

STREETS OF SAN FRANCISCO:
AN ANALYSIS OF THE CITY'S TRANSPORTATION NETWORK,
COMPLETE STREETS GUIDELINES AND POLICIES

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TITLE: Streets of San Francisco:
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Chapter 1: Introduction

Abstract

Transportation is a key element to everyday life, providing an efficient connection and movement of goods and people. While there are different modes of transportation, motor vehicles are still the preferred and highly used option, providing people the luxury of traveling to farther distances on their own time and in their own comfort. However, in a country where cities are increasingly becoming cores of pedestrian traffic, motor vehicles make these places less walkable, as well as produce pollution through their use of gasoline. At a time when we must continue to consider the safety and environmental aspects of transportation, we need to be thinking of alternative modes of transportation. A diverse set of transportation modes is beneficial in several ways, including providing people a variety of options to choose from as well as reducing the stress of congestion from motor vehicle traffic. Cities must promote alternative modes of transportation in order to improve the safety, health, and welfare of its residents, workers, and visitors. Designing streets is also a part of making the built environment aesthetically pleasing. Complete streets, a relatively newer term that is gaining traction in the United States, is a solution that combines sustainable and safe thinking with a visually enjoyable built environment.

Complete Streets help create communities for various types of users, including children, the disabled, and the elderly. (*What are Complete Streets?*, n.d.) Complete Streets improve safety and public health while promoting active and efficient travel. My research is intended to review, analyze, and understand design guidelines and policies of complete streets in order to improve the safety and the aesthetic of them, as well as to promote the use of alternative transportation modes, thus creating a more sustainable environment. The purpose of this research is not to discourage the use of motor vehicles, but rather integrate them with pedestrians, bikes, and public transit through the development of complete streets. With these newer and improved complete streets, environments can become more sustainable and roads safer for every vehicle and pedestrian.

Project Location

For my research, I will be analyzing the streets and transportation network of the City and County of San Francisco. San Francisco, the main hub of the San Francisco-Oakland-San Jose Bay Area, has a population of 884,363, and “is the second most densely populated city in the country after New York City,” with a population density of 7,279.6 (mi²). (San Francisco, California Population, 2019) The city offers several different modes of transportation to get around its streets, including motor vehicles (private, car share, taxi), public transportation, bicycling, and walking. Being one of the most densely populated cities in the United States, alternative transportation modes look to be trending upward in order to combat the population increase as well as improve safety and sustainability standards for all types of transportation. I chose San Francisco for a few reasons, the first being that I was born in the city and that I have several ties to the place, whether it be through family, school, or activities and programs that I have participated in throughout my past. One other reason I chose this city is because, while being a hub of business and advancements in technology and sustainability, people will continue to flock to this area: I want to be able to analyze the city and understand the mentality and decisions the city makes, while seeing its transformation as I continue to grow, both personally and as a planner.

Methodology

This study begins with a review of complete street literature discussed throughout the report. Analysis then begins with a review of San Francisco’s transportation network: what main transportation modes are there and current programs these modes provide that can be found guiding future development throughout the city today. Next, the report will review and analyze the complete street guidelines and implementation measures from the cities of Boston, Massachusetts and Chicago, Illinois, while providing a successful example project. I particularly chose these cities because they too are major cities in the United States, as well as have similar population sizes and/or population densities when compared to San Francisco. Lastly, I will review and analyze the city of San Francisco’s complete streets guidelines and guiding policies, comparing them to the cities of Boston and Chicago, and provide an example of a successful complete streets project, followed by a conclusion which summarizes my findings.

Relevance to Planning

Complete street guidelines and policies are beneficial as well as crucial to the enhancement and improvement of a community's streetscapes. Complete streets enable all users a variety of safe, comfortable, and convenient transportation modes to help facilitate the movement of people and goods. As cities continue to promote themselves as centers of walkability in order to support social and economic growth, complete streets ensure the health, safety and well-being of its people, roadways, and surrounding environment.

Chapter 2: Complete Streets Literature Review

Complete Streets

Complete streets is “a transportation and design approach that ensures that people of all ages and abilities can get around places.” (SFCTA, n.d.) This idea focuses on making sure streets are designed for everyone who is using them—whether that is people walking, biking, taking transit, or driving. Complete streets are designed to create safe, comfortable, and convenient connections for users, enhancing the roadway and its surrounding environments. One benefit of complete streets is a connected transportation network that focuses on the movement of people in order for them to travel with safe and better transportation choices. (*Complete Streets*, n.d.)

Complete streets enable pedestrians and drivers to make successful trips to their destinations in an easy and efficient manner. A second benefit of complete streets is walkable and vibrant

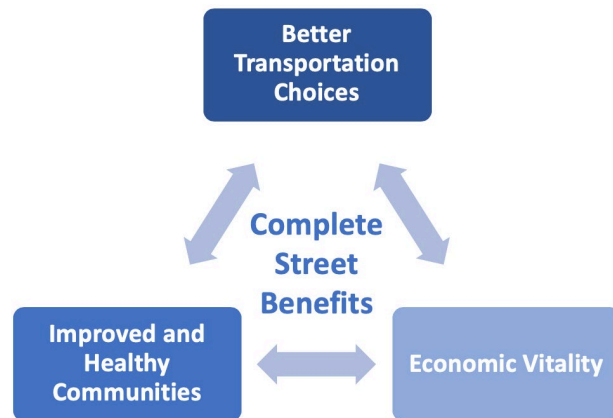


Table 1: Benefits of Complete Streets
Source: *Smart Growth America*

neighborhoods that promote economic vitality by making accessibility and support of economic and social development easier.

(*Complete Streets*, n.d.) As places are easier to access with complete streets, businesses and amenities are able to thrive more. One last benefit of complete streets is the promotion of healthy, active lifestyles through design and accommodation; whether it is for bicyclists or

pedestrians, complete streets help reduce the risk of severe and fatal collisions. (*Complete Streets*, n.d.) With safer streets, people become more comfortable exercising and using active transportation to travel.

Every complete street is unique and responds to its community’s context, as there is no singular description for them. (*What are Complete Streets?*, n.d.) These streets balance a wide variety of functions, including stormwater management, use as public space, vehicle and pedestrian movement, and emergency access, reflecting a unified, wholesome design of the community. (*Designing Complete Streets*, 2014) Although complete streets may vary in design and function, elements of complete streets often including wayfinding totems, bike lanes, crosswalks, transit stops, street trees, and lighting. (*Complete Streets*, n.d.)



Table 2: Complete Street Streetscape Elements
Source: Smart Growth America

Traffic calming measures can be found throughout complete streets, complimenting the elements that enhance a place and promote a positive experience there. Traffic calming is “a system of design and management strategies that aim to balance traffic on streets with other uses,” “founded on the idea that streets should help create and preserve a sense of place.” (*Traffic Calming 101*, 2008) Traffic calming tools include techniques designed to lessen the influence of motor vehicle traffic by “calming” or slowing it down, such as: widening sidewalks, chicanes, raised medians, and road humps. Along with other improvements, traffic calming can enhance a place instantly, while being reviewed and maintained to meet long-term needs. Each traffic calming tool has its own specific application(s) and does not necessarily need to apply to every complete street project, as some tools are more effective when combined with others, or function well with alternative transportation modes. (*Traffic Calming 101*, 2008) As traffic calming strategies are incorporated into an area, they may help benefit the goals of other transportation modes, such as transit. Transit can be an efficient, more economical and less polluting alternative to the automobile, yet people still need to be able to safely walk to their destinations along a pleasant and direct route. (*Traffic Calming 101*, 2008) Traffic calming measures make walking trips more convenient and safe, while providing amenities to make pathways more pleasant. When traffic calming tools and transit goals are coordinated to meet the needs of a specific street environment and its surrounding community, places can thrive and users can feel welcomed and safe in these public spaces. (*Traffic Calming 101*, 2008)



Diagonal Parking

Cars park diagonally, jutting out from the curb, rather than parallel to it

- Simple and inexpensive
- Changes both the perception and the function of a street
- Shortens the "peering distance" for people crossing the street
- Drivers pulling out must be alert to approaching traffic
- Oncoming drivers must be alert to the cars pulling out
- All of this added driver awareness creates more awareness of pedestrians
- Can add up to 40% more parking space than parallel parking



Changing One-Way Streets to Two-Way

Single or double traffic lanes, either face-to-face or with a median, sometimes flanked by parking

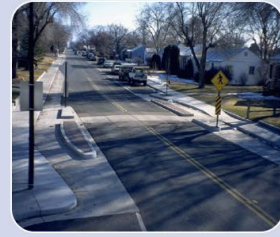
- Less confusion & better traffic access
- No need to make extra turns to get to nearby destinations
- Drivers can directly get to their destination
- Increases commercial traffic and business
- Decreases the speed of traffic



Widening Sidewalks/Narrowing Streets and Traffic Lanes

These techniques provide a flexible way to take back space from the street for non-motor-vehicle uses

- Narrowing lanes and widening sidewalks eases crossing for pedestrians and gives them more space to walk
- Lanes can also be removed from serving traffic and designated for busses and other types of transit
- Traffic lanes can be transformed into bicycle lanes
- All street lanes can be narrowed together to create more room for non-auto uses



Bulbs—Chokers—Neckdowns

Interchangeable terms for sidewalk extensions in selected areas—such as at intersections or at mid-block—as opposed to a full sidewalk widening

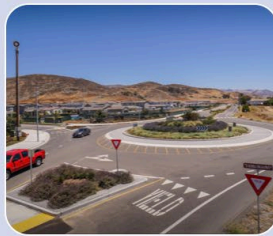
- Provide a haven for pedestrians waiting to cross the street
- Shorten the crossing distance
- Define parking spaces
- Deflect through traffic at a corner
- Provide space for amenities and enhancements (e.g. kiosks, trees, lighting)



Chicanes

Sidewalk extensions that jog out from one side of a street to the other to replicate such a circuitous route

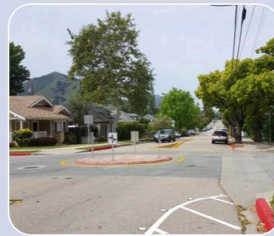
- Narrow, curving roads encourage motorists to drive more slowly and carefully
- An undulating path interrupts any clear view ahead and compels drivers to slow down
- Can be formed using sculpture, paintings, and parking to enhance the appearance and function of a street
- Diagonal parking and parallel parking can be alternated to create a chicane effect



Roundabouts

Large, raised, circular islands at the middle of intersections, around which all oncoming vehicles must travel until reaching their destination street, where they then turn off

- Create a "calmed," steady flow of traffic
- Reduction in conflict points, which can lead to fewer accidents
- Streets narrow as they approach roundabouts and crosswalks are installed on these approaches, thereby slowing oncoming vehicles and giving pedestrians a safe, clear opportunity to cross
- Enhanced with fountains, sculpture or attractive landscaping, the island can serve as a striking gateway



Traffic Circles

Essentially "mini-roundabouts" designed for small intersections, often used to slow traffic from a wide street into a smaller local street

- Help to slow down traffic in neighborhoods and remind drivers that they must proceed carefully
- Help to sustain lowered vehicle speeds when they're used in a series
- Provide an opportunity for community activity in residential areas, where citizens can create art or add other enhancements
- All street lanes can be narrowed together to create more room for non-auto uses



Raised Medians

Elevated islands parallel to traffic lanes down the middle of the street

- Curtail vehicle space
- Provide a safe in-between refuge for pedestrians as they make their way across the street, split up a lengthy curb-to-curb distance
- Provide ideal locations for trees, flowers, sculptures and other amenities

