritize small and local businesses in the development

- During the Coronavirus Pandemic, local and small businesses have struggled to pay rent and remain operational. This was especially the case with the hospitality sector.
- Creating a plan to promote small and local businesses can create a variety of options for new residents and commuters while keeping the money local.

Goal 4: The New Fourth and King Railyards as a Central Destination for the Neighborhood and Surrounding Area.

Objective 1: Create a plaza/park in order to provide open space, while also celebrating the railroad history of San Francisco.

- Other than a canal walkway and a few small plazas, the area around the site has very few open space options.
- Creating a plaza or park on site can create a new hub for the station.
- With railway related art and statues, the park or plaza can become a landmark while also paying homage to the importance of rail in the city.

Objective 2: Use placemaking tactics to create a comprehensive neighborhood identity while blending in with the surrounding area.

- Placemaking tactics are an urban design term used to create new plazas, development designs, and places. This is done in order to make a place not too overwhelming, but just right.
- Using these tactics in the final design is a must in order to create a safe and one-of-a-kind place.

Objective 3: Improve streetscaping and landscaping within and around the site in order to create a more welcoming atmosphere.

- At the moment, the pedestrian and street infrastructure (especially on Townsend Street) around the station is limited.
- Having a great streetscape design can increase foot traffic, business viability, and can rejuvenate an otherwise bland area.
- This objective is a priority to create a more welcoming atmosphere and to bridge the gap between two distinct neighborhoods.

Chapter 5: Design Proposals

5.1 Proposal Vision

This Fourth and King Caltrain Station Redevelopment Proposal envisions a new transit-oriented development in the rapidly growing neighborhood of Mission Bay in San Francisco, CA. The recommendations for designs and strategies aim to transform the Mission Bay Neighborhood into a world class destination for public transportation, shopping, and living. This proposal aims to increase the character of the surrounding neighborhood by adding to the existing structures, including a new train station and hall, mixed-use development, residential, commercial, office, open space and plazas, parking, and streetscape improvements. With a prime location that is close to Downtown San Francisco and already having a decent transportation hub, this proposal introduces new opportunities for leisure, employment, and housing within the Mission Bay Neighborhood and the surrounding area. Finally, this development is to serve as a framework for revitalizing underutilized land in the City of San Francisco, attracting future growth to Mission Bay and the surrounding neighborhoods in San Francisco. Figure 5.1 is a conceptual layout of buildings on the site.

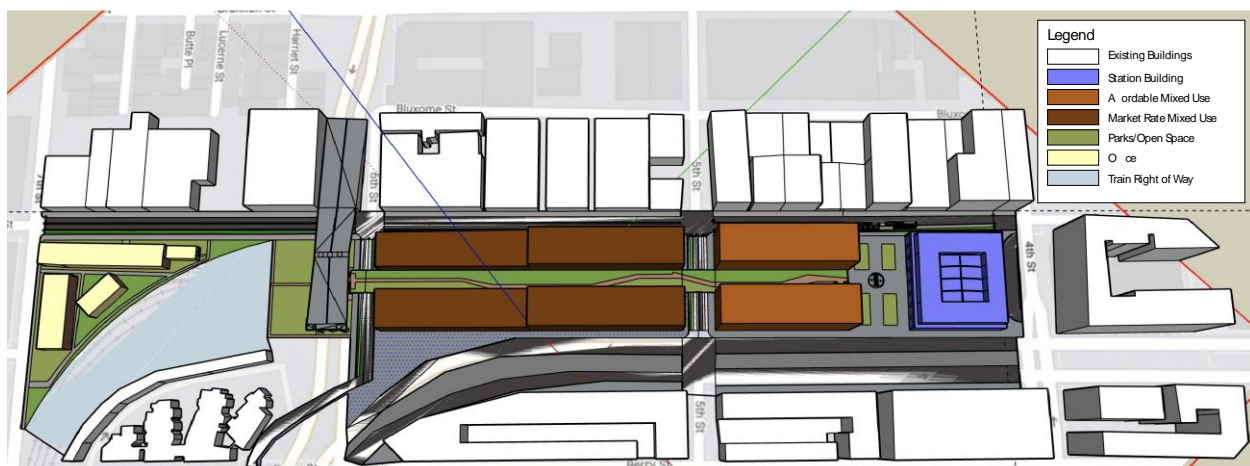


Figure 5.1 Conceptual Layout of Buildings

5.2 Land Uses

The conceptual layout of the site identifies certain key types of land use that are major components of the vision for the development. Figure 5.2 shows a perspective of the layout and land use types.

Subsequent subsections describe each land use type.

Public

Public facilities include transportation, government, and culturally significant hubs and places.

Open Space

Open space areas refer to parks, plazas, and open pedestrian or outdoor spaces used for leisure or are open to the general public.

Office

This refers to any office use such as a technology headquarters, standard office, etc.

Mixed-Use

Mixed-use refers to any combination for two or more compatible uses, typically residential units built over such commercial businesses as retail or office.

Commercial & Retail

Commercial & retail refers to the development of buildings or land designation for commercial or retail use. This includes hotels or other specialty businesses.

