2.0 ALTERNATIVES CONSIDERED

This chapter describes the Crenshaw Transit Corridor Project alternatives considered and the process used to identify, evaluate, and refine the alternatives. The alternatives considered were:

- No-Build Alternative, which serves as the baseline for evaluating transportation and environmental impacts potentially resulting from the build alternatives;
- Transportation System Management (TSM) Alternative; and
- Two build alternatives. The transit improvement build alternatives consist of a Bus Rapid Transit (BRT) Convertible[1] Alternative and a Light Rail Transit (LRT) Alternative.

This chapter also includes capital, operating, and maintenance cost estimates for the build alternatives.

The Los Angeles County Metropolitan Transit Authority (Metro) followed a prescribed process to identify the alternatives and issues to be analyzed, including seeking input from the public, corridor stakeholders, and other affected parties. The alternatives described provide a reasonable range of possible alternatives, which meet the project goals and objectives described in Chapter 1, Purpose and Need, of this Alternatives Analysis/Draft Environmental Impact Statement/Draft Environmental Impact Report (AA/DEIS/DEIR). At this point in project development, a decision regarding transit technology (i.e., LRT or BRT) or the alignment has not been made. Metro will consider all reasonable alternatives before selecting the preferred alternative that provides improved public transportation services in the Crenshaw Transit Corridor. Alternatives were evaluated based on their effectiveness, environmental impacts, efficiency, financial feasibility, and equity.

2.1 Alternatives Development and Screening

This section describes the alternatives development and screening process. This process began with the build alternatives development and screening resulting from project scoping. Beginning with the project scoping initiation and conceptual alternatives identification, the process resulted in the screened alternatives evaluation. The data collection, analyses, and results of the alternatives analysis process are summarized in this AA/DEIS/DEIR.[2]

2.1.1 Alternatives Screening and Selection Process

The Crenshaw Transit Corridor Project AA/DEIS/DEIR includes an evaluation of all reasonable alternatives; however, this does not preclude eliminating alternatives prior to releasing the AA/DEIS/DEIR for review and comment. The planning and project

[1] BRT Convertible alternative means the lane where the BRT is operating can be changed to LRT in the future, thus it is referred to as "convertible."

[2] This AA/DEIS/DEIR incorporates, by reference, all supporting technical information, studies, and other public documents produced for the Crenshaw Transit Corridor Project alternatives development. These documents are considered part of the administrative record and technical data file.

development process involved analyzing the alternatives, to determine which alternatives would be studied in the AA/DEIS/DEIR. These analyses typically result in alternatives being eliminated from further consideration during the project development phases. Alternatives can be eliminated from further consideration during the planning process, before the National Environmental Policy Act (NEPA)/ California Environmental Quality Act (CEQA) process is initiated, or after the NEPA/CEQA process is initiated (e.g., during NEPA/CEQA scoping or early coordination activities, as part of the planning process). This alternatives analyses process results in the Locally Preferred Alternative (LPA) being selected.

2.1.1.1 Alternatives Screening Methodology

For the AA/DEIS/DEIR, the alternatives were identified and evaluated during these steps or phases.

1. An initial screening of the potential reasonable transit modes, alignments, and station locations occurred before the public and agencies scoping meetings. This screening resulted in the conceptual alternatives presented at the scoping meetings.
2. A detailed screening of the conceptual alternatives determined the alternatives that are discussed, analyzed, and evaluated in this AA/DEIS/DEIR.
3. A final alternatives screening in the AA/DEIS/DEIR, resulting in the LPA that will be identified and analyzed in the Final EIS/Final EIR (FEIS/FEIR).

At each phase a more detailed level of analysis is employed. At the end of each phase, the alternatives selected for advancement and further evaluation were those that demonstrated the best combined performance, according to the evaluation criteria. This included those alternatives that best met the corridor transportation needs, were feasible from a cost and financial perspective, and had the least impact on the environment.

2.1.1.2 Initial Alternatives Screening

The alternatives development and evaluation process began with identifying the initial alternatives. The initial alternatives were presented at the scoping meetings and reviewed with the public and various agencies. In addition to a No-Build Alternative and a TSM Alternative, the initial build alternatives included BRT and LRT operating along different alignments/routes considered conceivable for transit and connecting points or termini. Figure 2-1 shows the initial alignment alternatives considered, including termini and station locations.

The initial alternatives were screened using an engineering and environmental constraints analysis. This analysis included comparing typical transit design configurations and alignments to existing right-of-way widths and to the surrounding community and environment.

The initial alternatives screening resulted in alignment sections and alignment configurations being eliminated from further analysis as referenced in the Final Alternatives Screening Report (September 2008). The initial alternatives eliminated are listed below:

Figure 2-1. Initial Alignment Alternatives Considered

Source: Parsons Brinckerhoff 2008

- Prairie Avenue between the Harbor Subdivision and the Metro Green was eliminated because (1) there is inadequate right-of-way between Florence Avenue and Manchester Boulevard for an at-grade or aerial LRT alignment or a dedicated BRT lane; (2) there are engineering problems connecting to the Metro Green Line Hawthorne Station over the I-105 Freeway; and, (3) potential adverse visual, noise, and land use impacts.
- Crenshaw Boulevard between the Harbor Subdivision and the Metro Green Line was eliminated because the right-of-way is inadequate and the engineering problems associated with the curves between Crenshaw Drive and Manchester Boulevard. In addition, there are significant grade and roadway elevation changes on Crenshaw Boulevard between Florence Avenue and 80th Street, the landscaped median would be removed, there are no activity centers or major trip generators between the Harbor Subdivision and Manchester Boulevard, and public support is lacking.
- Century Boulevard between Crenshaw Boulevard and Aviation Boulevard was eliminated because the right-of-way cannot accommodate an at-grade alignment; acquiring right-of-way would affect existing businesses; and there is inadequate distance to transition from an aerial alignment to a below grade alignment east of the I-405 Freeway. In addition, there are limited station location options.
- Hawthorne Boulevard between the Metro Green Line and El Segundo Boulevard was eliminated because there is not a viable station terminus at Hawthorne/El Segundo Boulevards, there are no activity centers, and there is low density development.

