MEMORANDUM

COMMUNITY DESIGN + ARCHITECTURE

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Date: December 17, 2013

To: Jamie Parks, City of Oakland; Kara Vuicich, Alameda CTC

From: Phil Erickson, Jonah Chiarenza, Community Design + Architecture; Rob Rees, Ryan McClain, Fehr & Peers

Re: Telegraph Avenue Complete Streets (1306): Final Existing Conditions Memorandum

Introduction

The following memorandum provides a description and analysis of existing conditions related to the Telegraph Avenue Complete Streets project. Community Design + Architecture (CD+A) and Fehr & Peers (F&P) developed and implemented the attached Data Collection Plan and completed analysis for the following conditions related to Telegraph Avenue from 20th Street to 57th Street, the project "corridor":

- Past Studies: review of key studies and reports with relevance to Telegraph Avenue, including past BRT and AC Transit studies, streetscape plans, parking analysis, and City policy.
- Bicycle Volume: report and analysis of bicycle counts taken from September 2013 and comparison to previous counts.
- Crash Data: analysis of crash data involving motorists, cyclists and pedestrians, during the years 2007 – 2011.
- Transit Travel Time and Delay: analysis of AC Transit 1 and 1R data, including passenger activity and operating speeds. This analysis will include additional analysis of transit on Telegraph Avenue from 57th Street to Alcatraz Avenue. Bus stop amenities are inventoried throughout the corridor.
- Traffic Operations: report and analysis of vehicle, as well as some bicycle and pedestrian activity, at signalized intersections throughout the corridor.
- Pedestrian Crossings: review of physical improvements and conditions related to pedestrian crossings along Telegraph, including crosswalk types, generators of pedestrian activity, bus stop locations, etc, and analysis of typical unsignalized crosswalks at two locations in the corridor.
- Streets Trees: an update of a 2006 urban forest inventory for street trees along Telegraph Avenue within the corridor, including species, size, condition, and whether the trees were planted recently.

Figures are provided in a separate PDF file.

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Review of Past Studies

The following provides a summary of past studies relevant to the Telegraph Avenue Complete Streets project. Quotations and paraphrased sections of documents are presented in *italics*, while consultant interpretation for the purposes of this project is provided in plain text. The studies reviewed are:

- Telegraph Avenue Pedestrian Streetscape Improvements Project (2005)
- Telegraph-Northgate Neighborhood Plan (2000)
- Oakland Pedestrian Master Plan (2002)
- Oakland General Plan, Land Use & Transportation Element (1998)
- Line 1R Service and Reliability Study Final Report (2011)
- AC Transit East Bay BRT EIR (2007)
- Telegraph Avenue Bike Lanes and BRT Memorandum (2009)
- Inner East Bay Comprehensive Operational Analysis Existing Condition Phase II
- Temescal Parking Policies and Management Plan (2012)

Telegraph Avenue Pedestrian Streetscape Improvements Project (2005)

The Telegraph Avenue Pedestrian Streetscape Improvements Project (Pedestrian Streetscape Project) provides a *strategy for capital improvements that encourage pedestrian activity throughout the corridor. Though specific, near and medium term improvements are identified, the Pedestrian Streetscape Project functions primarily as a guide to an ongoing process of streetscape improvement that will extend over a number of years, reflecting funding capabilities and local community priorities* (p2).

CD+A will develop a concept plan that incorporates identified near term improvements into the Phase 1 Striping designs, and update the concepts for medium-term improvements that are to follow as funding allows. Note that peer-review of the specific location and type of improvements outlined in this document will be completed as part of Task 2.5, at which point those concepts will be incorporated into that task's Streetscape and Urban Design Options.

Three (3) main goals are identified in the Pedestrian Streetscape Project (pp 3-4):

1. *Upgrade Safety and Image*
2. *Enhance the Pedestrian Environment*
3. *Strengthen District Character and Improve Street Function*

These include several more specific recommendations for improvements. CD+A has reorganized these into main goals that reflect the purpose of the current design effort and to classify the general recommendations into near-term (to be included in the Phase 1 striping plan if possible) and mid- to long-term (to be implemented as funding and future projects allow). Certain near-term opportunities include implementing temporary versions of recommended improvements, such as landscaping and bulbouts, which are noted in parentheses.

A. Upgrade Safety and Multi-modal Function

- Near-term:

a. Repaint/improve crosswalks and enhance unsignalized crossings with corner bulbouts, refuge islands and/or in-pavement signs (likely using paint and planters only, or parklet-style temporary structures).

b. Provide consistent maximum spacing of pedestrian crossings to reduce jaywalking and improve access [see Pedestrian Crossings section of this memorandum for more information].

c. Eliminate redundant red curb/no-parking areas at offset intersections and inactive bus stops, adding parking or bulbouts (temporary, paint-and-planter or parklets and/or bike parking) as feasible.

d. Relocate bus stops to far side of intersections, use bus bulbouts (as parklet-type temporary structures, if permanent bulbouts are not affordable).

- Mid- to long-term:

a. Repair sidewalks.

b. Construct permanent corner bulbouts to shorten crossing distances and make pedestrians more visible to traffic.

c. Retrofit ADA-compliant ramps and align ramps with crosswalks

d. Repair/replace damaged and rusted parking meters in "boulevard" areas (south of Grand Avenue, between 27th and 45th Streets, and North of Claremont Avenue)

e. Remove parking meters and install ticket kiosks in "neighborhood commercial areas" KONO (Grand Avenue to 27th Streets) and Temescal (45th Street to Claremont Avenue) (some kiosks have been installed in the Temescal segment)

f. Improve lighting at crossings and along sidewalks

g. Construct permanent bus bulbouts.

B. Enhance Pedestrian Comfort and Amenity

- Near-term:

a. Install street trees (using movable planter boxes or actually planted in the sidewalk tree wells as partnerships, funding and other projects allow).

b. Install bike racks, seating, planters and other amenities as funding allows or provide design standards for improvements that can be installed and maintained by adjacent property owners or businesses.

- Mid- to long-term:

a. Install street trees, construct permanent bulbouts.

b. Install coordinated street furnishings (benches, planters, newspaper racks, bicycle parking, and trash receptacles) in neighborhood commercial areas, and other high-pedestrian traffic areas of the corridor, organizing the location of elements to minimize a "cluttered" look.

c. Differentiate lighting in neighborhood commercial districts from the rest of the corridor: Pedestrian-oriented lighting with split downward facing luminaires on new metal poles should replace cobra-head lamps and steel poles in the Temescal commercial district; Double-head candelabra lamps and historic cast iron poles should replace cobra-head lamps in KONO and the rest of the corridor. (Pedestrian-scaled lighting has been added between 40th and 49th Streets, though cobra-head lamps and poles remain).

C. Strengthen District Character and Image

- Near-term:
    a. Construct larger bulbouts to provide space for landscaping, seating and other amenities where appropriate to support surrounding uses (likely using temporary structures and paint-and-planters approach as part of striping plan).
- Mid- to long-term:
    a. Construct permanent larger builbouts as described above.
    b. Differentiate street trees and furnishings in neighborhood commercial districts from the rest of the corridor. For tree wells, use Title 24-compliant tree grates in neighborhood commercial districts and decomposed granite in boulevard areas.
    c. Provide district gateways/landmarks.
    d. Incorporate district-specific amenities that relate to local history or culture.

The locations of deficiencies and recommended improvements are noted on map diagrams in the Pedestrian Streetscape Project document (pp 12-13, 16-17, 26-27). The inclusion of these improvements will be explored as the Complete Streets Concept Plan is developed, with near-term elements also included as feasible in the Phase 1 Striping Plans.

Telegraph-Northgate Neighborhood Plan (2000)

This community-based plan focuses on Telegraph Ave between 20th to 27th Streets. Its creation was a collaboration between the Telegraph-Northgate Neighbors Association, the City of Oakland's Community and Economic Development Agency, and the nonprofit group Urban Ecology. It focuses on targeted land use changes as the primary driver of neighborhood improvement, and highlights the importance of historic preservation, existing retail corridor investment, mixed-income housing, and multi-modal transportation. Community outreach was extensive, with seven main opportunities for community input, including a project kickoff, three community charrettes, and three focus groups.

Proposed Telegraph Avenue Redesign

Two potential designs are proposed, both propose removing the dedicated left turn lane to accommodate a bicycle lane in each direction. One design narrowed the sidewalks from 15' to 12' to accommodate a median; the other kept the sidewalks as is but had no median. Participants in the Project's community workshop preferred the second, full-sidewalks, no-median design. (p52)

Plan Vision related to Design of Telegraph Avenue

Guided by an examination and redefinition of land use *as the primary mechanism for changing their community* this community-driven plan for the area between 20th and 27th from Telegraph west to San Pablo focused on neighborhood revitalization

The plan *presents a vision for a thriving urban neighborhood that is predominantly residential, with local neighborhood stores and businesses lining the major commercial streets… As new development brings* *opportunities for improvements, the neighborhood wants to keep its assets intact… In order to achieve these goals, the Telegraph-Northgate neighborhood will need to accommodate new housing development and* ***foster a local neighborhood commercial district on Telegraph Avenue***. (p16)

Plan Objectives

Circulation: *Enhance the pedestrian environment of the public sidewalks and permit the safe movement of pedestrians and bicyclists…* ***Implement a bicycle lane along Telegraph Avenue to downtown Oakland.*** *Re-connect the parts of the neighborhood divided by the freeway and BART tracks. Protect the quiet residential streets by limiting through-traffic on residential streets. Maintain short-term parking on the neighborhood commercial streets and deter commuter parking in the neighborhood*. (p17)

Open Space: *Create a new public park in the neighborhood. Plant and maintain street trees*. (p17)

Neighborhood Economic Development: Attract new retail businesses that support the neighborhood and are open into the evening, including a grocery store, pharmacy, restaurants, and cafes. (p17)

This and the open space objective could support the creation of additional public space along the sidewalks through the use of corner bulbouts and/or intermittent parklets.

