Los Angeles County
Metropolitan Transportation Authority

Los Angeles County Bus Rapid Transit and Street Design Improvement Study

Final Report

December 2013

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Metro

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EXECUTIVE SUMMARY

Los Angeles County benefits from the largest Bus Rapid Transit (BRT) network in the world, with a mix of arterial, fixed-guideway and freeway-based BRT lines. The Los Angeles County Metropolitan Transportation Authority (Metro) is both the largest public transportation agency in Los Angeles County as well as manager of County revenues dedicated to public transportation. Metro conducted the Los Angeles County Bus Rapid Transit (BRT) and Street Design Improvement Study to examine the potential for a Countywide BRT system that includes dedicated peak period bus lanes. Bus lanes, whether arterial, at-grade, or grade-separated, are one of the most critical elements of a BRT system. The implementation of bus lanes will significantly improve travel times and schedule reliability.

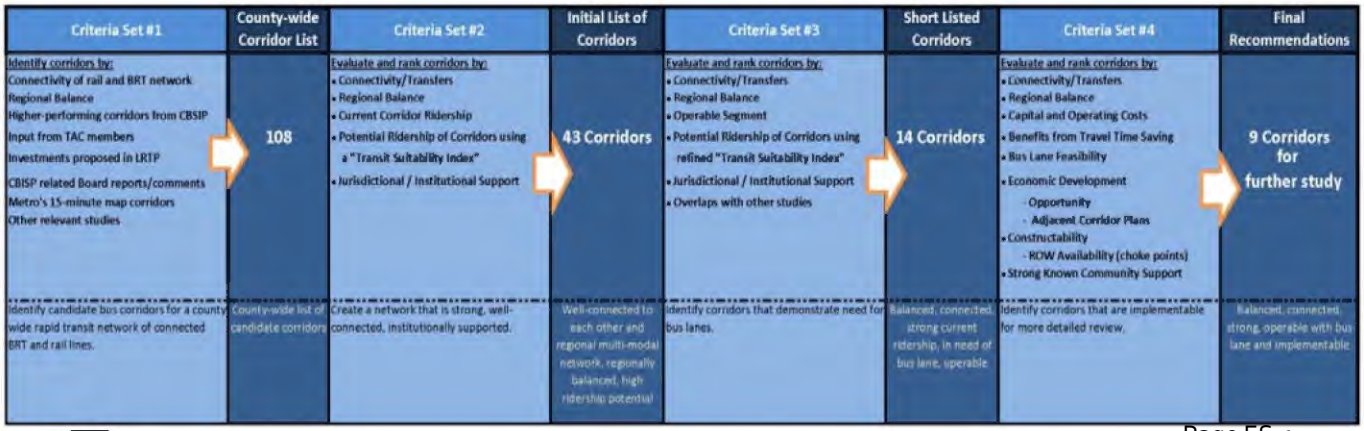
The study was conducted in collaboration with a special project advisory committee consisting of the City of Los Angeles Department of Transportation (LADOT), the Los Angeles County Department of Public Works (LACDPW), the Bus Riders Union, Metro Operations, some select transit agencies, and a number of other key stakeholders

Study Purpose

The purpose of the Los Angeles County Bus Rapid Transit (BRT) and Street Design Improvement Study was to identify, analyze and develop recommendations for an effective Countywide BRT system that includes dedicated peak hour bus lanes along with a number of other general bus speed improvements. The study was also to identify and recommend feasible and cost-effective techniques to improve the quality of street life at or near the bus stops along the recommended BRT corridors. Metro has already begun to address both goals in a variety of ways with the implementation of the Metro Rapid Program as well as the Metro Orange and Silver Line services and their related improvements.

The Los Angeles County BRT and Street Design Improvement Study's overall approach was designed to advance Metro's goal of a Countywide BRT system; one that leverages the success of the Metro Rapid program as well as the Metro Orange and Silver Lines, thereby creating a more seamless, intermodal connectivity for a greater number of the County's residents and visitors. Using evaluation and implementation criteria established as part of the study, a multistep approach was taken in evaluating and identifying promising BRT corridors. Figure 1 below illustrates the various screening stages of the study along with the defined criteria developed for each. This approach and process is discussed in more detail in Chapter 2 of this report.

Figure 1: LACBRT Candidate Corridor Screening Process



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Screening Stages and Results

The study began by examining all potential candidate corridors Countywide based upon their potential for enhancing regional connectivity, improving public transportation access, attracting additional ridership, and improving service efficiencies. An initial list of 108 corridors was identified as potentially promising candidates to be included in the BRT network. The initial list of 108 corridors included lines operated by Metro and some of the larger municipal transit operators.

Other factors guiding the identification of the initial 108 corridors included: other recent and/or current transit reports/studies; transit corridors with headways of 15 minutes or better; recommendations from the special project technical advisory committee; corridors with connections to the existing transportation system; corridors with the potential to improve regional connectivity; regional balance; corridors with the potential to improve inter-County connectivity with neighboring counties; and, industry best practices. Table 1 below lists the 108 initial candidate corridors identified as potential BRT corridors.

Table 1. Initial Countywide List of 108 Corridors

Wilshire Blvd (west)	Wilshire Blvd (central)	3rd St	Santa Monica Blvd	Venice Blvd
Florence Ave	Sunset Blvd	Vernon Ave	Hollywood	West Olympic
Whittier Blvd	Manchester-Firestone	Pico Blvd	Slauson	Ventura Blvd
Fairfax Ave	6th St	Colorado (Pasadena)	Sherman Way	Garvey
Beverly	Huntington-Las Tunas	Roscoe	Compton	Gage Ave
Valley Blvd.	Cesar Chavez Ave	Vanowen Way	East Olympic Blvd	Century Blvd
1st St	Reseda	Nordhoff	Rapid Blue 7 Corridor	Rapid Blue 10 (via I-10)
Artesia Blvd	Del Amo Blvd	Willow Ave	Cherry Ave	Cerritos Ave
Vermont Ave	Western Ave (north)	Western Ave (south)	Van Nuys Blvd	Hawthorne Blvd
San Fernando/ Lankershim	Crenshaw North	Long Beach Blvd	Soto St	Broadway
Atlantic - Fair Oaks	Avalon Blvd	Normandie Ave	La Brea Blvd	Central
Sepulveda (S.F. Valley)	Sepulveda (Culver City)	Sepulveda (South Bay)	North Figueroa	South Figueroa
Alvarado-Hoover	Sepulveda Pass (Westside)	Lincoln	Silver Line (Downtown core segment)	Lakewood Blvd
Norwalk/Hawaiian Gardens	Glendale Blvd/San Fernando Rd.	23rd St/West Adams Blvd.	Ocean Blvd (Long Beach)	8th St
West Washington	Virgil/7th St	Huntington Dr.	East Washington Blvd	Norwalk Connector (new)
North Hollywood-Pasadena (new)	Hollywood-Burbank BRT (new)	I-405 Corridor (Sepulveda Pass)	Santa Anita Ave	Orange Line East/Burbank
Montebello Blvd.	San Gabriel/ Montebello	Enhanced LA downtown circulator	I-10 Silver Streak (east)	Huntington Drive East
SR-101	South Pasadena-Harbor Corridor (new)	Metro Blue Line to CSU Long Beach	Azusa-Ontario Airport BRT (new)	South Bay-Harbor BRT
Harbor Subdivision	I-405 Corridor North	North Hollywood-Sylmar BRT (new)	Glendale–Downtown LA Corridor (SR-2)	I-605 North-South Corridor (new)
West Valley -West LA Direct	Long Beach to Whittier Direct	West Santa Ana Branch BRT	Orangeline North Palmdale BRT (new)	Rosemead Blvd
Imperial Hwy.	South I-405 corridor	Burbank via Glendale to Hollywood (new)	Azusa Ave.	South Atlantic Ave.
Westwood Blvd/ Overland Ave	Pacific Coast Hwy./South Bay	7th St. (Long Beach)		

Several corridors or segments of corridors had great potential for BRT development, but were immediately eliminated for further study to avoid redundancies with other studies or development projects already underway. For example, Wilshire Boulevard (Wilshire BRT Project), the northern segment of Atlantic Boulevard (I-710 North Study), the West Santa Ana Branch of the Harbor Subdivision (West Santa Ana Transit Corridor), Sepulveda Boulevard north of Los Angeles International Airport (Sepulveda Pass Corridor), and Van Nuys Boulevard (East San Fernando Valley Transit Corridor), were excluded from this study for this reason.

Upon further analysis of the initial 108 corridors, 43 were selected for the next level of evaluation. Additional criteria were used to guide the selection of these 43 transit corridors in order to identify the top most promising corridors for an effective Countywide BRT system. These criteria included:

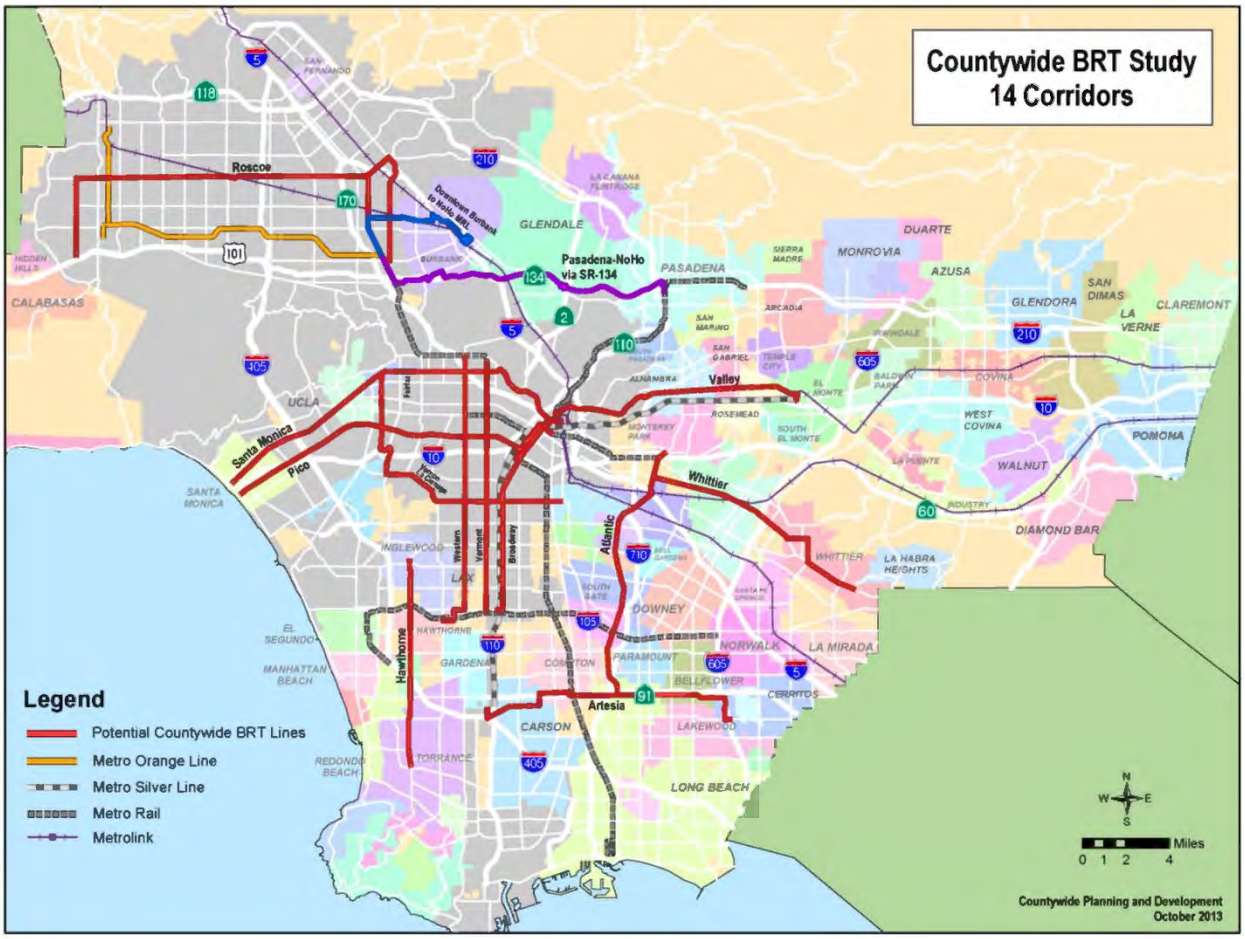
- Ridership potential/transit suitability
- Regional connectivity/access to public transportation options
- Adjacent corridor plans

The 43 corridors were then ranked based on a combined standardized score in each of the above areas. The results for the 43 corridors were presented to the special project Technical Advisory Committee (TAC) and other stakeholders for review. Based on input from the TAC, 14 corridors were selected to be advanced to the next level of detailed analysis and field reviews. In order to ensure that the potential candidate corridors and recommendations represented a balanced, Countywide BRT system that was not confined to a few communities, the 14 corridors consisted of two to three corridors from each sub-region of the County. The 14 corridors recommended for further evaluation and field reviews include:

- Artesia (Gateway Cities/South Bay)
- Atlantic (Gateway Cities)
- Broadway (Westside/Central)
- Burbank-North Hollywood (San Fernando Valley)
- Hawthorne (South Bay)
- La Cienega-Vernon (Westside/Central)
- Pico (Westside/Central)
- North Hollywood-Pasadena (San Fernando/San Gabriel Valleys)
- Roscoe (San Fernando Valley)
- Santa Monica (Westside/Central)
- Valley (San Gabriel Valley)
- Vermont (Westside/Central)
- Western (Westside/Central)
- Whittier (Gateway Cities)

A map of the 14 corridors is provided on the following page in Figure 2.

Figure 2: Map of 14 Countywide BRT Candidate Corridors



Field Reviews

The purpose of the corridor field reviews was to evaluate the most effective ways to implement peak period bus lanes and/or other bus speed improvements where buses experience delay. As a result of the field reviews, a set of recommendations was developed for each of the 14 corridors that included a variety of improvements designed to improve service to BRT standards, as well as recommendations for bus lanes, queue jumps, repaving where needed, implementation of other key BRT attributes such as limited stops, parking restructuring and installation of transit signal priority (TSP) or optimization of the TSP system where it already exists. Enhancements of the streetscape as well as each corridor's economic development potential were also considerations evaluated during the field reviews. The recommended streetscape improvements are included in Chapter 3. The analysis of each corridor's economic development potential can be found in Appendix B.

Cost and Benefit Analysis

In order to prioritize and rank the remaining 14 corridors, a cost and benefit analysis was conducted. The cost and benefit analysis compared the capital costs, operating costs, travel time savings and

projected increase in ridership and revenue for each of the 14 corridors. Details of this analysis and the specific results are included in Chapter 4.

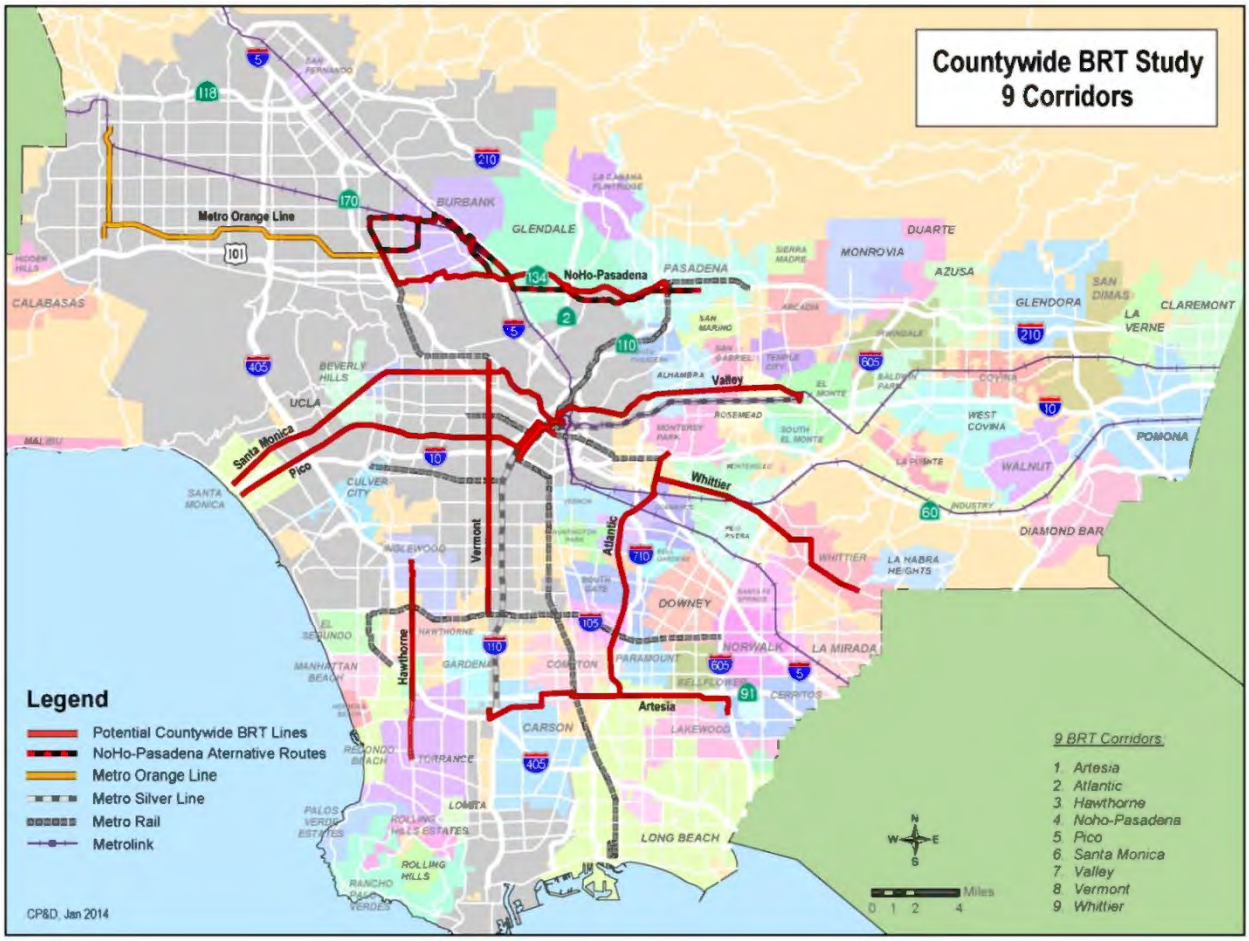
The capital improvements proposed for each corridor covered a range of costs including street repaving where needed, re-striping and signage for bus lanes, design and construction of new TSP or enhancements to the existing TSP system and branded stations/shelters. The net operating costs and/or savings were derived from the projected travel time savings and increased revenues expected from increased ridership as a result of implementing the proposed BRT service and capital improvements. Other elements examined but not included in the cost and benefit analysis included streetscape improvements and all-door boarding as these two elements are not immediately needed to implement BRT.

Upon completion of the cost and benefit analysis, a final list of nine regional BRT candidate corridors were identified and recommended for a more detailed corridor level analysis and environmental review. These nine BRT candidate corridors include:

- Vermont
- Hawthorne
- North Hollywood–Pasadena
- Atlantic
- Whittier
- Valley
- Artesia
- Santa Monica
- Pico

The Map in Figure 3 on the following page illustrates the final nine corridors recommended for additional study and potential development.

Figure 3: Map of Final 9 Countywide BRT Candidate Corridors



Next Steps

Further steps undertaken for any of the recommended corridors should include a more detailed corridor level analysis and/or environmental review, detailed planning and conceptual design work, public outreach, and further work with the affected jurisdictions along the individual corridors. The environmental reviews will identify and evaluate any significant or potentially significant environmental impacts associated with the implementation of bus lanes and address appropriate and feasible mitigation measures and alternatives that would reduce or eliminate those impacts. This more detailed work is needed should Metro decide later to seek discretionary grant funds to implement any of the proposed BRT corridors.

It is also recommended that the detailed corridor studies be developed in several phases beginning with the Vermont (Westside/Central) and the North Hollywood to Pasadena (San Fernando/San Gabriel Valleys) corridors. Vermont is the second (behind Wilshire Boulevard) most important bus transit corridor in the County with almost 50,000 weekday boardings. It also ranks at the top of this study for having the highest potential 20-year net benefits. The North Hollywood to Pasadena corridor is a new potential BRT corridor that has been identified in several studies as being a key regional connection

that is currently missing within the existing transit system. This corridor also has strong support from the affected cities of Pasadena, Glendale, Burbank, and the Burbank Bob Hope Airport.

Once these first two corridor studies are complete, the next group of corridors can begin their corridor level analysis/environmental review, followed by two more phases of corridor studies. It is recommended that the second phase of studies include the Hawthorne (South Bay service area), Valley (San Gabriel Valley service area), and Atlantic (Gateway service area) corridors. This would allow for at least one corridor from each service area to be completed.

The third phase of corridor studies would include the Artesia (Gateway service area) and the Whittier (Gateway service area) corridors. These BRT corridors are proposed to be operated by Long Beach Transit and Montebello bus lines, respectively. The last phase of corridor studies would include the Santa Monica (Westside/Central service area) and the Pico (Westside/Central service area) corridors. These two corridors were deemed worthy of further study as they both rank high for producing significant 20-year net benefits with the implementation of peak period bus lanes and other improvements.

Although the above phasing of the corridor studies is recommended, the actual phasing of the studies will be dependent upon whether or not Metro chooses to conduct the additional corridor studies and implement any new BRT corridors.

INTRODUCTION AND STUDY BACKGROUND

Los Angeles County already benefits from the largest Bus Rapid Transit (BRT) network in the world, with a mix of arterial, fixed-guideway and freeway-based BRT lines, which are operated by four different agencies in the County. The Los Angeles County Metropolitan Transportation Authority (Metro) is both the largest public transportation agency in Los Angeles County as well as manager of County revenues dedicated to public transportation. Metro conducted the Los Angeles County Bus Rapid Transit (BRT) and Street Design Improvement Study to examine the potential for a Countywide BRT system that includes dedicated peak period bus lanes. These efforts are similar to efforts currently being done at many other transit agencies, including Omnitrans in San Bernardino County and the Orange County Transportation Authority (OCTA). Antelope Valley Transit Authority (AVTA) is also looking at the feasibility of implementing BRT in their service area. Bus lanes, whether arterial, at-grade, or grade-separated, are one of the most critical elements of a BRT system. The implementation of bus lanes will significantly improve travel times and schedule reliability and help make transit more competitive with the auto.

Study Purpose and Need

The purpose of the Los Angeles County BRT and Street Design Improvement Study was to identify, analyze and develop recommendations for an effective Countywide BRT system that includes dedicated peak hour bus lanes along with other general bus speed improvements. The study was also to identify and recommend feasible and cost-effective techniques to improve the quality of street life at or near bus stops along the recommended BRT corridors. Metro has already begun to address both goals in a variety of ways, including the Metro Rapid program as well as the Metro Orange and Silver Line services and their related improvements. These are briefly discussed in the next several paragraphs.

The Metro Rapid arterial BRT program, which first began with two demonstration lines in June 2000, is now a 20-line network extending nearly 328 miles throughout the County. In addition, three other municipal operators, Culver City Bus Lines, Santa Monica Big Blue Bus, and Torrance Transit, also operate a combined four lines whose service characteristics emulate the Metro Rapid system and add another 50 miles of Rapid service to the system.

The Metro Orange Line in the San Fernando Valley is one of the most successful single BRT lines in the country, with approximately 30,000 weekday passengers. The Metro Orange Line BRT is an eighteen-mile bus rapid transit system that operates along a dedicated right-of-way from North Hollywood in the east to Warner Center and Chatsworth in the west (via separate branches). The line traverses the San Fernando Valley east to west and connects multiple neighborhoods and job centers within the City of Los Angeles. In addition to the rapid transit service provided, the corridor also includes extensive landscaping and a bicycle path running along a significant portion of the corridor.

Serving the San Gabriel Valley, the Los Angeles Central Business District (LACBD), and the South Bay area is Metro's Silver Line. The Metro Silver Line is a freeway-based BRT service branded in a similar fashion as the Orange Line. The Metro Silver Line operates seven days a week via Express Lanes on the I-10 and I-110 freeways. It has more than 12,000 weekday boardings, uses high-capacity, stylized vehicles and operates frequent service every 5-10 minutes during weekday rush hours. In addition, through a cooperative agreement between Metro and Foothill Transit called "Silver2Silver," commuters in the San Gabriel Valley and the LACBD enjoy even more frequent and convenient service as they are able to ride either Metro's Silver Line or Foothill Transit's Silver Streak using each other's fare media between Downtown Los Angeles and the El Monte Bus Station. The Silver Streak is a freeway express service operated between Montclair and Downtown Los Angeles by Foothill Transit via the 1-10 freeway.

Overall Approach

The Los Angeles County BRT and Street Design Improvement Study developed and followed a multistep methodology for evaluating promising BRT corridors for the feasibility of peak period bus lanes and/or transit priority treatments to improve travel times and schedule reliability and to encourage new riders onto public transportation. An initial 108 corridors were identified as potentially promising candidates to be included in the BRT network, based on their potential for enhancing regional connectivity, improving public transportation access, attracting additional ridership and enhancing service efficiencies. This approach and process is discussed in the next chapter.

In addition to Countywide BRT system recommendations for dedicated peak period bus lanes and other general bus speed improvements, the study also examined related cost-effective street design improvements. The study specifically examined investments that will not only improve transit efficiencies but also enhance pedestrian and bicycle safety and help encourage economic development. The streetscape improvements and recommendations are discussed in Chapter 3 of this report.

The Los Angeles County BRT and Street Design Improvement Study's overall approach was designed to further advance Metro's goal of a Countywide BRT system, one that leverages the success of the Metro Rapid program as well as the Metro Orange and Silver Lines, thereby creating a more seamless, intermodal connectivity for a greater number of the County's residents and visitors. In addition, opportunities for transit-oriented development (TOD) were explored and any further studies of the corridors recommended herein should include examination of the appropriate TOD strategies for each, further catalyzing public transportation's growth in the County as well as helping to build a more sustainable regional economy.

There were several corridors or segments of corridors that have great potential for BRT development but were immediately eliminated from further study to avoid redundancies with other studies or development projects already underway. For example, Wilshire Boulevard (Wilshire BRT Project), the northern segment of Atlantic Boulevard (I-710 North Study), the West Santa Ana Branch of the Harbor Subdivision (West Santa Ana Transit Corridor), Sepulveda Boulevard north of Los Angeles International

Airport (Sepulveda Pass Corridor), and Van Nuys Boulevard (East San Fernando Valley Transit Corridor) were excluded from this study for this reason.

Factors such as current and future development densities, connections with major regional transportation facilities as well as current bus travel times, traffic congestion, arterial speeds and potential for integrating such improvements with County economic development goals, and streetscape modernization and bicycle strategic plans were also considered as part of this study along with any operational issues related to transit service. Importantly, a regional service balance was considered throughout the study. Because the study's approach is Countywide, it is important to provide recommendations that are not confined to a few communities or service subregions.

This study examined the full range of BRT related investments for an improved long-term multimodal network development, including BRT corridors with grade-separated lanes (e.g., Orange Line, Silver Line), BRT corridors with dedicated arterial bus lanes (e.g., Wilshire BRT project underway) and BRT services in mixed traffic with no bus lanes (e.g., Metro Rapid). The recommendations contained herein focus mainly on BRT corridors with dedicated arterial bus lanes along with a number of other general bus speed improvements. This is primarily due to the lack of available infrastructure that could support grade-separated BRT service.