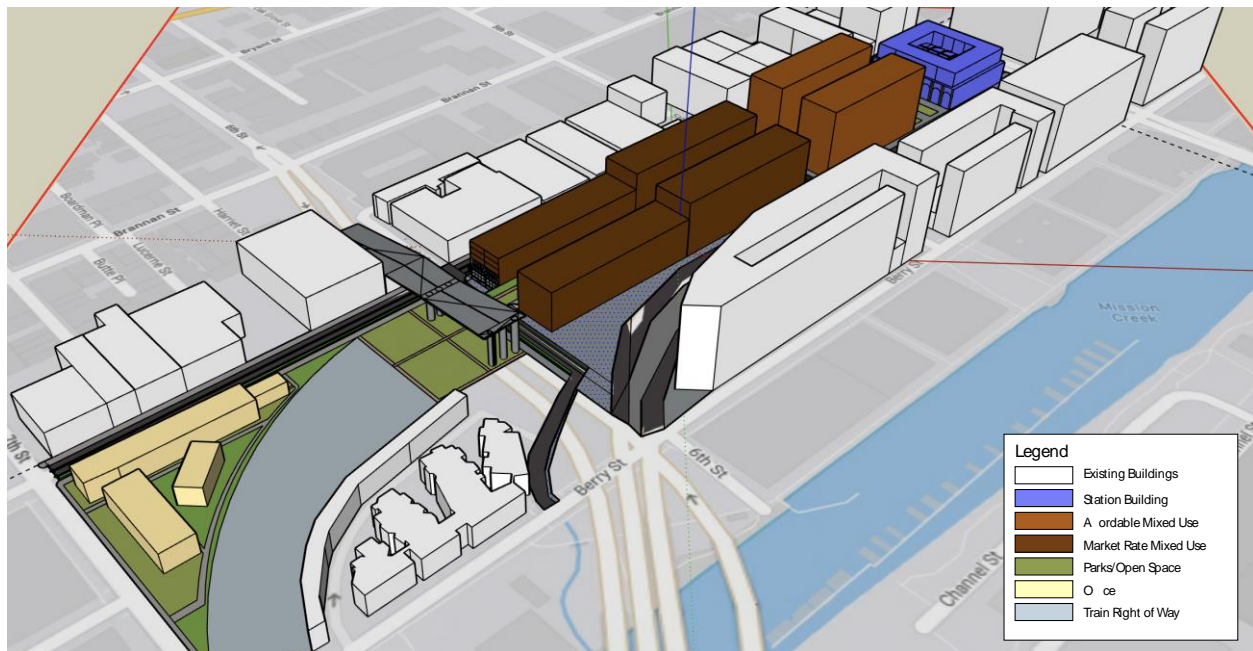


Figure 5.2 Perspective of Building Layout

5.3 Site Plan

The proposed conceptual land use diagram is the precursor to a site plan for the Fourth and King Railyards site. From the findings of the conceptual land use diagram, a modern site plan is formed with more details and components to strengthen the vision of the site. The reason why the redevelopment plan has this layout is for three main reasons. The first is to blend in with the surrounding nearby tall mixed-use buildings of Mission Bay. The second is to add more parks and open space in a city and neighborhood that does not have enough. The third reason is that this layout maximizes space while also creating unique features and amenities that make the final development a destination for residents and visitors alike. Figure 5.3 shows the conceptual land use diagram and site plan in order to show a possible modern transit-oriented development vision for the railyards site.

Fourth & King Station Redevelopment - Conceptual Land Use Diagram



Fourth & King Station Redevelopment - Proposed Site Plan



Figure 5.3 Site Plan and Conceptual Diagram

5.4 Key Features

Using the site plan and conceptual land use diagram, a development table is prepared to illustrate the allocation for space to residential, commercial, and other land uses in the study area. Table 5.1 shows an example development table which describes the rough acreage for the development of the proposed Fourth and King Railyards site.

Development Table

Table 5.1 Development Table

Category	Acreage (<i>Projected</i>)	% of Total Acreage (<i>Projected</i>)
Public Use	1.40 Acres	8.75%
Mixed-use Affordable Housing	2.60 Acres	16.25%
Mixed-use Market-Rate Housing	5.20 Acres	32.5%
Office Use	2.20 Acres	13.75%
Open Space **(Does Not Include Park-Line Connector)	1.20 Acres	7.5%
Roads & Caltrain Right of Way	3.40 Acres	21.25%
Totals	16 Acres	100%

A New Transportation Hub for San Francisco

This project began with the desire to improve the Fourth and King Caltrain Station to make Caltrain riders' journeys enjoyable. The new station hall is the centerpiece of this development. The station is to be home to a food hall, hotel, and the standard railway ticketing offices and waiting areas for visitors taking a rail journey or who are just there to take in the sights. Flanking the station building on the sides are a new bus waiting area on Townsend Street and the existing Muni Metro platforms for the N-Judah and T-Third Street lines on King Street. In the front of the station is an expanded drop off and pickup

area for passengers, rideshares, and taxis. The location of the transportation options are to allow for easy access to the freeways and city streets along with improved connections. Figure 5.4 shows the immediate transportation options and transit center around the proposed station building.

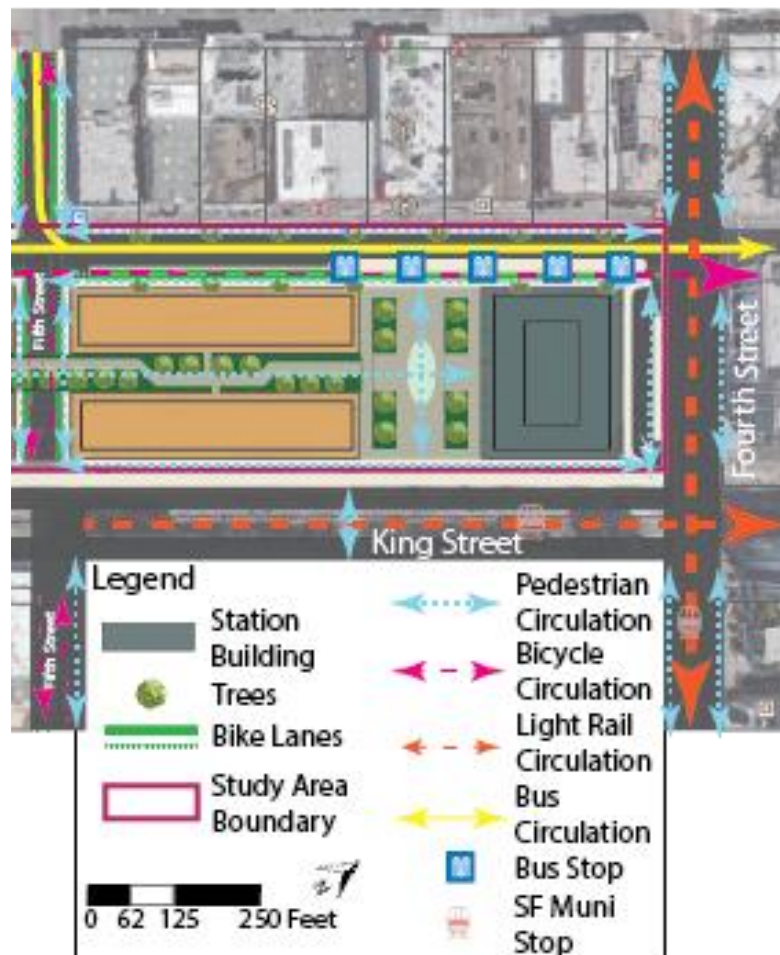


Figure 5.4 The proposed station with circulation of alternative modes of transportation immediately surrounding the station site.