Proposed Traffic Calming Plan

Traffic calming specifically designed to limit cut-through traffic was proposed for 10 intersections, including four intersections along Telegraph: Sycamore at Telegraph; and 25th, 24th, and 23rd Streets at Telegraph (p53). The Plan calls for traffic calming measures consisting of bulbouts to narrow the roadway at intersections, and mid-block chokers, chicanes, and landscaping along the indicated cross streets.

Proposed Traffic Calming Plan

New parking garages are not a proposed land use… An additional goal is to minimize the role of the neighborhood as a parking area for downtown Oakland. (p55)

Other

Once a thriving retail corridor, Telegraph Avenue has been depressed since Sears left its historic building at 27th and Telegraph for downtown Oakland in 1993 (p8).

Both Telegraph and San Pablo are too wide for pedestrians to cross safely (p8).

It is important to note the large amount of parking in the neighborhood. Surface and structured parking use…38 percent of the land from I-980 to Telegraph Avenue and West Grand Avenue to 27th Street (p32).

Oakland Pedestrian Master Plan (2002)

As part of the Land Use and Transportation Element of the City of Oakland's General Plan, the Pedestrian Master Plan is a comprehensive and wide-ranging plan promoting pedestrian *safety and access to help ensure that Oakland is a safe, convenient, and attractive place to walk* (p7). It applies throughout the City of Oakland. Outreach for the plan included community presentations by staff from the Oakland Pedestrian Safety Project (OPSP), as well as monthly project updates to the Citizen's Pedestrian Advisory Committee (CPAC) throughout the two-year planning process.

Relevant Plan Goals

Establishes a Pedestrian Route Network emphasizing safe routes to school and connections to transit. The routes include streets, walkways, and trails that connect schools, libraries, parks, neighborhoods, and commercial districts throughout the City. (p7)

Identifies priority street segments along these routes for targeted improvements over the next twenty years. (p7)

Plan Highlights Specifically Related To Telegraph Avenue

Telegraph's importance as a pedestrian and transit spine, and its designation as a Regional Transit Street, is underscored in the plan's focus on Safe Routes to Transit: *The Pedestrian Route Network identifies key routes that serve AC Transit bus lines and BART stations. These routes include the 'transit streets' designated by the Land Use and Transportation Element* of the General Plan, which include Telegraph Avenue (p47).

The Telegraph Avenue corridor, 16th to Aileen, is identified as a priority streetscape project in the short-term (1-5 years). Estimated cost was $200 million (2002 dollars).

Telegraph Avenue Street/Sidewalks16th to 20th" is identified as a *New Ped/Bike Project*, and estimated to cost $2.5 million (2002 dollars).

Telegraph Avenue (20th – 40th) bike and ped was also identified as a *New Ped/Bike Project*, with a cost estimate to be determined.

The intersection of 40th Street and Telegraph Avenue was called out as a short-term priority project, due to a high collision rate, cost estimate not broken out. Specific recommendations are not listed for this project, but it is possible that the recently installed bulbouts on the west side of the intersection of Telegraph and 40th are the result of this location being made a short-term priority project in 2002.

Noted Opportunities & Constraints

Oakland's still-in-place street grid was built for pedestrians and transit users:

- *Oakland's street grid was laid out when walking and transit were the most common modes of transportation. Neighborhoods like Temescal…developed with housing and businesses clustered along streetcar lines. These neighborhoods can be pedestrian-friendly because they were designed for people to walk from their homes to trolley stops and the surrounding shops*. (p16)

Oakland already has the right elements in place to be a great pedestrian city:

- *Oakland has amongst the highest walking rates of cities in the San Francisco Bay Area… Oakland's downtown and many vibrant neighborhoods give it the foundation for a walkable city.* (p11)
- *Many neighborhoods contain a mixture of homes, businesses, and public services within easy walking distance of each other.* (p16)
- *Oakland is well-served by public transit, making walking an important mode of transportation for trips across the City as well as within neighborhoods. Large numbers of pedestrian trips are to AC Transit bus lines, Oakland public schools, and BART stations*. (p11)

Pedestrian safety is poor on high-traffic arterial streets like Telegraph

- *On average, a pedestrian/vehicle collision occurs each day in Oakland. Most pedestrian/vehicle collisions occur in downtown, in Chinatown, and along arterial streets*. (p11)
- *Major constraints on walking include pedestrian/motor vehicle conflicts on busy streets and freeways as physical barriers for pedestrians*. (p11)
- *Many arterial streets have large volumes of motor vehicle traffic which, according to the Federal Highway Administration, 'can inhibit a person's feeling of safety and comfort and create a 'fence effect' that makes crossing those streets difficult (FHWA 2002b, p. 8).* (p17)

Arterial streets like Telegraph are designed for cars, not pedestrians – and it shows

- *Some street design elements like…large corner radii, and frequent driveways improve motor vehicle access yet decrease pedestrian safety*. (p17)

Relevant Policies

- (PMP Policy 1.1) Crossing Safety: Improve pedestrian crossings in areas of high pedestrian activity where safety is an issue.
  - (Action 1.1.1) Consider the full range of design elements – including bulbouts and refuge islands – to improve pedestrian safety.
  - (Action 1.1.4) Use pedestrian safety, bicyclist safety, and residential and business densities to establish lower speed limits in areas with a high level of pedestrian activity or a history of pedestrian/motor vehicle collisions
- (PMP Policy 2.1.) Route Network: Create and maintain a pedestrian route network that provides direct connections between activity centers.
  - (PMP Action 2.1.1) Improve existing connections across/under freeways to activity centers using lighting, acoustics, and other design features.
  - (PMP Action 2.1.2) Develop a system of signage for pedestrian facilities including walkways and trails.
- (PMP Policy 2.3) Safe Routes to Transit: Implement pedestrian improvements along major AC Transit lines and at BART stations to strengthen connections to transit.
  - (PMP Action 2.3.1) Develop and implement street designs (like bus bulbouts) that improve pedestrian/bus connections.
  - (PMP Action 2.3.2) Prioritize pedestrian improvements at transit locations with the highest pedestrian volumes and the most pedestrian/vehicle collisions.
  - (PMP Action 2.3.3) Prioritize the implementation of street furniture (including bus shelters) at the most heavily used transit stops.
- (PMP Policy 3.1.) Streetscaping: Encourage the inclusion of street furniture, landscaping, and art in pedestrian improvement projects.
  - (PMP Action 3.1.4) Include pedestrian-scale lighting in streetscaping projects.
- (PMP Policy 3.2) Land Use: Promote land uses and site designs that make walking convenient and enjoyable.

- (PMP Action 3.2.3) Consider implementing "pedestrian only" areas in locations with the largest pedestrian volumes.
- (PMP Action 3.2.8) Discourage motor vehicle parking facilities that create blank walls, unscreened edges along sidewalks, and/or gaps between sidewalks and building entrances.

Design Guidelines

Plantings: Trees are a dramatic street improvement that creates an attractive visual and psychological separation for pedestrians between the sidewalk and the roadway. (p70)

Street Furniture: Street furniture should be placed in the utility zone to maintain through passage zones for pedestrians and to provide a buffer between the sidewalk and the street. For bus shelters on crowded sidewalks, bus bulb-outs are recommended for providing additional space. (p71)

Driveways: Driveway entrances can be both dangerous and inconvenient for pedestrians… Wherever possible, entrances should be consolidated such that multiple users share a common curbcut for motor vehicle access. (pp 71-72)

Slip Turns: The removal of slip turns decreases pedestrian crossing distances, reduces the speed of turning vehicles, and improves pedestrian visibility. To address these three issues, slip turns may be converted to conventional corners or made into pedestrian areas with benches, transit stops, lighting, or selective planting. (p76)

Restriping for lane reduction: Restriping streets for fewer lanes slows motor vehicle traffic and increases crossing safety. (p84)

Medians and Access Control: Medians increase safety by separating oncoming motor vehicle traffic and minimizing turning conflicts. They may be constructed with curbs or painted stripes and combined with pedestrian refuge islands. Medians also increase the safety of marked crosswalks at uncontrolled intersections (FHWA 2002a). Through an approach known as "access control," a street's efficiency may be increased by limiting the number of locations where left turns are allowed. (p85)

Oakland General Plan, Land Use & Transportation Element (1998)

The City of Oakland's Land Use & Transportation Element, adopted with the rest of the General Plan in March 1998, remains in effect until 2015. It defines the city's long-range goals and intentions for a wide range of land use and transportation developments and improvements, tailored to the specific needs and character of neighborhoods and areas. A General Plan Congress composed of more than 30 members of the public was created specifically to ensure community involvement in the General Plan and its Land Use & Transportation Element, and direct community outreach for the General Plan included more than 18 community meetings.