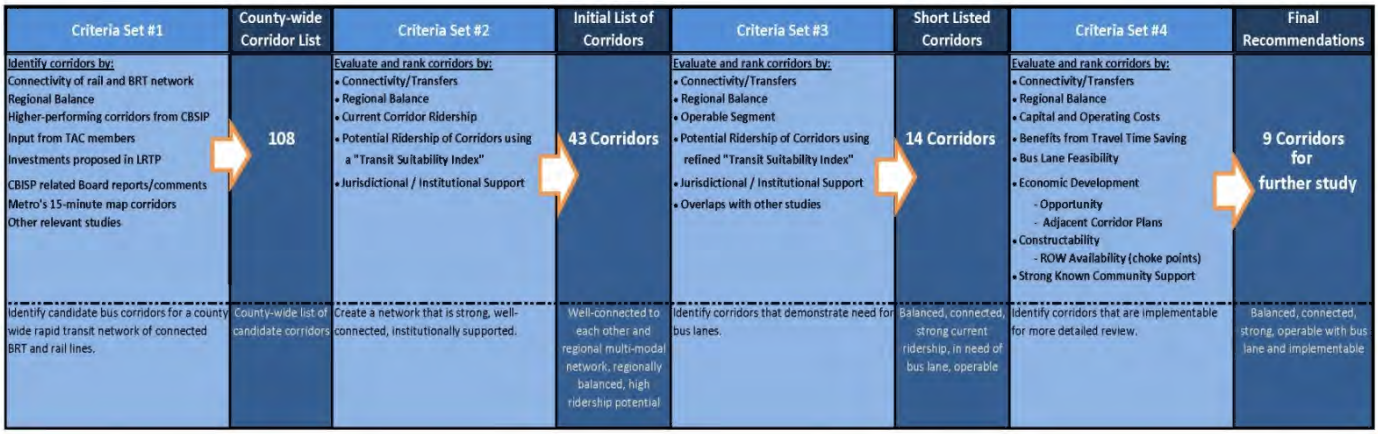
The Los Angeles County BRT and Street Design Improvement Study briefly considered the potential of other operational innovations such as all-door boarding strategies. While these are discussed in sections that follow herein, any such strategies would necessarily involve policy issues such as fare structure changes, which should be considered as part of a larger study of both existing and future fare policy changes. This study also includes an evaluation of the final corridors for economic development, which is discussed in Appendix B.

The next chapter describes the process and methodology taken in identifying and screening the candidate corridors. This methodology employs the latest best practices and research recommendations in the industry. Unit costs and assumptions for capital improvements were derived from those in current or recent projects in the region when available, or otherwise developed from national data and reports.

INITIAL SCREENING STAGES AND RESULTS

The Los Angeles County BRT and Street Design Improvement Study sought to develop recommendations for an effective Countywide BRT system that includes dedicated peak hour bus lanes and/or other general bus speed improvements using evaluation and implementation criteria established as part of the study. The study was also to identify feasible and cost-effective techniques to improve the quality of street life at bus stops along the identified BRT corridors. Figure 1 illustrates the various screening stages of the study along with the defined criteria developed for each.

Figure 1: LACBRT Candidate Corridor Screening Process



The study was conducted in collaboration with a special project advisory committee consisting of the City of Los Angeles Department of Transportation (LADOT), the Los Angeles County Department of Public Works (LACDPW), the Bus Riders Union, Metro Operations, some select transit agencies, and a number of other key stakeholders (see Appendix D).

Initial Candidate Corridor Screening (108 Corridors)

The study began by examining all potential candidate corridors Countywide, based on their potential for enhancing regional connectivity, increasing access to public transportation, attracting additional ridership and improving service efficiency throughout the region. Eventually, an initial list of 108 candidate corridors was identified to ensure a Countywide study that included the County's larger municipal operators. The following guided the identification of these 108 corridors:

- Transit corridors with headways of 15 minutes or better
- Recommendations from an earlier Countywide Bus Speed Improvement Study (CBSIP)
- Recommendations from the special project technical advisory committee
- Other recent and/or current transit reports/studies (San Fernando Valley BRT studies, Orange Line Development Authority Studies, Gold Line Bus/Rail Interface Study and Metro Green Line extension to LAX)

- Several Long Range Transportation Plans (Southern California Association of Governments, San Bernardino Associated Governments, and Metro)

Additional considerations included:

- Connections to the existing and planned near-term BRT/rail network (including Measure R projects)
- Corridors with the potential to improve inter-County connectivity with neighboring counties
- Corridors with the potential to improve Countywide/regional connectivity
- Corridors that are transit deficient, which would benefit from enhanced or new connectivity/access
- Regional balance
- Socioeconomic equity and environmental justice considerations
- Potential for economic development and mobility improvements
- Political and other stakeholder support

These initial 108 candidate corridors were also developed based on the results of the literature review and examination of industry best practices on similar projects. Industry documents include Transit Cooperative Research Program (TCRP) Report 118, TCRP Report 117, APTA Recommended Practices for BRT development, and project experience in cities like New York, Phoenix, Washington, DC, Seattle, and Chicago. A complete annotated bibliography of the literature review is contained in Appendix A of this report and includes the following:

- Bus travel speeds by route segment/segments experiencing low speeds and delays
- Load factor – Route level ridership divided by the number of trips to arrive at an average load
- "Ridership penalty score" - average load multiplied by the number of buses at a given "hot spot" generated for that location
- Intersections along the route that are experiencing high peak period delay (LOS D, E, or F in either peak period)
- Existing ridership
- On-time performance of transit route
- Potential ridership based on traditional socioeconomic factors (e.g., auto ownership, household income, population and employment densities, etc.)
- Connectivity among activity centers/communities to the larger multimodal transportation network as well as to other proposed BRT routes to form an operable network

A complete annotated list of the 108 initial candidate corridors is contained in Appendix C of this report. They are summarized in Table 1 on the following page.

Table 1. Initial Countywide List of 108 Corridors

Wilshire Blvd (west)	Wilshire Blvd (central)	3rd St	Santa Monica Blvd	Venice Blvd
Florence Ave	Sunset Blvd	Vernon Ave	Hollywood	West Olympic
Whittier Blvd	Manchester-Firestone	Pico Blvd	Slauson	Ventura Blvd
Fairfax Ave	6th St	Colorado (Pasadena)	Sherman Way	Garvey
Beverly	Huntington-Las Tunas	Roscoe	Compton	Gage Ave
Valley Blvd.	Cesar Chavez Ave	Vanowen Way	East Olympic Blvd	Century Blvd
1st St	Reseda	Nordhoff	Rapid Blue 7 Corridor	Rapid Blue 10 (via I-10)
Artesia Blvd	Del Amo Blvd	Willow Ave	Cherry Ave	Cerritos Ave
Vermont Ave	Western Ave (north)	Western Ave (south)	Van Nuys Blvd	Hawthorne Blvd
San Fernando/ Lankershim	Crenshaw North	Long Beach Blvd	Soto St	Broadway
Atlantic - Fair Oaks	Avalon Blvd	Normandie Ave	La Brea Blvd	Central
Sepulveda (S.F. Valley)	Sepulveda (Culver City)	Sepulveda (South Bay)	North Figueroa	South Figueroa
Alvarado-Hoover	Sepulveda Pass (Westside)	Lincoln	Silver Line (Downtown core segment)	Lakewood Blvd
Norwalk/Hawaiian Gardens	Glendale Blvd/San Fernando Rd.	23rd St/West Adams Blvd.	Ocean Blvd (Long Beach)	8th St
West Washington	Virgil/7th St	Huntington Dr.	East Washington Blvd	Norwalk Connector (new)
North Hollywood-Pasadena (new)	Hollywood-Burbank BRT (new)	I-405 Corridor (Sepulveda Pass)	Santa Anita Ave	Orange Line East/Burbank
Montebello Blvd.	San Gabriel/ Montebello	Enhanced LA downtown circulator	I-10 Silver Streak (east)	Huntington Drive East
SR-101	South Pasadena-Harbor Corridor (new)	Metro Blue Line to CSU Long Beach	Azusa-Ontario Airport BRT (new)	South Bay-Harbor BRT
Harbor Subdivision	I-405 Corridor North	North Hollywood-Sylmar BRT (new)	Glendale–Downtown LA Corridor (SR-2)	I-605 North-South Corridor (new)
West Valley -West LA Direct	Long Beach to Whittier Direct	West Santa Ana Branch BRT	Orangeline North Palmdale BRT (new)	Rosemead Blvd
Imperial Hwy.	South I-405 corridor	Burbank via Glendale to Hollywood (new)	Azusa Ave.	South Atlantic Ave.
Westwood Blvd/ Overland Ave	Pacific Coast Hwy./South Bay	7th St. (Long Beach)		

Refined List of Candidate Corridors (108 Screened to 43 Corridors)

Upon further analysis of the initial 108 corridors, 43 were selected for the next level of evaluation. Additional criteria were used to guide the selection of these 43 transit corridors in order to identify the top most promising corridors for an effective Countywide BRT system. These criteria included:

- Ridership potential/transit suitability
- Regional connectivity/access to public transportation options
- Adjacent corridor plans

Ridership potential/transit suitability

In order to determine a corridor's ridership potential, four socio-economic factors at the transportation analysis zone (TAZ) level were used. The use of this data allowed for the equal treatment between corridors with existing transit service and those corridors without. Each of these four socio-economic factors used were given equal weighting in the analysis to compile a "transit suitability index." These socio-economic indicators included:

- Population density
- Employment density
- Car ownership
- Household income

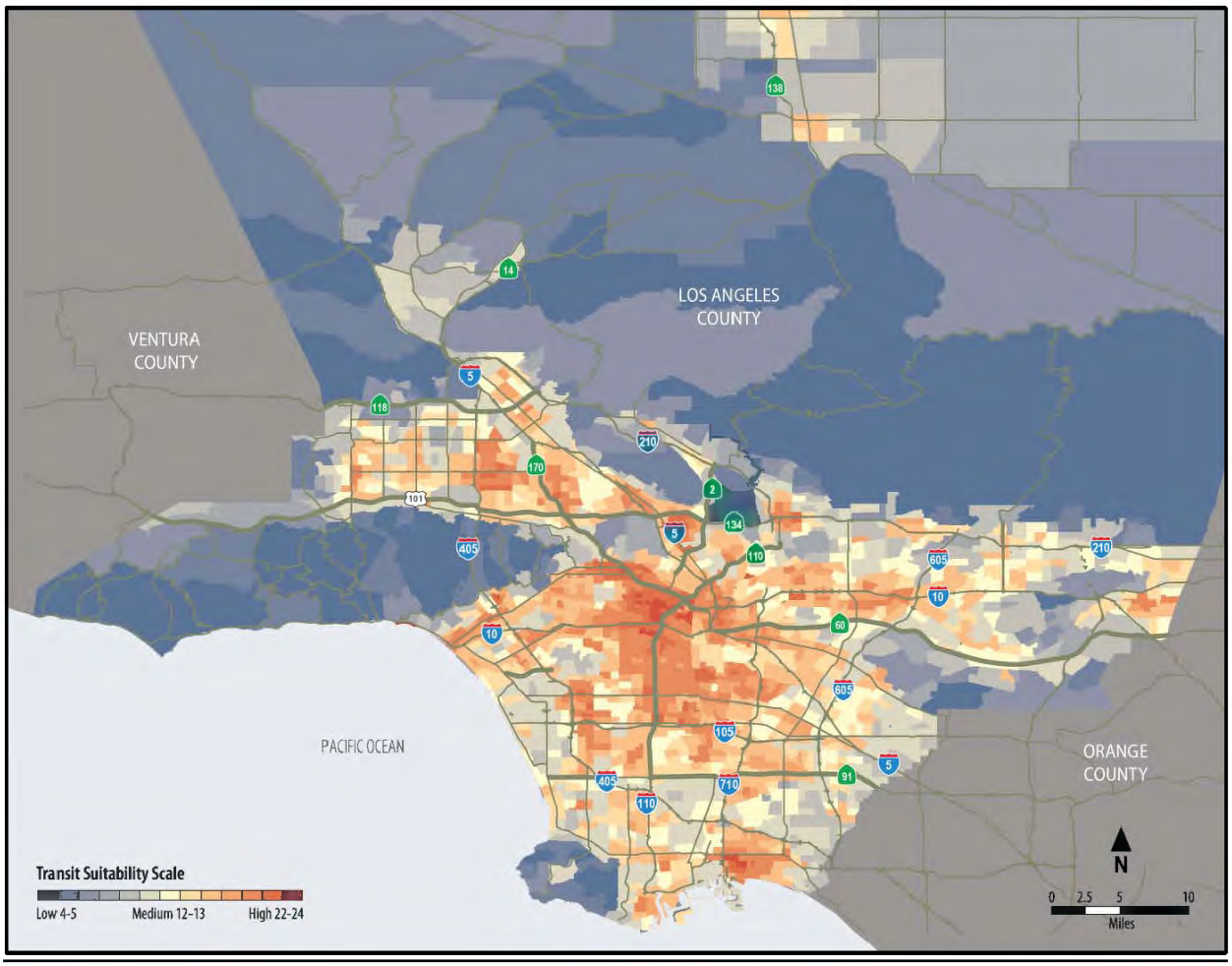
Population density, employment density, and household income data were sourced from the 2008 SCAG Regional Transportation Plan. Car ownership data were sourced from Metro's most recent TAZ data (2001). These four measures were then combined to create one "transit suitability" measure per TAZ. A scale of one to six was developed for each category. For the population and employment density factors, high values (densities) corresponded to high scores on the transit suitability scale, as high density tends to support transit ridership potential. For auto ownership and household income, low values corresponded to high scores on the scale, as transit ridership tends to be correlated with lower income and low auto ownership. The scales from each factor were then added to create a combined index with values ranging from four to 24, with lower scores indicating less transit suitability and higher scores indicating greater suitability. Areas with the highest transit suitability scores have high population density, high employment density, low household incomes, and low car ownership rates.

Figure 2: Transit Suitability Index Methodology

The transit suitability measure was then represented graphically on a "heat map" that was developed using ArcGIS, a mapping and data analysis software program. The transit suitability measure is represented on a color scale, from blue to red, with red representing high transit suitability. Each TAZ is colored according to its combined transit suitability measure. The resulting County map, shown in Figure 3 on the following page, depicts "hot spots" of transit suitability in the region. These "hot" areas

along existing transit lines and suggested potential corridors indicate transit corridors with the highest ridership potential.

Figure 3: Ridership Potential "Heat Map" Using Socioeconomic Data



Regional Connectivity/Access to Public Transportation

In selecting the refined list of potential candidate corridors, local and regional connectivity was also taken into account. Connectivity was important in ensuring regional connections to other transit modes such as rail, bus services, the Metro Orange and Rapid lines, and to transit demand generators such as major retail centers, airports, colleges, and job-rich areas, such as downtown and West Los Angeles.

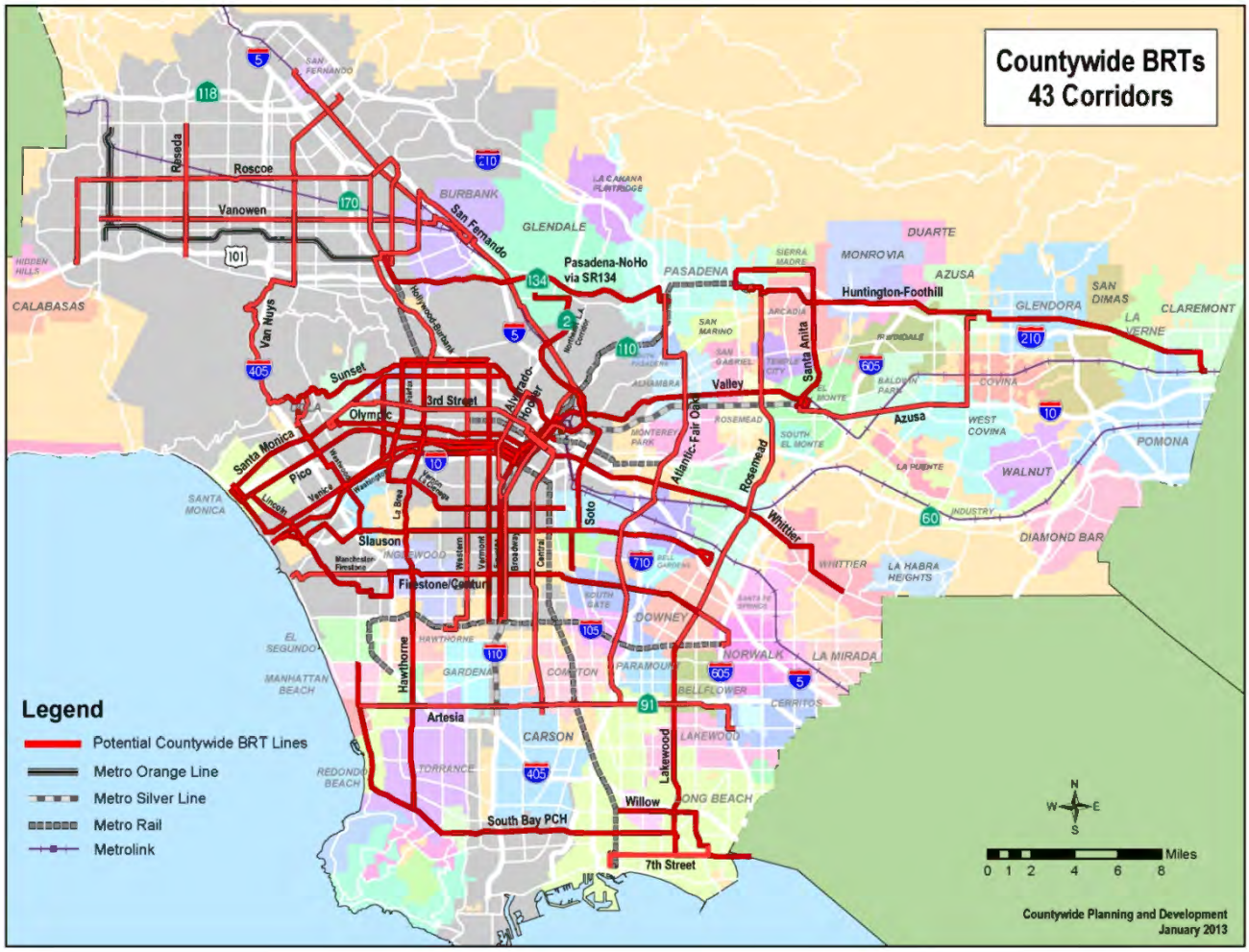
Adjacent Corridor Plans

Connectivity to other future bus and rail transit projects, such as to future Metro Rail/Rapid transit expansions, were also examined. A summary of the 43 potential candidate corridors is shown in Table 2, and are also depicted in the map on the same page (Figure 4).

Table 2: Refined List of 43 BRT Candidate Corridors

Broadway	Alvarado-Hoover	3rd St	Vermont
Pico Blvd.	Santa Monica	Western	Fairfax
Figueroa	Venice	7th St. (Long Beach)	Olympic
Sunset	Van Nuys	Soto	Vernon/La Cienega
Central	Valley	La Brea	Westwood
Whittier	Washington	Reseda	Manchester/Firestone
Hawthorne	Lincoln	Slauson	Roscoe
Atlantic/Fair Oaks	Northeast Los Angeles	Vanowen	Azusa
Firestone/Century	Artesia	Santa Anita	Hollywood-Burbank
Huntington Dr. East/Foothill Blvd.	North Hollywood to Pasadena	South Bay Pacific Coast Highway	San Fernando Rd./ Lankershim
Lakewood	Rosemead	Willow	

Figure 4: Map of Refined List of 43 BRT Candidate Corridors



Refined list of Candidate Corridors for Field Reviews (43 Screened to 14 Corridors)

The 43 corridors were then ranked based on how well they scored in the below criteria:

- Transportation network connectivity (based on how well each corridor connected to major transportation services and/or major activity centers)
- Ridership potential (based on more refined TAZ-based socioeconomic demographic factors from available regional data)
- Existing ridership (based on combined ridership of all Metro and municipal services serving the corridor)

Each of these refined criteria is discussed below.

Transportation Network Connectivity

A corridor received one point for each of the below variables it connected with (within a one-half mile radius):

- Rapid stop (Metro, Santa Monica's Big Blue Bus, Torrance Transit, and Culver City)
- Major transit hubs
- Rail station
- BRT busway station
- Future planned rail stations
- Airports (BUR, LAX, LB)

If more than one rail line connected at a station within the one-half mile radius, the corridor received one point for each of the rail lines. For example, the Wilshire/Vermont Station is a stop for both the Red and Purple Lines, equating to two points.

Connectivity points were summed by corridor to yield a raw score for each. Each corridor's raw score was normalized by corridor mile (i.e., the raw score was divided by the corridor length in miles). The sum of the normalized values were then standardized using a normal distribution (using the calculated mean and standard deviation of the data) to arrive at scores within a zero to one (0 to 1) range, the standardized score. This range captures the transportation connectivity of each corridor. The closer the score is to one, the more connection points the corridor in question offers potential passengers. Corridors with scores closer to zero offer fewer connection points to potential passengers. Corridors were then ranked by connectivity based on the standardized score.

Ridership Potential

The ridership potential of each corridor was also estimated based on socioeconomic data. The "ridership potential" variable was determined by spatially analyzing four socioeconomic demographic (SED) variables. These variables include: 1) population density; 2) employment density; 3) household income; and, 4) auto ownership. The latest socioeconomic demographic data were extracted from the

2012 SCAG Regional Transportation Plan/Sustainable Communities Strategy baseline model. SED data in this model are from 2010 (2012 data were not yet available at the time) and are disaggregated at the Transportation Analysis Zone (TAZ) level for the purpose of this analysis.

The first step of the ridership potential analysis was to create a 0.5 mile "buffer" across the centerline of each route, capturing a 0.25 mile "catchment area" on each side of the route. The buffer allows the analysis of ridership potential to focus on and characterize only the attributes of the immediate area around each corridor.

To analyze and compare the results of population density, employment density, household income, and auto ownership, data collected from buffer areas in each category was normalized using statistical average and standard deviation and assigned a corresponding value between zero and one (0 to 1). Values closer to one (1) correspond to data that are significantly above average for each category. Values closer to zero (0) correspond to data that are significantly below average for each category.

The normalized data were then summed to determine the overall strength of the categories along the buffer areas, based on a scale between 0 and 1. For example, lower household income in areas with values closer to one (1) would correspond with higher transit ridership. The results of these scores capture the relative ridership potential in each corridor, based on the SED characteristics in each corridor's buffer area.

Existing Ridership

The 43 corridors were then scored based on their existing ridership. Using route level average weekday ridership data, the total ridership for each corridor was determined by adding the total passenger load at the beginning of each corridor to the total boardings within the corridor for each direction of travel. Total boardings within the corridor comprised the sum of boardings at each bus stop from the beginning to the end of the corridor. The ridership for all the Metro and municipal routes serving each corridor were added to estimate the total corridor ridership.

The total ridership for each corridor was normalized by corridor length (i.e., divided by the length of the corridor). The sum of the normalized values was then again normalized further (using the calculated mean and standard deviation of the data) to arrive at scores within a similar zero to one (0 to 1) range, the standardized score. The corridors were ranked based on existing ridership using the standardized score.

Of the 43 corridors, three (Northeast Los Angeles, Hollywood to Burbank, and North Hollywood to Pasadena) did not have existing ridership data since they are completely new potential transit corridors. Therefore, a score for existing ridership could not be given to these three.

Corridor Combined Scoring and Ranking

The normalized scores for each of the three criteria, transportation network connectivity, potential ridership, and existing ridership, were then combined to arrive at a combined standardized score for

each of the corridors. Each criterion was weighted equally. The 43 corridors were then ranked based on their combined standardized score. Subsequently, the corridors were then arranged by service subregions of the County to ensure a balanced regional BRT system.

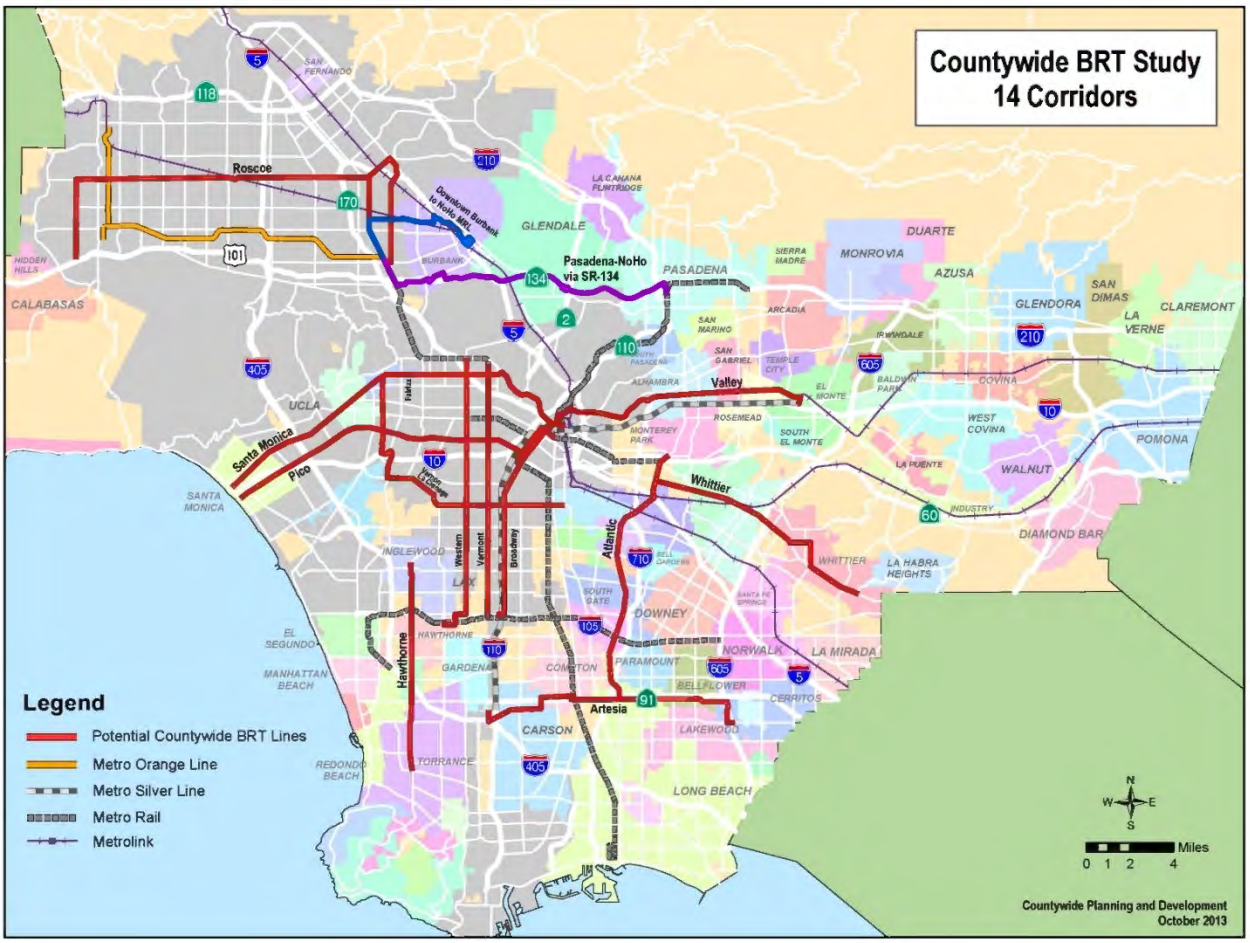
The results for the 43 corridors were presented to the special project Technical Advisory Committee (TAC) and other stakeholders for review. Based on input from the TAC, 14 corridors were selected to be advanced to the next level of detailed analysis and field reviews. In order to ensure that the potential candidate corridors and recommendations represented a balanced, Countywide BRT system that was not confined to a few communities, the 14 corridors consist of two to three corridors from each sub-region.