<p>Tight Corner Curbs</p> <p>Reducing the radius of a corner curve can lead to vehicles slowing down on a turn</p> <ul style="list-style-type: none"> • Inhibit the speed of turning vehicles • Give pedestrians a better chance to see and be seen by approaching traffic • Add sidewalk space, thereby shortening the distance to the other side of the street 	<p>Diverters</p> <p>These physical barriers redirect traffic heading for a certain street onto a different course</p> <ul style="list-style-type: none"> • Diagonal Diverters traverse an entire intersection, actually creating two unconnected streets that each turn sharply away from one another • Semi-Diverters restrict traffic in one direction to prevent entrance to a street, while permitting traffic to through in the other direction • Although they effectively reduce traffic volume, diverters must be part of a comprehensive improvement scheme or else they can end up simply displacing congestion 	<p>Road Humps & Speed Tables</p> <ul style="list-style-type: none"> • Road Humps (Speed Humps) are rounded mounds, approximately 3" high and 10-12' long. They effectively slow down traffic without making drivers uncomfortable. (Humps are not to be confused with speed bumps which are usually at least 5-6" high and less than 3' long) • Speed Tables are road humps that are flat on top and sometimes slightly longer. They are the same width as the street and rise to meet the grade of the sidewalk, providing safe and comfortable crossings for walkers and wheelchairs • Highlight road humps and speed tables with clear markings to alert approaching drivers by: painting words and symbols directly on the street; changing the texture of the street surface; or using signage 	<p>Rumble Strips and Other Surface Treatments</p> <ul style="list-style-type: none"> • Rumble Strips provide visual and aural cues to alert drivers to areas that require special care (shopping centers, schools, entrances to residential neighborhoods). • Changes in pavement color and texture used in interesting and visually attractive ways can also have the effect of rumble strips. These paving treatments also: delineate and create awareness of pedestrian crosswalks; make a street appear narrower than it is to deter speeding; define a street from a sidewalk or a parking lane

Table 3: Traffic Calming Strategies
Source: *Project for Public Spaces*

To help cities develop and implement complete street practices and policies, the National Complete Streets Coalition (NCSC) crafted ten elements of a comprehensive Complete Streets policy that originally supported local land uses, economies, cultures and natural environments. (*Elements of a Complete Streets Policy*, n.d.) These elements ensured improved safety for people of all ages and abilities as well as balanced the needs of different modes. However, complete street policies have evolved to focus far more on implementation and equity. The NCSC updated and revised the Complete Streets policy framework, requiring more accountability from jurisdictions and provisions that account for the needs of the most vulnerable users. (*Elements of a Complete Streets Policy*, n.d.) Based on decades of collective expertise in transportation planning and design, the NCSC revised the ten policy elements in consultation with a group of national researchers and advocates. (*Elements of a Complete Streets Policy*, n.d.) An ideal Complete Streets policy includes a vision for how and why the community wants to complete its streets, using the latest and best design criteria and guidelines. (*Elements of a Complete Streets Policy*, n.d.) These revised policy elements consider the surrounding community's land use and transportation needs, aiming to build so that all users are justifiably benefited, particularly vulnerable users and underserved communities. They establish performance standards that are specific, equitable, and available to the public and makes any exceptions specific and sets a clear

procedure that requires high-level approval and public notice prior to exceptions being granted. (*Elements of a Complete Streets Policy*, n.d.) The elements also serve as a national model of best practices that can be implemented in nearly all types of Complete Streets policies at all levels of governance, as well as provides guidance on areas for improvements. (*Elements of a Complete Streets Policy*, n.d.)

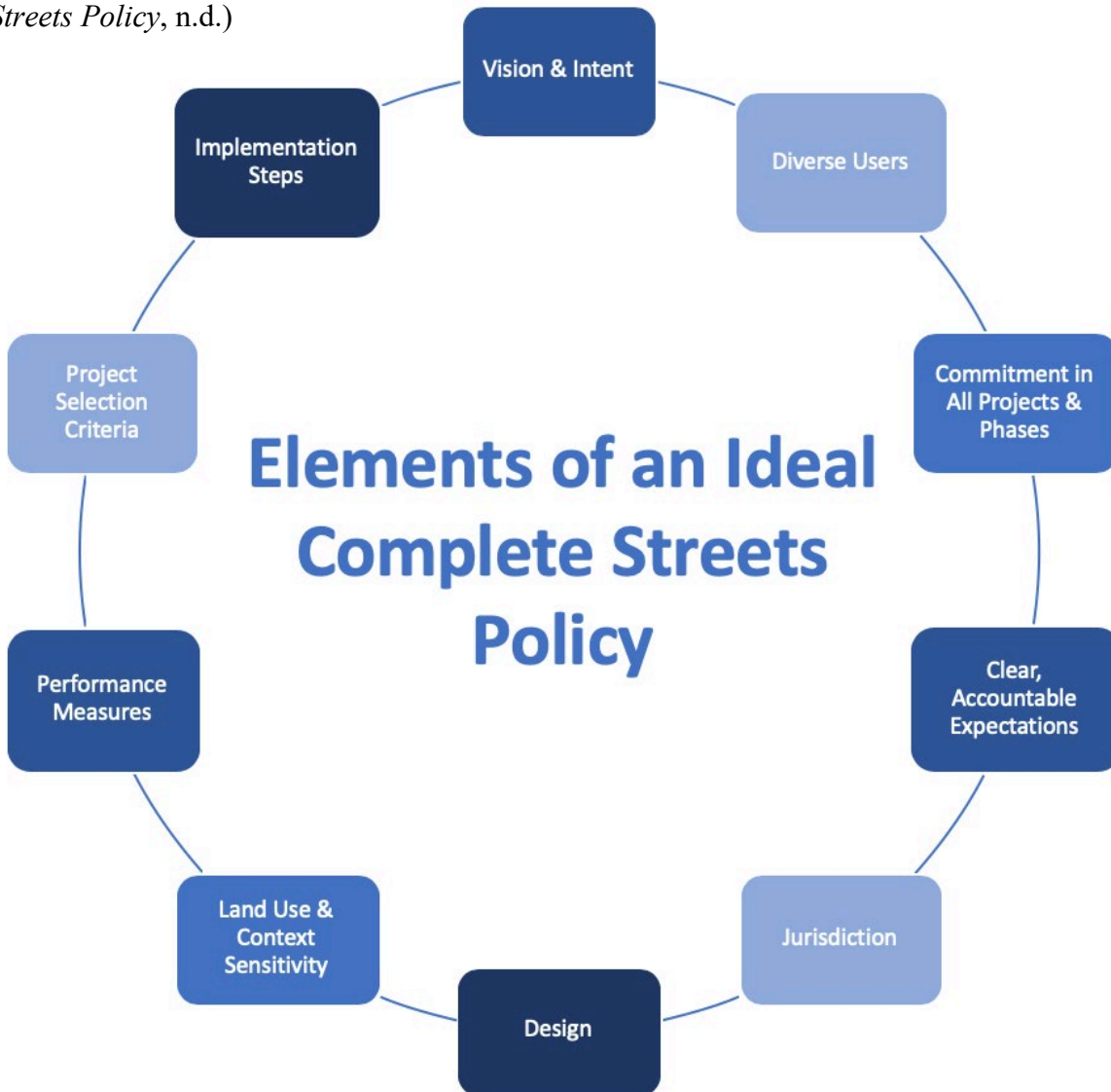


Table 4: *Elements of a Complete Streets Policy*
Source: Smart Growth America

Chapter 3: Transportation Network

San Francisco is a city filled with diverse transportation options, both for local and regional travel. The city contains regional transportation options such as Bay Area Rapid Transit (BART), Caltrain, AC Transit (Alameda Contra-Costa Transit District), Golden Gate Transit, SamTrans, and the San Francisco Bay Ferry. (Dailey, 2017) When the local transportation modes successfully function and run on schedule, it helps lead to the success of these regional transportation options. The following transportation modes are the primary alternatives to motor vehicles that locally serve the city: pedestrians, public transit (MUNI), and bicycle.

Pedestrian

As a highly-dense city with plenty of amenities and attractions in close proximity, San Francisco is a city that looks to walkability as major transportation mode. Whether it is employers going to work in the city’s active downtown, tourists sightseeing along the waterfront, or residents walking in their neighborhoods, SFMTA believes “the compact size and daytime population of one million people means that walking is a crucial part of keeping [San Francisco] moving.” (Chong, 2018) At some point, everybody walks in their travels, regardless of someone



going several city blocks or from their car to a store a few feet away. The SFMTA’s vision is to use walking to make San Francisco a more safe, sustainable and equitable city; their work to make San Francisco a more walkable city is guided by the SFMTA Strategic Plan, the city’s Vision Zero goal of eliminating traffic fatalities, and the San Francisco Pedestrian Strategy.

Table 5: SFMTA Pedestrian Goals
 Source: SFMTA

The mission of the SFMTA is to “work together to plan, build, operate, regulate and maintain the transportation network, with our partners, to connect the community.” (Chong, 2018) One program that especially looks to increase the well-being, safety, and health of members throughout the community is Safe Routes to School (SRTS). The SRTS program was created to help to make walking and bicycling to school safer and more accessible for children, including

those with disabilities, and to increase the number of children who choose to walk, bicycle, take public transit, or ride in parental carpools. (Chong, 2018) This program has been successfully implemented not only in San Francisco, but in many cities throughout the United States in an effort to promote safe, healthy, and easy mobility to and from schools for all.

In 2015, the SFMTA made hundreds of intersections safer by implementing: Red visibility curbs at 80 intersections; Painted safety zones at 40 intersections; Sidewalk bulbouts at 15 intersections; High visibility crosswalks at 200 intersections; Pedestrian head-start signal systems at 60 intersections; and advanced limit lines at 35 intersections. (Chong, 2018) Engineering and capital improvements play a critical role in getting all people to and from their destinations, as projects throughout the city range from large capital improvements to requests made by community members. (Chong, 2018) A number of capital projects improve safety for pedestrians by focusing on high-injury and transit corridors. As for community requests, SFMTA responds to approximately 100 requests every year to address safety through STOP signs, crosswalks, pedestrian safety initiatives, loading zones and others. (Chong, 2018) San Francisco is in the process of expanding their traffic calming program to focus more on schools, parks, and locations with high rate of vulnerable user crashes. (Chong, 2018) While large capital projects can take time to develop and carry out, the SFMTA also conduct quick and effective engineering treatments to improve safety throughout the city.

Public Transit

The main public transit system for the city is the San Francisco Municipal Railway (Muni). With its network of fuel-efficient reliable, and historic vehicles covering all corners of the city, Muni offers multiple options in its diverse and clean multimodal transit fleet, including: hybrid buses, Muni Metro (light rail), Trolley Coaches, Cable Cars, and Streetcars. In ongoing efforts to provide the most state-of-the-art Muni fleet, the SFMTA is replacing aging vehicles with low-floor biodiesel-electric hybrid buses and electric trollies. (Padilla, 2017) The transformation and success of Muni's improved transportation fleet has been made possible by a combination of funding and efforts from city leaders. As a foundation of the city's Transit-First policy, late Mayor Ed Lee's goal was to ensure that the newer, cleaner buses were "reliable, affordable and safe for all riders...The purchase of a new state of the art fleet, which reduce or

eliminate greenhouse emissions, has helped San Francisco lead the way to a sustainable future.” (Padilla, 2017) As a vital component of the public transit fleet throughout San Francisco, the Muni Metro system is the United States’ third-busiest light rail system, “operating a fleet of 151 light rail



*Figure 1: The new hybrid runs on B20: a blend of diesel and biodiesel which is made from recycled oil and fat.
Source: SFMTA*

vehicles (LRV) with an average weekday ridership of 173,500



*Figure 1: Muni light rail at a surface stop
Source: SFMTA*

passengers.” (Padilla, 2017) Throughout the city are 9 subway stations, 24 surface stations and 87 surface stops, totaling 71.5 miles of standard-gauge track. (Padilla, 2017) All subway and surface stations, as well as many surface street stops are handicap-accessible, allowing wheelchair users ease of movement; often there is a ramp leading up to a small platform for boarding. Electric trolley buses are rubber-tired motorized vehicles powered by electricity from overhead wires. The term “trolley” refers to the trolley poles on the roof of the bus that are used to transmit the electricity from the overhead wires. (Padilla, 2018) The modern-day trolleys have a battery that enables them to function without the overhead wires, as well as maneuver around anything obstructing their pathway. (Padilla, 2018) Although their operations can be less flexible than that of motor buses, trolley buses are more

87 surface stops, totaling 71.5 miles of standard-gauge track. (Padilla, 2017) All subway and surface stations, as well as many surface street stops are handicap-accessible, allowing wheelchair users ease of movement; often there is a ramp leading up to a small platform for boarding. Electric trolley buses are rubber-tired motorized vehicles powered by electricity from



*Figure 3: San Francisco Muni has the largest trolley bus fleet of any transit agency in the United States and Canada. Trolley Coaches
Source: SFMTA*



Figure 2: Muni Historic Streetcar
Source: SFMTA

energy efficient and much less polluting—they operate better on hills, run quieter, require less maintenance and are longer lasting than motor buses. (Padilla, 2018) Cable Car and Historic Street cars, seen also as iconic tourist attractions, are too a highly-used mode of transportation throughout the city. Muni’s streetcars,

cable cars and trolley coaches are almost entirely pollution-free since their electric power comes from the city’s hydroelectric Hetch Hetchy Water and Power System. (Padilla 2019) Mayor Lee believed this improved, more-efficient and sustainable public transportation system would serve as solutions to fighting climate change, helping meet the needs of the city’s growing population and flourishing population. (Padilla, 2017)

