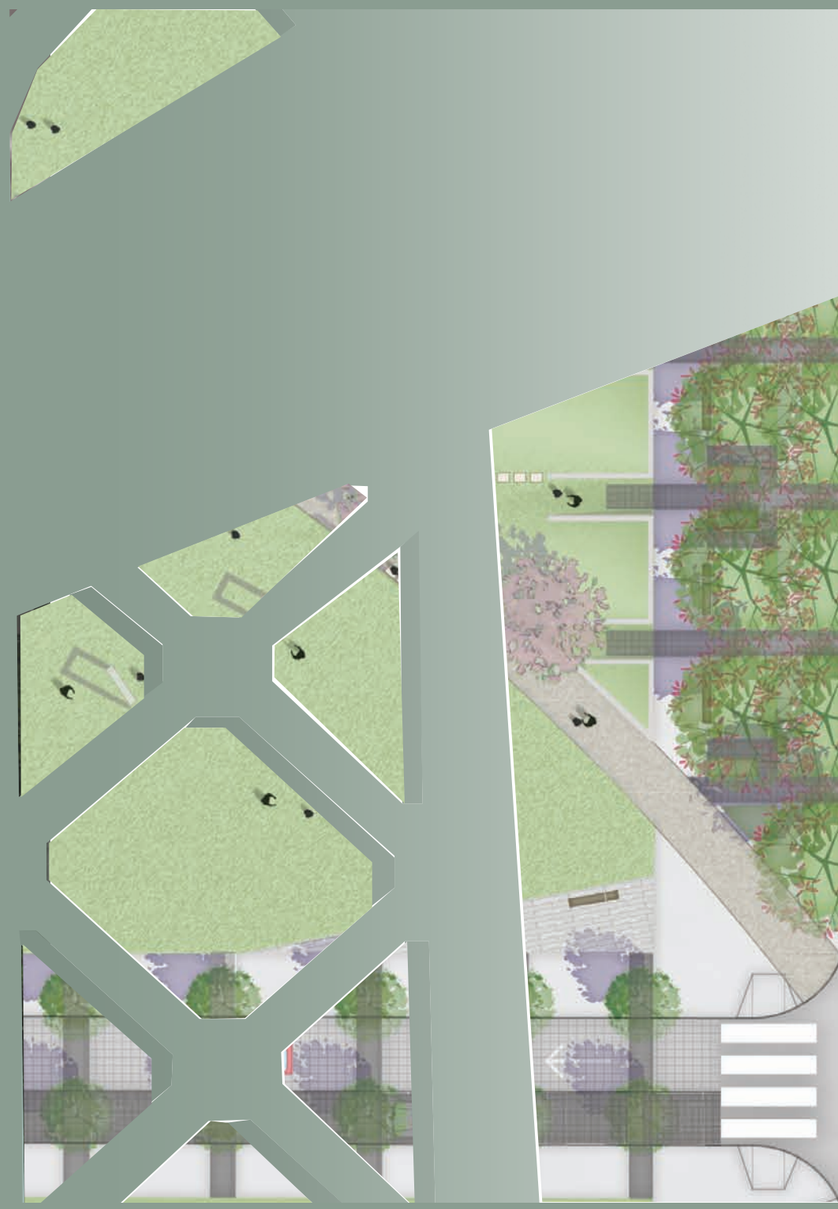
SAN FRANCISCO REDEVELOPMENT AGENCY & SAN FRANCISCO PLANNING DEPARTMENT

TRANSBAY REDEVELOPMENT PROJECT AREA
STREETSCAPE & OPEN SPACE CONCEPT PLAN

NOVEMBER 21, 2006



ZIMMER GUNSUL FRASCA PARTNERSHIP

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Marta Fry Landscape Architects / CHS Consulting Group / ARUP

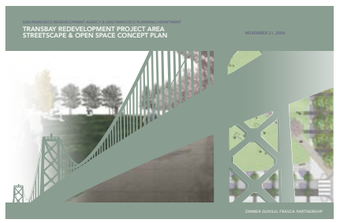
TABLE OF CONTENTS

1

INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

1 2 3



1. *Transbay Redevelopment Project Area Design for Development* (SOM lead consultant)
2. Rendering of the future Transbay neighborhood (SOM)
3. *Transbay Redevelopment Project Area Streetscape And Open Space Plan*

This document was developed by the San Francisco Redevelopment Agency (the "Agency") and San Francisco Planning Department to guide public realm improvements in the emerging Transbay neighborhood, a redevelopment project area comprised of approximately forty acres generally south of the existing Transbay Terminal in the city's southern Financial District. It will also help to guide public realm improvements in the Rincon Hill area south of Transbay. This plan builds on the streetscape and open space concepts in the *Transbay Redevelopment Project Area Design for Development*, the 2003 concept plan for the project area, and is intended to complement the urban design and zoning elements in the *Development Controls and Design Guidelines for the Transbay Redevelopment Project*, the specific development requirements that were adopted in 2005. It will be utilized by the Agency, the San Francisco Planning Department and other City departments, developers and architects as new projects are realized in Transbay and in the Rincon Hill area to the south.

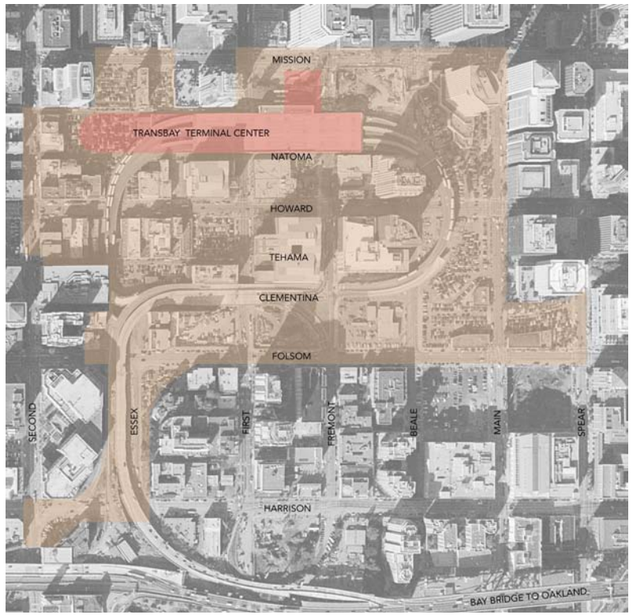
1.2 PROJECT DESCRIPTION

This concept plan addresses the public realm within a redevelopment project area of approximately 40 acres connected through a network of ten major streets and six public alleys. Included are a neighborhood park and innovative uses below bus and freeway ramps that connect to the Bay Bridge. The project boundaries generally span from east to west between Second and Spear Streets, and from north to south between Mission and Folsom Streets.

The Transbay neighborhood forms not only one of the largest emerging residential areas in the city, but is an important connection to the developing Rincon Hill neighborhood, linking it to the Transbay Terminal and the Financial District. Streetscape improvements will also improve pedestrian linkages between the Embarcadero waterfront and Yerba Buena Center in the east-west direction. With the Transbay Terminal bus and rail service and vehicular on- and off-ramps to the Bay Bridge, the Transbay neighborhood will always be one of the most accessible neighborhoods, while also being one of the most traversed in the city—these design recommendations strive to rectify these two competing factors.

Architecturally, the project area is a mix of modern and historic structures reflecting evolving land uses that range from light industrial to commercial, followed by the introduction of new residential projects. The future neighborhood projected in the Design for Development will include more mixed-use projects, greater density, and approximately 3,400 new residential units, making the public realm improvements critical to the creation of a livable community. Once realized, the streetscape and open space improvements proposed in this plan will fulfill a critical function of knitting together a mix of architectural project types and dominant infrastructure elements that occurs across the twenty block area, while making the streets and alleyways more inviting for walking and biking.

Aerial oblique showing the existing character of the Transbay neighborhood



Aerial showing project boundaries (peach color)

Folsom forms the southern boundary of the project area

1.3 THE DESIGN PROCESS

The ideas described in this concept plan emerged from a collaborative process led by the Redevelopment Agency and Planning Department with critical input from other City Departments and officials. The voice of the community was heard through a dedicated group of individuals serving on the Transbay Citizens Advisory Committee (CAC), consisting of residents and other stakeholders, developers and architects either living in, or possessing a strong interest in the community. The CAC provided thoughtful insights, raised smart questions and gave critical input to the future vision of the neighborhood's public realm.

A design team led by Zimmer Gunsul Frasca Partnership, in association with Marta Fry Landscape Architects, CHS Consulting Group and ARUP, aimed to develop the most advanced streetscape concepts that meld sophisticated design with sustainable strategies reinforcing the city's commitment to sustainability. The intent is the creation of a unique identity for the Transbay neighborhood visible in the design of its public sidewalks, parks and alleyways.

As this concept plan developed during 2006, planning advanced on replacing the existing 1939 Transbay Terminal with a new, multi-modal transit center. Although the proposed Transbay Transit Center is still in program development, the design teams for both the Terminal and this concept plan met to share preliminary ideas so the projects would begin to be thoughtfully integrated.

The adjacent Rincon Hill neighborhood has seen recent development evolve without a streetscape and open space concept plan, resulting in a less cohesive treatment of the area's public realm. The Planning Department expects to reference these design recommendations and apply them to the Rincon Hill area immediately south of the Transbay project area. For example, new developments along key streets like Folsom, Main and Beale will likely be required to follow these streetscape designs for consistency.

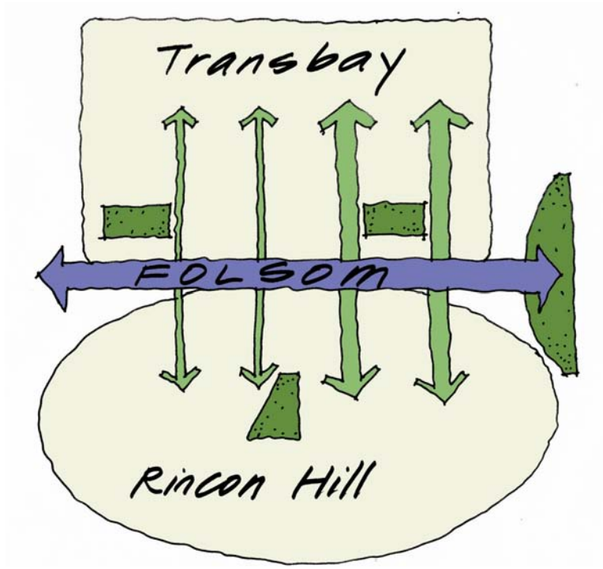


Diagram showing how Folsom Street is a critical link between the Transbay & Rincon Hill neighborhoods

CAC meeting to review design concepts

Meeting with City agencies

1.4 DESIGN OBJECTIVES

Specific recommendations for the streets and open spaces of the Transbay neighborhood follow a set of core objectives:

- Support a **pedestrian-oriented** mixed-use residential district through streetscape and alley designs
- Require **sustainable strategies** to support a more livable community and to contribute to the Mayor's "A Green and Clean San Francisco" Initiative
- Enforce the specific roles for each street to **balance the functional needs of pedestrians, bicyclists, transit patrons and motorists**
- Create a safe and **accessible** public realm for all ages and abilities
- Modify **Folsom** to fulfill its future role as a neighborhood "main street," allowing for its **conversion to balanced 2-way traffic** and to better link the Transbay and Rincon Hill neighborhoods
- Modify the Folsom off-ramp to function better as a **gateway** into a pedestrian-oriented neighborhood
- Develop Transbay Park as a **unique neighborhood park** that can serve a diverse group of users (residents, office workers and children) allowing for a range of activities
- Develop **viable uses under the west ramp** to the Transbay Terminal and the Fremont and Folsom off-ramps that provide additional recreational or cultural uses and contribute to the neighborhood's livability
- Reinforce Transbay neighborhood's identity through the integration of **public art and a clear wayfinding system**

Public spaces will support a pedestrian-oriented mixed-use district (Santa Monica Boulevard, West Hollywood)

Public art will take the form of artist-designed transit amenities, reinforcing the unique character of the neighborhood (Bus Stop by Massimo Iosa Ghini, Hannover, Germany)

Sustainable strategies will be integrated into sidewalks and open spaces (Green Street Project, SW 12th Avenue, Seattle)

Each street will balance the needs of the pedestrian, bicyclist, motorist and transit user (Downtown Los Angeles)

The Transbay Park neighborhood park will serve the diverse needs of its residents while maximizing green space and providing opportunities for art (Canary Wharf Park, London)

Art and cultural uses, in addition to recreational spaces, can transform the grim spaces under the bus ramps (Ateliers under Daumisil Viaduct, 12th Arrondissement, Paris)

1.5 IMPLEMENTING THE PLAN

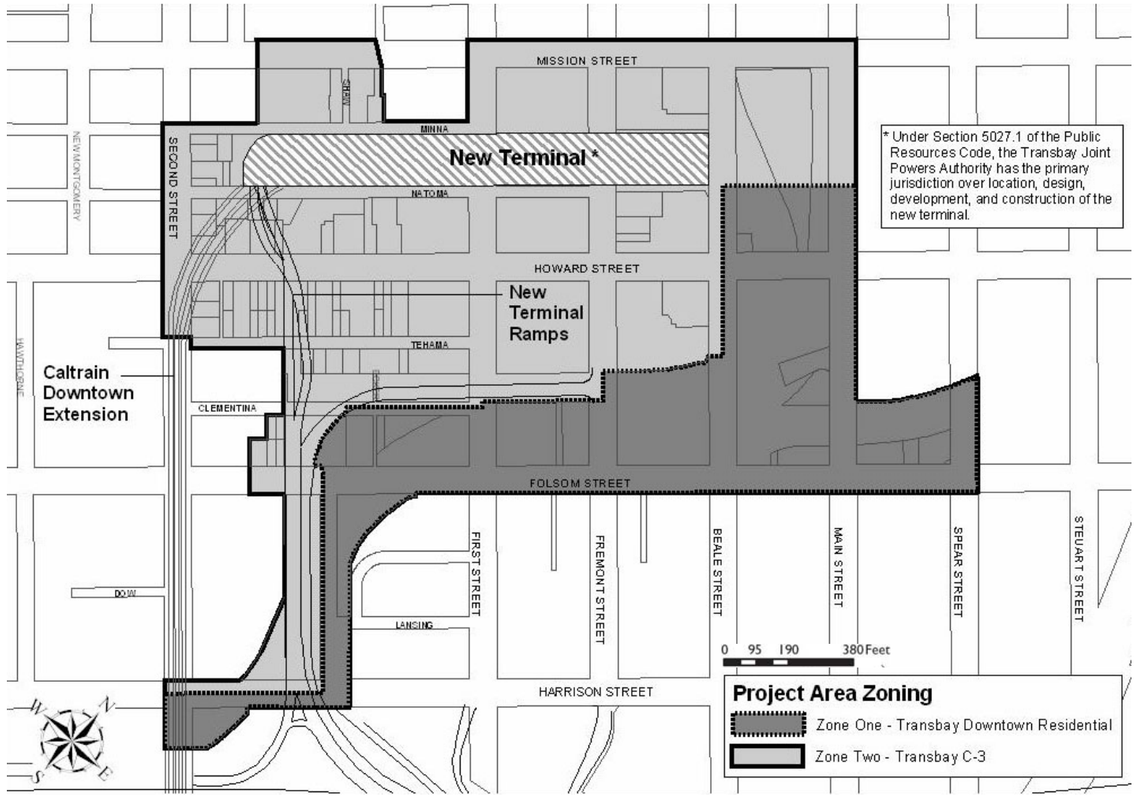
The streetscape and open space elements detailed in this concept plan are intended to complement the urban design and zoning elements in the *Development Controls and Design Guidelines for the Transbay Redevelopment Project*, the other primary supporting document to the Transbay Redevelopment Plan. The Development Controls and Design Guidelines lay out standards and recommendations for the private development within the Transbay Redevelopment Project Area, with a focus on Zone One, the portion of the Project Area comprised mainly of parcels that were formerly occupied by portions of the Embarcadero Freeway until it was demolished after the 1989 Loma Prieta Earthquake.

Funding for the construction of the streetscape and open space elements in this concept plan will be provided by both public and private sources. The Redevelopment Agency estimates that approximately $80 million (in constant 2005 dollars) in net tax increment will be available for public facilities, infrastructure, utilities and circulation improvements. In Zone One of the Project Area, the Redevelopment Agency will control the parcels that will be developed and can therefore require private developments to contribute a portion of the cost of the new streetscape and open space improvements. In the remainder of the Project Area, Zone Two, the Planning Code was amended as part of the Redevelopment Plan adoption to allow the Redevelopment Agency or the Planning Commission to impose additional streetscape requirements on new developments.

Within Zone One, the Redevelopment Agency and the Planning Department have an opportunity to almost completely redevelop both the public and private realms. Along both sides of Folsom, Main and Beale Streets as well as along the new alleys, Essex Street and within the public park and other open spaces in Zone One, it is anticipated that the streetscape and open space elements in this concept plan will be fully implemented with a combination of public and private funding. In Rincon Hill, it is anticipated that all of the elements of this plan will be extended along Main and Beale Streets and on the south side of Folsom Street as new developments, such as 201 Folsom Street, proceed.

Within Zone Two and some portions of Zone One, the existence of recently completed private developments means that there will not be as much of an opportunity for changes in the public realm. Along First, Fremont, Howard and Spear Streets, elements from this concept plan should be applied wherever possible to ensure that new sidewalks are improved for pedestrians while also maintaining continuity with existing sidewalks where there may not be an opportunity for comprehensive redevelopment. Second and Mission Streets, although they are within the Project Area, have some recently completed private developments and are part of larger urban corridors that require separate planning processes.

Funding for the maintenance of the streetscape and open space improvements will also be provided by both public and private sources. The Redevelopment Agency anticipates that developers of parcels in Zone One will be required to fund the long-term maintenance of the streetscape and open space improvements, possibly through the creation of a Mello-Roos Community Facilities District. The Redevelopment Agency estimates that the bonding capacity of such a district, based on estimated 2005 land values in Zone One of the Project Area, would be approximately $70 million.



Zoning Map for the Transbay Redevelopment Project Area

1.6 PLAN SUMMARY

Key recommendations described in this concept plan are summarized here. A synopsis of the streetscape recommendations, new open space treatment, mobility elements and infrastructure needs provide a snapshot of the intended vision for Transbay neighborhood's public realm.

STREETSCAPE DESIGN

The design of each street acknowledges and reinforces its particular role in the street system. Improvements that enhance the safety and level of comfort for pedestrians are the primary goal. Specific landscaping, materials, furnishings and sustainable strategies support the design character for each street.

Folsom will become the "neighborhood main street" and help connect residents to the adjacent Rincon Hill area. Conceived as a distinctly urban street with generous sidewalks, a double row of street trees and ample amenities, it will be transformed as dramatically as the Transbay neighborhood. Vertical markers will provide a unique identity and scale, while framing the stunning view to San Francisco Bay and Yerba Buena Island.

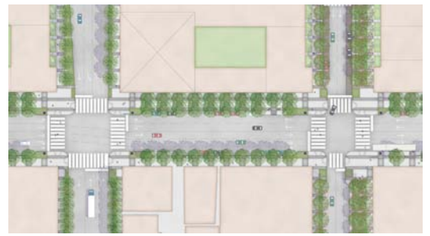
Howard & Mission will continue to serve as "crosstown boulevards" with new elements to complement the recent improvements realized with newer developments. A simple 2-color concrete paving pattern, consistent street trees and tree grates implemented along the entire length will vastly improve the pedestrian experience on both streets. The proposed Transbay Transit Center will recast Mission Street in the vicinity of the terminal and bring distinct but compatible streetscape improvements.

First & Fremont will function as important north-south "Bay Bridge connectors" leading residents to and from the terminal and Financial District into the South of Market area and Bay Bridge. Inherently higher traffic volumes informed the addition of a landscaped parkway, wider sidewalks and pedestrian lighting. Key to the success of Fremont is the redesign of the Folsom off-ramp which will improve the overall pedestrian experience and arrival sequence.

Second will continue to function as a "historic connector" which spans the full north-south length of the South of Market district. It should be considered for a more significant length than the three blocks that fall within this project's boundary, as part of a larger analysis of this important connector street.

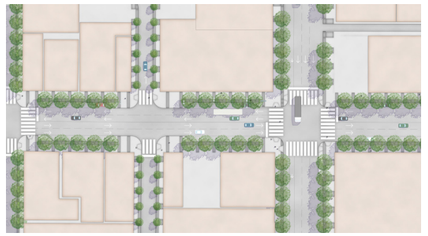
Beale, Main & Spear will have a unique character as "linear park streets" that embrace the new Transbay Park and extend a vital greenbelt north and south across the neighborhood. Beale and Main will be defined by a contiguous parkway, double tree rows, seating and public art. These streets will be transformed into popular walking streets for residents.

Clementina & Tehama are "pedestrian alleys" that provide important east-west connections across the neighborhood. These small urban spaces must be shared with automobiles and trucks so they are designed to feel like quiet walkable streets. They feature raised crosswalks that signal entrance into a pedestrian-oriented zone.


Folsom Street (page 18)


Howard Street (page 22)


Fremont Street (page 28)


Second Street (page 32)


Beale Street (page 36)


Clementina Street (page 40)

OPEN SPACE DESIGN

Transbay Park is envisioned to become a cherished gathering place for residents and office workers. The one-acre site, located between Main and Beale just north of Folsom, will accommodate multiple activities and layered uses. Informal play and recreation is crafted into sculptural forms that shape a plaza and a large open green. A water wall and basin create a dynamic and playful quality. The adjacent Clementina and Tehama alleys form the north and south boundaries, and are designed to blend seamlessly with the park.

The concept for the underutilized space under the bus and freeway ramps has been developed further in this plan. Recreational uses that can be accommodated within the supporting columns include hard courts and shuffle board. Adjacent areas that aren't shaded by the ramps themselves can provide additional green pockets and a mews on Shaw alley. Double rows of trees and a dog run will transform the character of Essex, making the least inviting street in the neighborhood into a regular gathering place for resident dog owners. Capturing these unclaimed spaces will increase usable open space in an area where little exists today.

MOBILITY PLAN

The mobility plan builds upon the recommendations made in the Design for Development. It includes additional recommendations and more detailed guidelines that support the streetscape concepts. A primary objective of the plan is to recast the nature of pedestrian environment in the Transbay neighborhood, from the dominant automobile-oriented character existing today.

The key recommendations described in the plan include: changing Folsom's circulation to two-way east of Fremont with widened sidewalks on the north and south sides; modifying the existing Folsom Street off-ramps to allow a sidewalk on the west side of Fremont Street between Howard and Folsom; adding corner bulb outs to increase pedestrian space and reduce crossing distances; adding a speed table at the alley entrances; and adding mid-block crosswalks with pedestrian actuated signals on Clementina at the Beale and Main intersections. Each of these improvements will enhance the livability of the Transbay neighborhood, balancing pedestrians with bicycle, bus, vehicular and casual carpool needs.

While future transit service improvements on Folsom are anticipated, their details are not fully known. This plan includes design concepts for how bus stops can be integrated onto Folsom at enlarged bulb outs on the far side of each intersection.

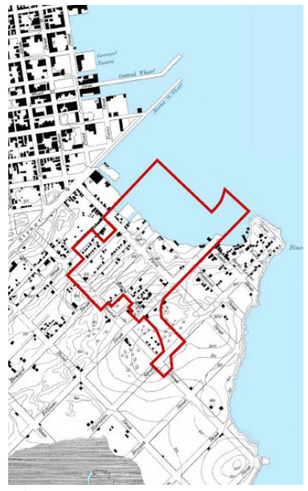
INFRASTRUCTURE PLAN

The existing infrastructure was evaluated very broadly to understand its ability to support the streetscape and open space improvements described here. The plan discusses the opportunities to employ sustainable strategies while improving systems serving the neighborhood. Future studies, investigation and design will still be needed as each of the physical improvements from this conceptual phase moves towards realization.

Transbay Park (page 44)

Mobility Element (page 79)

Under Ramp Areas (page 74)



Infrastructure Element (page 89)

2

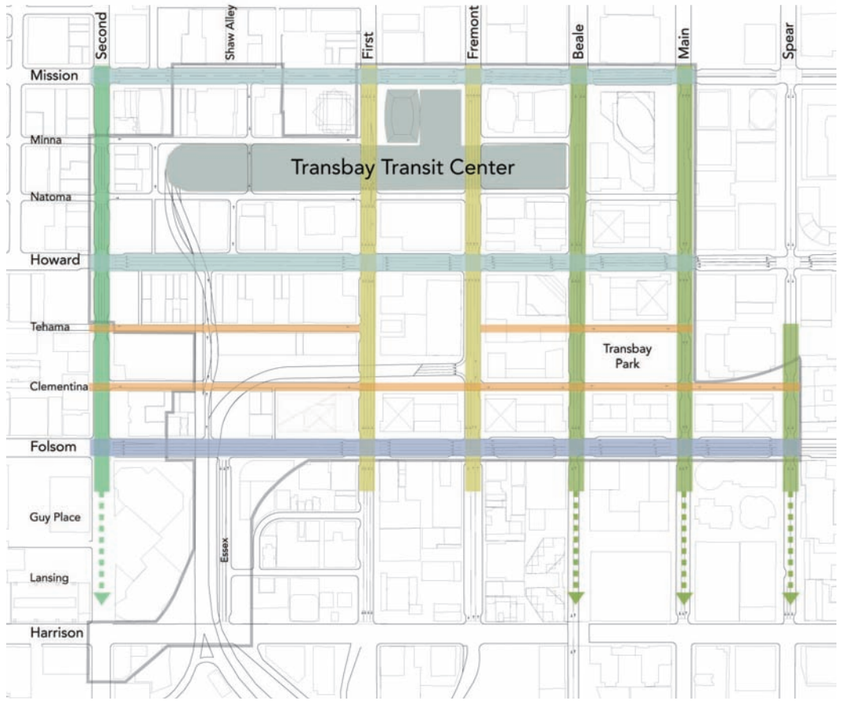
DESIGN ELEMENT

2.1 CONCEPTUAL FRAMEWORK

FRAMEWORK OF STREETS

The Transbay neighborhood does not currently exhibit a strong street character beyond what is conveyed through the land uses and architecture. The inventory of street trees is inconsistent and many areas have no trees at all. Sidewalks are typically 10' -11' wide—which is insufficient for a neighborhood that anticipates heavy pedestrian activity. To develop a cohesive design for the neighborhood's streets, it is important to consider each one's land uses, orientation, role and inherent capability to contribute to developing a more walkable neighborhood.

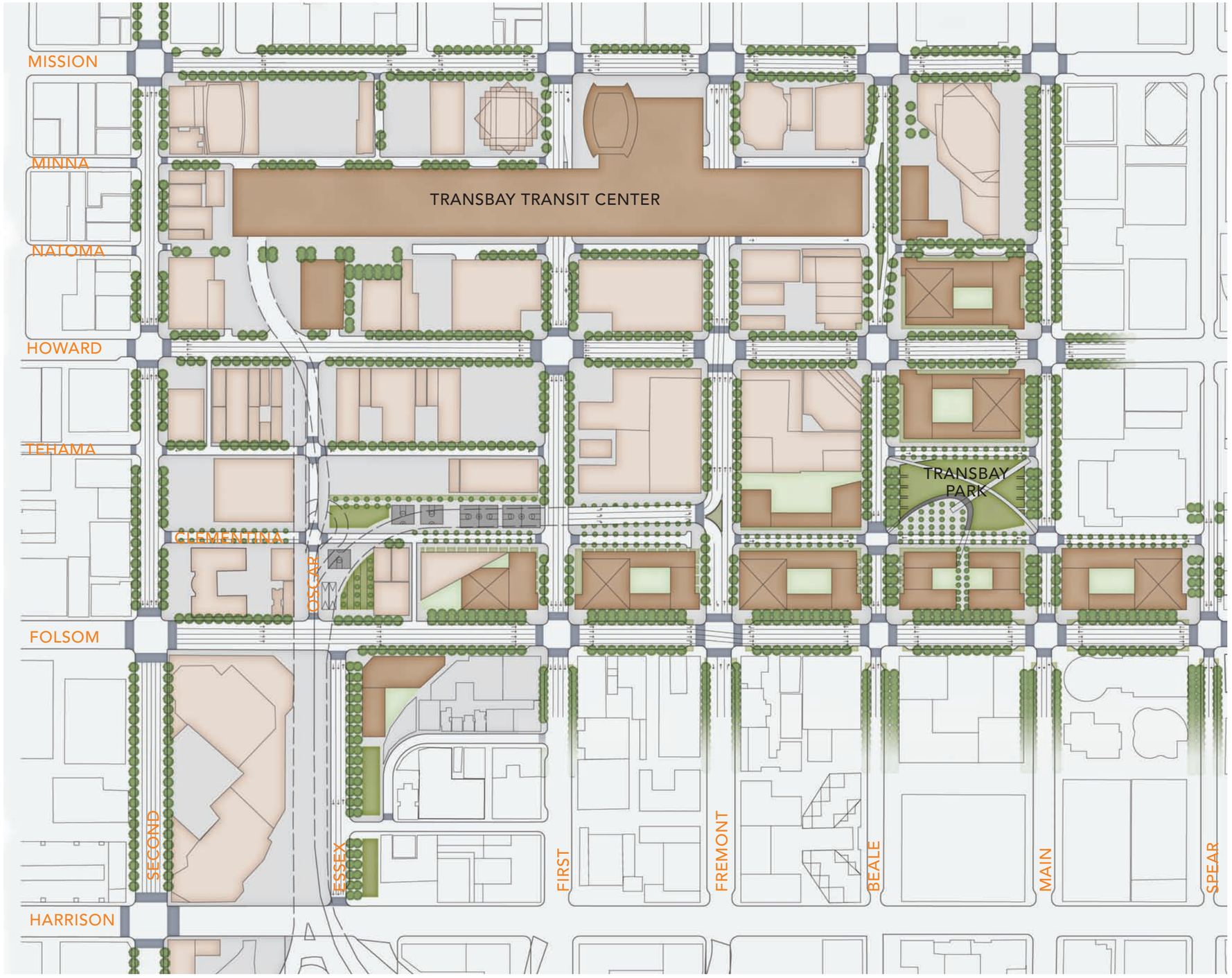
Streets are currently organized into a clear grid of north-south and east-west streets with 82.5' rights-of-way. The team considered several framework options for organizing the design concepts. One option that created two different streetscape designs for the north-south versus the east-west streets, primarily addressing environmental differences related to sun and wind orientation. Another option created alternating block treatments adding variety to each street corridor and highlighting major intersections with special treatments. The preferred framework option reflects the specific role of each street, employing common elements to unify the entire network while highlighting major intersections selectively.



The preferred option reflects each street's unique climatic orientation, functionality, and maintains strong consistency along each street corridor throughout the district

Legend

Street Name	Character Street
Folsom	Neighborhood Main Street
Howard & Mission	Cross Town Boulevards
First & Fremont	Bay Bridge Connectors
Second	Historic Connector
Beale, Main & Spear	Linear Park Streets
Clementina & Tehama	Pedestrian Alleys



N

North Arrow

The North Arrow depicted on each plan in orange represents the reference north, whereas true north is depicted in grey for reference.

Legend

- Proposed Redevelopment
- Existing Buildings
- Transbay Transit Center Area
- Proposed Public Open Space
- Proposed Private Open Space

Illustrative Concept Plan

This plan conveys how the landscape of the Transbay neighborhood will be dramatically altered once all the recommendations are realized.

SUSTAINABILITY

This project represents an opportunity to create one of San Francisco's most livable new communities. Towards this end, the team explored opportunities for integrating sustainable practices wherever possible and practical. This approach supports the Mayor's "A Green and Clean San Francisco" Initiative, which is in the nascent stages of implementation. There are several concepts integrated into this plan:

- Utilize specific materials and systems that employ **renewable resources** and reduce and delay storm water run-off entering the Bay
- Maximize the amount of **permeable surfaces** in the public right-of-way
- Increase landscaping, minimize irrigation and contribute to the diversity of the **urban forest**
- Maximize the **green space** in Transbay Park
- Introduce more **efficient lighting** for public spaces
- Develop high quality amenities to encourage **walking, biking and transit use**

Once this plan is fully realized, each street will have a strong visual identity that reinforces its role in the neighborhood and contributes to the overall beauty of the district. Distinct design elements will make it clear to all entering the Transbay neighborhood that they have arrived home.

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Images are sustainable streetscape precedents, not indicative of concept plan.

1. Maximize the permeable area in the public right of way by integrating landscaping and pavers to allow less water to runoff into storm drains (Santa Monica Blvd., West Hollywood)

2. The street tree spacing and variety will contribute to the diversity of the city's urban forest (Upper Westside, New York)

3. Bicycle lanes will remain on Folsom, Howard and Second, and Main and Beale will become more bicycle-friendly through the reduction in the roadway width and the presence of the linear park

4. On streets carrying fewer cars, permeable pavers can be used to minimize run-off and gain visual clarity (20th Street. Seattle, Washington)

5. On quieter streets where the roadway is narrow and run-off is limited, a storm water parkway can act as a localized treatment system (12th & Montgomery. Portland, Oregon)

6. Drainage troughs can be landscaped and designed to accept water directly from the roadway, rather than diverting water to a traditional catch basin (12th & Montgomery. Portland, Oregon)

ACCESSIBILITY

This concept plan recognizes that accessibility and pedestrian safety must be a priority as part of realizing public realm improvements in this burgeoning neighborhood. Currently, the quality of the existing infrastructure and sidewalks is sub-standard. There are many cracked sidewalks, uneven surfaces, and in some cases sidewalks are non-existent. Residents have indicated that they do not feel safe when crossing the street, and note that cars typically travel at high speeds when moving through the area. The recommendations that follow are integrated into the overall streetscape designs and open space concepts, but are highlighted here to underscore the importance of designing streets and public spaces that will dramatically improve accessibility and make walking and playing in the area a safer experience. The Transbay neighborhood represents a progressive strategy in which accessibility and safety issues are not addressed simply as ancillary concerns, but are holistically integrated into the design.

The following strategies are recommended for implementation as soon as funding is available to realize each street and open space:

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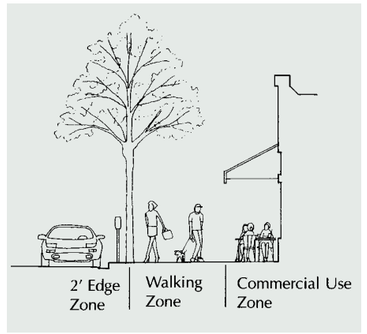

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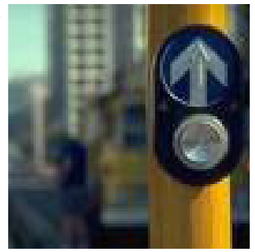

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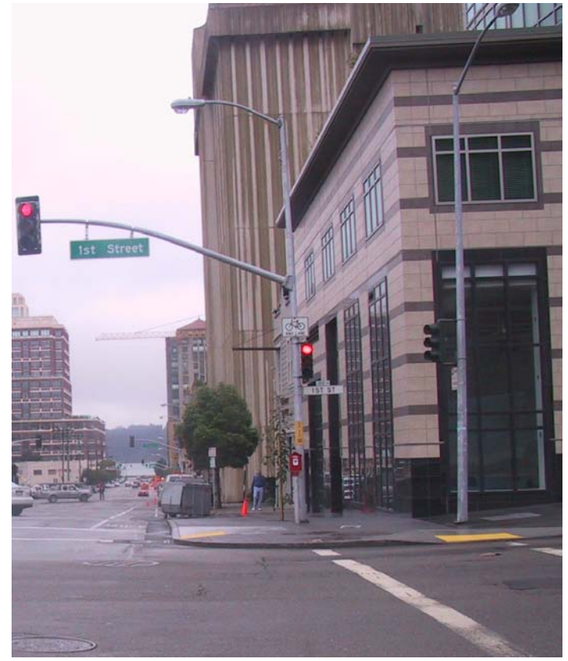


1. Example of existing sub-standard infrastructure on Folsom

2. Crosswalks should be demarcated with zebra striping to provide high contrast and visibility

3. Sidewalks will have a clear walking zone. Street trees and other amenities will occur in a zone along the curb. A commercial use zone can be designated against the building frontage.

4. Example of clear sidewalk zones with a double row of trees that define the pedestrian walking zone

5+6. All improved streets and sidewalks should have pedestrian timed-crossing signal heads and ADA compliant push buttons and warning devices

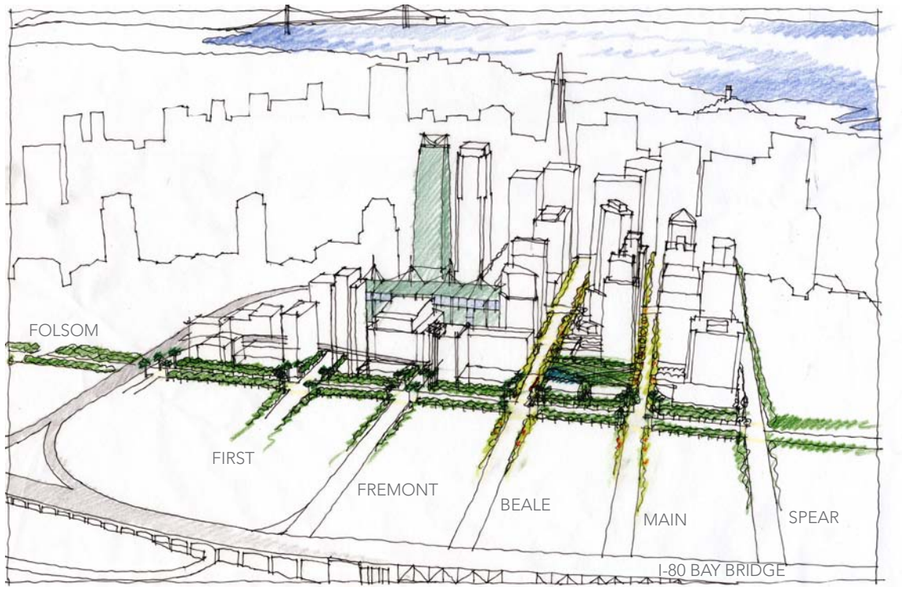
7. Example of new bulb-out at First and Fremont with ADA-compliant access ramps with truncated domes

Sidewalks

- Every public street in the neighborhood will have a sidewalk with a minimum width of 12 ' from property line to the curb face
- Sidewalks will be well lit and at a minimum meet current City street lighting standards for acceptable footcandles on the walkway and at intersections
- Pedestrian level lighting should be incorporated at streets anticipating the highest pedestrian volumes (for example Folsom, Main and Beale)
- Wherever possible, sidewalks at block corners will be extended with bulb-outs to shorten crossing distances and place the pedestrian in a better line of sight for drivers making turns at intersections
- Corners will have two ADA-compliant access ramps that lead pedestrians or people in wheelchairs in the proper direction and centered in the crosswalk
- Access ramps will have truncated domes to denote primary path of travel out to the crosswalk
- Crosswalks should be a minimum of 15' wide and be demarcated with zebra striping, in white hot tape, to provide greatest visibility, and redone on a regular basis for maximum contrast and visibility on the roadbed
- Public amenities such as trash cans, news racks, information kiosks or signage will be in delineated site furnishing zones at corner bulb-outs furthest from the access ramps in a fully accessible area that also minimizes conflicts with parked cars (and opening doors)
- Seating will be located adjacent to the primary public path and allow for adjacent companion seating and/or wheelchair spaces
- New sidewalks and paving will be installed wherever funding allows to achieve an even finished surface and high quality materials that provide durability
- Identify the need for pedestrian-actuated crossing signals in conjunction with street improvements, the temporary bus terminal and the new Transbay Transit Center being planned by the TJPA
- All improved streets and sidewalks should have pedestrian timed-crossing pedestrian signal heads, and ADA compliant push buttons and warning devices

Alleys

- Alleys will have raised crosswalks at each end of the block that are closely aligned with the finished sidewalk elevation and act as a traffic calming elements for drivers entering these pedestrian-oriented spaces
- The sidewalk and vehicle zones will be separated with a 4" curb to provide a clear change in elevation and surface from the raised pedestrian level to the lower vehicle level
- Drainage should be directed toward the permeable pavers with catch basins at the alley ends of the block
- Alleys will be well lit and at a minimum meet current City street lighting standards for acceptable footcandles on the walkway and at intersections
- Provide removable bollards at the alleys adjacent to Transbay Park so these streets can be closed for special events and made pedestrian-only



The Transbay Neighborhood

Sketch showing a mature neighborhood if developed in accordance with the Design for Development and Development Controls and Design Guidelines, as well as this concept plan

Open Space

- All open spaces will provide equal access to disabled residents and visitors for their enjoyment
- Provide a variety of activities, ample seating in both sun and shade for maximum comfort and options
- Select materials with sufficient durability, maintainability and coefficients of friction compliance
- Open spaces will be well lit and at a minimum meet current City street lighting standards for acceptable footcandles in public parks and plazas

Bicycle Lanes

- Provide clear bike lane route signage and marked lanes at Class II bikeways along Folsom and Howard
- Encourage slower vehicle speeds at Main and Beale to encourage bicycles to use the Class III bikeways for north and south access through the neighborhood
- Coordinate bicycle improvements on Second Street in conjunction with SFCMTA study currently underway
- Provide ample bike racks at corner bulb outs along Folsom, in Transbay Park, and at the under ramp open spaces

2.2 FOLSOM: THE NEIGHBORHOOD MAIN STREET

OVERALL CONCEPT

Folsom is arguably the most important street to re-envision as the Transbay neighborhood is developed. It must fulfill a unique role in the network as the "main street"—a critical public space that bridges both the Transbay and Rincon Hill neighborhoods. As envisioned in the Design for Development, Folsom will be lined with ground floor retail below mid-rise and high-rise housing. At Second Street, Folsom sits at one of the highest elevations in the neighborhood and culminates eastward in a dramatic view corridor that captures Rincon Point Park, the Bay Bridge, and Treasure and Yerba Buena Islands. The recommended design is based on preserving this view and providing improvements along the primary sidewalks where pedestrians are active. The recommended design preserves the bike lane and accommodates future transit service that will likely be needed by residents when the area is fully developed.