These 14 corridors recommended for further evaluation and field reviews include:

- Artesia (Gateway Cities/South Bay)
- Atlantic (Gateway Cities)
- Broadway (Westside/Central)
- Burbank – North Hollywood (San Fernando Valley)
- Hawthorne (South Bay)
- North Hollywood – Pasadena (San Gabriel/ San Fernando Valleys)
- Pico (Westside/Central)
- Roscoe (San Fernando Valley)
- Santa Monica (Westside/Central)
- Valley (San Gabriel Valley)
- Vermont (Westside/Central)
- Vernon/La Cienega (Westside/Central)
- Western (Westside/Central)
- Whittier (Gateway Cities)

These are depicted on the map on the following page (Figure 5).

Figure 5: Map of the 14 Candidate BRT Corridors for Field Review and Further Analysis



Field Reviews (14 Corridors)

Upon selection of the 14 corridors, field reviews were performed on each. The purpose of the corridor field reviews was to evaluate the most effective ways to implement peak period bus lanes and/or other bus speed improvements where buses experience delay. Potential bus speed improvements include a wide range of capital improvements, engineering improvements, and operational measures which enhance bus passenger travel times and bus schedule reliability. Specific improvements consist of new transit signal priority (TSP) implementation or existing TPS enhancements, queue jumps, restriping and signage for bus lanes, limited stop service, road surface repaving, optimized signal operations, and all-door boarding.

Additional field review considerations included verifying the number of traffic/parking lanes; confirming parking restrictions; looking at street widths/geometrics to evaluate whether a bus lane (either median or curb side) could feasibly be implemented within the existing street right-of-way (ROW); identifying exact areas of bus/traffic delays; identifying major activity centers such as employment, educational, shopping/retail, and social/recreational/tourism; and further refinements of the corridor alignment.

Streetscape enhancement opportunities were also evaluated; these observations and recommendations are described in Chapter 3. These enhancements include such things as street landscaping, enhanced sidewalks, and enhanced street furniture. Observations regarding potential for economic development and mobility improvements were also made, as illustrated in Table 3 below. These findings and other related analysis are discussed in greater detail in Appendix B.

Initial Corridor Recommendations

As a result of the field reviews, a set of recommendations was developed for each of the 14 corridors that included a variety of improvements designed to improve service to BRT standards, as well as recommendations for bus lanes, queue jumps, repaving where needed, implementation of other key BRT attributes such as limited stops, etc., parking restructuring and installation of transit signal priority (TSP) or optimization of the TSP system where it already exists. These recommendations are summarized in Table 4 on the following page.

The capital costs to implement the proposed improvements, the net operating costs and/or savings, and overall net benefits are described in Chapter 4.

Table 3. Potential Economic Development/Corridor Density

Corridor	Potential Economic Development	Corridor Density
Artesia	Low	Low
Atlantic	Low	Low
Broadway	High	High (north of Olympic)
Burbank – North Hollywood	Medium	Low
Hawthorne	Medium	Low
North Hollywood – Pasadena	Medium	High
Pico	High	High
Roscoe	Low	Low
Santa Monica	High	High
Valley	High	High
Vermont	High	High (north of King)
Vernon/La Cienega	Medium	High (north of Rodeo/La Cienega)
Western	Medium	High
Whittier	Medium	High (Atlantic to Rosemead)

Table 4. Initial Corridor Recommendations

Corridor	% Bus Lane Proposed	Proposed Improvements
Artesia	94%	Approximately 12.1 miles of peak period bus lanes; implement TSP; some selective street repaving; enhanced stations & streetscape improvements; restriping & signage; optional all-door boarding; implement new Rapid type service; consider some possible queue jump lanes
Atlantic	95%	Approximately 14.2 miles of peak period bus lanes; TSP enhancements; some selective street repaving; enhanced stations & streetscape improvements; optional all-door boarding
Broadway	0%	TSP enhancements; some selective street repaving; enhanced stations & streetscape improvements; optional all-door boarding
Burbank – North Hollywood	24%	Approximately 2 miles of peak period bus lanes; implement TSP; some selective street repaving; restriping & signage; enhanced stations & streetscape improvements; optional all-door boarding; implement new Metro Rapid type service
Hawthorne	91%	Approximately 8.48 miles of peak period bus lanes; TSP enhancements; restriping & signage; enhanced stations & streetscape improvements; optional all-door boarding
North Hollywood – Pasadena	10% (freeway options) to 48% (arterial option)	Approximately 2 to 9.1 miles of peak period bus lanes; implement TSP; some selective street repaving; restriping & signage; enhanced stations & streetscape improvements; optional all-door boarding; implement new Metro Rapid type service; look at freeway shoulder running bus lanes long term; possible queue jump lanes on freeway on/off ramps
Pico	73%	Approximately 12 miles of peak period bus lanes; TSP enhancements; some selective street repaving; some parking removal; restriping & signage; enhanced stations & streetscape improvements; optional all-door boarding
Roscoe	72%	Approximately 15.1 miles of peak period bus lanes; implement TSP; restriping & signage; enhanced stations & streetscape improvements; optional all-door boarding; implement new Metro Rapid type service
Santa Monica	52%	Approximately 9.7 miles of peak period bus lanes; TSP enhancements; some parking removal; restriping & signage; enhanced stations & streetscape improvements; optional all-door boarding
Valley	64%	Approximately 9.7 miles of peak period bus lanes; implement TSP; restriping & signage; enhanced stations & streetscape improvements; optional all-door boarding; implement new Metro Rapid type service
Vermont	78%	Approximately 9.1 miles of peak period bus lanes; TSP enhancements; some parking removal; restriping & signage; enhanced stations & streetscape improvements; optional all-door boarding
Vernon/La Cienega	0%	TSP enhancements; enhanced stations & streetscape improvements; optional all-door boarding
Western	0%	TSP enhancements; enhanced stations & streetscape improvements; optional all-door boarding
Whittier	55%	Approximately 7.1 miles of peak period bus lanes; implement TSP; restriping & signage; enhanced stations & streetscape improvements; optional all-door boarding; implement new Rapid type service

STREETSCAPE IMPROVEMENTS

The implementation of bus rapid transit (BRT) and peak period bus lanes provides the opportunity to improve both the aesthetics as well as the travel experience along the selected corridors. For this reason, this chapter presents recommendations for station area streetscape enhancements along each of the 14 potential bus rapid transit BRT corridors under the final phase of consideration as part of the Los Angeles County Bus Rapid Transit (BRT) and Street Design Improvement Study. Streetscape is defined as the visual elements of a street, including the road, adjoining buildings, street furniture, signage, trees and open spaces. In the case of this BRT study, the focus is on the streetscape surrounding the BRT stations and the design of the stations themselves.

The 14 corridors included in this chapter were selected as the most promising locations to introduce new BRT routes in the Metro service area in order to create an effective Countywide BRT system that includes dedicated bus lanes at peak periods. In March 2013, field visits were conducted along each of the 14 corridors. The purpose of these field reviews was to visually verify whether a bus lane could be implemented and to develop recommendations on the design for BRT along each of the corridors, including those for streetscape. The recommended streetscape-related BRT improvements fall into one of two categories:

- Median-aligned – BRT service with dedicated bus lanes in the center of the street with stations in the median.
- Curb-aligned – dedicated curbside bus lane with stations on the curb.

The streetscape discussion and recommendations included in this chapter are structured around these two BRT concepts.

The chapter begins with an overview of several relevant BRT station and streetscape case studies in the United States. The next section presents the existing conditions along each of the 14 corridors. This data was collected as part of the field reviews and the detailed results are summarized by corridor. The station and streetscape recommendations are then presented by the two BRT types (curbside or median bus lanes). These recommendations are derived from the best practices and include both station design and streetscape enhancements; these best practices are summarized in the final section of this chapter.

BRT Station and Streetscape Elements-Case Studies

Table 1 on the following page features examples of well-designed BRT systems in the United States, one of which is Metro's own Orange Line. These systems also relied upon the industry literature for best practices in BRT design and implementation. Exemplary station amenities and streetscape elements of each system are summarized as follows.

Table 1: Bus Rapid Transit Case Studies

BRT Service	Type	Station Amenities	Picture
Boston, Mass.- Silver Line, Washington Street Corridor	Curbside/Mixed	• Shelter • Seating • Information panels • Trash receptacles • Real-time information at stations • Bicycle Racks • Emergency call button	 Source: National BRT Institute
Eugene, Oregon – Emerald Express (EmX)	Median/ Mixed	• Median stations, left side boarding in both directions • Raised platforms for near-level boarding • Off-board fare collection • Shelters • Seating • Lighting • Schedule information • Native shrubs and trees • Station public artworks by local artists • Median greenway • System designed around some trees; city law mandates referendum on removal of any street trees over 50 years old	 Source: National BRT Institute
Las Vegas, Nevada – Metropolitan Area Express (MAX)	Curbside/Mixed	• Level platform boarding • Off-board ticketing • Sidewalk at rear of station • Aluminum paneled canopy shading • Customer information panel • Vending machines	 Source: FTA

Las Vegas, Nev. – Strip Downtown Express (SDX)	Median/ Curbside	• Level platform boarding • Off-board ticketing • Canopy shading • Communications • Customer information panel	 Source: ITDP, 2011
Cleveland, Ohio - HealthLine (Euclid)	Median/ Mixed	• Off-board fare collection • At-level boarding • Shelters • Emergency phone • Interactive kiosks • Raised platforms • Real time display • Station signage • Extensive streetscape improvements: public art, new lighting, trees, sidewalks, bike lanes, and fiber optic line	 Source: FTA, 2012
Los Angeles, Calif. Metro Orange Line	Dedicated busway	• Off-board fare collection • Bicycle racks/lockers • Covered seating • Telephones • Lighting • Security cameras • Real-time bus information • Alignment streetscaping component • Parallel-running bikeway and pedestrian path	 Source: SCAG
San Francisco, Calif. – Van Ness (Planned)	Median	Recommendations include: • Off-Board Ticketing • High-quality shelters • Extended bus bulb-outs • Lane markings, colored bus lanes • Buffers between bus and auto lane • Overhead signs • Pedestrian lighting • High visibility crosswalks, countdown signals, corner curb extensions • Planted trees at bus stops • Planting guidelines for curb/median BRT sections by buffer width	 Source: SFCTA, 2013

Streetscape Conditions of Existing Metro BRT Services

Metro operates three types of BRT services: fixed guideway (Metro Orange Line), arterial (Metro Rapid) and freeway based (Metro Silver Line). Because the Silver Line has elements of both the Metro Rapid program and the Metro Orange Line, only the streetscape elements of Metro Rapid and the Metro Orange Line are discussed here.

The Metro Rapid program, which began in June 2000, focused more attention on branding of the stations and vehicles than streetscape amenities. The branding program sought to establish Metro Rapid as distinct from other transit services, primarily in a red color palette. However, the program did not include streetscape amenities in the space buffering the stations, such as expanded sidewalks, enhanced pedestrian crossings, or street furniture.[1]

Amenities associated with Metro Rapid vary by line and stop. At the most, Metro Rapid stops feature some or all of the following amenities, as illustrated in Figure 1 below:

- Transit timetables/maps
- Advertisements
- Lighting
- Canopies
- Styled lean bars
- "Next Bus" displays

Figure 1: Metro Rapid 720 Stop at Wilshire and Western Boulevards.

Source/Photo Credit: Dan Reed[2]

[1]Transportation Management and Design Inc. n.d. MTA Metro Rapid Program Demonstration Report. Retrieved from: http://www.metro.net/projects_studies/rapid/images/demonstration_program_report.pdf

[2]Image retrieved from: http://www.justupthepike.com/2010/01/metro-rapid-or-what-we-couldve-had-if.html

At the least, however, Metro Rapid stations include only a Metro Rapid branded pole or inclusion of Metro Rapid line listing on the stop's signage.

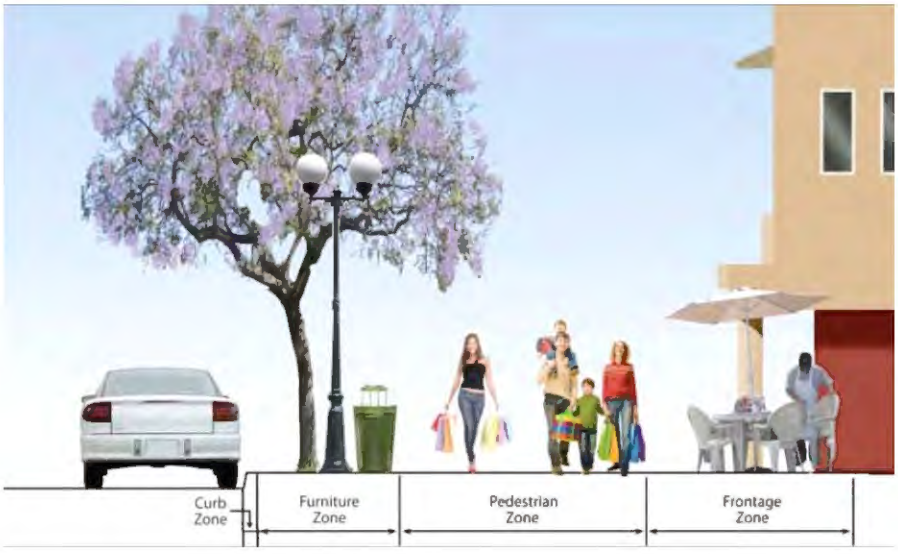
In contrast to the Metro Rapid service, the Metro Orange Line includes an alignment streetscaping component, extensive station amenities, and a new parallel-running bikeway and pedestrian path. In addition, bike lockers have been placed in many of the Metro Orange Line stations. However, this system is a different BRT type than Metro Rapid in that it travels in dedicated rather than mixed lanes.

The recommendations herein adapt elements and best practices of both of these Metro BRT services where appropriate.

Existing Conditions Of Field Review Corridors

The quality of pedestrian access integrated into the streetscape design of a bus corridor is essential to BRT system design and maintaining ridership. Pedestrians must feel safe and comfortable while boarding and alighting a BRT system, as well as when walking between transfers. In addition, implementing a new BRT system provides a good opportunity to upgrade the design of the street and public space.[3] Each streetscape element has an appropriate place or "zone" within the sidewalk. Figure 2 depicts a typical cross section of a low to mixed/multi-use sidewalk that supports significant pedestrian volumes. There are four zones in this cross section: curb, furniture, pedestrian, and frontage. Transit service running along these types of streets typically requires buffers from traffic. The majority of the 14 field reviewed corridors include at least one segment with streets similar to the example in Figure 2.

Figure 2: Sidewalk Zones on a Mixed/Multi-use Street



Source: Model Street Design Manual, 2010

[3] Institute for Transportation Development and Policy. (2013). The BRT Standard 2013.

The streetscape of these corridors was examined during field reviews and visual and photographic data collection was undertaken. Streetscape conditions were also examined using aerial and satellite maps and Google Street View in Google Maps. This web-based mapping and navigation tool provides ground-level photographic imagery of street conditions as recorded from a moving vehicle in 360-degree panoramic views.[4] Streetscape characteristics both in the median and sidewalks were recorded.

The 14 corridors selected for field reviews in this task can be classified as Boulevards or Avenues. An example of a typical boulevard in Southern California is depicted in Figure 3. An example of a typical Avenue in Southern California is depicted in Figure 4. Both are designed for moderate or high vehicular capacity with low to moderate speeds. Both may have landscaped medians.[5]

Figure 3: Boulevard Example in Coronado, California

Source/Photo Credit: Ryan Snyder, Model Street Design Manual, 2010

[4] According to Google, images were gathered between 2011 and 2013. For more information on how images for Google Street View imagery are gathered by Street View vehicles, please visit the following website: http://maps.google.com/help/maps/streetview/learn/cars-trikes-and-more.html

[5] County of Los Angeles Public Health, Choose Health LA.com and UCLA Luskin School of Public Affairs. (2011). Los Angeles County Model Design Manual for Living Streets.

Figure 4: Avenue Example

Source/Photo Credit: Ryan Snyder, Model Street Design Manual, 2010

The following high-level grade classifications were developed based upon the existing streetscape conditions observed during field reviews. The streets in Los Angeles County were not measured against existing streetscaping standards in other cities in the US or abroad. Rather, the grades herein were developed based upon a general continuum of the street with the highest quality streetscape (Santa Monica Boulevard) of the 14 corridors in this phase of the study and the street with the lowest quality (Vernon). All streets were compared along this continuum in order to keep the assessment fair and, importantly, contextual to the local surroundings. Lighting was not generally observed as corridors were observed in daylight hours only. The corridors were categorized as follows:

Below Average:

- Sidewalk: Not continuous throughout
- General width of sidewalk throughway: narrow (less than four feet)[6]
- Trees: Fewer than two per block
- Buffer (grass strip, trees): not present in at least two segments of a corridor

Average:

- Sidewalk: Continuous throughout
- General Width of sidewalk throughway: wide enough for at least two people to walk side by side (four to five feet)
- Trees: More than two per block
- Buffer (grass strip, trees): present in at least two segments of a corridor

Above Average

- Sidewalk: Continuous throughout

[6] County of Los Angeles Public Health, Choose Health LA.com and UCLA Luskin School of Public Affairs. (2011). Los Angeles County Model Design Manual for Living Streets.

- General Sidewalk Width: wide enough for at least two people to walk side by side (four to five feet), plus street furniture
- Trees: Coverage on at least half of block
- Buffer (grass strip, trees): present in at least two segments of a corridor
- Pedestrian refuge islands in median: present in at least two segments of a corridor
- Planters/ gardens: present in at least two segments of a corridor

Table 2 below displays a score for the quality of the streetscape in each corridor. The score is an overall one and takes into consideration conditions throughout the entire corridor. Specific segments may display better or poorer quality streetscape conditions than others.

Table 2: Performance Evaluation of Overall Streetscape

Corridor	Overall Streetscape Conditions
Artesia	Average
Atlantic	Average
Broadway	Below Average
Hawthorne	Above Average
Burbank to North Hollywood	Average
North Hollywood to Pasadena	Average
Pico	Average
Roscoe	Below Average
Santa Monica	Above Average
Valley	Average
Vermont	Average
Vernon-La Cienega	Below Average
Western	Below Average
Whittier	Above Average

Source: Parsons Brinckerhoff, 2013

Recommendations

Recommendations for implementing a minimum level of BRT-related streetscape improvements for all 14 field reviewed corridors is presented and discussed here. A comparison of these recommendations by BRT type is summarized in Table 3. In general, these recommendations apply to all 14 corridors studied and are primarily related to station areas. However, observations and recommendations specific to each corridor are also detailed herein. Cost estimates for these recommendations are found in Table 4.

These recommendations are derived from industry best practices for streetscape and station enhancements, which are displayed in Table 5, following the discussion of these recommendations. Of course, eventual implementation of streetscape enhancements for consideration are dependent not

only upon the type of BRT ultimately implemented in each corridor but also the streetscape conditions and related planning at the time of BRT implementation.

Countywide BRT-Related Streetscape Improvement "Packages"

Table 3 on the next page summarizes and compares the streetscape improvements recommended for each type of BRT contemplated for future BRT corridors in Los Angeles County, which are designed to make the BRT service more inviting to passengers as well as provide additional measures of safety protection for transit customers, thereby helping to create a "sense of place" around BRT stations. As noted in Appendix B of this study, research has also shown that BRT implementation coupled with streetscape improvements can provide an important catalyst for enhancing economic development in such corridors.

As Table 3 notes, there are few differences between the packages of streetscape improvements for curbside BRT lanes versus the package recommended for median BRT running lanes. Both types are recommended for enhanced lighting, real-time passenger information displays, Metro Rapid-type shelters, and vegetation and tree plantings, as well as more clearly marked pedestrian crossings for greater pedestrian protection. Both types are also recommended to include at least a single bicycle rack per station to accommodate a growing cycling population in the County.

The primary differences between the two types of BRT lie in how these improvements are to be implemented. For example, the curb-running BRT type's recommended pedestrian protections include bollards, while these protections are usually not needed in BRT projects involving median running lanes. This is because such projects are typically also part of a greater street reconstruction, such as a raised median that also provides substantial pedestrian refuge.

Table 3: Recommended Minimum Streetscape Improvements by BRT Type for Los Angeles County

	Element	Curbside	Median
Streetscape, Per BRT Station	Sidewalk Width (5 ft. min.)	Yes	Yes
	Crosswalk		
	Conventional Striped-Only	No	No
	Ladder-Type	Yes	Yes
	Pedestrian Refuge Island		
	With Landscaping	No	No
	Raised Median	None	Yes
	Landscaping (average count per station)		
	Trees (number per station)	4	4
	Shrubs (number per station)	15	15
	Plants (number per station)	8	8
	Irrigation System	Yes	Yes
Station Elements	Stamped Concrete in Shelter Area		
	Stamped Concrete	Yes	Yes
	Seating/Street Furniture/Public Art		
	Bike Rack	1	1
	Bollards (3 on each side of station)	6	None
	Lighting/Security		
	Site Electrical for station lighting	Yes	Yes
	NextBus Information Display (Minimum)	1 per station	1 per station
	Branding (Signage, logo, color etc.)	Yes	Yes

It should be stressed that the elements described in Table 3 above are intended to be minimum enhancement guidelines for the type of BRT ultimately implemented, as some of these streetscape elements are already present on one or more of the corridors. Therefore, the table is intended to provide flexibility in BRT implementation to address existing or future conditions and plans as they emerge (e.g. other streetscape-related projects as well as planning-level and environmental studies).[7]

Corridor Specific Observations and Recommendations

Beyond Table 3's recommended minimum streetscape elements for all of the corridors, consideration should be given to improvement on some of these elements beyond these minimums, depending on the existing conditions and planned improvements already in place for each corridor. This is discussed in more detail, corridor by corridor, in the streetscape recommendations that follow.

Artesia—Curbside BRT Streetscape

The curbside streetscape improvement package would be recommended if BRT is implemented on the

[7] Note: All recommendations are subject to budget and schedule constrains to be developed at later phases of this project.

Artesia corridor. Existing streetscape on the corridor is of average quality. Almost half of the alignment, beginning with Long Beach Blvd. to Atlantic on the western end of the corridor and scattered throughout in segments of the alignment to the corridor's eastern end, features adequately spaced, well-maintained trees or substantial vegetation in center and side raised medians. However, most of the corridor lacks trees and vegetation buffers on the sidewalks; the curbside package of recommendations should correct this situation. Streetscape improvements to the medians and sidewalk should be a higher priority on the segments between 190th and Central Ave., because these segments lack streetscape entirely. The sidewalks around proposed BRT stations using the curbside streetscape package of minimum recommendations can be improved throughout the corridor.

Atlantic—Curbside BRT Streetscape

The curbside streetscape package would be recommended if BRT lanes are implemented on the Atlantic corridor. Existing streetscape on the corridor is of average quality. About half of the segments have streetscaping in the median and along the sidewalk. Streetscape becomes sparser as the route approaches I-710 freeway. A more consistent cover of trees along the sidewalk in this section should complement BRT along this corridor. Streetscape in the segments between Whittier and Florence, Bandini and Slauson, and the segment nearest to the Metro Blue Line Artesia Station, are particularly sparse and are most in-need of improvement.

Broadway—Curbside BRT Streetscape

The curbside streetscape package would be recommended if BRT lanes are implemented on the Broadway corridor. Existing streetscape on the corridor is below average. All segments have at least some streetscaping in the sidewalks, but it is very sparse throughout the corridor, especially in the downtown Los Angeles Historic Core.

The City of Los Angeles, in conjunction with Metro, the former CRA/LA, and Los Angeles City Councilmember Jose Huizar's office, has adopted a Broadway Streetscape Master Plan (2013) that would bring major street infrastructure and road improvements from 2nd to Olympic. The Master Plan would be implemented in conjunction with the proposed streetcar that intersects with this corridor. It is recommended that this master plan be implemented in the segments within the downtown Historic Core area.

As the corridor transitions into low density residential, the streetscape continues to be in poor condition. It is recommended that streetscape improvements to support pedestrian activity are implemented, including a vegetation buffer to provide safety and shade to residents in the area. Midblock crossings can be improved with pedestrian refuge islands. Because this is a highly trafficked corridor by pedestrians, special attention via ladder-type striping should be given to the pedestrian crossings nearest to proposed BRT stations.

Burbank to North Hollywood—Curbside BRT Streetscape

The curbside streetscape package would be recommended if BRT is fully implemented on the Burbank to North Hollywood corridor. Existing streetscape along the corridor is average. Like other average corridors, segments with nice, inviting streetscape are sprinkled intermittently. Between Chandler and Moorpark, the streetscape improves greatly, especially near the North Hollywood Orange Line/Red Line stations. The segment along Lankershim between Vineland and Vanowen are in most need of improvements.

Hawthorne—Curbside BRT Streetscape (and Possible Future Median Streetscape)

The curbside streetscape package would initially be recommended if BRT lanes are implemented on the Hawthorne corridor, with possible eventual additional inclusion of median BRT lanes and associated improvements in the long-term future.

Existing streetscape on Hawthorne is above average. The middle portion of the corridor features a wide median with vertical parking spots, trees, grass, and some pedestrian refuge islands, depicted in Figure 5 on the next page. This pattern continues with relative consistency, creating an established character throughout the corridor.

If median-running BRT is ultimately implemented, the median would need to be reconfigured to accommodate bus lanes and stations. Although the existing streetscape, including the existing trees, can be adapted to fit these changes (see case studies for Van Ness BRT corridor in San Francisco and the Cleveland Health Line in Table 1), considerable neighborhood stakeholder input would have to be sought in order for median bus lanes to be implemented successfully (as it was in San Francisco and Cleveland). The streetscape in the segment from 190th St. to Torrance Blvd. is sparse and would require more improvements than other segments if bus-only lanes were implemented south of Artesia. Segments without raised medians should also be improved with at least a minimum of ladder-type crosswalk striping to accommodate pedestrian activity on this higher-speed corridor.

Figure 5: Raised Medians on Hawthorne (Existing)

Source: Bing Maps, Microsoft Corporation, 2013

North Hollywood to Pasadena — Curbside BRT Streetscape (for Arterial Segments)

The curbside streetscape package is recommended if BRT is implemented on the North Hollywood to Pasadena corridor, for the arterial segments of the corridor. Existing streetscape along this corridor is average. Some segments include good landscaping and well-marked crosswalks, particularly those on Fair Oaks Ave. in Pasadena and Brand Blvd. in Pasadena. Where possible, this pattern should be extended for the station areas throughout the corridor for arterial intersections near the proposed BRT stations, including the recommended package of landscaping and clearly marked crosswalks with ladder-type striping, in order to create a consistent streetscape character on the arterial segments.