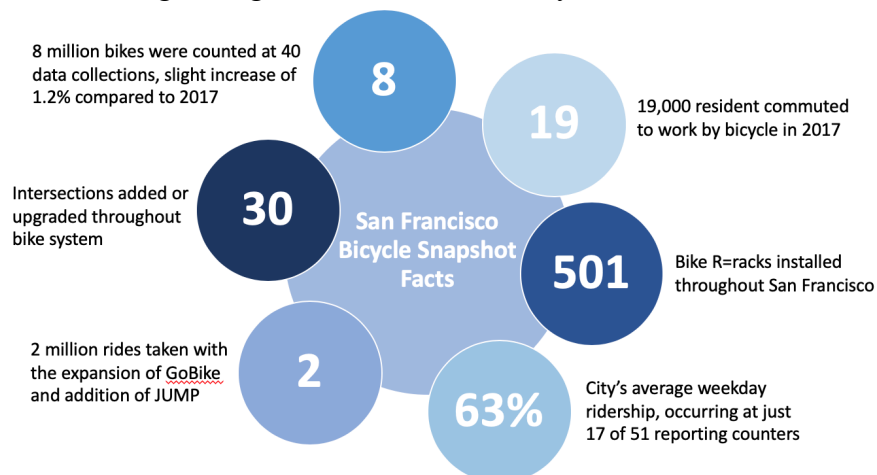
Aiming to make traveling throughout San Francisco safer and more dependable, SFMTA improves its public transit service through Muni Forward, a source of projects that implements service upgrades and route changes citywide to where they are needed. Initially introduced as the Transit Effectiveness Project (TEP), these improvements are performed to increase the frequency of service as well as simplify the Muni network to make navigating the system easier for all users. The TEP was an “in-depth planning process that—with technology, technical expertise, and deep community insight that helped inform and develop a comprehensive overhaul of San Francisco’s transit network in order to provide its 750,000 daily passengers,” with a more efficient and dependable trip. (Dailey, 2017) In conjunction with other Muni programs, the TEP represented the first major evaluation of the Muni System in 30 years, building the plan for improving mobility for all users while making Muni a great transportation choice for residents and visitors alike. (Dailey, 2017) A key part of the Muni Forward program is the implementation and expansion of the Rapid Network, which prioritizes reliability and frequency along the city’s most heavily used routes; nearly 70% of customers ride on the rapid routes. (Fpadmin, 2018) Many of the projects on the Rapid Network are Transit Priority projects, which includes engineering improvements designed to address delays and increase the safety and comfort of users along Muni’s most frequently used routes. These projects include a variety of treatments

that specifically address traffic congestion, transit stops that are spaced too close together, narrow travel lanes, and slow boarding times; project elements include lane modifications, traffic signal and stop sign changes, transit stop changes, parking and turn restrictions, pedestrian improvements and many others. (Dailey, 2017) SFMTA is making San Francisco’s transit system smarter, safer and more reliable by implementing and utilizing technology to integrate its transit system with traffic signals, while providing more real-time information. (Dailey, 2017) Updating the city’s transit fleet and making important safety and accessibility improvements across the city, combined with pedestrian and bicycle safety projects, helps to better accommodate the needs of all, while enhancing comfort and safety.

Bicycle

Bicycling has become a more popular transportation mode choice for everyday travel around San Francisco in recent years, having grown by 184 percent and adding more than 4 new bike commuters on an average day since 2006. (Chong, 2018) The city continues to support bike culture and keep up with the bike demand by making safer and better bike lanes, creating safer roadways for both bicyclists and other mode users. This increase in bicycling is due to the city’s efforts and investment in creating an infrastructure based on safety and comfortability, allowing more people to bike with ease all over the city. The SFMTA has a vision of making bicycling a part of everyday life in the city, making the streets safe for people biking as the city continues to grow. By focusing on creating streets that are easy to use for bicyclists of all ages, San Francisco can provide accessible and sustainable trip options for more people. (Chong, 2018) The SFMTA annually monitors and evaluates key bicycle data metrics to get a glimpse of biking in the city to understand how people are moving through San Francisco on bicycles.

*Table 6: San Francisco
 Bicycle Snapshot Facts
 Source: SFMTA*



Secure bike parking is a key convenience to promoting the use of bicycling. The SFMTA plays a proactive role in installing bike parking, as there are over 5,000 bicycle racks and corrals available for public use throughout San Francisco; the SFMTA aims to install 500 to 1,000 bike racks across the city yearly. (Smith, 2019) There are two main types of bike parking: short-term and long-term. The SFMTA installs racks for short-term bike parking (two hours or less) in the public right-of-way (sidewalks or in a parking lane) by request and free of charge, but does not install racks on private property or for purposes of longer-term bike storage. (Smith, 2019) There are two types of short-term bicycle parking, including sidewalk bicycle racks and bicycle corrals. Sidewalk bicycle racks are installed on the sidewalk, appearing as an inverted-U shape and can fit up to two parked bicycles on the rack.



Figure 3: Sidewalk bike rack and bike corral, San Francisco
Source: Google Images

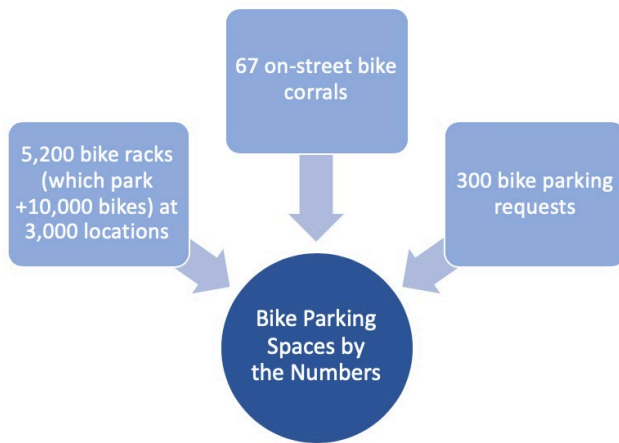


Table 7: Bike Parking Spaces by the Numbers
Source: SFMTA

On-street bicycle parking corrals are bicycle racks placed in a parking lane on the roadway. Approximately 8 to 12 bikes can be parked in one car space, making bike corrals a comparatively efficient use of roadway space in areas where demand for short-term bike parking is higher than can be accommodated on the sidewalk. (Smith, 2019) On the other hand, long-term bicycle parking (more than two hours) is readily available in dense urban areas with demand for secure facilities. The SFMTA provides long-term bicycle parking options primarily at city-owned garages in and around downtown, with a combination of bicycle racks at most locations throughout the city that are easy to use and typically low to no cost to users. (Smith, 2019) The SFMTA seeks to expand secure bicycle parking opportunities at transit centers, employment and retail areas and high residential neighborhoods; currently, the SFMTA is performing location, facility and economic feasibility studies for new long-term bicycle

parking stations, with the results of this research forming the next steps for future design and construction. (Smith, 2019)

A growing reason for the increase of bicycling in San Francisco is due to bikeshare, as opportunities and options for it keep expanding. Bikeshare is for any user who wants to make a short one-way trip by bike, often resulting in a fast, affordable, and active way to get around.

Many residents and commuters use bikeshare, as it is a convenient transportation option during



Figure 4: Ford GoBike Station
Source: Google Images

commute hours. In 2013, SFMTA partnered with public agencies throughout the Bay Area to plan and implement the original Bay Area Bike Share pilot project. (Smith, 2019) The SFMTA, in partnership with the Bay Area Air Quality Management District (BAAQMD), brought Bay Area Bike Share (BABS) to San Francisco with 350 bikes and 35 stations. In 2017, Motivate—the Bay Area Bikeshare

operator since 2014—began to roll out a major expansion of San Francisco’s bikeshare with sponsorship from the Ford Motor Company; the bikeshare network increased to culminate in 320 stations and 4,500 bikes, covering nearly half the city for no capital or operational expense to taxpayers. (Smith, 2019) Now with new equipped and rebranded as Ford GoBike, the now privately-held regional system has extended out to increase the number of bikes to 7,000 across 5 cities throughout the Bay Area. (Smith, 2019)

Station locations are prioritized to complement both local central transit stations as well as regional transportation Factors considered when determining ideal locations for stations within the service area include topography, job density, transit connections, bike rack requests, and proximity to the bikeway network. (Smith, 2019) These select locations also provide convenient options for residents, commuters and visitors making short trips to and from these facilities, to places of employment and residences, and to social and recreational destinations. Experience from other cities has shown that to maximize utility and customer satisfaction, bikeshare stations should be spaced on average every 2 to 3 blocks throughout the service area so that stations are within an easy five-minute walk of one another. (Smith, 2019)

Chapter 4: Case Studies

Case Studies provide great comparisons to better understand research. The cities of Boston and Chicago provide unique, informative complete street design guidelines that San Francisco can refer to and learn from. Boston, with a current city population of 685,094 and population density of 18,854.16 (mi²), also has a daily moving population of around 1.2 million people in the city, compared to 1 million in San Francisco. (Boston, Massachusetts Population, 2019) Chicago has a current population of 2,716,450 and a population density of 11,948.89 (mi²). (Chicago, Illinois Population, 2019) While San Francisco differs from these two cities in terms of population and population density, the city can still obtain knowledge on how its complete streets design and development can improve when looking at these design guidelines.

Boston, Massachusetts

In 2010, the Boston Department of Transportation introduced the *Boston Complete Streets Design Guidelines*. The *Boston Complete Streets Guidelines* serve as a new vision for the way roadways and sidewalks are designed throughout the metropolitan area. These guidelines have helped create a city where residents of every age feel safe on the streets by putting pedestrians, bicyclists and transit users on equal footing with motor-vehicle drivers, resulting in direct impacts on public health, transportation, and the environment. (*Boston Complete Streets Design Guidelines*, 2013) These guidelines have combined complete street practices with 21st

MULTIMODAL

- Multimodal designs ensure Boston's streets are safe and shared comfortably by pedestrians of all ages and abilities, bicyclists, transit users and motor vehicle drivers

GREEN

- Green design elements promote an environmentally sensitive, sustainable use of the public right-of-way

SMART

- Physical and digital information infrastructure enable all modes of transportation to move more efficiently, support vehicle sharing, and provide real-time data to facilitate trip planning, parking, and transfers between modes of transportation

Table 8: Principles of Boston Complete Streets Design Guidelines
Source: *Boston Complete Streets Design Guidelines*

ambitious design principles and detailed guidelines, are not only engaging to the general public but also informative for design and engineering professionals. *Guidelines* provides the opportunity of collaboration between policy makers, community leaders, neighborhood residents, city agencies, transportation, advocates and professionals, and the public at large, working

century thinking on how to make roadways engaging, sustainable, and safe for all users, embracing the innovative designs and technologies that address climate change and promote active healthy communities. (*Boston Complete Streets Design Guidelines*, 2013)

These strategies, containing both

together to develop new street design guidelines and implement projects informed with the new complete streets approach. (*Boston Complete Streets Design Guidelines*, 2013)

The city initially set out to accomplish two goals with the *Guidelines*: 1) Spread knowledge about emerging best practices in urban street design and 2) Build literacy of and support for these efforts among the wider public. (American Planning Association, n.d.) *Guidelines* communicates multimodal travel, environmental sustainability, and advanced technologies as fundamental principles in an illustrative manner that is clear for readers unfamiliar with urban design. (American Planning Association, n.d.) Design decisions require flexibility to balance the use of available knowledge with innovations in street design and technological advances that respond to a wide range of conditions and site constraints. These guidelines include designs to rebalance the use of streets so that walking, cycling and transit are as safe and convenient as driving a car. Throughout the document, *Boston Complete Street Guidelines* examine the principles and design of street types, sidewalks, intersections, smart curbsides, as well as reviews the implementation process of Boston’s Complete Street Projects.