More Housing For San Francisco

San Francisco is in a housing crisis. San Francisco has one of the highest costs of living in all of the United States due in part to the housing crisis and high demand for properties. As a result, rent, utilities, and other business expenses can be expensive. Therefore, maximization of density is an important issue for the success of the project. The Mission Bay Neighborhood is one of the few neighborhoods that allow

higher than usual densities with other buildings around the site built up to 140 feet in height. The site should maximize housing and also provide affordable alternatives for San Franciscans who cannot afford market rate housing. Three mixed-use housing buildings are on the site plan to maximize land use while blending in with the surrounding buildings and neighborhood. Figure 5.5 depicts an external view of a mixed-use building.

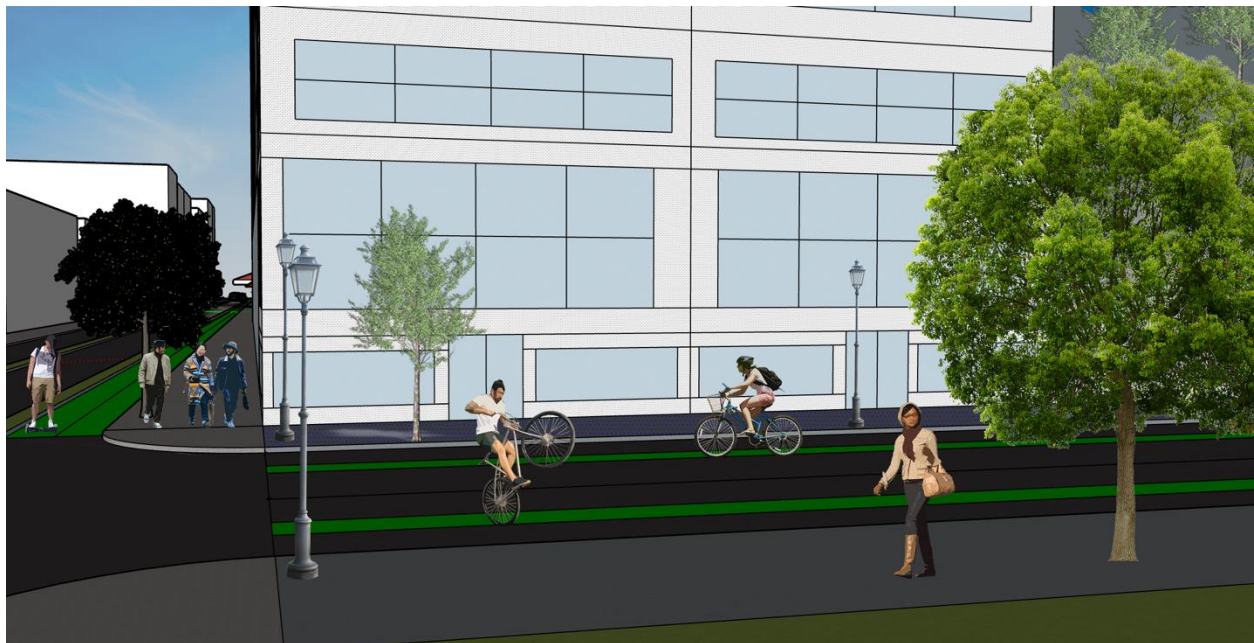


Figure 5.5 One of the Recommended Mixed-use Buildings On Site

New Opportunities for Businesses

One major problem with the Mission Bay Neighborhood District is that there is not a central core shopping area. This project seeks to rectify that issue by providing the surrounding neighborhood with a new central hub for shopping, dining, and leisure commercial spaces for new businesses. Another recommendation to have businesses thrive includes a lower rent provision or something similar to attract more talent and businesses to the area. Figure 5.6 depicts a partial external view of a commercial center.



Figure 5.6 Some New Shops Onsite

Expansion and Additions to A Blooming Office Sector

There is demand for office and large anchor-style businesses in the area. Some of the major technology companies that have an office in the area include Adobe, Lyft, Airbnb, Zynga, Stripe, and Reddit. With the Coronavirus Pandemic causing major technology companies to move digitally, so does the need for a new style of office space design. A new office can attract riders and visitors via Caltrain and San Francisco Muni, while also bring in more people to the Fourth and King Transit Center. Figure 5.7 depicts the view of a new office building. Figure 5.7 depicts a partial external view of an office building.



Figure 5.7 The New Office Complex to the Southwest of the Site

New Plazas and Parks

New parks and plazas can help create a sense of place in a new development. As a result, new parks located behind the Fourth and King Station Building and under the Interstate 280 freeway can help provide a place for relaxation and leisure while welcoming riders and visitors. In order to connect these two parks or plazas, a small highline style park will serve as a connection. This would provide open space to the public as well as new residents alike. Figure 5.8 depicts a mini park.



Figure 5.8 A View of the Highline Style Mini-park

5.5 Site Circulation

A main benefit to developing this proposal is the increase in circulation between Townsend and King Streets. Implementation of complete streets and pedestrian connectivity upgrades can help attract foot traffic to the site.

Pedestrian Circulation

One of the most significant problems on the site is currently circulation. Specifically, bicycle and pedestrian circulation have limits crossing over the railyard tracks from the South of Market (SOMA)