Pico—Curbside BRT Streetscape

The curbside streetscape package is recommended if BRT lanes are implemented on the Pico corridor. Existing streetscape on Pico is average, with the most quality streetscape on the segments within the City of Santa Monica. Streetscapes in the two most easterly segments (between Olympic and Alameda) in downtown Los Angeles have the greatest need for streetscape improvements. However, most of the other segments would also greatly benefit from sidewalk and station amenities.

Roscoe—Curbside BRT Streetscape

The curbside streetscape package is recommended if BRT is implemented on the Roscoe corridor. Streetscape on Roscoe is currently below average. At intersections with busy traffic, there are no trees or vegetation protecting pedestrians from traffic, noise, and smog. This is the case at the corner of Roscoe and Sepulveda, as depicted in Figure 6 below. In the few segments with a grass strip on the edge of the sidewalk, the width of sidewalk throughway appears too narrow, as depicted in Figure 7. Narrow sidewalks should be widened while retaining the grass and tree buffer on the edge.

Figure 6: Intersection of Roscoe and Sepulveda

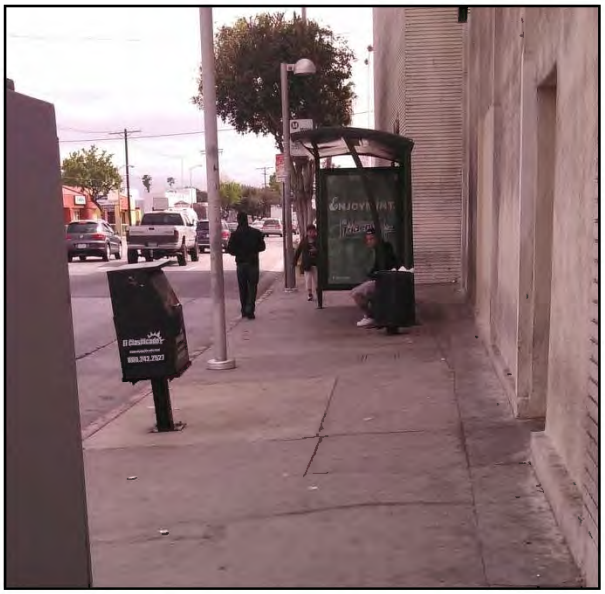


Photo Credit: Parsons Brinckerhoff, 2013.

Figure 7: Narrow Sidewalks on Roscoe Corridor

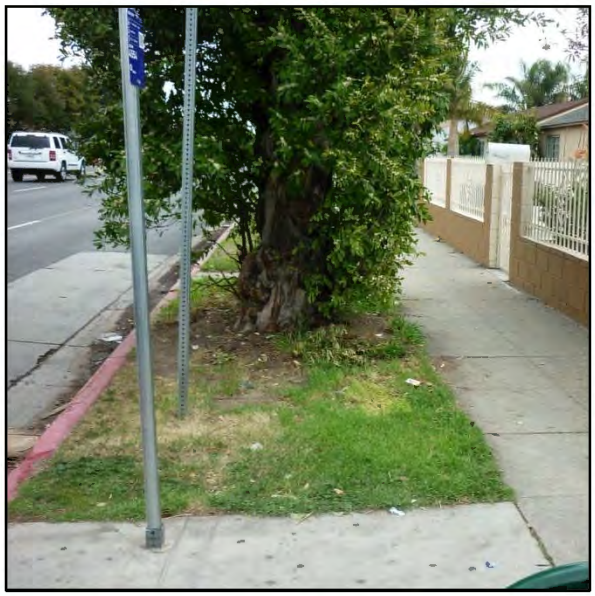


Photo Credit: Parsons Brinckerhoff, 2013

Santa Monica—Curbside BRT Streetscape

The curbside streetscape package is recommended should BRT lanes be implemented on the Santa Monica corridor. As shown in Figure 8 on the next page, existing streetscape in Santa Monica is the highest quality of all of the 14 corridors reviewed in the field. The portions of the Santa Monica corridor with the most exemplary streetscaping elements (e.g., the medians, crosswalks, sidewalks, and bus shelters) are those in the City of West Hollywood. Elements such as pedestrian refuges in the median, public art, paved pedestrian paths in the median surrounded by vegetation, wide sidewalks with a consistent tree and vegetation buffer is commonplace. Pedestrian intersections are well-marked and colorful. The American Planning Association designated the stretch of the corridor in City of West Hollywood as one of the 10 Great Streets in 2011 as part of the Great Places program (APA 2011). Accordingly, there is little improvement needed on this corridor, only to ensure that the lighting , branding and pedestrian protects around proposed BRT stations be brought to the minimums described in Table 3.

Figure 8: Streetscape on Santa Monica Boulevard

Photo Credit: Parsons Brinckerhoff, 2013

Valley—Curbside BRT Streetscape

The curbside streetscape package is recommended if BRT is implemented on the Valley corridor. The overall existing streetscape on Valley is average. The most western segments are primarily fronted by industrial land uses. The streetscape along these segments is sparse and would greatly benefit from all of the elements in the streetscape improvements package recommended for curbside BRT. Sidewalks are narrow along more commercial/retail sections of the corridor. The start of the corridor (i.e., the eastern section in the City of El Monte east of Santa Anita) contains some higher quality streetscaping, including physically landscaped medians, and the rest of the corridor should be upgraded to this standard.

The City of El Monte through the master planning around the El Monte Bus Station is planning some streetscape improvements to enhance walkability in the easternmost part of the corridor. However, this project is in early stages, and if the corridor is selected for further study and implementation for BRT, it would need to consider this redevelopment project.

The City of El Monte's Downtown Improvement Project is intended to revitalize and rebrand the downtown Valley Mall area just south and to the east of the Valley Boulevard-Santa Anita Ave. intersection. The City Council recently selected its Architectural/Urban Design firm for master planning of the downtown.

The goal of the Downtown Improvement Project is to transform Valley Mall, which was historically El Monte's Main Street, back into a vibrant, pedestrian-friendly, and economically active downtown area – while facilitating transit and pedestrian connections among the city's civic center, the El Monte Bus station and the El Monte Metrolink Station.

Vermont—Curbside BRT Streetscape

The curbside streetscape package is recommended if BRT lanes are implemented on the Vermont corridor. The overall existing streetscape on Vermont is average. Quality streetscape exists along the segments between Manchester and Century Blvds. and between Florence and Slauson Aves. However, the segments between Slauson Ave. and Wilshire Blvd. are in great need of streetscape improvements to help create a consistent character throughout the corridor. Much of Vermont has wide, open lanes – which is a good palette to start with when designing new streetscape improvements. Because Vermont is such a heavily traveled corridor with existing high corridor transit ridership, additional improvements beyond the minimum improvements recommended in the curbside design package could be considered, such as pedestrian refuge islands, landscaped medians, and perhaps even bus bulb outs, where street geometrics allow them. This is particularly true for virtually all of the areas north of Vernon Ave., including neighborhoods adjacent to Manual Arts High School, the Exposition Park and the Coliseum area, the neighborhoods near the University of Southern California campus, Koreatown, and the Wilshire commercial district.

Vernon/La Cienega—Curbside BRT Streetscape

The curbside streetscape package is recommended if BRT lanes were to be implemented on the La Cienega-Vernon corridor. Overall, the streetscape on La Cienega is currently below average. The corridor has high pedestrian activity along key connection points, such as Wilshire, Cadillac (near the Kaiser Permanente Hospital), and Crenshaw, and a high priority should be placed on pedestrian crossings in these areas. Streetscape in segments within the City of Beverly Hills is of slightly higher quality. Improvements should be concentrated on the segments between La Brea Ave. and Santa Fe Ave., where the streetscape is most sparse.

Western—Curbside BRT Streetscape

The curbside streetscape package is recommended if BRT lanes are implemented on the Western corridor. The overall streetscape along Western is currently below average. Like La Cienega, this street experiences high volumes of foot traffic, especially at the Purple Line station at Western and Wilshire in Koreatown. Only one segment has a median (near the Santa Monica Freeway). The segment nearest to the Metro Green Line Crenshaw Station, at the southern end of the corridor, lacks streetscape entirely. In fact, streetscape improvements are needed throughout the entire corridor. A good example of the potential character of Western is the segment between Washington and Jefferson Blvds. This segment has nice trees, of the older variety that could be mimicked throughout the corridor with tree plantings recommended for the station areas in the streetscape improvement package, to create a continuous pattern. The species and shade value of these trees should be studied in more detail.

Whittier—Curbside BRT Streetscape

The curbside streetscape package is recommended if BRT is implemented on the Whittier corridor. Overall, streetscape on Whittier is above average. Currently, the segments with the nicest trees (such as between Montebello Blvd. and Philadelphia St.) tend to have palm trees. While these trees provide a pleasant, continuous aesthetic, they do not provide as much shade for pedestrians as other species that are both native to Southern California and more drought-tolerant. Streetscape is sparse at the western end of the corridor; improvements should be initially concentrated there.

The costs of these recommended streetscape packages are estimated for each corridor as noted in Table 4 below. These estimates vary primarily by the number of stations recommended for each corridor, which is in turn primarily a function of the corridor's length. Importantly, these are only preliminary estimates of recommended streetscape improvements, and each corridor that is recommended to be studied in more detail must undergo more specific engineering estimates. All of these studies will require updated and refined capital costs estimates.

Table 4: Preliminary Streetscape Cost Estimates by Corridor

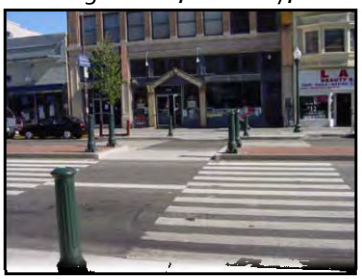
Corridor (Service Area)	Streetscape Costs	Recommended BRT Streetscape Package
Artesia (Gateway)	$2,239,305	Curbside
Atlantic (Gateway)	$2,413,331	Curbside
Broadway (WSC)	$2,140,776	Curbside
Burbank – North Hollywood (SFV)	$1,213,515	Curbside
Hawthorne (SB)	$1,703,500 to $2,544,100	Range is for curbside near-term; possible median lanes in the long-term
North Hollywood - Pasadena (SGV/SFV)	$377,784 to $3,124,970	Range is for curbside lanes in several arterial and freeway alignment variations
Pico (west) (WSC)	$1,987,449	Curbside
Pico (east) (WSC)	$1,845,488	Curbside
Roscoe (SFV)	$2,623,437	Curbside
Santa Monica (WSC)	$4,027,949	Curbside
Valley (SGV)	$1,904,400	Curbside
Vermont (WSC)	$2,839,212	Curbside
Vernon/La Cienega (Gateway)	$2,896,344	Curbside
Western (WSC/SB)	$2,840,959	Curbside
Whittier (Gateway)	$1,511,136	Curbside

Note: Elements of each recommended streetscape package are described in Table 3 on page 10 of this chapter.

Industry Streetscape Best Practices By BRT Type

The recommendations described in the previous section are derived from industry best practices for station and streetscape enhancements, which are summarized in Table 5. The table is organized according to BRT exclusive lane type – median-aligned or curb-aligned – as well as by station or streetscape element. Some considerations for a particular element are universal across all BRT types. Typical examples of a median-aligned running way and a curb-aligned running way are depicted in Figure 9 and Figure 10, respectively.

Table 5: Best Practices for Key Station and Streetscape Elements

Station/ Streetscape Element	Considerations	Median	Curbside
Sidewalk Width	• General width at stations at least 5 ft. and comply with ADA guidelines.[8] Larger is preferable, but sized to the projected volume of users[9] • Level, firm and slip-resistant sidewalk surface • Applicable to all BRT types • Sidewalks along corridor minimum 5 ft. wide[10] • Sidewalks can be behind the BRT station	Van Ness BRT Concept  Source: SFCTA, 2013	Boston Silver Line  Source: http://www.ktransit.com/transit/NAmerica/useast/boston/etb/photos/bos-lrt-silver-042905-01.jpg
Crosswalk	• If crossing more than two lanes, a signalized crosswalk should be provided • Well-lit • At-grade preferred, but pedestrian bridges or underpasses OK, with escalators or elevators[11] • Mark crosswalk with contrasting colors and materials	Pedestrian Access, Metrobus, Mexico City, Mexico  Source: BRT Standard, 2013 • Medians should be designed to discourage mid-block crossing[12]	Crossing Islands, Berkeley, CA  Source: Model Design Manual, 2010

[8] ADA Accessibility Guidelines for Buildings and Facilities (ADAAG). Retrieved from http://www.access-board.gov/adaag/html/adaag.htm

[9] County of Los Angeles Public Health, Choose Health LA.com and UCLA Luskin School of Public Affairs. (2011). Los Angeles County Model Design Manual for Living Streets.

[10] Institute for Transportation Development and Policy. (2013). The BRT Standard 2013.

[11] Ibid.

[12] BMS Design Group. (2009). Van Ness Bus Rapid Transit Landscape Design Principles.

Station/ Streetscape Element	Considerations	Median	Curbside
Pedestrian Refuge Islands	• At-grade pedestrian crossing where pedestrians cross a maximum of two lanes before reaching a pedestrian refuge (sidewalk, median)[13] • Pedestrian refuges should be provided if the crossing distance exceeds approximately 40 feet[14]	 Source: Model Design Manual, 2010	 Street Design Manual, 2010
Curb Extension/ Bulb Out	• Bus bulbs (curb extensions) on streets with on-street parking eliminates the need for buses to merge into mixed traffic after stop • Requires less parking removal than bus lane • Provides opportunity to beautify streetscape with landscaping or passenger amenities • Reduce the pedestrian crossing distance • Typical width is parking lane or loading zone width (8 to 10 feet); length can vary (30 to 50+ feet) • Best suited when traffic volumes are low, bus service is frequent, pedestrian volumes are substantial, development densities are high or where curb parking is permitted at all times[15] • Not recommended where queue-jump lane provided, street parking prohibited during peaks, or near-side stops at intersections with many right turns	Not applicable to median-running BRT	Bus loading at bus bulb "island": Broadway, Manhattan  NYCDOT Street Design Manual, 2009

[13] Institute for Transportation Development and Policy. (2013). The BRT Standard 2013.
[14] County of Los Angeles Public Health, Choose Health LA.com and UCLA Luskin School of Public Affairs. (2011). Los Angeles County Model Design Manual for Living Streets.
[15] Transportation Research Board. (2007). TCRP Report 118: Bus Rapid Transit Practitioner's Guide.

Station/ Streetscape Element	Considerations	Median	Curbside
Station Shelters	• Provides weather protection, including shade • Stations should be well-lit, transparent and have security (staff or cameras[16]) • Sliding doors at BRT stations improve quality of station environment, reduce risk of accidents and prevent unauthorized access[17] • Signage and graphics, ITS displays, telephones, bicycle racks and possibly newspaper vending should also be provided[18] • Standard shelters are 3-7 ft wide and 6-16 ft long[19] • Real time information and off-board ticketing should be provided • Shelters and furniture should be located so they don't conflict with pedestrian zone[20]	Ecovia, Quito, Ecuador  *Source: BRT Standard, 2013*	The Strip Express, Las Vegas, Nev.  *Source: dc.streetsblog.org*

[16] Institute for Transportation Development and Policy. (2013). The BRT Standard 2013.
[17] Ibid.
[18] Transportation Research Board. (2007). TCRP Report 118: Bus Rapid Transit Practitioner's Guide.
[19] County of Los Angeles Public Health, Choose Health LA.com and UCLA Luskin School of Public Affairs. (2011). Los Angeles County Model Design Manual for Living Streets.
[20] Ibid.

Station/ Streetscape Element	Considerations	Median	Curbside
Bollards	• Provides additional pedestrian protections for higher speed or higher-volume streets	Typically not needed due to major reconstruction of street for median BRT lanes	Typical example of a bollard  *Source: BRT Standard, 2013*
Lighting/ Security	• Passengers should be able to see and be seen from locations within the station and from outside • Security equipment such as emergency call boxes and closed circuit television may be warranted[21] • A lighting plan is recommended that locates sufficient lighting from all possible access locations. General lighting should be overhead, with lower elevation lighting to highlight changes in level or materials. Specifically, lighting should be located to illuminate the faces of people walking on paths and walkways. Overhead lighting can be located at levels from 8 to 16 feet above ground. Lower level lights should be designed to be vandal resistant[22]	Sinewave bus rapid transit, Las Vegas, Nevada  Source:Trueform	Same treatment as median

[21] Transportation Research Board. (2007). TCRP Report 118: Bus Rapid Transit Practitioner's Guide.
[22] RPTA Comprehensive Arterial Bus Rapid Transit Planning Study Final Report, Valley Metro/RPTA, 2009

Station/ Streetscape Element	Considerations	Median	Curbside
Lighting/ Security (cont.)	• Where separate lighting poles are not feasible or appropriate, pedestrian lighting should be coordinated with building and property owners to provide lighting attached to buildings[23] • Solar light fixtures should be utilized where possible for new installations or for retrofit projects; where solar light fixtures are not appropriate or possible, LED or a future more energy-efficient technology should be used[24]		
Platform Level Boarding	• Reduces boarding and alighting time[25] • Although raised platforms increasing in use, no industry consensus exists on best practice	Platform level boarding on EmX, Eugene, Oregon  Source: ITDP	Platform level boarding in Las Vegas, Nevada  Source: RTC, Las Vegas

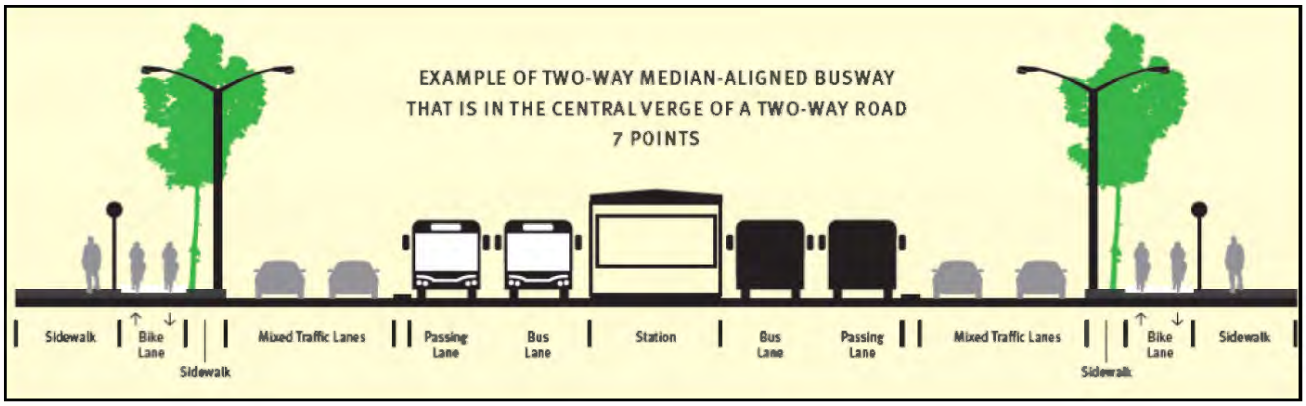
[23] County of Los Angeles Public Health, Choose Health LA.com and UCLA Luskin School of Public Affairs. (2011). Los Angeles County Model Design Manual for Living Streets.
[24] Ibid.
[25] Institute for Transportation Development and Policy. (2013). The BRT Standard 2013.

Station/ Streetscape Element	Considerations	Median	Curbside
Landscaping	• Drought-tolerant species native to Southern California are recommended[26] • Select trees with non-aggressive root systems to avoid damaging paving and sidewalks • Healthy, mature plantings should be retained and protected whenever possible (reference Eugene, OR case study) • To accommodate trees, a 6 to 8-foot wide, continuous sidewalk furniture zone must be provided[27] • Lowest branches at a height of 12 to 14 feet or more above the ground • New tree spacing should be 10 percent less than the mature (existing) canopy spread where possible • Trees may be planted as close as 6 feet from bus shelters, where they provide welcoming shade at transit stops[28] • Tree plantings should respect site distance requirements[29]	EmX Median-running BRT Eugene, Oregon  Source: ITDP • Trees may be planted in medians that are 4 feet or wider, but must have an adequate clear height below branches so that pedestrians are visible. Where trees hang over street, clear height should be 9 feet or higher to provide clearance for BRT vehicle[30] • Integrate shrub and ground cover planting in the median to increase permeable surfaces and increase area habitat value[31]	Landscaping along curbside, New Jersey  Source: New Jersey Bicycle and Pedestrian Resource Center, http://njbikeped.org/complete-streets-2/ • Closely planted trees at the sidewalk edge creates fence that protects pedestrians from vehicle traffic and provides shade • Trees should be adequately spaced and pruned high to avoid obstructions to pedestrians and vehicles[32] • Tree grates and guards are best used along streets with heavy pedestrian traffic[33]

[26] County of Los Angeles Public Health, Choose Health LA.com and UCLA Luskin School of Public Affairs. (2011). Los Angeles County Model Design Manual for Living Streets.
[27] Ibid.
[28] Ibid.
[29] Van Ness Bus Rapid Transit Landscape Design Principles, BMS Design Group, 2009
[30] County of Los Angeles Public Health, Choose Health LA.com and UCLA Luskin School of Public Affairs. (2011). Los Angeles County Model Design Manual for Living Streets.
[31] Van Ness Bus Rapid Transit Landscape Design Principles, BMS Design Group 2009
[32] MacDonald, E. (2007). The Intersection of Trees and Safety. Access Magazine, University of California, Los Angeles, Los Angeles, CA, volume 31.
[33] County of Los Angeles Public Health, Choose Health LA.com and UCLA Luskin School of Public Affairs. (2011). Los Angeles County Model Design Manual for Living Streets.

Station/ Streetscape Element	Considerations	Median	Curbside
Landscaping (cont'd)		• Enhanced pedestrian protection from mixed-traffic lanes on the boarding platforms with trees, shrubs or other barriers is recommended	• Where pedestrians are exposed to mixed-traffic lanes on the boarding platforms, trees, barriers or bollards are recommended
Pavement Treatment - Textured Pavement/ Semi-permeable/ Colorized Transit Lanes	• Human-scaled sidewalk materials, such as bricks and tiles, can be more inviting than concrete[34] • Standard, untinted concrete can be difficult to patch defects • Textured and porous pavement materials can be used to improve durability of sidewalks and enhance the character and branding • Types include: tinted concrete with silicon carbide or colored aggregate, exposed light treatments, porous concrete, mastic asphalt, etc[35]	Webster Avenue, New York City, New York  *Source: Streetsblog.org*	Busway, 34th Street, New York City  Source: *Street Design Manual, 2009*

Figure 9: Sample Cross Section of Median-Aligned Busway



Source: BRT Standard, 2013

[34] Valley Metro/RPTA. (2009). RPTA Comprehensive Arterial Bus Rapid Transit Planning Study Final Report.
[35] New York City Department of Transportation. (2009). Street Design Manual.

Figure 10: Overhead View of Sample Curb-Aligned Busway Street Layout

Source: Parsons Brinckerhoff, 2013

COST AND BENEFIT ANALYSIS

In order to prioritize and rank the remaining 14 corridors, a cost and benefit analysis was conducted. The cost and benefit analysis compared the capital costs, operating costs, travel time savings and projected increase in ridership and revenue.

The first two sections below describe how the capital costs and the operational benefits and costs were derived.

Capital Improvement Costs

The capital improvements proposed for each corridor covered a range of costs including street repaving where needed, re-striping and signage for bus lanes, design and construction of new TSP or enhancements to the existing TSP system and branded stations/shelters. Capital cost estimates were developed based on industry experience and existing local project comparisons. The costs were estimated per station, per intersection and per mile of recommended bus lanes and did not include any right-of-way (ROW) purchase, cost of vehicle acquisition or new maintenance facilities resulting from expansion and/or efficiencies from operational improvements. These capital cost estimates would be further refined in any subsequent detailed corridor studies.

Operating Costs/Benefits (Annual Cost Savings)

The annual operating costs for new BRT corridors were estimated based on a 15-hour weekday span of service (6:00 AM to 9:00 PM) and minimum frequencies of 15-minutes during the peak and 20 minutes during the off peak using Metro's or the municipal operator's current cost per revenue hour. The study did not assume any reallocation of service hours from the underlying local service to implement BRT but rather that new operating dollars would need to be identified. If a corridor had existing Metro Rapid service that met the above service requirements, then the existing operating costs for the corridor was used. The net operating costs and/or savings are the result of the projected travel time savings and projected increase in revenue as a result of increased ridership.

Travel Time Savings

The travel time savings on corridors with existing service was estimated based on the reduction in travel time resulting from the recommended treatments and/or enhanced BRT service. The travel time savings for bus priority treatments ranged from 20% to 33% depending on whether the corridor had existing Metro Rapid service (with a number of key BRT attributes) or was a brand new BRT corridor and/or if the bus lanes proposed were curbside or median. The reduction in travel time was then monetized using the operator's current cost per revenue hour.

Increase in Ridership and Farebox Revenue

Bus lanes and/or bus speed improvements attract new riders through faster and more consistent travel times. As part of this study, the projected ridership increase was attributed to improved travel times as

a result of new or enhanced transit signal priority, station/vehicle branding, fewer stops, queue jumps, bus lanes and any other BRT attributes. Half of the percentage of average daily round trip time savings was established as the overall elasticity factor for the increase in average daily corridor ridership (e.g., a 2% time savings would generate a 1% increase in riders). The projected percentage increase was then applied to existing daily corridor ridership levels and annualized to generate expected ridership increases resulting from the recommended improvements. The increase in farebox revenue was then calculated at Metro's current average fare per boarding of $0.71. Only the first year increase in ridership was included as part of the revenue increase.

Using the above elements, the following formula below (Figure 1) was developed to calculate the net benefits of implementing peak period bus lanes along with a number of other bus speed improvements. Other elements such as streetscape improvements and all-door boarding strategies were examined but not included in the cost and benefit analysis as they are not immediately needed to implement bus lanes.

Streetscape costs identified for each corridor in Chapter 3 of this study were excluded in the net benefit or one-time capital cost calculations because options for these investments are typically varied and do not directly affect the operation of the BRT system. However, these improvements should be included and studied in greater detail in any subsequent planning or engineering study. An attractive urban streetscape not only encourages walking or cycling but transit use as well.

Additionally, this study identified several corridors that would greatly benefit from all-door boarding strategies, but they also were excluded in the net benefit or one-time capital cost calculations. Although this change would have implications regarding payment validation and fare enforcement, it is worth studying further as average dwell times at bus stops could potentially be reduced by half, particularly at busy bus stops with longer-than-average dwell times. All-door boarding would help provide additional time savings and improved schedule reliability.

Figure 1: Net Benefits Formula

The results of the cost and benefit analysis is shown below in Table 1 on the following page.