Boston Street Types

Downtown Commercial	<ul style="list-style-type: none"> • Serve as cultural destinations and connect highways and transit hubs that serve the Greater Boston Region
Downtown Mixed-Use	<ul style="list-style-type: none"> • Support a lively mix of retail, residential, office, and entertainment that serve residents, visitors, and workers
Neighborhood Main	<ul style="list-style-type: none"> • The nucleus of the city's neighborhood economies, characterized by dense single-floor commercial and retail use
Neighborhood Connector	<ul style="list-style-type: none"> • Traverse several neighborhoods and form the backbone of Boston's multimodal street network
Neighborhood Residential	<ul style="list-style-type: none"> • Used primarily for local trips and are characterized by lower vehicle and pedestrian volumes
Industrial	<ul style="list-style-type: none"> • Support truck traffic and accommodate the loading and distribution needs of commercial, construction, and food-processing businesses
Shared Street	<ul style="list-style-type: none"> • Streets with a single grade or surface that is shared by people using all modes of travel at slow speeds
Parkway	<ul style="list-style-type: none"> • Typically four lane higher-speed roads, characterized by long, uninterrupted stretches running parallel to Boston's open space systems
Boulevard	<ul style="list-style-type: none"> • Defined by a grand scale and specific urban design characteristics such as wide sidewalks lined with street trees and furnishing

Table 9: Boston Street Type
 Source: Boston Complete Street Design Guidelines

To guide both Complete Street design projects and future development throughout the evolving city, the Boston Department of Transportation developed a new set of street types that classify its roadways to better understand how different streets interact with adjacent land uses.

The new street typology supplements the traditional functional classification system of streets (Arterial, Collector, and Local), and supports Complete Street designs that reflect Boston's diverse neighborhoods. (*Boston Complete Streets Design Guidelines, 2013*) Arterial streets are roadways which facilitate higher vehicle speeds and longer trips, and accommodate the greatest number of trips for all modes of travel. Local streets provide easy access to individual residences at slower speeds, while Collector streets are characterized by a balance between access and mobility. (*Boston Complete Streets Design Guidelines, 2013*) The traditional functional classification system primarily concentrates on the mobility and capacity of motor vehicles, whereas this innovative street typology helps supplement the functional classification system by balancing that capacity and mobility with the context and character of the street and surrounding neighborhood. (*Boston Complete Streets Design Guidelines, 2013*) Boston's street typology offer balance between functional classification, adjacent land uses, and competing needs of all transportation modes. Each street type prioritizes users and various design elements based on the context and character of the neighborhood and street, to best follow and achieve the city's principles of making its streets multimodal, green, and smart. Boston's streets are designed to be balanced and equitable, while encouraging healthy and active transportation options such as bicycling and walking. Boston's street types are made to provide additional guidance during the selection of design elements to help support the city's economy and local businesses. (*Boston Complete Streets Design Guidelines, 2013*)

Sidewalk character is a key contributor to the identity of Boston's streets and neighborhoods. Known for being a great walking city, Boston continues to be designed with the pedestrian in mind. Boston is well suited for healthy, active transportation built around walking, with transit within walking distance of virtually every place in the city. (*Boston Complete Streets Design Guidelines, 2013*) Boston's sidewalks are a part of all trips and are essential pieces of infrastructure. The city plans and implements sidewalks not to be recognized as a pedestrian amenity, but to serve as the foundation of Boston's transportation network. (*Boston Complete Streets Design Guidelines, 2013*) A major goal of Boston's sidewalk guidelines is to enhance Boston as a great walking city by providing a physical framework that encourages people to walk as part of their everyday routine; an equally important goal is to enhance the vitality of Boston's streets as public spaces. (*Boston Complete Streets Design Guidelines, 2013*) To encourage people to stay in a space, sidewalks need to be safe, comfortable, and attractive, with

facilities that provide accommodations for people of all ages and abilities. Active sidewalks become venues for people to participate in social activities, support businesses, and use new innovations in digital technology to interact with the public realm. (*Boston Complete Streets Design Guidelines*, 2013) Other features discussed in relation to sidewalks include: minimum sidewalk zone widths; greenspace; storm water management; street furniture; transit stops; and street lights.

Boston's streets have transformed over time to accommodate the city's growth. *Boston Complete Streets Guidelines* also comprehensively discusses designing the space in between curbs, presenting techniques to rebalance the lane needs of different transportation users with the city's roadways. Boston's roadway design is intended to balance the needs of pedestrians, bicyclists, transit riders, and motorists, while not being dominated by cars. Roadway designs must offer people viable transportation choices and should provide safe and convenient accommodations for all modes, aimed to maximize sustainability to protect Boston's environment. (*Boston Complete Streets Design Guidelines*, 2013) Features looked at when discussing roadways include safe speeds, minimum lane widths, design features to reduce operating speeds, travel lanes, transit lanes, and bike facilities. Intersections and curbsides are also key elements that complete the design guidelines for Boston's Complete Street, having their own principles that reflect the multimodal, green, and smart goals Boston's roadways and sidewalks have been designed and implemented with in mind. Boston perceives intersections to be the heart of squares—where streets, sidewalks, and public spaces come together and converge with all modes of travel. (*Boston Complete Streets Design Guidelines*, 2013) The document advocates ways to balance the needs of all users while preserving a unique sense of place throughout intersections in the city. Throughout the literature of intersections, the guidelines also go over intersections in relation to street type, placemaking at intersections, intersection geometry, crosswalk design, guidelines for crosswalk installation, signalized intersections, and both transit and bicycle accommodations at intersections. When discussing curbsides, the document reviews pertaining topics such as: mobility hubs, information infrastructure such as traffic cameras and smart meters, plus alternative curbside uses such as parking stations for vehicle sharing, parklets, and food trucks.

The design and implementation of projects must remain flexible to the unique circumstances of each site, creating the most sustainable and innovative solutions. Implementation of complete street projects follows a four-step process with public involvement to see an idea to fruition, with numerous public agencies responsible for a range of duties relative to the ownership and management of the city’s owned assets in the public right-of-way. The Public Works Department (PWD) is the primary owner and manager of the reconstruction of city streets, sidewalks, and bridges, while the Boston Transportation Department (BTD) is responsible for installing and operating traffic and parking management devices, and managing access for pedestrians, motor vehicles, and bicyclists. PWD owns the city’s right-of-ways in coordination. (*Boston Complete Streets Design Guidelines, 2013*)



Table 10: Boston Complete Streets Design Guidelines Implementation Process
Source: Boston Complete Streets Design Guidelines

Peabody Square, Dorchester Avenue

Located in the heart of Ashmont, the revitalization of the public space in Peabody Square is a great example of a successful completed project that incorporates some of the multimodal, green, and smart principles addressed throughout the *Boston Complete Streets Design Guidelines* in the Greater Boston Area. Peabody Square is reemerging as a center for community life with thriving restaurants, new housing and a refurbished Ashmont Train Station. (Boston Complete Streets, n.d.) The site consists largely of paved areas including roadway, parking, sidewalk and plaza and filled primarily of commercial and high-density residential land uses. (Blue Cities Initiative, n.d.)



Figure 7: Peabody Square Before Improvements
Source: Boston Complete Streets

Completed in November 2018, the new design realigned Talbot Avenue to create a plaza for outdoor cafes, expanded greenspace, and improved and traffic flow along Dorchester Avenue, mainly pedestrian safety and bicycle lane connection improvements. (Boston Complete Streets, n.d.) The project stakeholders also took the opportunity to incorporate green infrastructure in to the redesign and incorporated a number of stormwater management practices. Some of the work completed included a pedestrian plaza with porous pavers, a rain garden, and



Figure 8: Site Plan for Peabody Square Improvement
Source: Boston Complete Streets

an infiltration trench for treating runoff. (Blue Cities Initiative, n.d.) The project, designed by the City of Boston and constructed by Massachusetts Department of Transportation using ARRA funding (Boston Complete Streets, n.d.), cost “roughly \$110,000.” (D’Angelo, 2018) Facilitated by the Greater Ashmont Main Street organization, Director Jenn Cartee of the Greater Ashmont Main Street group and her project group sought to

finalize elements of an earlier project that were never implemented, mentioning that “some of the

aspects of the work that we're doing are actually completing the original plans – things like the street furniture and informational signage.” (D’Angelo, 2018) Seeking input from residents, neighbors, and local business owners, Greater Ashmont Main Street hosted a community-wide public forum session in 2016 inspiring resident Bryan Bryson to seek grants for project funding, who said that the biggest part of the whole project is participation. Bryson, raising over \$26,000 in individual donations from over 130 Dorchester residents, believed “Neighbors participating to make the project happen and think about what they wanted” was a key aspect in the success of the implementation of this project. (D’Angelo, 2018) Jack Pelletier, owner of Ashmont Cycles, which is situated on Peabody Square plaza believes the project “makes a better use of the space in terms of getting people to congregate there and sit and relax... that the more people feel welcome to gather and congregate in the square is great for community development, economic development. (D’Angelo, 2018)

Chicago, Illinois

The mission of the Chicago Department of Transportation (CDOT) is to keep the city’s “surface transportation networks and public way safe for users, environmentally sustainable, and in a state of good repair...so that its diverse residents, businesses, and guests all enjoy a variety of quality transportation options, regardless of ability or destination.” (*Complete Streets Chicago Design Guidelines*, 2013) CDOT advocates for the city supporting multiple transportation modes so that pedestrians have places to meet at, conduct business, and socialize. One of the solutions CDOT has created and used to help advance this mission is the *Chicago Complete Street Guidelines* 2013 Edition; its Complete Streets Policy states:

The safety and convenience of all users of the transportation system including pedestrians, bicyclists, transit users, height, and motor vehicle drivers shall be accommodated and balanced in all types of transportation and development projects and through all phases of a project so that even the most vulnerable—children, elderly, and persons with disabilities—can travel safely within the public right-of-way.

Chicago Complete Streets Design Guidelines is the result of an integrated and inclusive process that builds upon the Complete Streets policy of building and maintaining roads for healthy business districts, vibrant neighborhoods, and a high quality of life. (*Complete Streets Chicago Design Guidelines*, 2013) CDOT believes complete streets means using the tools and strategies provided by its policies and procedures to create the most efficient streets and

transportation infrastructure for all users while maximizing their social and environmental benefits. (*Complete Streets Chicago Design Guidelines*, 2013) CDOT has six main reasons why the city should plan for and implement complete streets. Keeping these six goals in mind, *Guidelines* help facilitate the safe and comfortable movement of people, vehicles, and goods while promoting social, sustainable, and healthy lifestyles

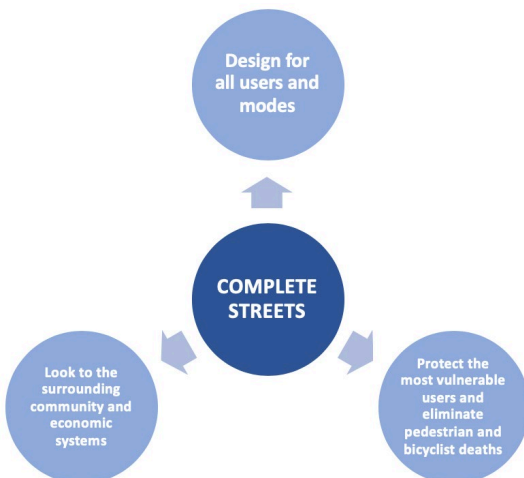


Table 11: What Complete Streets mean in Chicago
Source: *Complete Streets Chicago Design Guidelines*



Table 12: CDOT Reasons for Complete Street Planning and Implementation
Source: *Complete Streets Chicago Design Guidelines*

CDOT follows four key themes to ensure the successful implementation and functionality of complete streets: modal hierarchy, typology, design guidance, and procedures. The modal hierarchy operates under a “pedestrian-first strategy,” meaning the walking public is the main priority in the design and operation of all CDOT projects and programs, with transit coming second, followed by bicycle then automobiles (private motor vehicles) operations. (*Complete Streets Chicago Design Guidelines*, 2013) In some circumstances, the hierarchy may be adjusted somewhat, but overall the paradigm shift from the dominant, auto-based approach to the pedestrian, transit-first configuration allows the city’s transportation network to grow safely, sustainably and equitably into the 21st Century. (*Complete Streets Chicago Design Guidelines*, 2013) Complete Street projects in Chicago are reviewed and analyzed through the lens of roadway and building typology, going away from the traditional, highway-based functional classification system. Typology is used by transportation professionals to categorize streets and their contexts by type, or similar characteristics. They help in the selection of treatments which best reflect the surrounding environment, best accommodate all modes, best reflect regulatory strictures,

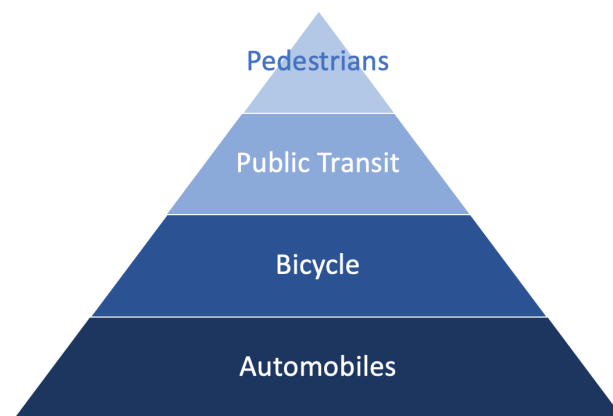




Table 13: CDOT Modal Hierarchy
Source: *Complete Streets Chicago Design Guidelines*




Building Form & Function

- Describes the character of the surrounding land uses, structures, regulatory framework, environmental, and economic characteristics




Roadway Form & Function

- Describes the character of the roadway and its uses and function within the modal systems.
- Characteristics include right-of-way, design/target speeds, number of lanes, parking demand, traffic operations, and modal volumes



Intersections & Crossings

- Categorizes how streets meet



Overlays

- Describes the various statutory, operational, and planning categories such as snow routes, truck routes, modal plans, and jurisdictions which impact design decisions

Table 14: Chicago Street Types
Source: Complete Streets Chicago Design Guidelines

and best affect desired outcomes: complete streets. (*Complete Streets Chicago Design Guidelines*, 2013) The figure shows the four typology aspects CDOT focuses on to help decide and prioritize where and when complete street projects should be carried out. Design guidance provides the principles and policies to help create and offer best practices for what to prioritize in designing complete streets. Throughout Design Guidance, design trees, cross-section elements, intersections, and geometric and operational policies are discussed. Cross-section elements divide streets into four component parts: pedestrian realm, interstitial area, vehicle realm, and media.