Relevant Policies

- (Objective T4, Alternative Modes of Transportation) Increase use of alternative modes of transportation. (LUTE, p58)
  - Policy T4.6, Making Transportation Accessible for Everyone. "*Alternative modes of transportation should be accessible for all of Oakland's population. Including the elderly, disabled, and disadvantaged*. (LUTE, p58)

    - (Policy T4.10, Converting Underused Travel Lanes) Take advantage of existing transportation infrastructure and capacity that is underutilized. For example, where possible and desirable, convert underused travel lanes to bicycle or pedestrian paths or amenities.
- (Objective T6, Safety) Make streets safe, pedestrian accessible, and attractive.
    - (Policy T6.2, Improving Streetscapes) *The City should make major efforts to improve the visual quality of streetscapes. Design of the streetscape, particularly in neighborhoods and commercial centers, should be pedestrian- oriented and include lighting, directional signs, trees, benches, and other support facilities*. (LUTE, p60)

Line 1R Service and Reliability Study Final Report (2011)

The Line 1R Service and Reliability Study analyzed existing route and operating characteristics of AC Transit's rapid bus route on Telegraph Avenue and International Boulevard. Key characteristics and findings are presented below.

Key Characteristics of the 1R Route

- 36 1R bus stops exist between Downtown Berkeley and Bayfair BART Stations, with approximately 1/3 mile spacing between most bus stops
- Line 1R operates at 12 minute headways between 6:00AM and 7:00PM on weekdays
- Line 1R makes 66 southbound trips and 68 northbound trips on weekdays with a scheduled run time of between 73 and 78 minutes
- Ridership is 12,023 passengers per day with an average of 89 passengers per trip (76 passengers per in-service hour)

Identified Operating, Ride Check, and Delay Characteristics and Analysis

- As of 2011, 20% of the fleet had Automatic Passenger Counters (APCs) to count when a passenger enters or exits a bus and collect the GPS coordinates of the bus
- Actual run time of vehicles consistently exceeds the scheduled run time in both directions, with some early morning and later evening trips operating faster than the scheduled run time
- Average speed is 11.8 MPH in the southbound direction and 12.4 MPH in the northbound direction during the PM peak
- Bus schedule adherence, measured as the percentage of runs completed no more than five minutes late or one minute earlier than scheduled, is 18 percent in the PM peak and 42 percent in the AM peak for the entire route.
    - Telegraph Avenue/Alcatraz (NB), Broadway/14th Street (SB), and International Boulevard/High Street (SB) had the lowest on-time percentages by time point out of the six total time points

- One of the ten highest delay locations is on Telegraph Avenue from 20th Street to West Grand (NB).[1] The measurement of delay aggregates several types of delay including that related to motion, dwell time, traffic control devices, and turning movements. On the corridor, the largest source of delay was auto congestion at the intersections of major arterials.
- Two of the top ten dwell time locations are on Telegraph Avenue: 40th Street and 49th Street.

Key Findings and Recommendations

- (5.1.3 Pavement Marking for Boardings Areas and Wheelchair Zone) Pavement markings should be used at 1R bus stops to indicate the location of front and middle doors, including a wheelchair legend showing where the wheelchair lift would deploy
- (5.1.8 Route Operations) The IR does not currently have scheduled time points though they exist internally to provide a guide for drivers. It is recommended that the schedule be published with drivers expected to meet the schedule time points.
- (5.1.10 Transit Signal Priority) Maintain and repair transit signal priority (TSP) on-board and signal equipment and move all stops to far-side stops to take advantage of TSP benefits.
- (Table 5.1 Northbound 1R Bus Stops) Recommendations include:
  - *24th Street – Remove old parking meter pole blocking lift access, add amenities and lighting*
  - *31st Street – Move bus pole and shelter back 10 feet and move all street furniture at least 2 feet from curb, repair sidewalk*
  - *40th Street – Move street furniture at least 2 feet from curb, move bench an additional 5 feet from curb*
  - *49th Street – Cannot lengthen bus stop and do not recommend moving stop currently, move street furniture back from curb at least 2 feet and repair sidewalk*
  - *59th Street – Extend red curb 11 additional feet, move bus shelter back 1 foot, repair sidewalk, move landscaping and streetscape furnishings back 2 feet*
  - *Alcatraz Avenue – Extend red curb 1 foot, move bus pole 10 feet north, move landscaping and streetscape furnishings back 2 feet, repair sidewalk*
- (Table 5.2 Southbound 1R Bus Stops) Recommendations include:
  - *Alcatraz Avenue – Move bus pole three feet south (to edge of driveway) and 2 feet from curb, move bench and trash cans to 8 feet from curb for wheelchair lift access, repair sidewalk*
  - *59th Street – Extend red curb 3 feet to south and move bus pole 3 feet south and two feet from curb*
  - *51st Street – Extend red curb 4 feet, move bus pole 4 feet north, repair sidewalk*
  - *40th Street – Move bus pole 4 feet north, remove loading zone to north of stop and extend red curb for bus stop 13 feet, move trash can to 8 feet from curb, repair sidewalk*

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[1] It is noted in the document that construction delays were in effect near 20th Street/Telegraph Avenue when the data was collected.

  - *30th Street – Bound by crosswalk (cannot length and do not recommend relocating now), move bus pole to within 10 feet of crosswalk and 2 feet from curb, move shelter and trash can to 8 feet from curb, repair very large pothole in front of stop*
  - *24th Street – Move bus pole south 15 feet, move tree 5 feet back from curb or remove (blocking lift), remove parking regulation sign from bus stop, repair curb and sidewalk, move shelter back to 8 feet from curb*
- (Appendix – Road and Traffic Signal Configuration Tables) all signals on Telegraph Avenue between 20th Street and Alcatraz Avenue are TSP equipped.

AC Transit East Bay BRT EIR (2007)

The AC Transit East Bay BRT EIR examined the alignment, operations, and design of a proposed 17-mile long BRT corridor to serve the cities of Berkeley, Oakland, and San Leandro. This summary is included here to provide background related to potential lane reductions that could be a part of this Complete Streets Project. It is recognized that the East Bay BRT project is now not planned to be implemented north of 20th Street in Oakland.

The described project's goals were to enhance service for the existing high ridership, increase ridership, and attract transit-oriented development to the corridor. The described project runs between Downtown Berkeley and either the San Leandro or Bayfair BART Stations. It would provide, for the most part, dedicated transit-only lanes that are typically median-running. Four alternatives were studied that varied in terminus and whether separated BRT and local service were provided. The cost-benefit analysis indicated that the project would reduce travel times on the corridor, increase transit capacity, increase AC Transit ridership, and decrease the operating cost per passenger. The project purpose (S.1 Purpose and Need) is to:

- *Improve transit service and better accommodate high existing bus ridership*
- *Increase transit ridership by providing a viable and competitive transit alternative to the private automobile*
- *Improve and maintain efficiency of transit service delivery and lower AC Transit' operating costs per rider*
- *Support local and regional planning goals to organize development along transit corridors and around transit stations.*

Between 20th Street and Berkeley, one alignment was proposed between Berkeley and Downtown Oakland, which would have been a two-way median-running transit way with right-side boarding.

Throughout the corridor, the project was also expected to improve the pedestrian environment through the reduction of vehicle speeds and possibly vehicle volumes on the corridor where dedicated lanes were proposed. At some locations with proposed dedicated BRT lanes and BRT station platforms, existing curb extensions, tight curb radii, and similar pedestrian improvements were proposed to be reduced in width, increased in radii, or removed by the project to accommodate dedicated lanes. The project assumed that north of SR-24, Class II bicycle lanes were to be kept between intersections but could not be maintained through station areas and at intersections. Though the City has planned Class II bicycle lanes on other portions of Telegraph, those were not included in the proposal due to space limitations. Under the 2025 Build Alternatives, Telegraph/45th Street/Shattuck Avenue, Telegraph/40th Street, and Telegraph/MacArthur Boulevard all fail in the afternoon peak period under the unmitigated Build Alternatives. With proposed mitigations, the three intersections continue to operate at acceptable levels.

Telegraph/Alcatraz Avenue operated at level of service F under the 2025 Build Alternatives, with no mitigation measures identified. Proposed mitigation measures are detailed below:

- Telegraph/45th Street/Shattuck Avenue: add a northbound through lane on Telegraph Avenue, becoming a trap left-turn at the intersection
- Telegraph/40th Street: Convert an existing southbound shared through-and right-lane to through-only and add a southbound right-turn lane
- Telegraph/MacArthur Boulevard: Add a northbound left-turn lane

Telegraph Avenue Bike Lanes and BRT Memorandum (2009)

Given the proposed dedicated transit facilities under the East Bay BRT proposal, the Telegraph Avenue Bicycle Lanes and BRT memorandum addressed potential alternative alignments for the City's previously planned Class II bicycle lanes for Telegraph Avenue, as the East Bay BRT proposal would have potentially removed portions of the existing Class II lanes north of SR-24 and prevent the addition of lanes south of SR-24 as the City has previously planned. The memorandum studied Telegraph Avenue, Shattuck Avenue/West Street, and Webster Street/Shafter Street/Genoa Street as three alternatives. For each alignment, elevation and topography, bicycle collisions, and difference in distance between alternative routes and Telegraph were studied. Telegraph has the most consistent grade at 1.1 percent, with the other two routes having similar start and end elevations but greater uphill and downhill grades in between. Telegraph Avenue has the highest existing peak hour bicycle traffic (54 bicyclists in the AM peak hour, and 72 bicyclists in the PM peak hour), the most destinations, and the most direct routes for bicyclists.

Inner East Bay Comprehensive Operational Analysis Existing Condition Phase II (2013)

The Inner East Bay Comprehensive Operational Analysis Existing Conditions Report provides information on transit markets, current bus and rail service, and system performance for the Urban Core network, Urban Trunk corridors, and Transbay routes.