Table 1: Capital and Operating Costs and Net Benefits by Corridor

Corridor (Service Area)	% Bus Lane Proposed	One-Time Capital Cost	Base Yr. Net Op. Savings/(Costs)	Net 20-Year Benefit/(Cost)
Vermont[1] (WSC)	78%	($1,599,862)	$1,572,057	$38,557,802
Santa Monica[1] (WSC)	52%	($2,021,772)	$1,037,410	$24,478,510
Hawthorne[1, 2] (SB)	99%	($969,440) to ($20,532,209)	$145,686 to ($433,228)	$11,500,600 to ($50,445,028)
Pico (west)[1] (WSC)	83%	($1,645,550)	$512,756	$11,452,621
Broadway[1] (WSC)	0%	($96,886)	$218,626	$5,487,843
Western[1] (WSC)	0%	($59,920)	$107,261	$2,680,036
Vernon/La Cienega[1] (WSC)	0%	($61,632)	$76,033	$1,880,601
Atlantic [1] (Gateway)	95%	($2,510,389)	($864,909)	($24,604,193)
Pico (east)[1] (WSC)	67%	($598,868)	($1,461,340)	($37,928,304)
North Hollywood - Pasadena[3] (SFV/SGV)	50% (arterial option) 10% (freeway options)	($2,100,000) to ($3,312,300)	($1,845,778) to ($5,241,081)	($49,249,800) to ($137,193,862)
Burbank – North Hollywood (SFV)	24%	($1,876,071)	($2,001,212)	($52,996,345)
Whittier (Gateway)	55%	($5,523,844)	($2,094,061)	($59,015,911)
Artesia (SGV)	94%	($5,617,081)	($2,813,320)	($67,566,668)
Valley (SGV)	64%	($8,306,540)	($3,461,865)	($96,738,688)
Roscoe (SFV)	72%	($7,111,810)	($5,557,470)	($149,075,485)

1. Existing Metro Rapid Corridors
2. Study included looking at multiple alternatives/operating segments
3. Study included looking at two freeway and one arterial alternatives
4. Operating costs assumes a 15-hour span of service weekdays with headways of 15-minute peak/20-minute off-peak for brand new BRT corridors and Atlantic Metro Rapid

Note: Study assumed no reallocation of revenue service hours from local services to implement new BRT service. Some hours could be reallocated from local service and/or other lower-performing lines. Therefore, no net 20-year cost would result for those new BRT corridors.

The cost and benefit analysis reveals that the Vermont corridor provides the highest net benefit over a 20-year period. The cost and benefit analysis also included looking at multiple alternatives and corridor alignments for the Hawthorne and North Hollywood to Pasadena corridors. The alternatives considered for the North Hollywood to Pasadena corridor include two freeway running alternatives (the I-5/SR-134 and the SR-134) as well as one arterial running alternative. It also considered evaluating the longer-term feasibility of implementing shoulder running bus lanes when freeway speeds drop below a certain threshold.

Due to some overlap and duplication of the Burbank-North Hollywood corridor with some of the North Hollywood to Pasadena alternatives, the two corridors should be combined as one potential candidate corridor for further evaluation. In addition, the Pico corridor was analyzed at as two separate corridors (east & west) since Santa Monica Big Blue Bus operates the western portion of the corridor from downtown Santa Monica to the Wilshire/Western Metro Purple Line station, and Metro operates the eastern portion of the corridor from Pico/Rimpau to downtown Los Angeles.

In addition, it was determined that Broadway, Western and Vernon/La Cienega should no longer be considered as candidate corridors for bus lanes. Due to the existing street/lane widths along these three corridors, bus lanes of any length were not feasible; Broadway is also being evaluated for streetcar operation. Moreover, because these corridors are currently Metro Rapid corridors, significant additional savings and/or long-term benefits could not be achieved with the few improvements recommended for each, such as TSP enhancements, all-door boarding and streetscape enhancements.

Table 1 includes existing corridors with Metro Rapid service and brand new potential BRT corridors. This is important to note when interpreting the data and cost methodology. For corridors with existing Metro Rapid service, smaller capital and operating dollars are needed for conversion to BRT with peak period bus lanes. Because a number of key BRT attributes have been implemented on Metro Rapid corridors, including transit signal priority, a smaller initial capital investment is needed. Therefore, these corridors are able to achieve a net benefit savings.

For new candidate corridors without existing Metro Rapid service, Table 1 reflects a much higher initial capital investment and on-going operating costs. Because this study assumed no reallocation of service hours from existing local services, new operating dollars would be needed for the BRT service. A much larger up-front capital investment would also be required since these new corridors, unlike the Metro Rapid corridors, do not have any key BRT attributes. Therefore, these corridors reflect an overall net cost to implement BRT; however, the reallocation of service hours could help negate these costs. Therefore, implementing new BRT, including bus lanes, could result in no net operating costs while providing at least a 30% improvement in bus travel times and encouraging an increase in ridership. These improvements in travel times would allow for improved frequencies on the corridors.

In an effort to create a countywide BRT system, the top scoring corridor within each service area was selected for more detailed corridor level analysis and environmental review. The following are the top candidate corridors within each service area:

1. Vermont – Westside/Central
2. Hawthorne – South Bay
3. Atlantic – Gateway
4. North Hollywood/Pasadena – San Fernando Valley/San Gabriel Valley
5. Valley – San Gabriel Valley

Furthermore, because this study was a countywide effort, and there was strong support for studying and implementing BRT on two additional corridors, Whittier and Artesia, by Montebello Bus Lines and Long Beach Transit, respectively, these two corridors were added to the list of potential candidate corridors for further study. Additionally, it was further determined that due to the potential net 20-year benefits obtained from implementing bus lanes on the Santa Monica and Pico corridors, they too warranted consideration. This brought the total number of potential candidate corridors for further study to nine, which are listed as follows:

1. Vermont
2. Hawthorne
3. Atlantic
4. North Hollywood– Pasadena
5. Valley
6. Whittier
7. Artesia
8. Santa Monica
9. Pico

Below is the final list of potential candidate corridors along with a brief description of each:

Vermont:

Vermont is a north/south corridor approximately 12 miles long. Vermont is the second busiest bus corridor in the County with nearly 50,000 weekday boardings. It primarily serves the City of Los Angeles with a small segment on the south end within the unincorporated area of Los Angeles County. The Vermont corridor begins at the Sunset/Vermont Metro Red Line Station in Hollywood and ends at Vermont and 120th Street near the Vermont/Athens Metro Green Line Station. This corridor is currently served by Metro Local Line 204 and Metro Rapid Line 754.

Hawthorne:

Hawthorne is a north/south corridor approximately 9 miles long. The corridor serves the cities of Inglewood, Hawthorne, Lawndale and Torrance. The corridor begins at Florence and La Brea south to Hawthorne and Carson near the Del Amo Mall. This corridor is currently served by Metro Local Lines 40 and 344 and Metro Rapid Line 740 as well as Torrance Transit Line 8 and their Rapid 3.

Atlantic:

Atlantic is a north/south corridor approximately 15 miles long corridor. The corridor serves the community of East Los Angeles in Los Angeles County, and the cities of Commerce, Bell, Maywood, Cudahy, South Gate and Lynwood. The corridor starts at Cesar E. Chavez and Atlantic near East Los Angeles College and terminates at the Artesia Metro Blue Line Station. This corridor is currently served by Metro Local Line 260 and Metro Rapid Line 762.

North Hollywood – Pasadena:

The North Hollywood to Pasadena corridor is an 18 mile east/west corridor connecting the cities of Pasadena, Glendale and Burbank to North Hollywood at the Metro Red Line/Orange Line Station. The corridor would serve the cities of Pasadena, Glendale, Burbank, and Los Angeles via various proposed alternative freeway (SR-134 and SR-134/I-5) and arterial routes. This newly proposed corridor would begin at one of the Metro Gold Line Stations in Pasadena and end at the North Hollywood Metro Red Line/Orange Line Station.

Valley:

Valley is an east/west corridor approximately 15 miles long. The corridor serves the cities of El Monte, Rosemead, San Gabriel, Alhambra and Los Angeles. The corridor begins at the El Monte Transit Center and ends in downtown Los Angeles at Olive and 18th Street. This corridor is currently served by Metro Local Line 76.

Whittier:

Whittier is an east/west corridor approximately 13 miles long. The corridor serves the community of East Los Angeles in the County of Los Angeles, and the cities of Montebello, Pico Rivera, and Whittier. The corridor begins at Cesar E. Chavez and Atlantic, near East Los Angeles College, and ends at Santa Gertrudes and Whittier, at Whittwood Mall. This corridor is currently served by Montebello Bus Line 10.

Artesia:

Artesia is an east/west corridor approximately 13 miles long. The corridor serves the cities of Cerritos, Bellflower, Long Beach, Compton, and Carson. The corridor begins at the Harbor Gateway Transit Center and ends near the Cerritos Mall. The corridor is currently served by Metro Local Line 130 and Long Beach Transit Line 61.

Santa Monica:

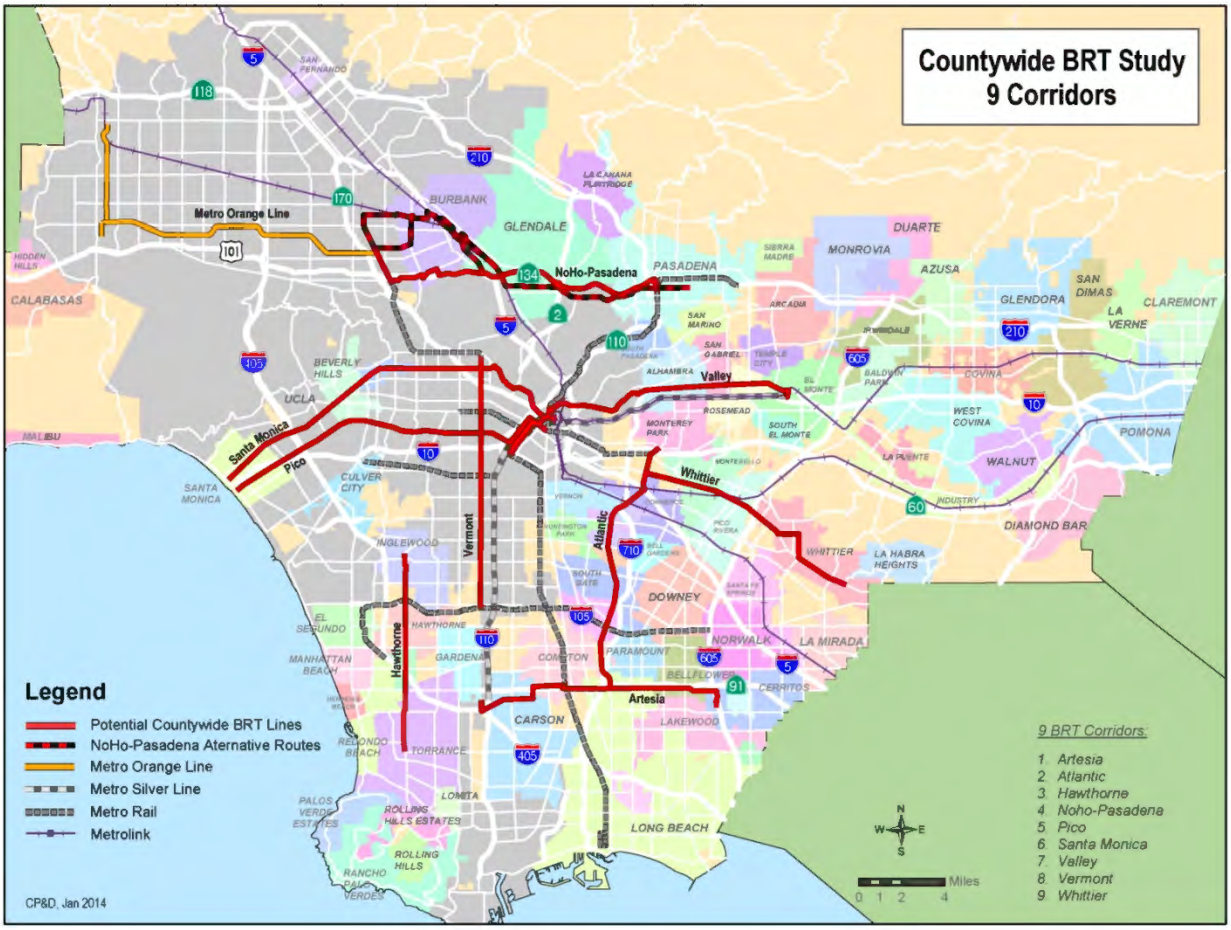
Santa Monica is an east/west corridor approximately 18.5 miles long. The corridor serves the cities of Los Angeles, West Hollywood, Beverly Hills, and Santa Monica. It begins in downtown Los Angeles and ends at 2nd Street in downtown Santa Monica. This corridor is currently served by Metro Local Line 4 and Metro Rapid Line 704 as well as Santa Monica Big Blue Bus Line 1.

Pico:

Pico is an east/west corridor approximately 16 miles long. The corridor serves the cities of Los Angeles and Santa Monica as well as the high-density area of Century City. The corridor begins in downtown Los Angeles and ends in downtown Santa Monica at Ocean and Pico. This corridor is currently served by Metro Local Lines 30 and 330 as well as Santa Monica Big Blue Bus Lines 7 and Rapid 7.

Figure 2 below is a map of the nine corridors recommended for further study. Recommendations for the next steps and additional studies are discussed in the next chapter.

Figure 2: Map of the Nine Countywide Corridors Recommended for Additional Studies



NEXT STEPS

Further steps undertaken for any of the recommended corridors would necessarily include a more detailed corridor level analysis and/or environmental review, detailed planning and conceptual design work, additional public outreach, and work with the affected jurisdictions along the individual corridors. The purpose of the corridor-level environmental reviews is to identify and evaluate any significant or potentially significant environmental impacts associated with the implementation of bus lanes and address appropriate and feasible mitigation measures and alternatives that would reduce or eliminate those impacts. This more detailed work is needed should Metro decide later to seek discretionary grant funds to implement any of the proposed BRT corridors.

The detailed corridor-level analysis and environmental reviews would examine the nine recommended regional BRT corridors identified in the previous chapter. It is recommended that the detailed corridor studies be developed in several phases, beginning with the Vermont and the North Hollywood to Pasadena corridors. Vermont (Westside/Central service area) is the second (behind Wilshire Boulevard) most important bus transit corridor in the county with almost 50,000 weekday boardings. It also ranks at the top of this study for having the highest potential 20-year net benefits. The North Hollywood to Pasadena corridor (San Fernando Valley service area) has been identified in several studies as being a key regional connection that is currently missing within the existing transit system. This corridor also has strong support from the affected cities of Pasadena, Glendale, Burbank, and the Burbank Bob Hope Airport. It is suggested that the Los Angeles Department of Transportation (LADOT) consider modifying their existing peak-hour freeway Commuter Express Line 549 to an all-day, more frequent and possibly branded service while the detailed corridor study is conducted. We anticipate that each study would take approximately 18 to 24 months to complete.

Once these first two corridor studies are complete, the next group of corridors can begin their corridor level analysis. We recommend that the second phase of studies include the Hawthorne (South Bay service area), Valley (San Gabriel Valley service area), and Atlantic (Gateway service area) corridors. This would allow for at least one corridor from each service area to be completed.

The third phase of corridor studies could include the Artesia (Gateway service area) and the Whittier (Gateway service area) corridors. These BRT corridors are proposed to be operated by Long Beach Transit and Montebello bus lines, respectively. However, given the strong interest from both transit agencies to implement some type of BRT service, it may be possible to seek some source of funding to implement Rapid bus type service earlier while studying the feasibility of implementing enhanced BRT service that includes peak period bus lanes.

The last phase of corridor studies includes the Santa Monica (Westside/Central service area) and the Pico (Westside/Central service area) corridors. These two corridors were also deemed worthy of further study, as they both rank high for producing significant 20-year net benefits with the implementation of peak period bus lanes and other improvements. Although the above phasing of the corridor studies is recommended, the actual phasing of the studies will be dependent upon whether or not Metro chooses to conduct the additional corridor studies and implement any new BRT corridors.

If the studies were completed, further investigation into capital and operating funding options with a specific financial plan and refined cost estimates would be provided. LA Metro's experience with its existing Metro Rapid and BRT services has demonstrated that operating cost savings can potentially be achieved because of the improvement in travel time resulting from features like transit signal priority (TSP) and exclusive lanes. These features allow buses to serve their routes more expeditiously, enabling fewer buses and drivers to maintain a given service frequency on a line. Moreover, the improved performance of Metro's BRT routes has attracted additional riders to the affected corridors, yielding increased fare revenues and other benefits, all of which help Metro achieve its sustainability goals.

APPENDIX A. LITERATURE REVIEW

Introduction

The purpose of the Los Angeles County Bus Rapid Transit (BRT) and Street Design Improvement Study is to further develop recommendations for an effective County-wide BRT system that includes dedicated peak hour bus lanes using evaluation and implementation criteria established as part of this study. Demands for viable alternatives to the automobile have increased as congestion continues to slow both automobile and bus travel. The implementation of bus lanes will significantly improve bus passenger travel times and schedule reliability by allowing buses to travel in dedicated peak period bus lanes for most of their route, making transit more competitive with automobiles.

This report provides a summary of studies and other documents related to the Los Angeles County BRT and Street Design Improvement Study. The following sections review studies related to evaluating the need for and implementing an effective Countywide BRT system.

Previous Studies

Shared-Use Bus Priority Lanes on City Streets: Case Studies in Design and Management - Asha Weinstein Aggrawal, Todd Goldman, Nancy Hannaford (April 2012)

Description

This study examines the design and operations of bus lanes in congested urban centers. It focuses on bus lanes that operate in mixed traffic conditions, and provides the historical, legal, institutional, engineering, and enforcement contexts for understanding the bus lane development and management strategies in seven cities. The study examines four main questions:

- How do the many public agencies within any city region that share authority over different aspects of the lanes coordinate their work in designing, operating, and enforcing lanes?
- What are the physical design aspects of the lanes?
- What is the scope of the priority use granted to buses? When is bus priority in effect, and what other users may share the lanes during these times?
- How are the lanes enforced?

Findings

- In most of the cities examined, there has been movement toward greater integration of designing, operating, and enforcing bus lanes. The most common development has been the emergence of urban transportation agencies with integrated responsibility for both urban transit services and city streets, such as Transport for London, the San Francisco Municipal Transportation Agency, and Seoul's City Transportation Headquarters.

- Bus priority lanes are most commonly located along the curbside on city streets. Over the past decade, prominently painted lanes for bus lane designs have been common. No single "one size fits all" bus lane design or alignment is suitable throughout any of the cities in this case study.
- In general, nearly every city studied allows all vehicles to use curbside bus priority lanes to make right turns and to access driveways on a given block. In most cities, bus lanes only operate during peak hours of public transit use. As cities shift toward the new physical layouts for bus lanes discussed above, they have been able to extend operating hours.
- Transportation agencies rarely have the luxury to develop and implement optimal bus lane enforcement strategies. In most cases, enforcement of laws concerning the operation of motor vehicles is a police responsibility, and the granting of police powers to a civilian transportation agency is not a possibility. Cities have dealt with this challenge in various ways.

Implications

- Prevalence of peak period bus lanes throughout U.S.
- Importance of jurisdictional support in identifying corridors for BRT lanes and improvements

Bus Rapid Transit and Development: Policies and Practices that Affect Development Around Transit – Report No: FTA-FL-26-7109.2009.512/1/2009 - Cheryl Thole and Joseph Samus (December 2009)

Description

This paper is a response to a need for a more comprehensive understanding of the relationship between land use and BRT system development, particularly in comparison to other fixed-guideway modes such as light rail (LRT). This research examines current or potential development impacts along BRT corridors in North America, and the policies and practices that have been implemented within each respective city that has the ability to affect development patterns around transit. The cities that were selected for discussion are those in which both modes operate.

Findings

Development along BRT corridors has often been encouraged through different land use policies or practices that have been established and adopted by local governing agencies or by other contributing organizations. It is therefore understood that a particular city's approach to the transit culture has the ability to shape and determine whether or not development occurs and if it will be successful. These policies and the local climate may be more of an important factor than the issue of permanence of a transit system.

What has been shown from significant development along the Boston Silver Line is that the city has included BRT in their policies and plans and labeled it as a rapid transit mode that is significant and capable of supporting both development and the resulting increased demand for transit ridership in

those particular locations. Whether or not the development has occurred because of the BRT or because the areas were slated for redevelopment is a separate issue.

Future amendments, resolutions, and policies could improve incentive based BRT development and truly differentiate it from LRT. As it stands today, there are no noticeable differences between the incentives offered by the studied cities for BRT and LRT. The development around mass transit corridors seems to be dependent upon public support and developer interest with various factors determining the interest in the corridor development.

Implications

- BRT has potential to generate economic development
- Local commitment and physical permanence are important development success factors

Countywide Bus System Improvement Plan, Los Angeles County Metropolitan Transportation Authority (2001)

Description

The Countywide Bus System Improvement Plan (CBSIP) was developed to ensure a regional bus system will be operated within a cooperative environment, balanced between service quality and cost. The CBSIP is a financially unconstrained business plan, which details improvements to the bus system in Los Angeles County. A three-tiered system of service is included in the BSIP to ensure all County-wide transit operators are included in the planning process and implementation of BSIP:

- Core regional service
- Community connectors
- Local services

The Bus System Improvement Plan 2020 Vision outlines an ideal bus system County-wide. Key elements of the 2020 Bus System Vision include the vision, goals and strategies. Tactics to implement the goals and strategies of the 2020 vision will be independently developed and administered by bus agencies. Programs and resources to implement the 2020 Bus System Vision were developed to be a component of the 2008 Long Range Transportation Plan (LTRP). As of 2001, BSIP has been incorporated into the LRTP. The program was created to improve service on overcrowded bus lines County-wide for the transit-dependent.

BSIP contains six elements: crowding relief and more frequent service, mobility improvements, security, pricing and fare collection, service quality improvements, and customer focus. The plan also coordinates planning concepts such as Mobility Alliance and Smart Shuttle Programs with the ongoing service quality improvements like graffiti abatement and bus shelter installations. Since the program

uses Proposition C 40% Discretionary funds, recipients must spend their BSIP money on transit service expansion or improvements.

BSIP consists of two phases. The first is the five-year implementation, which addresses new initiatives and currently budgeted improvements that can occur within six months. The second phase incorporates the BSIP into the LTRP, and it involves a variety of strategies for making sustainable improvements to the bus system, which can be implemented over the next several years, consistent with the Short Range Transportation Plan.

Implications

Validates similar approach in the CBSIP study as well as regional balance and outreach among stakeholders in this study's approach

- Underscores need to look at other related investments that could leverage any investment recommendations for BRT

Metro Rapid Presentation, Los Angeles County Metropolitan Transportation Authority (Rex Gephart, 2005)

Description

In response, to the need for enhanced speed and reliability of Metro's bus system in the late 1990s, Metro and the City of Los Angeles developed the Metro Rapid Program in June 2000. A major program goal was to improve bus speeds by 20-25 percent. The two demonstration lines, along Wilshire/Whittier and Ventura Boulevards, saw increased ridership and improved travel times (indicative of the concept of triple convergence).

Operationally, Metro Rapid began as new service in addition to local service and it allowed customers to choose which service they preferred and adjusted Local/Rapid service levels accordingly. However, per the Consent Decree, no more than one-third of local service on corridor could become Rapid. Overall, passenger travel times have improved by an average of 20 percent over local service. Corridor ridership has increased on those corridors with Rapid service. Fifty-one percent of all system boardings are in Rapid corridors.

Future improvements include the Wilshire BRT Project, off-vehicle payment (explored via the County-wide Bus Lane Study). The Wilshire BRT Project would travel along Wilshire Boulevard from MacArthur Park to the Santa Monica City Line during weekday peak periods. The project aims to improve bus passenger travel times, bus service reliability, and traffic flow along Wilshire Boulevard, while providing other ancillary environmental benefits associated with these improvements.

Meanwhile, the County-wide BRT Study concurrent with this study identified corridors that can accommodate dedicated peak period bus lanes & other bus speed improvements, and looked at street design and operational strategies such as all door boarding.

Implications

- Provides a good summary of the recent history of bus improvements and BRT developments in Los Angeles County, including the program's overall goals and objectives
- These goals and objectives should also be considered for this Study

Los Angeles County Bus Speed and Street Design Improvement Plan Final Report, Los Angeles County Metropolitan Transportation Authority, Los Angeles Department of Transportation Los Angeles County Department of Public Works (December 2010)

Description

Metro partnered with the Los Angeles Department of Transportation (LADOT) and the Los Angeles County Department of Public Works (LACDPW) to conduct the Los Angeles County Bus Speed and Street Design Improvement Plan (CBSIP). The purpose of the study is to evaluate the most effective ways to implement bus speed improvements where buses experience delay. This study builds upon prior Los Angeles area bus transit improvement initiatives including the Wilshire Bus Rapid Transit Project and other Bus Rapid Transit implementations.

Potential bus speed improvements considered in this study include a wide range of capital improvements, engineering improvements, and operational measures, which enhance bus passenger travel times and schedule reliability. The targeted improvements are intended to be relatively low cost and easy to implement. These improvements should provide valuable time savings for riders as well as operating cost savings for the operating agency and opportunities to reinvest in improved service.

Study Stages

1. Review of industry best practices for bus speed improvements
2. Screening of existing Metro arterial services to identify those with the greatest potential opportunities to improve passenger travel times
3. Field review of Metro arterials with greatest potential for improved passenger travel time in order to generate recommended improvements
4. Cost-benefit assessment of proposed bus speed improvements to recommend a set of arterials for subsequent implementation-focused studies
5. Discussion of likely impacts of proposed bus speed improvements
6. Identify a list of opportunities to enhance the bus stop facilities along the proposed arterials identified for bus speed improvements

Findings

Six arterials were selected for the first phase of bus speed improvement implementation based on the greatest potential benefit from delay reduction. A cost-benefit analysis of the recommended improvements identified three higher cost arterials for implementation study and three lower cost arterials for more immediate implementation.

Next steps include tasks centered on the following elements to assist Metro and other project partners with moving forward into the next phase of the CBSIP.

- Lower Cost Arterials
- Higher Cost Arterials
- Quality of Life
- Parking
- Traffic

Implications

- Lays important groundwork for identifying arterials with great potential for additional ridership and service improvements
- Has an excellent summary of costs and benefits from an operations perspective

Planning and Programming Committee Meeting: Los Angeles County Bus Rapid Transit Corridors, Los Angeles County Metropolitan Transportation Authority (October 2011)

Description

At the direction of the Metro Board at the August 4, 2011 meeting, Metro staff developed a strategy for identifying a minimum of five potential corridors in Los Angeles County that could accommodate an effective BRT system. This strategy would build upon the recommendations of the Los Angeles County Bus Speed and Street Design Improvement Plan (CBSIP), published in December 2010 (refer to Section 0).

The purpose of the CBSIP study was to identify near term, low cost, highly effective improvements that could be quickly implemented and lead to substantial bus speed improvements. Potential bus speed improvements included road surface repaving, selective street widening, enhanced transit signal priority, optimized signal operations, and bus stop relocations. Even though the CBSIP's focus was on improvements of a smaller scale than a full dedicated bus lane, the methodology used is valid for bus lane analysis as well. The CBSIP methodology closely parallels the criteria requested by the Board in August 2011.

Findings

Based on the findings of the CBSIP study, staff looked at the top eighteen corridors previously identified as benefiting the most from bus speed improvements for a large number of riders. Of the eighteen, seven of the corridors appear promising as potential BRT corridors. These corridors include: Vermont Avenue, 3rd Street, Santa Monica Boulevard, Western Avenue, Pico Boulevard, Venice Boulevard, and Sunset Boulevard. Of the seven corridors, five are existing Metro Rapid corridors (Vermont, Santa Monica, Western, Pico, and Venice).