Critical to changing Folsom's character from being an underdeveloped thoroughfare to becoming a "neighborhood main street," is a need to modify the circulation pattern to be more conducive to pedestrians. To truly support more pedestrian activity, Folsom should be redesigned to accommodate two-way traffic in a balanced number of lanes. The mobility plan (Section 3) describes how this can be achieved incrementally beginning with a conversion of Folsom to two-way traffic between Fremont and the Embarcadero. The conversion of the rest of Folsom to two-way traffic will depend on broader studies being completed by the City for the larger South of Market area, and for Howard, Folsom's one-way counterpart to the north.

As a defining street for the area, Folsom will have some of the widest sidewalks in the neighborhood and some of the tallest buildings framing it. It will be transformed with new street trees and intersections highlighted with vertical art elements that provide scale and serve as wayfinding markers for the district.

STREETSCAPE

On the north side of Folsom developers will be required to set back buildings 15' from the existing property line to achieve a 25' sidewalk. This greater width will support sidewalk and café activity that can flourish on sunny days. The south side is currently 10' wide and can be widened to 12'. When possible, additional development setbacks can be applied on the undeveloped blocks. Widening the south sidewalks by 2' will require moving the curb and gutter and reducing the parking and traffic lane widths. The bike lane eastbound will be maintained.

The wider north sidewalk will have a double row of trees, matched on the south with a single row of the same species. The major intersections at First, Fremont, Beale and Main will be highlighted with four vertical markers. Through the use of tall markers like pylons of palm trees at each corner, views of the San Francisco Bay will be dramatically framed as one moves east towards the waterfront, and the major cross-streets will be visible. Conversely, Folsom will be easily landmarked when approaching from surrounding areas.

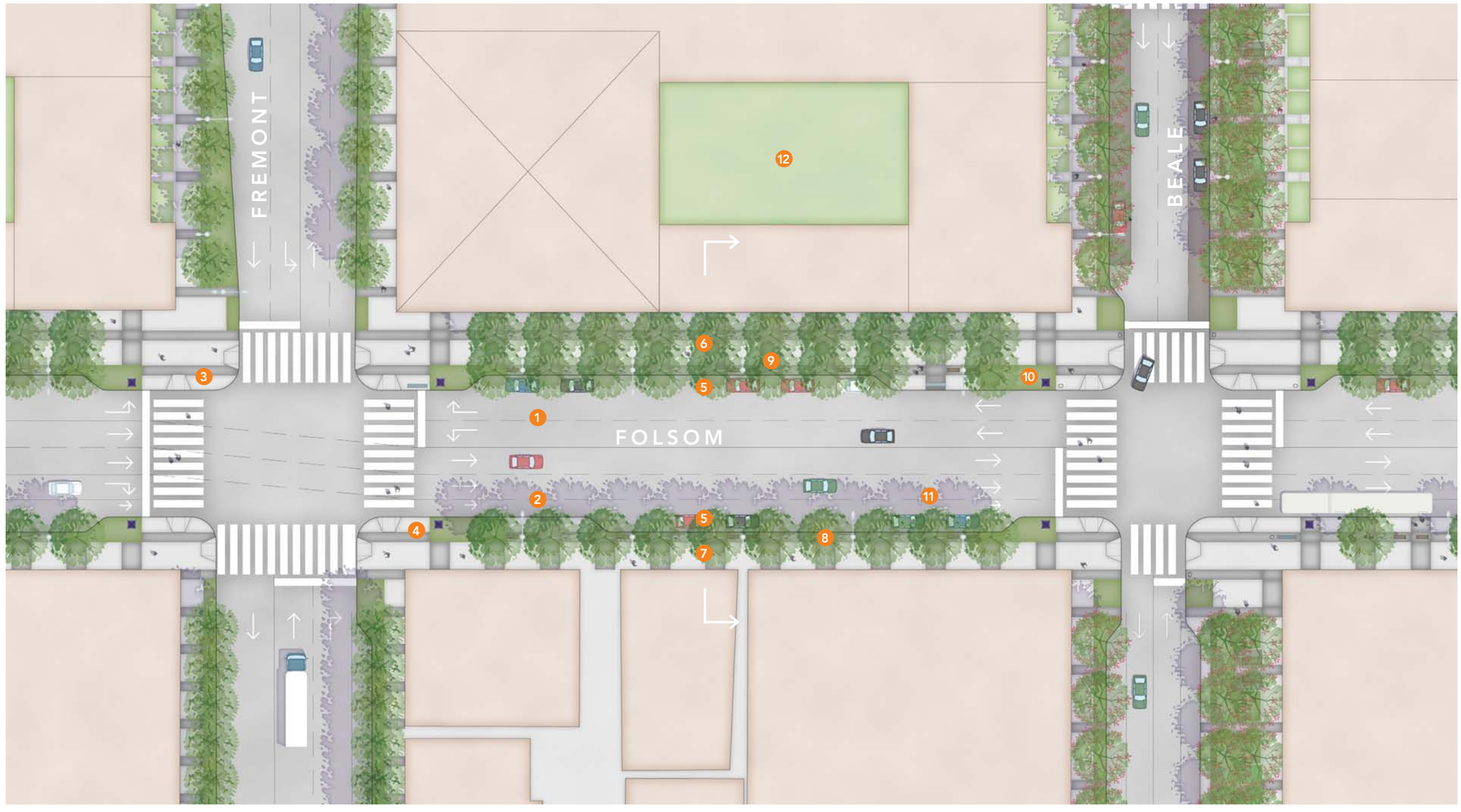
The paving on Folsom will be a combination of black granite setts and saw-cut concrete into two colors. The granite setts will form bold graphic bands 8' wide to visually reinforce the tree locations. These bands will be separated by a sandblasted light gray concrete field. These fields will be further interrupted in the east-west direction with 4' wide bands of a dark gray concrete that correspond to the double row of trees. All concrete will be saw-cut to produce distinct joint lines and a finer visual texture in the walkway (See Section 2.10, page 63 for the materials family). Furnishings will be clustered at the corner bulb outs, or limited to the curbside paving band. Bulb outs will accommodate landscaping and furnishings with longer one on the far side of intersections that can serve as future transit stops. (See Sec 3.12, page 85 for the transit stops on Folsom).

Existing view of Folsom Street showing the dramatic view corridor to the Bay

Perspective sketch showing proposed improvements

FOLSOM DESIGN FEATURES

1 Two lanes each direction
2 Bike lane - eastbound only
3 Corner curb extensions at every intersection
4 Longer curb extensions on far side can accommodate future transit stops
5 Parallel parking on both sides of street
6 25' sidewalks on north side
7 12' sidewalks on south side
8 Trees 22' on center
9 Double tree row on north side at 14' spacing
10 Vertical markers at each intersection
11 New pedestrian and roadbed lighting
12 Private Open Space



Folsom - Illustrative block plan

50 feet

N

1

2

3

4

1. The north sidewalk of Folsom will feature a double row of trees that creates a zone for pedestrians and for sidewalk dining along the ground floor of new developments

2. Vertical markers such as canary island palms will highlight each intersection of Folsom, providing continuity with the vertical palms along the Embarcadero where Folsom meets the Bay

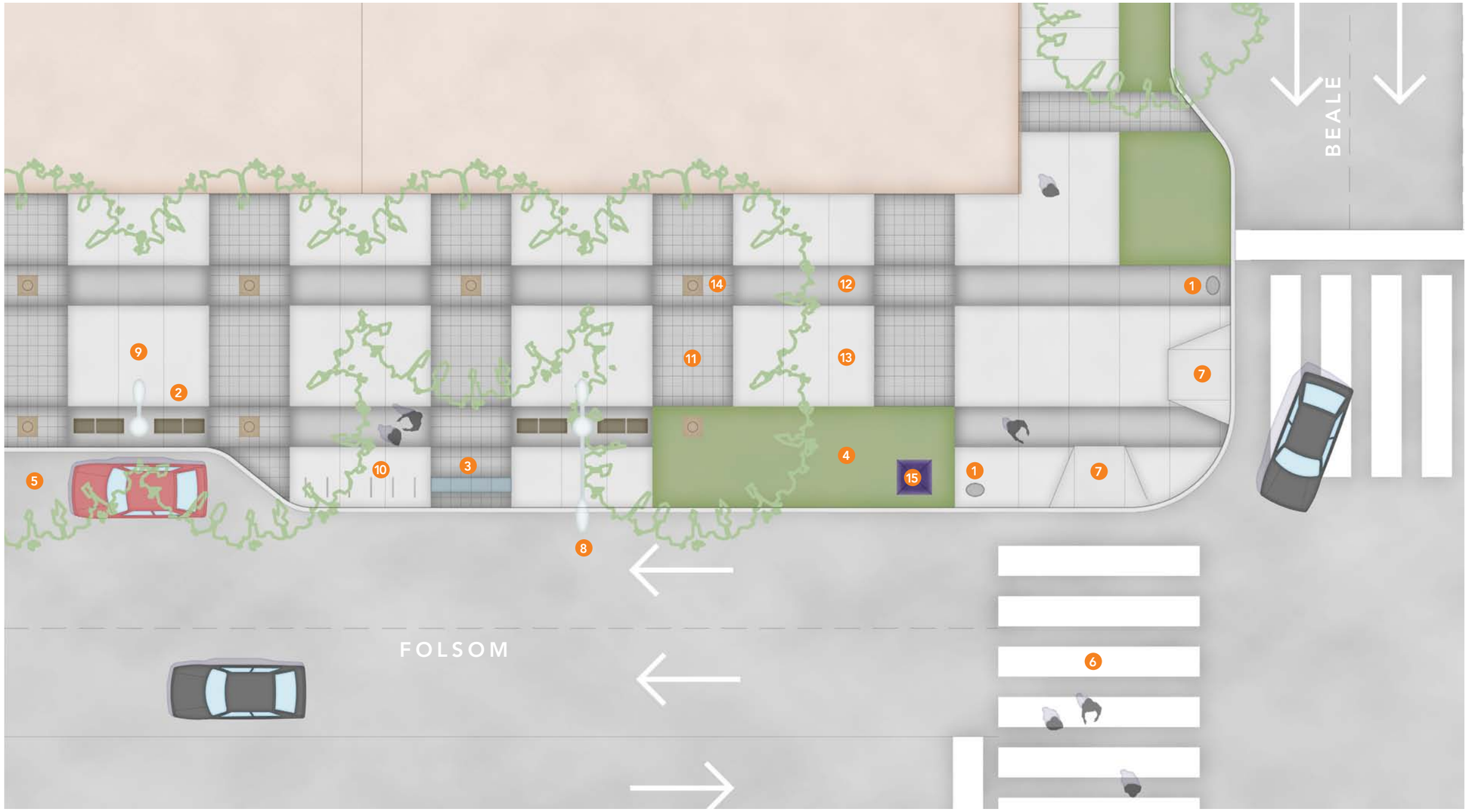
3. The vertical marker can be illuminated and artful (Cliff Garten Studios light beacon. Long Beach, California)

4. Sketch concept of architectural vertical marker on Folsom

Folsom Cross section looking east

FOLSOM DESIGN FEATURES

1 Trash receptacles
2 Seating integrated with lighting
3 News rack housing
4 Planter at base of vertical marker
5 Parallel parking
6 High visibility zebra stripe crosswalk
7 ADA compliant access ramps
8 Combination roadbed/pedestrian light
9 Pedestrian light
10 Bicycle rack
11 8' wide bands of granite setts
12 Colored concrete paving band
13 Light gray concrete infill
14 Granite setts at tree well
15 Vertical Marker



Folsom - Enlarged layout plan

2.3 HOWARD & MISSION: CROSS TOWN BOULEVARDS

HOWARD

OVERALL CONCEPT

Howard and Mission Streets are important transit corridors that provide strong east-west connections flanking the Transbay Terminal. They also serve as major cross town boulevards that provide one-way and two-way vehicle flow and heavy bus service related to Transbay connections. Parcels along these corridors are almost fully developed and have seen sidewalk improvements done concurrently with individual development. This has resulted in a patchwork of street trees and sidewalk patterns that are not cohesive.

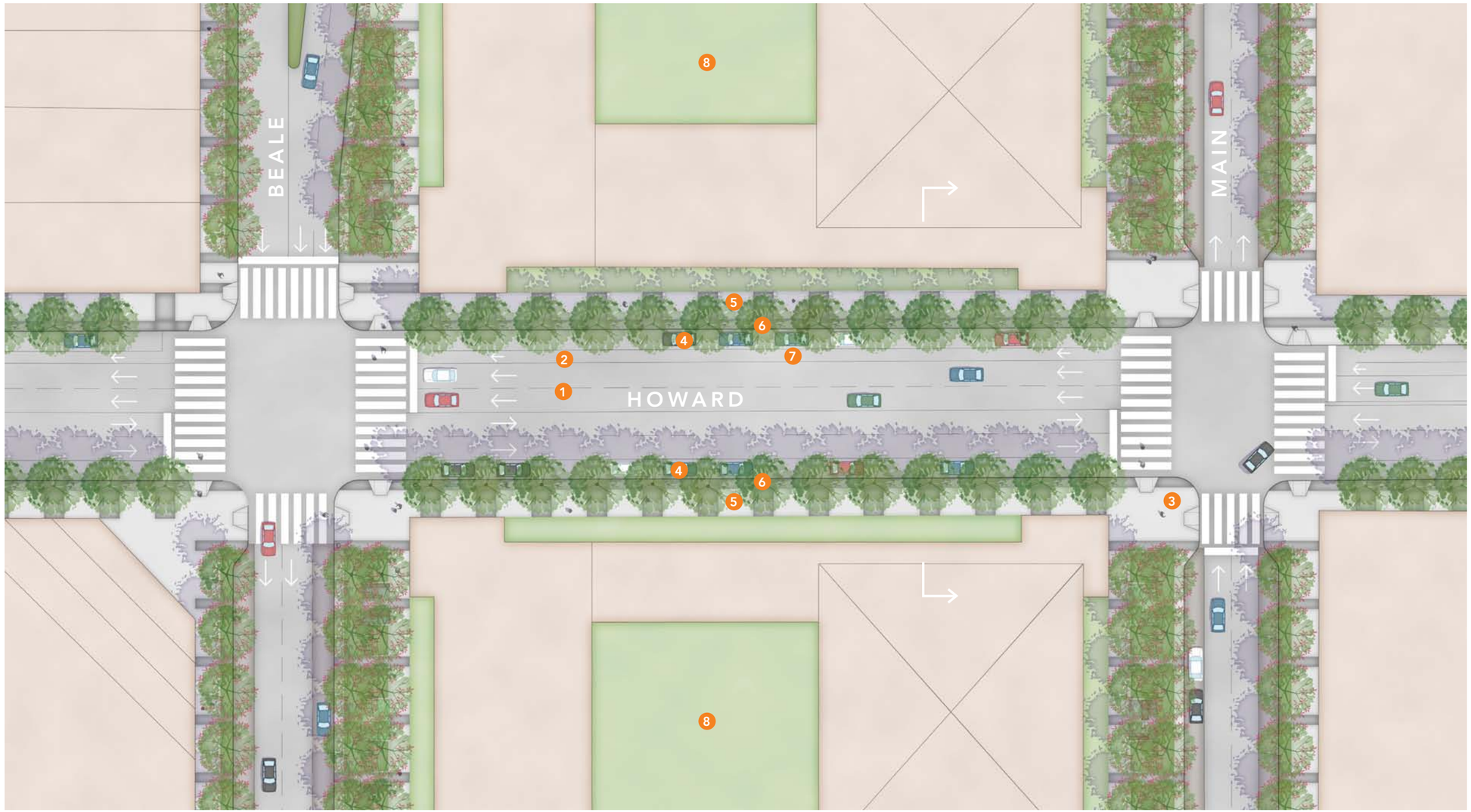
Howard Street is located in the midsection of the project area and currently functions as a circulation couplet with Folsom Street (Howard provides one-way westbound access west of Fremont, Folsom provides one-way eastbound access west of Fremont). Converting Howard to two-way traffic would contribute to its pedestrian-orientation. These modifications would need to be studied further and correlated to Folsom's final disposition. Howard will continue to function as a strong commercial office street combined with established neighborhood services. The existing westbound bike lane will remain.

Existing view of Howard Street

STREETSCAPE

Howard could be greatly improved with consistent street trees and a paving pattern that will help make it as consistent as possible across the project area. London Plane trees will be spaced at 22' on center with a paving pattern introduced along its 11.5' sidewalks that complement the tree and parking stall locations. Trees should be planted in 4' x 8' tree wells finished in black granite setts with cast iron tree grates. This treatment will be durable and easy to maintain with the heavy pedestrian and automobile traffic already existing in this corridor.

Howard Street is built out with street trees and trees grates at newer developments



HOWARD DESIGN FEATURES

1. 2 lanes each direction east of Fremont
2. Bike lane - westbound only
3. Corner bulb outs on cross streets only
4. Parallel parking both sides
5. Maintain existing sidewalk width both sides
6. Trees 22' apart in 4' x 8' cast iron tree grates
7. New pedestrian and roadbed lighting
8. Private Open Space

Howard - Illustrative block plan

50 feet

N

Mission Street is built out with street trees and tree grates at newer developments

Cross Section of Howard looking east between Beale and Main

HOWARD DESIGN FEATURES

1 Trash receptacles
2 News rack housing
3 Bike racks
4 8' bands of black granite setts
5 Dark gray concrete band
6 High visibility zebra stripe crosswalk
7 New pedestrian and roadbed lighting
8 4' x 8' cast iron tree grates
9 Light gray concrete with saw cut joints
10 Required private residential setback

Howard - Enlarged layout plan

15 feet

N

MISSION

OVERALL CONCEPT

Mission Street defines the northern edge of the Transbay Project Area and is a mixture of historic and new high-rise developments. The greatest change will occur as the proposed Transbay Transit Center is realized, affecting the surrounding streets and alleys which will need to be improved and coordinated with the larger project. New streetscape recommendations will work with more recent sidewalk improvements and when implemented will begin to establish the Transbay neighborhood identity on these two streets.

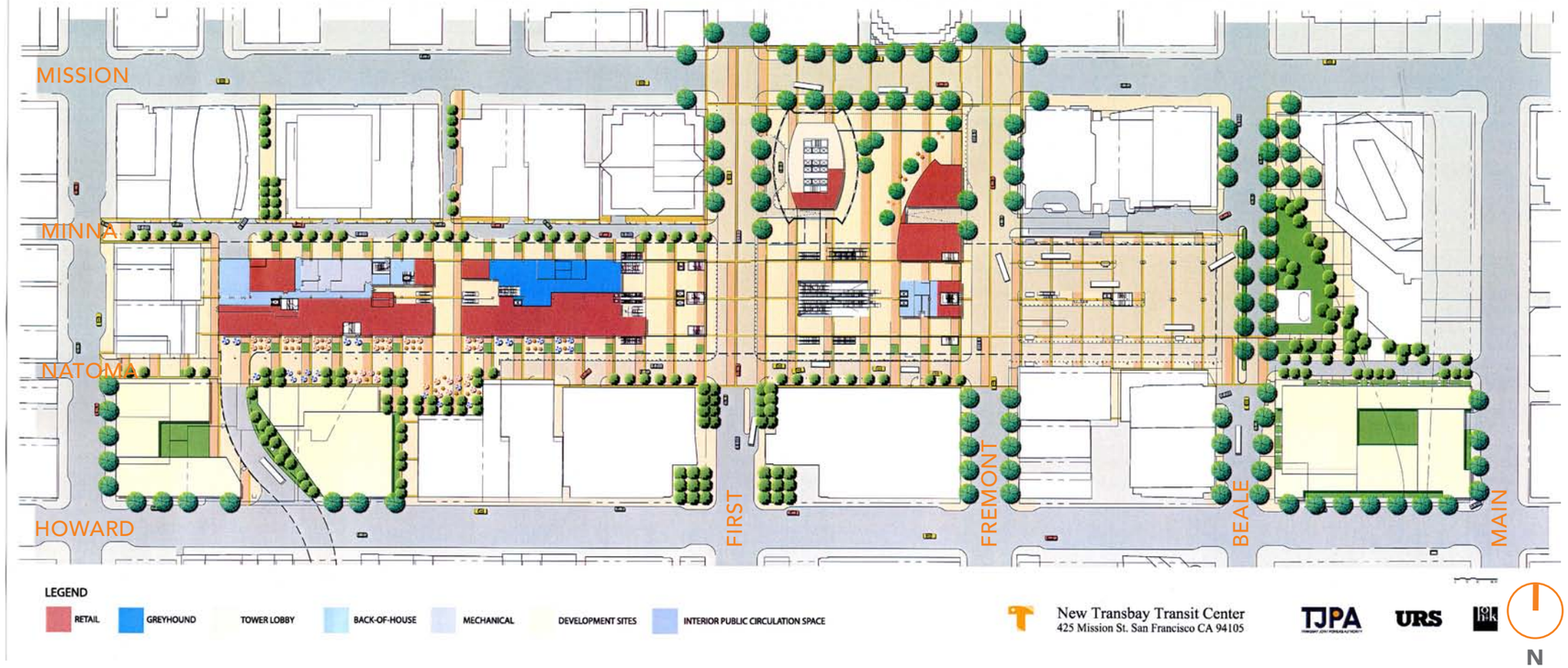
STREETSCAPE

Mission Street needs a cohesive streetscape treatment to fulfill its role as the northern portal to the Transbay Transit Center. Most patrons using the terminal walk northward up to the Financial District and traverse Mission Street. The design should be closely coordinated with the Transbay Transit Center plans.

The preliminary concept plan for the Transbay Transit Center suggests a cohesive streetscape and alley treatment to visually connect all of the center's associated public spaces. An integrated plaza paving design is proposed at the "front door" of the new transit center along Mission, First and Fremont, surrounding the proposed high-rise structure and winter garden. Indoor and outdoor spaces are intended to blend seamlessly to create a vibrant pedestrian district worthy of the center's intended role as a gateway and major city landmark.

The future design of Mission needs to unfold with the development of the Transbay Transit Center, as it will serve as a major boulevard leading to the terminal's front door. The design team for this concept plan, and the program managers for the terminal redesign, agreed that the streets and alleys surrounding the terminal should complement the Transbay Streetscape and Open Space recommendations, while creating a cohesive public realm for the larger Transbay district.

Both concept plans share a graphic approach to paving design, paired with consistent street tree planting. The redesign of Natoma and Minna alleys will evolve with the new terminal to become more pedestrian – with limited vehicular access and accommodation of a pedestrian promenade and outdoor dining.



Preliminary concept plan for the Transbay Transit Center showing an approach to the surrounding streets and alleys (By URS & HOK, courtesy of the Transbay Joint Powers Authority)

2.4 FIRST & FREMONT: BAY BRIDGE CONNECTORS

OVERALL CONCEPT

First and Fremont Streets are important north-south connectors to the Transbay neighborhood and the Transbay Terminal. Both streets fulfill an important role in the network, carrying vehicular traffic to and from the Bay Bridge during peak commute hours. In addition, they have heavy bus movement with several regional carriers providing routes that terminate at the Transbay Terminal. A key challenge to reconceiving these streets is addressing the need for these streets to carry lots of cars, and their need to become pedestrian-friendly as the neighborhood matures. Their location in the heart of the Transbay neighborhood requires improvements that balance vehicles and pedestrians, while making the streets more beautiful. This is critical as both streets function as gateways in and out of the city if using the Bay Bridge access ramps at Folsom or Harrison.

The two streets work as a couplet; First provides one-way southbound access, and Fremont provides one-way northbound access across the neighborhood. They each have curbside parking along some block faces, and some curbside lanes that allow off-peak parking.

STREETSCAPE

First Street is fairly developed from Howard Street north. From Howard south to Folsom, new mixed-use development will begin to redefine its character. First Street follows the streetscape design of Fremont north of the I-80 off-ramp shown in the Illustrative block plan. A challenging area to improve is the area around and under the Folsom Street off-ramp.

Fremont Street's role in the neighborhood network will improve greatly with the proposed changes to the Folsom Street off-ramp (See Mobility Section 3.4). The recommended modifications will make it possible to walk on the west side of the street, safely across the off-ramp lanes at a signalized crosswalk. There will be a planted triangular island that will control the traffic turning radii onto Fremont and allow for pedestrian crossing at this intersection. Fremont will have new parkway planting, street trees and paving.

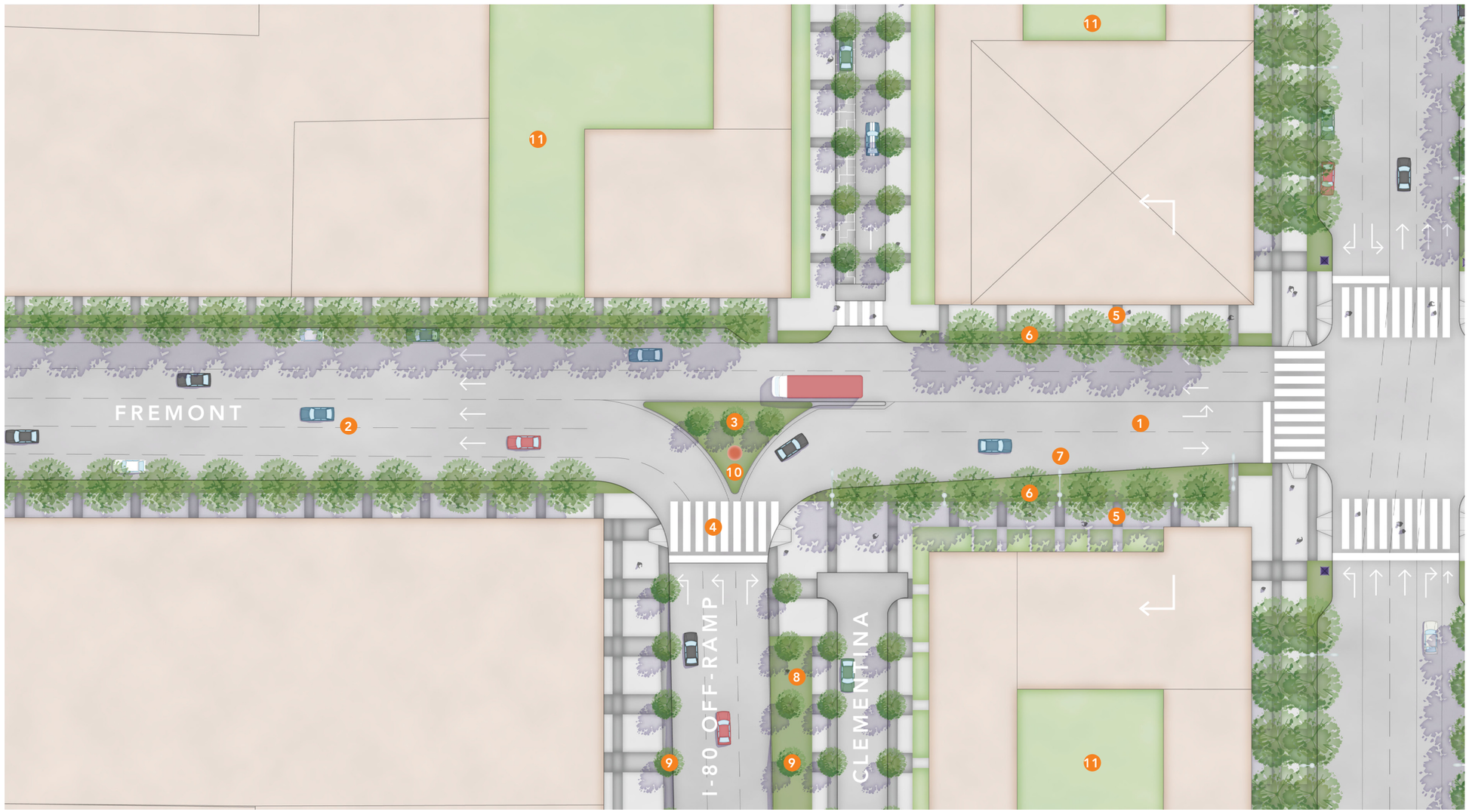
Due to the heavy traffic flow and to encourage pedestrians, a landscaped parkway is proposed on both streets. The parkway will provide a visual buffer while adding permeable green space to the neighborhood. It will also set these gateway streets apart from other downtown streets

Existing view of Fremont

Perspective sketch showing proposed improvements

FREMONT DESIGN FEATURES

1. 2 lanes each direction south of off-ramp
2. 5 lanes northbound north of off-ramp
3. Signalized intersection & modified island with landscape
4. New pedestrian crossing
5. 15' sidewalk both sides
6. Trees 22' apart in landscaped parkway
7. New pedestrian and roadbed lighting
8. Linear green space at ramp edge
9. New columnar trees at ramp edge
10. Public art opportunity
11. Private Open Space



Fremont - Illustrative block plan

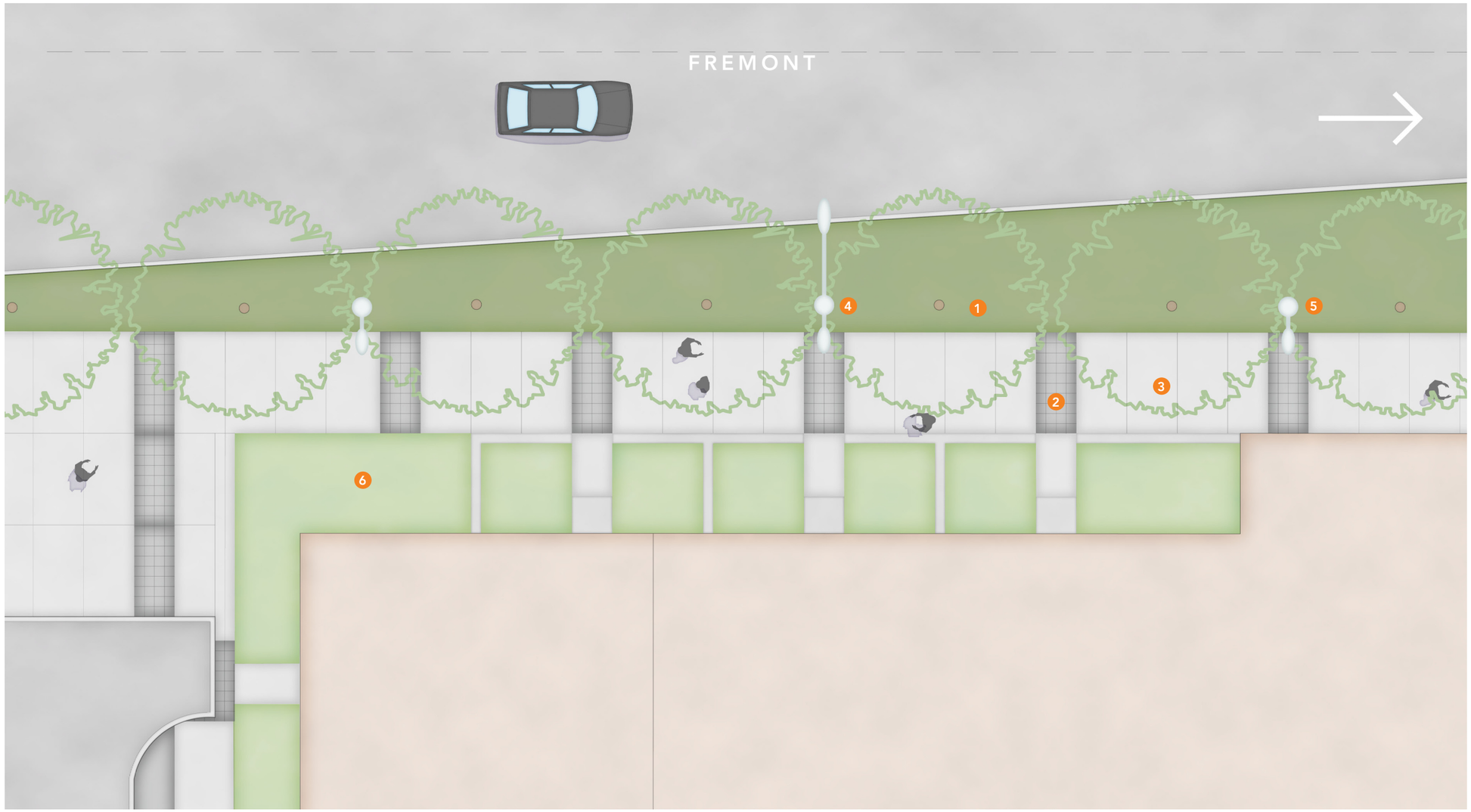
1

2

1. Currently, Fremont is not navigable for pedestrians due to the existing off ramp configuration

2. Landscaped parkways will buffer pedestrians on the sidewalk from vehicular traffic traveling to and from the Bay Bridge

Fremont - Cross Section looking north from Folsom



Fremont - Enlarged layout plan

15 feet

N

FREMONT DESIGN FEATURES

1. Landscaped parkway
2. 4' bands of black granite setts
3. Light gray concrete with saw cut joints
4. New roadbed/pedestrian light
5. New pedestrian light
6. Required private residential setback

2.5 SECOND STREET: HISTORIC CONNECTOR

Second Street is an important historic connector and serves as a major north-south link from Market Street south to AT&T Park on King Street. It forms the western boundary of the project area. The streetscape vision for Second Street should be considered for a more significant length than the three blocks that fall within this project's boundary, as part of a larger analysis of this important connector street. Second Street is almost entirely built-out and many of the buildings are historic. There are some new developments that have occurred near the intersection of Mission and at Folsom. The proposed improvements should be considered as a new standard between Market Street and the Bay Bridge in order to create a stronger public presence for Second Street.

Today there are stretches of magnolia trees with cast iron tree grates corresponding with new developments. Where older and historic structures exist, sub-sidewalk basements are common. The existence of these structures precludes street trees from being planted. Until the time these parcels are redeveloped, there will be segments where street trees cannot be planted (unless an owner opts to put trees in planters on the sidewalk).

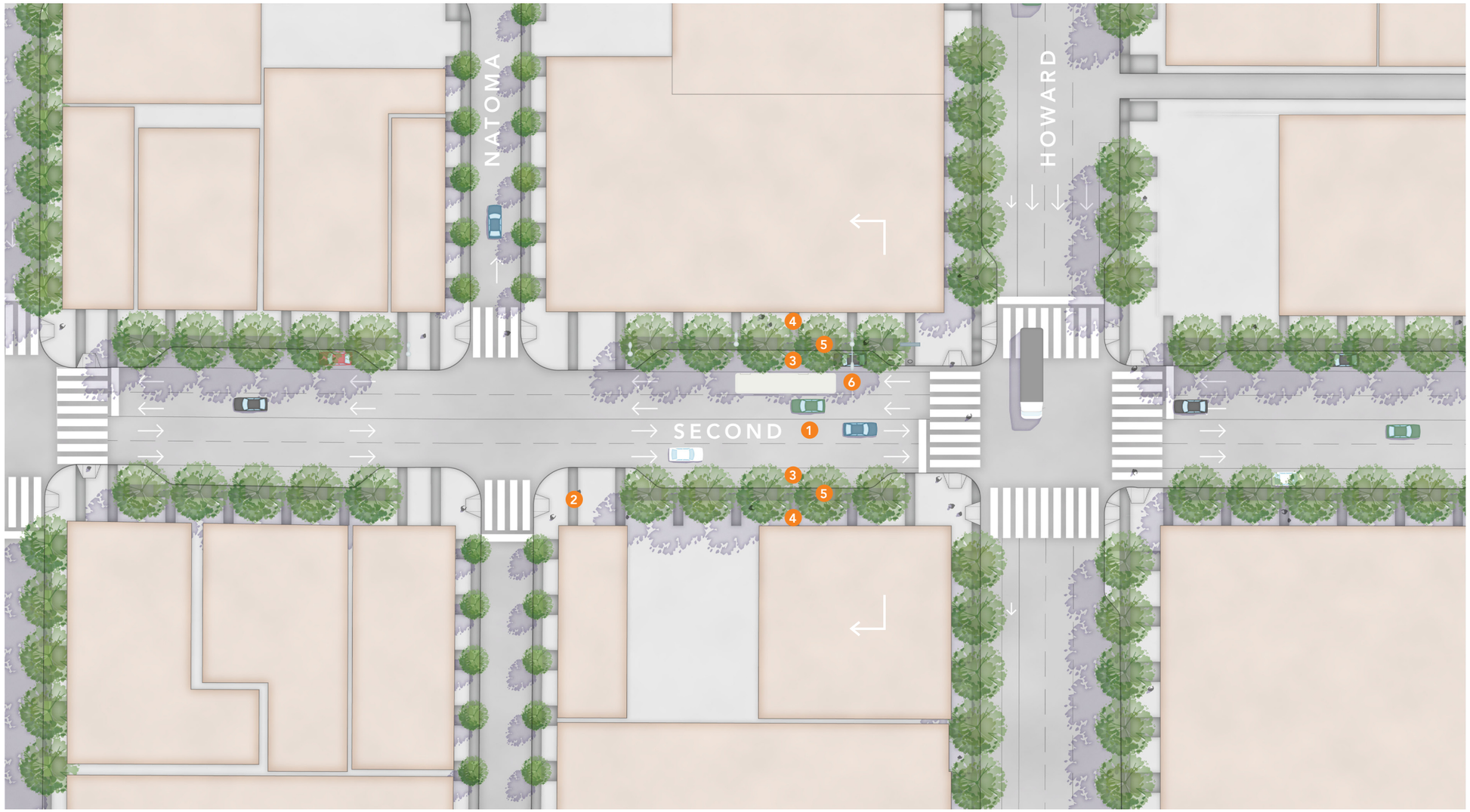
MTA and SFCTA have been evaluating Second for potential bike lanes, which could require removing a lane of traffic and installing turn pockets. This would need to be studied further and coordinated with the design of any corner bulb-outs, which are recommended in this concept plan based on current conditions.

1

2

1. Improvements will build off the established pattern of trees and tree wells fronting new developments.

2. Implementing a unified streetscape design on Second Street between Market and King Streets would reinforce its role as a major South of Market corridor. Shown is a typical block with older and historic structures fronted by treeless sidewalks due to subgrade basements.