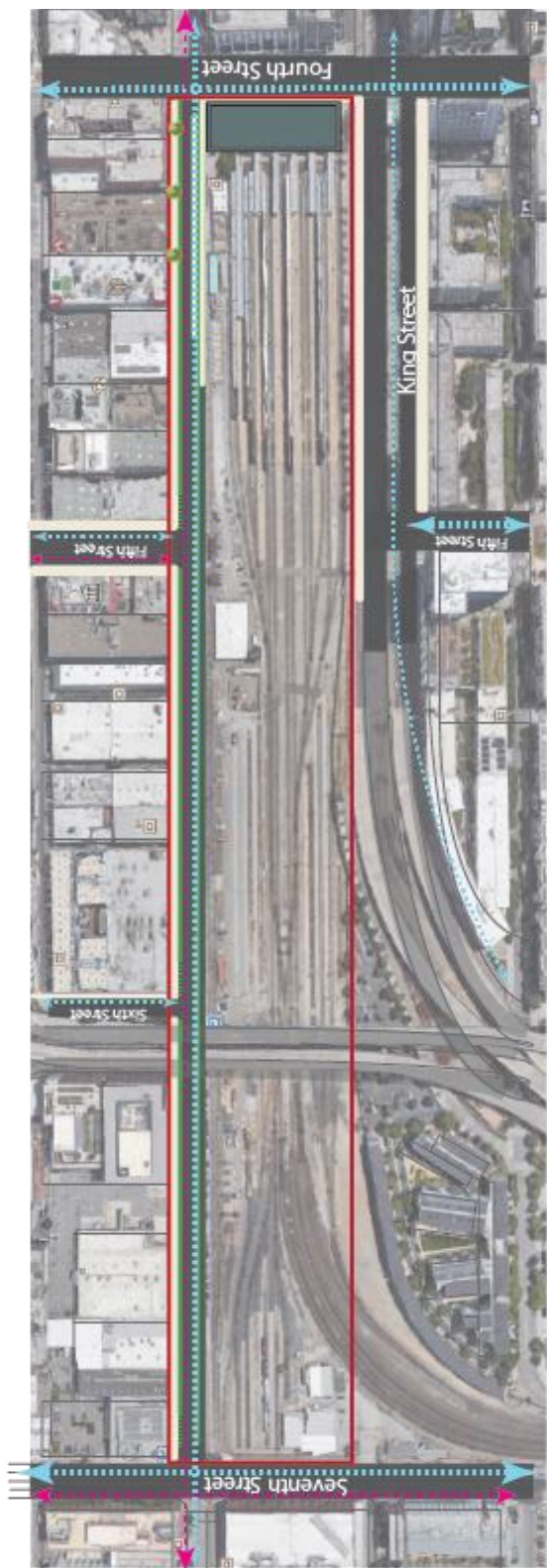
neighborhood to gain access to King Street and Mission Bay amenities. The result is that walking around the railyard site can add 10-20 minutes to someone's trip by walking or biking because there is no alternative to getting around the railyards. Other existing issues include having no sidewalks on the southern side of Townsend Street, underutilized sidewalks on King Street, and a lack of decent bicycle infrastructure such as separated bike lanes despite Caltrain having high bicycle ridership.

The proposed development has a better circulation plan because the plan adds more options to get around and provides new features that support pedestrian and foot traffic. Rather than walking or biking around the railyards site, the new proposal adds three new crossing points at the Station plaza, Fifth Street, and Sixth Street. To better accommodate bicycles and pedestrians, Townsend Street will get a new complete street makeover which includes barriers and buffers for a new two-way bike lane, new sidewalks and greenspace, and more shops and pedestrian features such as benches, streetlights, and more to promote walkability. In addition, a new highline style park can give residents and visitors more greenspace and a new way to access the buildings and surrounding area. Figure 5.9 showcases an example of the streetscape style envisioned for the project area. Figure 5.10 a before and after of new improvements for bicycle and pedestrian circulation for the study area boundary.



Figure 5.9 Townsend Street Streetscape Example

Fourth & King Station Redevelopment - Existing Pedestrian and Bicycle Conditions



Fourth & King Station Redevelopment - Proposed Pedestrian and Bicycle Additions

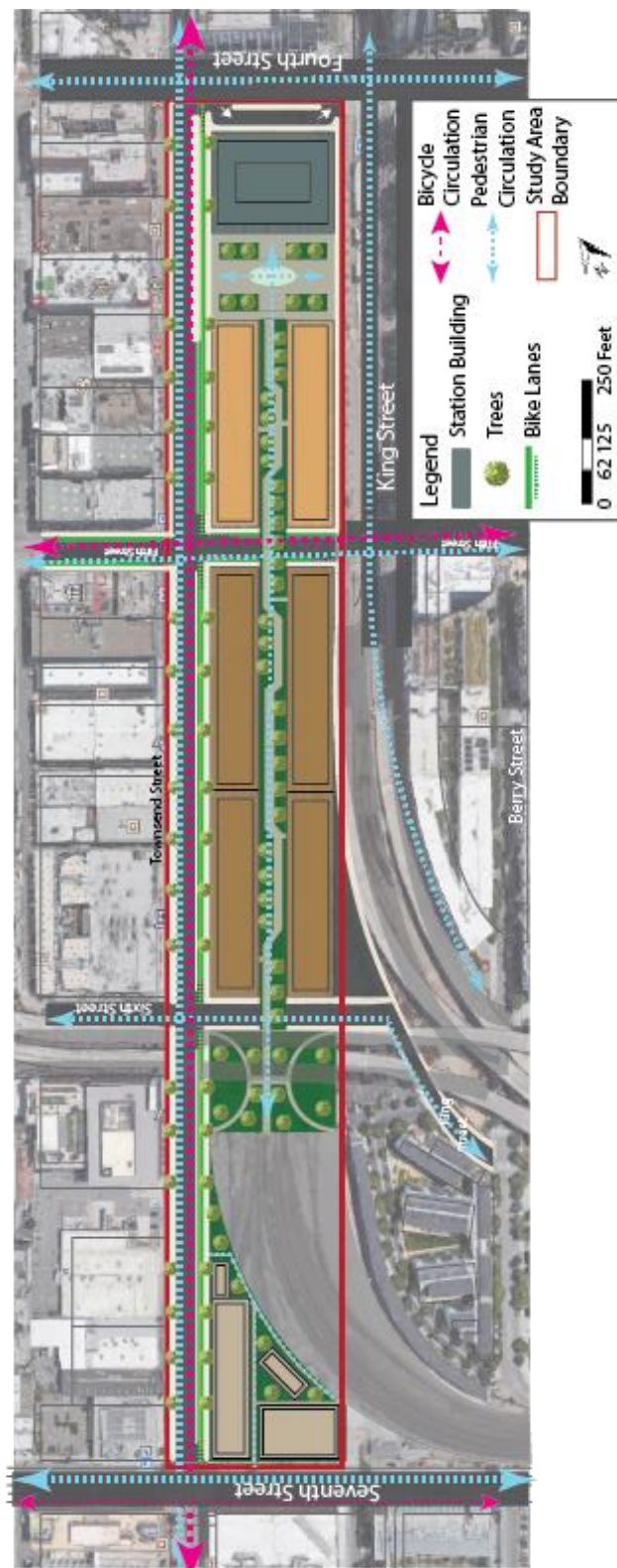


Figure 5.10 The Study Boundary Area Existing and Proposed Circulation Changes For Bicycle and Pedestrian Traffic