Key findings include:

Service Frequencies*: Most AC Transit routes in the Urban Core operate at frequencies less than the every 10-15 minutes that are necessary to attract the large "show and go" customer market. The existing low frequency of service exacerbates delay further when transfer[s] are required, which is how a high functioning urban transit network should be used. Lastly, the poor on-time performance further degrades the customer experience by making the planned frequencies highly unreliable with impacts doubled for transferring customers.*

Service Tiers*: There is a significant performance differential between the various service tiers; urban trunk services are much stronger than local, and local services are generally stronger than community routes in terms of overall boardings, passengers per revenue hour, and financial productivity.*

Coverage Service*: The focus on coverage services, particularly during the recent service reductions, decreases the opportunity to provide "spontaneous use" frequencies on major core corridors. The quality of the core network directly drives the performance of coverage services.*

***Operating Speed**: Slow operating speeds plague bus service throughout the service area, but are worst on the most important high ridership urban trunk lines. Focusing speed improvements on the key corridors first will have the greatest impact and benefit the largest amount of riders.*

On Telegraph Avenue, the 1 and 1R cover 5.4 miles. The 1 has 3,666 total boardings and the 1R has 3,879 total boardings. For the 1, the slowest segment during the PM peak is between 12th Street BART and 40th Street with a 9 MPH operating speed. For the 1R the slowest segment is between 40th Street and Berkeley BART with a 9.3 MPH operating speed during the PM peak. The average operating speed is 9.1 MPH for the 1 and 11.0 MPH for the 1R.

Summary recommendations include:

***Branding**: AC Transit should focus its branding of Urban Trunk services on the customer experience. The experience is short waits in a comfortable, secure stop or station, fast travel (much faster than today), on comfortable state-of-the-art vehicles with clearly demarcated liveries.*

***Speed Improvement:** Despite AC Transit's efforts to date, Urban Trunk operating speeds are very slow[2], with both Local and Rapid service lagging (although they show an expected 20 percent speed differential). The International BRT and Telegraph BRT/Rapid together with the MTC pilot for the 51 A/B (Santa Clara/Broadway and College/University) are a good initial program assuming that the expectation bar is not set too low.*

***Wait Times:** AC Transit's best lines don't meet the minimum frequency for Rapid/BRT success of at least 10 minutes (ACT's Rapid lines are at best every 12 minutes). One suggested lower cost option is to operate the Rapids every 10 minutes and the Locals every 15 minutes (likely save one bus that can be reinvested).*

***Match the Service to the Corridor**: Depending on the corridor, market density, and network role, the service structure should be adjusted to the best advantage for AC Transit and its customers. For instance, in assessing the 51 A/B the structure has several options that balance high frequency, stop spacing access, and corridor service complexity:*

- *A combination of Local and Rapid/BRT bus transit on the same right-of-way.*
- *A single service that provides a combination of Local and Rapid/BRT customer experience: stop spacing somewhere between Rapid/BRT and regular tight Local (i.e., around 1/4 to 1/3 mile), 10-minute or better frequency, and the stop/station and vehicle experience of AC Transit's enhanced transit brand. Basically a Rapid/BRT with closer stop spacing than possible with a separate underlying local service.*

Temescal Parking Policies and Management Plan (2012)

The Temescal Parking Policies and Management Plan presents an existing conditions baseline for available parking supply and demand in the Temescal neighborhood as well as recommendations and strategies for improving parking in the area. Where meters are installed, pricing is currently uniform at $2.00 an hour between 8AM and 6PM, and meters are installed in the area of highest parking demand. Revenue data was available for approximately 25 percent of the parking spaces, and each space averages $169.47 in revenue per month for an average of 3.5 hours of paid occupancy per day. Additionally,

[2] The document does not specifically define "slow operating speeds". However, it states: "For instance, the Rapid… runs at a speed much slower than in other cities (e.g., LA's Wilshire Rapid Bus operates at around 15-16 mph without bus lanes)."

parking citation revenue generated on Telegraph Avenue, 44th Street, and 49th Street in the area generated $12,029 for March 2011. A residential parking district (RPD) has recently been installed in the vicinity of the MacArthur BART Transit Village to control spillover into the residential neighborhoods. Key findings include:

Intercept Survey Findings: The majority of respondents found a parking space within 2 to 5 minutes and it was typically 1 block or less from their destination. Over 90 percent of respondents found a space within 3 blocks of their destination.

Parking Supply: May and June 2011 occupancy data was collected between Webster Street, 40th Street, SR 24, 55th Street, and 51st Street, with 2,498 total parking supply (1,780 on-street, 718 off-street).

Parking Meters: 87 metered spaces are located in the area and all are located on Telegraph between 51st and 40th Street. The remaining 1,693 on-street parking spaces in Temescal are free; however, some of these spaces are now incorporated into a residential parking district (RPD) to control spillover of MacArthur BART parking associated with the MacArthur BART Transit Village development.

Utilization: Even during the peak periods, parking utilization does not exceed 85 percent. The highest observed occupancy rate was 61 percent between 10AM and 12PM weekdays and 65 percent between 12PM and 2PM on weekends.

Key recommendations include:

- Utilization indicates that additional supply is not needed and that supply can be better managed through implementation of shared parking strategies and a parking management district.
- City could consider extending metered hours later in the evening given area nightlife and restaurants.
- Consider easing time restrictions on parking on Telegraph north of 52nd Street.

Bicycle Volume

Bicycle tube counts were collected on Telegraph Avenue between 40th Street and 41st Street over a nine day period beginning October 5 and ending October 13, 2013. In order to avoid damage from street sweepers, the tubes were switched between the northbound and southbound sides of the street each night. Counts were collected in the northbound direction on Tuesday, Thursday, Saturday, and Sunday. Counts were collected in the southbound direction on Saturday, Sunday, Monday, and Wednesday. The resulting daily counts are summarized in Table 1. Bicycle volumes are comparable and may show a slight increase relative to previous intersection counts on the corridor completed by the City of Oakland and the Metropolitan Transportation Commission (MTC).

TABLE 1
DAILY BICYCLE VOLUMES ON TELEGRAPH AVENUE AT 40TH STREET

Period		Count		
		Northbound	Southbound	Total
Average Weekday[1]	AM Peak Hour (8AM)	29	63	92
	PM Peak Hour (5PM)	65	52	117
	Daily	525	678	1,203
Average Weekend[2]	Peak Hour (10:15AM)	37	21	58
	Daily	398	281	679

Notes:
1. Average of Tuesday and Thursday in northbound direction, Monday and Wednesday in southbound direction
2. Average of Saturday and Sunday
Source: Fehr & Peers, 2013.

In April 2013, bicycle tube counts were also collected on the parallel bicycle routes to the east and west: Genoa Street and Webster Street/Shafter Street. On Webster Street between 41st and Rich Streets, the average daily bicycle volume was 621 on weekdays and 488 on weekends. On Genoa Street between 59th and 58th Streets, the average daily bicycle volume was 656 on weekdays and 441 on weekends. On both of these corridors, auto ADT is substantially lower than on Telegraph Avenue, which can create a more comfortable bicycling environment. Despite this, bicycle volumes are as much as 1.5 to almost 2 times higher on Telegraph Avenue than on parallel continuous routes, likely because of the direct connections Telegraph Avenue provides to many destinations.

Crash Data

Bicycle Collisions

Table 2 presents bicycle-auto collisions between 2007 and 2011, and Figure 1 provides a map of collision locations and frequency during this time frame. In that time period, 66 bicyclist-auto collisions occurred on Telegraph Avenue between 20th Street and Alcatraz Avenue. Two bicyclist-pedestrian collisions also occurred during that period. The primary collision factors for bicycle collisions varied. A plurality of the bicycle-auto collisions were due to "dooring", where a driver fails to yield to an oncoming bicyclist when opening the door, accounting for 25 percent of all collisions on Telegraph Avenue. Additionally, 23 percent of collisions were due to a vehicle failing to yield when making a left or U-turn. Turning movement and turning signal violations accounted for 14 percent of collisions, and in 11 percent of collisions, a vehicle failed to stop at a red signal. The driver was deemed to be at fault in 68 percent of collisions. In 5 percent of the collisions, a truck was at fault, and only one collision involved a bus.

As shown on Figure 1, bicycle collisions occur throughout the corridor and suggest that a corridor-based solution will be important for Telegraph Avenue. Additionally, several hot spots are found along the corridor and are presented on Table 2. 42nd Street, a low-volume bicycle route that connects under SR-24, has the highest number of collisions – 5 in total. The intersection at 45th Street/Shattuck Avenue is also a bicycle collision hot spot. The five-legged intersection has a flashing yellow ball for southbound Shattuck Avenue traffic when the southbound Telegraph Avenue traffic has a green ball. 45th Street also provides a local bicycle connection underneath SR 24. The Alcatraz Avenue intersection is another hot spot and is part of an existing gap in the Class II bicycle lanes between North Street and 65th Street.

TABLE 2 BICYCLE-AUTO COLLISION HOT SPOTS ON TELEGRAPH AVENUE, 2007-2011

Bicyclist-Auto Collision		
Intersection	**Signal**	**Total Collisions**
42nd Street	Signal	5
West Grand Avenue	5-Way Signal	4
45th Street/ Shattuck Avenue	Signal	3
59th Street	Signal	3
Alcatraz Avenue		3

Source: SWITRS, TIMS, 2007-2011 Collision Data.