SECOND DESIGN FEATURES

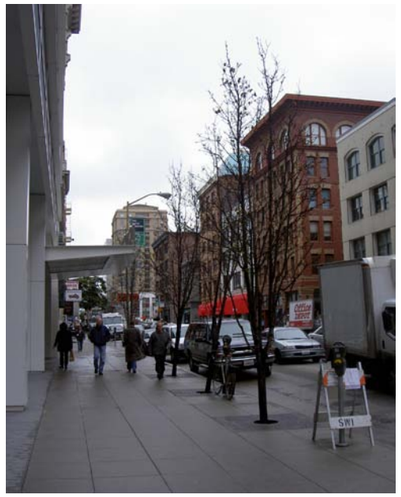
1. 2 lanes each direction
2. Corner bulb outs at most intersections
3. Parallel parking both sides
4. Maintain existing sidewalk width both sides
5. Trees 22' apart in cast iron tree grates
6. New pedestrian and roadbed lighting

Second - Illustrative block plan

50 feet

N

1



2

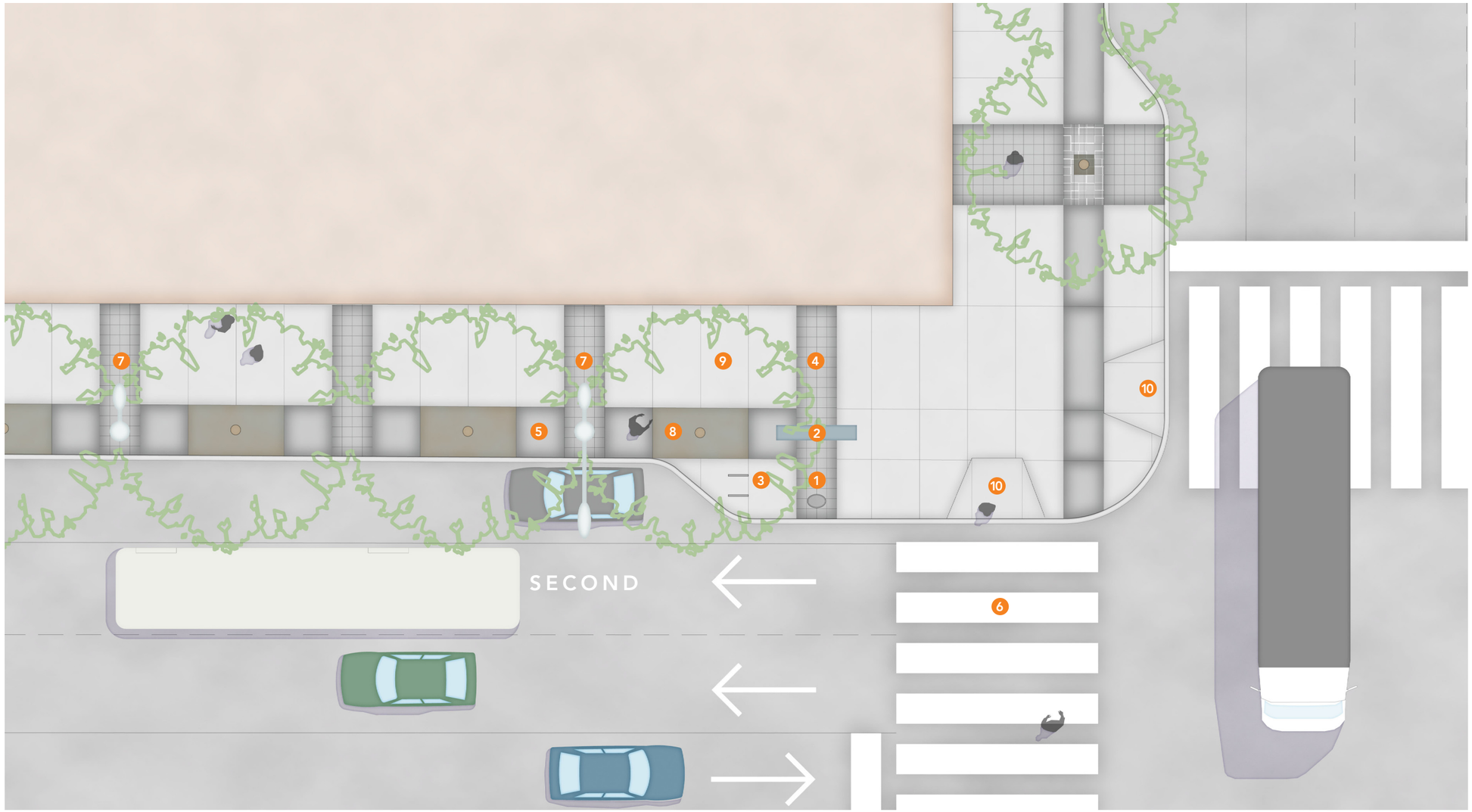
1. New corner bulb outs at each intersection would improve the pedestrian experience along this busy corridor

2. The bus ramp shown here provides a gateway opportunity (See Section 2.10) to formally mark the entrance into the district.

Second - Cross Section looking north from Howard

SECOND DESIGN FEATURES

1 Trash receptacles
2 News rack housing
3 Bike racks
4 4' bands of black granite setts
5 Dark gray concrete band
6 High visibility zebra stripe crosswalk
7 New pedestrian and roadbed lighting
8 Trees 22' apart in 4 x 8' cast iron tree grates
9 Light gray concrete with saw cut joints
10 ADA compliant access ramps



Second - Enlarged layout plan

2.6 BEALE, MAIN & SPEAR: LINEAR PARK STREETS

Beale, Main, and Spear have entirely different responsibilities as streets in the Transbay neighborhood. As the primary residential streets running north-south (See Mobility Section 3.7), they serve the function of connecting residents to the new community open space, and take on the nature of parks themselves. These linear park streets will be an important amenity to neighborhood residents with informal landscaping, seating, and walking paths. The linear parks will serve the adjacent corner cafes or small neighborhood shops that anchor the block corners.

Each linear park street will have a consistent planting of trees and paving patterns. These streets also will boast more sustainable strategies since they will have more green space by definition. By achieving a higher level of planting and permeable paving, these linear parks will reduce and delay the volume of stormwater run-off entering the City's combined server system. Trees will be spaced 22' apart in double rows. The increased parkway width will allow for a secondary walking path along the street edge; this will also provide required curbside access to parked cars. The parking lane itself will be constructed with eco pavers to allow for water to percolate down into the ground.

The linear park will be a wide band of planting and street trees that will separate residential units from the street. The total width of the widened sidewalks is 30' from curb to property line with an additional setback, as required by the Development Controls and Design Guidelines, for residential patios and entry stairs. This additional private space will allow residents to create personal spaces with gardens, walls, and stoops and will add to the perceived reach of the linear parks.

The linear park streets exhibit two primary practices for remediating stormwater volume, velocity and flow. The first, and perhaps the most significant practice, is that the streets are actually living. The volume of the street canopy will act to prevent the creation of stormwater through the capture of rain in the trees' canopy architecture, which will both absorb and hold a significant amount of an average storm event's intercepted rainfall until evaporation. The ground plane, comprised of the linear parkway and the tilted planes, will act to absorb the remaining rainfall that passes through the tree canopy. Additionally, the permeable paving along the living streets will filter and significantly decrease the volume and velocity of stormwater, capturing it before it reaches the municipal stormwater drains.

The tilted planes will be constructed of cast in place concrete and based on specifications for integral strength and finish. At their apex they will be approximately 24" high. Due to their urban context, plantings specified for the tilted planes have been selected for low maintenance requirements and for their inherent textural expressions, and are anticipated to be used by dog walkers. Reinforcing the character of the park as a recreational destination, seating is not intended for the tilted planes, but is provided in the niches between these walls and within the adjacent Transbay Park.

At Transbay Park, the linear park treatment will help bring the edge of the park out to meet the street. By using this approach, continuous open space is maximized. On the edges where the park meets the street edge, pedestrians can continue through on a sidewalk without interruption if they are just passing by the park.

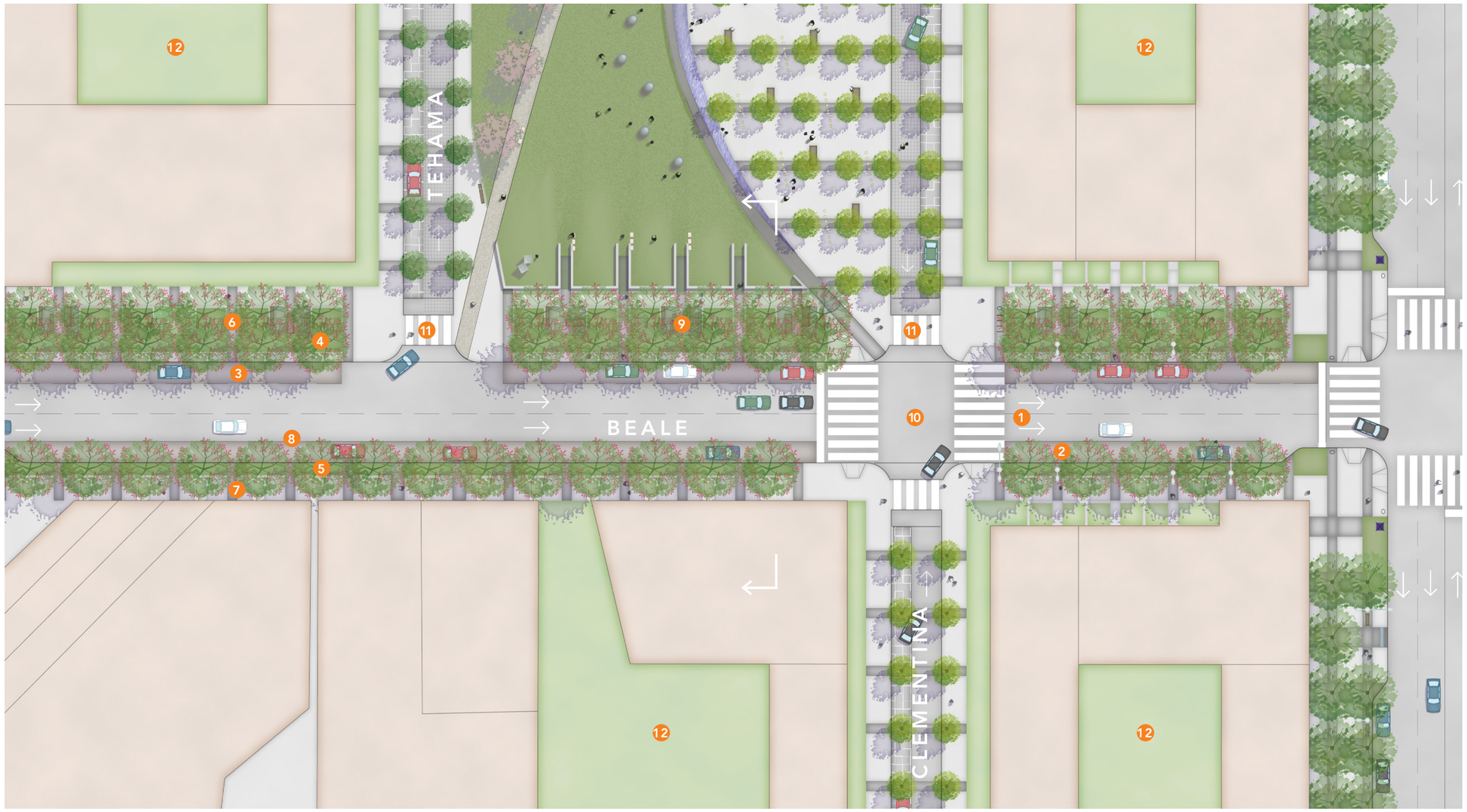
Additionally, there can be some controlled variation within the structure of the linear park layout. The zone shown as outdoor seating can also accommodate dramatic planting or a public art opportunity.

Existing view of Main Street

Perspective sketch showing proposed improvements

BEALE DESIGN FEATURES

1 2 lanes one-way
2 Curbside parking
3 Off-peak parking
4 Double rows of trees
5 Single row of trees
6 30' linear park zone
7 15' sidewalk with parkway
8 New pedestrian lighting
9 Linear park continues at Transbay Park
10 New signalized crosswalks, pedestrian activated at Clementina
11 New raised crosswalks
12 Private Open Space

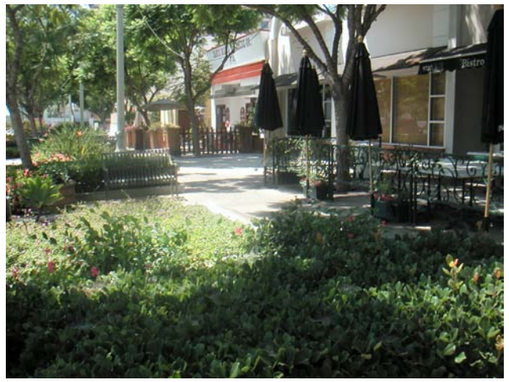


Beale - Illustrative block plan

50 feet

N

1



2

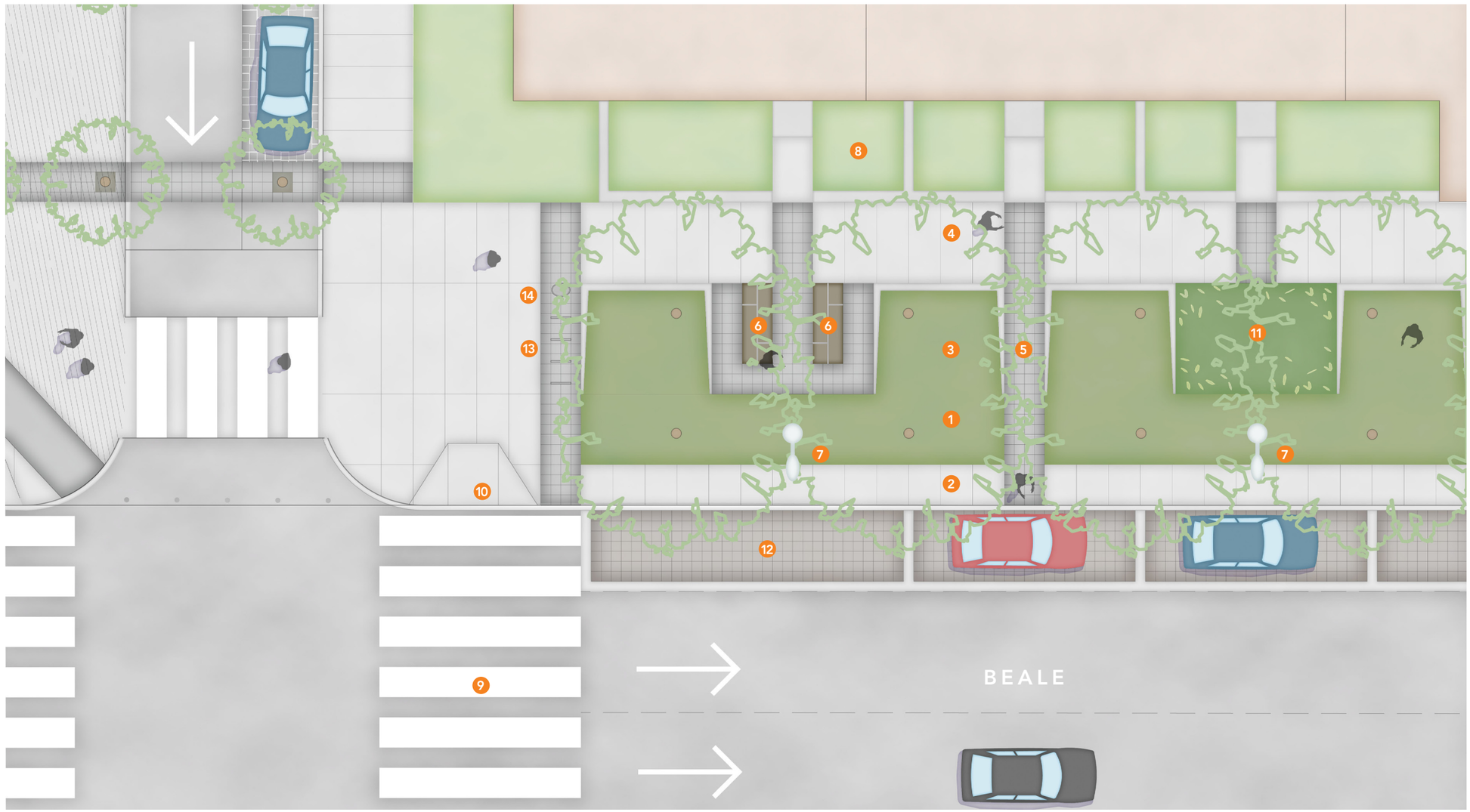
1. Along one side, the linear park streets will have 30′ sidewalk zones for extensive landscaping and double rows of trees to complement the smaller residential and retail frontages

2. Carrying less traffic, these streets would be appropriate for permeable pavers to visibly mark the curbside parking zones and reduce run-off typically directed to catch basins

Beale - Cross section looking north from Clementina

BEALE DESIGN FEATURES

1 Landscaped parkway
2 4' light concrete walk, saw cut joints
3 Sloped planting with concrete retaining walls
4 8' light gray concrete walk, saw cut joints
5 4' bands of black granite setts
6 Benches
7 New pedestrian lights
8 Required private residential setback
9 High contrast visible zebra stripe crosswalks
10 ADA compliant access ramps
11 Opportunity for dramatic planting or public art
12 Eco-pavers with precast concrete bands to denote parking stall
13 Bike racks
14 Trash receptacle



Beale - Enlarged layout plan

15 feet

N

2.7 CLEMENTINA & TEHAMA: PEDESTRIAN ALLEYS

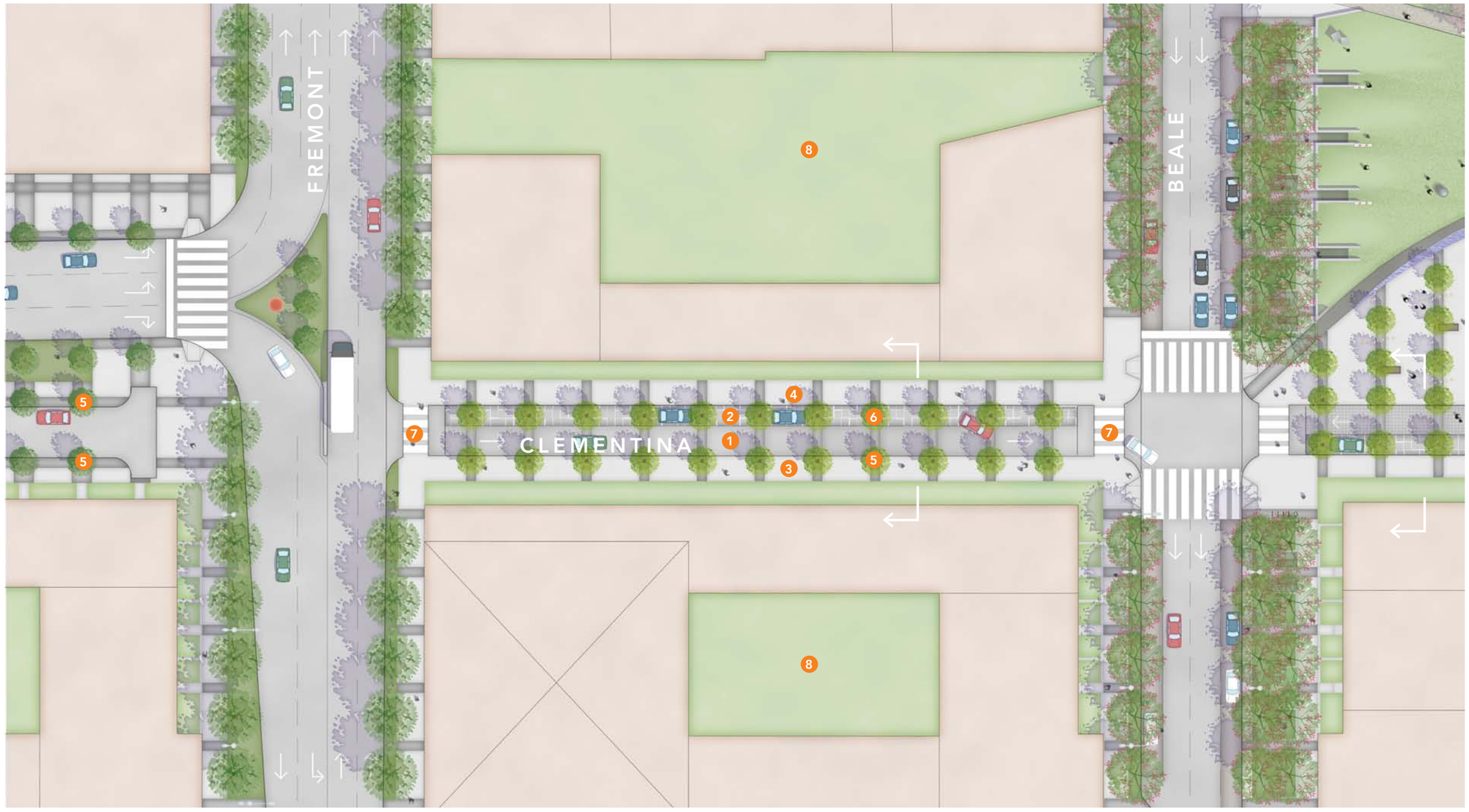
The Transbay neighborhood has several existing alleys that function as traditional service drives, more suited to vehicles than pedestrians. Natoma & Minna have been conceptually planned as part of the Transbay Transit Center by the Transbay Joint Powers Authority. The development of their function and specific design elements will be better understood as the Transit Center project moves forward.

The Design for Development proposed eastern extensions to Clementina between First and Spear, and to Tehama between Beale and Main. Running in an east-west direction, these alleys will be transformed into intimate neighborhood linkages providing greater access to Transbay Transit Center, Transbay Park and several new development projects. They have been designed to accommodate multiple uses within a 35' right-of-way, allowing them to become an amenity for the neighborhood.

Typically, the alleys must be divided into clear zones for the pedestrians and for vehicles. The transition between these two uses also needs to allow pedestrians to navigate across them easily. The transition between sidewalk and vehicular zones will be treated with 4" curbs and raised crosswalks at the entrances to the alleys (See Mobility Section 3.8). The sections of Clementina and Tehama that define the north and south boundaries of Transbay Park could be closed off to vehicles with motorized bollards to allow the street to be transformed during special neighborhood events, like a farmer's market or a street festival. During such events, closing off the street would effectively increase the size of the open space.

In general, the Transbay neighborhood alleys provide one-way local access and service vehicle access to loading and service areas of buildings. Typically there is street parking along one side. The parking spaces will be separated by Poplar trees in tree grates every 22' to correlate with a single parking stall length. The tall slender form of the Poplar will complement the narrow alley corridor. The rhythm proposed by the tree spacing will be reinforced with enhanced graphic bands in the paving. The paving treatment will run from property line to property line (or park edge) and unify both the pedestrian and automobile zones into a more urbane shared space.

Existing view of Clementina



ALLEY DESIGN FEATURES

1. 1 lane one-way
2. Parking zone
3. 6' sidewalk zone
4. 9' sidewalk zone
5. Trees 22' apart on sidewalk zone
6. Trees 22' apart in parking zone
7. Raised crosswalk
8. Private Open Space

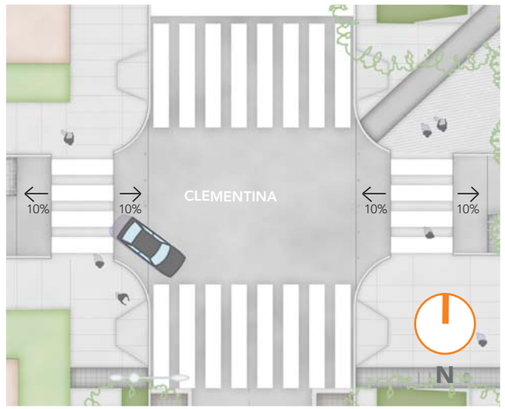
Alley - Illustrative block plan

50 feet

N

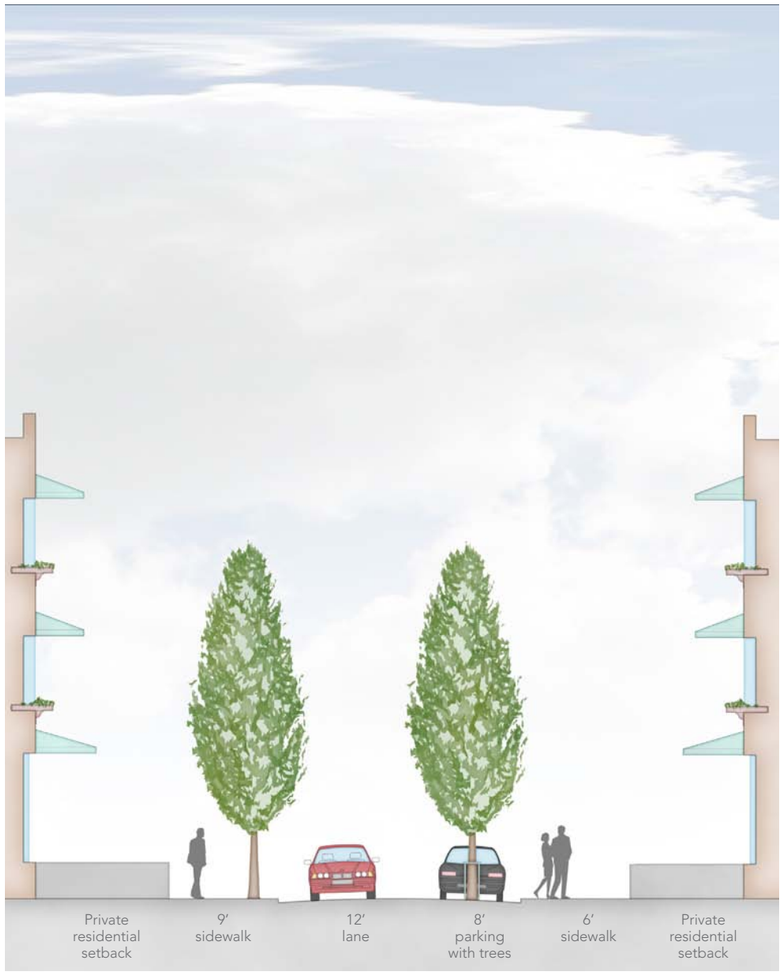
1

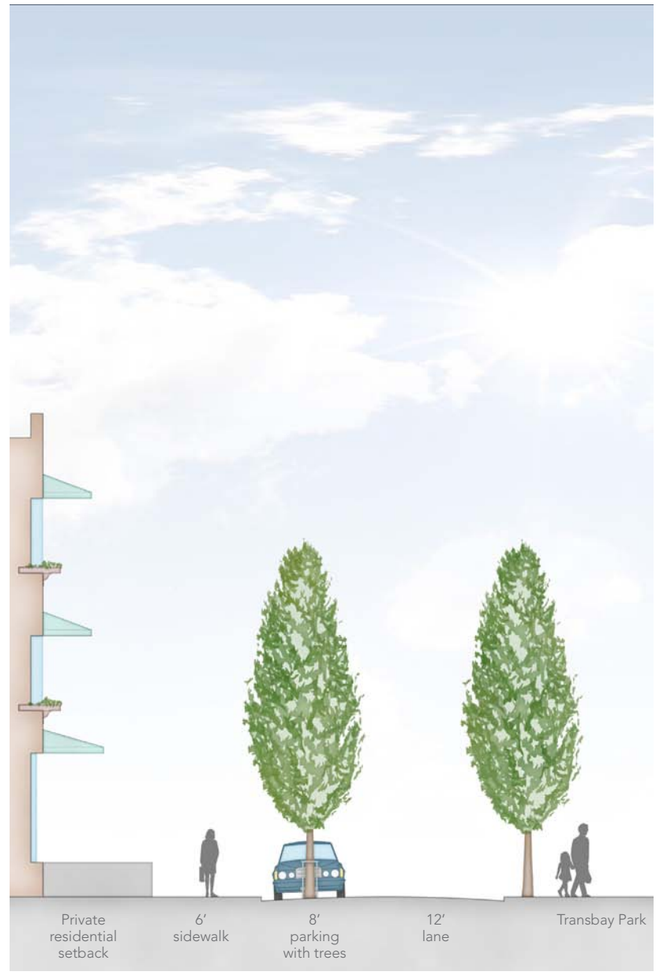
2



1. Alleys need to balance pedestrian movement with service vehicles and bicycles in the limited 35′ right of way (Pedestrian block near Russell Square, London)

2. Raised crosswalks at alley entrances will facilitate pedestrian access and have traffic calming effect (section 3.7)

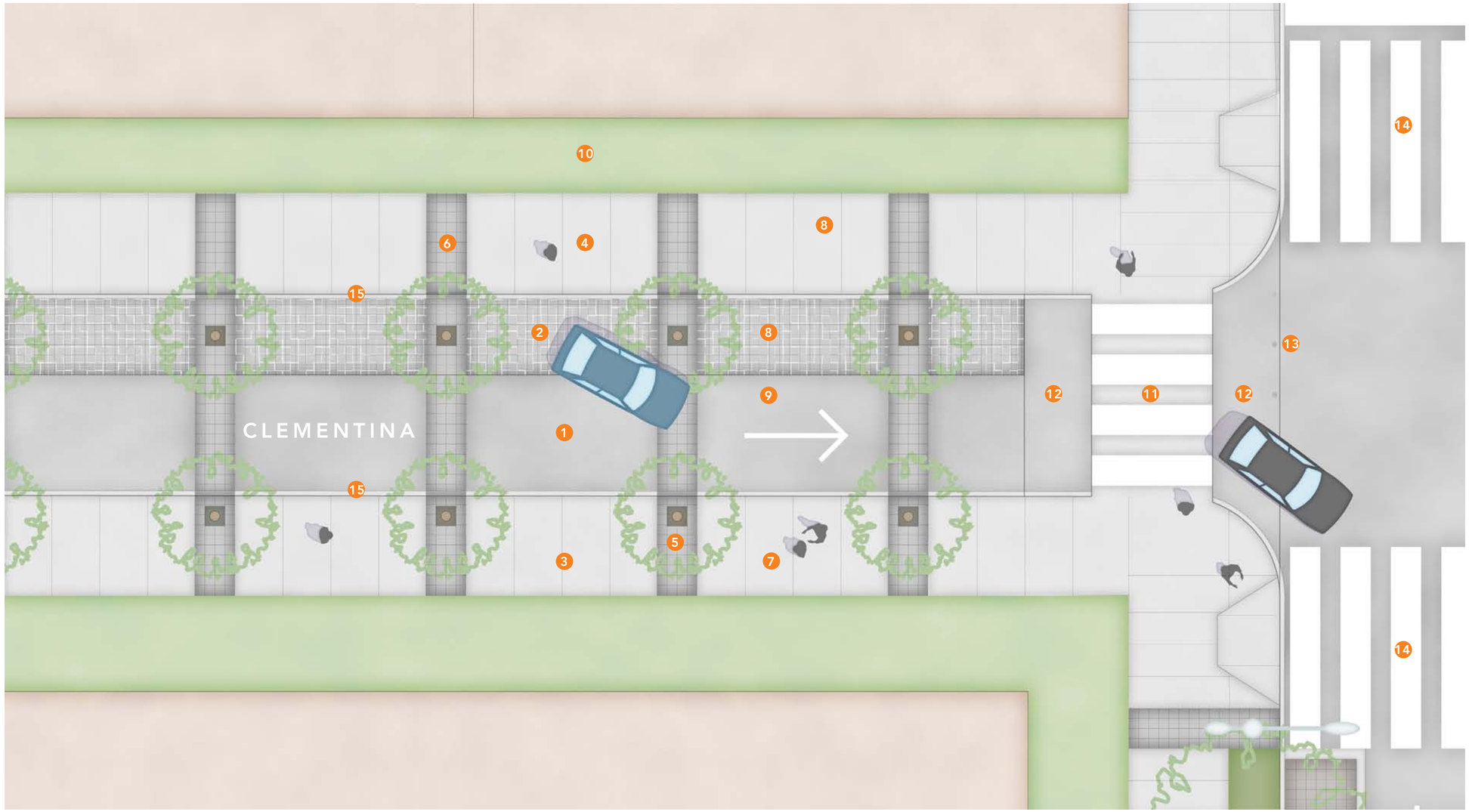




Alley - Cross sections at new development and at Transbay Park

ALLEY DESIGN FEATURES

1. 1 lane one-way
2. Curbside parking
3. 6' sidewalk zone
4. 9' sidewalk zone
5. Trees 22' apart on sidewalk with tree grates
6. 4' bands of black granite setts
7. Light gray colored concrete with saw cut joints
8. Black granite setts in parking lane
9. Black asphalt pavers in drive lane
10. Required private residential setback
11. Raised crosswalk
12. Speed bump transition
13. Removable bollards
14. High contrast visibility zebra strip crosswalks
15. 4" curb



Alley - Enlarged layout plan

15 feet

N

2.8 TRANSBAY PARK

Transbay Park is 1.1 acre site within the Transbay project area designated for recreational open space. Surrounded by proposed mixed-use residential developments and adjacent to existing commercial uses and the Financial District, the anticipated site users will be the newly emerging neighborhood residents well as office workers

The team's analysis of adjacent open space within the greater framework of parks, boulevards, mews and plazas surrounding the Transbay project area, combined with an understanding of the scale of this site relative to other urban parks, informed this park program. The scale of the site requires the development of a park that has an inherent capacity for multiple activities that are unprogrammed so that a "layering" of uses can occur. A program was developed to facilitate informal play and recreation framed within a creative and sculptural expression. Design and programming objectives include the integration of the adjacent alleys, Clementina and Tehama, and the living street linear parks, at Main and Beale Streets, providing expanded recreational real estate.

Circulation through the site was designed in a number of ways. A more defined and formalized approach occurs along the walks, sidewalks and alleys, facilitating directional and diagonal corner-to-corner movement and plaza access. Seating, water elements, sculpture and artistic lighting are all integral to the park's composition and have been developed as a "family" of park site furnishings. They also maintain a strong relationship to the Transbay District streetscape furnishings.

THE PLAZA

The elliptical plaza is sited adjacent to Clementina and the residential townhouses. With excellent solar exposure, this zone will provide an appropriate scale for many types of users, from informal marketplaces to small neighborhood gatherings. The tilted water wall and basin create a sculptural backdrop and edge to the plaza. Interspersed series of carbon fiber rods with lighting components reach skyward and provide kinetic and nighttime lighting interest. A columnar ginkgo "bosque" extends from the plaza into the alley. The surfaces are further expressed as extensions into the alley paving treatments and visually connect to the mid-block Clementina-Folsom passageway, which is lined by columnar pears.

THE WATER WALL

The water wall is effected by a uniform and thin sheet of water that flows over a smooth charcoal grey granite surface. The shallow basin at the foot of the wall is created by a sloped coping and is intended only for splashing, and as such, is no deeper than six inches. The water wall will comply with all applicable codes in effect at the time of its construction. Storm water reclaimed from the park landforms will pass through structural cellular networks under the park turf and will subsequently be purified, treated and stored in tanks under the landforms prior to its recirculation through the water wall.

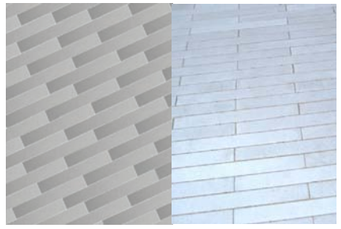
THE GREEN

The remainder of the park site has been developed into a sculptural "green", utilizing topography expressed by a series of undulating waves and tilted planes that define the site. Intersecting into these waves are the lateral pathways of the living streets, furthering the park's integration with its edges. At this juncture with the sidewalk, the grass waves also provide informal seating and play for all ages. Accessibility has been provided by the primary and secondary path systems that cross the site, which also partition the remaining green through surface treatment and topographic changes, providing for a multiplicity of simultaneous uses.

The green also provides an opportunity for sculpture, either of a temporal nature or permanent installations. Interactive art expressions are anticipated and would contribute to a playful environment.