Transportation and Vehicle Circulation

Some of the same problems as the pedestrian and bicycle circulation map also plague public transit and vehicles. The railyards eliminate two blocks of streets leaving auto traffic and public transit to go around. This leads to more traffic on Fourth Street, Seventh Street, and King Street. In addition, freeway traffic remains a significant issue as the study area boundary borders two on-ramps to Interstate I-280. During rush hour, this can lead to more gridlock due to a lack of options for freeway access leading to more congestion and the possibility of worse health defects related to car emissions. Public transportation also has its limits but largely suffers from the same problems as auto traffic where more traffic leads to slower and less reliable service.

While transportation and vehicle circulation will not have as many benefits as the bicycle and pedestrian map, the plan still fixes some problems with vehicle traffic and public transportation. With Fifth Street having a new connection with the proposed railyard, this gives drivers another option to get onto the Interstate I-280 freeway. With this addition, this will allow the reduction of some traffic off the Fourth Street and Seventh Street throughfares. Public transit already has some solutions in place in the coming years with the Central Subway opening in 2022. This will reduce traffic to Downtown due to a trip taking 10-15 minutes by train. With the new station comes the possibility of more passengers. With this, a new designated drop-off and pickup point will be placed in front of the station separate from the Fourth Street traffic. This will lead to less chances of clutter and traffic by managing the merge points to locations where traffic lights can handle in and out traffic.

Other solutions that can be integrated include the possibility of a one-way system on Townsend Street going east between Fourth and Fifth Streets for easier access for buses and public transit, adding an off-site drop-off and pickup area for Uber and Lyft drivers in a nearby parking lot to reduce congestion, or the possibility of a discounted ticket or perks by using public transit instead of driving. These ideas can

also be implemented at a later date to further reduce traffic and improve public transit. Figure 5.11 shows the before and after improvements for vehicular and public transit circulation.

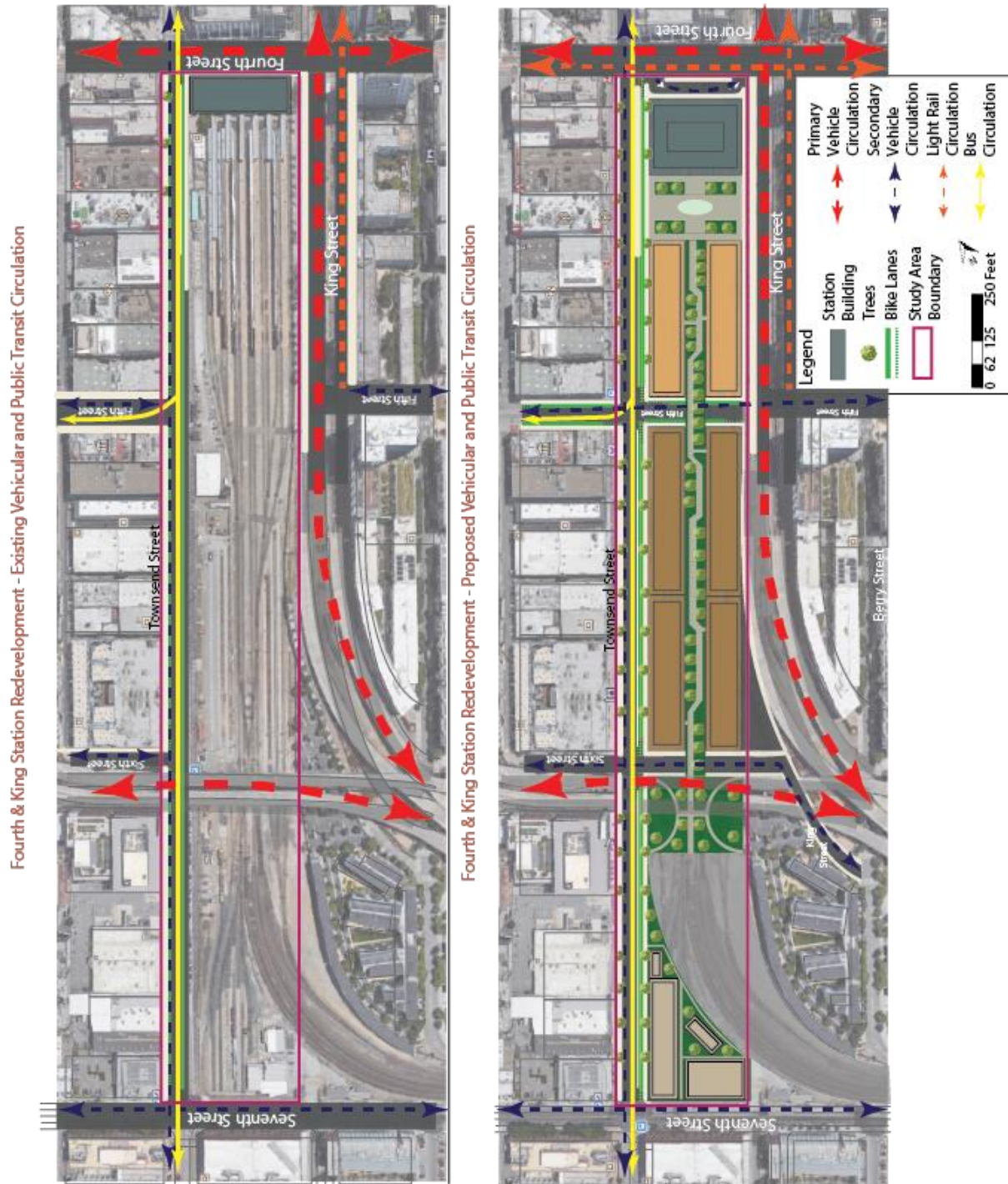


Figure 5.11 The Study Area Boundary Existing and Proposed Circulation Changes for Public Transit and Vehicular Traffic.