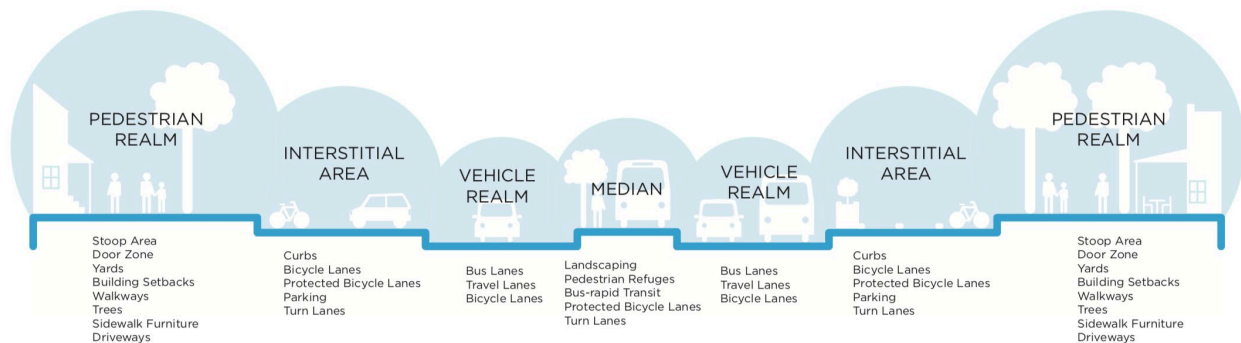


Figure 5: CDOT Cross-Street Element
Source: Complete Streets Chicago Design Guidelines

Implementation contains a six stage process that ensures all projects will be as “complete” as possible. In implementing these policies and procedures, CDOT uses safety and mode share performance measures to evaluate success over time. (*Complete Streets Chicago Design Guidelines*, 2013) With safety, implementation goals include: eliminating all pedestrian, bicycle, and overall traffic crash fatalities within 10 years; reduce pedestrian and bicycle crash injuries, each by 50% within 5 years; and reduce total roadway crashes and injuries from all roadway crashes, each by 10% each year. (*Complete Streets Chicago Design Guidelines*, 2013) Mode share goals for project implementation include: increase the share of people bicycling, walking and taking transit to work and working from home to 50% by 2040; and increase the share of all trips under 5 miles made by cycling to at least 5%. (*Complete Streets Chicago Design Guidelines*, 2013)

Project Delivery Process

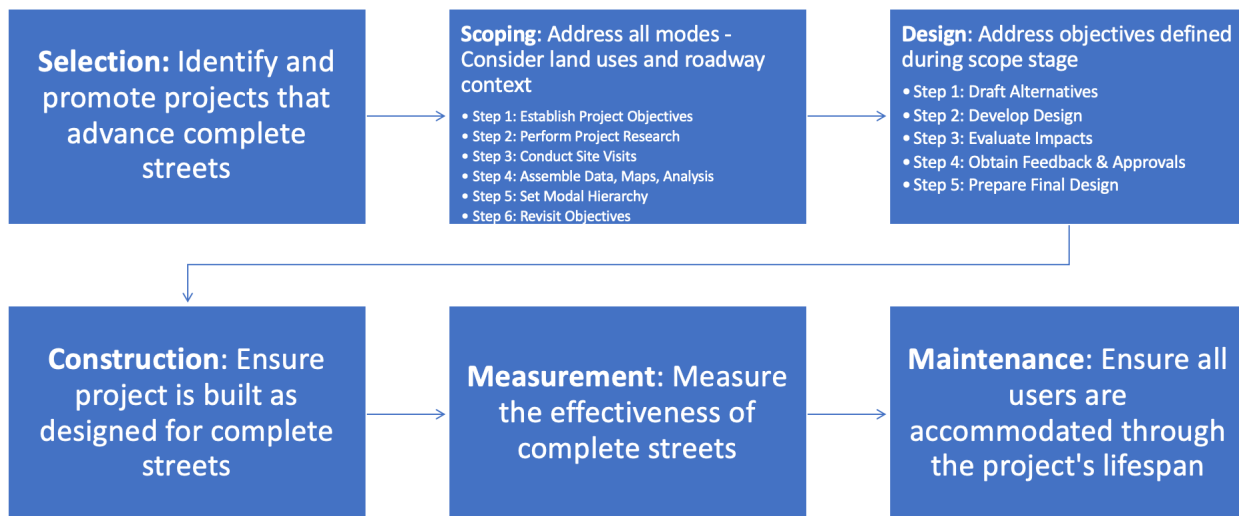


Table 11: CDOT Project Delivery Process
Source: *Complete Streets Chicago Design Guidelines*

Morgan Street Streetscape Project

The Morgan Street Streetscape is an example of a successfully finished complete street project in Chicago. Beginning in March 2017, the city renovated the section of Morgan Street, between 31st Street and 35th Street, with infrastructure upgrades and streetscape elements. (*Morgan Street, 31st Street to 35th Street Streetscape*, 2017.) The \$3.8 million streetscape project was planned and designed by CDOT in close cooperation with community representatives, and according to the news release was funded “mostly through tax increment financing.” (Staff, 2017) The project consisted of numerous improvements, including street resurfacing, lighting upgrades, street furniture, and pedestrian safety improvements. Throughout construction, motorists and pedestrians had access to businesses and residences along Morgan Street, although parking was not allowed in active construction areas in order to keep the road open to traffic. (*Morgan Street, 31st Street to 35th Street Streetscape*, 2017) City Transportation Commissioner Rebekah Scheinfeld voiced how the Morgan Street streetscape project demonstrated the city’s commitment to working with community stakeholders and delivered business in neighborhoods all across Chicago. (Staff, 2017)

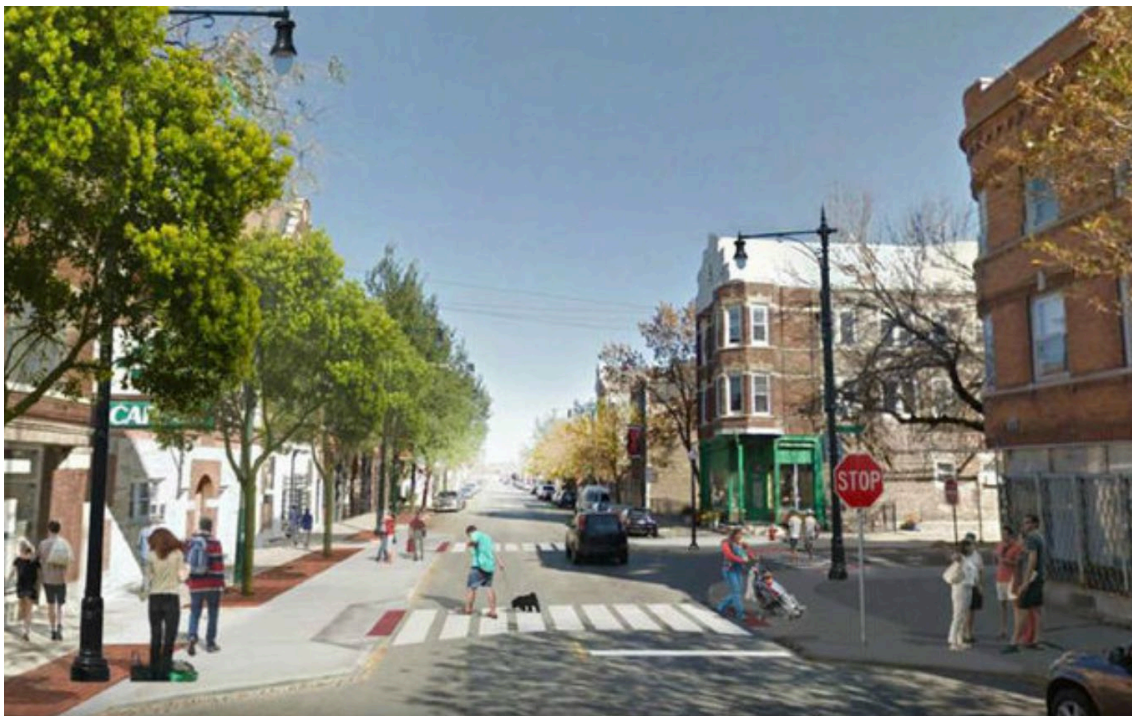


Figure 6: Rendering of Morgan Street Streetscape Project
Source: DNA Info

Chapter 5: Complete Streets Guidelines and Policies

San Francisco's policies encourage the design and development of 'Better Streets' that work for all users. Nationwide, cities often refer to these streets as 'Complete Streets.' When Designing these roadways and streetscapes, Better Streets consider the street's role in the overall transportation network, including facilities appropriate to that role, as well as the street's role in the City's ecological systems and its role in supporting other city infrastructure networks; designing Better Streets also means maximizing features for the comfort, usability, and aesthetics of people walking. (Better Streets Overview, 2019) A successful design for a street should positively address all of these considerations and serve the multiple roles that streets play. San Francisco follows several policies in order to successfully carry out the design and development of better streets.

Guiding Policies

Transit First Policy

San Francisco's growing economy and expanding population has indirectly led to less efficient and more congested traffic for commuters throughout their travels. The city's Transit First policy is designed to keep people moving and allow them to get around efficiently and conveniently. (Barnett, 2018) In 1973, San Francisco adopted the policy, which states, "Public transit is an economically and environmentally sound alternative to transportation by individual automobiles. (Amin, 2014) By prioritizing the movement with a focus on alternative transportation modes such as transit, walking, and biking instead of automobiles, Transit First continues to guide the city's efforts amidst the city's growth and change. Since adopting the transportation policy. Transit First is moving more people in San Francisco more efficiently than ever before. For example: Muni vehicles are boarded almost 720,000 times each weekday, with over 220 million people using Muni each year; Auto trips have shrunk to 43 percent of total daily trips, furthering the city's Climate Action Strategy goals; and an estimated 82,000 bike trips are made in the city on an average day, a 213 percent increase from 2006. (Barnett, 2018) Today, this policy is guiding efforts to improve city streets and major infrastructure projects, including the SFMTA's Muni Forward Program.