PARK FURNISHINGS

GRANITE SETTS: SIDEWALK AND PLAZA BANDING, AND SEATING FIELD



LINEAR STONE PAVING IN PLAZA

PUNTO GARBAGE CAN [HESS]

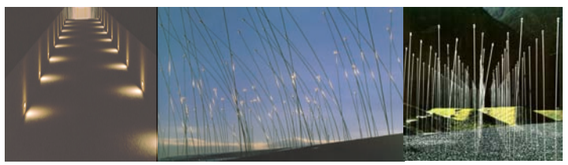
'FREDERIK' PERCH SEATING ALONG TERRAIN WALLS [VIA FUTURA] WITH CUSTOM BASE FROM HESS TO INTEGRATE FAMILY OF SITE FURNITURE

'FREDERIK' BENCH IN PLAZA [VIA FUTURA]

BOLLARD TYPE I

LIGHT PATTERNING WITHIN PLAZA, ALONG PATHS AND FLUSH MOUNTED ALONG TERRAIN WALLS

L.E.D. PAVING BRICKS [HESS]



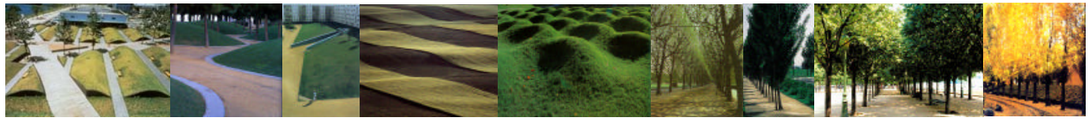
FLUSH WALL-MOUNTED LUMINAIRES [BEGA]

CARBON FIBER L.E.D. RODS IN PLAZA

PARK INSPIRATION

WATER ELEMENT

PLAY



TOPOGRAPHIC MANIPULATION

SCULPTURE

SEATING

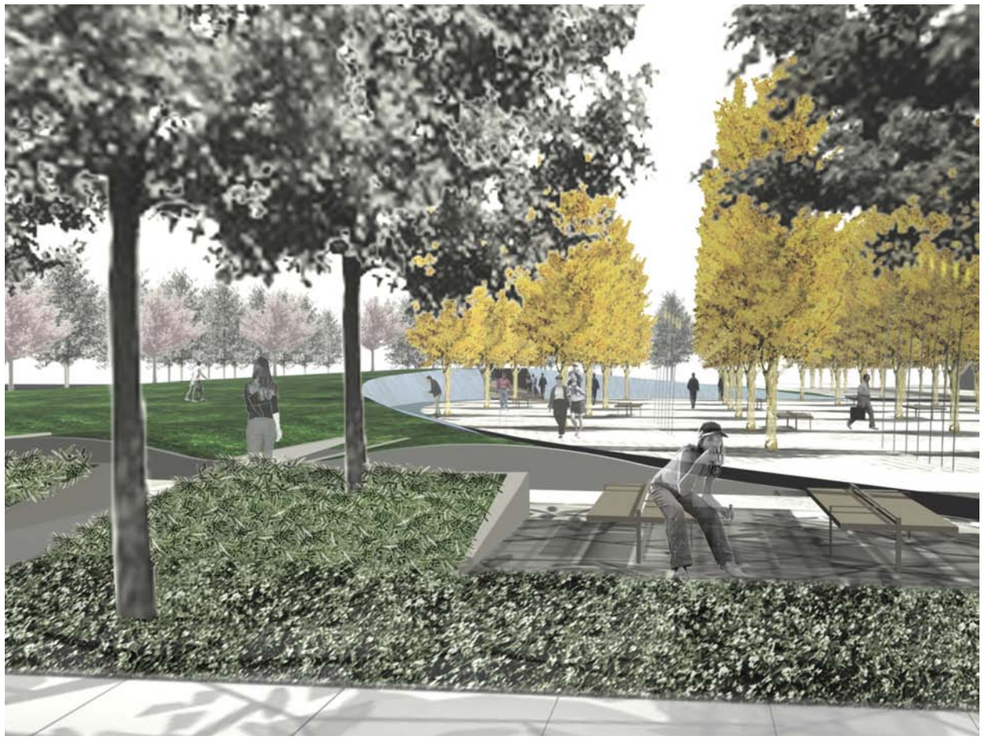
ILLUMINATION

PLAZA: WATER AS SCULPTURE, FORM, LIGHT CANVAS AND INTERACTION

Plaza: “Water as Sculpture, Lighting as Kinetic Art”

Open field: “Open Space: Programmatic Flexibility”

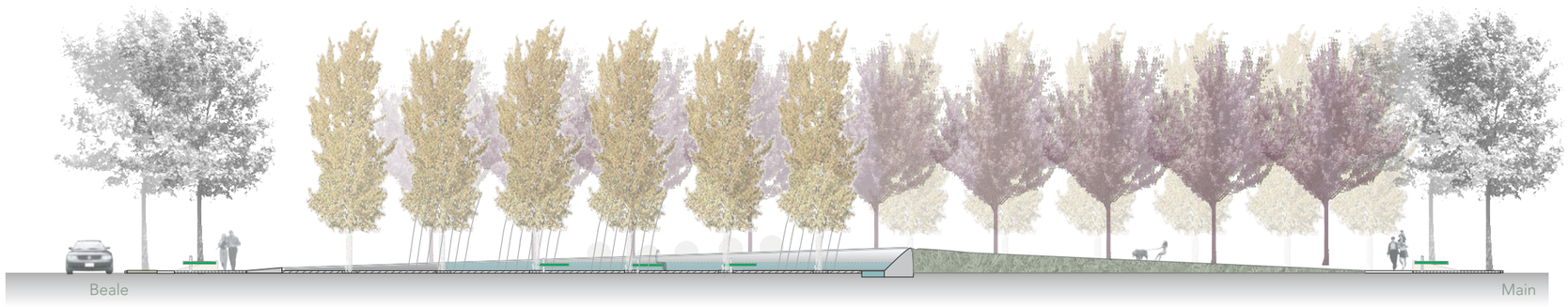
Pedestrian mews looking north: “Park Integration with Street”



Linear park street and park perspective: “Topographic Manipulation”

TRANSVERSE SECTION

30 feet

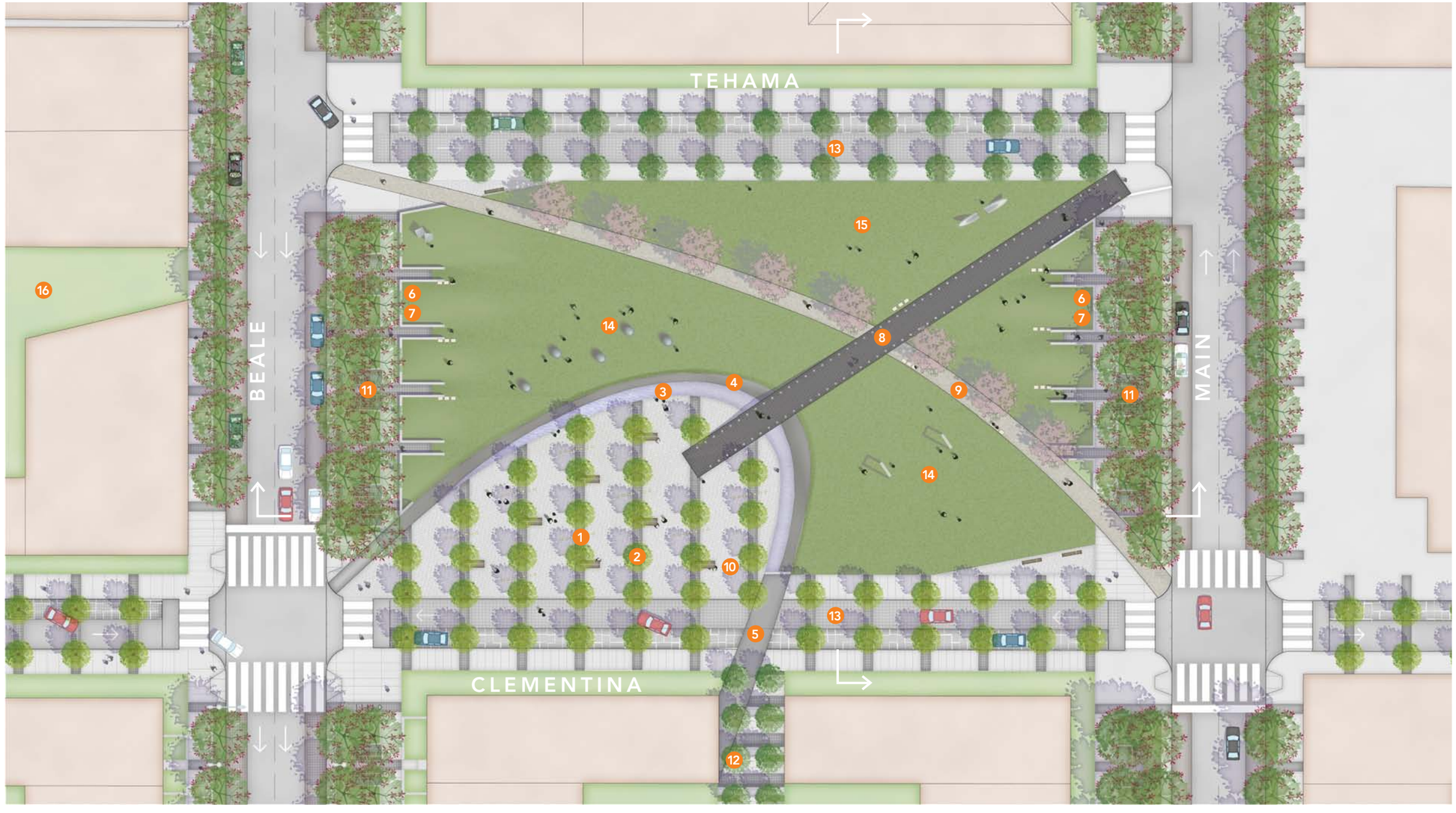


LONGITUDINAL SECTION

30 feet

TRANSBAY PARK DESIGN FEATURES

1 Plaza paved in 4" x 24" black granite pavers
2 Gingko trees
3 Water basin
4 Black granite wall
5 Black granite paving extending to mews
6 Concrete walls
7 Undulating "waves" of turf
8 Black granite 8" pavers with in-ground LED lights
9 Medium gray concrete path with intermittent seat walls & lights
10 Benches
11 Extension of linear park sidewalk
12 Grass planters at Beech trees
13 Black granite setts in field of medium gray concrete
14 Play Area
15 Field
16 Private Open Space



Transbay Park - Illustrative plan

2.9 STREET TREES

Inventory

The design team undertook a comprehensive field survey and inventory of the existing street and alley street trees in the Transbay Project Area. The field survey documentation indicates a generally poor inventory of existing street trees except in newly developed sites within the district. No consistent pattern of street trees was observed except for a predominate planting of Platanus x. acefolia "Bloodgood" along Howard Street and mature plantings of London Planes and Southern Magnolias trees on Second Street.

Another influencing factor in the analysis is the proposed sidewalk widening and re-scaling occurring on the linear park streets as well as on Folsom Street, thereby necessitating the removal of any existing street trees, regardless of their condition.

The Team's conclusion is that a new street tree palette is recommended for the entire district, excluding Howard Street and the historic Second Street, where there would be a continuation of the existing tree types and pattern.

Selection Criteria

Street tree selection was developed with the assistance of an arborist team. Preferred tree genus-species recommendations and alternatives were based on a number of criteria. The criteria have both design aesthetic and horticultural components. Alternative recommendations are provided for circumstances in which the provision of the primary trees is impracticable. This could be the result of limited sourcing quantities or species-wide disease risk which would compromise the viability of a uniform street tree reading.

Design and Aesthetics

The Team investigated a series of Streetscape Framework options (see Section 2.1) and determined that a hybrid of the three studies was the most interesting in terms of wayfinding and street type identification. East-west streets would receive a similar streetscape development, including site furnishings and tree types; north-south streets will have a similar expression; and north-south living streets, a unique treatment. Alleys will be developed as the interstitial links, having specific spatial requirements.
A variety of tree typologies were explored for aesthetics, scaling, density and transparency, and spatial organizing opportunities within the overall streetscape framework. The living streets provide opportunities to plant double rows of trees, creating allées and linear parks. The expanded north sidewalks of Folsom Street are spacious enough for double rows of street trees and north-south intersection vertical elements (see Folsom Street alternate 2). Sidewalks that remain the same dimension receive single rows of street trees, and narrower alleys and mid-block mews have columnar trees specified.

Horticultural Requirements

Urban Performance

Trees have been selected for their performance in urban environments in which higher demands are placed on them, affecting their success rate, viability and longevity as street trees. Traffic interference, pollution and limitations on soil volume are all factors in determining the suitability of specific genus-species.

Microclimate

The Transbay Project Area was reviewed in greater detail for its specific microclimate conditions. New trees to be located on the north-south grid orientation have a general habitat with leeward building protection and reduced winds and shorter solar seasons with more shadow in the mornings-afternoons. Trees selections recommended for these conditions have habits that are more bold, open, "centrifugal" and in general are taller, deciduous, forest-type trees.

Trees to be located on the east-west grid orientation have a general habitat that is windward with corridors more aligned with the prevailing or parallel winds and will have a potentially longer period of solar exposure. Tree selections for these conditions are in general shorter, coastal, "closed", buffeted bosque and evergreen, representative of tight, virgate, dark and denser canopy trees. Decurrent branching and a more Mediterranean "centripetal" type(s) have been selected. With those specific characteristics we were concerned with canopy density and low light conditions underneath and have selected trees that have a more open, broad-leaved evergreen canopy so light penetration is maintained.

The area's alleys run in both east-west and north-south directions, and due to the narrow character of these streets and parking requirements, tall, deciduous, columnar trees have been recommended; trees are shown within the alley parking zones, protected by bollards. This streetscape strategy provides a more generous, unimpeded sidewalk pedestrian zone.

Size and Location

The recommended nursery-grown container size specifications is a 48" box for all new street tree installations and a 36" box for the columnar alley trees. A SFRA-approved Arborist should accompany the Landscape Architect when nursery field inspections and final street tree nursery tagging takes place. Tree structure, overall form, branching heights and pattern, and general nursery growing protocol all require careful consideration in the selection of street trees, and will greatly influence the outcome of a successful streetscape.

Structural Soils

Structural soil is a critical component to the success of street trees and a successful urban forest. All street trees are to utilize structural soils as the planting medium with specific volume requirements identified for the specified genus-species. Where practical, continuous structural soil trenches should run the length of the street tree plantings. Specifications for structural soils should be carefully analyzed for the appropriate application within the project area. Trees that will go into existing streetscape environments should utilize structural soils in new planting installation. (See Appendix for Sample Structural Soil Guidelines)

Irrigation

All street trees are to receive automatic irrigation. This pertains to trees planted within hardscape-stone setts and tree grate environments as well as trees planted within planting zones. The latter will receive irrigation that provides a two tiered horizontal coverage for both the trees and understory, as vertical saturation is provided through the use of structural soils.

Staking

A custom-designed tree-staking system will be developed for the Transbay Project Area that contributes to the aesthetics of the site furnishing family and provides the required support during the initial years of tree stabilization and adaptation. These will be developed to provide tree support and anchorage yet allow for movement and root structure development. Prescriptive staking techniques and removals will be clearly defined in a maintenance manual.

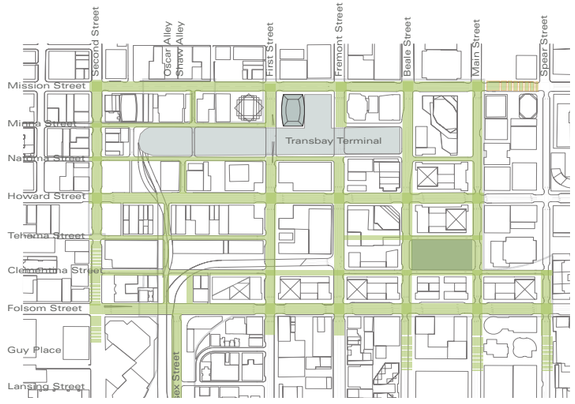
Visibility Guidelines

The siting of all new tree plantings shall be in accordance with City of San Francisco guidelines [Department of Public Works, Ordinance No. 169,946] regarding tree setbacks and utility/signal visibility. On the approach and far sides of any intersection, trees shall be no closer than 25 and 10 ‘, respectively, from the corner of the property line. Additionally, trees and landscape treatments located in the sidewalk area shall be located so that visibility of traffic signals or lights will be assured at all times.

Management and Maintenance

A maintenance manual for the project area will be required and will specify the maintenance requirements of the street trees as they relate to all components: staking, staking adjustment and removal, irrigation programming, water application requirements and frequency, fertilization program, pruning methods and schedule, as well as tree .

STREET TREE PALETTE



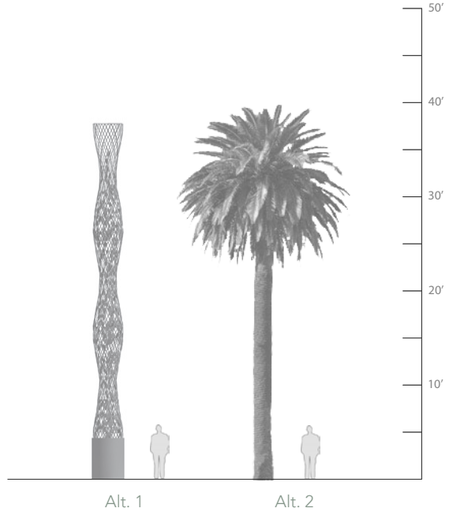
Allée | Bosque | Columnar

LOCATION	BOTANICAL NAME	COMMON NAME
FOLSOM STREET MISSION STREET	*Lophostemon conferta*	Brisbane Box
FOLSOM STREET ACCENT	Vertical gateway element Alternative: *Phoenix canariensis*	 Canary Island Date Palm
FOLSOM STREET OFF-RAMP	*Populus nigra var betulifolia v.* 'Theves'	Theves Improved Lombardy Poplar
HOWARD STREET	*Platanus acerifolia v.* 'Bloodgood'	London Plane Cultivar
MAIN STREET BEALE STREET SPEAR STREET	*Tilia cordata v.* 'Greenspire' Alternative: *Liquidambar styraciflora* 'Rotundiloba'	Little Leaf Linden Liquidambar Cultivar

LOCATION	BOTANICAL NAME	COMMON NAME
SECOND STREET	*Magnolia grandiflora* *Platanus acerifolia v.* 'Yarwood'	Southern Magnolia London Plane
FREMONT STREET FIRST STREET ESSEX STREET	*Acer rubrum* 'Red Sunset' Alternative: *Acer x. freemanii* 'Autumn Blaze'	Red Maple Freeman's Maple
CLEMENTINA	*Ginkgo biloba v.* "Princeton Sentry"	Columnar Ginkgo
TEHAMA	*Pyrus calleryana v.* 'Chanticleer'	Columnar Ornamental Pear
MINNA	*Acer rubrum* ''Bowhall	Columnar Red Maple
NATOMA	*Pyrus calleryana v.* 'Chanticleer'	Columnar Ornamental Pear
SHAW	*Ginkgo biloba v.* "Princeton Sentry"	Columnar Ginkgo
OSCAR	*Fagus sylvatica v.* "'Dawyck Gold"	Columnar Beech
ECKER	*Fagus sylvatica v.* 'Fastigiata'	Columnar Beech

FOLSOM STREET

ACCENT ELEMENTS AT INTERSECTIONS



VERTICAL GATEWAY ELEMENT SCALING

DESIGN GOALS

There are two streetscape applications that may be used to help create the character of Folsom Street, the 'Main Street' of the new Transbay Neighborhood and Rincon Hill.

ALTERNATIVE 1

Acting as visual gateways, sculptural lighting, tensile structures or other vertical art elements will announce Folsom as the gateway street into the Transbay neighborhood. Scaled to rise above the Brisbane Box on the north and south sides of the street, these 'markers' would also function as wayfinding devices for pedestrians using the north - south connector streets.

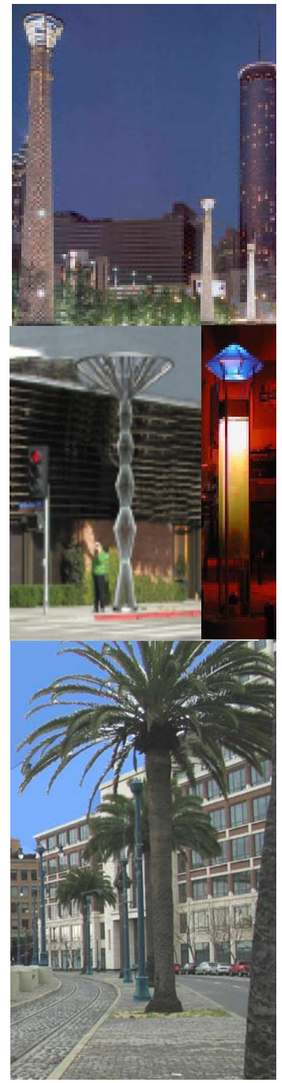
It is recommended that the art budget for the redevelopment effort target and aggregate these vertical elements as an opportunity for differentiating the character of the Transbay neighborhood. Potential sources of inspiration for the work could be climactic, kinetic (transportation), light-related, or based on seasonal or other regional phenomena.

ALTERNATIVE 2

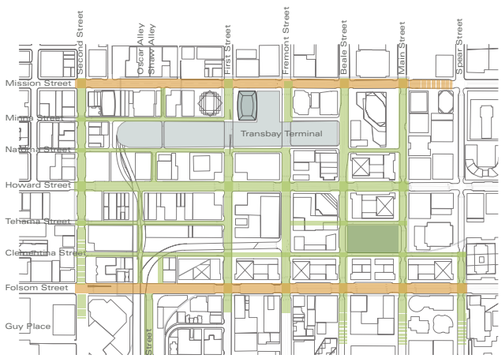
Under the alternative scenario, the intersections of Folsom Street will be accented by the Canary Island Date Palms, which will rise above the canopies of the Brisbane Box on the north and south side corners of the street, framing both the urban cityscape and water views beyond.

The Canary Island Date Palm, a medium height palm with a stout, textured trunk and broad canopy, presents a striking and dramatic silhouette.

The photo on the right illustrates one of the numerous plantings within San Francisco's boulevards. This palm has been effectively used in the medians of Dolores Street, upper Market Street and the Embarcadero.



FOLSOM & MISSION STREETS



GROWTH PATTERN

The newly installed Brisbane Box are to have the branches and overall tree structure trained for a street environment. The branching will be 8' at installation.

DESIGN GOALS

As the "Main Street" of the new Transbay and Rincon Hill neighborhoods, Folsom Street will provide a mixed-use pedestrian environment. Widened sidewalks on the north will accommodate a double planting or alley of street trees. The Brisbane Box will provide an evergreen, vertical profile, facilitating ground level site lines. The south side will be planted with a single row.

Mission Street will also receive a similar street tree treatment, with unaltered sidewalks widths and single rows on both the north and south sides. Folsom and Mission Streets represent the northern and southern project boundaries and planting like genus/species responds to these street's east-west horticultural growth criteria and establishes a visual demarcation of neighborhood edges.

Brisbane Box is a broadleaf evergreen that is similar in appearance to madrone and some eucalyptus species. This fast-growing and robust tree is well suited for street planting as they are pyramidal in form and maintain an upright habit, facilitating double plantings and allées.

The photo on the right is an example of a successful Brisbane Box streetscape in San Francisco. This tree selection has been used in commercial, retail and residential environments as it facilitates a rapid scaling of the adjacencies, reaching two to three stories in height.

BOTANICAL INFORMATION

Species:
Lophostemon confertus

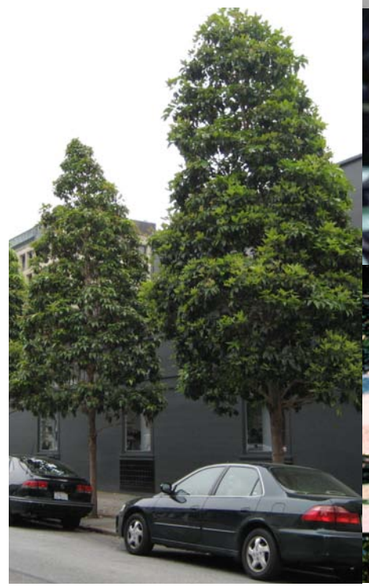
Common Name:
Brisbane Box

Type:
Broadleaf Evergreen

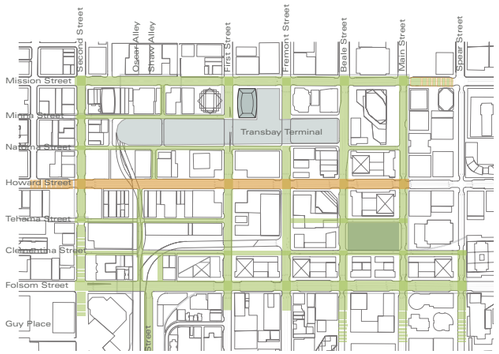
Height:
30'-45'

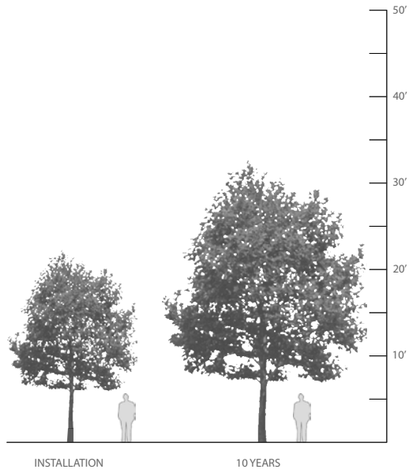
Spread:
To 25'

Description:
Erect and moderate to fast growing. The leaves are in bright green clusters at the ends of branches. White to cream colored flowers in summer. The bark is reddish brown, similar to a Madrone.



HOWARD STREET





GROWTH PATTERN

The newly installed Plane Trees are to have the branches trained for a street environment. The branching will be 8' at installation and will be 10'-12' after 10 years.

DESIGN GOALS

Howard Street represents one of the primary east-west connector streets through the Transbay Redevelopment area. This street is primarily developed and will not have sidewalk rescaling. London Plane trees are the predominate tree along this corridor with more recent introductions of other genus-species along newer development streetscape frontages. The Planes are in relatively good condition.

For all new development and infill it is recommended that the same Plane cultivar, "Bloodgood", be utilized, resulting in a continuation and strengthening of the existing street tree type and pattern. Well known for its urban adaptability, the large canopied Plane contributes to the appropriate scaling of Howard.

Existing Conditions:
This tree is currently the predominant street tree on Howard street and the plantings are in relatively fair condition. Recommendations are for continuing the use of this genus/species at new project development and infill sites so that the streetscape will "leaf-out" simultaneously and retain a consistency in character.

BOTANICAL INFORMATION

Species:
Platanus acerifolia 'Bloodgood'

Common Name:
London Plane Tree

Type:
Deciduous

Height:
30'-60'

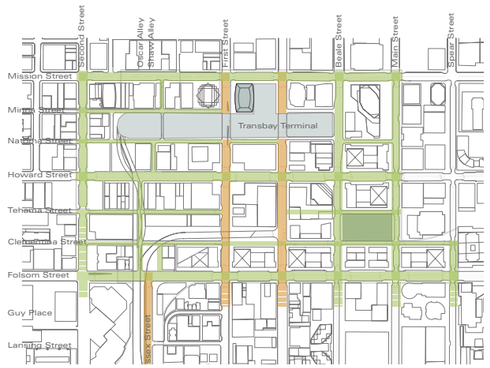
Spread:
25'-35'

Description:
The London Plane is large and sculptural tree well suited for street and urban uses. Fall color ranges from yellow to brown. The bark varies from brown to gray. Ball-shaped seeds hang on the bare branches in winter.

Platanus X. acerifolia 'Bloodgood'

CONNECTOR STREETS

FREMONT, FIRST & ESSEX STREETS



GROWTH PATTERN

The newly installed Red Maples are to have the branches trained for a street environment. The branching will be 8' at installation.

DESIGN GOALS

The Connector Streets run north-south and represent the middle third of the Transbay Redevelopment Area. These streets will carry a large volume of traffic from the Transbay District through Rincon Hill and are the main access routes to the easternmost Bay Bridge on-ramp.

The mixed-use development along these streets is well established, while the existing street trees are poorly represented. A broad, stately, deciduous tree will compliment these streets. As high traffic volume and parking is prescribed for the Connector Streets, rescaling of the sidewalks will not occur.

The Red Maple has been used as a street tree throughout the Bay Area, planted for its large and graceful profile and successful autumn coloration. A non-fruiting cultivar has been recommended.

BOTANICAL INFORMATION

Species:
Acer rubrum 'Red Sunset'

Common Name:
Red Maple

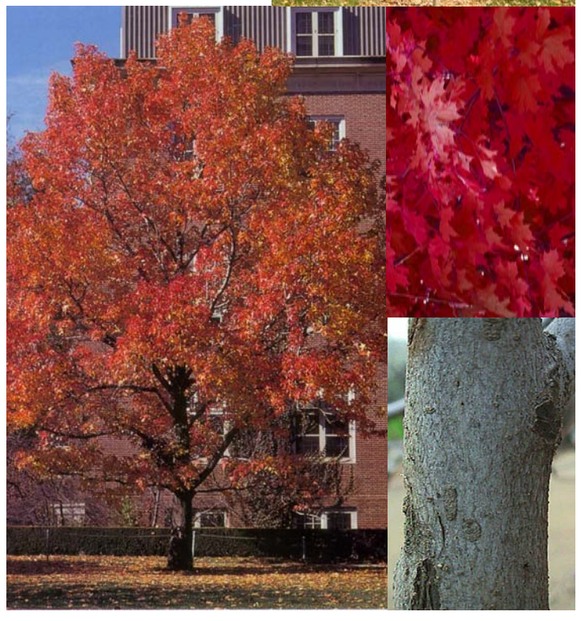
Type:
Deciduous

Height:
45'-60'

Spread:
25'-30'

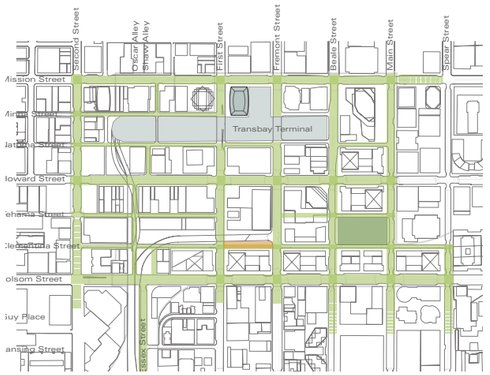
Description:
Growth is upright and spreads at a moderate rate with maturity. The leaves turn yellow, vibrant red and burgundy in fall. Sets no seed pods. Lightly textured grey brown bark.

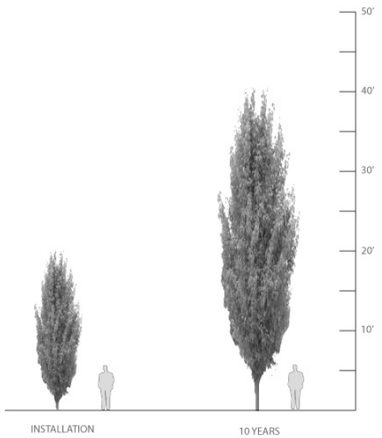
Alternates:
Acer x. Freemanii 'Autumn Blaze'



FOLSOM STREET OFF-RAMP

INTENSIVE PLANTING AREA





GROWTH PATTERN

The newly installed Lombardy Poplars are to have the branches trained for an urban street environment. The branching will be 3'- 4' at installation.

DESIGN GOALS

The proposed realigned Folsom Street Off-Ramp includes a narrow strip of land adjacent to the ramp as the ramp meets grade at Fremont Street.

The Theves Improved Lombardy Poplar is recommended to line the south and north edges of the ramp in order to create a memorable and dramatic sense of entry into the Transbay Redevelopment District. This Poplar's form is tall and upright and is characterized by a narrow crown, dense growth and striking whitish bark. In the fall, the Theves Poplar provides vivid seasonal color.

More than any other tree explored by the horticultural team, this Poplar's striking verticality and form will balance the large scale and mass of the ramp. Among the hardiest of poplars, these trees will also avoid the fungal problems and shorter life spans common to other members of the Poplar genus.

The photo on the right shows a typical windbreak planting of columnar Poplars.

BOTANICAL INFORMATION

Species:
Populus nigra var betulifolia 'Theves'

Common Name:
Theves Improved Lombardy Poplar

Type:
Deciduous

Height:
40'-60'

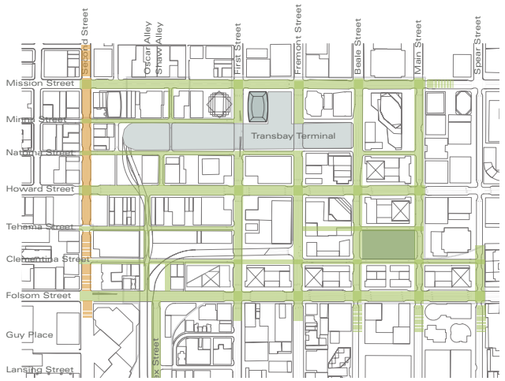
Spread:
15'-20'

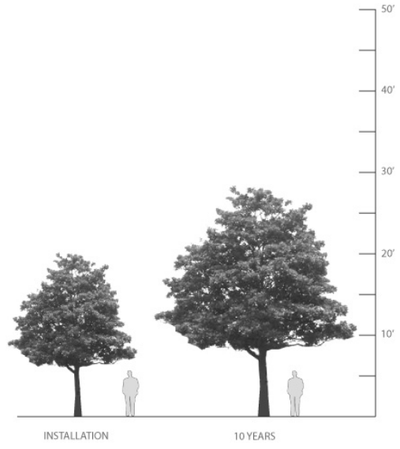
Description:
Dramatic columnar tree with upward reaching branches. Bright green leaves turn yellow in the fall. Valuable as a windbreak and vertical skyline element.

Alternates:
*Zelkova serrata 'M*usashino' (Columnar Sawleaf Zelkova)

SECOND STREET

HISTORIC NEIGHBORHOOD STREET





GROWTH PATTERN

The newly installed Magnolias and Planes are to have the branches trained for a street environment. The branching will be 8' at installation. Cultivars should match those already existing on Second Street.

DESIGN GOALS

Second Street runs north-south and represents the western edge of the Transbay Redevelopment Area.

To maintain the historic character of this street, new street trees will match the existing planting palette. Currently Southern Magnolias and London Planes line Second Street between Mission and Folsom. In addition, the City has been infilling using these two tree types. Both are large, broad-spreading trees with the London Planes being deciduous and the Southern Magnolias, evergreen.

Although both are large trees, London Planes have an open and graceful branching pattern and striking bark. The Southern Magnolias are renowned for their showy display of large white flowers and glossy green foliage.

Microclimates, solar and wind exposures influence the success of both selections and should be carefully considered when siting these selections. Consideration should also be given to the pre-existing streetscape pattern.

BOTANICAL INFORMATION

Species:
Magnolia grandiflora

Common Name:
Southern magnolia

Type:
Evergreen

Height:
30' to 40'

Spread:
15' to 30'

Description:
The Southern Magnolia is a large and sculptural tree well suited for street and urban uses. Most noted for is dramatic display of white flowers in summer and fall. The leaves are glossy and leathery. The bark varies from brown to gray.

Species:
Platanus x. acerifolia 'Yarwood'

Common Name:
London Plane Tree

Type:
Deciduous

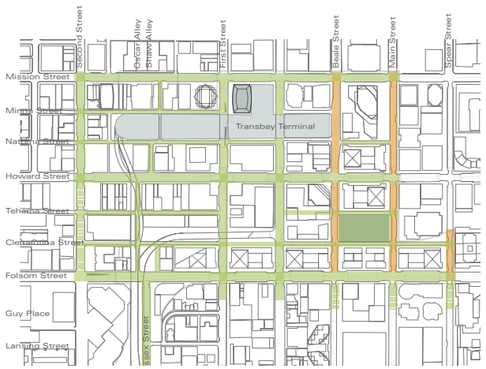
Height:
30'-60'

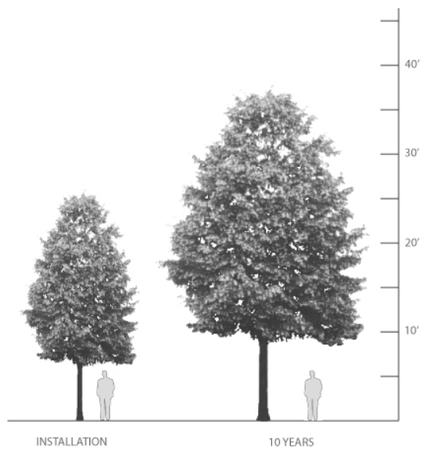
Spread:
25'-35'

Description:
The London Plane is a large and sculptural tree well suited for street and urban uses. Fall color ranges from yellow to brown. The bark varies from brown to gray. Ball-shaped seeds hang on the bare branches in winter.

LIVING STREETS

SPEAR, MAIN & BEALE STREETS





GROWTH PATTERN

The newly installed Little Leaf Lindens are to have the branches trained for a street environment. The branching will be 8' at installation. Pyramidal at youth, the Linden develops to a pyramidal to upright oval with maturity.

DESIGN GOALS

The "Living Streets" run north-south and represent the eastern third of the Transbay Redevelopment Area. These streets will carry a lower volume of traffic than the Connector Streets or the east-west corridors, Mission, Howard and Folsom.

The mixed-use residential development along these streets will be complimented by widened sidewalks planted with a double allée of trees on one side of the street. The widened sidewalks will allow for the development of linear parks and understory plantings and seating environments.

The Little Leaf Lindens loose leaf and branch structure will allow for ample light to reach the sidewalk and understory plantings at the linear park.

BOTANICAL INFORMATION

Species:
Tilia cordata v. 'Greenspire'

Common Name:
Little Leaf Linden

Type:
Deciduous

Height:
40'-50'

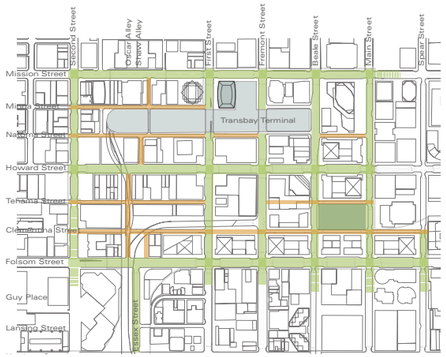
Spread:
20'-30'

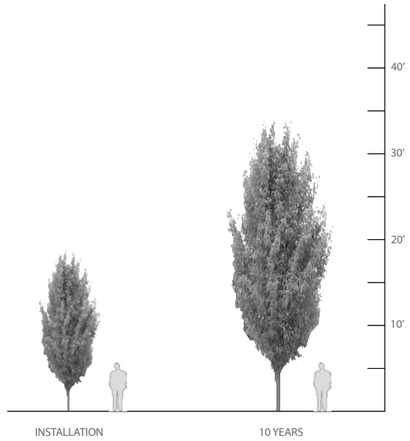
Description:
Symetrical leafed trees with stately good looks, and small, fragrant yellowish white flowers. Has an especially handsome winter silhouette.

Alternates:
Liquidamabar stryraciflora
'Rotundiloba'

ALLEYS

CLEMENTINA, TEHAMA, MINNA, NATOMA SHAW, OSCARECKER





GROWTH PATTERN

The newly installed columnar trees are to have the branches trained for a street environment. The branching will start at 3'-4' at installation.

DESIGN GOALS

The alleys in the Transbay Redevelopment area will capture the vitality created by the mixed-use developments and transit hub, but also display the character of the neighborhood through a finer textured vocabulary.

Deciduous, columnar trees of a medium height have been selected to compliment the pedestrian scale and slower moving traffic of the alleys. The columnar form allows the trees to grow naturally but not interfere with the narrow conditions of the alleys. This form is also well suited to light penetration as well as the combined parking/planting layouts prescribed for the alleys.

Diverse genus/species of deciduous trees will be used to differentiate the north-south from the east-west alleys and will result in a horticultural wayfinding and patterning.

Existing columnar trees in alleys that are in good condition and in sufficient quantities should be retained and infill in these areas should be of the same genus / species.


Pyrus calleryana v. "Chanticleer' at Clementina

BOTANICAL INFORMATION

Illustrative Species:
Gingko biloba v. 'Princeton Sentry'

Common Name:
Columnar Ginkgo

Type:
Deciduous

Height:
To 40'

Spread:
To 15'

Description:
Columnar Ginkgo is distinguished by its upright, columnar growth pattern. Brilliant fall color ranges from deep to bright yellow.

Other Species Recommendations:
Acer rubrum 'Bowhall'
Fagus Sylvatica v. 'Fastigiata' and v. 'Dawyck Gold'
Pyrus calleryana v. 'Chanticleer'

See Street Tree Palette page for specific recommendations for each alley application.

Gingko biloba v. 'Princeton Sentry'


Acer rubrum v. 'Bowhall'

Pyrus calleryana v. "Chanticleer'

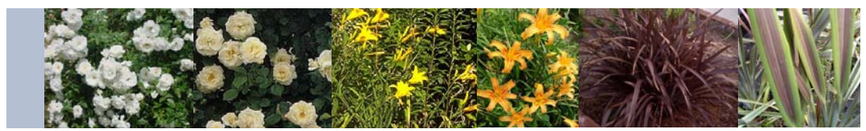
HORTICULTURAL UNDERSTORY DESIGN GUIDELINES

- Develop an integrated, overall understory plant palette for all of the Transbay area conditions.
- Select the appropriate understory planting that will achieve the design intent in the specific zone. Maintain consistent height, repetition of form and pattern, and color balance.
- Selections are to consider maintenance requirements. Plant choices should not require extensive dead-heading or foliage trimming and pruning.
- Plant alternatives provided have been recommended for overall form, texture, year-round interest, and adaptability to an urban streetscape condition.
- Selections should consider the light availability and solar exposures and selections be made that correspond to sun-shade patterns.
- The living streets are to be planted in a consistent manner along the entire lengths of Beale, Main and Spear.
- The plant palette should consider water requirements and frequency, and any combination of planting will need to have similar water requirements.
- Provide for an automatic irrigation system specifically designed for the understory and integrate the system with the overall streetscape tree irrigation system.
- Understory planting should have an organic mulch cover.
- Plant selections need to take into consideration the impact of dog walkers and dog wastes as well as pedestrian circulation and vehicular exiting.
- Selections should provide a permanent, municipal, low maintenance environment with the exception of the Special Feature Gardens.

FREMONT STREET OFF-RAMP ISLAND

Alt. I. Flax, Phormium composition, patterning of low and taller varieties.
Alt. II. Floral and textural composition utilizing Folsom St. Alt. I. rose type and perennial edgers.
Alt. III. Jasmines, Trachelospermum groundcover or similar as “plinth” for art installation.
Alt. IV. Fremont street trees with same understory planting for continuation of streetscape language.

FOLSOM STREET BULBOUTS AND VERTICAL GATEWAYS



Alt. I. Roses, Rosa cultivars: mono-species, evergreen-semi-evergreen - groundcover varieties, i.e. R. wichuraiana, R. polyanthas. Colors: white, yellow, copper-salmon, coral-orange, ‘Alberic Barbier’, ‘Paul Transon’, Gardenia’, ‘Margo Koster’.
Alt. II. Flax, Phormium hybrids, low to medium varieties, 18”-36” height, ‘Duet’, ‘Sea Jade’, Tom Thumb’, ‘Bronze Baby’.
Alt. III. Daylilies, Hemerocallis hybrids, evergreen, long blooming, low-medium varieties, 24”-36” height. Color, yellows, golds, oranges, ‘Stella de Oro’, ‘Mary Todd’, ‘Hyperion’.

CONNECTOR STREET UNDERSTORY

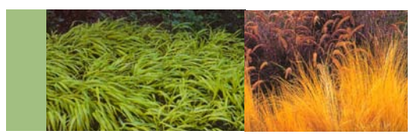
Alt. I. Star or Asian Jasmine, Trachelospermum jasminoides or asiaticum, massed, 18”-24” height.
Alt. II. Sedges or Carex, variegated or solid-color hardy varieties,18”-24” height, one-two varieties, massed or patterned, C. testacea, C. tumulicola, C. ‘Frosted Curls’, C.montana.
Alt. III Other grass or grass-like textural groundcovers, mono-species; Deschampsia caespitosa, Koeleria glauca, or Nassella tenuissima.

LIVING STREETS

Type I –Tilted Plane

Alt. I. Dwarf Bamboo Groundcovers, 18”-36” height, mono-species, Sasa vechii, Pleioblastus humilis pumilis, P. variegata,P. argenteostriata, P. chino vag. ‘Variegata’, P. viriddistriatus.
Alt. II. Evergreen shrub massing, 24”-36” height, mono-species, Loropetalum chinense, Camellia `sasanqua v. ‘Mine-No-Yuki’, or Viburnum davidii.
Alt. III. Clipped boxwood tilted plane, 24’ height, Buxus m. japonica ‘Green Beauty’.
Type II Linear Flat Parkway - See the Alternates for Connector Street Understory.

SPECIAL FEATURE GARDENS



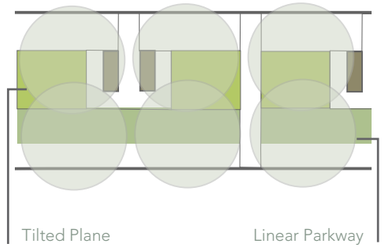
See composition imagery for examples of color and texture. These gardens occur intermittently along the living street parkways and are intended to provide seasonal color and textural interest. The planting selections should be derivative of an overall palette for the Transbay area yet provide a more detailed and horticulturally rich expression. Seasonal “change outs” will be required two-three times per year. Structural or foundation plants can be designed for permanency within these compositions, while annual color, perennials, ornamental grasses and bulbs are seasonally rotated.