Chapter 6: Strategies and Implementation

6.1 Implementation Strategies

This chapter outlines strategies for project implementation. In the event that this project proposal gets the green light, a construction management company, architectural engineering agency, and other similar expert authorities would actually develop the plan fully to achieve the project goals. With that in mind, this project proposal advances a couple of options for project implementation. It is noteworthy that all three options involve the Fourth and King Railyards remaining active during construction.

Option A: The Half and Half Strategy

The half and half strategy divides the construction of the underground station into two halves, each with six platforms. As one side submerges and develops into a station box, the existing platforms would be in service. This process would continue until the first half is ready to serve trains. Then the other at-level platforms will be incorporated into the station box for service. Once everything is complete, the station box gets a cover up to the street level, and construction crews can begin building upward on the development.

Pros:

- The Fourth and King Station stays open (but on limited capacity)
- Preparation for sewer, water, and other utilities can be done ahead of time
- This process encourages construction to be completed on time due to the work schedule needs.
- The storage tracks and operations can still remain open during construction.

Cons:

- Funding must be secured to begin construction, otherwise the project will likely fail.
- Minor inconveniences for passengers

- Unexpected surprises could occur.

Option B: Temporary Townsend with the Half and Half or Cut and Cover

This option begins by working with the California High Speed Rail Authority to make a temporary station under Townsend Street that would eventually lead to the Salesforce Transit Center. When complete, Caltrain trains can terminate at the temporary station while a massive excavation project can begin on the Fourth and King Railyards to create a new station and mixed-use development either by using the half and half tactic in the previous option or utilizing the cut and cover tactic over the entire site.

Pros:

- The site will be ready for California High Speed Rail's new downtown extension
- No immediate conflicts within the railyards site
- Caltrain still services the area (but on an extremely limited area)
- Can implement a similar construction philosophy similar to that of the Transbay Transit Center.

Cons:

- This process will likely be more expensive than option A due to the additional tunnel boring.
- This will restrict access to the Caltrain railyard for storage and operations.
- Major inconveniences for passengers as this may involve tearing up Townsend Street earlier than expected.

Option C: Cut and Cover – Post Salesforce Transit Center

This option takes a different approach in comparison to the other two options. The idea for this option is to give priority for tunnel construction to the Salesforce Transit Center and create the rail line there first. Once the line is open, government officials can make the call on whether to include a large underground station for the development or keep it to just two platforms as stated in the California High Speed Rail renderings. Once a decision has been made, construction can commence on the railyards site.

Pros:

- This proposal would result in less gridlock in the fight for infrastructure funding.
- The station design can be smaller depending on future needs.
- The California High Speed Rail Downtown Extension would get built.

Cons:

- The Salesforce Transit Center's new rail station would likely result in less passenger traffic for Fourth and King.
- This would almost certainly be the most expensive option out of the three.
- This option has the highest potential for things to go wrong.
- Requires the Salesforce Transit Center tunnel to work to actually implement the plan, which at the moment, seems highly unlikely.

Pre-Construction Challenges

There are plenty of challenges during pre-construction. Some of the most notorious challenges include navigating San Francisco's planning and building departments along with the city council, relieving the burden on the existing Caltrain railyard with a new northern maintenance facility, and most importantly securing funding for the project to reduce delays or public opposition.

There are plenty of ways to confront these challenges. Most important is working with neighborhood organizations, the planning department, and the City and County of San Francisco via community outreach, community workshops, and maybe even creating a neighborhood task force to gain trust with the community. This is because San Franciscans are typically very sensitive to new development as new changes can severely affect their everyday lives. Therefore, community outreach is the number one priority in pre-construction challenges, even though the outreach process can cost more than typical public comments.

The biggest challenge at the moment on the site is maintaining and keeping Caltrain's operations on-going during construction. This is because the Fourth and King railyards serve as Caltrain's northern light maintenance hub, a massive storage area for trainsets, and serves as the busiest station in the entire corridor. While building a temporary station is possible, mitigating the storage and maintenance yard impacts should be a main focus to relieve construction delays. Fortunately, the California High Speed Rail Authority needs to build a new maintenance facility on the San Francisco Peninsula for future service. It is imperative that Caltrain and the California High Speed Rail Authority collaborate on this northern maintenance facility before construction on the primary site begins. This way, California High Speed Rail is good to go on the San Francisco Peninsula and Caltrain has a new northern maintenance hub which can mitigate the impacts during the project construction.

Funding is the final pre-construction challenge and is discussed further in the financing section. This is the most significant obstacle to development as without funding, the project cannot go ahead. Working out a funding strategy is important to avoid public distrust and to completing the project in a fast and efficient manner.

Construction Challenges

There are three major challenges during construction. These are noise, landfill and reclaimed land impacts, and construction timing.

Noise is a major problem during construction. Noise around the site is common with the Interstate-280 freeway, the railyard and EMD F40PH locomotives, and stadium and other nearby construction noise. This project could go on for quite some time with constant construction noise in a very dense area. This could be quite unpopular with surrounding neighbors even if a reduction in noise is a benefit of the final product. As a result, noise mitigation strategies must be a consideration during construction of the project.

Another big issue is the land that the station itself is on. Much of the surrounding land is on landfill or reclaimed land. This problem is made significantly worse because San Francisco is in a high earthquake risk area due to its proximity to major fault lines. Therefore, construction experts must assess the site on how to best develop the final project. Building on landfill, especially in San Francisco, is something that cannot have shortcuts.

Finally, there is construction timing. This section is all dependent on agreements from the City and County of San Francisco, surrounding neighbors, and financing. If the funding is all there in the beginning and work can be done during most hours of the day and night, the project can be completed fast. However, work hours and construction timing are the biggest obstacles during construction which can affect how quickly the project is completed.

6.2 Financing

The following are strategies for financing the Fourth and King Railyards project. The options include publicly funding the whole project, privately funding the whole project, or doing a public-private partnership.

Option A: The Project is Funded Publicly (By the Local, State, or Federal Government)

The City of San Francisco in recent years has been a strong advocate of transit projects within the City limits including multiple bus rapid transit projects, the N-Judah Embarcadero Extension, and the T-Third Street light rail line. There are also other local government agencies that could help including the Peninsula Joint Powers Board (the agency that operates Caltrain), the Association of Bay Area Governments, the State of California and the High-Speed Rail Authority, and the Federal Government. Finally, with the Salesforce Transit Center finishing its early phases, there is evidence that a project of this magnitude can be funded entirely by the public sector.