Streets are a hotly contested space, where roadway space is competed for by cars, buses, bicycles, and other transit modes and users, with an ever-present chance of injury and death while using streets. Each year in San Francisco, some 100 people are severely injured or killed,

and 800 more are injured, while walking; seniors and children are especially vulnerable. (Amin, 2014) Transit First aims to save lives—in line with the goals of Transit First, Vision Zero SF leads a campaign to reaching zero traffic fatalities in San Francisco by 2024. Investments to improve pedestrian and bicycling space make streets safer for everyone, helping SF get closer to its ultimate goal of eliminating traffic deaths. (SFCTA, 2019) Focusing on these alternative transportation modes along with public transit also solves a spatial problem. San Francisco’s narrow streets are better sized for transit, cycling and walking than they are for cars, as even just a single car takes up an incredible amount of street space. (Amin, 2014)

Emphasizing transit isn’t just about using streets efficiently, it’s about using land efficiently and improving the surrounding environment. Transit First highlights buses and light rail trains, which use less road space per passenger than private cars, and keeps people moving while reducing greenhouse gas emissions. (Barnett, 2018) Transit First can do a lot to reduce the greenhouse gases that are changing earth’s climate, as Muni’s fleet produces just 1% of the city’s greenhouse gas emissions, while cars and trucks produce 40%; walking and cycling have essentially zero pollutants. (Amin, 2014) Transit First goals promote transit, walking, and biking, leading to cleaner air and healthier communities. Transit first aims to creates opportunity and equity as well. Among U.S. cities, San Francisco is fifth in number of jobs available by transit and second in rate of transit use. (Amin, 2014) Public transportation helps create a more viable commute option, opening up a greater range of job opportunities. (Amin, 2014) Together, transit and job-rich neighborhoods create a system where people can access economic opportunity, helping assist future population and economic growth.

Vision Zero SF

Vision Zero SF is San Francisco’s road safety policy that intends to protect the travelers by building safety and livability into the city’s streets. San Francisco adopted Vision Zero in 2014, “committing to build better and safer streets, educate the public on traffic safety, enforce traffic laws, and adopt policy changes that save lives.” (Vision Zero SF, 2019) Every year people lose their lives and even more people are seriously injured while traveling on city streets; these situations are unacceptable and preventable, and San Francisco is committed to stopping further loss of life. Through a collaborative, citywide effort, the goal of Vision Zero is to create a culture that prioritizes traffic safety, generating safer and more functional streets to eliminate traffic

fatalities by 2024. (Vision Zero SF, 2019) Since 2014, Vision Zero SF has published an Action Strategy that lays out the strategic actions for city departments and agencies to reach the city's Vision Zero goal. The strategy was developed by San Francisco Municipal Transportation Agency and Department of Public Health, with leadership from the Mayor's Office, and in coordination with local community groups and advocacy organizations. (Dailey, 2019)

The third and newest version of the Action Strategy reaffirms the city's long-term commitment to Vision Zero, as well as expands beyond standard engineering, enforcement, and education actions to be articulate about the broader policies and goals needed to achieve Vision Zero. (*Vision Zero Action Strategy*, 2019) The Action Strategy acknowledges that the city must be serious and advance complementary city goals so that sustainable choices are a viable option for most trips; these goals include advocating for more alternative transit mode and reducing greenhouse gas emissions. (*Vision Zero Action Strategy*, 2019) The Vision Zero Action Strategy warrants that implementation of goals, policies, and actions of Vision Zero improve health outcomes for all, especially vulnerable communities.

Better Streets Policy

San Francisco's Better Streets Policy (San Francisco Administrative Code Section 98.1), adopted in 2006, ensures streets are for all types of transportation, and requires City agencies to coordinate the planning, design and use of public rights-of-way to carry out the vision for streets contained in the policy. See Appendix B for complete policy.

Complete Streets Policy

The Complete Streets Policy (Public Works Code Section 2.4.13) guides the City to include pedestrian, bicycle, and streetscape improvements as part of any planning or construction in the public right-of-way. See Appendix C for complete policy,

San Francisco Better Streets Plan

The Better Streets plan provides a set of policies and guidelines for the design of the pedestrian environment in San Francisco. The plan seeks to balance the needs of all street users, with a particular emphasis on pedestrians and how streets can be transformed from conduits for motor vehicles into public spaces. Officially adopted by the San Francisco Board of Supervisors on December 7, 2010, the Better Streets plan was developed over three years through a significant public process, which included over 100 Better Streets community meetings, and monthly meetings with a 15-member community advisory committee. (*Guide to the San Francisco Better Streets Plan, 2010*) Well-known for its quality of life, commitment to social equity and growing concern for environmental sustainability, San Francisco strives to be a world-class city that provide services, infrastructure, and lifestyle opportunities for all people. (*San Francisco Better Streets Plan, 2010*) As the city continues to grow and develop, this vision of a global city faces several challenges—hough San Francisco’s streets are one of its most memorable feature and make up. The quality of streets and public spaces is slowly deteriorating. (*San Francisco Better Streets Plan, 2010*) Well-designed streets that serve a multitude of uses can help to address these concerns.

Intended for community members, developers, design professionals, and others to understand the key requirements and guidelines of the Plan, the Better Streets Plan provides “a blueprint for achieving this multi-use vision of streets – streets that continue to function as corridors of movement while at the same time reach their potential for enhanced community life, recreational opportunities, and ecological benefits.” (*San Francisco Better Streets Plan, 2010*) As the city continues to evolve, this plan can help ensure the vision of a world-class city, one that is recognized for the quality of the streets and vibrant public spaces. With this blueprint, the Better Streets Plan describes a set of



Table 12: Benefits of the San Francisco Better Streets Plan
Source: San Francisco Better Streets Plan

guidelines for the pedestrian realm. As street improvements are built over time using the Better Streets Plan, the city will gain a number of benefits from improved street design, including: helping families remain in San Francisco; helping minimize sewer/stormwater overflows; increasing accessibility for all users; providing open space in areas that are lacking; and supporting neighborliness, civic interaction, and identity. (*San Francisco Better Streets Plan*, 2010). The Better Streets Plan will result in a street system “designed to promote human needs for the use and enjoyment of public streets, prioritizing the needs of walking, bicycling, transit use, and the use of streets as public spaces for social interaction and community life.” (*San Francisco Better Streets Plan*, 2010) With the elements of better streets, outcomes of this executed plan consist of: streets people choose to use because they are safe, engaging, attractive, and convenient; streets that increase linkages among city landmarks, transit centers, and other destinations; and improved street-based social opportunities for all people, regardless of cultural identity, income, group, or abilities.

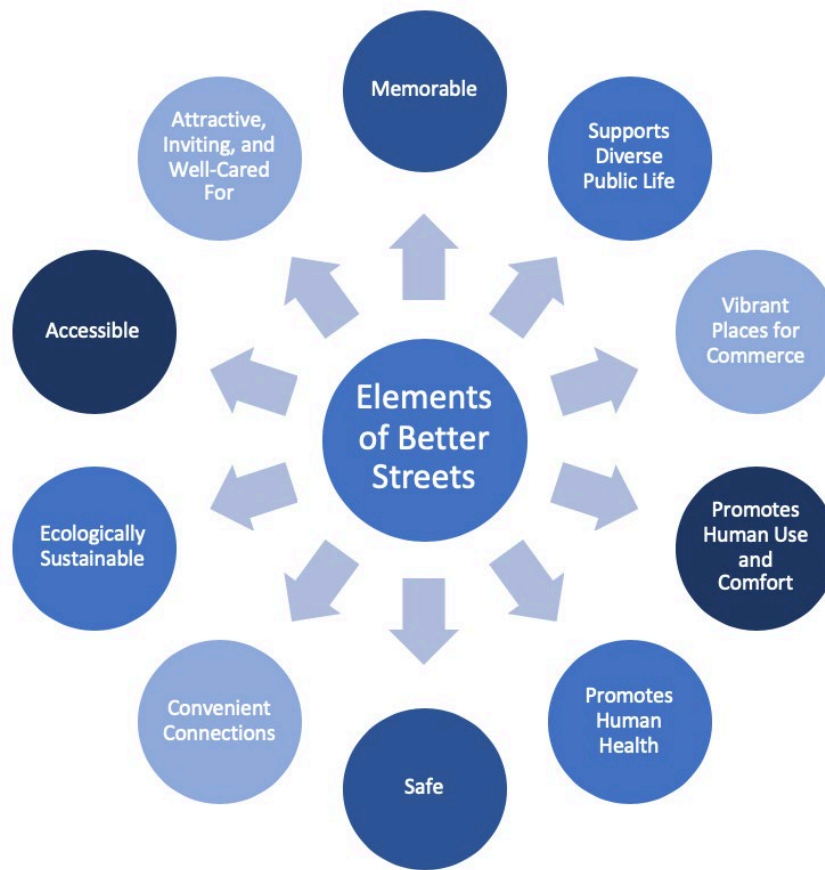


Table 13: Elements of Better Streets San Francisco
Source: *San Francisco Better Streets Plan*

The Better Streets plan contains comprehensive guidelines for the design of the pedestrian realm; the legislation requires that any changes to the public right-of-way must conform with the policies and guidelines in the plan (Section 98.1(e) of the Administrative code, “Better Streets Policy—see Appendix B for more information) (*Guide to the San Francisco Better Streets Plan*, 2010) Streetscapes reflect a unified, complete design that balances among a wide variety of functions; when possible, street improvement projects are coordinated to make related improvements simultaneously to construct holistically designed street improvements. (*San Francisco Better Streets Plan*, 2010) The Plan highlights guidelines for street types, intersection design, sidewalk width, sidewalk zones, and streetscape layout. Street types are identified to set the design framework for appropriate features and dimensions for a particular street. In determining street type for a particular project, designers are suggested to begin by determining adjacent land use(s): is it primarily residential, commercial, other? Next, see what are the transportation characteristics: is it a major through corridor with high traffic volumes and speeds, or does it serve a more local function with lower traffic volumes and speeds? (*San Francisco Better Streets Plan*, 2010) Determining street types for each project help to decide what street designs and streetscape elements are appropriate. The guidelines for sidewalks create sufficient clear widths for through travel while providing functional amenities, creating a usable and pleasant environment; the plan identifies five sidewalk “zones” to organize elements on the sidewalk: frontage zone; throughway zone; furnishing zone; edge zone; and extension zone. (*Guide to the San Francisco Better Streets Plan*, 2010) Each zone follows its minimum and recommended sidewalk width for each street type. With streetscape layout, key principles include: street trees being the primary organizing element of the streetscape; street lighting being placed alternately with street trees; and other furnishings being placed between the said organizing elements, as they create a pattern of plantings and furnishings. (*Guide to the San Francisco Better Streets Plan*, 2010) The Better Streets Plan also thoroughly discusses strategies and tools for building effective streetscapes, such as traffic calming techniques and stormwater management tools. Implementation is the last section of the Better Streets Plan, suggesting recommendations for maintenance, enforcement, and funding strategies. The city must consider how to make these improvements happen, and how to sustain improvements over time; the city must identify strategies for on-going funding, efficient and effective maintenance practices, and pedestrian enforcement and education campaigns. (*San Francisco Better Streets Plan*, 2010)

Leland Avenue, Visitacion Valley

Once a neglected and unattractive environment, Leland Avenue is now the heart of the Visitacion Valley neighborhood. In 2006, the city and community collaborated to create a design for its improvement; the city applied for and won a \$4 million grant to build the proposed street improvements. (*Guide to the San Francisco Better Streets Plan, 2010*) The Leland Avenue improvements were completed in September 2010, revitalizing the street and providing a gateway to Visitacion Valley. Though not part of the Better Streets plan itself, The Leland Avenue streetscape improvements are consistent with the Better Streets plan guidelines, and include many of the elements the plan proposes. (*Guide to the San Francisco Better Streets Plan, 2010*) This project serves as a good model for how Better Streets plan guidelines can be applied, in this case to a neighborhood commercial street. Significant features of the project include: new street trees, street lighting, colored and textured paving treatments to highlight pedestrian crosswalks, pervious paving in the furnishings zone and parking lane; and public art including metal work, tile mosaics, and a gateway sculpture. (*Guide to the San Francisco Better Streets Plan, 2010*)



Figure 11: Seat wall and stormwater planter
Source: *Guide to the San Francisco Better Streets Plan*



Figure 12: Crosswalk treatments
Source: *Guide to the San Francisco Better Streets Plan*



Figure 13: Gateway plaza and public art
Source: *Guide to the San Francisco Better Streets Plan*



Figure 14: Pervious paving in the sidewalk and parking lane
Source: *Guide to the San Francisco Better Streets Plan*

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Conclusion

San Francisco is an evolving city looking to improve the way it designs and implements its roadways and streetscapes. After research of the city’s transportation network as well as its complete streets design guidelines and policies, San Francisco has a realistic and encouraging vision for successful streets that integrate motor vehicles with alternative transportation modes. San Francisco’s Better Streets Plan provided ideas and strategies that enhance communities to



Figure 15: Rendering of Better Street design in San Francisco neighborhood
 Source: Guide to the San Francisco Better Streets Plan

make them safe and engaging for all people using them. While the plan can improve and learn from the unique, innovative layout and guidelines that the cities of Boston and Chicago provide, all cities appear to be on the right path of successfully designing and developing complete streets. Complete streets not only mean design of the roadways but the surrounding environment as well, whether that is being environmentally and

sustainably aware, or supporting economic and social development. Streets should not only provide the channels for cars driving through, but also provide pedestrians the ability to walk, shop, work, play, and interact with the amenities and attractions that the streets provide in an aesthetically pleasing and carefully planned-out design. Moving forward, San Francisco should continue to consider the users of streetscapes and consider the methods for implementation of future projects. An ideal complete street project would include multiple modes of transportation, such as public transit lanes, bicycle lanes, and sidewalks, as well as provide wayfinding resources, allowing the pedestrian the best experience of a safe, comfortable, and convenient trip.