Pedestrian Collisions

From 2007 through 2011, 68 pedestrian-auto collisions occurred on the study corridor. Drivers failing to yield to a pedestrian in the crosswalk (CVC 21950 A) caused the majority of collisions—56 percent in total. In approximately 18 percent of collisions, the pedestrian action was determined to have caused the collision due to crossing outside of a crosswalk, failing to take due care when crossing, or violating the NO WALK signal.

As shown on Figure 2, pedestrian collisions are also distributed throughout the corridor, again suggesting that corridor-based solutions should be addressed. Where hot spots exist, they are found at both signal-controlled and uncontrolled crosswalks, as presented in Table 3. The intersections at 24th and 49th Street both have a single ladder-striped crosswalk on the north side of the intersection. Both intersections also have a northbound AC Transit bus stop only fifty feet in length. Crosswalks across Telegraph Avenue at 57th Street, though legal, are not marked and are unsignalized. Signalized crosswalks at West MacArthur and 51st Street are long, with six to seven lanes of traffic that pedestrians must cross at each approach.

TABLE 3 PEDESTRIAN-AUTO HOT SPOTS ON TELEGRAPH AVENUE, 2007-2011

Pedestrian-Auto		
Intersection	**Control**	**Total Collisions**
40th Street	Signal	5
24th Street	Unsignalized	4
51st Street	Signal	4
20th Street	Signal	3
West MacArthur	Signal	3
49th Street	Unsignalized	3
57th Street	Unsignalized (No Marked Crosswalks)	3

Source: SWITRS, TIMS, 2007-2011 Collision Data.

Auto Collisions

Table 4 presents auto collisions on Telegraph Avenue between 2007 and 2011, and Figure 3 provides a map of collision locations, type and number during this time frame. In that time period, 138 auto collisions were reported. Many of the auto collision hot spots are also bicycle and pedestrian collision hot spots. West MacArthur and West Grand Avenue have the highest number of auto collisions, followed by 40th Street and Alcatraz Avenue. Speeding and failing to yield when turning left or making a U-turn account accounted for 20 percent and 21 percent of collisions, respectively. Failing to stop at a red signal caused 16 percent of auto collisions, and 12 percent of collisions were due to failing to turn safely and with a signal.

TABLE 4 AUTO COLLISION HOT SPOTS ON TELEGRAPH AVENUE, 2007-2011

Auto Collisions		
Intersection	**Control**	**Total Collisions**
West MacArthur	Signal	11
West Grand Avenue	Signal	10
40th Street	Signal	7
Alcatraz Avenue	Signal	5
23rd Street	Unsignalized	4
34th Street	Signal	4
45th Street/Shattuck Avenue	Signal	4
55th Street	Signal	4

Source: SWITRS, TIMS, 2007-2011 Collision Data.

Transit Travel Time and Delay

AC Transit operates two bus lines along Telegraph Avenue: Line 1 and Line 1R. Line 1 is a local bus, with bus stops approximately every 850 feet in the study corridor. Line 1R is a rapid bus, with bus stops approximately every 2,500 feet in the study corridor.

Existing passenger activity and operating speeds were analyzed for the weekday AM peak hour (8:00 – 9:00 AM) and PM peak hour (5:00 – 6:00 PM). Automatic Passenger Count (APC) data, covering the period from January to March 2011 were obtained from AC Transit. The Transportation Research Board's Transit Capacity and Quality of Service Manual (TCQSM), 3rd Edition provided the computational engine used to estimate average operating speeds and bus stop capacities (buses/hour) for the two peak hours. The following sections summarize passenger activity and operating speeds along the corridor.

Passenger Activity

Table5 presents average dwell time in each direction along the study corridor (20th Street to Alcatraz Avenue) for the AM and PM peak hours for the Line 1 and Line 1R. Average dwell time is higher for Line 1R, as fewer bus stops and faster service attract more riders. The bus stops with highest average dwell times for both lines are 20th Street in the southbound direction and 40th Street in the northbound direction. Both of these bus stops serve BART stations, and 20th Street provides connections to downtown employment centers and several AC Transit routes as well.

TABLE 5

DWELL TIME SUMMARY

Study Scenario	Line 1			Line 1R		
	Average Dwell Time (sec)	Maximum Average Dwell (sec)	Location of Max. Avg. Dwell (sec)	Average Dwell Time (sec)	Maximum Average Dwell (sec)	Location of Max. Avg. Dwell (sec)
AM Peak Hour						
Southbound	9	32	20th Street	16	22	40th Street
Northbound	10	27	40th Street	20	32	40th Street
PM Peak Hour						
Southbound	11	34	20th Street	19	31	20th Street
Northbound	7	19	40th Street	16	23	20th Street

Source: APC data, 2011

Figure 4 illustrates passenger activity at each bus stop, defined as the sum of boardings and alightings. Stops that are shared by both the Line 1 and 1R have the highest passenger activity. These include 20th Street, 24th Street, 30th Street/31st Street, 40th Street, and 49th Street. The locations of the highest passenger activity for the AM and PM peak hours are northbound 49th Street and southbound 20th Street, respectively. Appendix A includes detailed passenger activity data for each bus stop of the study area.

Speed and Capacity Model

Operating speed[3] was estimated using the TCQSM Speed and Capacity computational engine[4] and calculated from APC data. The TCQSM tool implements the bus stop capacity and facility speed calculation methods described in Chapter 6 of the TCQSM, 3rd Edition, which was published in August 2013. Operating speeds were modeled to facilitate testing design options developed in subsequent phases of the project. Key inputs to the Speed and Capacity Model include: average dwell time, average stop spacing, scheduled number of buses, traffic signal timing at bus stops, and traffic volumes at bus stops. Table6 provides a list of the inputs to the model and data sources.

TABLE 6

SPEED AND CAPACITY MODEL INPUTS AND DATA SOURCES

Input	Source
Capacity Module (data per bus stop)	
Standard deviation of dwell times	APC, 2011
Average dwell time	APC, 2011
Green time ratio	Synchro model
Traffic signal cycle length	Synchro model
Stop type (online or offline)	Field survey of Telegraph Avenue
Curb lane traffic volume	Synchro model
Right-turning traffic volume	Synchro model
Conflicting pedestrian volume	Synchro model
Number of loading areas	Field survey of Telegraph Avenue
Bus lane type	Field survey of Telegraph Avenue
Speed Module (data per segment)	

[3] Operating speed includes time spent serving bus stops.
[4] The computational engine is available online at this location: http://www.trb.org/Main/Blurbs/169437.aspx

Scheduled buses per hour	**AC Transit, 2013**
Average stop spacing	**AC Transit, 2011 and field survey of Telegraph Avenue**
Running way type (mixed traffic, bus lane)	**Field survey of Telegraph Avenue**
Traffic signal pattern (typical, timed for buses)	**Assumption**
Free-flow bus speed	**Telegraph Avenue speed limit**
Acceleration and deceleration rate	**TCQSM default values**

The model estimates speed over four segments of Telegraph Avenue. The segments are primarily defined by Line 1R bus stops. The segments include the following:

- 20th Street to 30th/31st Street
- 30th/31st Street to 40th Street
- 40th Street to 49th Street/50th Street
- 49th/50th Street to Alcatraz avenue

The model was calibrated[3] to match speed estimates from the same APC data used to produce the passenger activity estimates. Tables 7and 8 present speed estimates for both lines, by segment, peak hour and direction. Segment speeds generated by APC data are provided for comparison. The Speed and Capacity model generally performs well, with a deviation from empirical values between -1 and 12 percent in the northbound direction and between -10 and 14 percent in the southbound direction. The deviation from actual values is within the range of daily fluctuation and is thus appropriate for estimating the effects of design options. Appendix B provides the input sheets of the Speed and Capacity Model.

Figure 5 presents average segment speeds calculated from APC data. Average segment speeds for Line 1 range from 8 mph to 11 mph across both peak hours. The fastest segments for the Line 1 are between 40th Street and 30th Street and between 50th Street and Alcatraz Avenue. The segment with the slowest average speed is southbound 30th Street to 20th Street. Line 1R operates with faster average segment speeds, which is primarily a function of fewer bus stops and longer distance between bus stops. Average segment speeds for Line 1R range from 10 mph to 15 mph. The fastest segment for Line 1R is also between 40th Street and 30th Street. The slowest segment is between 30th Street and 20th Street.

[3] The parameter used to calibrate the model was the base bus running time losses estimate in the speed module. See Chapter 6 of the TCQSM for more details. Per TCQSM guidelines, the running time losses parameter ranged from 1.0 to 1.5 along the study area. Because both the Line 1 and Line 1R operate in the same travel lanes and travel through the same traffic signals along Telegraph Avenue, the same base running time losses were used for both lines for a given segment and peak hour.