Options for how the project can be funded include:

- City Bonds
- Increases in taxes within the City of San Francisco (sales tax, transportation tax, etc.)
- Increases in Caltrain or Muni fares.

However, it should be noted that this can backfire. The San Francisco Municipal Transportation Agency has a history of overspending and overestimating on transportation projects. Furthermore, an increase in taxes or fares for a station may not convince the public. In addition, state and federal funding may be difficult to get due to politics and other issues.

Option B: The Project is Privately Funded

There are many benefits to getting the project done privately. For one, there are plenty of developers who would have interest in developing the land. Most of the buildings surrounding the existing site use private funds and are privately operated. In addition, the existing owner of the site, Prologis, is actually a private industrial developer. Finally, if the project is using private funds, it might lower the pushback from the public, who may not want public money going into a station development such as the one that is being proposed.

However, there are also many problems. A project of this magnitude is going to be expensive and will likely require many developers, stakeholders, and fundraisers to get the project off the ground. This is a monumental task, especially since if this is possible, the project would already be done. Finally, if the private sector pays for this project, the public will largely have little to no say on the building process. This leads to the third and most realistic option.

Option C: Develop a Public-Private Partnership

This is by far the most realistic option if funding for this project is to be secured. Public-private partnerships have been on the rise in order to reduce costs and maximize project outcomes. Major public-private partnerships in the San Francisco area include the Presidio Parkway Project, the California High Speed Rail Authority, and the University of California San Francisco Neurosciences Building near the project site. Public-private partnerships are also a more secure project type which reduces the Federal Government spending on infrastructure projects while guaranteeing returns for private investors.

An example scenario of a public-private partnership is the City of San Francisco and other interested government agencies such as Caltrans, the California HSR Authority, or the Federal government developing and paying for the underground station, the parks, and the station building while private parties develop the mixed-use buildings and office spaces. This way, the government has more control of the station while developers can develop and make money off the condos and offices.

There are, however, challenges to this option. While public support under the local and state government may be a challenge, getting private developers to participate might be even more challenging for this endeavor. People are tired of overspending and expensive infrastructure. Convincing citizens to fund this project could be the biggest challenge in any public option.

6.3 Phasing

This section includes three recommended options for phasing the project. It is necessary to evaluate options because of the complexity of the project and multiple external factors related to funding, bureaucracy, etc. The three options align with the three presented under Implementation Strategies.

Option A: Half and Half Strategy

- Phase 0 – Collaborate with the California High Speed Rail (CAHSR) Authority on a Caltrain North Maintenance Yard and Facility.
 - This can mitigate the effects of having the railyard torn up and pave the way for CAHSR in San Francisco and on the peninsula.
- Phase 1 – Make a temporary station on the railyard site (in the spot of the railway plaza; *refer site plan, Figure 5.3*) and begin construction and digging of the new Fourth and King Station Building.
 - This is to prepare construction crews for the first half of the station box excavation.
- Phase 2 – When station is complete, take half the railyard out of service for excavating and implantation of the station box. Begin construction of the underground station.
 - While this is being done, the other half of the railyard is to remain in service.
- Phase 3 – When the first half of the station box is ready for train service, the two halves of the railyard are to switch. The submerged station platforms can begin operating trains while the other half begins the submerging process to match the other platforms.
- Phase 4 – When the two halves of the railyards are submerged, a roof over the platform area is to be constructed and built up to allow for underground parking areas, and future transit-oriented developments.
- Phase 5 – Commence any future expansion projects including possible Salesforce Transit Center tunnel extension.

Option B: Townsend Temporary Station

- Phase 0 – Collaborate with the California High Speed Rail Authority on a Caltrain North Maintenance Yard and Facility.

- This can mitigate the effects of having the railyard torn up and pave the way for CAHSR in San Francisco and on the peninsula.
- Phase 1 – Begin tunneling and excavation of Townsend Street to begin the construction of the Fourth and King Temporary Station.
 - This tunnel is also to eventually tun into the Salesforce Transit Center extension tunnel.
 - When construction of the station is completed, Townsend Street is to be covered up and a streetscape project is to be conducted to restore Townsend Street.
- Phase 2 – When phases 0 and 1 are complete, excavation on the project site can be conducted. This can either be done by the cut and cover method or the half and half method if more capacity is needed.
- Phase 3 – When the two halves of the railyards are submerged, a roof over the platform area is to be constructed and built up to allow for underground parking areas, and future transit-oriented developments.
- Phase 4 – Commence any future expansion projects including possible Salesforce Transit Center tunnel extension.

Option C: Post Salesforce Transit Center Solution

- Phase 0 – Complete the Salesforce Transit Center Downtown Extension Tunnel and open the station hall to rail line traffic.
- Phase 1 – When phase 0 is complete, excavation on the project site can be conducted. This can either be done by the cut and cover method or the half and half method if more capacity is needed.
- Phase 2– When the two halves of the railyards are submerged, a roof over the platform is to be constructed and built up to allow for underground parking areas, and future transit-oriented developments.
- Phase 3 – Commence any future expansion projects including possible Salesforce Transit Center tunnel extension.

6.4 Report Conclusion

The Fourth and King Station Redevelopment Proposal seeks to help the Mission Bay Neighborhood become a world class public transportation hub and a bustling center for residents and visitors alike. The site is an ideal location for a transit-oriented development with world class public transportation, entertainment, shops, and restaurants. This project can help San Francisco make progress toward accomplishing its housing goals while also providing a world class railway station to welcome visitors and commuters.

This development is to add mixed-use, affordable, and market rate housing units as well as commercial, office, and open space to a neighborhood that has no central core. Adding these improvements can enhance the surrounding neighborhood and give the Mission Bay community a new cultural identity. In addition, with the expansion of the Fourth and King Station, this can leave the door open to more transportation options from Caltrain, Amtrak, and California High Speed Rail in the future. Completion of this project can improve travel in the surrounding Bay Area region and to certain parts of the State of California.