Metro staff recommended that an additional nine transit corridors also be studied. Of these, Glendale Boulevard, Artesia Boulevard, Hawthorne Boulevard, Huntington Drive, and Washington Boulevard are existing transit corridors. The remaining four new corridors were identified as being important regional links and/or connections currently missing in the existing transportation system and include:

- SR-134 corridor connecting the Metro Gold Line in Pasadena to the Metro Red Line at North Hollywood
- Downtown Burbank to Hollywood corridor connecting the Metro Red Line at the North Hollywood Station to either the downtown Burbank or Burbank-Bob Hope Airport Metrolink stations
- I-405 corridor linking Los Angeles County to Orange County (this is separate from the Measure R Sepulveda Pass project)
- Whittier/Lambert Road corridor linking Los Angeles County to Orange County

The main recommendations of the study are as follows:

- Hire a consultant to further develop recommendations for a Countywide BRT system, consistent with findings from the CBSIP study.
- Expand study to include an additional nine transit corridors to take a system-wide approach in looking at BRT implementation.

Implications

- Several corridors in the County can feasibly be improved through bus lanes or other improvements
- Study did a thorough job of identifying potential BRT corridors based on opportunities for ridership and bus speed improvements
- More study needed based on other evaluation criteria

Transportation Research Board's Transit Cooperative Research Program (TCRP) Synthesis 83: Bus and Rail Transit Preferential Treatments in Mixed Traffic (2010)

Description

This report addresses a range of potential transit preferential treatments that could be applied to bus and rail systems operating in mixed traffic on urban streets. Transit preferential treatments are a key component to the provision of travel time savings and improved on-time performance for bus and rail systems operating in mixed traffic on urban streets. Enhanced bus operations where transit preferential treatments are particularly critical include bus rapid transit and express bus.

The report describes these different treatments and reviews their application, costs, and impacts. Information was acquired through a literature review, a transit and traffic agency survey, and selected case studies in four U.S. urban areas: San Francisco, Seattle, Portland, and Denver.

Findings

The survey suggests that:

- Transit Signal Priority is the most popular preferential treatment on urban streets.
- There are no standard warrants being applied to identify the need for particular treatments.
- Most transit agencies do not have formal comprehensive transit preferential treatment programs.
- Only a slight majority of transit agencies have intergovernmental agreements with traffic engineering jurisdictions in their service area related to developing and operating preferential treatments.
- Transit agency involvement in preferential treatments tends to focus on identifying, locating, and designing treatments, with construction and maintenance primarily left to the roadway/traffic jurisdictions.

Five major areas for potential added research have been identified from this report:

1. Limited stop/stop consolidation impacts
2. Warrants for transit preferential treatments
3. Benefits of multiple transit preferential treatments
4. Tradeoffs on intersection-based transit preferential treatments
5. Intergovernmental relationships in transit preferential treatment development

Implications

- Important to ensure jurisdictional support for any recommended improvements, particularly involving traffic authorities

- Study provides useful ideas for prioritizing recommended investments from traffic signal priority, to queue jump lanes and other intersection improvements to exclusive lanes for BRT operation

Bus Rapid Transit: Chicago's New Route to Opportunity, Chicago Metropolitan Planning Council (August 2011)

Description

Chicago's Metropolitan Planning Council (MPC) prepared a BRT report aimed at reshaping the way that the City of Chicago thinks about the relationship between transit and livability. Its primary purpose was to serve as an initial assessment of where BRT could be feasible, best supports existing community assets, and fills accessibility gaps in the current transit network. The report also aimed to pioneer a method for using livability as a guide for public investment. MPC hypothesized that livability measures can be used in screening corridors for enhanced transit service, not just BRT.

The report is separated into 4 phases:

- Phase I: Basic Suitability for BRT
- Phase II: Constructability and Livability
- Phase III: Connectivity to Existing Transit
- Phase IV: Modeling Demand for BRT

Findings

The report recommended ten "new" BRT routes for Chicago. BRT in Chicago could generate substantial new demand for transit, trigger new investment and development around its stations, create new jobs, and generate needed tax revenues. This network could be built at a fraction of the cost of light or heavy rail.

The report also put forward a methodology for screening and prioritizing transit investments. This methodology evaluates standard transportation metrics such as current ridership and travel time and also quantifies livability objectives such as improved access in underserved areas, and connections to employment centers, shopping and schools. The modeling phase validated the hypothesis that livability measures can and should be used in screening corridors for enhanced transit service.

Next steps include gathering support for investment toward the implementation of the recommended BRT routes as well as the institutionalization of livability screening methodology.

Implications

- Enhances BRT literature regarding methodology for analyzing corridors of potential in achieving livability goals beyond transit service improvements, such as economic development and neighborhood improvements
- Very similar methodologies described to those being used in this Study

From Buses to BRT: Case Studies of Incremental BRT projects in North America, John Niles, Lisa Callaghan Jerram (June 2010)

Description

This report examines five approaches to BRT systems as implemented by public transit agencies in California, Oregon, and Ontario. The study's objective is to understand and analyze existing BRT implementation by agency. This includes steps and strategies to identify innovations that could incrementally upgrade a bus service network while improving performance and attracting more riders.

Findings

The case studies show that BRT, as applied in North America, is a discretionary combination of elements that can be assembled in various combinations over time. Transit agencies can widely vary which combination of elements best serves their needs, given their specific circumstances. Every element can incrementally add to the quality or attractiveness of the service. This variability provides transit agencies with many benefits, including the ability to match physical infrastructure with operating requirements. Transit agencies also can select specific BRT components and strategies, such as traffic signal priority and increased stop spacing, and apply them to existing local bus operations as a way to increase bus speeds and reduce operating costs.

This variability creates challenges in terms of defining what constitutes BRT. For instance, a wide range of systems are labeled as BRT in North America, creating confusion among policymakers and the public regarding the definition of BRT. Additionally, this variability can create planning challenges. For instance, how should a transit agency prioritize and justify a given level of BRT investment? What features should be prioritized and how should they be implemented (in phases, only in certain parts of a route, etc.)?

The report suggests that incremental improvements, applied widely to regional bus networks, may be able to achieve significant benefits at a lower cost than substantial infrastructure investments focused upon just one or a few corridors. The availability of BRT elements in many incremental combinations suggests that an expanded policy framework that enables objective comparison across these options and the allocation of funding to projects that achieve the greatest benefit at the lowest cost is warranted.

Implications

- Some incremental improvements short of full or peak period exclusive lanes could also greatly improve BRT and traditional bus service outcomes
- Similar recommendations can be identified in our Study for corridors not recommended for exclusive lanes

Montgomery County Department of Transportation Countywide Bus Rapid Transit (BRT) Study Briefing, Parsons Brinckerhoff (April 2011)

Description

The Montgomery County Department of Transportation (MCDOT) initiated the Countywide Bus Rapid Transit (BRT) Study to identify key corridors within the County that could facilitate premium rapid transit service. The study explored the feasibility of constructing a set of BRT corridors given constrained availability of right-of-way on County and state roads. The study proposed BRT treatments, including exclusive transitways, transit signal priority (TSP) and queue jump lanes, and improved stations – all of which could be feasibly implemented in Montgomery County. The recommended 150-mile BRT network could significantly increase daily transit use during peak-hour.

The next section covered what BRT is and its potential features and variations.

The final section summarized study findings. It lays out the proposed BRT network and treatments at various segments within each proposed corridor. Ridership and operating costs are also covered, based on the Maryland Transit Administration's transit forecasting model. The forecasted ridership for 2040 is almost double the ridership for existing Ride On service throughout the County.

The cost of the system, a network of approximately 150 route miles including all the elements listed previously, is estimated to be $2.5 billion (not including right-of-way costs) in 2011 dollars. This reflects the cost of incorporating the highest level of design possible for the proposed BRT system. Actual total system costs would vary based on anticipated funding availability and implementation strategy.

Key Considerations for BRT implementation include:

- Costs
- Land use and BRT branding

Implications

- Outlines and explains the range of costs and other implementation considerations that can be explored for use in this Study

Metro's 2010 Pedestrian Symposium - Walking into the Future City (Agenda), Los Angeles Metropolitan Transportation Authority (2010)

Description

Diego Cardoso, Metro Executive Officer and Los Angeles City Planning Commissioner (in absentia) recognizes that every transit rider is a pedestrian and walking is a key element in the transportation system and a defining factor in building a livable and sustainable city.

Topics covered, per the agenda:

- "What does the future city look like knowing that we are aging, overweight and unhealthy today? What are the mobility challenges in the future city?"
- "What are the walking needs in the future city"
- Creating the Best Walking Environments. Using Our Transportation and Land Use Policies to Create Complete Streets for All Users. Have we created cities that are unhealthy to our mobility and well being?
- Toxic Cities
- Walk this Way: Pedestrian Planning in (Climate) Changing World
- If You Don't Count It, It Doesn't Count
- A Complete Green Street: Streetscape Improvement Project
- Linking Pedestrians Together
- Getting the State to Step Forward or Step Back,
- How does the transportation system play a role in the health of our communities?
- Getting Great-Grandma and Little Timmy Walking Safely in Today's City. Preparing Cities to Accommodate an Aging Population's Mobility. Improving Accessibility, Creating Better Environments. How do we design healthier communities?
- How Do We Make Change Happen?
- Safe Routes to School
- Preparing for an Aging Population
- The Built Environment Matters to Community Health
- Designing Communities to Accommodate Persons with Disabilities
- Walking: From a Community Perspective
- Do Streets Need to be Great to be Good?
- Innovative and Cost-Effective Strategies to Improve the Walking Environment. Funding and Implementing Walking Strategies. (Part 1) Video: Transforming NYC Streets: A Conversation with Janette Sadik-Khan
- Innovative and Cost-Effective Strategies to Improve the Walking Environment. Funding and Implementing Walking Strategies. (Part 2)
- Re-Imagining The Cities Of Tomorrow
    - A Look at the Future Cities if We Stay on Our Present Path.

- Want Different, Design Different: Improving Mobility and the Health of Our Communities.
- Can great-grandma and little Timmy walk safely in the city, yet?

Implications

- Important non-service considerations for streetscape improvements in the later phases of this study
- Useful tools for analyzing walkability potential for the short list of corridors in this study

Discussion on Capital, Operating and Financial Scenarios, Montgomery County, Maryland (2012)

Description

This discussion highlights scenarios for capital and operating costs and financing for a potential BRT project in Montgomery County, Maryland.

The objectives of this discussion include:

- Present RTV financial scenarios – based on Finance Working Group efforts
- Seek Transit Task Force feedback
- Revise/adjust scenarios based on feedback provided and incorporate results into Task Force Report

Capital costs are projected to be implemented in three phases and are based on a short and a long-term construction scenario. These estimates are based on several operating assumptions. These include:

- Parsons Brinckerhoff cost per mile assumptions and RTV system route length
- Base fares increasing every year with inflation
- Boardings based on Parsons Brinckerhoff per mile estimates
- Tested under short and long-term implementation schedules

<table>
<tr><th>Capital Costs</th><th>Operating Costs</th></tr>
<tr><td>1/2 Mile District property taxes</td><td>1/2 Mile District property taxes</td></tr>
<tr><td>Property tax on 90% of County assessable base

• 2013—2018 – 0.9% ramping up to 6.3% annually
• 2019 and thereafter – generally 6.0% annually</td><td>Property tax on 90% of County assessable base</td></tr>
<tr><td>State/County funding

• $20 million starting in 2014, $35 million in 2017 and $45 million in 2019, continuing thereafter</td><td rowspan="2">Property tax on 100% of County assessable base</td></tr>
<tr><td>Private sector contribution

• Assumed to equal 1/3 of Right Of Way and station costs</td></tr>
</table>

Several financial scenarios were explored based on these potential sources and on some financing assumptions. In summary, each scenario requires approximately $2 billion in debt issuance based on established financing parameters. Additionally, the tax rate varies for each scenario was based on several factors: base of taxation, availability of Maryland state and local funding, and implementation schedule. Subsequent sections of this presentation discuss tax rate smoothing alternatives and alternative state funding scenarios.

Implications

- Useful cost data and funding scenarios that could be employed in this study
- Important cost factors to consider in the financial planning task of this study

Reinventing Los Angeles: Seizing the Transit Opportunity, *The Planning Report,* Ken Bernstein (May 2012)

Description

This article summarizes the City of Los Angeles Planning Department's approach to transit-oriented development (TOD). Generally, the Planning Department favors incorporating context-specific community and specific plans around enhanced livability, focused on transit investments. The author poses the question of whether Los Angeles is ready to seize new opportunities created through the passage of Measure R to create lasting changes in the look, feel and form of communities in Los Angeles.

The author highlights key pieces of the City's long-range plan to provide a sense of how these pieces can help reshape Los Angeles. One of the central principles around the City's current planning

framework is to focus new development around transit stations. These Transit Oriented Development (TOD) plans will provide zoning requirements and incentives, design standards, pedestrian-, bicycle- and transit-oriented street standards, streetscape guidelines, and housing strategies. Each plan will be tailored to its local context.

Several grants, local and federal, have allowed the Planning Department to pursue TOD as an opportunity to achieve mutually beneficial goals between land use, transportation, and public health goals. The author then highlights projects that the Planning Department has participated in with Metro and the Los Angeles County Department of Public Health.

The article suggests that encouraging lively and attractive communities near transit stations is all about creating choices around access to job opportunities, housing options, walkable, bike-friendly, and healthy neighborhoods, and to travel via alternative modes.

Implications

- Identifies important aspects of the City of Los Angeles' TOD related long-range planning program
- Useful compendium of joint planning projects with Metro and could help inform related recommendations on corridors in later phase of this Study
- Although only Los Angeles, this work could serve as a "template" for other jurisdictions in Los Angeles County affected by the corridor recommendations of this Study

Transportation Research Board's Transit Cooperative Research Program Report 117 - Design, Operation, and Safety of At-Grade Crossings of Exclusive Busways, Vanasse Hangen Brustlin, Herbert Levinson, et al., (2007)

Description

Transit Cooperative Research Program (TCRP) Report 117 provides information and guidance for improving the safety and performance of exclusive busways through safe design and operation of at-grade crossings. The report derives background information from a detailed literature review and interviews with selected transit agencies in North America.

The report includes guidance for at-grade intersections along:

- Busways within arterial street medians;
- Physically separated, side-aligned busways;
- Busways on separate rights-of-way; and
- Bus-only ramps. The intersections discussed include highway intersections, midblock pedestrian crossings, and bicycle crossings.

This information can be applied to improve safety at busway crossings while maintaining efficient transit and highway operations and minimizing pedestrian delay. These guidelines are intended to

assist transit, traffic engineering, and highway design agencies in planning, designing, and operating various kinds of busways through street and roadway intersections.

Implications

- Good summary of important design guidelines and considerations for pedestrian and vehicular cross traffic that should be employed in bus lanes and busway recommendations that could ensue from this Study
- Good design guidelines for bicycle, station and other aspects of BRT running way design recommendations

Transportation Research Board's Transit Cooperative Research Program Report 118 – Bus Rapid Transit Practitioners Guide, Kittleson & Associates Inc., Herbert Levinson, and DMJM+Harris (2007)

Description

This report provides information on the costs, impacts, and effectiveness of implementing selected BRT components. It covers running ways, stations, vehicles, service plans, intelligent transportation systems (ITS) applications, fare collection, and branding. This research reviews the BRT demonstration projects underway or planned in the United States, similar projects throughout the world, and bus systems that employ various components.

The report suggests that BRT lines should be planned as an interconnected system of routes and incrementally developed, with the most promising links built first. Additionally, BRT should be planned and developed through a process that stresses solving demonstrated current and forecast future problems and needs. Planning requires a realistic assessment of demands, costs, benefits, and impacts for a range of alternatives that includes a "base case" and may include one or more rail rapid transit options. It also highlights the importance of community and decision-maker involvement to identify a clear vision of BRT needs and opportunities.

Moreover, the report argues that BRT plans should focus on major markets, take advantage of incremental development opportunities, and promote complementary "Transit First" policies. "Deconstruction" of a BRT system by removing elements critical to its success to cut costs should be avoided. The addition of unnecessary, capital cost–intensive features also should be avoided.

Findings

The report recommends that the following key steps in developing and analyzing BRT service alternatives should include:
1. Establish the need.
2. Identify the market
3. Select type of running way
4. Recognize public preferences.

5. Integrate BRT with existing bus services.
6. Consider funding availability.
7. Explore development opportunities.

Implications

- Comprehensive set of planning and design guidelines for BRT; the most important work in the industry literature for BRT planning
- Process described in TCRP 118 forms the basis for the phased screening employed in this study
- Good articulation of trade-offs associated with BRT planning and will form the basis for recommending the various tradeoffs in this Study's final report

Transportation Research Board's Transit Cooperative Research Program Report 90 - Bus Rapid Transit Volume 2: Implementation Guidelines, Herbert Levinson, et al. (2003)

Description

TCRP Report 90: Bus Rapid Transit, Volume 2, identifies the potential range of BRT applications through 26 case studies and provides planning and implementation guidelines for BRT.

This report covers the main components of BRT - running ways, stations, traffic controls, vehicles, intelligent transportation systems, bus operations, fare collection and marketing, and implementation.

It also describes BRT concepts, planning considerations, key issues, the system development process, desirable conditions for BRT, and general planning principles. It provides an overview of system types and elements, including stations, vehicles, services, fare collection, running ways, and ITS applications.

Implications

- Guidelines contained in the report form the basis for the corridor screening criteria and methodology employed in this Study

Bus Rapid Transit Projects Improve Transit Service and Can Contribute to Economic Development, United States Government Accountability Office (July 2012)

Description

This review found that few of the BRT projects in the U.S. used dedicated or semi-dedicated lanes – a feature commonly associated with BRT in international systems. Project sponsors and officials cited costs, community needs, and the ability to phase in additional features as reasons for design differences between the U.S. and the international implementation of BRT. Despite ridership increases and reductions in travel times in a majority of U.S. BRT systems, ridership still lags behind rail transit

projects and international BRT systems. Project sponsors attributed this disparity to higher population densities internationally and a preference for rail transit domestically.

Capital costs were generally lower for BRT than rail transit projects; this is largely due to capital elements required for rail transit but not for BRT. However, these cost differences should be considered in the context of additional riders, operation costs, and higher long term costs.

This study also found that most local officials believe that BRT projects have a positive influence on local economic development and other community benefits, including short construction times and implementation and operational flexibility. Officials still believe that rail transit has greater potential for economic development opportunities than BRT. However, enhancing BRT with permanent physical elements (such as dedicated lanes or guideways), can increase its potential for localized economic development. The potential for stimulating new economic development opportunities is enhanced when BRT is combined with local policies and incentives that encourage transit-oriented development. An analysis of land value changes near BRT supports these conclusions.

Despite the potential benefits of BRT, its development is susceptible to broad economic conditions, as has been the case during the recent economic recession.

Implications

- Documents the range of economic return expectations from BRT investments in examples of projects throughout the U.S.
- Also documents costs and benefits of BRT investments from these project examples, which could help form the basis for such calculations in this Study's corridor recommendations

APPENDIX B. ECONOMIC DEVELOPMENT

Introduction

This analysis identifies specific existing economic development plans and general plans along each of the 14 field-reviewed bus rapid transit (BRT) corridors as part of the Los Angeles County Bus Rapid Transit and Street Design Improvement Study. These plans are reviewed herein for specific transit-supportive initiatives that have the potential to influence the BRT development on a given corridor. Addressing the economic development potential of these corridors is important as Moving Ahead for Progress in the 21st Century (MAP-21) places increased emphasis on land use effects and economic development potential of proposed BRT projects.

Background

A symbiotic relationship exists between transit and urban form. The relationship between residential densities, employment center densities, and transit patronage is well established. Transit investments can influence compact, mixed-use, and transit-supportive development. Such development, in turn, can induce additional transit ridership. This symbiotic relationship is ongoing, with transit and urban form continually reinforcing, reshaping, and helping to reconstitute each other. The accessibility advantage that transit can confer on particular locations is often capitalized by real estate markets into higher property values and rents.[1]

Within compact urban areas, transit service in corridors that contain a variety of residential and non-residential activities can prove especially attractive as a mode of travel. The characteristics of areas around stations strongly influence the way in which patrons travel to and from transit stations. In employment centers, land use mix strongly contributes to the increased transit use, just as in residential neighborhoods urban design that supports pedestrians clearly influences the mode of access to transit.[2]

Existing research on transit-supportive land uses shows that regions with successful transit-supportive development possess the following characteristics:

- Commitment to a regional vision of high-capacity transit connections between regional centers or in development corridors, as well as a vision of transit's supportive role at the neighborhood level
- Strong, respected institutions that people trust to deliver services
- Political cultures that value transit
- High-quality transit service that attracts riders
- Regional growth that channels development to station areas
- Transit stations located in areas where the market supports development
- Regional policies that focus growth in transit corridors and limit it elsewhere

[1] Transportation Cooperative Research Program (TCRP) 16. (1996). Part I: Transit, Urban Form, and the Built Environment: A Summary of Knowledge.
[2] Transportation Cooperative Research Program (TCRP) 16. (1996). Part I: Transit, Urban Form, and the Built Environment: A Summary of Knowledge

- Station-area policies and programs to support private sector investments and transit-friendly development
- Long-term commitment to transit-supportive development[3]

Economic development can be a potential benefit derived from implementation of a BRT system. Local land use policies in proximity to BRT corridors often dictate the level of economic growth that such a transit system can bring to a local area. In addition, developers favor BRT systems with more permanent, visible features.[4] Moreover, existing policies and development patterns are part of the economic development evaluation for the project justification rating in the new FTA guidance for Small Starts projects.[5]

Development along BRT corridors has been encouraged through different land use policies that local government agencies have established and adopted. A particular city's approach to the transit culture has the ability to shape and determine whether or not development occurs and if it will be successful.[6]

Certain factors can enhance the ability of a BRT system to generate economic development similar to that of rail transit. Specifically, economic development near a BRT system can be supported by the following elements:

- Physical BRT features that convey a sense of permanence to developers
- Plans and design features that help provide better pedestrian connections between stations and surrounding neighborhoods
- Major institutional, employment, and activity centers along or near the BRT corridor that can sponsor development projects
- Transit-supportive local policies and development incentives.[7]

BRT systems can also spur development in a corridor simply by providing enhanced connections between major employment and activity centers. Transit projects linking residential areas to employment centers or attractions can generate economic development. BRT systems with dedicated running ways, well-designed stations with enhanced pedestrian amenities, and other fixed assets represent a larger investment in the corridor by the public sector and assure developers that the transit service and infrastructure will be maintained for decades to come. The type of BRT is important – those

[3] Transportation Cooperative Research Program (TCRP) 16. (1996). Part I: Transit, Urban Form, and the Built Environment: A Summary of Knowledge
[4] Transportation Cooperative Research Program (TCRP) 118. (2007). Bus Rapid Transit Practitioners Guide (developer survey in Appendix)
[5] Federal Transit Administration (2013). Federal Register, Volume 78 Issue 6: Appendix A to Part 611--Description of Measures Used for Project Evaluation
[6] Federal Transit Administration. (2009). Bus Rapid Transit Development: Policies and Practices that Affect Development Around Transit.
[7] Government Accountability Office. (2012). Bus Rapid Transit Projects Improve Transit Service and Can Contribute to Economic Development

with physical features more closely resembling rail tend to generate more development interest from the private sector.[8]

Land use policies can incentivize transit-oriented development near BRT stations, with a mix of land uses and sufficient pedestrian amenities. Such incentives can stimulate real estate development that coincides with the implementation of a BRT system. Examples of land use zoning strategies supportive of transit include "transit overlay" zoning districts to encourage transit-oriented development along BRT corridors. Provision of density bonuses and relaxation of developer parking mandates also encourage mixed residential and commercial development around transit stations.[9]

Each of the 14 field reviewed corridors currently being studied possesses unique characteristics in terms of demographics, existing land use, plans and policies guiding growth, population density, and income levels of the surrounding communities. Together, these factors contribute to the economic status of these corridors. Of these factors, the institutional plans and policies guiding growth (more commonly known as specific, redevelopment, and general plans) dictate how communities and designated areas can develop. An understanding of these plans is important for identifying the priorities of local governments and whether they recognize the connection between land-use planning, transit development, and economic development.

FTA New/Small Starts Economic Development Criteria

Metro has previously been successful in obtaining federal funding through the Very Small Starts portion of the Small Starts program for some of its BRT projects. Since the enactment of MAP-21, however, the program's structure and its evaluation criteria for grant awards have changed. Very Small Starts has been eliminated as a category, though FTA may reintroduce an analogous category through evaluation rating "warrants" that the agency is expected to propose later in the year. Moreover, applicants now must achieve justification based on how the predetermined selection criteria have changed in their weightings. Economic development is one such criterion, now accounting for 16.67 percent of the project justification rating and 8.33 percent of the overall rating for New/Small Starts projects. Intertwined with economic development, however, is existing land use and related policies, which also account for equivalent percentages of both the project justification and the overall rating.[10]

Per the New/Small Starts requirements under MAP-21, economic development is assessed on qualitative and optionally, quantitative grounds. The qualitative assessment includes existing or anticipated plans and policies to support economic development near a project. The assessment also considers social equity impacts by examining plans and policies in place to maintain or increase affordable housing in the corridor.[11]

[8] Government Accountability Office. (2012). Bus Rapid Transit Projects Improve Transit Service and Can Contribute to Economic Development
[9] Transportation Cooperative Research Program (TCRP) 90. (2003). Vol. 2: Implementation Guidelines
[10] Federal Transit Administration. (2009). Bus Rapid Transit Development: Policies and Practices that Affect Development Around Transit.
[11] Reconnecting America. (2013). Final New Starts / Small Starts Regulation. Retrieved from:

The optional quantitative measure is based on examining the economic conditions in the corridor and the likely future development and improvements resulting from a particular project. It includes indirect changes in vehicle miles traveled (VMT) resulting from changes in land use (e.g. availability of land in station areas for development and redevelopment) with the resulting environmental benefits calculated, monetized, and compared to the both annualized capital and operating cost of the project for New Starts projects and importantly for BRT, only to the annualized federal share for Small Starts projects.[12]

Existing Specific, Redevelopment and General Plans for the Candidate Corridors

At the local level, government agencies and jurisdictions plan future growth, as well as future economic development, by creating long-range planning documents. Los Angeles County has many jurisdictions, and consequently, many plans and policies for the various areas and cities. The 14 field-reviewed corridors fall within the purview of multiple specific and redevelopment land use plans. Table 1 lists the specific and redevelopment plans currently guiding development for communities along these corridors. Table 2 lists the general plans that guide growth for the Cities through which the 14 corridors traverse.

(Note: data from Table 1 reflects available data at the time that the Economic Development analysis was prepared in mid-2013. Several routes have been refined since that time and the plans of these jurisdictions are subject to change.)