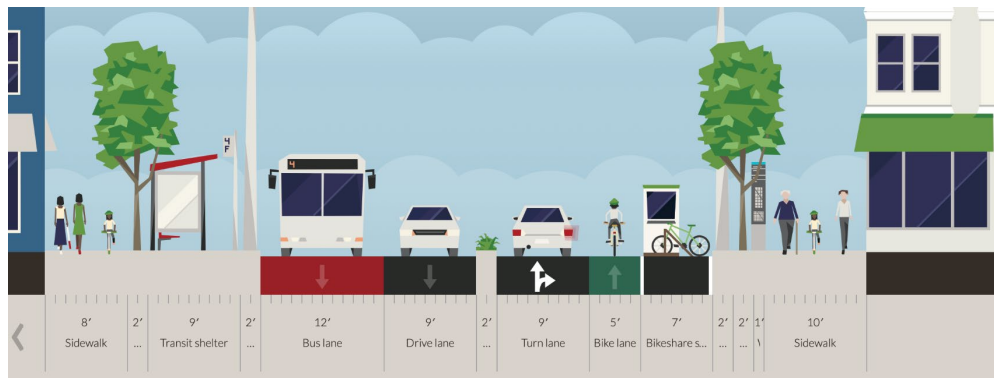


Figure 16: An ideal complete street in a commercial zone
 Source: Ian Connolly, StreetMix

References

- Amin, R., Garg, R., & Feeney, D. (2014, November 13). 5 Reasons Why SF Needs Transit First Policy More Than Ever. Retrieved April 25, 2019, from <https://www.spur.org/news/2014-10-29/5-reasons-why-sf-needs-transit-first-policy-more-ever>
- American Planning Association. (n.d.). Boston Complete Streets Design Guidelines. Retrieved April 23, 2019, from <https://www.planning.org/awards/2015/bostoncompletestreets.htm>
- Barnett, B. (2018, March 26). City's Transit-First Policy Turns 45. Retrieved April 25, 2019, from <https://www.sfmta.com/blog/citys-transit-first-policy-turns-45>
- Belov, C. (2019, May 13). Bicycle Ridership Data. Retrieved April 21, 2019, from <https://www.sfmta.com/bicycle-ridership-data-1>
- Better Streets Overview. (2019, March 21). Retrieved April 21, 2019, from <https://www.sfbetterstreets.org/why-better-streets/>
- Boston Complete Streets. (n.d.). Peabody Square, Dorchester. Retrieved April 25, 2019, from <https://bostoncompletestreets.org/projects/peabody-square-dorchester/>
- Boston Complete Streets Design Guidelines* [PDF]. (2013). Boston: Boston Transportation Department.
- Boston, Massachusetts Population 2019. (n.d.). Retrieved April 23, 2019, from <http://worldpopulationreview.com/us-cities/boston-population/>
- Charles River Watershed Association. (n.d.). Blue Cities Initiative. Retrieved April 25, 2019, from <https://www.crwa.org/blue-cities/demonstration-projects/peabody-square>
- Chicago, Illinois Population 2019. (n.d.). Retrieved April 21, 2019, from <http://worldpopulationreview.com/us-cities/chicago-population/>
- Chong, V. (2018, July 09). Our Vision and Bike Program. Retrieved April 21, 2019, from <https://www.sfmta.com/getting-around/bike/our-vision-and-bike-program>
- Chong, V. (2018, July 09). Pedestrian Program. Retrieved April 18, 2019, from <https://www.sfmta.com/getting-around/walk/pedestrian-program-and-vision>
- Chong, V. (2017, December 15). SFMTA School Safety Programs. Retrieved April 18, 2019, from <https://www.sfmta.com/sfmta-school-safety-programs>
- Complete Streets Chicago Design Guidelines* [PDF]. (2013). Chicago: Chicago Department of Transportation.
- D'Angelo, M. (2018, October 18). On tap: Facelift for Peabody Square begins this week. Retrieved April 25, 2019, from <https://www.dotnews.com/2018/tap-facelift-peabody-square-begins-week>

- Dailey, K. (2017, September 29). About Muni Forward. Retrieved April 23, 2019, from <https://www.sfmta.com/getting-around/muni/muni-forward/about-muni-forward>
- Dailey, K. (2017, September 29). Origins of Muni Forward. Retrieved April 23, 2019, from <https://www.sfmta.com/getting-around/muni/muni-forward/origins-muni-forward>
- Dailey, K. (2017, December 04). Regional Transit Connections. Retrieved April 23, 2019, from <https://www.sfmta.com/getting-around/regional-transit-connections>
- Dailey, K. (2019, February 28). Vision Zero SF. Retrieved April 25, 2019, from <https://www.sfmta.com/getting-around/walk/vision-zero-sf> (Dailey, 2019)
- Designing Complete Streets. (2014, May 29). Retrieved April 14, 2019, from <https://www.sfbetterstreets.org/why-better-streets/designing-complete-streets/>
- Elements of a Complete Streets Policy. (n.d.). Retrieved April 11, 2019, from <https://smartgrowthamerica.org/resources/elements-complete-streets-policy/>
- Fpadmin. (2018, July 20). Muni Forward Transit Priority Projects. Retrieved April 23, 2019, from <https://www.sfmta.com/projects/muni-forward-transit-priority-projects>
- Fpadmin. (2019, January 04). TEP – Transit Effectiveness Project (Muni Forward). Retrieved April 23, 2019, from <https://www.sfmta.com/projects/tep-transit-effectiveness-project-muni-forward>
- Guide to the San Francisco Better Streets Plan [PDF]. (2010). San Francisco: San Francisco Board of Supervisors.
- Morgan Street, 31st Street to 35th Street Streetscape* [PDF]. (n.d.). Chicago: Chicago Department of Transportation.
- Padilla, C. (2019, May 20). Cable Cars. Retrieved April 21, 2019, from <https://www.sfmta.com/getting-around/muni/cable-cars>
- Padilla, C. (2017, December 08). Historic Streetcars. Retrieved April 21, 2019, from <https://www.sfmta.com/getting-around/muni/historic-streetcars>
- Padilla, C. (2018, November 26). Muni’s Electric Trolley Buses. Retrieved April 21, 2019, from <https://www.sfmta.com/getting-around/muni/munis-electric-trolley-buses>
- Padilla, C. (2017, December 03). Muni Hybrid Buses. Retrieved April 21, 2019, from <https://www.sfmta.com/getting-around/muni/muni-hybrid-buses>
- Padilla, C. (2017, December 03). Muni Metro Light Rail. Retrieved April 21, 2019, from <https://www.sfmta.com/getting-around/muni/muni-metro-light-rail>
- San Francisco Better Streets Plan [PDF]. (2010, December 7). San Francisco: San Francisco Board of Supervisors.

- San Francisco, California Population 2019. (n.d.). Retrieved April 21, 2019, from <http://worldpopulationreview.com/us-cities/san-francisco-population/>
- San Francisco's Guiding Policies. (2019, March 21). Retrieved April 21, 2019, from <https://www.sfbetterstreets.org/why-better-streets/san-franciscos-guiding-policies/>
- SFCTA. (n.d.). Complete Streets. Retrieved April 11, 2019, from <https://www.sfcta.org/policies/complete-streets>
- SFCTA. (n.d.). Transit-First Policy. Retrieved April 25, 2019, from <https://www.sfcta.org/policies/transit-first-policy>
- Smith, K. (2019, May 30). Bike Parking. Retrieved April 21, 2019, from <https://www.sfmta.com/getting-around/bike/bike-parking>
- Smith, K. (2019, May 28). Bikeshare. Retrieved April 21, 2019, from <https://www.sfmta.com/getting-around/bike/bike-share>
- Staff. (2017, March 27). Morgan Street To Get \$3.8 Million In Upgrades From New Streetscape Project. Retrieved April 25, 2019, from <https://www.dnainfo.com/chicago/20170327/bridgeport/38-million-streetscape-project-upgrade-morgan-street/>
- Traffic Calming 101. (2008, December 31). Retrieved April 16, 2019, from <https://www.pps.org/article/livememtraffic>
- Vision Zero Action Strategy: Eliminating Traffic Deaths in San Francisco* [PDF]. (2019). San Francisco: Vision Zero SF. (*Vision Zero Action Strategy*, 2019)
- Vision Zero SF. (2019, May 13). What is Vision Zero SF? Retrieved April 25, 2019, from <https://www.visionzerosf.org/about/what-is-vision-zero/> (Vision Zero SF, 2019)
- What are Complete Streets? (n.d.). Retrieved April 11, 2019, from <https://smartgrowthamerica.org/program/national-complete-streets-coalition/publications/what-are-complete-streets/>

Appendix

Appendix A: Transit First Policy

SEC. 8A.115. TRANSIT-FIRST POLICY.

(a) The following principles shall constitute the City and County's transit-first policy and shall be incorporated into the General Plan of the City and County. All officers, boards, commissions, and departments shall implement these principles in conducting the City and County's affairs:

1. To ensure quality of life and economic health in San Francisco, the primary objective of the transportation system must be the safe and efficient movement of people and goods.

2. Public transit, including taxis and vanpools, is an economically and environmentally sound alternative to transportation by individual automobiles. Within San Francisco, travel by public transit, by bicycle and on foot must be an attractive alternative to travel by private automobile.

3. Decisions regarding the use of limited public street and sidewalk space shall encourage the use of public rights of way by pedestrians, bicyclists, and public transit, and shall strive to reduce traffic and improve public health and safety.

4. Transit priority improvements, such as designated transit lanes and streets and improved signalization, shall be made to expedite the movement of public transit vehicles (including taxis and vanpools) and to improve pedestrian safety.

5. Pedestrian areas shall be enhanced wherever possible to improve the safety and comfort of pedestrians and to encourage travel by foot.

6. Bicycling shall be promoted by encouraging safe streets for riding, convenient access to transit, bicycle lanes, and secure bicycle parking.

7. Parking policies for areas well served by public transit shall be designed to encourage travel by public transit and alternative transportation.

8. New transportation investment should be allocated to meet the demand for public transit generated by new public and private commercial and residential developments.

9. The ability of the City and County to reduce traffic congestion depends on the adequacy of regional public transportation. The City and County shall promote the use of regional mass transit and the continued development of an integrated, reliable, regional public transportation system.

10. The City and County shall encourage innovative solutions to meet public transportation needs wherever possible and where the provision of such service will not adversely affect the service provided by the Municipal Railway.

(b) The City may not require or permit off-street parking spaces for any privately-owned structure or use in excess of the number that City law would have allowed for the structure or use on July 1, 2007 unless the additional spaces are approved by a four-fifths vote of the Board of Supervisors. The Board of Supervisors may reduce the maximum parking required or permitted by this section.

Appendix B: Better Streets Policy

**SEC. 98.1. BETTER STREETS POLICY; GOVERNING PRINCIPLES;
COORDINATION OF DEPARTMENTAL ACTIONS.**

(a) The Better Streets Policy is an official policy of the City and County of San Francisco and shall read as follows: Design City streets in keeping with the Urban Design Element of the City's General Plan; the City's Transit-First Policy; best practices in environmental planning and pedestrian-oriented, multi-modal street design, including the design guidelines set forth in the National Association of City Transportation Officials (NACTO) Urban Street Design Guide (2013) and the NACTO Urban Bikeway Design Guide (2014), and any subsequent editions of these Guides; and incorporation of sustainable water management techniques to ensure continued quality of life, economic well-being, and environmental health in San Francisco.

(b) In furtherance of the Better Streets Policy, the City recognizes that San Francisco's streets constitute a large portion of the City's public space. Implementation of the Better Streets Policy will ensure that such streets will continue to be:

- (1) Corridors for all modes of transportation, with a particular emphasis on pedestrians and transit priorities;
- (2) Organizers of the City's development pattern and how individuals perceive such a pattern; and
- (3) An integral component of San Francisco's water management infrastructure.