While this proposal may be expensive, San Francisco is quickly running out of developable land for housing and new development. This project would blend into the Mission Bay Neighborhood, build more housing, enable opportunities for businesses, and can transform an underutilized prime piece of land to realize its fullest potential. This project can give San Francisco a world class railway gateway and cement the Mission Bay Neighborhood as an attractive neighborhood in which to live, work, and play.

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Appendices

Appendix A: Demographics Data

2018 ACS Data 5 Year Estimates				
	San Francisco		Mission Bay	
Racial & Ethnic Composition	2018 Persons	Percent	2018 Persons	Percent
Total population	870,044	100.00%	29,689	100.00%
One race	822,688	94.56%	28,006	94.33%
Two or more races	47,356	5.44%	1,683	5.67%
One race	822,688	94.56%	28,006	94.33%
White	406,538	46.73%	15,668	52.77%
Black or African American	45,402	5.22%	1,551	5.22%
American Indian and Alaska Native	2,746	0.32%	83	0.28%
Cherokee tribal grouping	151	0.02%	9	0.03%
Chippewa tribal grouping	4	0.00%	-	0.00%
Navajo tribal grouping	133	0.02%	-	0.00%
Sioux tribal grouping	54	0.01%	-	0.00%
Asian	297,667	34.21%	8,968	30.21%
Asian Indian	19,021	2.19%	1,434	4.83%
Chinese	185,222	21.29%	4,707	15.85%
Filipino	38,123	4.38%	925	3.12%
Japanese	9,996	1.15%	513	1.73%
Korean	10,530	1.21%	533	1.80%
Vietnamese	15,183	1.75%	216	0.73%
Other Asian	19,592	2.25%	640	2.16%
Native Hawaiian and Other Pacific Islander	2,911	0.33%	5	0.02%
Native Hawaiian	444	0.05%	-	0.00%
Guamanian or Chamorro	510	0.06%	-	0.00%
Samoan	1,342	0.15%	-	0.00%
Other Pacific Islander	615	0.07%	5	0.02%
Some other race	67,424	7.75%	1,731	5.83%
Two or more races	47,356	5.44%	1,683	5.67%
White and Black or African American	6,111	0.70%	216	0.73%
White and American Indian and Alaska Native	3,715	0.43%	74	0.25%

2018 ACS Data 5 Year Estimates				
	San Francisco		Mission Bay	
Racial & Ethnic Composition	2018 Persons	Percent	2018 Persons	Percent
Total population	870,044	100.00%	29,689	100.00%
White and Asian	21,853	2.51%	858	2.89%
Black or African American and American Indian and Alaska Native	676	0.08%	69	0.23%
Race alone or in combination with one or more other races		0.00%		0.00%
Total population	870,044	100.00%	29,689	100.00%
White	447,002	51.38%	17,005	57.28%
Black or African American	55,913	6.43%	1,898	6.39%
American Indian and Alaska Native	9,478	1.09%	267	0.90%
Asian	326,719	37.55%	10,134	34.13%
Native Hawaiian and Other Pacific Islander	6,823	0.78%	237	0.80%
Some other race	75,279	8.65%	1,929	6.50%
HISPANIC OR LATINO AND RACE		0.00%		0.00%
Total population	870,044	100.00%	29,689	100.00%
Hispanic or Latino (of any race)	132,651	15.25%	3,322	11.19%
Mexican	67,949	7.81%	1,513	5.10%
Puerto Rican	4,870	0.56%	324	1.09%
Cuban	2,423	0.28%	167	0.56%
Other Hispanic or Latino	57,409	6.60%	1,318	4.44%
Not Hispanic or Latino	737,393	84.75%	26,367	88.81%
White alone	353,670	40.65%	14,462	48.71%
Black or African American alone	43,619	5.01%	1,500	5.05%
American Indian and Alaska Native alone	1,363	0.16%	60	0.20%
Asian alone	294,846	33.89%	8,915	30.03%
Native Hawaiian and Other Pacific Islander alone	2,694	0.31%	5	0.02%
Some other race alone	4,163	0.48%	15	0.05%
Two or more races	37,038	4.26%	1,410	4.75%
Two races including Some other race	1,510	0.17%	30	0.10%
Two races excluding Some other race, and Three or more races	35,528	4.08%	1,380	4.65%

Appendix B: Crime Data

	San Francisco		Mission Bay		
2019 Population	881,549		31,461		
	40-Month Total	Average Annual Rate per 1000 Residents	40-Month Total	Average Annual Rate per 1000 Residents	Mission Bay Crime Rate as % of San Francisco Rate
Larceny/Theft	138,510	46.6	1,883	17.7	38.1%
Other Miscellaneous	33,861	11.4	634	6.0	52.5%
Malicious	29,939	10.1	462	4.4	43.2%
Non-Criminal	28,138	9.5	585	5.5	58.3%
Assault	27,475	9.2	393	3.7	40.1%
Burglary	25,690	8.6	487	4.6	53.1%
Motor Vehicle Theft	21,095	7.1	213	2.0	28.3%
Recovered Vehicle	16,528	5.6	189	1.8	32.0%
Warrant	15,245	5.1	226	2.1	41.5%
Lost Property	14,419	4.8	289	2.7	56.2%
Fraud	13,873	4.7	610	5.7	123.2%
Drug Offense	11,285	3.8	79	0.7	19.6%
Robbery	10,800	3.6	108	1.0	28.0%
Missing Person	10,322	3.5	339	3.2	92.0%
Suspicious Occ	9,101	3.1	217	2.0	66.8%
Disorderly Conduct	7,829	2.6	148	1.4	53.0%

	San Francisco		Mission Bay		
2019 Population	881,549		31,461		
	40-Month Total	Average Annual Rate per 1000 Residents	40-Month Total	Average Annual Rate per 1000 Residents	Mission Bay Crime Rate as % of San Francisco Rate
Offenses Against Family & Children	6,404	2.2	142	1.3	62.1%
Traffic/Violation Arrest	5,456	1.8	85	0.8	43.7%
Miscellaneous Arrest	4,311	1.4	95	0.9	61.7%
Other Offenses	3,909	1.3	47	0.4	33.7%
Other	3,656	1.2	617	5.8	472.9%
All Crimes	437,846	147.2	7,848	73.9	50.2%

Comparative Average Annual Rates of Crime per 1000 Residents (2018 to 2021) by Type