In subsequent studies, a detailed review of these plans is necessary to determine if any of these plans consider development around transit, especially in proximity to transit stops. In coordinating BRT system development with economic development plans, a detailed review of these plans may influence BRT station placing to ensure transit access to future developments. Given that California mandates (through SB 375) that future local long range plans connect land use planning with transit development, future long-term growth documents will likely include strengthened transit-supportive land use policies.

http://reconnectingamerica.org/what-we-do/policy/final-new-starts-small-starts-regulation/

[12] Reconnecting America. (2013). Final New Starts / Small Starts Regulation. Retrieved from: http://reconnectingamerica.org/what-we-do/policy/final-new-starts-small-starts-regulation/

Table 1: Specific and Redevelopment Plans Affecting Candidate Corridors

Corridor	From	To	Jurisdiction	Adopted Plans / Redevelopment Projects	In Adjacent Areas	Source
Artesia	Vermont Ave/ Artesia Blvd	Vermont Ave/ Victoria St	City of LA	Harbor Gateway Community Plan		City Website
	Vermont Ave/ Victoria St	Victoria St /I-110	Unincorporated Area	SBCCOG Shared Vision for a Sustainable South Bay		SCAG
	Victoria St/ I-110	Central Ave/ Walnut St	Carson	Dominguez Technology Center Specific Plan		City Website
	Walnut St/Central Ave	Artesia Blvd/Hilda St	Compton	Dominguez Hills Village Specific Plan		City Website
				Project Area No. 1		Redevelopment Agency
				Compton General Plan Update and Small-Area Visioning		SCAG
	Artesia Blvd/ Hilda St	Artesia Blvd/ Downey Ave	Long Beach	Walnut Industrial Park Amendment 1995		Redevelopment Agency
				North Long Beach Redevelopment Area		Redevelopment Agency
	Artesia Blvd/ Downey Ave	Artesia Blvd/ Palo Verde	Bellflower	West Artesia Boulevard Commercial Highway Planning Area Specific Plan		City Website
	Artesia Blvd/ Palo Verde Ave	South St/ I-650	Cerritos	Corte Fina Specific Plan		City Website
				CRA Redevelopment District		Redevelopment Agency
				Los Cerritos Redevelopment Project Area		Redevelopment Agency

Corridor	From	To	Jurisdiction	Adopted Plans/ Redevelopment Projects	In Adjacent Areas	Source
Atlantic	Atlantic Blvd/ CA-60	Atlantic Blvd/ Telegraph Rd	Unincorp. Area			
	Atlantic Blvd/ Telegraph Rd	Atlantic Blvd/ 26th St	Commerce	Town Center Proj. Area; Atlantic/Washington Proj.		Redevelopment Agency
	Atlantic Blvd/ 26th St	Atlantic Blvd/ 52nd St	Vernon	Redevelopment Area		Redevelopment Agency
	Atlantic Blvd/ 52nd St	Atlantic Blvd/ Randolph St	Maywood	N.Cent. Target Area and Redev. Proj. No. 2		Redevelopment Agency
	Atlantic Blvd/ Randolph St	Atlantic Blvd/ Florence Ave	Bell			
	Atlantic Blvd/ Florence Ave	Atlantic Blvd/ Patata St	Cudahy			
	Atlantic Blvd/ Patata St	Atlantic Blvd/ Abbott Rd	South Gate			
	Atlantic Blvd/ Abbott Rd	Atlantic Blvd / McMillan St	Lynwood		Redev. Proj. Area A and Alameda Proj.	
	Atlantic Blvd/ McMillan St	Atlantic Blvd/ Alondra Blvd	Unincorp. Area			
	Atlantic Blvd/ Alondra Blvd	Atlantic Blvd/ near I-710	Compton			
	Atlantic Blvd/ near I-710	Artesia Blvd/ Hilda St	Long Beach	North Long Beach Redev. Area		Redevelopment Agency
	Acacia/ Walnut St	Artesia Blvd/ Hilda St	Compton	Compton Gen. Plan Update and Small-Area Visioning		SCAG
				Walnut Indust. Park Amendment 1995		Redevelopment Agency
Broadway	Cesar Chavez/ Vignes St	Figueroa St/ 117th St	City of LA	Central City North Community Plan		City Website
				Central City Comm. Plan		City Website
				Southeast LA Community Plan		City Website
				South LA Comm. Plan		City Website
				Alameda Dist. Specific Plan		City Website
				Los Angeles PARK 101 District Phase 2		SCAG
				LA PARK 101		SCAG
				LA Sustainable Transit Communities		SCAG
				Broadway/Manchester Recovery Redev. Proj.		CRA/LA
				Cent. Business Dist.		CRA/LA
				Watts Corridors		CRA/LA
				Council Dist. 9 Redev. Project		CRA/LA

Corridor	From	To	Jurisdiction	Adopted Plans/ Redevelopment Projects	In Adjacent Areas	Source
Burbank - North Hollywood	Hollywood Blvd/Vine St	Burbank Blvd/ Clybourn Ave	City of LA	North Hollywood - Valley Village Community Plan		City Website
				Valley Village Spec. Plan		City Website
				North Hollywood Redevelopment Project		CRA/LA
				Hollywood Redevelopment Project		CRA/LA
	Burbank Blvd/ Clybourn Ave	Hollywood Blvd/ Cohasset St	Burbank	Burbank Downtown Development Standards		SCAG
					Magnolia Park Specific Plan	City Website
				Golden State Redev. Project Area		Redevelopment Agency
	Hollywood Blvd/ Cohasset St	Hollywood Blvd/ I-5	City of LA	Sun Valley - La Tuna Canyon Community Plan		City Website
				Los Angeles Sustainable Transit Communities		SCAG
	Glenoaks/near Burbank Blvd	Olive Ave/San Fernando Rd	Burbank	Burbank Center Plan		City Website
				City Centre Redevelop. Project Area		Redevelopment Agency
Hawthorne	La Brea Ave/Regent St	Hawthorne Blvd/ 190th St.	Entire Corridor	Shared Vision for a Sustainable South Bay		SBCCOG/SCAG
	Market St/La Brea Ave	La Brea Ave/104th St	Inglewood	In-Town Project Area		Redevelopment Agency
					Hollywood Park Specific Plan	City Website
	Hawthorne Blvd/104th St	Hawthorne Blvd/ I-105	Unincorporated Area	Los Angeles County Vision Lennox		SCAG
	Hawthorne Blvd/I-105	Hawthorne Blvd/ 144th St	Hawthorne		Primavera Courts Specific Plan (Traffic Impact Rev.)	
					Ocean Park Village Specific Plan (Traffic Impact Rev.)	
	Hawthorne Blvd/ 144th St	Hawthorne Blvd/ Redondo Beach Blvd	Lawndale	Hawthorne Boulevard Corridor Specific Plan		City Website
				Lawndale Econ. Strategy		SCAG
				Lawndale Economic Revitalization Area		Redevelopment Agency
	Hawthorne Blvd/ Redondo Beach Blvd	Hawthorne Blvd/ 190th St.	Torrance	Hawthorne Boulevard Corridor Specific Plan		City Website
				Meadow Park Redevel. Project Area Map		Redevelopment Agency
				Skypark Redev. Project Area Map		Redevelopment Agency

Corridor	From	To	Jurisdiction	Adopted Plans/ Redevelopment Projects	In Adjacent Areas	Source
North Hollywood-Pasadena (all alignment variations)	Lankershim Blvd/ Chandler Blvd	CA-134/ Clybourn Ave	City of LA	North Hollywood - Valley Village Community Plan		City Website
				Sherman Oaks - Studio City - Toluca Lake - Cahuenga Pass Community Plan		City Website
				North Hollywood Redevelopment Project		CRA/LA
	CA-134/ Clybourn Ave	CA-134/near I-5	Burbank	Media District Specific Plan		City Website
				Rancho Master Plan		City Website
				West Olive Redev. Project Area		Redevelopment Agency
	CA-134/near I-5	CA-134/CA-2	Glendale	Downtown Specific Plan		City Website
				Central Glendale Redev. Project Area		Redevelopment Agency
	CA-134/CA-2	CA-134/Rock Eagle View	City of LA	Northeast Los Angeles Community Plan		City Website
	CA-134/Rock Eagle View	Del Mar Ave/Arroyo Dr	Pasadena	Central District Specific Plan	Colorado Boulevard Specific Plan	City Website
				West Gateway Specific Plan		City Website
				Orange Grove Redev. Project Area		Redevelopment Agency
				Downtown Redev. Project Area		Redevelopment Agency
				Old Pasadena Redev. Project Area		Redevelopment Agency

Corridor	From	To	Jurisdiction	Adopted Plans/ Redevelopment Projects	In Adjacent Areas	Source
Pico	Pico Blvd/ Ocean Ave	Pico Blvd/ Centinela Ave	Santa Monica	Civic Ctr. Specif. Plan		City Website
				Earthquake Recov. Redev. Project Area		Redevelopment Agency
	Pico Blvd/ Centinela Ave	Pico Blvd/Main	City of LA	West Los Angeles Community Plan		City Website
				Wilshire Comm. Plan		City Website
				Westlake Comm. Plan		City Website
				Central City Community Plan		City Website
				Sepulveda Corridor Specific Plan		City Website
				L. A. Sports and Entertainment District Specific Plan		City Website
				LA Sustainable Transit Communities		SCAG
				Cent. Business Dist.		CRA/LA
				Mid City Recov. Redev. Project		CRA/LA
				Pico Union 1 Redev. Project		CRA/LA
				Pico Union 2 Redev. Project		CRA/LA
Roscoe	Fallbrook Ave/ Ventura Fwy.	Vineland Ave/ Magnolia Blvd	City of LA	Chatsworth - Porter Ranch Comm. Plan		City Website
				Canoga Park-Winnetka-Woodland Hills-West Hills Community Plan		City Website
				Reseda-West Van Nuys Comm. Plan		City Website
				Mission Hills-Panorama City-North Hills Community Plan		City Website
				Sun Valley-La Tuna Canyon Comm. Plan		City Website
				No. Hollywood-Vall. Village Comm. Plan		City Website
				Chatsworth-Porter Ranch Comm. Plan		City Website
				Ventura-Cahuenga Blvd. Corr. Spec. Plan		City Website
				North Hollywood Redev. Project		CRA/LA
				Pacoima/Panorama City Earthquake Disaster Assist. Proj.		CRA/LA

Corridor	From	To	Jurisdiction	Adopted Plans/ Redevelopment Projects	In Adjacent Areas	Source
Santa Monica	Santa Monica Blvd/Ocean Ave	Santa Monica Blvd/Centinela Ave	Santa Monica	Earthquake Recov. Redev. Project Area		Redevelopment Agency
					Downtown Specific Plan	City Website
				-	Civic Center Specific Plan	City Website
	Santa Monica Blvd/Centinela Ave	Santa Monica Blvd/Heath Ave	City of LA	West Los Angeles Community Plan		City Website
	Santa Monica Blvd/Heath Ave	Santa Monica Blvd/Doheny Dr	Beverly Hills	9900 Wilshire Specific Plan		City Website
	Santa Monica Blvd/Doheny Dr	Santa Monica Blvd/La Brea Ave	West Hollywood	Pacific Design Center Specific Plan		City Website
				-	Sunset Specific Plan	City Website
	La Brea Ave/Santa Monica Blvd	Cesar Chavez St/Vignes St	City of LA	Hollywood Community Plan		City Website
				Silver Lake - Echo Park - Elysian Valley Community Plan		City Website
				Central City North Community Plan		City Website
				Century City North Specific Plan Area		City Website
				Vermont/Western TOD Specific Plan		City Website
				Los Angeles PARK 101		SCAG
				Los Angeles Sunset Junction Streetscape Vision		SCAG
				Los Angeles Sustainable Transit Communities		SCAG
				Chinatown Redevelopment Project		CRA/LA
				Hollywood Redevelopment Project		CRA/LA

Corridor	From	To	Jurisdiction	Adopted Plans/ Redevelopment Projects	In Adjacent Areas	Source
Valley	Grand Ave/I-10	Valley Blvd/I-710	City of LA	Central City Community Plan		City Website
				Central City North Community Plan		City Website
				Northeast LA Comm. Plan		City Website
				LA PARK 101 District Phase 2		SCAG
				LA PARK 101		SCAG
				Adelante Eastside Redev. Project		CRA/LA
				Bunker Hill Redev. Project		CRA/LA
				Chinatown Redev. Project		CRA/LA
				Central Business Dist.		CRA/LA
	Valley Blvd/I-710	Valley Blvd/ New Ave	Alhambra	Valley Specific Plan		City Website
				Alhambra Vision 2035		SCAG
	Valley Blvd/ New Ave	Valley Blvd/ Hidden Pines Dr	San Gabriel	Valley Blvd. Neighborhoods Sustainability Plan		City Website
	Valley Blvd/ Hidden Pines Dr	Valley Blvd/ Strang Ave	Rosemead	Redevelopment Project Area No. 2		Redevelopment Agency
	Valley Blvd/ Strang Ave	Valley Blvd/ Ramona Blvd/ Tyler Ave	El Monte	El Monte Gateway Specific Plan		City Website
				El Monte Transit Village Specific Plan		City Website
				El Monte Economic Development Plan		SCAG
				Downtown El Monte Redev. Project		Redevelopment Agency

Corridor	From	To	Jurisdiction	Adopted Plans/ Redevelopment Projects	In Adjacent Areas	Source
Vermont	Vermont Ave/ Sunset Blvd	Vermont Ave/ Manchester Bl.	City of LA	Wilshire Comm. Plan		City Website
				South LA Comm. Plan		City Website
				Vermont/Western TOD Specific Plan		City Website
				Expo LRT Station Areas		SCAG
				LA Sustainable Transit Communities		SCAG
				E.Hollywood/Beverly/ Normandie Earthquake Disaster Asst. Project		CRA/LA
				Council Dist. 9 Redev. Project		CRA/LA
				Western/Slauson Redev. Project		CRA/LA
				Vermont/Manchester Recovery Redev.Proj.		CRA/LA
				Hoover Redev. Proj.		CRA/LA
				Wilshire Ctr./ Koreatown Redev. Proj.		CRA/LA
	Vermont Ave/ Manchester	I-105	Unincorporated Area			
Vernon-La Cienega	La Cienega/ Santa Monica	La Cienega/ Rosewood Av.	West Hollywood		Sunset Specific Plan	City Website
					Pacific Design Ctr. Spec. Plan	City Website
	La Cienega/ Santa Monica	La Cienega/ Clifton Way	City of LA	Hollywood Comm. Plan		City Website
	La Cienega/ Clifton Way	La Cienega/ Olympic	Beverly Hills	N/A	N/A	City Website
	La Cienega/ Olympic Blvd	Vernon Ave/ Alameda St	City of LA	Wilshire Comm. Plan		City Website
				West Adams-Baldwin Hills Leimert Comm. Pln.		City Website
				South LA Comm. Plan		City Website
				SE LA Comm. Plan		City Website
				Crenshaw Corridor Specific Plan		City Website
				Expo LRT Station Areas		SCAG
				La Cienega/Jefferson Station Area TOD Plan		SCAG
				Dist. 9 Redev. Proj.		CRA/LA
				Crenshaw Redev. Proj.		CRA/LA
				Mid City Recov. Redev. Project		CRA/LA
	Vernon Ave/ Alameda St	Vernon Ave/ Santa Fe Ave	Vernon	Redevelopment Area		RDA

Corridor	From	To	Jurisdiction	Adopted Plans/ Redevelopment Projects	In Adjacent Areas	Source
Western	Hollywood Blvd/ El Centro St	Western Ave/ 108th St	City of LA	Hollywood Comm. Plan		City Website
				Wilshire Comm. Plan		City Website
				South L.A. Comm. Plan		City Website
				Vermont/Western TOD Specific Plan		City Website
				Expo LRT Station Areas		SCAG
				Los Angeles Hollywood Freeway Central Park		SCAG
				Hollywood Redev. Proj.		CRA/LA
				Normandie 5 Redev. Project		CRA/LA
				Western/Slauson Redev. Project		CRA/LA
				Vermont/Manchester Recovery Redev. Proj.		CRA/LA
				Wilshire Ctr./Koreatown Redev. Project		CRA/LA
	Western Ave/ 108th St	Imperial Hwy/ Van Ness Ave	Unincorporated Area			
	Van Ness Ave/ Imperial Hwy	120th St/ Crenshaw	Hawthorne			
Whittier	6th St/Main St	Whittier Bl./ Indiana Ave	City of LA	Cent. City Comm. Plan		City Website
				Cent. City North Comm. Plan		City Website
				Boyle Hgts Comm. Plan		City Website
				Adelante Eastside Redev. Project		CRA/LA
				Cent. Indust. Redev. Proj.		CRA/LA
				Cent. Business District		CRA/LA
	Whittier Blvd/ Indiana Ave	Whittier Blvd/ Garfield Ave	Unincorporated Area			
	Whittier Blvd/ Garfield Ave	Whittier Blvd/ Norman Rd	Montebello	Whittier Boulevard		Redevelopment Agency
	Whittier Blvd/ Norman Rd	Whittier Blvd/ Juarez Ave	Pico Rivera	7 redevelop. projects along Whittier Blvd.		Redevelopment Agency
	Whittier Blvd/ Juarez Ave	Whittier Blvd/ Painter	Whittier	Whittier Blvd. Spec. Plan		City Website
				Uptown Specific Plan		City Website
				Whittier Bl. Redev. Proj.		Redevelopment Agency
				Whittier Earthquake Recovery Redev. Proj.		Redevelopment Agency
				Greenleaf Ave Uptown Whittier Project		Redevelopment Agency
				Whittier Bl. Comml. Corr. Orig./Addit. Proj. Area		Redevelopment Agency

Table 2: General Plans for Cities along Candidate Corridors

City	Document Coverage Date	Specific Elements (if applicable)
Alhambra	Apr-2010	
Bell	Oct-1996	
Bellflower	Sept-2003	Housing Element
Beverly Hills	Jan-2010	Housing Element 2008-2013
Burbank	1964-2008 [a]	Housing Element 2008-2014[13]
Carson	Oct-2004	Housing Element 2006-2014
Cerritos	Jan-2004	Housing Element 2008-2014
City of LA	1992-2009 [a]	Housing Element 2006-2014
Commerce	Jan-2008	
Compton	2030	Land Use Element & Economic Development Element
Cudahy	2020	
El Monte	Jun-2011	
Gardena	2006	Housing Element 2008-2014
Glendale	1975-2009 [a]	Housing Element 2006-2014
Hawthorne	unknown	
Inglewood	Jan-2013	
Lawndale	Dec-1991	Housing Element 2008-2014
Long Beach	1975-2010 [a]	Mobility Element (draft)
Lynwood	Aug-2003	
Maywood	unknown	Land Use, Housing and Economic Development Elements
Montebello	2009	
Monterey Park	2020	Housing Element 2014-2021 (draft)
Pasadena	2009	Land Use & Mobility Elements (draft)
Pico Rivera	1993	Housing Element 2006-2014
Redondo Beach	1992	Housing Element 2008-2014
Rosemead	Apr-2010	
San Gabriel	May-2004	Housing Element 2008-2014
Santa Monica	July-2010	
South Gate	Dec-2009	
South Pasadena	Oct-2008	Land Use & Economic Development/Revitalization
Torrance	Apr-2010	
Vernon	Feb-2009	
West Hollywood	Sep-2011	
Whittier	Aug-1993	
Note: [a] Each element was adopted or updated in different year		

[13] Approved 2035 General Plan FEIR on 11/19/2012

Implications from Elimination of Redevelopment Agencies in California

Changes stemming from the dissolution of redevelopment agencies (RDAs) in California (as of February 1, 2012) may affect the implementation of some of these redevelopment plans. Within Los Angeles County, the Redevelopment Agency of the City of Los Angeles (CRA/LA) was the largest RDA agency involved in developing and implementing redevelopment plans. In light of the elimination of RDAs, CRA/LA will continue to administer and oversee Redevelopment Plans as the Designated Local Agency DLA) of the City of Los Angeles. The redevelopment plans for other cities are being administered by their respective DLAs.[14]

Preliminary Assessment of the Economic Potential of Candidate Corridors

Although the field reviewed corridors possess varying degrees of land-use densities and commercial/residential activities, the correlation between BRT-supportive plans and policies and economic development is complex. Many factors can potentially contribute to the economic state of a city or jurisdiction. However, research has shown that a mix of high quality transit combined with development around stations (transit oriented development), dense commercial and residential land uses, dense employment centers, pedestrian-friendly planning and transit-supportive site design contributes to high transit ridership. In combination, land use planning supportive of these factors has been shown to enhance economic development around transit stations. The relationship between transit and urban form matters because research shows they continue to be mutually beneficial.[15]

Table 3 categorizes the candidate corridors by the following measurement variables: transit connectivity, potential and existing ridership rankings, availability of redevelopment plans, and existing levels of economic activity observed during field reviews. These categorizations provide a general guide to understanding how the 14 field reviewed corridors perform in terms of factors that contribute to economic development. Further study of the redevelopment and general plans will clarify how these plans target economic development and if transit-supportive policies are included.

Definition of Field Review Land Use Observations

Based on observations from the field reviews, the 14 candidate field reviewed corridors are categorized by the level of land use density. The candidate corridors in Table 3 fall into one of two categories: high and low. Corridors with highly dense commercial or residential activities either concentrated in certain areas or consistently throughout the corridor are categorized as "High" in terms of existing economic activity. Corridors with sparse or less dense land uses are categorized as "Low" existing economic activity.

[14] Community Redevelopment Agency/Los Angeles (CRA/LA). (2012). Retrieved from: http://www.crala.org/internet-site/
[15] Transportation Cooperative Research Program (TCRP) 118. (2007). Bus Rapid Transit Practitioners Guide

Table 3: Economic Development Potential for 14 Candidate Corridors

Corridor	Ridership and Connectivity Ranking Average (out of 43 Corridors)	Availability of Redevelopment Plans	Land Use Density
Artesia	14	Yes	Low
Atlantic	10	Yes	Low
Broadway	1	Yes	High (north of Olympic Blvd.)
Burbank – North Hollywood	11	Yes	Low
Hawthorne	9	Yes	Low
North Hollywood - Pasadena	12	Yes	High (especially in Old Pasadena, Downtown Glendale, Downtown Burbank and North Hollywood Red Line Station)
Pico	2	Yes	High
Roscoe	13	Yes	Low
Santa Monica	4	Yes	High
Valley	5	Yes	High
Vermont	3	Yes	High (north of King Blvd.)
Vernon-La Cienega	7	Yes	High (north of Rodeo/La Cienega and around Crenshaw District)
Western	6	Yes	High (especially north of I-10)
Whittier	8	Yes	High (between Soto St. and Rosemead)

Source: Parsons Brinckerhoff, 2013

Activity Center Analysis

A BRT system that improves transit travel times can effectively connect a wider segment of the population to activity centers than existing transit service. This may lead to enhanced economic, educational, commercial and recreational opportunities within each of the candidate corridors.[16] Activity centers can benefit from an increased pool of qualified workers, students, consumers, etc. For the general population, this can manifest itself in the form of increased access to jobs, educational opportunities, and improved quality of life. Enhancing access to activity centers within the candidate corridors can contribute to their overall economic growth.

[16] Melo, P., Graham, D., Levinson, D., Aarabi, S. (2012). Agglomeration, Accessibility, and Productivity: Evidence for Urbanized Areas in the US.

Table 4 on the next several pages lists the major activity centers found in each of the 14 candidate corridors. These activity centers were selected based on their employment, educational, commercial and entertainment / cultural significance (locally and regionally). The ranking / scoring for each corridor is based on the total number of activity centers located within 0.25 miles of a specific route. (These activity center locations are based on available information at the time.)