TABLE 7
SEGMENT OPERATING SPEEDS, NORTHBOUND

Northbound		20th Street to 31st Street	31st Street to 40th Street	40th Street to 49th Street	50th Street to Alcatraz Avenue
AM Peak Hour					
Line 1	Actual Operating Speed (APC)	9.5	11.1	8.6	9.5
	Estimated Operating Speed (TCQSM)	9.6	10.9	9.1	10.0
	Deviation	*2%*	*-1%*	*6%*	*6%*
Line1R	Actual Operating Speed (APC)	10.4	13.6	10.5	12.1
	Estimated Operating Speed (TCQSM)	11.5	14.0	11.5	12.6
	Deviation	*11%*	*3%*	*10%*	*4%*
PM Peak Hour					
Line 1	Actual Operating Speed (APC)	9.6	10.6	9.0	9.6
	Estimated Operating Speed (TCQSM)	9.9	10.5	10.1	10.5
	Deviation	*3%*	*-1%*	*12%*	*9%*
Line1R	Actual Operating Speed (APC)	10.3	12.1	11.1	12.0
	Estimated Operating Speed (TCQSM)	11.5	13.0	12.3	13.1
	Deviation	*11%*	*7%*	*10%*	*9%*

TABLE 8
SEGMENT OPERATING SPEEDS, SOUTHBOUND

Southbound		Alcatraz Avenue to 50th Street	50th Street to 40th Street	40th Street to 30th Street	30th Street to 20th Street
AM Peak Hour					
Line 1	Actual Operating Speed (APC)	11.4	10.5	11.4	8.8

	Estimated Operating Speed (TCQSM)	10.1	10.0	10.7	8.3
	Deviation	*-12%*	*-5%*	*-6%*	*-5%*
Line1R	Actual Operating Speed (APC)	12.8	12.3	14.8	10.8
	Estimated Operating Speed (TCQSM)	14.3	13.3	14.7	11.7
	Deviation	*12%*	*7%*	*-1%*	*9%*
PM Peak Hour					
Line 1	Actual Operating Speed (APC)	10.3	8.5	9.4	7.8
	Estimated Operating Speed (TCQSM)	9.3	8.0	8.8	8.4
	Deviation	*-10%*	*-6%*	*-6%*	*7%*
Line1R	Actual Operating Speed (APC)	10.5	10.5	13.6	10.4
	Estimated Operating Speed (TCQSM)	10.6	10.6	11.7	11.5
	Deviation	1%	*1%*	*14%*	*11%*

Table 9 provides a list of 1 and 1R transit stop amenities, which were inventoried in November 2013, along Telegraph from West Grand to Alcatraz Avenue.

TABLE 9 TELEGRAPH AVENUE BUS STOP EXISTING CONDITIONS

Location	Route(s)	Length	Near Side / Far Side	Curb Lane Width	Included Amenities			
					Shelter	Bench	Planter	Bike Rack
Northbound Telegraph Avenue								
West Grand Avenue	1	50’	Near Side	19’	✓	✓		

24th Street	1, 1R	15’	Far Side	20’				
27th Street	1	70’	Near Side	18’	✓	✓		
32nd Street	1, 1R	100’	Near Side	17’	✓	✓		
34th Street	1	65’	Near Side	18’	✓	✓		
36th Street	1	34’	Near Side	19’				
West MacArthur Blvd	1	90’	Far Side	19’	✓	✓		
40th Street	1, 1R	170’	Far Side	19’	✓	✓	✓	
▪ 44th Street	▪ 1	▪ 60’	▪ Near Side	▪ 20’		✓	✓	✓
45th Street	1	66’	Far Side	18’		✓		
49th Street	1, 1R	65’	Far Side	19’		✓	✓	
55th Street	1	40’	Near Side	19’		✓	✓	
Aileen Street	1	80’	Near Side	20’		✓		

58th Street	1	70’	Near Side	22’		✓		
59th Street	1, 1R	60’	Far Side	24’	✓	✓		
62nd Street	1	50’	Near Side	22’		✓		
Alcatraz Avenue	1, 1R	70’	Far Side	17’	✓	✓	✓	✓
Southbound Telegraph Avenue								
Alcatraz Avenue	1, 1R	40’	Near Side	19’	✓	✓	✓	
62nd Street	1	60’	Near Side	23’		✓		
60th Street	1	70’	Near Side	23’		✓		
59th Street	1, 1R	80’	Far Side	23’	✓	✓	✓	
58th Street	1	45’	Far Side	23’		✓		
Aileen Street	1	55’	Near Side	20’		✓	✓	
55th Street	1	75’	Near Side	19’		✓	✓	
52nd Street	1	50’	Near Side	19’		✓		
51st Street	1, 1R	90’	Far Side	19’	✓	✓	✓	✓

44th Street	1	50’	Near Side	19’		✓	✓	
40th Street	1, 1R	80’	Near Side	19’			✓	
West MacArthur Blvd	1	80’	Near Side	19’	✓	✓		
34th Street	1	60’	Near Side	19’				
32nd Street	1	60’	Near Side	19’				
30th Street	1, 1R	80’	Far Side	19’	✓	✓		
27th Street	1	80’	Near Side	19’				
24th Street	1, 1R	95’	Far Side	19’		✓		
West Grand Avenue	1	35’	Near Side	19’	✓	✓		

Source: City of Oakland, Fehr & Peers.

Traffic Operations

Within the study corridor, there are 19 signalized intersections. Existing AM and PM peak hour traffic operations were analyzed at these intersections using the Synchro software and the 2010 Highway Capacity Manual (HCM) methodology.

Vehicle, bicycle, and pedestrian turning movement counts were collected on October 17, 2013 during the AM peak period (7:00AM to 9:00AM) and PM peak period (4:00PM to 6:00PM) at the following intersections:

- Telegraph Avenue and Alcatraz Avenue
- Telegraph Avenue and 51st Street
- Telegraph Avenue and 40th Street
- Telegraph Avenue and 27th Street
- Telegraph Avenue and West Grand Avenue

Figures 6A and 6B presents the auto volumes, and Figures 7A and 7B presents the bicycle and pedestrian volumes. To supplement this data, turning movement counts from the AC Transit East Bay Bus Rapid Transit (BRT) Existing Traffic Conditions Memorandum (Cambridge Systematics, Inc., December 10, 2009) were obtained for use at the other signalized intersections in the study corridor. These counts were collected in September and October 2009. The Telegraph Avenue/34th Street and Telegraph Avenue/30th Street intersections were not included in the 2009 BRT counts. Turning movement counts from the Alta Bates Summit Medical Center, Summit Campus Seismic Upgrade and Master Plan Environmental Impact Report (December 2009) were collected in November 2008. The 2008 and 2009 traffic counts were adjusted to be consistent with the 2013 counts collected at adjacent intersections. In general, the 2013 volumes indicated a five to ten percent decrease in auto traffic across the corridor on average, as compared to the 2008 and 2009 counts.

Current signal timings were obtained from the City of Oakland for the operational analysis. Traffic currently operates acceptably throughout the corridor, with level of service D or better at all signalized intersections during the AM and PM peak hour as shown in Table 10.

In addition to the signalized intersection operational analysis, a prototypical side street stop controlled intersection was chosen for analysis. The Telegraph Avenue/49th Street intersection was chosen for this purpose. 49th Street is offset across Telegraph Avenue; therefore, each leg was analyzed independently. Vehicle, bicycle, and pedestrian turning movement counts were collected during the AM and PM peak hours on October 29 and October 30, 2013 respectively. The intersections were analyzed using the Synchro software and 2010 HCM methodology. Average vehicle delay, LOS, and queue length are reported for the side street stop controlled approach (49th Street) and left-turn movement from Telegraph Avenue onto 49th Street are reported in Table 11. The intersections operate acceptably with minimal queuing.

TABLE 10
EXISTING (2013) CONDITIONS PEAK HOUR SIGNALIZED LEVELS OF SERVICE

Location	Peak Hour	Existing Conditions		
		V/C[1]	Delay[2]	LOS[2,3]
1. Telegraph Avenue & Alcatraz Avenue	AM	0.78	29	C
	PM	0.78	34	C
2. Telegraph Avenue & Aileen Street/SR 24	AM	0.65	22	C
	PM	0.51	12	B
3. Telegraph Avenue & 56th Street/SR 24	AM	0.45	5	A
	PM	0.80	33	C
4. Telegraph Avenue & 55th Street	AM	0.51	7	A
	PM	0.64	6	A
5. Telegraph Avenue & 52nd Street/ Claremont Avenue	AM	0.41	13	C[4]
	PM	0.48	5	D[4]
6. Telegraph Avenue & 51st Street	AM	0.65	24	C
	PM	0.78	44	D
7. Telegraph Avenue & 50th Street	AM	0.26	2	C
	PM	0.27	2	A
8. Telegraph Avenue & 48th Street	AM	0.22	3	A

	PM	0.24	2	A
9. Telegraph Avenue & 45th Street	AM	0.32	11	B
	PM	0.37	10	A
10. Telegraph Avenue & 42nd Street	AM	0.30	5	A
	PM	0.31	2	A
11. Telegraph Avenue & 40th Street	AM	0.47	13	B
	PM	0.60	19	B
12. Telegraph Avenue & W. MacArthur Boulevard	AM	0.29	3	A
	PM	0.50	14	B
13. Telegraph Avenue & 34th Street	AM	0.22	9	A
	PM	0.35	6	A
14. Telegraph Avenue & Hawthorne Avenue	AM	0.18	2	A
	PM	0.38	6	A
15. Telegraph Avenue & 30th Street	AM	0.25	4	A
	PM	0.35	5	A
16. Telegraph Avenue & 29th Street	AM	0.27	3	A
	PM	0.44	4	A
17. Telegraph Avenue & 27th Street	AM	0.40	21	C
	PM	0.50	11	B

18. Telegraph Avenue & W. Grand Avenue	AM	0.33	17	B
	PM	0.58	19	B
19. Telegraph Avenue & 20th Street	AM	0.30	14	B
	PM	0.36	14	B

Notes:
1. V/C = Intersection volume/capacity, based on the 2000 HCM method.
2. Average intersection delay and LOS based on the 2010 HCM method is shown. Average delay is in seconds
3. LOS = Level of Service
4. HCM analysis shows that the Telegraph Ave/Claremont Ave intersection operates at LOS A during both the AM and PM peak hours; however, the HCM analysis does not take into consideration the short storage length between the Telegraph Ave/51st Street and Telegraph Ave/Claremont Ave intersections, and the vehicle queuing between them. The Telegraph Ave/Claremont Ave LOS was therefore set equal to the Telegraph Ave/51st Street intersection since it is influenced by the adjacent intersection.
Source: Fehr & Peers, 2013.