These gardens will require a higher level of maintenance and weekly care; the quantity of special feature gardens within the living streets should carefully consider the costs of rotating gardens and the associated maintenance requirements. The occurrence and layout of these special gardens should also consider the over all living street seating patterns and general streetscape layout.

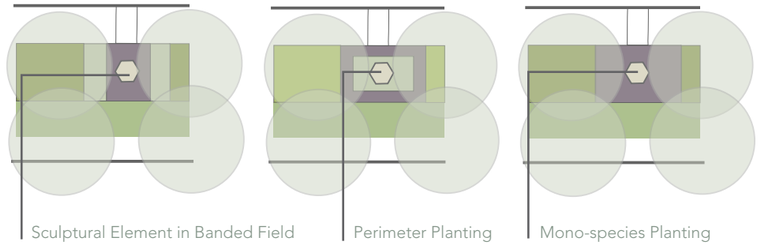
HORTICULTURAL UNDERSTORY DESIGN GUIDELINES

SPATIAL ORGANIZATION

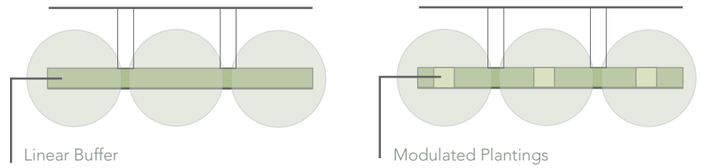
Living Streets



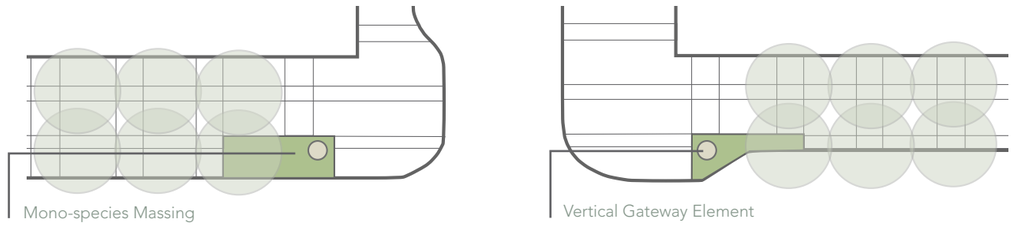
Special Feature Gardens at Living Streets



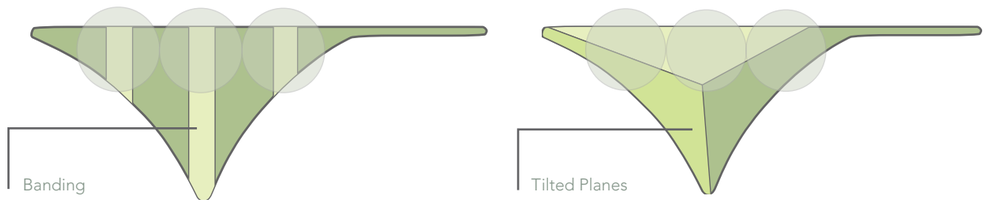
Connector Street Understory

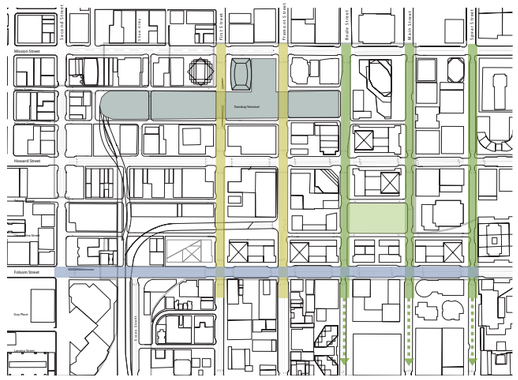


Folsom Street Bulbouts and Vertical Gateways



Folsom Street Off Ramp Island





Understory Planting Streets

Textural Plantings at Tillted Planes and Linear Parkway on Living Street

2.10 MATERIALS & FURNISHINGS FAMILY

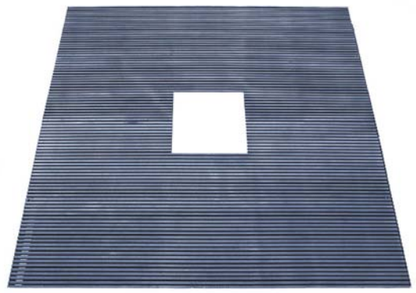
Perhaps the most human aspect of the public realm is the texture and tone of the materials and furnishings used to complete the sidewalks and open spaces of the Transbay neighborhood. The recommended materials were selected to convey longevity, the urban nature of the setting, and a crisp aesthetic more readily seen in the European public realm. The paving palette is purposefully limited to a small range of textures and hues to reinforce a graphic aesthetic approach to the sidewalks—the contrasting bands provide a simple modulating rhythm and reinforce the zones of use on the sidewalk. The family of furnishings focuses on pieces that are modern and simple, meant to serve their purpose as a well-integrated amenities, not bright colorful objects that detract from the overall natural color palette.

Considering that the full build out of the Transbay streetscape will occur over a period of years, certain furnishings suggested in this chapter may no longer be available or quantities may be too limited for the completion of a consistent streetscape identity. Accordingly, alternative furniture selections should adhere to the general design intent illustrated by the elements that follow. Furnishings should be modern, minimal, urbane in character, and should share design characteristics with other elements in the furnishings family.

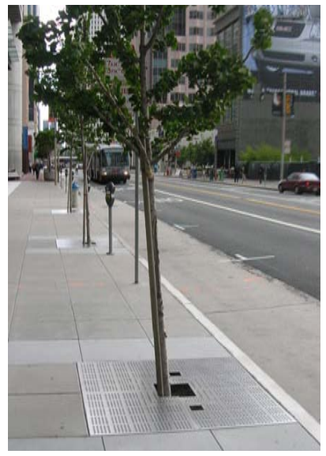
Master Specifications are recommended to insure consistency, design conformance, and the highest quality of installation for the long range build-out of the Transbay Streetscape and Open Space vision. The development of Master Specifications for the project would include all design and engineering sections and contain the technical information that future teams would apply to their specific project development. Master Specifications would be developed simultaneously with the first phase of the streetscape and/or open space development and conform to the design guidelines developed in this document. See the Appendix for Mission Bay Master Specification samples.

HOWARD AND MISSION

MATERIALS FAMILY



METAL TREE GRATE



EXISTING MISSION STREET
WITH VARIOUS TREE GRATES

SIDEWALK CONCRETE BANDING : TYPE II

SIDEWALK CONCRETE FIELD : TYPE I

COLOR :	TYPE I - LIGHT GREY - CUSTOM* TYPE II - MEDIUM GREY - CUSTOM*
FINISH :	LIGHT SANDBLAST
PATTERN :	SAW CUT JOINT
***CUSTOM :**	SCOFIELD LITHOCHROME HARDENER

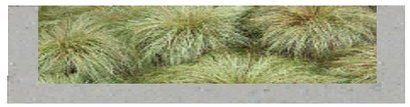
MAIN, BEALE & SPEAR

MATERIALS FAMILY

GRANITE SETTS :
SIDEWALK BANDING
AND SEATING FIELD

ALTERNATE TREE WELL AND BANDING MATERIAL:

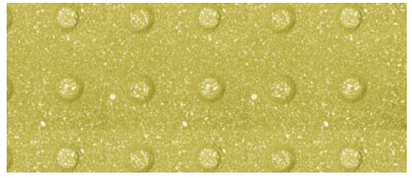
HANOVER PRESET BRICK,
TRADITIONAL, SUPER BLACK, TUDOR FINISH



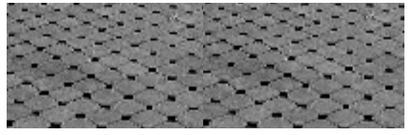
ORNAMENTAL GRASS UNDERSTORY PLANTING
AT TILTED PLANE AND SIDEWALK EDGE

CONCRETE RETAINING WALL
AT TILTED PLANE

SIDEWALK CONCRETE FIELD : TYPE I (SEE FOLSOM)



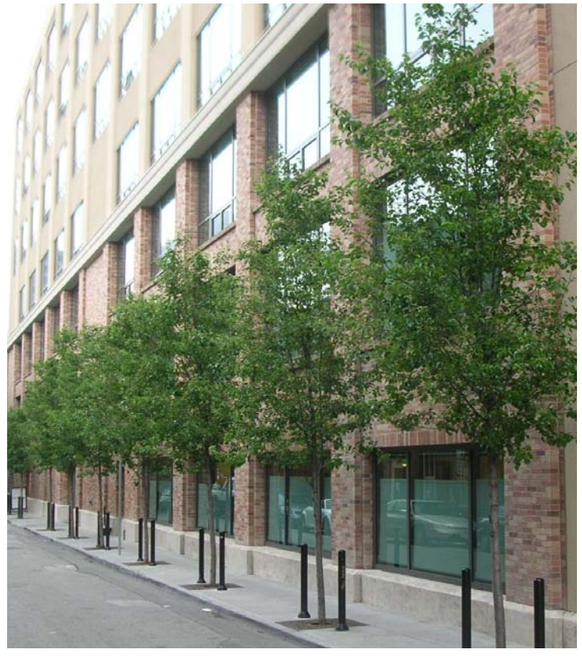
DETECTION PAVERS

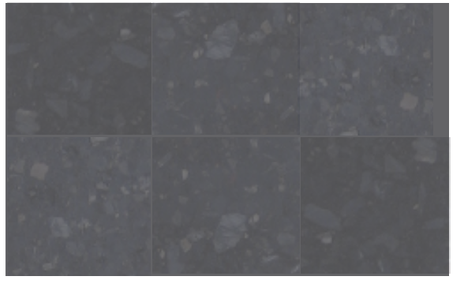


PERMEABLE PAVERS AT PARKING

CLEMENTINA, TEHAMA, NATOMA & MINNA

MATERIALS FAMILY





ASPHALT FIELD PAVING

GRANITE SETTS : AT TREE WELLS AND AS SIDEWALK BANDING

ALTERNATE TREE WELL AND BANDING MATERIAL:

HANOVER PRESET BRICK, TRADITIONAL, SUPER BLACK, TUDOR FINISH

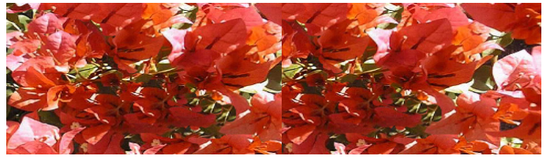
SIDEWALK CONCRETE FIELD : TYPE I (SEE FOLSOM)

FOLSOM

MATERIALS FAMILY

ORNAMENTAL UNDERSTORY PLANTINGS AT PALMS AT CORNER INTERSECTIONS

ALTERNATIVE I : ORNAMENTAL GRASSES



ALTERNATIVE II : FLORAL PLANTINGS

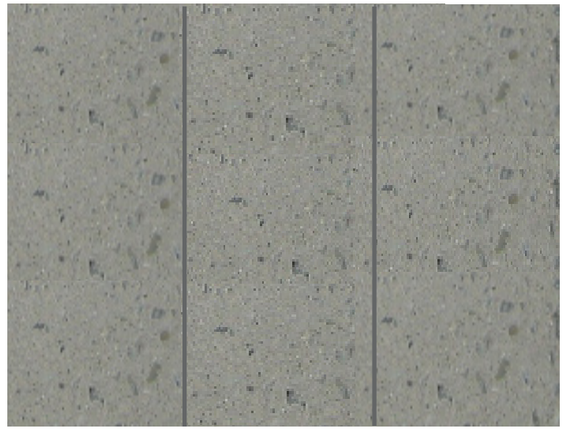
SURFACE CONTRAST AND BANDING

SAW CUT JOINTS

GRANITE SETTS : AT TREES WELLS AND AS SIDEWALK BANDING

ALTERNATE TREE WELL AND BANDING MATERIAL:

HANOVER PRESET BRICK, TRADITIONAL, SUPER BLACK, TUDOR FINISH



SIDEWALK CONCRETE FIELD : TYPE I (SEE FOLSOM)

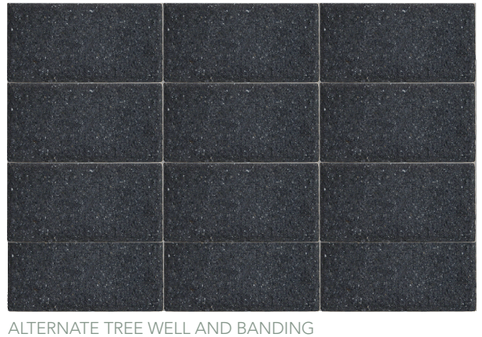
SIDEWALK CONCRETE BANDING : TYPE II (SEE FOLSOM)

FIRST, FREMONT & SECOND

MATERIALS FAMILY

ORNAMENTAL GRASS UNDERSTORY PLANTING AT TREES

GRANITE SETTS : AS SIDEWALK BANDING



ALTERNATE TREE WELL AND BANDING MATERIAL:

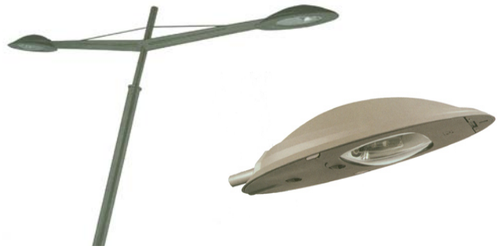
HANOVER PRESET BRICK, TRADITIONAL, SUPER BLACK, TUDOR FINISH

SIDEWALK CONCRETE FIELD : TYPE I (SEE FOLSOM)

CROSS TOWN BOULEVARDS AND BAY BRIDGE CONNECTORS:

FURNISHINGS FAMILY

HESTIA ROADWAY AND PEDESTRIAN LIGHT



AT TRANSIT LOCATIONS:
FOR TRANSIT PATRONS WAITING FOR TRANSIT SERVICE 10 MINUTES OR LESS WE RECOMMEND A DURABLE MATERIAL LIKE METAL. THE CUSTOM BASE WILL COMPLY WITH ADA HEIGHT REQUIREMENTS

PERCH SEATING WITH CUSTOM BASE*

*CUSTOM BASE FROM HESS TO INTEGRATE FAMILY OF SITE FURNITURE / SEATING

ALTERNATE PERCH SEATING WITH CUSTOM BACK AND BASE*

WELLECIRCULAR (SQUARE TUBE)
[PALMER GROUP]

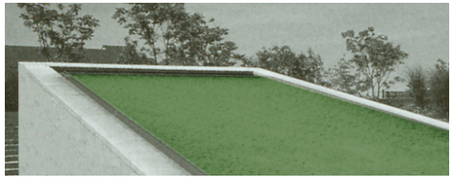
DUAL TRASH RECYCLING RECEPTACLE
[FORMS AND SURFACES]

BOLLARD TYPE I

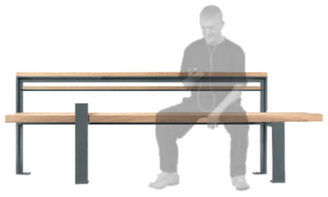
MAIN, BEALE & SPEAR

FURNISHINGS FAMILY

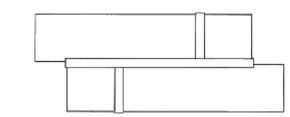
AT LINEAR PARK LOCATIONS:
FOR RESIDENTS AND VISITORS TO THE TRANSBAY NEIGHBORHOOD
WE RECOMMEND THE FOLLOWING WOOD FURNISHINGS



TILTED PLANE PLANTINGS AND RETAINING WALL
AT SIDEWALK

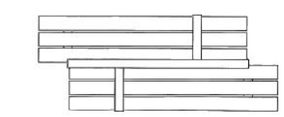


PREFERED HESS ARGO BENCH
WITH CUSTOM BACK



HESS ARGO BENCH TYPE I :
SINGLE-SIDED PLANE

HESS ARGO BENCH TYPE II :
DOUBLE-SIDED PLANE



ALTERNATIVE HESS ARGO

ALTERNATIVE VIA FUTURA BANK
SERIE WIESBADEN

MAIN, BEALE & SPEAR

FURNISHINGS FAMILY

HESTIA ROADWAY AND PEDESTRIAN LIGHT

WELLECIRCULAR (SQUARE TUBE)
[PALMER GROUP]

COLOR : *'TRANSBAY'*

CUSTOM COLOR FOR
BOLLARDS, TRASH
RECEPTACLES, BIKE RACKS
AND LUMINAIRE POLES

DUAL TRASH RECYCLING
RECEPTACLE
[FORMS AND SURFACES]

BOLLARD TYPE I

CLEMENTINA, TEHAMA, NATOMA & MINNA

FURNISHINGS FAMILY

LIGHTING ALTERNATIVES:

CABLE SUSPENDED LUMINAIRES
[BEGA]

PEDESTRIAN SCALED LIGHTING

LUMINAIRE
[BEGA]

LUMINAIRE
[SELUX, SATURN MAGNUM]

ALTERNATE : BOLLARD TYPE III
[DESIGN PLAN, STILETTO]

BOLLARD TYPE I
BOLLARD TYPE II
[URBAN ACCESSORIES DG1, DG5]

TREE GUARD
[HESS, ALKOR Q]

FOLSOM

FURNISHINGS FAMILY

AT TRANSIT LOCATIONS:
FOR TRANSIT PATRONS WAITING FOR TRANSIT SERVICE 10 MINUTES OR LESS WE RECOMMEND A DURABLE MATERIAL LIKE METAL. THE CUSTOM BASE WILL COMPLY WITH ADA HEIGHT REQUIREMENTS

PERCH SEATING WITH CUSTOM BACK AND BASE*

ALTERNATE PERCH SEATING WITH CUSTOM BASE*

*CUSTOM BASE FROM HESS TO INTEGRATE FAMILY OF SITE FURNITURE / SEATING

HESTIA ROADWAY AND PEDESTRIAN LIGHT

BOLLARD TYPE I

DUAL TRASH RECYCLING RECEPTACLE [FORMS AND SURFACES]

WELLECIRCULAR (SQUARE TUBE) [PALMER GROUP]

LIGHTING

Lighting is a critical aspect of creating a unique character for the neighborhood. This concept plan recommends a general aesthetic approach consistent with the overall design of the streetscapes and open spaces. The scope of this study did not include the critical analysis and photometric studies required to specify the exact light fixture, lamping, wattage and fixture spacing. All lighting shown in the enlarged layout plans is conceptual only and should not be used for construction reference. Generally, it is recommended that a unique lamp be evaluated and specified for the entire neighborhood, in addition to complementary fixtures needed for unique situations. The following summarizes the conceptual lighting recommendations:

General Recommendations

All fixtures should be specified to meet the following guidelines:

- Limit uplight and reduce light pollution
- Minimize energy consumption and increase public safety
- Luminaires with open lamps should be prohibited
- Use uplight limiting shields to minimize uplight components
- Use full cutoff luminaires wherever such equipment is preferred
- Use semi cutoff or cutoff luminaires if full cutoff luminaires are not available
- The use of non-cutoff fixtures shall be limited to designated ornamental areas

Combination Roadbed & Pedestrian Light

As the tallest fixtures, a single pole should carry both the roadway lighting with the pedestrian lighting occurring at a much lower height. Benches can be integrated into this system (as suggested in the enlarged layout plans) to reduce unnecessary clutter of the sidewalk.

Pedestrian Light

This secondary fixture should be a derivative of the Combination Roadway & Pedestrian Light but provide a more intimate scaled lighting with fixtures more closely spaced to achieve proper illuminance. In subsequent design stages, when photometric analysis is performed, this may provide an opportunity to consider pedestrian lights on the linear park streets to provide required light levels on both the roadway and public paths.

Illuminated Bollards

On smaller streets like the alleys or linear park streets, illuminated bollards can provide a finer-grained element, scaled to the smaller rights-of-way that will occur on Clementina and Tehama.

Pendant Lights

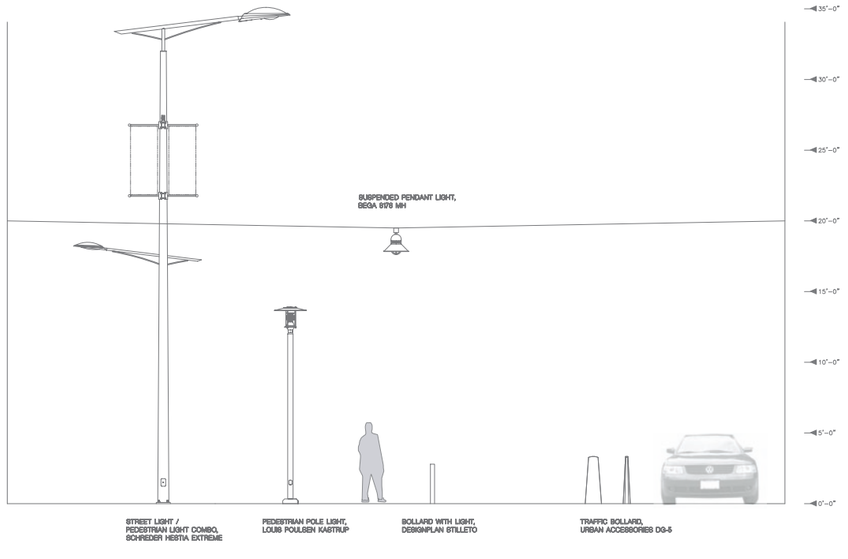
Where opposing buildings face directly onto the property line of the alleys, pendant overhead lights can be used to eliminate the need for poles and extra clutter in these constrained rights-of-way.

Landscape Lighting

Integrated lighting should be developed for the vertical markers (or palms) on Folsom to reinforce their monumental status at each cross street. The linear park streets and Transbay Park will need to develop an integrated lighting approach as their designs move forward into the design development stage concurrent with adjacent developments.

MUNI Combination Poles

To reduce pole clutter, a joint use pole to support MUNI's overhead contact wires in combination with a roadbed luminaire should be developed when the street lighting is upgraded for Mission and Howard Streets. MUNI will require structural and safety standards comply with the CPUC (Also see Sec 4.6 Street Lights).



2.11 UNDER RAMP AREAS

Within the project area is a network of unused spaces existing below the aerial bus ramps that serve the Transbay Transit Center. Rather than remain as detrimental spaces, these spaces could be reclaimed and transformed into a neighborhood amenities. Currently under the ownership of the Transbay Joint Powers Authority, they could be developed for public and private uses. There will be some modifications and additional ramps constructed as part of the Transbay Transit Center project that can be addressed as the designs for the center progress.

One option is to judiciously infill these areas with structures that provide new usable space, thus making an eyesore an amenity. By reusing the existing structures, LEED® credit could be given for individual development projects, supporting a more sustainable strategy for small infill development. There are good built examples where new spaces have been inserted under older viaduct structures to create entirely new block frontages. This would effectively transform what is a "one-sided block" to a more pedestrian-oriented "two-sided" block along Clementina and Essex. Infill uses could include studios that support art, fashion and culture. Small businesses can get a foothold in these urbanized workshops bringing more creative entrepreneurs to the neighborhood.

A second option is to consider outdoor uses—as permitted by column spacing and overhead clearances—to add recreational hardcourts or pedestrian mews as envisioned in the Design for Development. Column spacing and overhead clearances will determine which hardcourts are viable. Below the Howard Street loop ramp, a pedestrian mews could be developed with landscaping, lighting and public art to make these mid-block passages inviting places to walk and to improve pedestrian connections across a very long block.

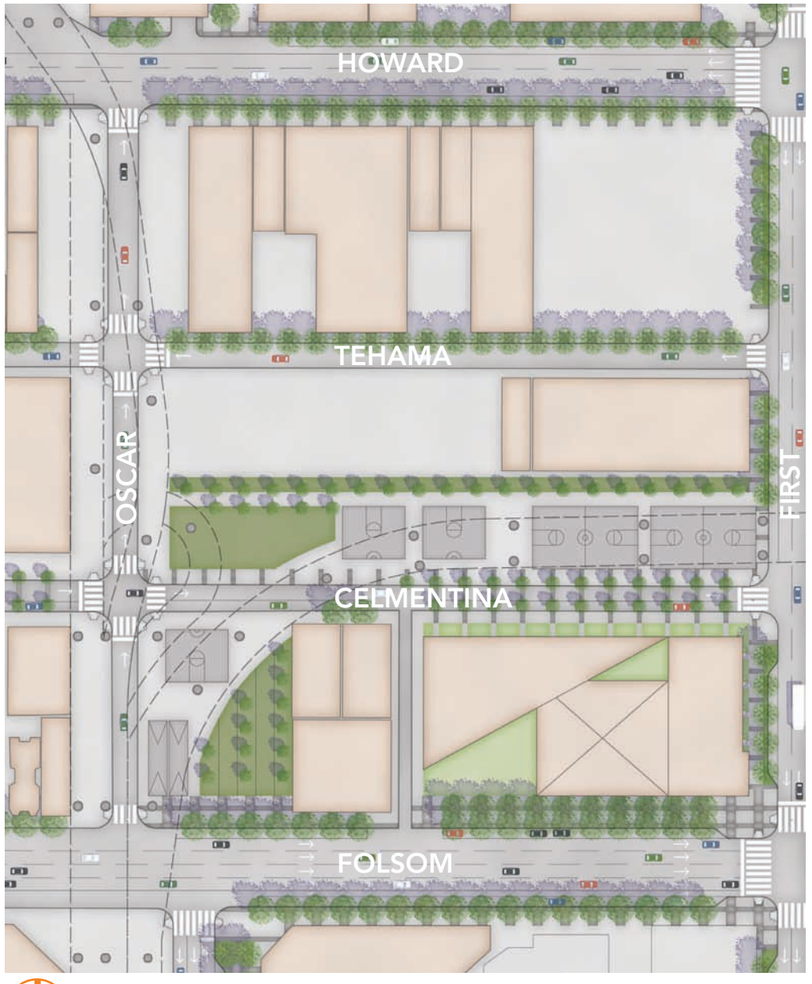
The ramps that pass over Howard Street and Folsom Street act as natural gateways into the Transbay neighborhood. While currently they pose the least inviting place for the pedestrian, these zones can be transformed with lighting, art and new surface treatments into pleasant places to walk under as one enters or leaves the neighborhood.

The range of possible under ramp improvements is shown in the concept plan here, which maximizes open space and recreational uses. Retail is limited to the street frontage at Howard. As development progresses in the area, specific uses at each under ramp site should be evaluated on a case-by-case basis.

Public art take the form of artist-designed transit amenities, reinforcing the unique character of the neighborhood

Photo examples of artist-designed bus shelters, seating, etc

1



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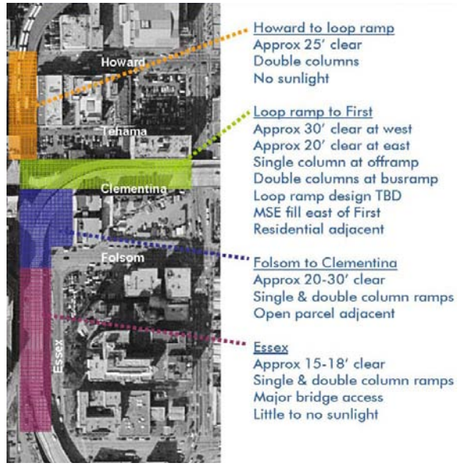


Howard to loop ramp
Approx 25' clear
Double columns
No sunlight

Loop ramp to First
Approx 30' clear at west
Approx 20' clear at east
Single column at offramp
Double columns at busramp
Loop ramp design TBD
MSE fill east of First
Residential adjacent

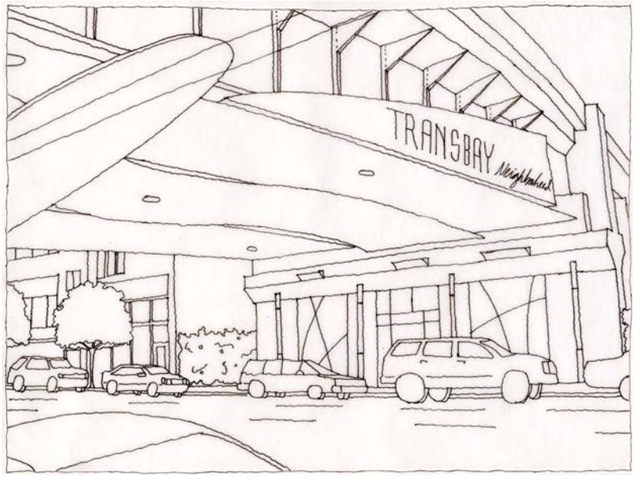
Folsom to Clementina
Approx 20-30' clear
Single & double column ramps
Open parcel adjacent

Essex
Approx 15-18' clear
Single & double column ramps
Major bridge access
Little to no sunlight

3

4

5



1. Opportunities include infilling under the ramps with enclosed spaces for arts and cultural uses; or incubator workshops for emerging industries (like fashion design); recreational hardcourts or a pedestrian mews

2. The areas below the Howard loop ramp, and below the Folsom off ramp along Essex and Clementina can become neighborhood amenities

3. Existing bus ramps create unseemly places for the pedestrian as on Howard east of Second Street

4. Examples of under bridge structures that could be infilled with neighborhood markets and restaurants (59th Street bridge, New York)

5. Sketch showing improvements that can be artist-designed to become gateways into the Transbay neighborhood with improvements such as panelized finishes at the ramp underside, uplighting, signage, and murals infilling the columns along the sidewalk.

2.12 PUBLIC ART

The team collaborated with the Arts Commission's Program Director to consider a range of opportunities for public art in the Transbay neighborhood. It was desirable to reflect the unique qualities of the district in the public art program, thus reinforcing the neighborhood's special identity. Taking into account the dominant nature of the Transbay Terminal, and proposed Transbay Transit Center high-rise development, lent credence to considering a public art program that focused its commissions on mobility and transit in the project area's public realm. Using this transit as a unifying theme provides a range of opportunities for transit-related improvements that would be enjoyed by transit users, regional visitors, residents while adding unique gateways and wayfinding elements to the streetscape. If done consistently, the public art program would signal one's presence in the Transbay neighborhood.

Public art will take the form of artist-designed transit amenities, reinforcing the unique character of the neighborhood (Hannover, Germany)

London bus shelter

As it currently exists, there are little to no transit amenities, and no consistency in informational signage amongst the various bus operators with stops in the area surrounding Transbay Transit Center. The public art program could require artist-designed transit stops in the neighborhood. These elements could include bus shelters, seating, special paving, bike racks and wayfinding pylons or kiosks. Transbay Park and the linear parks along Main and Beale provide additional opportunities for public art. These elements could be sculptural or playful and would help improve the experience of the transit user and pedestrian.

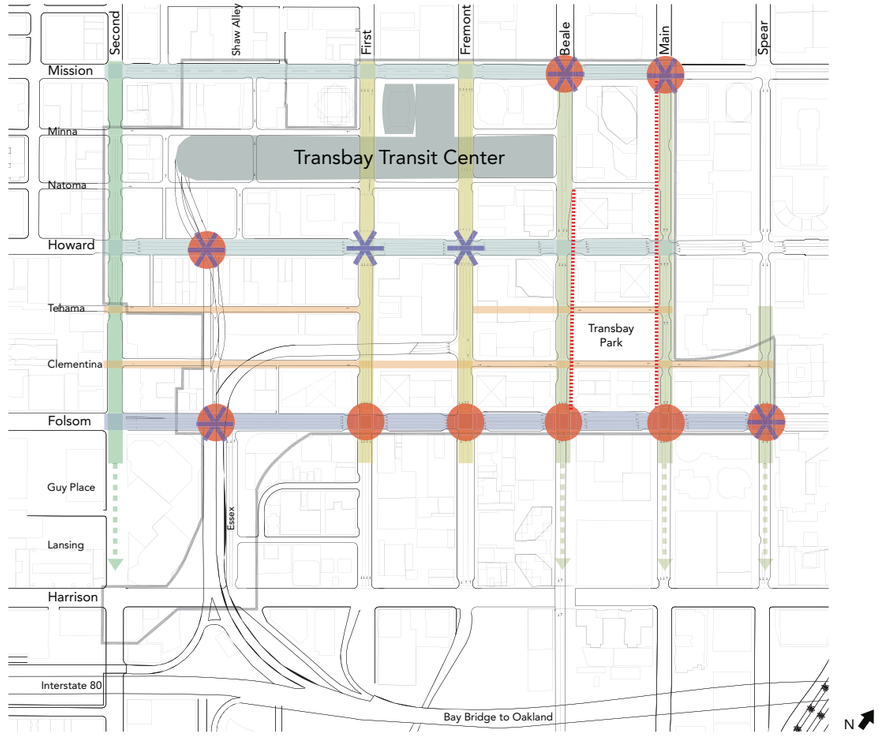


Diagram showing opportunity sites for public art and wayfinding

Legend

- Gateway element / Public art opportunity
- District wayfinding sign opportunity
- Occasional dramatic planting or public art

2.13 WAYFINDING

If coming to San Francisco from the Bay Bridge, one can land first in the Transbay neighborhood. This requires effective signage to guide visitors and residents to major city districts and venues often beyond the Transbay neighborhood. At the same time, there needs to be appropriate district signage to guide visitors to local amenities and public parking sites. As part of implementing any major streetscape and open space components, it will be important to develop in parallel a district wayfinding program that sets a graphic standard for the neighborhood. This is especially critical because when faced with no clear directional signage, drivers will get lost or circulate needlessly in the Transbay neighborhood. This will not be acceptable as the area is transformed into a more vibrant neighborhood.

A wayfinding program should be designed as a comprehensive program for the neighborhood, or for the larger South of Market area and coordinated at a larger scale of the City. Ideally it would be undertaken by a City department so it could be implemented in a broader scale.

Examples of wayfinding elements necessary for a developed Transbay neighborhood; district maps and clear signage for both drivers and pedestrians are essential to reducing unnecessary vehicular movements (Downtown Walks Program, Los Angeles. Photos courtesy of Hunt Design)

3

MOBILITY ELEMENT

3.1 CONDITIONS TODAY

The Transbay neighborhood street system serves a wide range of transportation needs, including vehicular access and circulation, transit, parking, pedestrians and bicyclists. Most of the streets in this area have rights-of-way with typical sidewalk widths of 10'. The street pavement is usually 62.5' wide except on Main and Beale Streets where sidewalks are 15' wide and the streets are 52.5' wide. Several streets in this area designated as major arterial roads in the General Plan are mostly one-way with four travel lanes in each direction and parking on both sides, including First, Fremont, Howard, and Folsom Streets. Parts of these streets typically carry higher volumes of traffic, especially during the morning and evening peak commute hours. Other streets, such as Spear and Main Streets, have the same right-of-way widths, but traffic volumes are substantially lower in comparison. Several major arterial roadways in the Transbay neighborhood provide direct access to and from the I-80/San Francisco-Oakland Bay Bridge.

These access points include off-ramps to Harrison and Fremont Streets and on-ramps from First, Essex and Harrison Streets. The substantial volume of traffic going to the Bay Bridge results in extensive queuing along portions of First, Folsom, and Harrison Streets, and occasionally on Second Street during the evening commute. There are also several east-west alleyways, most of them located west of First Street. These alleys provide service functions to the buildings fronting the major arterial roads for parking and loading access. Due to the very wide streets, pedestrian crossing distances are longer, and pedestrian crossings at certain freeway on- and off-ramp intersections are prohibited.

3.2 THE NEED FOR CHANGE

The Transbay neighborhood will change dramatically due to the approved land uses in the area. The Redevelopment Plan and the Rincon Hill Plan will result in the development of thousands of new residential units. Several high-density residential development projects are either under construction or have been approved and will begin construction in the near future. These new development projects will change the needs, functions, and characteristics of street design and circulation patterns. These changes will also include significant increases in pedestrians, bicyclists, and transit patrons.

This plan recognizes the need to accommodate access to the Bay Bridge during the peak commute hours. On the other hand, the plan seeks to accommodate the probable increases in pedestrians, bicyclists, and transit patrons in the area, and to make the area more livable. The recommendations described strive to balance these conflicting needs.

3.3 BUILDING ON THE DESIGN FOR DEVELOPMENT

This plan builds upon the recommendations made by the Design for Development. It includes additional recommendations and design guidelines that serve as guiding principles for concept plan.

This plan seeks to improve the pedestrian environment as outlined in Section 1.6 of this document. The Design for Development includes several major design concepts for the Transbay neighborhood, including Folsom Street with bus lanes and a median, sidewalk widening for First, Main, and Beale Streets, corner bulb outs, and several new alleyways. This project evaluated the recommendations in the Design for Development, specifically on the Folsom Street two-way operation, Fremont Street off-ramp configuration, alleyways, corner bulb outs, transit services, and bicycle lane treatments. In some cases, recommendations varied from the previous work based on new information and input from the Transbay CAC.

3.4 FREMONT AND FOLSOM STREET OFF-RAMPS

The existing Fremont and Folsom Street off-ramps include one that descends to Fremont Street mid-block between Howard and Folsom Streets at an approximately 90-degree angle and another that descends in a diagonal direction to the intersection of Fremont and Folsom Streets. The former has been in existence for many years, and its design facilitates free left turns to Fremont Street northbound and prohibits pedestrian movement on the west side of Fremont Street. The current layout is not acceptable for the following reasons:

1. Pedestrians are not allowed on the west side of Fremont.
2. Inability to walk on both sides of the street compromises future street level retail
3. The southbound ramp reduces the developable parcel on Folsom
4. Current ramp geometry isn't conducive to entering a pedestrian-oriented neighborhood.