Table 4: Activity Centers Located Along the Candidate Corridors

Corridor	List of Activity Centers	Total (#)	Approximate Location	Activity Type	Notes
Artesia	Home Depot Center	4	Victoria/Avalon	Entertainment	
	Cal State Dominguez Hills		Victoria/Central	Educational	
	El Camino College Compton Center		Artesia/Santa Fe	Educational	
	Los Cerritos Center		Studebaker/183rd	Commercial	
Atlantic	East LA Community College	2	Atlantic/Cesar Chavez	Educational	
	Between Slauson and Florence		Atlantic (between Slauson and Florence)	Entertainment/ Cultural; Commercial	Several strip malls/shopping centers lining the west side of Atlantic
Broadway	Union Station/El Pueblo de Los Angeles/Chinatown	5	Cesar Chavez/Alameda	Entertainment/ Cultural; Commercial	
	City Hall/Civic Center		Broadway between Temple and 1st	Public Facilities; Employment; Entertainment/ Cultural	Mark Taper Forum/Dorothy Chandler Music Center; Our Lady of the Angels Cathedral; Disney Hall, Grand Park, MOCA
	Historic Core District		Broadway between 2nd and 9th St.	Commercial, Entertainment/ Cultural; Employment	Jewelry, Fashion, Toy Districts (adjacent)
	LA Trade Tech College		Washington/Grand	Educational	
	LA Memorial Coliseum		Figueroa/39th	Entertainment	0.3 miles away from Broadway
Burbank – North Hollywood	Downtown Burbank	4	3rd and Magnolia, San Fernando and 1st	Employment; Commercial; Entertainment/ Cultural; Public Facilities	Burbank Town Center, Ikea
	Burbank Empire Center		Victory Pl/Empire	Commercial	Costco, Target, Lowe's
	Bob Hope Airport		Hollywood Way/Empire	Public Facility; Commercial; Employment	Metrolink/Amtrak Station-Adjacent; Yahoo!
	North Hollywood Arts District		Lankershim/Chandler	Cultural/Entertainment; Commercial	Also includes Red/Orange Line Stations
Hawthorne	Downtown Inglewood	3	La Brea between Florence and Market	Commercial; Employment Center; Public Facilities; Educational	City Hall, Kaiser Permanente, Market St., Inglewood Marketplace, Inglewood High School, Inglewood Transit Center
	South Bay Galleria		Hawthorne/Artesia	Commercial	

Corridor	List of Activity Centers	Total (#)	Approximate Location	Activity Type	Notes
North Hollywood-Pasadena (Arterial)	Pasadena City College/Caltech	9	Colorado/Hill	Educational	
	Paseo Colorado/ City Hall		Colorado/Los Robles	Commercial; Public Facilities	
	Old Town Pasadena		Colorado between Arroyo Pkwy and Pasadena Ave	Commercial	
	Eagle Rock Plaza Shopping Center		Colorado/Broadway	Commercial	
	Downtown Glendale		Broadway/Brand	Commercial; Employment; Public Facilities;	Glendale Fashion Center, City Hall, The Americana at Brand, Glendale Galleria
	Downtown Burbank		3rd and Magnolia, San Fernando and 1st	Employment; Commercial; Entertainment/Cultural; Public Facilities	Burbank Town Center, Ikea
	Burbank Empire Center		Victory Pl/Empire	Commercial	Costco, Target, Lowe's
	Bob Hope Airport		Hollywood Way/Empire	Public Facility; Commercial; Employment	Metrolink/Amtrak Station-Adjacent; Yahoo!
	North Hollywood Arts District		Lankershim/Chandler	Entertainment/Cultural; Commercial	Also includes Red/Orange Line Stations
North Hollywood-Pasadena (SR 134 and I-210)	Lake Avenue Shopping District	5	Lake/Colorado	Commercial; Employment	PCC; Caltech within 0.6 miles
	Paseo Colorado		Colorado/Los Robles	Commercial	
	Pasadena City Hall/Civic Center		Walnut/Marengo	Public Facility	Memorial Park/Gold Line-Adjacent
	Burbank Media District		Alameda/Olive	Employment; Commercial; Entertainment/Cultural	Walt Disney Studios, Providence St. Joseph Medical Center, NBC Universal, Warner Bros.
	North Hollywood Arts District		Lankershim/Chandler	Entertainment/Cultural; Commercial	Also includes Red/Orange Line Stations
North Hollywood-Pasadena (SR 134/ I-5/I-210 Bob Hope Airport)	Lake Ave. Shopping District	5	Lake/Colorado	Commercial; Employment	PCC and Caltech within 0.6 miles
	Paseo Colorado		Colorado/Los Robles	Commercial	
	Pasadena City Hall/ Civic Center		Walnut/Marengo	Public Facility	Memorial Park/Gold Line-Adjacent
	Bob Hope Airport		Hollywood Way/Empire	Public Facility; Commercial; Employment	Metrolink/Amtrak Station-Adjacent; Yahoo!
	North Hollywood Arts District		Lankershim/Chandler	Cultural/Entertainment; Commercial	Also includes Red/Orange Line Stations

Corridor	List of Activity Centers	Total (#)	Approximate Location	Activity Type	Notes
Pico	Downtown Santa Monica	10	Pico/Main	Commercial, Public Facility, Educational; Entertainment/Cultural; Employment	Santa Monica Auditorium, Santa Monica HS, Main St. Santa Monica Place, Santa Monica Pier, 3rd St. Promenade
	Santa Monica College		Pico/20th	Educational	
	Little Osaka		Sawtelle/Olympic	Commercial, Entertainment/Cultural	
	Westside Pavilion		Pico/Westwood	Entertainment/Cultural, Commercial	
	20th Century Fox Studios		Pico/Motor	Employment	
	Pico-Rimpau Transit Center/ Midtown Crossings		Pico between La Brea and West	Commercial, Public Facility	
	LA Live		Figueroa between Venice and Olympic	Commercial, Entertainment/ Cultural, Employment	LA Convention Center, Staples Center, LA Live
	Historic Core District		Main between 9th and 2nd	Entertainment/Cultural; Employment	Jewelry, Fashion, Toy Districts (adjacent)
	LA City Hall/ Civic Center		1st between Grand and Main	Public Facilities; Employment	Mark Taper Forum/ Dorothy Chandler Pavilion; Our Lady of the Angels Cathedral; Disney Hall, Grand Park, MOCA
	Little Tokyo		1st/Alameda	Entertainment/Cultural; Commercial; Public Facility	Japanese American Museum-Adjacent; Union Station/El Pueblo de Los Angeles (0.5 miles)
Roscoe	Fallbrook Center	7	Fallbrook between Victory and Vanowen	Commercial	
	Cal State Northridge*		Lindley and Nordhoff	Educational	*1 mile north of Roscoe
	Van Nuys Airport		Roscoe/Balboa	Employment	
	Panorama Mall		Roscoe/Van Nuys	Commercial	
	Kaiser Permanente		Roscoe/Woodman	Employment, Public Facility	
	Bob Hope Airport		Vineland/Sherman Wy	Public Facility; Commercial; Employment	Metrolink/Amtrak Station-Adjacent; Yahoo!
	North Hollywood Arts District		Lankershim/Chandler	Entertainment/Cultural; Commercial	Also includes Red/Orange Line Stations

Corridor	List of Activity Centers	Total (#)	Approximate Location	Activity Type	Notes
Santa Monica	Downtown Santa Monica	13	Santa Monica/3rd	Entertainment/ Cultural; Commercial; Public Facility	Santa Monica Place, Santa Monica Pier, 3rd St. Promenade, City Hall/Civic Center
	UCLA/St. Johns Medical Centers		Santa Monica between 15th and 23rd	Public Facility	
	VA Hospital		Sawtelle/Ohio	Public Facility; Entertainment/ Cultural	0.2 miles north; Little Osaka (0.45 miles south)
	Westwood/UCLA* Little Tehran		Wilshire/Westwood	Educational; Employment Commercial; Entertainment/ Cultural	*0.75 miles north to UCLA/Westwood; Los Angeles LDS Temple (0.2 miles east)
	Century City		Santa Monica/Avenue of the Stars	Commercial; Employment; Entertainment/ Cultural	Westfield Century City, 20th Century Fox (0.4 miles south)
	Rodeo Dr.		Rodeo Dr/ Santa Monica	Commercial; Entertainment	
	West Hollywood		Santa Monica between San Vicente and Fairfax	Commercial; Public Facility; Entertainment/ Cultural	West Hollywood City Hall; MOCA Pacific Design Center; dense commercial strip
	Hollywood/Highland*		Hollywood/Highland	Entertainment/ Cultural; Commercial	*0.75 miles north of Santa Monica/Highland
	Hollywood/Vine		Hollywood/Vine	Entertainment/ Cultural; Commercial	*0.75 miles north of Santa Monica/Vine
	Los Angeles City College		Vermont/Melrose	Educational	
	Dodger Stadium*		Stadium Way/ Elysian Park	Entertainment/ Cultural	*0.2 miles north
	LA City Hall/Civic Center		1st between Grand and Main	Public Facilities; Employment; Entertainment/ Cultural	Mark Taper Forum/Dorothy Chandler Music Center; Our Lady of the Angels Cathedral; (Disney Hall (0.34 miles south); City Hall/Civic Center (0.3 miles south)
	Union Station/El Pueblo de Los Angeles/Chinatown		Cesar Chavez/Alameda	Public Facilities; Employment; Entertainment/ Cultural	

Corridor	List of Activity Centers	Total (#)	Approximate Location	Activity Type	Notes
Valley	El Monte Transit Center	9	Santa Anita/Ramona	Public Facility	
	Cal State LA		Mariondale/Paseo Rancho Castilla	Educational	
	USC University Hospital/LA County General Hospital		Zonal/San Pablo	Public Facility; Educational	Lincoln Park-adjacent
	Chinatown		Alameda/College	Entertainment/ Cultural; Commercial	
	Union Station/ El Pueblo de Los Angeles		Cesar Chavez/Alameda	Public Facilities; Employment; Entertainment/ Cultural	
	City Hall/Civic Center		1st between Grand and Main	Public Facilities; Employment; Entertainment/ Cultural	Mark Taper Forum/ Dorothy Chandler Pavilion; Disney Hall; Our Lady of the Angels Cathedral; Grand Park
	Financial District/Historic Core		Grand between 2nd and 9th	Commercial; Employment; Entertainment/ Cultural; Public Facility	Pershing Square; California Plaza; LA Ctrl. Library; Fig at 7th
	LA Live		Figueroa between Venice and Olympic	Commercial; Entertainment/ Cultural; Employment	LA Convention Ctr., Staples Ctr., LA Live
	LA Trade Tech Coll.		Grand/Washington	Educational	
Vermont	Exposition Park/USC	4	Vermont/Exposition	Educational; Entertainment/ Cultural; Public Facility	LA Coliseum; Nat. Hist. Museum, Calif. Science Center; Afr.-Amer. Museum; Sports Arena; USC
	Koreatown		Vermont between Pico and 3rd	Commercial; Employment; Entertainment	Wilshire/Vermont Red/Purple Line Sta.; MacArthur Park
	LA City College		Vermont/Melrose	Educational	
	Vermont/Sunset		Vermont/Sunset	Public Facility; Entertainment/ Cultural	Kaiser Permanente Med. Ctr.; Children's Hospital LA, Vermont/ Sunset Red Line Sta.; Church of Scientology
Vernon-La Cienega	West Hollywood	7	La Cienega/ Santa Monica	Commercial; Entertainment/ Cultural	Santa Monica Strip; West Hllywd. City Hall
	Pacific Design Center (PCD)		Melrose/Norwich	Employment	PCD is 0.3 miles west of La Cienega
	Beverly Center/ Cedars Sinai		La Cienega/Beverly	Commercial; Public Facility	
	Kaiser Permanente West LA Med. Ctr.		Cadillac/Venice	Public Facility	
	Crenshaw/Baldwin Hill Plaza		Crenshaw/King	Commercial; Entertainment/ Cultural	
	Leimert Park Village		Crenshaw/Vernon	Commercial; Entertainment/ Cultural	
	Alameda Swap meet		Vernon/Alameda	Commercial	Major Swap Meets; Blue Line Vernon Sta.

Corridor	List of Activity Centers	Total (#)	Approximate Location	Activity Type	Notes
Western	Koreatown	4	Western between Beverly and Pico	Commercial	
	Wilshire/Western Purple Line Station		Wilshire/Western	Commercial; Entertainment/Cultural; Public Facility	Wiltern Theater
	LA Southwest College		Imperial/Western	Educational	
	Hawthorne Airport		120th/Crenshaw	Commercial; Employment; Public Facility	Crenshaw Green Line Station; Hawthorne Airport; SpaceX Corp.; shopping centers on both sides of 120th St. between Crenshaw and Wilke
Whittier	East Los Angeles Community College	5	Atlantic/Cesar Chavez	Educational	
	Uptown Whittier		Philadelphia between Whittier Ave and Painter	Commercial	
	Whittier College		Painter/Philadelphia	Educational	
	Whittier Hospital Medical Center		Colima/Janine	Public Facility	
	Whitwood Center		Whittier/Whitwood Dr.	Commercial	

Table 4: Activity Center Comparison and Ranking by Corridor

Corridor	Total Number of Activity Centers	Rank
Santa Monica	13	1
Pico	10	2
North Hollywood - Pasadena (Arterial)	9	3
Valley	9	3
Vernon-La Cienega	7	4
Roscoe	7	4
North Hollywood - Pasadena (SR-134/I-5/I-210)	5	5
Whittier	5	5
Broadway	5	5
North Hollywood - Pasadena (SR-134/I-210)	5	5
Artesia	4	6
Burbank-NoHo	4	6
Western	4	6
Vermont	4	6
Hawthorne	3	7
Atlantic	2	8

Table 6 provides a view of how each corridor fares relative to the others in terms of opportunities to enhance economic development through improving access to major activity centers. Each corridor is

ranked based on the number of activity centers it contains. As noted earlier, higher ranking indicates a higher potential for economic development within that corridor. More specifically, a higher ranking suggests a higher potential for enhancing employment, educational, commercial and entertainment/cultural opportunities through implementation of a BRT system.

However, it should be noted these rankings must be combined with regional transit connectivity, existing and potential ridership, current land uses and future growth policies and plans in further corridor studies, in order to provide a more complete understanding of the economic development potential for each of candidate corridors that are recommended for further study.

Conclusions

Coordination between land use plans and BRT system development can enhance their combined effect on urban form and transit patronage. This analysis has identified those studies that are recommended for more detailed review in future corridor planning studies. Such coordination is encouraged by MAP-21 as the New/Small Starts requirements have now place more emphasis on land use and economic development effects of major capital investments, including for BRT systems. Additionally, several industry reports (e.g., TCRP 118) have concluded that BRT systems with physical infrastructure investments, such as bus only lanes, tend to generate higher development interest.

As evidenced by Table 3, some of the existing candidate corridors fare better than others in terms of existing land use and transit system usage and connectivity – both important contributing factors to overall economic development. Additionally, Tables 5 and 6 provide a view of the availability of specific activity centers by corridor. These activity centers can serve as the anchors of economic development provided by implementation of a BRT system along a given corridor.

For the candidate corridors that are carried forward into subsequent phases of study and BRT implementation, further analysis of their respective specific, redevelopment and general plans will be needed to assess whether future plans integrate land use with transit in a manner that can enhance a potential BRT system and stimulate economic development. Additionally, a detailed review of these plans may influence BRT station placing to ensure transit access to future developments.

Accordingly, if any of the nine corridors recommended herein are considered for a Small Starts grant application, Metro and its stakeholders should also consider strengthening future redevelopment plans with transit-supportive policies prior to seeking entry into project development. These actions should be considered particularly around the stations of the planned BRT project, for it is on this type of action that the new federal guidance places the greatest emphasis.

Appendix C. Initial Corridors for Study (108 Corridors)

Ref #	Corridor	Current Service (Metro, etc.)	Example Neighborhoods			Subregion	Directional
1	Wilshire Blvd (west)	720,20, BBB 2	Santa Monica/ Westwood	Park La Brea/ Hancock Park	Koreatown/ Downtown LA	Westside Cities	East-West
2	Wilshire Blvd (central)	720	Downtown LA	East Los Angeles	Commerce	Central LA	East-West
3	3rd St	316, 16	Rampart Village	Park La Brea/ Hancock Park	Koreatown/ Downtown LA	Westside Cities	East-West
4	Santa Monica Blvd	704, 4, BBB 1 (partial)	Santa Monica/	Century City/ Beverly Hills	Silver Lake/ Downtown LA	Westside Cities	East-West
5	Venice Blvd	733, 33	Santa Monica/ Venice	Palms/ Culver City	Mid-City/ Downtown LA	Westside Cities	East-West
6	Florence Ave	311, 111	Hyde Park	Florence/ Huntington Park	Downey/ Norwalk	Central LA	East-West
7	Sunset Blvd	302, 2	Pacific Palisades/ Brentwood	West Hollywood/ Hollywood	Silver Lake/ Downtown LA	Westside Cities	East-West
8	Vernon Ave	105	Crenshaw	Los Angeles	Vernon	Central LA	East-West
9	Hollywood Blvd	217	West Hollywood	Hollywood	Los Feliz	Westside Cities	East-West
10	West Olympic	728, 28	Century City/ Beverly Hills	Koreatown	Downtown LA	Westside Cities	East-West
11	Whittier Blvd	MBL 10	Monterey Park	Montebello	Pico Rivera/ Whittier	Central LA	East-West
12	Manchester-Firestone	115	Playa del Rey/ Westchester	Inglewood/ Florence	Downey/ Norwalk	Central LA	East-West
13	Pico Blvd	330, 30	Santa Monica	Mid-City/ Pico/Rampau	Downtown LA	Central LA	East-West
14	Slauson	358, 108	Windsor Hills/ Hyde Park	Florence	Commerce/ Pico Rivera	Central LA	East-West
15	Ventura Blvd	150	Woodland Hills/ Warner Center	Sherman Oaks	Studio City/ Universal City	San Fernando Valley	East-West
16	Fairfax Ave	217	Mid-City	West Hollywood	Fairfax	Westside Cities	East-West
17	6th St	18	Koreatown	Wilshire Center/ Westlake	Downtown LA	Central LA	East-West
18	Colorado Blvd (Pasadena)	180, 181	Pasadena	Altadena	Eagle Rock	San Gabriel Valley	East-West
19	Sherman Way	162, 163	West Hills/ Canoga Park	Reseda/ Van Nuys	Sun Valley	San Fernando Valley	East-West
20	Garvey	70	Alhambra	Monterey Park/ Rosemead	El Monte	Central LA	East-West
21	Beverly Blvd	14	Beverly Hills	Park La Brea	Hancock Park	Westside Cities	East-West
22	Huntington-Las Tunas Blvd	378, 78, 79	Temple City/ Arcadia	San Marino/ Alhambra	Lincoln Heights/ Downtown LA	San Gabriel Valley	East-West
23	Roscoe	152, 153	West Hills	Northridge/ North Hills	Panorama City	San Fernando Valley	East-West

24	Compton	127	Compton	Bellflower	Lennox	South Bay Cities	East-West
25	Gage Ave	110	Florence	Huntington Park/ Bell	Bell Gardens	Central LA	East-West
26	Valley Blvd	76	Lincoln Heights	Alhambra	San Gabriel/ El Monte	San Gabriel Valley	East-West
27	Cesar Chavez Ave	68	Boyle Heights/ East LA	Monterey Park	Montebello	Central LA	East-West
28	Vanowen Way	165	West Hills/ Woodland Hills	Lake Balboa/ Van Nuys	North Hollywood	San Fernando Valley	East-West
29	East Olympic Blvd	66	Koreatown	Downtown LA	East LA/ Montebello	Central LA	East-West
30	Century Blvd	117	Westchester/LAX	Inglewood	Vermont Knolls/Watts	Central LA	East-West
31	1st St	330, 30	West Hollywood	Mid-city/Pico/ Rampau	Downtown LA/ Boyle Heights	Central LA	East-West
32	Reseda	240	Northridge	Reseda	Tarzana	San Fernando Valley	East-West
33	Nordhoff	364, 166	Chatsworth/ Northridge	Reseda/ Granada Hills	Panorama City/ Pacoima	San Fernando Valley	East-West
34	Rapid 7 (Big Blue Bus)	R7	Santa Monica	Century City	Koreatown	Westside Cities	East-West
35	BBB Rapid 10 Corridor (I-10)	R10	Santa Monica	Downtown LA		Westside Cities	East-West
36	Artesia Blvd	LB 61	Compton	Northridge/ North Hills	Gardena	Gateway Cities	East-West
37	Del Amo Blvd	LB 191, 192	Carson	Long Beach/ Lakewood	Cerritos	Gateway Cities	East-West
38	Willow Ave	LB 102, 104	Carson	Signal Hill	Long Beach	Gateway Cities	East-West
39	Atlantic Blvd South	770	Downtown LA/ Boyle Heights	Monterey Park/ Rosemead	Montebello	Gateway Cities	East-West
40	Cherry Ave	LB 21	Long Beach	Signal Hill	Lakewood	Gateway Cities	North-South
41	Cerritos Ave	LB 72	Rancho Estates	Los Alamitos	Cypress	Gateway Cities	East-West
42	Vermont Ave	754	Hollywood	Westlake/ Koreatown	Vermont Knolls/ Athens	Central LA	North-South
43	Western Ave (north)	757	Jefferson Park	Koreatown	Los Feliz	Central LA	North-South
44	Western Ave (south)	757	Inglewood/ Hawthorne	Hyde Park	Jefferson Park	South Bay Cities	North-South
45	Van Nuys Blvd	233	Van Nuys	Panorama City	Pacoima/ Lake View Terrace	San Fernando Valley	North-South
46	Hawthorne Blvd	40	Redondo Beach/ Torrance	Hawthorne	Lennox	South Bay Cities	North-South
47	San Fernando Rd/Lankershim	224	Sun Valley	Pacoima	San Fernando/ Sylmar	San Fernando Valley	North-South
48	Crenshaw North	210	Hyde Park/ Leimert Park	Jefferson Park	Hancock Park	Central LA	North-South

49	Long Beach Blvd	60	Compton	Lynwood/ South Gate	Huntington Park/ Vernon	Gateway Cities	North-South
50	Soto St	251, 252	Vernon	Boyle Heights	Lincoln Heights	Gateway Cities	North-South
51	Broadway	45	Lincoln Heights	Downtown LA	Rosewood	Gateway Cities	North-South
52	Atlantic - Fair Oaks	260	Compton/ North Long Beach	East LA/ Commerce	Pasadena/ Altadena	Gateway Cities	North-South
53	Avalon Blvd	352, 52, 51	Wilshire Center	Downtown LA	Compton	Gateway Cities	North-South
54	Normandie Ave	206	Westmont	Harvard Heights/ Koreatown	Hollywood	Gateway Cities	North-South
55	La Brea Blvd	312, 212	Crenshaw	Mid-City/ Hancock Park	Hollywood	Central LA	North-South
56	Central	53	Carson/ Compton	Willowbrook	Los Angeles	Gateway Cities	North-South
57	Sepulveda (San Fern. Valley)	234	Sherman Oaks	Van Nuys/ North Hills	Pacoima	San Fernando Valley	North-South
58	Sepulveda (Culver City)	CCB 6, R6	Westchester/LAX	Culver City	Westwood	Westside Cities	North-South
59	Sepulveda (South Bay)	232	El Segundo	Manhattan Beach	Hermosa Beach/ Redondo Beach	South Bay Cities	North-South
60	North Figueroa	81	Downtown LA	Highland Park	Eagle Rock	Central LA	North-South
61	South Figueroa	81	South Los Angeles	Exposition Park	Downtown LA	Central LA	North-South
62	Alvarado-Hoover	200	Los Angeles	Westlake	Echo Park	Central LA	North-South
63	Sepulveda Pass	761	Westwood	Sherman Oaks/ Van Nuys	Pacoima	San Fernando Valley	North-South
64	Lincoln	R3, 3	Santa Monica	Venice/ Marina Del Rey	LAX/ Westchester	Westside Cities	North-South
65	Silver Line (CBD segment)	Silver	Downtown LA			Central LA	North-South
66	Lakewood Blvd	LB 111	Bellflower	Signal Hill	Belmont Shore	Gateway Cities	North-South
67	Norwalk/ Hawaiian Gardens	LB 173	Artesia	Hawaiian Gardens	Los Alamitos	Gateway Cities	North-South
68	Glendale/San Fernando Rd.	92	Chinatown	Atwater Village	Glendale	Arroyo Verdugo	North-South
69	23rd St/West Adams Blvd.	60	McManus	Jefferson/ University Park	Downtown LA	Central LA	North-South
70	Ocean Blvd	232, LB D	Long Beach	Cerritos		Gateway Cities	North-South
71	8th St	66, 366, 82	Downtown LA	Pico/Union	Koreatown	Central LA	East-West
72	West Washington	36, Culver City 1	Culver City	West Adams	Downtown LA	Westside Cities	East-West
73	Virgil/7th St	51, 52, 352	Downtown LA	Westlake	Wilshire Center	Central LA	North-South

74	Huntington Dr	78, 760	Highland Park	South Pasadena	Arcadia	San Gabriel Valley	East-West
75	E.Washington Blvd	35	Downtown LA	East LA	Commerce	Central LA	East-West
76	Norwalk Connector	New	Norwalk	Santa Fe Springs	West Whittier	Gateway Cities	North-South
77	No. Hollywood-Pasadena	New	Pasadena	Glendale	Burbank	San Fernando Valley	East-West
78	Hollywood-Burbank BRT	New	Hollywood	North Hollywood	Burbank	Arroyo Verdugo	North-South
79	I-405 Corridor (Sepulveda Pass)	New	Sherman Oaks	Santa Monica	Westwood	Las Virgenes/ Malibu	North-South
80	Santa Anita Ave	487 FH 186	El Monte	Arcadia	Pasadena/ Altadena	San Gabriel Valley	North-South
81	Orange Line E./ Burbank Airpt.	New	North Hollywood	Toluca Village	Burbank	San Fernando Valley	East-West/ North-South
82	Montebello Boulevard	MBL 10	Montebello	South Montebello	Downey/ Norwalk	Central LA	East-West
83	San Gabriel/ Montebello/ Greenwood	MBL 10	Montebello	Commerce	El Monte	San Gabriel Valley	North-South
84	Enhanced downtown circulator	DASH, multiple Metro routes	Downtown LA	Little Tokyo	Chinatown	Central LA	North-South/ East-West
85	Silver Streak Route (east)	FH Silver Streak, Metro Silver Line	El Monte	West Covina	Pomona	San Gabriel Valley	East-West
86	Huntington Dr. East	68	Monrovia	Duarte	Irwindale	San Gabriel Valley	East-West
87	SR-101	LADOT CE 419, 423	Sherman Oaks	Studio City	Downtown LA via Silver Lake	Arroyo Verdugo	North-South
88	South Pasadena to Harbor	New	San Pedro	Huntington Park	South Pasadena	Arroyo Verdugo	North-South
89	Burbank to Hollywood BRT	New	Burbank	Glendale	Hollywood	San Fernando Valley	North-South
90	Blue Line to CSU Long Beach	New	Long Beach	Belmont Shore	Naples	Gateway Cities	East-West
91	Azusa to Ontario Airport	New	Azusa	Claremont	Ontario	San Gabriel Valley	East-West
92	Torrance to Long Beach, Orange County	New	Willow Brook	Dominguez Hills	Signal Hill/Long Beach Airport	South Bay Cities	East-West
93	Harbor Subdivision (Crenshaw to Los Angeles)	New	Leimart Park	West Adams	Downtown LA	Central LA	North-South
94	I-405 Corridor North	New	Van Nuys	Panorama City	Sylmar	San Fernando Valley	North-South
95	Lankershim (MOL - Sylmar)	New	North Hollywood	Sun Valley	Sylmar	San Fernando Valley	North-South

96	Glendale –Los Angeles (SR-2)	New	Glendale	Silver Lake	Downtown LA	San Gabriel Valley	North-South
97	I-605 Corridor	New	South El Monte	Santa Fe Springs	Norwalk/ Buena Park	San Gabriel Valley	North-South
98	West Valley to West LA Direct	New	Burbank	Universal City	West Hollywood	Las Virgenes/ Malibu	North-South
99	Long Beach to Whittier	New	Long Beach	Cudahy	Whittier	Gateway Cities	North-South
100	West Santa Ana Branch BRT alt.	New	Cerritos	Downey/ Paramount	Huntington Park/ Cudahy	Gateway Cities	North-South
101	Orangeline BRT alt. to Palmdale	New	Downtown LA	Atwater Village	Glendale	North Los Angeles County	North-South
102	Rosemead Blvd	266, 76	Pasadena	Pico Rivera	Lakewood	Gateway Cities	North-South
103	Imperial Hwy	Green Line	El Segundo/LAX	Hawthorne	Lynwood	Gateway Cities	East-West
104	I-405 corridor South (to Orange Co.)	New	Hawthorne/LAX	Carson/ Dominguez Hills	Westminster	Gateway Cities	North-South
105	Westwood Blvd/ Overland	Culv. City R6; several BBB routes	Westwood Village	Fox Hills	Culver City	Westside Cities	North-South
106	Azusa Ave.	Foothill 280	Azusa	Covina/ West Covina	La Puente/ Puente Hills	San Gabriel Valley	North-South
107	Pacific Coast Hwy.	New	Torrance	Lomita	Carson	South Bay Cities	East-West
108	7th St. (Long Beach)	LB 91,92,93,94	Long Beach	Belmont Shore	Naples	Gateway Cities	East-West

Appendix D. Los Angeles County Bus Rapid Transit & Street Design Improvement Study
Technical Advisory Committee

Transit Agencies:

Agency Name	Contact(s)
Culver CityBus	Diana Chang
Foothill Transit	LaShawn Gillespie
LADOT Transit Services	Susan Bok
Long Beach Transit	Shirley Hsiao
Metro (Service Planning and Development)	Dana Woodbury
Montebello Bus Lines	Jose Medrano
OCTA	Charlie Larwood
Santa Monica Big Blue Bus	Paul Casey and Timothy McCormick
Torrance Transit	James Lee
Metrolink	Gray Crary and Karen Sakoda

Cities/County:

City Name	Contact(s)
Burbank/Arroyo Verdugo Cities Subregion	David Kriske
County of Los Angeles (Public Works)	Vince Aguilar
Glendale	Katherine Engel
Los Angeles (LADOT) & LA City Planning	Jesus Serrano and Jane Choi
Pasadena	Valerie Gibson
West Hollywood	Melissa Antol and Sharon Perlstein

Councils of Governments:

COG Name	Contact(s)
Gateway Cities COG	Richard Powers
Las Virgenes/Malibu Cities COG	Terry Dipple
San Fernando Valley COG	Bob Scott
San Gabriel Valley COG	Fran Delach
South Bay Cities COG	Jacki Bacharach
Westside Cities COG	Maria Rychlicki

Other Interest Groups:

City Name	Contact(s)
Bob Hope Airport	Mark Hardyment and Bob Huddy
Bus Riders Union	Sunyoung Yang
Coalition for Clean Air	Martin Schlageter

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Los Angeles County
Metropolitan Transportation Authority