TABLE 11
EXISTING (2013) CONDITIONS PEAK HOUR UNSIGNALIZED LEVELS OF SERVICE

Location	Peak Hour	Existing Conditions					
		Side Street Stop			Left-turn From Telegraph		
		Delay[1]	LOS[1,2]	Queue[3]	Delay[1]	LOS[1,2]	Queue[3]
20. Telegraph Avenue & 49th Street (East)	AM	13	B	25’	1	A	<20’
	PM	16	C	25’	1	A	<20’
21. Telegraph Avenue & 49th Street (West)	AM	12	B	25’	0	A	<20’
	PM	13	B	25’	0	A	<20’

Notes:
1. Approach delay and LOS based on the 2010 HCM method is shown. Average delay is in seconds.
2. LOS = Level of Service
3. 95th percentile queue based on the 2010 HCM method in feet
Source: Fehr & Peers, 2013.

Pedestrian Crossings

Existing Conditions

CD+A performed a corridor-wide general assessment of pedestrian crossing conditions along Telegraph Avenue, between 20th and 57th Streets. This included documentation and mapping of key existing features of the pedestrian crossing environment throughout the project corridor, illustrated in Figure 8A:

- Location and type of existing marked crossings
    - Signalized
    - Stop-controlled
    - Standard crosswalk striping
    - High visibility ladder crosswalk striping
    - White color striping
    - Yellow color striping (near schools)
- Location of closed crossings
- Location of sidewalk bulbouts, roadway medians and "pork chops" islands
- Location and service level (Local or Express) of AC Transit bus stops, future Downtown BRT stations in proximity to Telegraph, and BART stations

For the purposes of understanding existing crossing conditions around AC Transit facilities extending to the Oakland/Berkeley border, these elements were also documented and mapped between 57th Street and Alcatraz Avenue, as illustrated in Figure 8B.

Figure 9A indicates locations identified by the 2005 *Telegraph Avenue Pedestrian Streetscape Improvement Project* for proposed improvements, including bulbouts, mid-block crossing refuges, and new crossings at 43rd Street, 47th Street, and between 52nd and 55th Streets, and for key intersections improvements at Claremont Avenue/52nd and 51st Streets, Shattuck Avenue/45th and 46th Streets, 41st and 40th Streets, MacArthur Boulevard, 27th Street, and Grand Avenue/22nd Street. Improvement concepts proposed for these key intersections are presented in Figure 9B.

Existing curb ramps include a mix of diagonal (non-directional, aligned at a 45-degree angle with respect to crossing directions) and directional (aligned with crossing directions). In some locations, bulb outs and directional curb ramps provide a safer and more comfortable pedestrian crossing experience, but there are very few examples such as on the west side of Telegraph Avenue at 40th Street. At many other locations throughout the corridor, diagonal crosswalks may encourage pedestrians to venture east-west across Telegraph Avenue where no receiving curb ramp exists, typically as a result of offset or T-intersections, such as 31st Street, or where the receiving curb ramp is a directional ramp aligned in the wrong direction, such as on the north side of 44th Street. Crossing intersecting streets north-south in the direction of Telegraph Avenue, slip lanes create dangerous conditions for pedestrians. These include the HWY-24 on-ramps, Shattuck Avenue/45th Street, and MacArthur Boulevard. In general, many curb ramps are non-compliant with ADA regulations because of direction, slope, and/or presences of tactile warning strips.

Analysis of Existing Marked Crossing Spacing

The Telegraph Avenue project corridor features 30 marked crossings (counting three- and four-way intersections as one crossing and offset intersections with two marked crossings as two) over approximately 2.3 miles, for an average spacing of over 400 feet between crossings. This interval is slightly larger than that of a typical city block in an urbanized area, and indeed the corridor is predominantly intersected by cross streets at every 250 to 350 feet. Notable exceptions include the corridor segments under the I-580 overpass and between 52nd and 57th Streets, where crossings are separated by a gap of over 700 feet. Numerous other locations throughout the corridor require pedestrians to travel up to 500 feet to reach a destination directly across the street, using available marked crossings. Spacing of marked crossings (signalized and unsignalized) along an urban corridor such as Telegraph Avenue should be no greater than 500 feet; 300 feet is a more desirable distance.

Locations for Potential New Crossings

Figure 10A and 10B indicate the location of pedestrian-generating and attracting uses along and near the Telegraph corridor, including:

- School and public facilities
- Medical facilities
- Religious institutions
- Commercial/retail and food/retail businesses

As shown in Figure 10A, many of the larger gaps between crossings exist in the commercial/retail districts of Temescal and KONO where retail businesses line both sides of the street; other gaps between crossings exist where popular destinations are located mid-way between crossings but directly across from bus stops or on-street parking. Conditions such as these lead to mid-block crossings and crossing at intersections with unmarked crossings, which exposes pedestrians to auto and bus traffic without the safety provided by traffic signals and/or roadway striping.

Figure 10A also indicates the location of primary pedestrian desire lines. These locations are influenced by CD+A's professional judgment based on the presence of pedestrian-attracting and generating land uses, transit facilities, and observations of pedestrian activity throughout the corridor, including patterns of jaywalking and pedestrian crossing at intersections with unmarked crossings. These locations indicated by pedestrian desire lines may be candidates for new crossings and additional crossing improvements; however, feasibility analysis will be necessary to determine exact locations and treatments.

As part of a peer review of the 2005 *Telegraph Avenue Pedestrian Streetscape Improvement Project* under Task 2.5, these locations and the specific design concepts of potential improvements will be vetted in coordination with possible bus stop consolidation/relocations and new roadway cross section and intersection design alternatives concepts.

Driver Yielding Behavior at Unsignalized Crosswalks

Section 21950 (a) of the California Vehicle Code (CVC) requires that drivers yield the right-of-way to a pedestrian crossing a roadway within a marked or unmarked crosswalk. Section 21950 (b) of the CVC puts the onus on the pedestrian to take "due care for his or her safety." On multi-lane roadways, such as Telegraph, driver yielding is particularly critical due to the possibility of a multiple-threat collision. A multiple-threat collision is when, on a multi-lane roadway, a driver in one lane yields to a pedestrian crossing the roadway and, in doing so, prevents the driver in the adjacent travel lane from being able to see the oncoming pedestrian crossing the road. The following presents an analysis of driver yielding behavior at two unsignalized crosswalks and results of the Crosswalk+ analysis, which is a crosswalk treatment identification tool.

Data Collection

Fehr & Peers collected data on the yielding behavior of drivers approaching unsignalized crosswalks when a pedestrian indicated intent to cross the street. For the purposes of this study, that was defined as standing at the edge of the curb visibly looking for a gap in oncoming traffic, stepping off the curb into traffic, or otherwise entering the marked crosswalk. Weekday AM and PM peak hour data was collected on November 5 and November 6, 2013 at two unsignalized intersection locations: Telegraph Avenue/24th Street and Telegraph Avenue/49th Street. When AM peak hour data was collected at 49th Street, utility work was being completed in the northbound curb lane, which blocked auto use of that lane. As such, data for that lane was not used.

Both locations have a high-visibility (ladder-style) marked crosswalk on Telegraph Avenue across the north leg of the intersection. Telegraph Avenue has two travel lanes in each direction plus a turn-pocket at both intersections. Both intersections also have far-side, northbound AC Transit 1R bus stops. Table 12 presents the observed peak hour pedestrian volumes at each location.

TABLE 12 OBSERVED PEAK HOUR PEDESTRIAN VOLUMES

Crosswalk Location	AM Peak[1]	PM Peak[2]
24th Street/Telegraph Avenue	20	30
49th Street/Telegraph Avenue	23	60

1. AM Peak data was collected between 7:45AM and 8:45 AM.
2. PM Peak data was collected between 5:00 and 6:00PM.
Source: Fehr & Peers, November 2013

Yielding Analysis

At each intersection, the number of cars failing to yield the right-of-way to pedestrians, location of the yielding driver, and pedestrian location when the driver yielded the right-of-way were recorded for each pedestrian crossing event. The following section presents findings and trends from those observations, which are summarized in Table 13. Unless otherwise noted, crossing events are aggregated for eastbound and westbound pedestrians.

TABLE 13 DRIVER YIELDING RATES

Crosswalk Location	Metric	AM Peak	PM Peak
24th Street/Telegraph Avenue	Yield Rate[1]	1/5	2/9
	Average Number of Cars Failing to Yield[2]	4.05	4.8[3]

49th Street/Telegraph Avenue	Yield Rate[1]	1/3	3/8[4]
	Average Number of Cars Failing to Yield[2]	2.6	4.0

1. X/Y drivers indicates the rate of drivers who yielded to pedestrians. For example, "one in five drivers yielded to pedestrians in the crosswalk." The calculation consists of: (Total Number of Cars that Yielded to Pedestrians) / (Total Number of Cars that Yielded to Pedestrians + Total Number of Cars that Did Not Yield to Pedestrians).
2. Average number of cars failing to yield averages: (Total # of Cars in Lanes 1 +2 +3 +4 that Failed to Yield to the Pedestrian) for each crossing event.
3. Two crossing events skewed the average higher. In those cases, 20 total cars failed to yield to one pedestrian over the four lanes, and in another event, 13 total cars failed to yield to one pedestrian over the four lanes of traffic.
4. In the PM peak hour at 49th Street, four crossing events occurred with no oncoming traffic, and seven crossed the roadway when drivers were stopped due to queues rather than yielding behavior. These two sets of observations are not included in this table.
Source: Fehr & Peers, November 2013.