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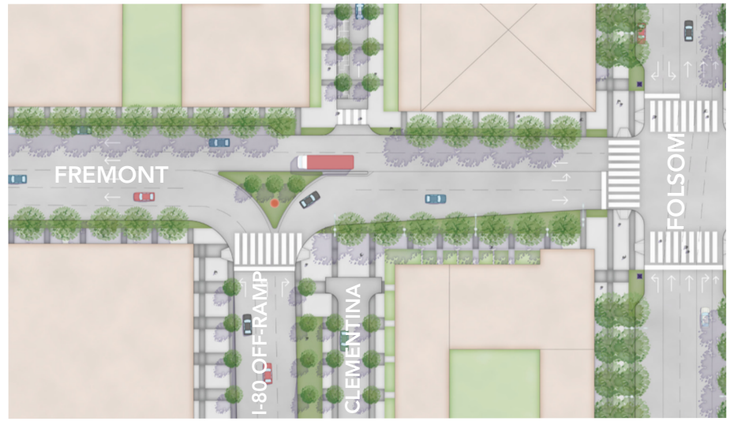


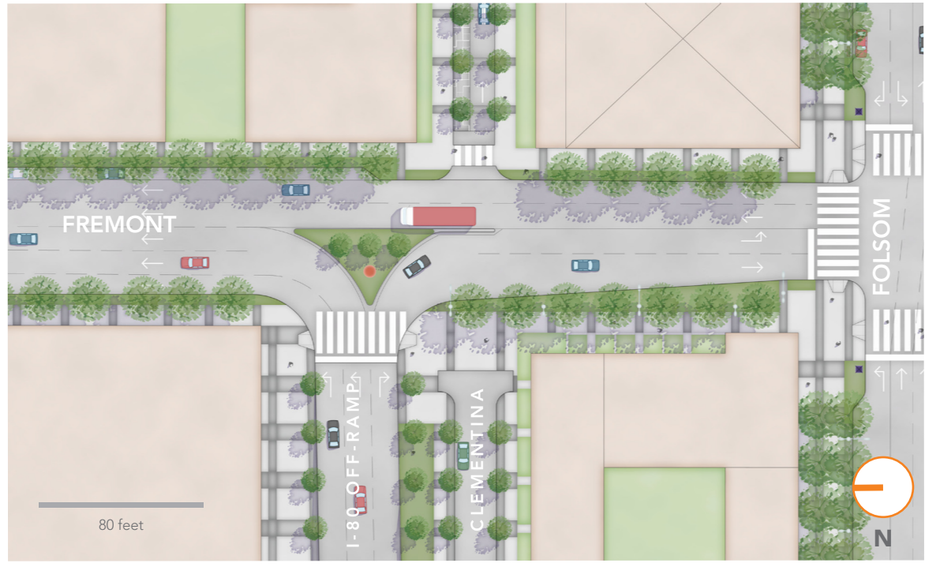
1. The existing Bay Bridge off-ramp looking north from First Street as it descends toward Fremont and Folsom
2. The existing Bay Bridge off-ramp looking west from Fremont as it descends toward Folsom
3. Aerial photo of existing Folsom off-ramp with shortcomings noted
4. Proposed new configuration for the off-ramp at Fremont shown in relation to the existing off ramp, which enlarges the adjacent developable parcel and rationalizes the intersection at Fremont allowing pedestrian access across the off-ramp at a new signalized intersection

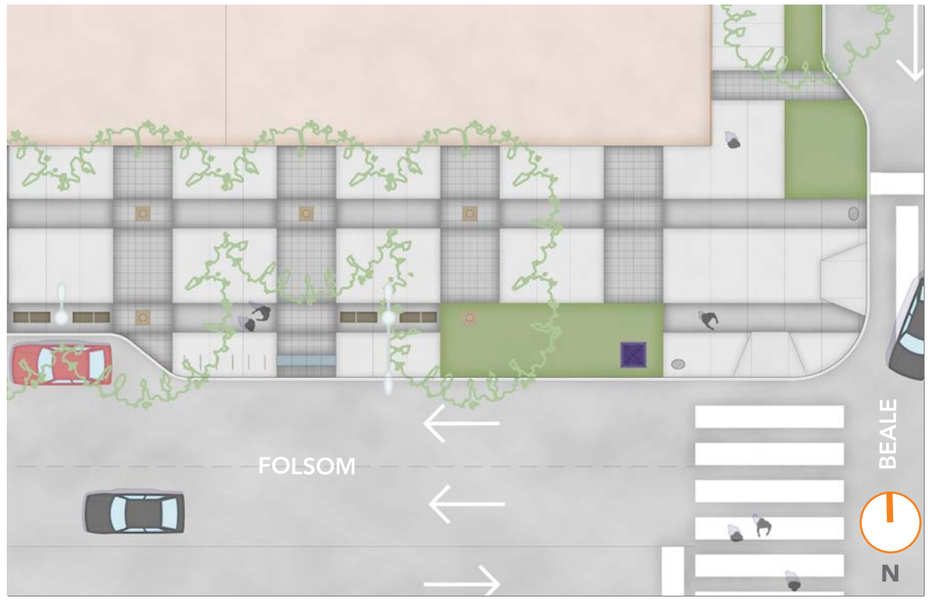
This plan proposes to modify both of these ramps in order to facilitate better pedestrian movement and to improve the pedestrian environment. The proposed changes involve the following elements:

1. Remove the diagonal section of the Folsom Street off-ramp (two lanes) and replace it with a one-lane off-ramp immediately contiguous to the existing Fremont Street off-ramp that stub ends at Fremont Street at a 90-degree angle.
2. Change Fremont Street configuration south of the replacement off-ramp to a two-way street.
3. Ensure that the intersection of the replacement off-ramp and Fremont Street has sufficient turning radius to allow trucks with a wheel base of 42' (WB-42) to make right turns to Fremont Street southbound.
4. Modify the existing 90-degree section of the Fremont Street off-ramp to allow a pedestrian sidewalk on the west side of Fremont Street, and provide a proper turning radius to allow large-size trucks (STAA Standard).
5. Add a traffic signal at the modified Fremont Street off-ramps, approximately mid-block between Howard and Folsom Streets for the purpose of controlling traffic and pedestrian movement at this location. The pedestrian signal will be actuated.
6. The design of the transition from five to three lanes on the viaduct section of the ramp must be carefully studied because they are different supporting structures underneath the viaduct on both sides of First Street and there is a Caltrans overhead sign structure on the viaduct.

The existing diagonal section of the Fremont Street off-ramp carries approximately 500-750 vehicles during the morning peak hour and approximately 300-390 vehicles during the evening peak hour (based on 2006 counts provided by Caltrans). Previous City intersection turning movement counts at Harrison and Fremont show 539 vehicles along the Harrison Street off-ramp during the evening peak (no morning data is available) before the closure of the Harrison Street off-ramp for seismic retrofit. These data suggest that most of the vehicles that currently use the Folsom Street diagonal off-ramp will be diverted back to the Harrison Street off-ramp when the Harrison Street off-ramp seismic retrofit is completed. Reducing this off-ramp to one-lane should leave sufficient capacity to handle the expected traffic.

Modifying the existing 90-degree section of the Fremont Street off-ramp should not cause significant impacts. The current bottleneck for this ramp during the peak hours is caused by the downstream signal at the intersection of Fremont and Howard. Adding a signal at the Fremont Street replacement off-ramps with a coordinated signal timing (offset) with the signal at the Howard and Fremont intersection would essentially provide a similar vehicle throughput capacity and thus, should not cause traffic impacts on the Fremont Street off-ramp during the peak hours.





Illustrative plan showing proposed corner bulb out.

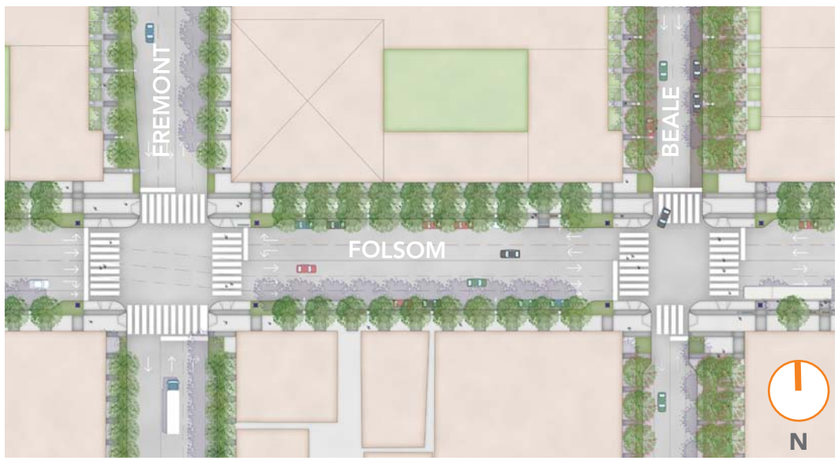
3.5 FOLSOM STREET

Folsom Street is designated as an eastbound arterial road in the General Plan. It forms a one-way couplet with Howard Street. It is also a major route to the Bay Bridge via Essex and First Streets. However, land uses along a significant portion of Folsom Street in the Transbay neighborhood will face major changes in the next few years, transforming its role into a main street that serves both the Transbay and Rincon Hill neighborhoods. A number of large-scale high-density residential development projects have been approved and shortly will begin construction along Folsom Street between Fremont and Main Streets, which will bring new residents into the area.

The Design for Development document envisions Folsom Street as a boulevard with two-way circulation, widened sidewalks, an eastbound bike lane, and transit services. Two potential cross-sections are identified, one with a median and the second one without a median. The Mobility Plan in general endorses the concept of establishing two-way traffic here. However, this plan also recognizes that changing Folsom Street to two-way operation potentially could have significant implications to the overall traffic circulation in the South-of-Market area.

The San Francisco County Transportation Authority (SFCTA) has indicated that it plans, in the near future, to analyze the implications of converting both Howard and Folsom Streets to two-way operation. Before any conclusion is reached by that study, this plan seeks to find an interim plan that meets the needs of the Transbay neighborhood without creating undue impacts on overall traffic circulation in the South of Market area. Thus, this plan proposes to change Folsom Street to two-way operation east of Fremont Street at this point and postpone the two-way proposal between Fremont and Second Street until the completion of the SFCTA's study.

Folsom Street currently carries approximately 1,600 vehicles during the evening peak hour at the Second Street approach. The volume along Folsom Street reduces as it moves eastward, and east of Fremont Street the volume is less than 600 vehicles. Converting Folsom to two-way from Main to Fremont Streets would calm traffic fronting the proposed high-density residential neighborhood but would not cause significant traffic congestion problems.



Folsom illustrative plan (See Section 2.2)

The intersection level of services analysis performed for the Rincon Hill Plan EIR shows that intersections along Folsom Street will continue to operate at acceptable conditions with the proposed land use changes in the Rincon Hill area and with Folsom Street as a two-way operation.

Pedestrian crosswalks are provided at every intersection along Folsom Street. They typically have the same width as the sidewalks, 10' wide. Sidewalks in the Transbay area are usually 10' wide, except for Main and Beale Streets, where 15' sidewalks are provided. The Design for Development document proposes wider sidewalks (25') along the north side of Folsom Street by requiring minimum building setbacks of 15'. There is interest expressed by the members of the Transbay Citizen Advisory Committee (CAC) to potentially widen the south side of Folsom Street by 2.5'. This could be potentially be accomplished by reducing the exiting traffic lanes to 10' and parking lanes to 7.5'. The other possibility is to only widen the sidewalk by 2' and keep the parking land at 8' in order to avoid the "doorings" impacts with bicyclists on the adjacent bicycle lane.

During the interim period when the Transbay Terminal will be located to its temporary location north of Folsom Street between Fremont and Beale Streets, Folsom Street would have a contra-flow bus lane to allow outbound AC Transit buses to access the Bay Bridge. This contra-flow bus only lane may terminate at First Street or at Essex Street.

3.6 FIRST STREET

The Design for Development document provided a vision for potential sidewalk widening on the west side of First Street. The concept requires elimination of one travel lane and no parking, tow-away during the peak period, so there will be three travel lanes during midday and four travel lanes during the peak period. The Design for Development concept appears to be viable on certain blocks, but detailed traffic analysis would be necessary.

3.7 BEALE & MAIN STREETS

During the development of this concept plan, Beale and Main were being considered by the Transbay Transit Center team for temporary conversion to two-way traffic flow. This modified circulation is necessary to accommodate efficient bus circulation in and out of the temporary bus terminal whose location is planned where Transbay Square will be built. The temporary bus terminal and two-way flow is needed during the construction of the new Transbay Transit Center. While further study is needed, converting to two-way flow on these linear park streets would be conducive to these pedestrian-oriented bicycle-friendly streets. The temporary conversion would be a good test for considering Main and Beale as two-way streets more permanently. The implications of this conversion for the long term would be worth further study to understand the potential benefits for the neighborhood when the temporary bus terminal is no longer needed.

3.8 ALLEYS

The Design for Development envisions a number of additional alleys in the Transbay neighborhood area. The purpose of these alleyways is to enhance pedestrian circulation in the area while continuing to provide limited access to parking and service areas. The block sizes in the Transbay neighborhood are substantially larger than a typical block in the North of Market area. Mid-block alleyways would facilitate pedestrian circulation in the area.

Some of these alleys may not be implemented for many years to come, because of existing buildings, while others may be implemented in the near future because of the potential land development projects in the area or because of the opportunity to reconstruct them as part of the reconstruction of the Transbay Terminal and Caltrain Downtown Extension. This plan focuses only the alleys shown here. Entrance to the alleys would feature a raised crosswalk as shown here. The raised crosswalks would have traffic calming effect and would facilitate pedestrian movement along the sidewalk.

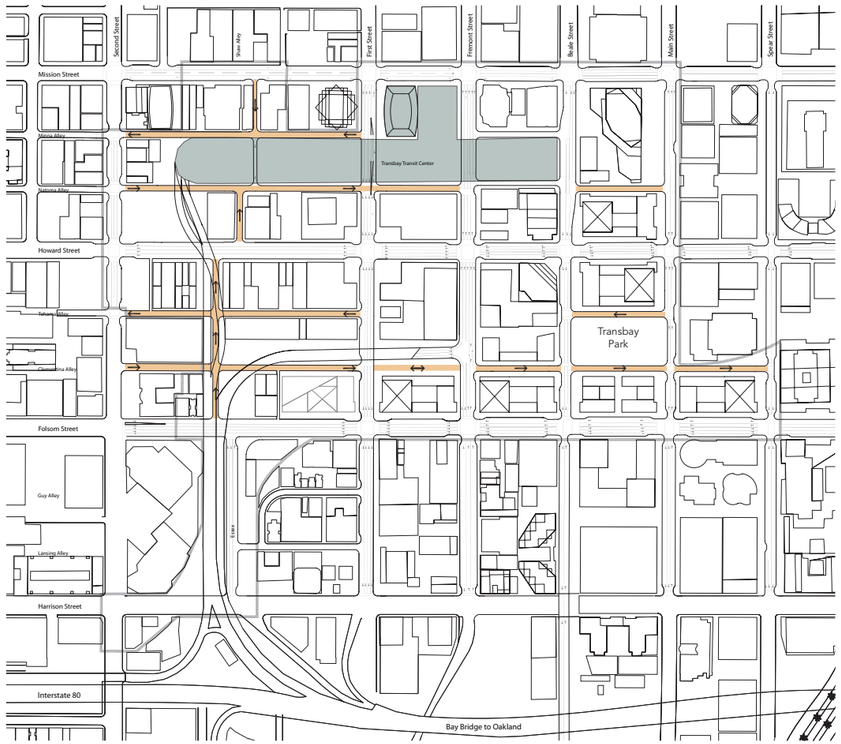
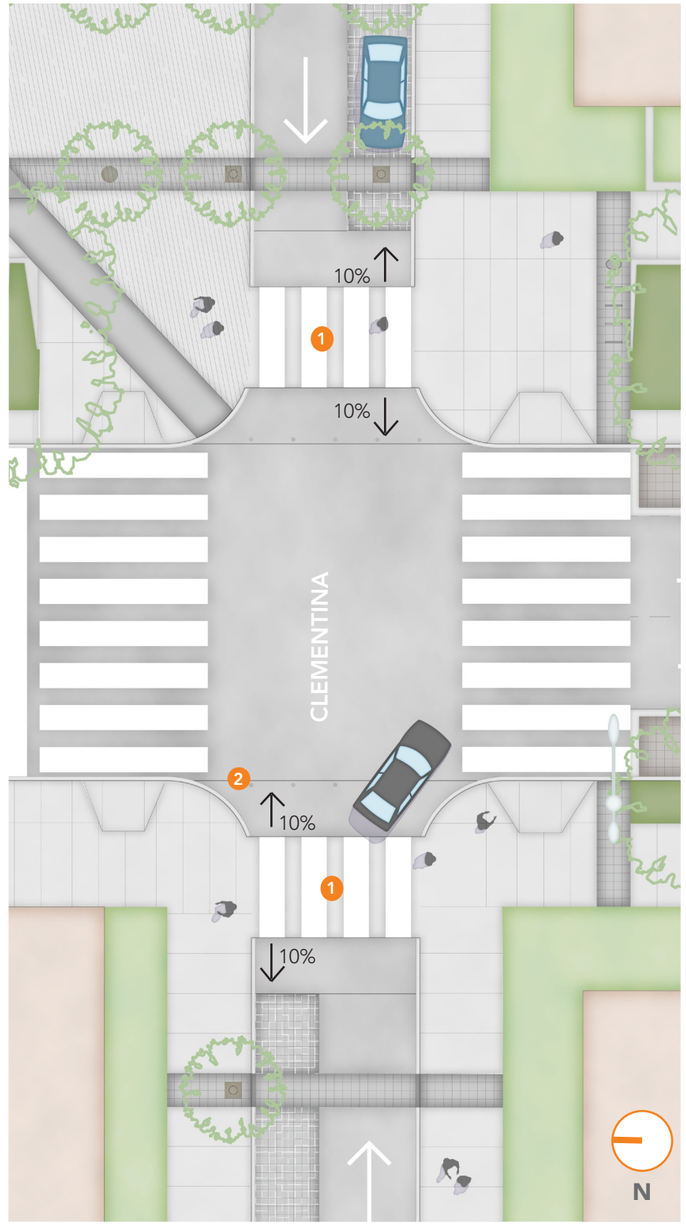


Diagram of existing and proposed alleys in the Transbay neighborhood



Illustrative plan showing raised crosswalks at alley entrances to facilitate pedestrian access.

DESIGN FEATURES

1 Raised crosswalk
2 Removable bollards

3.9 MID-BLOCK PEDESTRIAN CROSSINGS

Mid-block pedestrian crosswalks are generally discouraged unless they are protected by traffic control devises. Two mid-block pedestrian crossings are proposed, one each on Beale and Main Street, at Clementina. These two mid-block crosswalks are proposed to facilitate pedestrian crossings to the proposed Transbay Park. Pedestrian crossings at both of these two crosswalks would be controlled by a pedestrian actuated signal.

3.10 CASUAL CARPOOL PICK-UPS

The east side of Beale Street between Howard and Folsom Streets is currently used as a casual carpool pick-up zone during the PM peak period. During the interim when the temporary Transbay Terminal will be located on the southern half of this block, the casual carpool zone will be relocated to the west side of Beale Street in order to facilitate the proposed change of Beale Street to two-way operation for bus circulation into the temporary Transbay Terminal. Relocating the casual carpool pick-up zone to the west side is preferred because it would provide a safer loading of passengers from the sidewalk. In the future, relocating the casual carpool pick-up zone to the block between Mission and Howard Streets has been suggested. This suggestion may not be viable because locating casual carpool pick-ups to this location would force more traffic to Market and Mission Streets.

3.11 PARKING

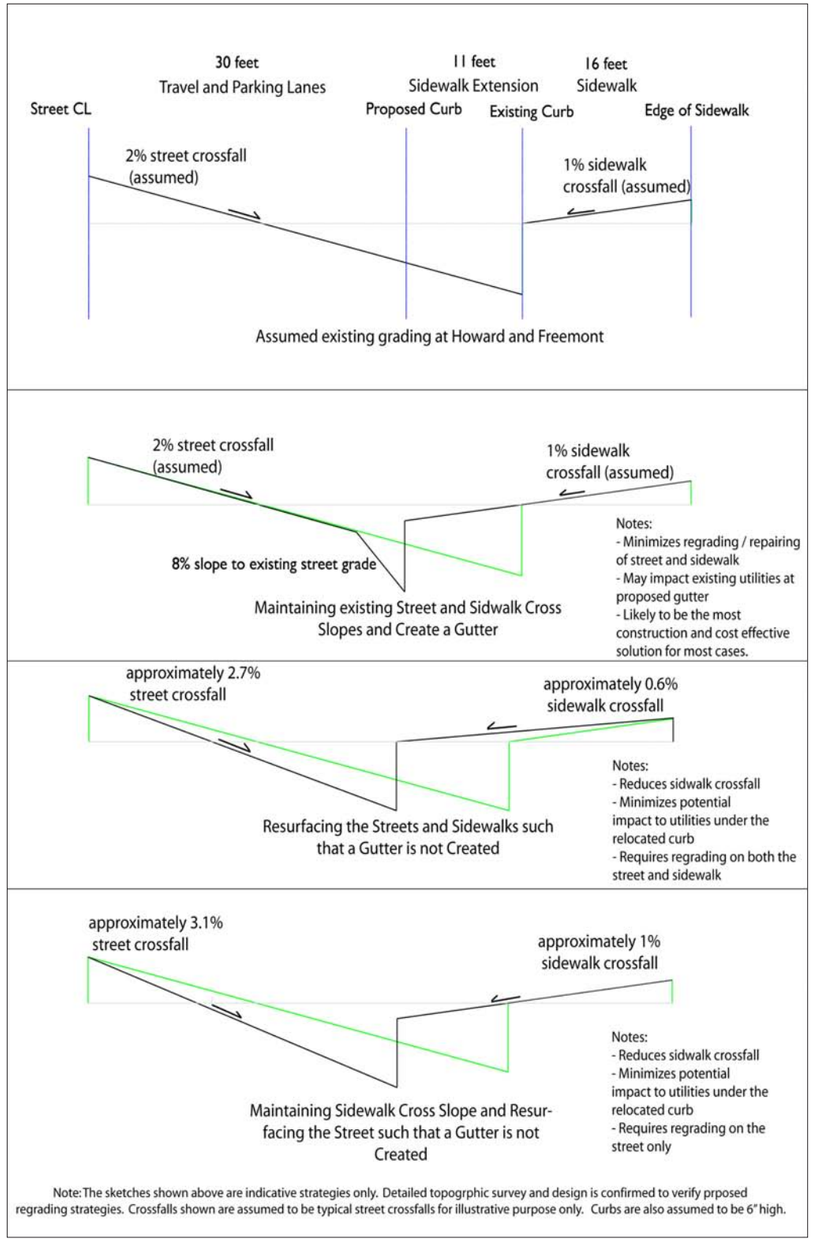
On street parking is maintained everywhere it is feasible -- understanding it will be a key component of meeting the parking demands of residents and visitors. The street level retail uses required by the Development Controls and Design Guidelines will require these short term spaces to be plentiful and convenient. Generally speaking, the proposed bulb outs will reduce on-street parking by one or two stalls on each street's corner frontage (specific stall counts cannot be verified until more detailed street design is done).

New technologies for meters are recommended to minimize the clutter of individual parking meters for every parking space. For example, multi-space meters can serve 10 to 15 spaces (after parking, drivers type in space number and pay with a credit card or cash). These methods should be employed now that the technology is proven and has been tested in other major cities.

3.12 CORNER BULB OUTS

Corner bulb outs are extensions of the existing sidewalks at street corners. They have the benefits of reducing pedestrian crossing distances and increasing the pedestrian reservoir area at street corners. The width of the bulb outs is usually 6' to 8', but should be no more than the width of the on-street parking lane.

A key concern in the corner bulb out design is establishing a proper turning radius. Intersection designs should have adequate turning radii at street corners to allow safe truck turning without encroaching upon the adjacent lane causing traffic accident problems. The



Transbay Streetscape Utility Study - Typical alternative grading strategies at proposed bulb outs

City of San Francisco requires a 10' to 15' corner radius. Due to the existence of on-street parking, the effective turning radius can be increased to 45'. Typically this turning radius would allow a 30' long single unit panel truck (SU-30) to make left or right turns in a single movement without encroaching upon the adjacent lane. The other concern may include the loss of on-street parking spaces in the area. Each corner bulb out could cause the loss of one to two spaces on each side of the corner (potentially two to four parking spaces for both sides of a corner).

The design concept developed by the Design for Development envisions all streets in the Transbay neighborhood to have 7' or 8' on-street parking lanes on both sides. Consequently, it is possible to have 6' to 8' wide corner bulb outs for the left turn movements. However, the width of the bulb outs may need to be compromised to accommodate right turn truck movement in order for SU-30 size trucks to turn in a single movement.

To maintain adequate drainage paths at each proposed bulb out location, the grading of the streetscape will have to be adjusted. Each proposed bulb out will have to be studied during detailed design to determine the impacts to: existing utilities; existing roadway grades and cross falls; existing sidewalk grades and cross falls; and existing drainage systems. Refer to the figure on page 85 for suggested alternative grading strategies that could be used at the proposed bulb out locations.

Auxiliary Water Supply System cisterns are located underground at intersections within the redevelopment area. They are believed to exist at Beale and Howard, First and Howard, First and Folsom, and Second and Folsom. Bulb out configurations and regrading strategies must consider the impacts to these storage systems as well. Each bulb out will require a unique design solution strategy to be developed during detailed design utilizing detailed topographical survey information.

Illustrative plan showing proposed corner bulb out with transit services and amenities

3.13 TRANSIT SERVICES AND AMENITIES

Transit plays an important role in the Transbay neighborhood. Currently, most MUNI services are provided along the perimeter of this neighborhood, such as The Embarcadero, and Market, Mission, and Second Streets. Regional transit carriers provide services to the Transbay Terminal only.

MUNI is in the process of assessing its system-wide needs for service improvement [Transit Effectiveness Project (TEP)], which should include an assessment of service needs in the Transbay neighborhood, such as additional routes, services, and amenities, especially in light

of the significant increases in residential development projects in the area in the near future. The mobility plan does not suggest additional transit improvements, but suggests that any change recommended by the TEP be examined to determine whether any recommendations made in this study would require potential adjustments.

The proposed reconstruction of the Transbay Terminal would not change access by AC Transit and SamTrans, but may change some of the existing Golden Gate Transit bus routes in the study area. Golden Gate Transit has suggested that bus stop amenities, such as bus shelters, be added at its bus stops. This concept plan recommends any new bus shelters or major transit amenities be considered for design by a public artist, as part of a neighborhood-wide public art program.

3.14 BICYCLE LANES

The Mobility Plan supports the concept for bicycle lanes included in the Design for Development document. In the Transbay neighborhood, the City should continue to implement bicycle lanes: one each on Howard and Folsom Streets east of Fremont Street, with the Howard Street bicycle lane operating westbound and the Folsom Street bicycle lane operating eastbound. This configuration could remain as the streets are converted to two-way flow and should be confirmed as the larger South of Market traffic study progresses.

3.15 NEXT STEPS FOR ENVIRONMENTAL APPROVAL

Some of the recommended projects would require CEQA (California Environmental Quality Act) clearance. The required CEQA clearance document could be in the form of an Environmental Impact Report (EIR), Negative Declaration, or simply an Initial Studies (IS). The levels of analyses required for each of these vary substantially, depending on the levels of environmental impacts resulting from the proposed project.

The recommended modifications to the Fremont and Folsom Street off-ramps, changes to make Folsom Street two-way operation, and sidewalk widening would potentially require a Mitigated Negative Declaration, but the recommended corner bulb outs could be categorically exempt projects under CEQA, thus, not requiring any environmental approvals.

The proposed modifications to the Fremont and Folsom Street off-ramps would also require Caltrans approval.

San Francisco Bicycle Map showing routes in the Transbay neighborhood. Blue depicts a wide curb lane bike route; orange depicts a dedicated bike lane.

4

INFRASTRUCTURE ELEMENT

4.1 INTRODUCTION

The proposed improvements described in this streetscape and open space plan will require changes to infrastructure to accommodate:

- Sidewalk widening
- New landscaping
- Changes in traffic patterns and parking
- Enhanced transit
- A pedestrian friendly environment

This section identifies the infrastructure modifications and makes recommendations regarding future studies, investigation, and design. Determination of existing utility capacities and demand changes brought by the redevelopment plan are beyond the scope of this report and are not included.

4.2 DEMOLITION AND REUSE

Many of the redevelopment parcels are currently either paved, or contain structures to be removed. Diversion of demolition debris from landfills should be maximized through materials reuse where feasible, e.g. asphalt and road-base from roads and parking lots; concrete and steel from the existing Transbay Terminal structures; curbs, street poles, fencing, plumbing, utility appurtenances, etc. These materials could be reused in new road construction, building pad formation, backfill drain rock, trench backfill, etc. Metals, plastics and other demolition materials should be recycled wherever feasible.

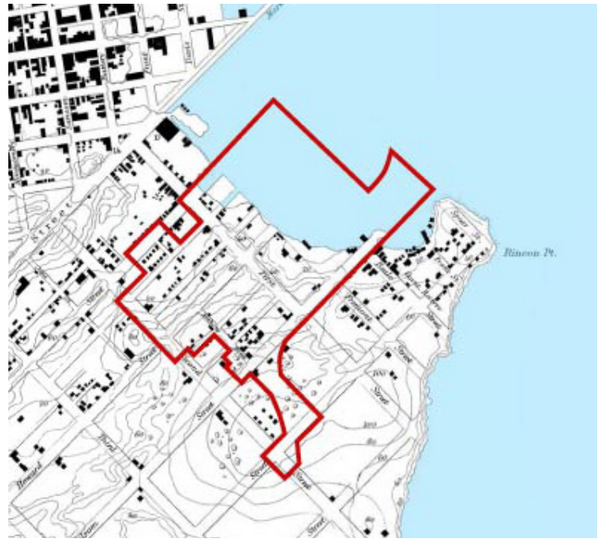
New projects should refer to the Construction and Demolition (C&D) Recycling Information and Forms of the City and County of San Francisco for the new recycling ordinance (No. 27-06).

4.3 EXCAVATION

The groundwater in the redevelopment area is believed to be approximately 15-20 ft below grade. This should not impact the design of the open space and streetscape improvements, however it may impact the storm water quality drainage design (see Page 91).Some areas to be redeveloped may contain hazardous materials, therefore hazardous materials assessments should be conducted prior to demolition. Removal of any hazardous materials should be completed in accordance with City regulations set forth by Article 22A “Analyzing Soils for Hazardous Waste” of the Public Health Code.

The redevelopment area lies partially to the bayward side of the historic shoreline as indicated on the Historic San Francisco Maps. Article 20 “Analyzing Soils for Hazardous Wastes” of the Public Works Code states that soils within this zone require testing per the requirements of the aforementioned Article 22A. Construction on the bayward side of the historic shoreline must also be conducted with respect to the possibility of archaeological findings. Should such items be found during construction, they should be documented and preserved in accordance with the testing and standards set forth by the California Environmental Quality Review Act.

Aerial of project area with 1852 Shoreline superimposed



1852 Shoreline with project area shown in red (U.S. Coast Survey Office 1852; Reproduced in 1967 by Historic Urban Plans, Inc., Ithaca, New York)

4.4 STORM WATER

This concept plan aims to improve storm water quality and to reduce run-off volume by increasing the area of open space, soft landscaping and permeable surfaces. The integration of stormwater best management practices (BMP's) within the streetscape and open spaces will improve the storm water management system.

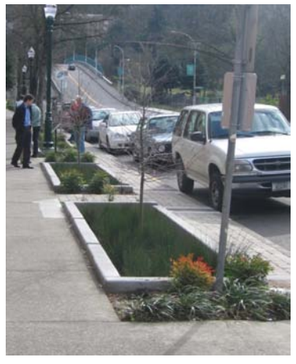
Natural BMP's that should be considered within the streetscape and open spaces include:

Raingardens within landscaped areas: shallow, depressed areas in the softscape, planted with vegetation that can withstand periodic inundation of water. Stormwater would be treated by filtration and infiltration processes.

Raingardens within streetscape areas: custom designed or proprietary biofiltration planters that are integrated into the streetscape. These would be landscaped elements designed to capture runoff from streets using openings in curbs, which treat storm water by filtration and infiltration through the vegetation and an engineered soil medium.

Permeable paving: the use of permeable paving should be considered wherever feasible, e.g. within the parking areas and on sidewalks or lightly trafficked streets. Suitable types of permeable paving may include porous asphalt, porous concrete, pavers and reinforced grass. Future design teams should confirm the use of permeable paving within the streetscape with the Department of Public Works and the Mayor's Office of Disability.

Swales: small grass-lined or vegetated channels that direct stormwater into drainage areas along the ground surface. They can slow the velocity of surface run-off, and improve water quality via filtration and infiltration. These may be suitable within park and open space areas, but should be used with caution as they are not easily integrated into an urban streetscape environment.



Raingardens within streetscape

Swales within the landscaping

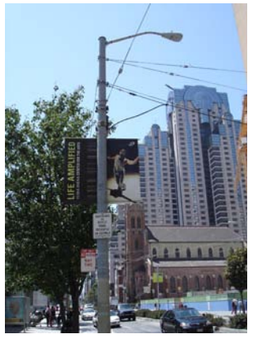
Formulation of a storm water strategy is heavily impacted by maintenance issues and site conditions. Natural BMP's are most effective where subsoils are permeable and where groundwater is well below the surface. If in-situ soils are found to be impermeable, engineered drainage systems will be required within the BMP's to direct runoff to the City's storm water system. Mechanical type BMP's such as media-filters and oil/water separators could be considered if the soils constrain natural infiltration techniques, but these devices require a dedicated maintenance plan. The San Francisco Public Utilities Commission (SFPUC) and the San Francisco Water Board should be consulted to determine a stormwater quality strategy that improves the quality of stormwater run-off without compromising the groundwater resource or imposing heavy maintenance demands. Storm water BMP's can be effective in run off volume reduction. If these strategies are implemented on other redevelopment projects throughout the city they may be able to reduce operations and ease maintenance at the South East Water Pollution Control Plant (SEWPCP).

The feasibility of utilizing rainwater harvesting techniques in the redevelopment area should be considered in future design phases of the project. Run-off could be collected from hardscaped areas including Transbay Park, and adjacent building roofs and stored for landscape and open space irrigation purposes. This would reduce the volume of stormwater run-off entering the City's combined sewer system, and reduce the volume of potable water required for irrigation purposes. Treatment of this water may be required prior to irrigating. Storage and treatment facilities could be integrated into the streetscape, the parks and open spaces, or within redevelopment parcels.

4.5 IRRIGATION

The streetscape plans significantly increase the number of trees and area of open spaces in the neighborhood. Approximately 1100 trees are anticipated to be planted, which will require irrigation, especially during the initial establishment period. The need for permanent irrigation systems throughout the streetscape and within the new parks should be determined during the next phase of the project.

To reduce the volume of potable water used for irrigation, alternative water sources should be considered. Storm water collected on site through rainwater harvesting, could be used for irrigation systems. As the design progress the feasibility of using groundwater wells as an alternative irrigation source should be investigated. Recycled water should also be considered as an alternative water supply source for irrigation. Although the City of San Francisco does not currently have a recycled water supply system in the area, future municipal recycled water supplies may become available. To facilitate the possible future use of recycled water for irrigation in the redevelopment area, the irrigation system should be constructed using code compliant purple pipe for recycled water, per Article 22: "Reclaimed Water Use", of San Francisco's Municipal Code. The system could use potable water or another irrigation alternative, until a recycled water supply becomes available.



Existing street light used for MUNI lines

4.6 STREET LIGHTS

The existing street lighting poles and fixtures will be replaced throughout the redevelopment area as described in Section 2.8. The impact of the new street fixtures on the existing power supply should be confirmed by future analysis, however it is unlikely that the energy demand of the new fixtures will require electrical capacity upgrades.

New light poles afford the opportunity to support overhead MUNI bus service lines. This would reduce the need for separate MUNI street poles, minimizing the number of poles within the pedestrian environment. Strengthened light poles with deeper foundations and thicker materials will be necessary to support these service lines. A pole, fixture and foundation detail should be developed during the future design phases of the project that meets the requirements of SFRA, MUNI, and the PUC.

4.7 STREETS

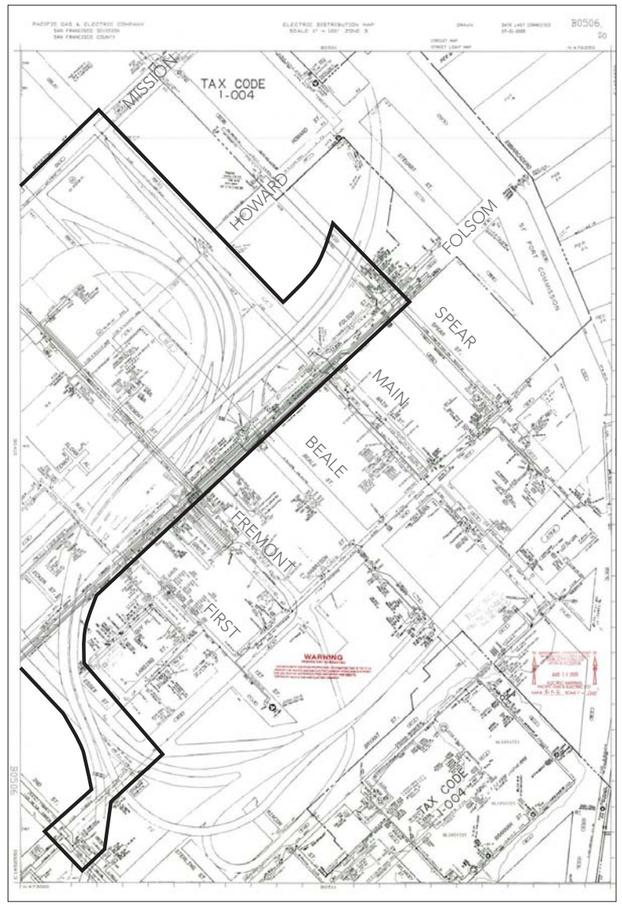
The plan on page 13, shows that most of the parcels to be redeveloped occur on Folsom, Main and Beale Streets. The program associated with these redevelopment parcels may significantly increase the utility demands. An assessment of the capacity of the existing utilities should be undertaken during future phases of the project to determine which existing utility lines need to be upgraded to adequately service future development.

For the purposes of this report, it is assumed that significant mainline utility upgrades will be required on Folsom, Main and Beale to service the new development. Under this scenario, these streets could be completely rebuilt during the utility upgrades. This would allow the streetscape improvements (new trees and curb realignments) to be effectively planned and integrated with the new utility infrastructure. A regular pattern of street trees should therefore be achievable if the streets are rebuilt completely. New utilities should be placed in the street where space permits, and should avoid layouts within the sidewalk where possible. New utility boxes, public cabinets, and vaults should be screened from the public's view on any point on the street where possible, while maintaining accessibility requirements.

The other streets within the redevelopment area have some adjacent new development, but a complete upgrade of the utility infrastructure may not be required. Under this scenario, the proposed street improvements could be retrofitted around the existing utility infrastructure, perhaps with limited utility relocations where financially viable. A detailed analysis of the existing constraints should be prepared for each of the streets where a retrofit approach is preferred. An accurate topographical survey of these streets should be performed to accurately determine the existing constraints, e.g. utilities, basements, curb cuts, and trees to be retained.

The existing utility information that has been studied as part of this preliminary analysis has been provided by SFRA and the utility providers, however the accuracy of the location of the utilities shown is unknown. It is likely that the drawings provided are not "as-built" information, and are therefore unsuitable for a detailed analysis of existing constraints. The locations of basements underneath existing sidewalks should also be confirmed during the next phase of the project as these may constrain tree planting.

The information provided is sufficient to identify potential future constraints for the redevelopment of each of the streets. The following sections discuss potential constraints identified during this preliminary analysis.



PGE Electrical Distribution map at Folsom Street

FOLSOM STREET

New development will be concentrated along the north side of Folsom. Due to the size of development, significant utility upgrades and the consequent rebuild of the street and underlying infrastructure may be necessary. In this scenario, the utility infrastructure can be coordinated with the proposed street trees to achieve a regular spacing. The wider 25' sidewalks offer the flexibility to integrate a storm water system into the landscaping scheme with the use of natural infiltration BMP's.

If the utilities within the street do not require significant upgrades, the most cost effective strategy may be to retrofit new trees and curb realignments within the existing utility layout. There are overhead electrical and communications lines on the north side of Folsom between Spear and Beale. If these are to remain as overhead lines, they will limit the height of trees planted underneath, and may cause irregular tree spacing within the streetscape. As development projects are progressed, consideration should be given to under grounding the overhead utility lines.

A PG&E substation is located on the south side of the street between Fremont and First as shown on the PG&E Electrical Distribution Map at Folsom Street. The utility information received from the SFRA shows a substantial number of electrical lines connecting to and from this substation along Folsom and the surrounding blocks. This electrical system could significantly constrain tree planting and curb adjustments if a retrofit approach is used on Folsom.

HOWARD STREET

Howard is currently almost completely developed, with limited opportunities for future redevelopment. It is possible that future redevelopment along Howard will not require significant upgrades to the existing utility system. In this retrofit scenario, regular tree spacing should be achievable in most locations, however it may become irregular in certain locations where constrained by existing utilities and basements. Visual inspection has shown that several electrical manholes are located in the north sidewalk between First and Second that could disrupt regular tree spacing.

MISSION STREET

The Transbay Terminal and the adjacent lot between First and Fremont are the areas along Mission that will be redeveloped. The streetscape on the south side of the street from Beale to First are assumed to be constructed as part of the Transbay Terminal project, using the design framework contained in this document. The strategy for integrating the new streetscape with the required infrastructure in these areas, will be determined by the Transbay Terminal project. Sections of Mission that are not redeveloped by the Transbay Terminal project should be redeveloped through streetscape retrofit, in areas where feasible and not constrained by curb cuts and utilities.

FIRST, FREMONT & SECOND STREETS

First, Fremont and Second streets are fully developed areas with limited space for redevelopment. It is possible that future redevelopment within these areas will not require significant upgrades to the existing utility system. In this retrofit scenario, regular tree spacing should be achievable in most locations, however it may become irregular in certain locations where constrained by existing utilities and basements.

There is a network of street trees along Second street that will most likely remain in place and be supplemented by additional trees. If additional trees are planted they must be placed such that they do not conflict with basements or existing utilities. Visual inspection shows that plantings along the east side of Fremont, south of Howard, may become irregular due to PG&E vaults in the sidewalk. If these utilities are not relocated during streetscape improvements the tree spacing may become irregular in this location.

The current proposed rail extension shows that tunnel construction from Second and Howard to the Terminal will be cut and cover. The cut and cover tunneling procedure creates a deep exposed trench in which construction takes place. During construction many of the existing utilities will have to be removed or diverted. This offers the opportunity to effectively integrate new infrastructure with the proposed streetscape improvements within the cut and cover area.