(c) The Better Streets Policy also is intended to ensure that the City's public right-of-ways become:

- (1) Attractive, safe, and useable public open spaces corridors with generous landscaping, lighting, and greenery;
- (2) Sustainable and healthy components of the City's ecology, taking advantage of available technologies to reduce the environmental impact of our street systems and to comprehensively manage stormwater based on established principles of watershed planning;
- (3) Providers of access to properties, public view corridors, light, and air; and
- (4) Providers of habitat for urban wildlife.

(d) As part of an approval or decision concerning any public and private project that impacts or is adjacent to a publicly-accessible right-of-way, all City departments shall coordinate their various determinations regarding the planning, design, and use of public right-of-ways in accordance with the Better Streets Policy and the following supporting principles:

- (1) Streets must be designed as a whole, cognizant of the facing buildings and uses within them, such that the resulting street environment is of appropriate scale and character.
- (2) Streets that support and invite multiple uses, including safe, active, and ample space for pedestrians, bicycles, and public transit, are more conducive to the public life of an urban neighborhood and efficient movement of people and goods than streets designed primarily to move automobiles. Decisions regarding the design and use of the City's limited public street space shall prioritize space for pedestrians, bicycles, and public transit over space for automobiles.
- (3) Streets should be appropriately designed and maintained to ameliorate negative effects of traffic on pedestrian areas and adjacent uses, to provide usable on-street open spaces, to enhance property values, and to increase the safety and attractiveness of neighborhoods.
- (4) Streets should be appropriately designed and maintained to address the unique characteristics and challenges of the watersheds in which they lie through design treatments that

reduce downstream flooding with untreated stormwater and combined sewer overflows into the San Francisco Bay and Pacific Ocean. Decisions regarding City street design and use shall include techniques that reduce impacts on the combined sewage and stormwater system and increase permeable surface area through the planting of street trees and landscaping and minimization of unnecessary pavement. Designs also shall incorporate strategies that facilitate the health and maintenance of street trees and landscaping, such as use of drought-tolerant plantings, passive rainwater retention systems, piping for recycled water, and other water management technologies that minimize the need for potable irrigation water.

(5) The design of the City's streets shall minimize visual clutter. This concern shall extend to the number, design, and placement of signs, signals, utility structures, and elements oriented to vehicular traffic. Decisions regarding signs and signals for the control of vehicles must consider and balance the visual impact of the design of the street on all users and the image of the City.

(6) The control and signalization of vehicular traffic has significant impacts on the quality and safety of the street experience for all users, including pedestrians, bicyclists, and public transit users and operators. Decisions regarding the systems and signals for the control of vehicles, including, but not limited to, changes to signal timing, speed limits, and allowable turning movements, must consider and balance the impact on the street experience and safety of all users.

(7) The design of the right-of-way and adjacent development, including the maintenance and removal of street trees and other landscaping, allowance of curb cuts, and placement of utilities, have significant impact on the street environment. Decisions regarding street design must consider and prioritize pedestrian safety, enjoyment, and comfort.

(8) Paved space on many of the City's streets is more than is needed for the safe and efficient movement of transit, bicycles, and automobiles. The City will encourage innovative solutions to reuse such excess street space as planted or open space areas. The City also will consider establishing a program to encourage and make it possible for adjacent neighborhoods to replace paved areas with usable open space, permeable surfaces, plantings, stormwater retention areas, and other public amenities.

(9) New technologies and the rethinking of old techniques will provide opportunities for more sustainable design of our public right-of-ways to increase opportunities for public use and enjoyment, reduce pollution and water usage, better manage stormwater, and provide the opportunity for environmental education where possible. The City will encourage and facilitate the use of innovative solutions based on best practices in environmental planning and pedestrian-oriented, multi-modal design for its publicly-accessible right-of-ways.

(10) Major new developments, both public and private, often include the rebuilding of portions of public right-of-ways and should serve as models of the Better Streets Policy. Special efforts should be made to ensure that such new developments lead by example. Public projects should establish model street and open space designs and private projects should incorporate stronger street design and landscaping standards. The City should encourage local residents, businesses, and other stakeholders to collaboratively develop such designs and standards in order to foster the community's active use and sense of ownership of these spaces over time.

(e) To carry out the intent of this Section, the City has developed, and the Board of Supervisors adopted in Ordinance No. [310-10](#), a citywide streetscape master plan and a comprehensive set of streetscape design guidelines, known as the "Better Streets Plan."

The Better Streets Plan identifies street types, and provides design guidelines for pedestrian and streetscape elements such as street trees and landscaping, street lighting, sidewalk widths, sidewalk extensions, sidewalk paving, and site furnishings.

(1) **Streetscape and Pedestrian Improvements on Existing Right-of-ways.**

(A) The Better Streets Plan shall govern design and dimensions of all pedestrian and streetscape elements, including but not limited to those elements shown in Table 1 and defined in the Better Streets Plan, on any public right-of-way.

(B) All public and private sponsors that propose or are required to make changes to any such right-of-way shall:

(i) Be consistent with the principles and guidelines for streetscape and pedestrian elements and overall streetscape design found in the Better Streets Plan.

(ii) Select streetscape elements from a City-approved palette of materials and furnishings, where applicable.

(iii) Select streetscape elements that are consistent with the overall character and materials of the corridor and district.

(iv) Follow, to the maximum extent possible, the street design guidelines set forth in the NACTO Urban Street Design Guide (2013) and the NACTO Urban Bikeway Design Guide (2014), and any subsequent editions of these Guides.

(C) Street improvements shall be subject to approval by all applicable City agencies.

(2) **Streetscape and Pedestrian Improvements on New Right-of-Ways.** Any public and private projects that create or develop new public right-of-ways, including streets, alleys and pedestrian pathways; or that bring unaccepted streets up to City standards for accepted streets, shall:

(A) Meet or exceed recommended sidewalk widths for the appropriate street type as described in the Better Streets Plan; Where a consistent front building setback of 3 feet or greater extending for at least an entire block face is provided, the recommended sidewalk width may be reduced by up to 2 feet.

(B) Include all standard improvements for the appropriate street type as described in the Better Streets Plan;

(C) Include stormwater facilities as required by Public Works Code [Article 4.2](#).

(D) Follow, to the maximum extent possible, the street design guidelines set forth in the NACTO Urban Street Design Guide (2013) and the NACTO Urban Bikeway Design Guide (2014), and any subsequent editions of these Guides.

(3) **Approvals.**

(A) Any proposed changes to the public right-of-way shall be subject to approval by the applicable city bodies with permitting jurisdiction over streetscape and pedestrian improvements, and shall comply with all applicable ordinances.

(B) Permitting bodies shall review proposed changes to streetscape and pedestrian elements in the public right-of-way against the principles and guidelines of the Better Streets Plan.

(C) Notwithstanding the provisions of this Section, any sponsor proposing to make changes to the public right-of-way shall apply for and obtain all required permits for street use; changes to the legislated sidewalk widths; and street improvements.

(4) **Amendments.** The Better Streets Plan may be amended from time to time by the Board of Supervisors. The Board of Supervisors hereby delegates authority for non-material amendments to the Directors of those agencies tasked with the design, construction,

maintenance, and permitting of features in the public right-of-way, including the Municipal Transportation Agency, Department of Public Works, Planning Department, and Public Utilities Commission, in consultation with the Mayor's Office on Disability, provided, however, that no such amendment shall be effective until each affected agency approves the amendment after a public hearing.

(5) **Reporting.** All agencies approving projects subject to Administrative Code Section [98.1](#), including the Department of Public Works, Municipal Transportation Agency, Public Utilities Commission, and the Planning Department shall produce an annual report documenting compliance with the Better Streets Policy and the NACTO Guidelines. The affected agencies shall submit said report(s) to the Board of Supervisors within sixty (60) days of the end of the City's fiscal year.

Table 1. Pedestrian and Streetscape Elements per the Better Streets Plan

#	PHYSICAL ELEMENT	BETTER STREETS PLAN SECTION
1	Curb ramps	5.1
2	Marked crosswalks	5.1
3	Pedestrian-priority signal devices and timings	5.1
4	High-visibility crosswalks	5.1
5	Special crosswalk treatments	5.1
6	Restrictions on vehicle turning movements at crosswalks	5.1
7	Removal or reduction of permanent crosswalk closures	5.1
8	Mid-block crosswalks	5.1
9	Raised crosswalks	5.1
10	Curb radius guidelines	5.2
11	Corner curb extensions or bulb-outs	5.3
12	Extended bulb-outs	5.3
13	Mid-block bulb-outs	5.3
14	Center or side medians	5.4
15	Pedestrian refuge islands	5.4
16	Transit bulb-outs	5.5
17	Transit boarding islands	5.5
18	Flexible use of the parking lane	5.6
19	Parking lane planters	5.6
20	Chicanes	5.7
21	Traffic calming circles	5.7
22	Modern roundabouts	5.7
23	Sidewalk or median pocket parks	5.8
24	Reuse of 'pork chops' and excess right-of-way	5.8

25	Multi-way boulevard treatments	5.8
26	Shared public ways	5.8
27	Pedestrian-only streets	5.8
28	Public stairs	5.8
29	Street trees	6.1
30	Tree basin furnishings	6.1
31	Sidewalk planters	6.1
32	Above-ground landscaping	6.1
33	Stormwater management tools	6.2
34	Street and pedestrian lighting	6.3
35	Special paving	6.4
36	Site furnishings	6.5

Table 2. Recommended Sidewalk Widths by Street Type

Zone	Street Type (per Better Streets Plan)	Recommended Sidewalk Width (Minimum required for new streets)
Commercial	Downtown commercial	See Downtown Streetscape Plan
-	Commercial throughway	15
-	Neighborhood commercial	15
Residential	Downtown residential	15
-	Residential throughway	15
-	Neighborhood residential	12
Industrial/Mixed-Use	Industrial	10
-	Mixed-use	15
Special	Parkway	17
-	Park edge (multi-use path)	25
-	Multi-way boulevard	15
-	Ceremonial	varies
Small	Alley	9
-	Shared public way	n/a
-	Paseo	varies

Appendix C: Complete Streets Policy

SEC. 2.4.13. TRANSIT, PEDESTRIAN, BICYCLE, STORMWATER, AND COMMUNICATIONS INFRASTRUCTURE IMPROVEMENTS AS PART OF PLANNING, CONSTRUCTION, RECONSTRUCTION, AND REPAVING PROJECTS.

(a) Whenever the Department or other Municipal Excavator undertakes a project involving the planning, construction, reconstruction, or repaving of a public right-of-way, such project shall include, to the maximum extent practicable and feasible, the following transit, pedestrian, bicycle, stormwater, and communications infrastructure improvements:

- (1) Street and pedestrian-scale sidewalk lighting;
- (2) Pedestrian and bicycle safety improvement measures, as established in any official City adopted bicycle or pedestrian safety plan or other City adopted planning documents;
- (3) Appropriate access in accordance with the Americans with Disabilities Act;
- (4) Public transit facilities accommodation, including, but not limited to designation of the right-of-way as a transit preferential street designation or bus rapid transit corridor;
- (5) Traffic calming devices;
- (6) Landscaping;
- (7) Low-impact design stormwater facilities consistent with the Stormwater Design Guidelines;
- (8) Other pedestrian and streetscape elements listed as appropriate to the relevant street type as identified and defined in the Better Streets Plan;
- (9) Other street and sidewalk improvements consistent with the City's "Transit First" Policy" (Section 8A.115 of the City Charter) and "Better Streets Policy" (Section 98.1 of the Administrative Code); and
- (10) Communications infrastructure.

(b) The Director, in consultation with the Directors of the San Francisco Municipal Transportation Agency, Department of Public Health, Planning Department, Department of the Environment, San Francisco Public Utilities Commission, Department of Technology, and Mayor's Office on Disability shall develop orders, regulations, or amendments to the Department's Standard Plans and Specifications that address the improvements set forth in Subsection (a).

(c) To the maximum extent practicable and feasible, the Director shall condition all excavation and street improvement permits on the inclusion of the improvements set forth in Subsection (a). If such conditions would exceed the Director's regulatory authority, the Director shall coordinate with other City departments to provide, to the maximum extent practicable and feasible, said improvements on behalf of the City. As part of the decision on any permit or authorization pursuant to the Public Works Code, the Director shall take into account the permit activity's positive and negative impacts on the integration, enhancement, or preservation of the improvements set forth in Subsection (a)