24th Street/Telegraph Avenue

30 pedestrians were observed using the 24th Street marked crosswalk during the PM peak hour. On average, pedestrians had to wait for a total of 4.8 cars to pass during the course of their crossing. Stated another way, 2 drivers in every 9 vehicles yielded to a pedestrian in the crosswalk. The inside southbound lane of traffic had lower yield rates, with pedestrians waiting, on average for 3.5 autos to pass before being able to cross that lane. 10 of the crossing pedestrians had to wait for five or more cars to pass during the course of their crossing. In two of those instances, a total of 13 or more vehicles failed to yield the right-of-way to the pedestrian waiting to cross. When drivers yielded, they typically yielded approximately 20 feet or more in advance of the crosswalk.

In the AM peak period, 20 pedestrians crossed Telegraph Avenue at 24th Street. On average, pedestrians waited for 4.05 autos to pass through the crosswalk over the course of each crossing event. The yielding rate for the AM peak hour was one in five vehicles. In the morning, the southbound direction also provided a lower yield rate, with 2.6 drivers passing through the crosswalk in each southbound lane on average before yielding to a pedestrian.

49th Street/Telegraph Avenue

60 pedestrians were observed using the 49th Street marked crosswalk during the PM peak hour, with 4.0 drivers failing to yield the right-of-way to pedestrians on average during the course of each crossing. Yielding rates in the curb lane were lower that the inside travel lanes, with 2.4 curb-lane autos failing to yield the right-of-way to the pedestrian on average. When pedestrians waited to cross the inside travel lanes, the average number of autos failing to yield to pedestrians was slightly lower - 1.8 autos. In six crossing events, pedestrians had to wait for a total of five or more drivers to pass before a driver yielded the right-of-way. Four of the crossing events during the PM peak hour occurred with no oncoming traffic. In the AM peak hour, the average number of cars that passed before a driver yielded the right-of-way to a crossing pedestrian was 2.6 vehicles during the course of their crossing.

During the peak fifteen minutes of the peak period, around 5:30PM, congestion was heavy enough that the northbound queue on Telegraph spilled back in both lanes from the signalized intersections at 51st

Street and the Temescal Plaza Driveway to 49th Street. Seven pedestrians crossed Telegraph under these conditions. This appeared to encourage drivers to yield to pedestrians in the crosswalk while waiting in queue; though as drivers moved forward in a rolling queue in both lanes, this also setup the possibility of a multiple-threat collision.

Pedestrian Delay and Recommend Crosswalk Enhancements

Using the peak hour pedestrian volumes, auto volumes, and other variables, Fehr & Peers ran our Crosswalk+ tool to analyze pedestrian level of service at the unsignalized crosswalks at 24th and 49th Streets. The tool serves as crosswalk treatment identification tool, consistent with national best practices.

Methodology

The Crosswalk+ tool codifies the variables presented in National Cooperative Highway Research Program (NCHRP) *Report 562: Improving Pedestrian Safety at Unsignalized Crossings* (2006). This report continues to be the industry standard in providing engineering guidance on the recommendation and selection of crosswalk enhancements based on roadway variables including auto volume, pedestrian volume, prevailing speeds, number of travel lanes, among other variables. Crosswalk+ is a treatment identification tool that follows a two-step process to determine a “match” for the study location characteristics. The first step is to determine if the pedestrian and vehicle volumes meet the signal warrant requirements to install a pedestrian signal. If this warrant is met, the tool will recommend a signal. If the warrant is not met, the tool recommends one or more less “intense” treatments, as described below.

A calculation of Pedestrian Level of Service forms the basis for the Treatment Identification Tool. Pedestrian Level of Service is the average delay experienced by pedestrians as they are waiting to cross the street. The Treatment Identification Tool calculates the average crossing time based on curb-to-curb width and gaps in traffic.

Expected motorist compliance is another key variable for treatment identification. Compliance is based on field observations and engineering judgment. It is meant to reflect typical motorist responses to pedestrians attempting to cross the street. If drivers are likely to stop for a pedestrian, the compliance is rated “high.” If drivers rarely stop for pedestrians, compliance is “low.” The tool sets the compliance rate to low for all locations where the speed limit is greater than 30 MPH.

The treatment matrix, which is embedded within the Tool, assigns treatment by level of enhancement needed (with the most significant enhancement required with the worst LOS and compliance rates), as described below.

Level 1 Treatments:

- High Visibility Crosswalk Markings, Advance Yield Lines, Advance Signs

Level 2 Treatments:

- Curb Extensions, Bus Bulb, Reduced Curb Radii, Staggered Pedestrian Refuge

Level 3 Treatments:

- In-pavement Flashers, Overhead Flashing Beacons (two-lane roads)
- Rectangular Rapid Flashing Beacon (RRFBs, for multi-lane roads)

Level 4 Treatments:

- Pedestrian Hybrid Beacon (PHB or HAWK), RRFB, or Direct Pedestrians to Nearest Safe Crossing

Treatments are selected within each level based on the characteristics of the location (presence of bicycle lanes, transit, etc.). For higher levels of treatments, combinations of treatments across levels (such as a PHB with curb extensions) may be appropriate. These combinations should be determined based on site feasibility and engineering judgment.

Analysis

The high auto volumes and long crossing distance combined with the high peak hour pedestrian demand (approximately one pedestrian every two minutes at 24th Street and one pedestrian each minute at 49th Street) indicate that additional controls are needed at both locations to improve pedestrian safety. At both locations, HCM 2010 pedestrian level of service (LOS) is F, and a pedestrian hybrid beacon (or "HAWK") is warranted. Signalization of the intersection is not warranted based on auto speeds and volumes.

24th and 49th Streets can be seen as two prototypical intersections on the corridor though pedestrian volumes at these locations may be among the highest on the corridor given the active land uses on both sides of Telegraph Avenue. Regardless of pedestrian volumes, auto speeds, volumes, and number of lanes of travel on the whole corridor are generally high enough to warrant Level 4 treatments at each of the unsignalized crosswalks. With comparable auto volumes to those at 24th and 49th, crosswalks where more than 20 pedestrians are present in the peak hour would meet the warrant for the Pedestrian Hybrid Beacon. Where pedestrian volumes are less than 20, consideration for not marking the crosswalk could be given if adjacent land uses are not expected to generate additional pedestrian demand based on latent and/or future demand. Another consideration at unsignalized crosswalks, could be a pedestrian refuge, which would allow pedestrian to cross the street in two stages. This would be accompanied by high-visibility crosswalk striping.

Appendix C provides additional details about the Xwalk+ tool and data used in this analysis.

Street Trees

As part of CD+A's fieldwork, landscape architects and other staff performed a survey of Telegraph Avenue's street trees, from 20th to 57th Streets. Species, size and health were cataloged, grading the latter on a simple binary scale of good or struggling. A GIS-based 2006 urban forest inventory was used as a baseline and updated as part of this effort. Figure 11A indicates tree size and species, while Figure11B indicates size and condition. "New Street Tree" indicates trees that were planted since the 2006 survey.

Overall, street trees are present on a majority of blocks along the corridor. However, many street trees are either young, newly planted trees that are small and provide less benefit that mature trees, or they are in poor health. This is especially true in Lower Telegraph, below the I-580 overpass, where there are only a few pockets of trees that are large and healthy enough to have a significant beneficial impact on the streetscape.

Telegraph Ave currently has 235 live street trees between 20th and 57th Streets. Roughly 79 percent of these street trees are in good condition, while 17 percent are either struggling or snapped off. Another 4 percent of existing tree wells are empty. A majority of corridor trees are either newly planted or small in size. On a block-by-block basis, coverage is spotty, with some blocks lush and green, and others devoid of trees entirely. The Temescal District has consistently good tree coverage, with more healthy trees that exist between 40th Street and I-580. Likewise, the long block in Pill Hill along Alta Bates Summit Medical Center has large healthy streets, while to the south there are blocks with just a few small or unhealthy trees that do little to improve the streetscape through shade or visual relief. North and south of Grand, between 22nd and 23rd Streets is largely devoid of trees, as is Telegraph from I-580 to 38th Street.

From Highway 24 south to MacArthur Boulevard, there is a consistent palette of predominantly London Plane and Chinese Pistache trees, with some American Sweetgum on the northern and southern ends of this section. Below I-580, there is greater variety though London Plane and Chinese Pistache remain the most common species. Together, these two varieties account for nearly 60 percent of all street trees on the Telegraph corridor. The majority of London Plane trees are larger and healthier than other varieties, though this may be a result of these being the oldest trees on the corridor.

The greater variety in Lower Telegraph is a result of more recent tree planting. From 20th Street to MacArthur Boulevard, the west side of Telegraph is planted with new street trees. Varieties include Crape Myrtle, Gingko, Red Oak, Red Horse Chestnut, and Maple.

Trees snapped by vandals are a small problem on Telegraph but one that has long-term consequences for the streetscape. Filling in the tree wells where there are few street trees now, planting new street trees in gaps along the corridor, and considering ways to introduce temporary street trees and temporary or permanent flowering plants and grasses in tree wells and planters will help improve the quality of the streetscape along the corridor. These ideas will be further explored as part of Task 2.5 streetscape and urban design concept development.