BEALE, MAIN & SPEAR STREETS

New development is concentrated along Beale and Main. Due to the size of development, significant utility upgrades may be required, therefore a complete rebuild of the street and underlying infrastructure may be necessary. In this scenario, the utility infrastructure can be coordinated with the proposed street trees to achieve a regular spacing.

On the east side of the Transbay Terminal there is a proposed rail turn-around under Main Street. The section of track under Beale Street that connects to the turn-around is planned to be constructed using cut and cover techniques, therefore many of the existing utilities will be removed or diverted between Mission and Howard. A complete rebuild of the street is likely, allowing the new infrastructure to be coordinated with the streetscape improvements.

Significant curb realignments are planned for Beale and Main streets between Mission and Howard. If the redevelopment within this area does not require complete rebuild of the street, there is the potential for utility conflicts with the proposed streetscape layout. Tree spacing may also be constrained to where spaces exist amongst curb cuts, basements and utilities.

Per the utility information from SFRA, the following potential utilities may be impacted by the Beale curb realignment.

- **PG&E electrical line** – The electrical line, and associated vaults and manholes on the southwest side of the street, may be impacted by the realigned curb. Those vaults that may be impacted by the curb realignment will require accurate survey to determine the extent of the conflict. Access to electrical facilities will need to be maintained per the access requirements of PG&E. The vaults will require adjustments to their cover elevations to incorporate grade changes caused by the curb relocations.

- **Overhead MUNI lines** – Street poles and overhead lines must be considered with respect to continued maintenance and usage requirements from the street. Proposed planting and pedestrian strategies should consider the existing overhead lines and poles.

- **Auxiliary water line** - A 10" auxiliary water line runs along the southeast curb line. Auxiliary water line fire hydrants and control valves may need to be relocated with respect to the proposed curb line depending on the Fire Department's requirements. There is an existing cistern, for water supply, at the intersection of Beale and Howard. Curb configurations must consider the impacts to these storage systems as well as the other utilities within the right of ways.

- **Sanitary sewer** - A 18" VCP (vitrified clay pipe) sanitary sewer line runs along the middle of the street. Two manholes lie within the proposed median. The rim elevations of the manholes may have to be adjusted to match the proposed grade in the median.

- **Utilities within the Proposed Median** - A communications line and electrical line are within the median and a gas line is in proximity to the proposed median. Communications vaults may also be located within the median. No other vaults, valves, etc are shown to exist within the median. These conduits are likely to be approximately 3-5' below road elevation and will likely constrain the type of planting that can be considered within the median unless they are relocated.

- **Storm drainage inlets** – All existing drainage inlets on Beale Street are grate inlets. The locations of grate inlets will need to be relocated to suit the amended curb line.

Per the utility information from the SFRA, the following potential utilities may be impacted by the Main curb realignment.

- **PG&E electrical line** – The electrical line, and associated vaults and manholes on the southwest side of the street, may be impacted by the proposed curb. Those vaults that may be impacted by the curb realignment will require accurate survey to determine the extent of the conflict. Access to electrical facilities will need to be maintained per the access requirements of PG&E. The vaults will require adjustments to their cover elevations to incorporate grade changes caused by the curb relocations.

  There is a series of high voltage vaults on the southeast side of the street. These should be taken into consideration during the design of the proposed bulb out in between Mission and Howard, and may preclude the bulb-out and regular tree spacing. The vaults could be relocated to accommodate the bulb outs, however this is likely to be prohibitively costly.

- **Overhead MUNI lines** - The proposed curb lines may place existing street poles in the middle of the new sidewalk. Proposed planting and pedestrian strategies should consider the existing overhead lines and poles. Street poles and overhead lines must be considered with respect to continued maintenance and usage requirements from the street.

- **Auxiliary water line** – A 14" auxiliary water line runs along the southwest curb line. Auxiliary water line fire hydrants and control valves may need to be relocated with respect to the proposed curb line depending on the Fire Department's requirements.

- **Storm drainage inlets** - All existing drainage inlets on Main Street are grate inlets. The locations of grate inlets will need to be relocated to suit the amended curb line.

The section of Spear street, near Folsom, is shown to have private development. New construction offers the chance to renovate the streetscape to meet the concepts set forth by this report, while fitting within the existing infrastructure.

ALLEYS (CLEMENTINA & TEHAMA)

The alleys are planned to be pedestrian friendly streets with lowered curbs and raised intersections engaging the street fabric with homes, shops, and restaurants. Stormwater is intended to be directed toward one or more of the following collection facilities: permeable pavers; a series of catch basins; a series of biofiltration planters located within the alley landscaping. The preferred drainage strategy should be determined during the detail design stage.

It is possible that future redevelopment within the alleys will not require significant upgrades to the existing utility system. The existing utility network shows that the majority of utility service to the alleys is from the surrounding major streets. In this retrofit scenario, regular tree spacing should be achievable in most locations, however it may become irregular where constrained by existing utilities and basements. The location and depths of existing utilities should be verified during the detailed design stages, to determine whether the existing infrastructure will constrain the alleys' streetscape strategies.

TRANSBAY PARK

Transbay Park is a formalized open space incorporating lighting features, landscaping, and grassy areas. To limit the amount of water used to irrigate the park, water efficient landscaping techniques should be integrated into the design of the park. Carefully considering issues such as plant selection, turf areas, zoning of plants by water needs, soil conditions, use of mulches and maintenance practices can offer significant water savings over traditional high water use landscape designs.

Water efficient landscaping

There is an opportunity for Transbay Park to integrate a storm water feature or an alternative strategy for storm water management within its boundary. The open space is assumed to be self treating, because the amount of permeable surface and landscaping is sufficient to handle the amount of rain fall on the park area. A natural infiltration system could be integrated into the landscaped or grassy areas to improve water quality. Another storm water management strategy that can be integrated into the park is using recycled or reclaimed water for the water feature conceptualized for the park program. Rain water can be harvested and stored for use in this water feature, or it can be plumbed for the possibility of a future recycled water supply system.

Appropriate lighting design levels should be considered for the park. The conceptual plan should ensure a safe pedestrian environment within the park, without creating excessively bright areas. The park should be illuminated appropriately for use. For more information on lighting guidelines see Section 2.10 Lighting.

It is anticipated that the energy use requirements of the park lighting system is unlikely to require an upgrade of the electrical supply utilities in the area, however this should be confirmed as part of the future utility capacity study.

4.8 PHASING

Phasing of streetscape improvements should be considered throughout the duration of the project. Street improvements are likely to be driven by adjacent private development, therefore streetscape improvements could be phased in conjunction with parcel development. This would allow all significant parcel and utility construction to be performed prior to installing the finished surfacing, trees and street furniture. This would minimize the constraints placed on parcel developers by the existing streetscape, however implementation of the improved streetscape would be delayed until completion of the adjacent parcel blocks.

Alternatively, if certain streets are determined to merit immediate streetscape improvements prior to adjacent parcels being developed, this strategy could be implemented. An immediately improved streetscape would benefit the users of the area, however it would place a significant constraint on the construction of the adjacent parcels as the new surfaces, trees and street furniture would have to be protected, or replaced at cost by the parcel developers.

Streetscape that is adjacent to existing buildings to be retained is less likely to require significant utility upgrades, therefore phasing of the improvements is less likely to be constrained by coordination with new construction projects. These areas should be improved when funding is available and when it is logical within the context of the overall plan.

4.9 CURRENT AND FUTURE PROJECTS

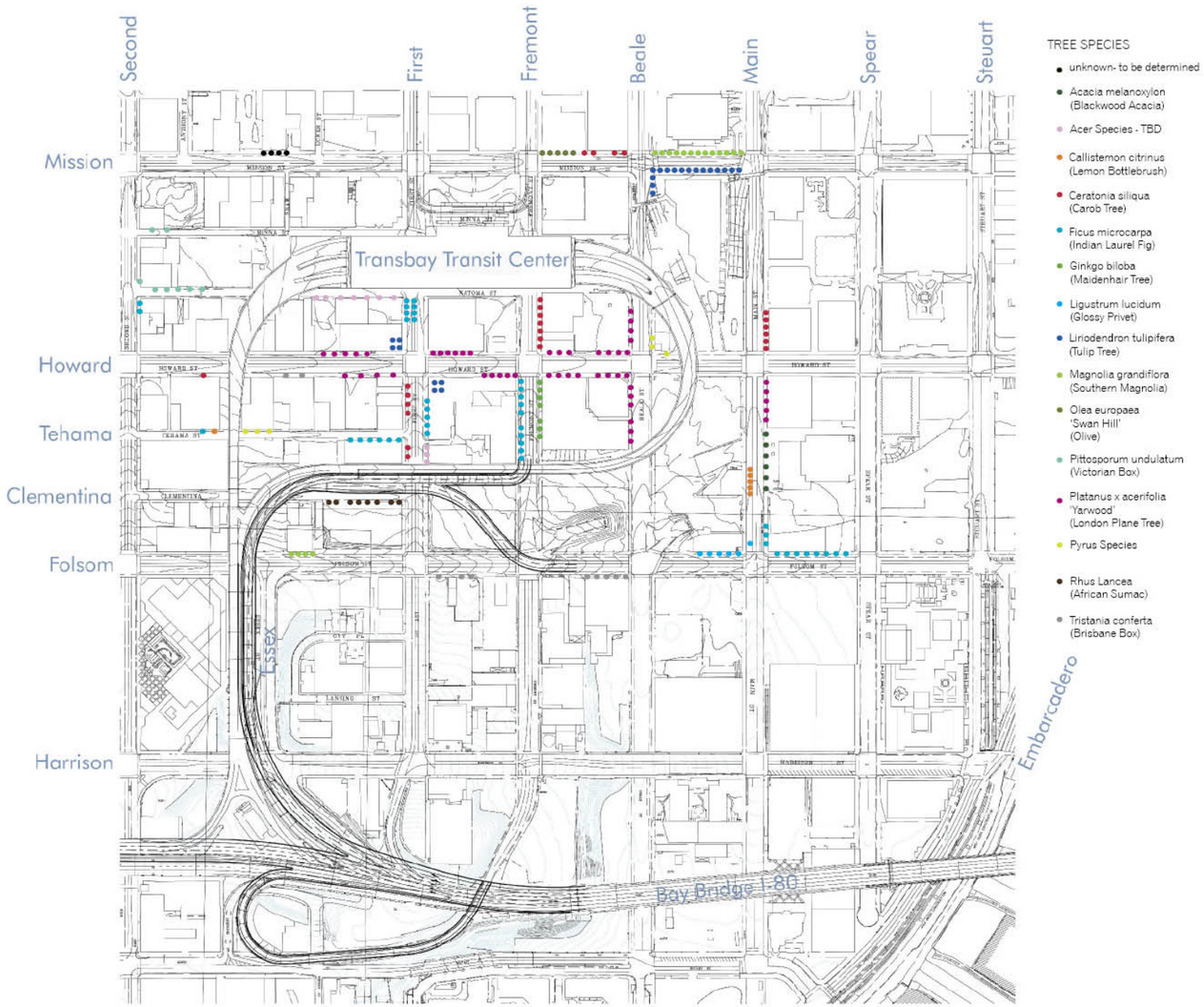
Currently there are several development or renovation projects planned or known to be underway within the project area. These are located at 301, 535 and 555 Mission, 303 Second Street and at the northeast corner of Foundry Square near Howard and First. A high rise tower is also under construction adjacent to the project boundary on the south side of Folsom between Main and Spear. The San Francisco Department of Public Works has a five year plan that lists the proposed utility and street improvement projects throughout the city. There are several improvements scheduled for this area, and these projects should be tracked and followed as redevelopment progresses. Effective coordination of the streetscape improvements with these private construction projects will be a primary goal as development in the area progresses. Streetscape and utility improvements required by these projects should follow the recommendations of this plan.

Construction underway at Folsom and Main

APPENDICES

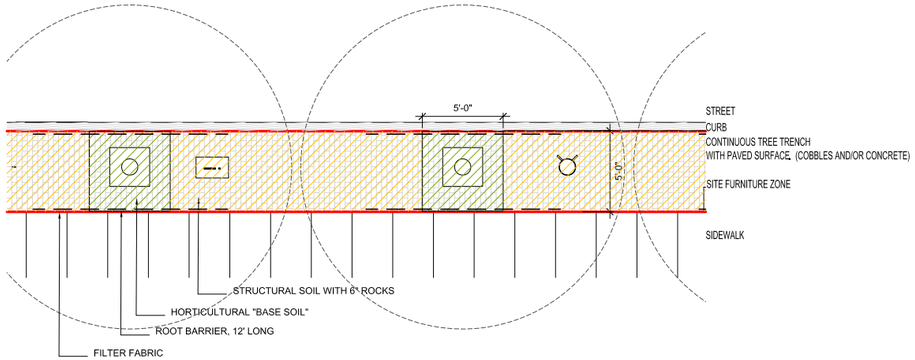
APPENDIX 1:

STREET TREE INVENTORY

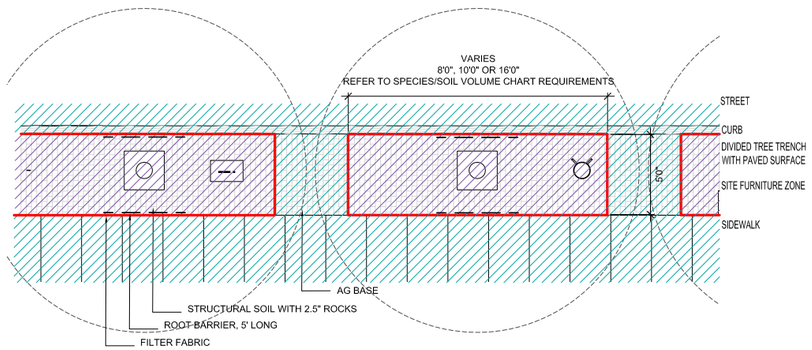


APPENDIX 2: STRUCTURAL SOIL GUIDELINES

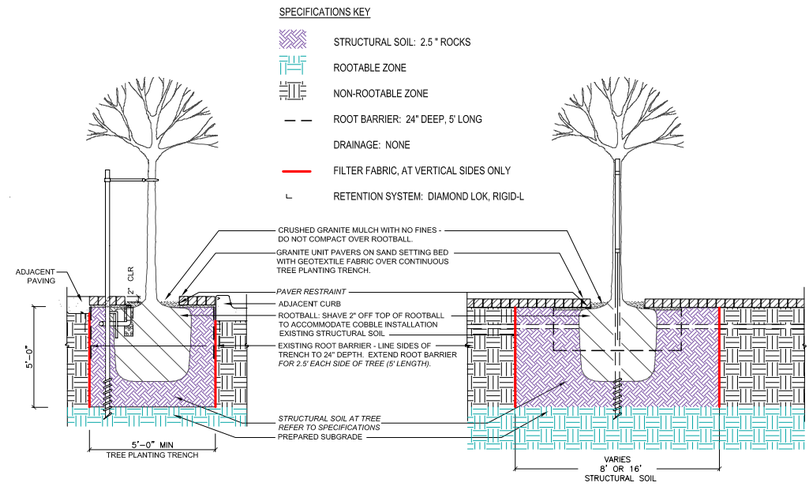
SAMPLE EXHIBIT



1 EXISTING CONDITIONS SPECIFICATIONS
PLAN



2 PROPOSED TREE LAYOUT DESIGN - MODIFIED SPECIFICATION
PLAN



2A PLANTING DETAIL FOR MODIFIED SPECIFICATIONS
SECTION

SAMPLE EXHIBIT

Steve Batchelder, Consulting Arborist
1534 Rose Street, Crockett, CA 94525
WC ISA Certified Arborist #228
Calif. Contractor Lic. (C-27) 533675
Phone (510) 787-3075, Fax (510) 787-3065
E-mail sbcatree@attbi.com

Date: 3/5/2003

To: Amy Coburn, Associate Vice President, Development
CATELLUS Urban Development Corporation

Re: **SOIL VOLUME RECOMMENDATIONS FOR MISSION BAY TREES**

Dear Amy,

In this memo I have tried to bring together and to clarify some of the previous information regarding the volumes of structural soil that are required for the tree species designated for use on the Mission Bay Project.

This and all previous communiqué pertaining to volumes of structural soil are mean to designate threshold levels requiring additional site analysis by arborist and engineer.

Previous Transmittals

The first soil volume communiqué, dated 6/25/02, indicates that structural soil volumes less than the respective volumes of 600 cubic-feet and 800 cubic-feet requires further site analysis. This communication does not provide a list of tree species keyed to the soil volumes provided.

The second communiqué, dated Feb. 2, 2003, provides another set of minimum volumes for structural soil. These two volumes are predicated upon access to sandy soil adjacent to the planting locations and a number or additional favorable site conditions listed. The

MCP Rendering.jpg soil volumes provided in this communication were 200 and 400 cubic-feet. These volumes specifically refer to root anchoring and minimizing hardscape damage. This was meant to signify a critical level where additional and possibly special arborist and engineer analysis is required.

Optimum Soil Volumes
It was requested that I provide some additional information regarding what is an *optimum soil volume*. Optimum volumes for most of the tree species designated for the MISSION BAY begin at above 1000 cubic feet of rootable soil which includes the combined structural soil and the adjacent rootable soil. Optimal soil volumes can be provided in different ways.

- Continuous Trenching - Continuous trench filled with structural soil as pre original design. This volume can be attained by excavating deeper, wider, or providing additional channels (trenches) of structural soil in other directions.

- Access to Surrounding Soil - Root access into surrounding rootable soil can make up for shortages in structural soil volume.

MINIMUM VOLUMES OF COMBINED STRUCTURAL SOIL AND ADJACENT ROOTABLE NATIVE SOIL

The determination of what is rootable soil is to be made by qualified arborist, site engineer or a qualified soils expert who can attest to the soil conditions.

SPECIES	Est. Ht. at 25-30 yrs.	Root Crown	Tree Size Classification	Minimum Volume for Inspection
Acer rubrum 'Bowhall'	30'	3'	Small-medium	600 cu. Ft.
Arbutus 'Marina'	30'	3'	Small -medium	600 cu. Ft.
Brachychiton populneus	30'	4'	Small-medium	600 cu. Ft.
Corylus colurne	50'	2'	Small-medium	600 cu. Ft.
Eucalyptus ficifolia	30'	4'	Small-medium	600 cu. Ft.
Eucalyptus maculate	70'	5'	Medium-large	800 cu. Ft.
Eucalyptus microtheca	40'	4'	Medium-large	800 cu. Ft.
Ficus retusa	30'	4'	Medium-large	600 cu. Ft.
Koelreuteria bipinnata	30'	4'	Small-medium	600 cu. Ft.
Laurus 'Saratoga'	25'	2'	Small-medium	600 cu. Ft.
Platanus x acerifolia 'Yarwood'	50'	5'	Medium-large	800 cu. Ft.
Pyrus calleryana 'Chanticleer'	40'	2'	Small-medium	600 cu. Ft.
Sophora japonica	50'	4'	Medium-large	800 cu. Ft.
Tristania conferta	45'	4'	Small-medium	600 cu. Ft.
Washingtonia robusta	50'	4'	Medium-large	800 cu. Ft.

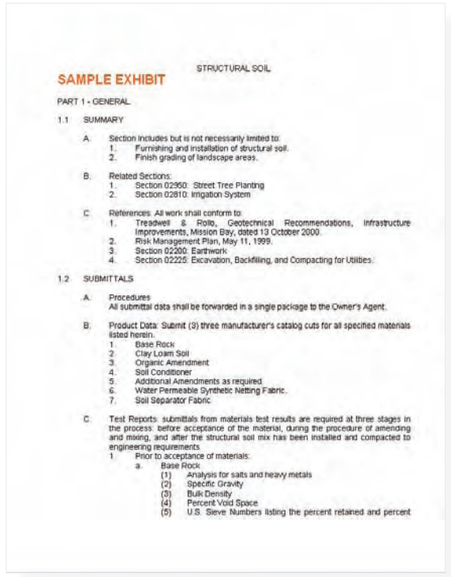
The following soil volume recommendations are based upon the conditions listed in the January 28, 2003 communiqué, Streetscape Master Plan Supplemental Planting Guidelines.

Species – tree species being used on the Mission Bay Project
Est. Ht. at 25-30 yrs. – Based upon observations of street tree plantings under favorable conditions.
Root Crown – Lists the minimum opening required to accommodate the base of a mature tree.
Tree Size Classification – Medium to large and Small to medium. Refer to est. ht.
Minimum Volume for Inspection – The threshold soil volume requiring a site inspection.

END

Steve Batchelder, Consulting Arborist
1534 Rose St. Crockett, CA 94525
Phone (510) 787-3075
Fax (510) 787-3065

APPENDIX 3: STRUCTURAL SOIL



STRUCTURAL SOIL

SAMPLE EXHIBIT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes but is not necessarily limited to:
1. Furnishing and installation of structural soil.
2. Finish grading of landscape areas.

B. Related Sections:
1. Section 02950: Street Tree Planting
2. Section 02810: Irrigation System

C. References: All work shall conform to:
1. Treadwell & Rollo, Geotechnical Recommendations, Infrastructure Improvements, Mission Bay, dated 13 October 2000.
2. Risk Management Plan, May 11, 1999.
3. Section 02200: Earthwork
4. Section 02225: Excavation, Backfilling, and Compacting for Utilities.

1.2 SUBMITTALS

A. Procedures
All submittal data shall be forwarded in a single package to the Owner's Agent.

B. Product Data: Submit (3) three manufacturer's catalog cuts for all specified materials listed herein.
1. Base Rock
2. Clay Loam Soil
3. Organic Amendment
4. Soil Conditioner
5. Additional Amendments as required.
6. Water Permeable Synthetic Netting Fabric.
7. Soil Separator Fabric

C. Test Reports: submittals from materials test results are required at three stages in the process: before acceptance of the material, during the procedure of amending and mixing, and after the structural soil mix has been installed and compacted to engineering requirements.
1. Prior to acceptance of materials:
a. Base Rock
(1) Analysis for salts and heavy metals
(2) Specific Gravity
(3) Bulk Density
(4) Percent Void Space
(5) U.S. Sieve Numbers listing the percent retained and percent passing for each.
(6) Rock Hardness
b. Soil – Complete Standard Analysis
c. Compost – Laboratory analysis as per specifications
2. During the amending and mixing process
a. Complete Standard Analysis of five composite samples of the amended soil prior to the mixing with rock.
b. Maximum Dry Bulk Density Test Reports of the amended soil (ASTM D-1557).
c. Percent moisture content of amended soil.
3. After installation
a. Water Infiltration Test – using a double ring method. The water infiltration rate is to be a minimum of ¾" per hour.
b. Soil Bulk Density Test - using a Neutron Probe

D. Testing Laboratory:
1. Wallace Laboratories, 365 Coral Circle, El Segundo, CA 90245 (310) 640-6863.

E. Testing Methods and Procedures: see Appendix E.

F. Purchase Documentation
1. Soil Conditioner Purchase and Delivery Invoices
2. Organic Amendment Purchase
3. Base Rock Purchase and Delivery Invoices

1.3 SITE CONDITIONS

A. Environmental Requirements
1. Do not work soil when moisture content is close to or at field capacity. Do not work soil when it is so dry that dust will form in the air or when clods will not break readily.
2. Apply water, if necessary, to bring soil to an optimum moisture content for tilling. Optimum for a clay loam is about 20% by weight.
3. Do not work soil when muddy or frozen.
4. Do not apply chemicals if wind conditions will cause hazardous drift to people or property.

B. Existing Conditions
1. Prior to work commencement review and clearly mark in field horizontal and vertical locations of existing public underground utilities and structures with respective utility companies.

1.4 COORDINATION

A. Contractor shall be responsible for coordinating structural soil installation with work of other trades.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Base Rock:
1. Minimum Standards for Acceptance
a. Chemical Analysis:
Standard chemical properties involves heavy metals below phytotoxic levels, soluble salt<300 ppm, and 6> pH< 8.5. If calcium carbonate is present, rock must be rinsed.
b. Screen Size:
<6% passing a 1" screen, 100% passing a 2 ½" screen.
c. Hardness:
Soundness ASTM No. C88 - 10% max
Abrasion Loss ASTM No. C 535 – 30% max
d. Minimum Percent Void:
The minimum void space, calculated by the "water filled method" must be greater than 41%. The percent void space determined by the rock size gradation.
e. Rock shall be angular.

2. Additional Information Required for Rock Submittals
a. General:
Accurate data is essential as the primary unit of measurement for the rock will be weight tags from the quarry of origin.
b. Specific Gravity:
Available from the quarry. Specific gravity in grams per cubic centimeter.
c. Bulk Density:
Bulk density supplied by the quarry in tons per cubic yard. Bulk density of the rock will require five random tests to confirm, using a minimum four cubic four container.
d. Percent Void Space within the Rock Matrix: The void is determined through two tests, the "water filled capacity" and calculation using the specific gravity and the weight of a known volume of rock. Void space can also be calculated directly from quarry data on bulk density and specific gravity. The minimum void space within the rock matrix, calculated by the "water filled method", must be greater than 41%. This is a measure of the uniformity of the rock screen size.

B. Clay Loam Soil:
1. Soil Sampling Method: A minimum of five samples shall be taken for analysis from any potential source of homogenous soil prior to acceptance. Each sample is to be approximately two quarts in volume and a composite from 10-15 locations.
2. General: Topsoil shall be free of roots, clods, stones larger than 1-inch in the greatest dimension, pockets of course sand, noxious weeds, sticks, lumber, brush and other litter.
3. Friable: topsoil shall be friable and have sufficient structure in order to give good tilth and aeration to the soil.
Total pore space content on a volume/volume basis shall be at least 15% when moisture is present at field capacity.
Soil shall have a field capacity of at least 15% by weight.
4. Gradation Limits: the soil shall be a sandy loam, loam, clay loam or clay. The selection shall be made by the engineer/landscape architect or else be similar to the site soil. The definition of soil texture shall be the USDA classification scheme.
5. Permeability Rate: Hydraulic conductivity rate shall be no less than 1-inch/hour and no more than 20 inches per hour when tested in accordance with the USDA Handbook Number 60, method 34b or other approved methods.
6. Fertility: The range of essential elements concentration in soil shall be as follows:

	Ammonium Bicarbonate/DTPA Extract Parts per million (mg/kilogram) Dry weight basis
phosphorus	2-40
potassium	40-220
iron	3-35
manganese	0.3-6
zinc	0.6-8
copper	0.1-5
boron	0.2-1
magnesium	50-150
sodium	0-100
sulfur	25-500
molybdenum	0.1-30

7. Acidity: The soil pH range measured in the saturation extract (Method 21a, USDA Handbook number 60) shall be 6.0 – 7.9.
8. Salinity: The salinity range measured in the saturation extract, the maximum salinity shall be 4.0 dS/m.
9. Chloride: The maximum concentration of soluble chloride in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 150 mg/1 ppm.
10. Boron: The maximum concentration of soluble boron in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 1 mg/1 ppm.
11. Sodium Absorption Ratio (SAR): The maximum SAR shall be 4 (measured per Method 20b, USDA Handbook Number 60).
12. Soil Organic Matter Content: sufficient soil organic matter shall be present to impart good physical soil properties but not be excessive to cause toxicity or cause excessive reduction in the volume of soil due to decomposition of organic matter.
13. Calcium Carbonate Content: Free calcium carbonate shall not be present.
14. Heavy Metals – the maximum permissible elemental concentration in the soil shall not exceed the following:
Ammonium Bicarbonate/DTPA Extract
in parts per million (mg/kilogram) on a dry weight basis.

Arsenic	2	Molybdenum	60
Cadmium	2	nickel	100
Chromium	10	Selenium	30
Cobalt	2	Silver	10
Copper	150	Vanadium	50
Lead	90	zinc	200
Mercury	1		
Nickel	5		
Selenium	3		
Silver	0.5		
Vanadium	3		

If the pH is between 6 and 7, the maximum permissible elemental concentration shall be reduced 50%. If the soil pH is less than 6.0, the maximum permissible elemental concentration shall be reduced 75%. No more than three metals shall be present at 50% or more of the above values.

15. Phytotoxic constituent, herbicide, hydrocarbons etc. Germination and growth of plants shall not be restricted more than 10% compared to standard controls. Standards controls shall be both monocots and dicots. Total petroleum hydrocarbons shall not exceed 100mg/kg dry soil measured per EPA Method No. 8002.

C. Organic Amendment: Organic material is to be a well composted humus with the following properties.
1. Humus material shall have an ash content of no less than 8% and no more than 50%.
2. The pH of the material shall be between 6 and 7.5.
3. The salt content shall be less than 10 millimho/cm @ 25 degrees C. (Ece less than 10) on a saturated paste extract. If the Ece exceeds 10 millimho/cm, the maximum rate of sue shall not exceed 15 % by volume. If the concentration of calcium sulfate in the saturation extract is greater than 25 milliequivalents per liter, the maximum level of salinity can be increased 3 millimho/cm @ 25 degrees C. units (13 millimho/cm @ 25 degrees C).
4. Boron content of the saturated extract shall be less than 1.0 parts per million.
5. Silicon content (acid-insoluable ash) shall be less than 20%.
6. Calcium carbonate shall not be present if the amendment is applied on alkaline soils.
7. Types of acceptable products are composts, manures, mushroom composts, straw, alfalfa, sludge, peat mosses etc. low in salts, low in heavy metals, free from weed seeds, free of pathogens and other deleterious materials.
8. Composted wood products are conditionally acceptable (stable humus must be present). Wood based products are not acceptable which are based on redwood or cedar.
9. Sludge-based materials are not acceptable if the soil already has a high level (toxic level) of zinc, copper or other heavy metals based on soil analysis.
10. Carbon:nitrogen ratio is less than 25:1
11. The compost shall be aerobic without malodorous presence of decomposition products.
12. The maximum particle size shall be 0.5 inch, 60% more shall pass a No. 4 screen.
13. Maximum total permissible pollutant concentrations in organic amendment in parts per million on a dry weight basis:

arsenic	20	Molybdenum	60
Cadmium	15	nickel	100
Chromium	100	Selenium	30
Cobalt	50	Silver	10
Copper	150	Vanadium	50
Lead	100	zinc	200
Mercury	10		

Higher amounts of salinity or boron may be present if the soils are to be pre-leached to reduce the excess or if the plant species will tolerate the salinity and/or boron.

D. Soil Conditioner:
1. Polymer – Soil Drain/ P.A.M.
Available: Complete Green Company, 365 Coral Circle, El Segundo, CA 90245, p. (310)640-6815.
Application: P.A.M. is applied dry to the base soil with other soil amendments at the time of screening. The polymer is then applied in a water solution and allowed to cure.
Application Rate: As per Wallace Laboratory recommendations based upon soil textural qualities.

E. Additional amendments, which may be required:
1. Fertilizer
Ammonium sulfate, Ammonium Nitrate (21-0-0)
Ammonium nitrate (34-0-0)
Sulfur Coated Urea (32-0-0) 22% sulfur
Single Superphosphate (0-20-0)
Triple super phosphate (0-45-0)
Potassium sulfate (0-0-50)
Calcium carbonate (CaCo3)
2. Gypsum – Agricultural Gypsum (CaSO4- 2H20) 97%
3. Humate ag, available: Humate International, 500 North Ellis Road, Jacksonville, Florida 32254, (904) 781-6512.

F. Water Permeable Synthetic Netting Fabric: Shall conform to guidelines contained in the Risk Management Plan.

G. Soil Separator: Mirafi 140NC, as manufactured by Mirafi, Inc, Pendergrass, GA (706) 693-2226, or approved equal.

PART 3 – EXECUTION

3.1 SOIL AMENDING AND CONDITIONING

A. Incorporate dry amendments during initial screening – all amendments including compost and dry polymer (P.A.M.) are incorporated during screening. Amendments are applied at the rate specified by Wallace Laboratory. Soil amendments are measured on a pounds per cubic yard of soil basis. Maximum particle size after first screening is ½".

1. Measurement – The volume of a front loader bucket is used as the primary unit for bulk soil measurement. Precise measurements of the volume of the bucket as well as the average bulk density of a level bucket are required. Fertilizer and amendments are measured in volumes appropriate for each unit (tractor bucket full). The maximum bulk density is to be recorded (ASTM D-1557). The average percent moisture content is to be determined and recorded as well.

B. Soil Preparation for Liquid Polymer Treatment
1. After screening, spread the soil in a large flat area to a depth of 12".
   a. The site must have good drainage.
   b. The process of spreading the material shall be done in a manner that the front end loader does not drive over or compact any of the soil.
   c. Form a small berm at the top edge of the soil to retain the liquid polymer.

C. Mix the polymer with water per instructions.
1. The water tank shall have a minimum 500 gallon capacity and a discharge pump.

D. Apply the solution to the surface of the soil.

E. Allow the solution to infiltrate until inspection reveals that the soil is evenly saturated with the P.A.M. solution.

F. Curing of amended soil: Allow the soil to cure and dry for a minimum of two days before disturbing.

G. Stockpiling Soil
1. The soil is stockpiled until needed. Optimum moisture content for working the soil is 20%. Optimum moisture should be maintained by covering the stockpiled soil with a tarp to prevent drying, or the opposite, in the event of rain.

H. Screen the amended and conditioned soil to ½" maximum particle size just prior to mixing with the structural rock. Mixing should occur just prior to installation.

3.2 MEASUREMENT AND CALIBRATION OF EQUIPMENT

A. General – Material portions are by volume. Actual volume is determined through dry weight per unit volume at 100% maximum bulk density.

B. Rock – the bulk density and weight of all units of rock are required for calculation. The volume of rock required represents 100% of the volume of the excavation to be backfilled. Bulk density of the rock is taken to be 100% compaction.

C. Percent Void – the percent void space within the rock matrix is calculated in accordance with procedures contained herein. Crushed rock can vary in percent void space from about 35% to slightly above 50%. This is highly dependent upon the shape and size gradation of the rock. The projected void of the crushed rock is about 45%.

D. Percent Soil – Soil is measured in volume as a percent of the rock volume. The total volume of the rock is taken to be 100%. The volume of the soil is to be adjusted to an average bulk density of 65% of maximum (ASTM D-1557). (The actual volume of soil is equal to the volume of the void space in the rock matrix less 20%. This volume of soil is adjusted to an average bulk density of 65%). Example: The percent void space in the rock is 45%, a given. The volume of the soil is calculated at 25% of this volume. The dry bulk density of the soil is to be 65% of maximum.

E. Calibration of Loader Bucket – Calibration of the working volume of a level bucket should be as accurate as possible. The working volume of a bucket of soil is adjusted to an average bulk density of 65% of maximum. The bulk density is calibrated as dry bulk density.

F. Calibration of Soil Moisture Percentage – Optimum moisture percentage for working soil is considered to be 20%. Collect a soil sample having a representative moisture level. Weigh the soil sample. Completely dry the soil sample and weigh the soil again. Divide the difference in weight of the soil (water loss in drying) by the original weight of the soil. [Example: five pounds of soil weighing four pounds after drying. One pound, (the difference), divided by five, (original weight) is twenty percent moisture.]

3.3 PROCEDURES FOR MEASURING ROCK AND SOIL.

A. General - All measurements for rock and soil are based upon cubic yards of material. Material is to be mixed with a front loader bucket and then with an excavator bucket in the planting trench.

B. Rock – Weight tags from the quarry supplying the rock will be used as the basic units of measurement. Rock volume is calculated from bulk density and the net weight of the rock.
1. Determining the volume of the rock
   Rock weight in tons ÷ Bulk Density (ton/cubic yard) = cubic yards

C. Soil - Unit volume measured in a level bucket of a front loading tractor. The working volume of a level loader bucket is to be calibrated to be at a bulk density of 65%. Depending upon the size of the bucket, partial bucket calibration measurements may be required.

D. Sequencing of Measurements - The soil volume is based upon the weight (volume) of rock. Rock is placed first and then the calculated volume of soil is placed on top of the rock.

3.4 PROCEDURE FOR MIXING ROCK AND SOIL

A. General – Creating a good root medium depends upon accurate measurement and sufficient mixing. Rock and soil should be mixed until they are homogenous, because any area of the mix having too high a proportion of soil will be subject to later settling.

B. The stone, clay loam soil and hydrogel (polyacrylamide) shall be mixed at a location where it can be stored up to 45 days. During this time it must be covered by tarps to prevent drying. If rock and amended soil are mixed off site and stored prior to use, piles of material should be on larger than 40 cubic yards each. Piles are to be covered by plastic tarp to prevent changes in moisture.

C. Companies qualified to prepare the mix include:
1. Sheldon Transfer, 1996 Old Oakland road, San Jose (408) 492-4090
2. Voss Materials (800) 660-6677
3. American Soil Products (510) 889-7206
4. Bauman Landscaping (510) 236-1212

D. Prior to any mixing or installation of Structural Soil Mix, the Owner's Agent shall hold pre-installation meeting with the contractor to discuss schedules, methods and techniques for the mixing and delivery of the material.

E. All mixing shall be performed at the agreed upon site using appropriate soil mixing equipment of sufficient capacity and capability to assure proper quality control. No mixing of soils at the project site shall be permitted.

F. Perform mixing in clean area free of materials that may contaminate mix.

G. Variable Blending Procedure – No matter how much mixing takes place prior to depositing in the trench, further blending must take place inside the trench. The structural soil is mixed with either a backhoe or excavator bucket until well homogenized.

H. The contractor shall have available at the mixing site sufficient equipment and instrumentation, including qualified technicians, to determine weights and water content of the mix components immediately prior to the mixing procedure. The contractor shall monitor these critical elements throughout the mixing process to provide adequate quality control.
1. The Contractor shall maintain a quality control log of material weight, water content and mix proportions for every 15 tons of material mixed.

I. The contractor shall mix sufficient material in advance of the time needed at the job site to allow adequate time for testing as required by the progress of the work. Structural Soil Mix shall be stored in piles of no more than 400 cubic yards and each pile shall be numbered for identification and testing purposes.

J. The contractor shall submit three-particle size distribution analyses from samples taken randomly through each 400 cubic yards of Structural soil Mix prepared. In the event that the particle size distribution varies significantly from the approved sample, as determined by the Owner's Agent, make adjustments to the mixing ratios or procedures and re-mix the lot. Re-test any lot of soil that fails to meet correct analysis after the adjustment has been made.

K. Correcting mistakes in blending – If the mix is found to be incorrect after depositing in the planting trench, additional rock or soil can be added and blended. The blending of the structural soil mixing is complete when the Owner's Agent determines it to be so.

3.5 EXCAVATION, INSTALLATION AND COMPACTION

A. Excavation of the tree trench
1. Excavate tree planting trench as indicated on contract documents.
2. Dispose of excavated spoils in accordance with paragraph 3.1 of Section 02200 "Earthwork"

B. Line Trench: Line two sides and ends of the tree trench with soil separator. Lap joint 18" minimum. Install in accordance with manufacturer's instructions.

C. Compaction
1. Compact the mix in successive layers called lifts, each lift having maximum thickness of 12 inches. If compaction is not acceptable to Owner's Agent, lift thickness may be reduced.
2. Compact the mix by using a roller, with a minimum of four passes. Corners and irregular areas which the roller cannot reach are to be compacted with a hand tamper. Vibrating compactors or jack hammer type compactors shall not be used.

D. Scarify Soil Surface: After each lift has been compacted, scarify the top 2" of soil prior to installing the next lift.

3.6 FIELD QUALITY CONTROL

A. Testing Agency Services: The Geotechnical Engineer will observe placement of structural soil. Contractor shall not proceed until previously completed work has been verified for compliance with requirements.

B. Whenever acceptance of the Geotechnical Engineer is required by these Specifications, the Contractor shall notify the Owner's Agent at least 48 hours prior to commencing any phase of earthwork.
1. No phase of the work shall proceed until the prior phase of work has been accepted by the Geotechnical Engineer.
2. Work shall not be covered up or continued until acceptance of the Geotechnical Engineer has been obtained.
3. The Geotechnical Engineer will give written notice of conformance with the Specifications upon completion of grading.

C. The Geotechnical Engineer has been retained to observe performance of work under this section.
1. If in the opinion of the Owner's Agent, the work performed does not meet the technical or design requirements stipulated, the Contractor shall make the necessary readjustments as required by the Geotechnical Engineer.
2. No deviations from the contract documents shall be made without specific and written acceptance of the Geotechnical Engineer.
3. In the event of conflict between the Specifications and the recommendations contained in the Geotechnical Report, the Geotechnical Engineer shall be notified.
   a. The Contractor shall follow clarification and interpretation memoranda prepared by the Owner's Agent at no additional cost to the Owner.
   b. If clarification or interpretation memoranda should result in a change in the scope of work, as adjustment in the contract price will be mutually agreed upon by the Contractor and the Owner.

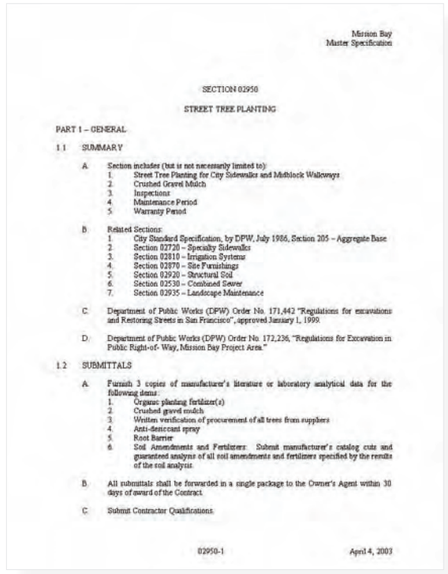
D. The Geotechnical Engineer's review of the Contractor's performance does not include review of the Contractor's safety measures.

E. The Geotechnical Engineer review is only limited to the geotechnical aspects of the Contractor's performance.

F. Settlement Mock-Up: Mock up areas of backfill mix at the specified depths and apply irrigation to induce settlement, if required to help determine the amount of settlement which will be caused by irrigation and rain. No settlement will occur when the proportions of rock and soil are correct and well homogenized.

END OF SECTION

APPENDIX 4: STREET TREE PLANTING



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SECTION 02950

STREET TREE PLANTING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes (but is not necessarily limited to):
1. Street Tree Planting for City Sidewalks and Multilock Walkways
2. Crushed Gravel Mulch
3. Inspections
4. Maintenance Period
5. Warranty Period

B. Related Sections:
1. City Standard Specification, by DPW, July 1986, Section 205 – Aggregate Base
2. Section 02720 – Specialty Sidewalks
3. Section 02810 – Irrigation Systems
4. Section 02870 – Site Furnishings
5. Section 02920 – Structural Soil
6. Section 02930 – Combined Sewer
7. Section 02935 – Landscape Maintenance

C. Department of Public Works (DPW) Order No. 171,442 "Regulations for excavations and Restoring Streets in San Francisco", approved January 1, 1999

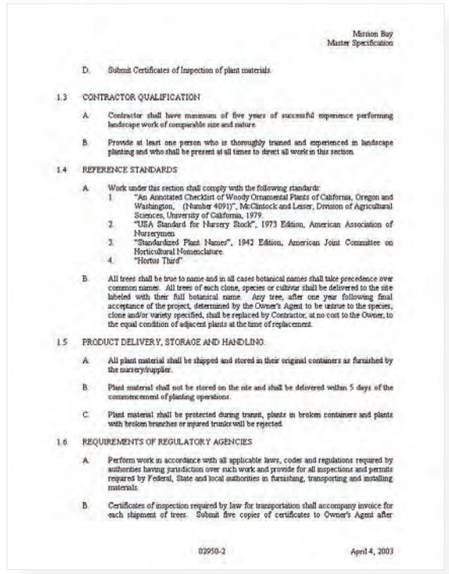
D. Department of Public Works (DPW) Order No. 172,236, "Regulations for Excavation in Public Right-of- Way, Mission Bay Project Area."

1.2 SUBMITTALS

A. Furnish 3 copies of manufacturer's literature or laboratory analytical data for the following items:
1. Organic planting fertilizer(s)
2. Crushed gravel mulch
3. Written verification of procurement of all trees from suppliers
4. Anti-desiccant spray
5. Root Barrier
6. Soil Amendments and Fertilizer: Submit manufacturer's catalog cuts and guaranteed analysis of all soil amendments and fertilizer specified by the results of the soil analysis.

B. All submittals shall be forwarded in a single package to the Owner's Agent within 30 days of award of the Contract.

C. Submit Contractor Qualifications.



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Master Specification

D. Submit Certificates of Inspection of plant materials.

1.3 CONTRACTOR QUALIFICATION

A. Contractor shall have maximum of five years of successful experience performing landscape work of comparable size and nature.

B. Provide at least one person who is thoroughly trained and experienced in landscape planting and who shall be present at all times to direct all work in this section.

1.4 REFERENCE STANDARDS

A. Work under this section shall comply with the following standards:
1. "An Annotated Checklist of Woody Ornamental Plants of California, Oregon and Washington, (Number 4091)", McClintock and Lester, Division of Agricultural Sciences, University of California, 1979.
2. "USA Standard for Nursery Stock", 1973 Edition, American Association of Nurserymen.
3. "Standardized Plant Names", 1942 Edition, American Joint Committee on Horticultural Nomenclature.
4. "Hortus Third".

B. All trees shall be true to name and in all cases botanical names shall take precedence over common names. All trees of each clone, species or cultivar shall be delivered to the site labeled with their full botanical name. Any tree, after one year following final acceptance of the project, determined by the Owner's Agent to be untrue to the species, clone and/or variety specified, shall be replaced by Contractor, at no cost to the Owner, to the equal condition of adjacent plants at the time of replacement.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All plant material shall be shipped and stored in their original containers as furnished by the nursery/supplier.

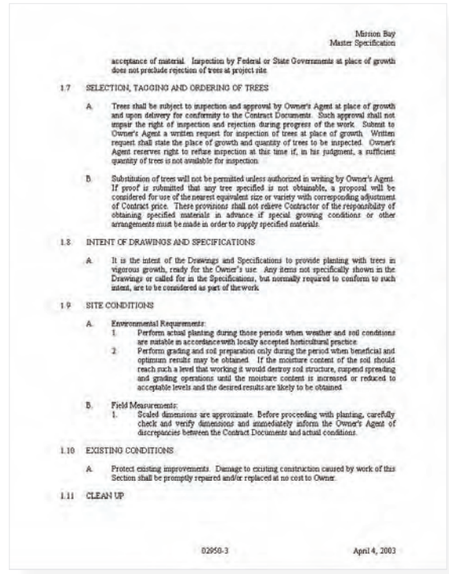
B. Plant material shall not be stored on the site and shall be delivered within 5 days of the commencement of planting operations.

C. Plant material shall be protected during transit, plants in broken containers and plants with broken branches or injured trunks will be rejected.

1.6 REQUIREMENTS OF REGULATORY AGENCIES

A. Perform work in accordance with all applicable laws, codes and regulations required by authorities having jurisdiction over such work and provide for all inspections and permits required by Federal, State and local authorities in furnishing, transporting and installing materials.

B. Certificates of inspection required by law for transportation shall accompany invoice for each shipment of trees. Submit five copies of certificates to Owner's Agent after



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Master Specification

acceptance of material. Inspection by Federal or State Governments at place of growth does not preclude rejection of trees at project site.

1.7 SELECTION, TAGGING AND ORDERING OF TREES

A. Trees shall be subject to inspection and approval by Owner's Agent at place of growth and upon delivery for conformity to the Contract Documents. Such approval shall not impair the right of inspection and rejection during progress of the work. Submit to Owner's Agent a written request for inspection of trees at place of growth. Written request shall state the place of growth and quantity of trees to be inspected. Owner's Agent reserves right to refuse inspection at this time if, in his judgment, a sufficient quantity of trees is not available for inspection.

B. Substitution of trees will not be permitted unless authorized in writing by Owner's Agent. If proof is submitted that any tree specified is not obtainable, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price. These provisions shall not relieve Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

1.8 INTENT OF DRAWINGS AND SPECIFICATIONS

A. It is the intent of the Drawings and Specifications to provide planting with trees in vigorous growth, ready for the Owner's use. Any items not specifically shown in the Drawings or called for in the Specifications, but normally required to conform to such intent, are to be considered as part of the work.

1.9 SITE CONDITIONS

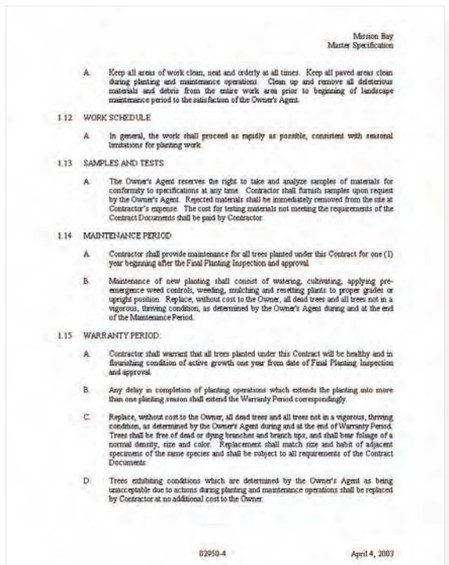
A. Environmental Requirements:
1. Perform actual planting during those periods when weather and soil conditions are suitable in accordance with locally accepted horticultural practice.
2. Perform grading and soil preparation only during the period when beneficial and optimum results may be obtained. If the moisture content of the soil should reach such a level that working it would destroy soil structure, suspend spreading and grading operations until the moisture content is increased or reduced to acceptable levels and the desired results are likely to be obtained.

B. Field Measurements:
1. Scaled dimensions are approximate. Before proceeding with planting, carefully check and verify dimensions and immediately inform the Owner's Agent of discrepancies between the Contract Documents and actual conditions.

1.10 EXISTING CONDITIONS

A. Protect existing improvements. Damage to existing construction caused by work of this Section shall be promptly repaired and/or replaced at no cost to Owner.

1.11 CLEAN UP



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Master Specification

A. Keep all areas of work clean, neat and orderly at all times. Keep all paved areas clean during planting and maintenance operations. Clean up and remove all deleterious materials and debris from the entire work area prior to beginning of landscape maintenance period to the satisfaction of the Owner's Agent.

1.12 WORK SCHEDULE

A. In general, the work shall proceed as rapidly as possible, consistent with seasonal limitations for planting work.

1.13 SAMPLES AND TESTS

A. The Owner's Agent reserves the right to take and analyze samples of materials for conformity to specifications at any time. Contractor shall furnish samples upon request by the Owner's Agent. Rejected materials shall be immediately removed from the site at Contractor's expense. The cost for testing materials not meeting the requirements of the Contract Documents shall be paid by Contractor.

1.14 MAINTENANCE PERIOD

A. Contractor shall provide maintenance for all trees planted under this Contract for one (1) year beginning after the Final Planting Inspection and approval.

B. Maintenance of new planting shall consist of watering, cultivating, applying pre-emergence weed controls, weeding, mulching and resetting plants to proper grades or upright position. Replace, without cost to the Owner, all dead trees and all trees not in a vigorous, thriving condition, as determined by the Owner's Agent during and at the end of the Maintenance Period.

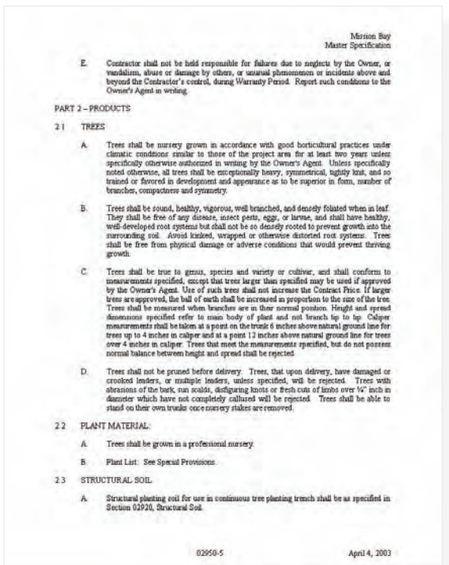
1.15 WARRANTY PERIOD:

A. Contractor shall warrant that all trees planted under this Contract will be healthy and in flourishing condition of active growth one year from date of Final Planting Inspection and approval.

B. Any delay in completion of planting operations which extends the planting into more than one planting season shall extend the Warranty Period correspondingly.

C. Replace, without cost to the Owner, all dead trees and all trees not in a vigorous, thriving condition, as determined by the Owner's Agent during and at the end of Warranty Period. Trees shall be free of dead or dying branches and branch tips, and shall bear foliage of a normal density, size and color. Replacement shall match size and habit of adjacent specimens of the same species and shall be subject to all requirements of the Contract Documents.

D. Trees exhibiting conditions which are determined by the Owner's Agent as being unacceptable due to actions during planting and maintenance operations shall be replaced by Contractor at no additional cost to the Owner.



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E. Contractor shall not be held responsible for failures due to neglects by the Owner, or vandalism, abuse or damage by others, or unusual phenomenon or incidents above and beyond the Contractor's control, during Warranty Period. Report such conditions to the Owner's Agent in writing.

PART 2 – PRODUCTS

2.1 TREES

A. Trees shall be nursery grown in accordance with good horticultural practices under climatic conditions similar to those of the project area for at least two years unless specifically otherwise authorized in writing by the Owner's Agent. Unless specifically noted otherwise, all trees shall be exceptionally heavy, symmetrical, tightly knit, and so trained or favored in development and appearance as to be superior in form, number of branches, compactness and symmetry.

B. Trees shall be sound, healthy, vigorous, well branched, and densely foliated when in leaf. They shall be free of any disease, insect pests, eggs, or larvae, and shall have healthy, well-developed root systems but shall not be so densely rooted to prevent growth into the surrounding soil. Avoid kinked, wrapped or otherwise distorted root systems. Trees shall be free from physical damage or adverse conditions that would prevent thriving growth.

C. Trees shall be true to genus, species and variety or cultivar, and shall conform to measurements specified, except that trees larger than specified may be used if approved by the Owner's Agent. Use of such trees shall not increase the Contract Price. If larger trees are approved, the ball of earth shall be increased in proportion to the size of the tree. Trees shall be measured when branches are in their normal position. Height and spread dimensions specified refer to main body of plant and not branch tip to tip. Caliper measurements shall be taken at a point on the trunk 6 inches above natural ground line for trees up to 4 inches in caliper and at a point 12 inches above natural ground line for trees over 4 inches in caliper. Trees that meet the measurements specified, but do not possess normal balance between height and spread shall be rejected.

D. Trees shall not be pruned before delivery. Trees, that upon delivery, have damaged or crooked leaders, or multiple leaders, unless specified, will be rejected. Trees with abrasions of the bark, sun scalds, disfiguring knots or fresh cuts of limbs over ¾" inch in diameter which have not completely callused will be rejected. Trees shall be able to stand on their own trunks once nursery stakes are removed.

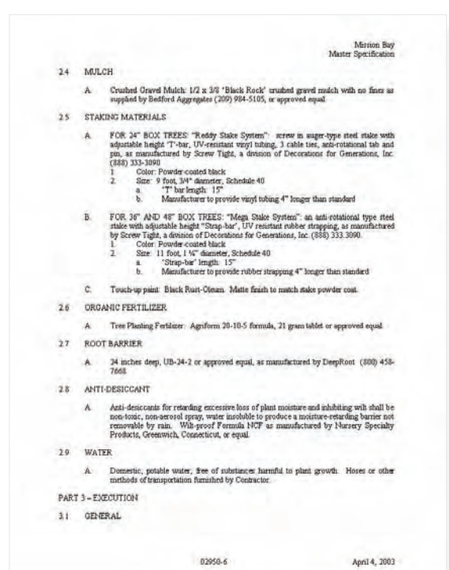
2.2 PLANT MATERIAL:

A. Trees shall be grown in a professional nursery.

B. Plant List: See Special Provisions.

2.3 STRUCTURAL SOIL

A. Structural planting soil for use in continuous tree planting trench shall be as specified in Section 02920, Structural Soil.



Mission Bay
Master Specification

2.4 MULCH

A. Crushed Gravel Mulch: 1/2 x 3/8 'Black Rock' crushed gravel mulch with no fines as supplied by Bedford Aggregates (209) 984-5105, or approved equal.

2.5 STAKING MATERIALS

A. FOR 24" BOX TREES: "Reddy Stake System": screw in auger-type steel stake with adjustable height "T-bar, UV-resistant vinyl tubing, 3 cable ties, anti-rotational tab and pin, as manufactured by Screw Tight, a division of Decorations for Generations, Inc. (888) 333-3090
1. Color: Powder-coated black
2. Size: 9 foot, 3/4" diameter, Schedule 40
a. "T" bar length: 15"
b. Manufacturer to provide vinyl tubing 4" longer than standard

B. FOR 36" AND 48" BOX TREES: "Mega Stake System": an anti-rotational type steel stake with adjustable height "Strap-bar", UV resistant rubber strapping, as manufactured by Screw Tight, a division of Decorations for Generations, Inc. (888) 333.3090.
1. Color: Powder-coated black
2. Size: 11 foot, 1 ¼" diameter, Schedule 40
a. "Strap-bar" length: 15"
b. Manufacturer to provide rubber strapping 4" longer than standard

C. Touch-up paint: Black Rust-Oleum. Matte finish to match stake powder coat.

2.6 ORGANIC FERTILIZER:

A. Tree Planting Fertilizer: Agriform 20-10-5 formula, 21 gram tablet or approved equal.

2.7 ROOT BARRIER

A. 24 inches deep, UB-24-2 or approved equal, as manufactured by DeepRoot (800) 458-7668.

2.8 ANTI-DESICCANT

A. Anti-desiccants for retarding excessive loss of plant moisture and inhibiting wilt shall be non-toxic, non-aerosol spray, water insoluble to produce a moisture-retarding barrier not removable by rain. Wilt-proof Formula NCF as manufactured by Nursery Specialty Products, Greenwich, Connecticut, or equal.

2.9 WATER

A. Domestic, potable water, free of substances harmful to plant growth. Hoses or other methods of transportation furnished by Contractor.

PART 3 – EXECUTION

3.1 GENERAL

A. Commencement of planting operations shall presume that Contractor has fully examined all areas to be planted and has determined that conditions are satisfactory.

B. Coordinate tree planting operations with installation of irrigation systems, drain installation, and work of other trades.

3.2 HANDLING OF PLANT MATERIALS

A. Carefully pack trees to prevent breaking, damage to bark, branches and root systems, and root ball cracking. Provide adequate ventilation. Protect root balls from sun, drying wind and frost. Do not drop trees from vehicles. Legibly label trees with correct botanical name and common name, including genus, species and variety/cultivar name.

B. Store packaged materials in dry locations away from contaminants. Separate pesticides from other landscape materials.

3.3 PLANTING OF TREES

A. GENERAL
1. At the nursery and upon delivery, plants shall be subject to inspection and approval by Owner's Agent for conformity with this section. The Owner's Agent reserves the right to examine and reject any plant material deemed in unhealthy condition during planting or throughout the Guarantee period. Provide 72 hours notification of plant delivery.
2. Notify the Owner's Agent a minimum of 72 hours prior to commencement of tree planting.
3. Examine areas to receive planting prior to commencement of work. Items to be examined include irrigation installation and completed work of other trades.

B. DRAINAGE, DETRIMENTAL SOILS AND OBSTRUCTIONS:
1. Notify the Owner's Agent in writing of all soil or drainage conditions Contractor considers detrimental to growth of trees. State conditions and submit proposal to improve drainage.

D. PLANTING OPERATIONS
1. Protect trees at all times prior to planting from sun or drying winds. Trees that cannot be planted immediately on delivery shall be kept in the shade, well protected and shall be kept well watered for no more than (5) five days.
2. Place root barrier per Drawings and manufacturer's instructions.
3. After removing trees from container, scarify sides of root ball to prevent root-bound condition.
4. Install tree as shown on Drawings.
5. Set tree plumb and brace rigidly in position until installation of tree is complete.
6. Place specified fertilizer tablets 4" below finished grade in accordance with the following schedule:

Container size	#of Tablets
24 inch box	8
36 inch box	12
48 inch box	16

7. Smooth planting areas per Section 02920 after full settlement has occurred.
8. Water all trees immediately after planting.

9. Remove all nursery type plant labels from trees.

3.4 ROOT BARRIER

A. Install per drawings and in accordance with manufacturer's instructions.

3.5 STAKING

A. To avoid damage to powder coating, stakes shall be wrapped separately by manufacturer for delivery to site.

B. Staking shall be completed immediately after planting. Trees shall stand plumb after staking.

C. Staking for 24" Box Trees – 'Reddy Stake':
1. Tree should be oriented with nursery stake on the same side as the 'Reddy Stake'. Nursery stake must be removed.
2. Place the 'Reddy Stake' as shown on Drawings. The tree should be one to three inches away from the end of the T-bar. Set stake within tree pit. Avoid damaging root ball. Insert the pin through the hole in the top of the 'Reddy Stake' and twist clockwise into the soil.
3. Twist the 'Reddy Stake' until the tab is 1 to 2 inches below grade. Drive the anti-rotation pin through the hole in the tab and into the soil. Use the handle of a shovel, rake, or two by two, and pack soil firmly around the stake.
4. Determine the correct height for the "T-bar keeping in mind it should be no higher than necessary but high enough to hold the tree upright. To locate the correct point to mount the 'T-bar, hold the trunk of the tree in one hand and gently bend the top with the other. Find the lowest height at which the top returns upright, and mark the 'Reddy Stake' six to eight inches higher than that point. Slip the 'T-bar over the top of the 'Reddy' Stake to the marked height and tighten the bolt.
5. Place the UV-resistant, tubing strap around the tree, and slip the ends of the tubing over the ends of the 'T-bar. Fold both sides of tubing towards the tree trunk and against the 'T'-bar and secure with two of the provided cable ties. Add third cable tie around strap between 'T'-bar and tree trunk.
6. Treat any chipped powder coating on stakes with touch-up paint per manufacturer's recommendation.

D. Staking for 36" and 48" box trees – 'Mega Stake'
1. Tree should be oriented with nursery stake on the same site as the 'Mega Stake'. Nursery stake must be removed.
2. Place the "Mega-Stake" as shown on Drawings. The tree should be one to three inches away from the end of the 'Strap-bar'. Set stake within tree pit. Avoid damaging root ball.
3. Drive the 'Mega-Stake' into the soil 3 feet minimum. Use the handle of a shovel, rake, or two by two, and pack soil firmly around stake.
4. Determine the correct height for the 'Strap-bar' keeping in mind it should be no higher than necessary but high enough to hold the tree upright. To locate the correct point to mount the 'Strap-bar", hold the trunk of the tree in one hand and gently bend the top with the other. Find the lowest height at which the top returns upright, and mark the 'Mega Stake' six to eight inches higher than that

point. Slip the 'Strap-bar' over the top of the 'Mega Stake' to the marked height and tighten the set bolts.
5. Fold the UV-resistant, flat strapping around the tree, bringing both ends of the strap to opposite sides of the 'Strap-bar' and secure with two bolts and nuts through the holes."
6. Treat any chipped powder coating on stakes with touch-up paint per manufacturer's recommendation.

3.6 PRUNING

A. Prune trees only at time of planting and according to standard horticultural practice to preserve the natural character of the tree. Pruning shall be done only under supervision of a certified arborist and upon review and approval of Owner's Agent. Remove all dead wood, suckers and broken or badly bruised branches. Use only clean, sharp tools.

3.7 WATERING

A. All trees shall be watered immediately after planting. After the first watering, water shall be applied to all trees as conditions may require to keep the trees in a healthy and vigorous growing condition until completion of the Contract.

B. Trees shall be at final grade so that crown is at 2" above grade prior to the commencement of cobble, cobble restraint system and gravel mulch installation.

3.8 FINAL PLANTING INSPECTION (FOR BEGINNING OF MAINTENANCE AND WARRANTY PERIOD):

A. At the completion of all tree planting work under this contract, and before the beginning of the one (1) year Maintenance and Warranty Period, the Final Planting Inspection shall be performed.

B. The Contractor shall request the Final Planting Inspection in writing to the Owner's Agent ten (10) days prior to anticipated inspection date.

C. The Owner's Agent, Contractor and such others as the Owner's Agent may designate shall be present at the Final Planting Inspection.

D. At the time of the Final Planting Inspection, the Contractor shall have all tree planting areas under this Contract free of weeds and neatly cultivated.

E. If, after the inspection, the Owner's Agent is of the opinion that all work has been performed in accordance with the Contract Documents and that all trees are in satisfactory growing condition, then the Owner's Agent will issue the Contractor written notice of acceptance of the planting portions of the Work and commencement of the Maintenance Period.

F. Work requiring corrective action in the judgement of the Owner's Agent shall be performed within ten days after the Final Planting Inspection. Corrective work and materials replacement shall be in accordance with the Contract Documents and shall be made by the Contractor at no cost to the Owner.

G. If the Final Acceptance of the project does not precede the end of the Maintenance and Warranty Period, then the Period shall be extended until Final Acceptance at no additional cost to the Owner.

3.9 FINAL ACCEPTANCE INSPECTION

A. At the completion of the one (1) year Maintenance and Warranty Period, the Final Acceptance Inspection shall be performed.

B. The Contractor shall request the inspection, in writing, to the Owner's Agent ten (10) working days before the completion of the Maintenance Period or ten (10) working days prior to the date of Final Inspection, whichever occurs later.

C. The Owner's Agent, Contractor, and such others as the Owner's Agent may designate, shall be present at the inspection.

D. If, after the inspection, the Owner's Agent is of the opinion that all work has been performed in accordance with the Contract Documents, and that all trees are in satisfactory growing condition, then the Owner's Agent will issue written notice of Final Acceptance, the end of the Maintenance Period, and of the Warranty Period.

E. Work requiring corrective action or replacement in the judgement of the Owner's Agent shall be performed within ten (10) days after the Final Acceptance Inspection. Corrective work and materials replacement shall be in accordance with the Contract Documents, and shall be made by the Contractor at no cost to the Owner.

F. No partial approvals will be given.

END OF SECTION

APPENDIX 5: SPECIAL CONCRETE COLORS & FINISHES

SECTION 02950

STREET TREE PLANTING

PART I – GENERAL

1.1 SUMMARY

A. Section includes (but is not necessarily limited to):
1. Street Tree Planting for City Sidewalks and Midblock Walkways
2. Crushed Gravel Mulch
3. Inspections
4. Maintenance Period
5. Warranty Period

B. Related Sections:
1. City Standard Specification, by DPW, July 1986, Section 205 – Aggregate Base
2. Section 02720 – Specialty Sidewalks
3. Section 02810 – Irrigation Systems
4. Section 02870 – Site Furnishings
5. Section 02920 – Structural Soil
6. Section 02530 – Combined Sewer
7. Section 02935 – Landscape Maintenance

C. Department of Public Works (DPW) Order No. 171,442 "Regulations for excavations and Restoring Streets in San Francisco", approved January 1, 1999.

D. Department of Public Works (DPW) Order No. 172,236, "Regulations for Excavation in Public Right-of- Way, Mission Bay Project Area."

1.2 SUBMITTALS

A. Furnish 3 copies of manufacturer's literature or laboratory analytical data for the following items:
1. Organic planting fertilizer(s)
2. Crushed gravel mulch
3. Written verification of procurement of all trees from suppliers
4. Anti-desiccant spray
5. Root Barrier
6. Soil Amendments and Fertilizers: Submit manufacturer's catalog cuts and guaranteed analysis of all soil amendments and fertilizers specified by the results of the soil analysis.

B. All submittals shall be forwarded in a single package to the Owner's Agent within 30 days of award of the Contract.

C. Submit Contractor Qualifications.

D. Submit Certificates of Inspection of plant materials.

1.3 CONTRACTOR QUALIFICATION

A. Contractor shall have minimum of five years of successful experience performing landscape work of comparable size and nature.

B. Provide at least one person who is thoroughly trained and experienced in landscape planting and who shall be present at all times to direct all work in this section.

1.4 REFERENCE STANDARDS

A. Work under this section shall comply with the following standards:
1. "An Annotated Checklist of Woody Ornamental Plants of California, Oregon and Washington, (Number 4091)", McClintock and Lester, Division of Agricultural Sciences, University of California, 1979.
2. "USA Standard for Nursery Stock", 1973 Edition, American Association of Nurserymen.
3. "Standardized Plant Names", 1942 Edition, American Joint Committee on Horticultural Nomenclature.
4. "Hortus Third"

B. All trees shall be true to name and in all cases botanical names shall take precedence over common names. All trees of each clone, species or cultivar shall be delivered to the site labeled with their full botanical name. *Any* tree, after one year following final acceptance of the project, determined by the Owner's Agent to be untrue to the species, clone and/or variety specified, shall be replaced by Contractor, at no cost to the Owner, to the equal condition of adjacent plants at the time of replacement.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All plant material shall be shipped and stored in their original containers as furnished by the nursery/supplier.

B. Plant material shall not be stored on the site and shall be delivered within 5 days of the commencement of planting operations.

C. Plant material shall be protected during transit, plants in broken containers and plants with broken branches or injured trunks will be rejected.

1.6 REQUIREMENTS OF REGULATORY AGENCIES

A. Perform work in accordance with all applicable laws, codes and regulations required by authorities having jurisdiction over such work and provide for all inspections and permits required by Federal, State and local authorities in furnishing, transporting and installing materials.

B. Certificates of inspection required by law for transportation shall accompany invoice for each shipment of trees. Submit five copies of certificates to Owner's Agent after

acceptance of material. Inspection by Federal or State Governments at place of growth does not preclude rejection of trees at project site.

1.7 SELECTION, TAGGING AND ORDERING OF TREES

A. Trees shall be subject to inspection and approval by Owner's Agent at place of growth and upon delivery for conformity to the Contract Documents. Such approval shall not impair the right of inspection and rejection during progress of the work. Submit to Owner's Agent a written request for inspection of trees at place of growth. Written request shall state the place of growth and quantity of trees to be inspected. Owner's Agent reserves right to refuse inspection at this time if, in his judgment, a sufficient quantity of trees is not available for inspection.

B. Substitution of trees will not be permitted unless authorized in writing by Owner's Agent. If proof is submitted that any tree specified is not obtainable, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price. These provisions shall not relieve Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

1.8 INTENT OF DRAWINGS AND SPECIFICATIONS

A. It is the intent of the Drawings and Specifications to provide planting with trees in vigorous growth, ready for the Owner's use. Any items not specifically shown in the Drawings or called for in the Specifications, but normally required to conform to such intent, are to be considered as part of the work.

1.9 SITE CONDITIONS

A. Environmental Requirements:
1. Perform actual planting during those periods when weather and soil conditions are suitable in accordance with locally accepted horticultural practice.
2. Perform grading and soil preparation only during the period when beneficial and optimum results may be obtained. If the moisture content of the soil should reach such a level that working it would destroy soil structure, suspend spreading and grading operations until the moisture content is increased or reduced to acceptable levels and the desired results are likely to be obtained.

B. Field Measurements:
1. Scaled dimensions are approximate. Before proceeding with planting, carefully check and verify dimensions and immediately inform the Owner's Agent of discrepancies between the Contract Documents and actual conditions.

1.10 EXISTING CONDITIONS

A. Protect existing improvements. Damage to existing construction caused by work of this Section shall be promptly repaired and/or replaced at no cost to Owner.

1.11 CLEAN UP

A. Commencement of planting operations shall presume that Contractor has fully examined all areas to be planted and has determined that conditions are satisfactory.

B. Coordinate tree planting operations with installation of irrigation systems, drain installation, and work of other trades.

3.2 HANDLING OF PLANT MATERIALS

A. Carefully pack trees to prevent breaking, damage to bark, branches and root systems, and root ball cracking. Provide adequate ventilation. Protect root balls from sun, drying wind and frost. Do not drop trees from vehicles. Legibly label trees with correct botanical name and common name, including genus, species and variety/cultivar name.

B. Store packaged materials in dry locations away from contaminants. Separate pesticides from other landscape materials.

3.3 PLANTING OF TREES

A. GENERAL
1. At the nursery and upon delivery, plants shall be subject to inspection and approval by Owner's Agent for conformity with this section. The Owner's Agent reserves the right to examine and reject any plant material deemed in unhealthy condition during planting or throughout the Guarantee period. Provide 72 hours notification of plant delivery.
2. Notify the Owner's Agent a minimum of 72 hours prior to commencement of tree planting.
3. Examine areas to receive planting prior to commencement of work. Items to be examined include irrigation installation and completed work of other trades.

B. DRAINAGE, DETRIMENTAL SOILS AND OBSTRUCTIONS:
1. Notify the Owner's Agent in writing of all soil or drainage conditions Contractor considers detrimental to growth of trees. State condition and submit proposal to improve drainage.

D. PLANTING OPERATIONS
1. Protect trees at all times prior to planting from sun or drying winds. Trees that cannot be planted immediately on delivery shall be kept in the shade, well protected and shall be kept well watered for no more than (5) five days.
2. Place root barrier per Drawings and manufacturer's instructions.
3. After removing trees from container, scarify sides of root ball to prevent root-bound condition.
4. Install tree as shown on Drawings.
5. Set tree plumb and brace rigidly in position until installation of trees is complete.
6. Place specified fertilizer tablets 4" below finished grade in accordance with the following schedule:

Container size	# of Tablets
24 inch box	8
36 inch box	12
48 inch box	16

7. Smooth planting areas per Section 02920 after full settlement has occurred.
8. Water all trees immediately after planting.

9. Remove all nursery type plant labels from trees.

3.4 ROOT BARRIER

A. Install per drawings and in accordance with manufacturer's instructions.

3.5 STAKING

A. To avoid damage to powder coating, stakes shall be wrapped separately by manufacturer for delivery to site.

B. Staking shall be completed immediately after planting. Trees shall stand plumb after staking.

C. Staking for 24" Box Trees – 'Reddy Stake':
1. Tree should be oriented with nursery stake on the same side as the 'Reddy Stake'. Nursery stake must be removed.
2. Place the 'Reddy Stake' as shown on Drawings. The tree should be one to three inches away from the end of the T-bar. Set stake within tree pit. Avoid damaging root ball. Insert the pin through the hole in the top of the 'Reddy Stake' and twist clockwise into the soil.
3. Twist the 'Reddy Stake' until the tab is 1 to 2 inches below grade. Drive the anti-rotation pin through the hole in the tab and into the soil. Use the handle of a shovel, rake, or two by two, and pack soil firmly around the stake.
4. Determine the correct height for the 'T-bar' keeping in mind it should be no higher than necessary but high enough to hold the tree upright. To locate the correct point to mount the 'T-bar', hold the trunk of the tree in one hand and gently bend the top with the other. Find the lowest height at which the top returns upright, and mark the 'Reddy Stake' six to eight inches higher than that point. Slip the 'T-bar over the top of the 'Reddy' Stake to the marked height and tighten the bolt.
5. Place the UV-resistant, tubing strap around the tree, and slip the ends of the tubing over the ends of the 'T-bar. Fold both sides of tubing towards the tree trunk and against the 'T-bar and secure with two of the provided cable ties. Add third cable tie around strap between 'T-bar and tree trunk.
6. Treat any chipped powder coating on stakes with touch-up paint per manufacturer's recommendation.

D. Staking for 36" and 48" box trees – 'Mega Stake':
1. Tree should be oriented with nursery stake on the same site as the 'Mega Stake'. Nursery stake must be removed.
2. Place the 'Mega-Stake' as shown on Drawings. The tree should be one to three inches away from the end of the 'Strap-bar'. Set stake within tree pit. Avoid damaging root ball.
3. Drive the 'Mega-Stake' into the soil 3 feet minimum. Use the handle of a shovel, rake, or two by two, and pack soil firmly around stake.
4. Determine the correct height for the 'Strap-bar' keeping in mind it should be no higher than necessary but high enough to hold the tree upright. To locate the correct point to mount the 'Strap-bar', hold the trunk of the tree in one hand and gently bend the top with the other. Find the lowest height at which the top returns upright, and mark the 'Mega Stake' six to eight inches higher than that

APPENDIX 6: REFERENCES

DOWNTOWN & DISTRICT-SPECIFIC URBAN DESIGN GUIDELINES

Transbay Redevelopment Project Area Design for Development, SFRA, SF Planning, SOM Team, 10.2003
Transbay Transit Center, Scope Definition Report, Volume IV. Site Design Guidelines, URS-HOK, 06.2006
The Rincon Hill Plan. Adopted August 2005.
Destination Downtown. The Planning Dept. City and County of San Francisco. 1995
Mission Bay North Plan Streetscape Master Design Detail Plan, Catellus, MFLA-Olin Partnership Team, 1999.

HORTICULTURAL

City and County of San Francisco, Department of Public Works, Ordinance No. 169,946. 10.1997.
City of San Francisco, Street Tree Resource Analysis. Draft 2006.
Urban Forest Plan, City and County of SF., Hortscience, 01.2006
USDA's Assessing Urban Forest Effects and Value. San Francisco's Urban Forest. 09.2005
The Trees of San Francisco, A Plan for the Management of the City's Urban Forest, DPW. 1991.
Sunset Western Garden Book, Sunset Publishing, 2001.
Dirr's Hardy Trees and Shrubs, Michael Dirr, Timber Press, 1997.
Dirr's Trees and Shrubs for Warm Climates, Michael Dirr, Timber Press, 2002.
Landscape Plants of Western Regions, Bob Perry, Land Design Publishing, 1994.
Plants and Landscapes for Summer-Dry Climates, East Bay Municipal Utility District, EBMUD, 2004.
The Color Encyclopedia of Ornamental Grasses, Rick Darke, Timber Press, 1999.
Structural Soil and Streetscape Improvements in Mission Bay, MFLA, 06.2003
Urban Forest Ecosystems Institute, UFEI website, www.selectree.calpoly.edu

ARBORIST TEAM

Mr. Steve Batcheldor
Mr. Stewart Winchester

RECEIVED UTILITY INFORMATION

The following documents were provided by the City and served as a basis for understanding general aspects of the existing infrastructure:

Gas and Electrical Layout, General Layout, Pacific Gas and Electric, Main to Second and Mission to Howard (Autocad Drawings)
Auxiliary Water Supply System, General Layout, Chung Linh and Raymond Tan, Spear to 3rd and Market to Folsom (Autocad Drawings)
Sanitary Layout, General Area Sewer Map, Nathan Lee, Department of Public Works, Spear to 3rd and Market to Folsom (Autocad Drawings)
Water layout, General Layout, Arleen Chan and Thinh Nguyen, Beale to Second and Mission to Folsom (Autocad Drawings)
SBC Telecom, General Layout, Beale to Second and Mission to Folsom (Autocad Drawings)
Electrical, PG&E Electrical Distribution Map, 7/21/05, (Hard Copy)
Street Lighting and Traffic Light, General Layout, Dan Arellano (Hard copy)
AT&T Communications Layout, San Francisco 21 to San Jose 02 Light guide System;.8/01, Rosemary Hamill, San Francisco 21 to Redwood City 02 Detail Construction Drawing (Hard Copy)
RCN Communications Layout, 9/16/99, Twila Griffith, General Layout Townsend Street between 4th and 7th Streets (Hard Copy)
Comcast Communications, 5/01/90, Paul O'Leary, General Layout (Hard Copy)
Verizon Communications, General Layout (Hard Copy)
Global Crossing, General Layout, 4/18/00, Luis Garcia (Autocad Drawings)
Level 3 Communications, General Layout, 8/30/01, Keith Osborn (Hard copy) As-built, 9/20/99 (Hard Copy)
ICG Communications, General Layout, Curtis Heley and Mark Denning, 8/8/98, As-built (Hard Copy)
Sprint Communications, Fiber Optic Route Record Drawing, 12/11/95, Serfino Garcia, General Layout San Francisco to San Jose (Hard Copy)
Time Warner Telecom, General Layout, Todd Elder and Brad Eneo, 10/13/04 (Hard Copy)
Looking Glass Fiber Optics, General Layout, 5/21/02 Fiber optic cable route (Autocad Drawings)
Pactel Communications, General Layout, 1/1/02, Conduit Record SF Division (Hard Copy)
Qwest Communications, Fiber Optic Cable Route, 03/19/04, Mike Lopez, General Layout CBD to San Francisco and San Francisco to San Jose (Hard Copy)
MCI Metro / World Communications, As-built drawings, 5/18/99 (Hard Copy)
MFS Network Technologies, As-built, 9/24/98 (Hard Copy)
Adesta Communications, San Francisco Internodal: Brannan St. – Mission St., 2/8/01 (Hard Copy)
Trolley Overhead Lines, General Layout and updates, 4/1/98 (Hard Copy)
Access Transmission Services, San Francisco Main, 2/1/95 (Hard Copy)
GST Telecom, General Layout, 9/16/99, As-built (Hard Copy)
Nextlink California, General Layout, 11/30/99, As-built (Hard Copy)

ACKNOWLEDGMENTS

TRANSBAY CITIZENS ADVISORY COMMITTEE
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Bruce Balshone
Reed Bement
Alexandria Chun
James Haas
Peter Harman
John Holtzclaw
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