2.1.1.3 Conceptual Alignment Alternatives Considered

The initial alternatives screening resulted in conceptual LRT and BRT alternatives that were analyzed in more detail. The Crenshaw Transit Corridor was divided into three sections to facilitate detailed screening:

- Section A: Wilshire Boulevard to Exposition Boulevard
- Section B: Exposition Boulevard to Harbor Subdivision/Florence Avenue
- Section C: Harbor Subdivision/Florence Avenue to the Metro Green Line

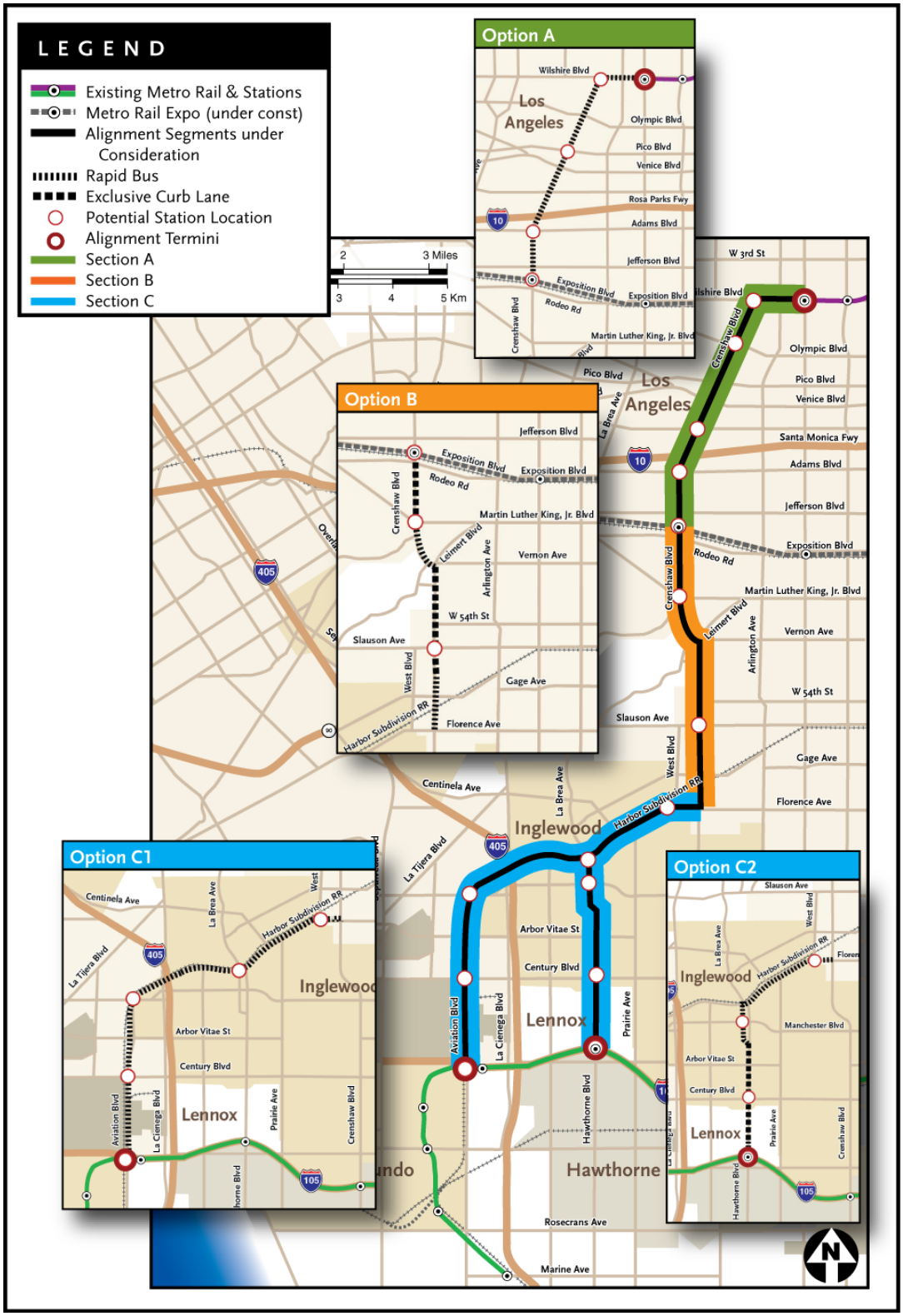
Bus Rapid Transit Alternatives

Figure 2-2 presents the conceptual BRT alignment alternatives for screening by corridor section. The BRT alternatives included one alignment in Section A, one alignment in Section B, and two alignments in Section C.

Light Rail Transit Alternative

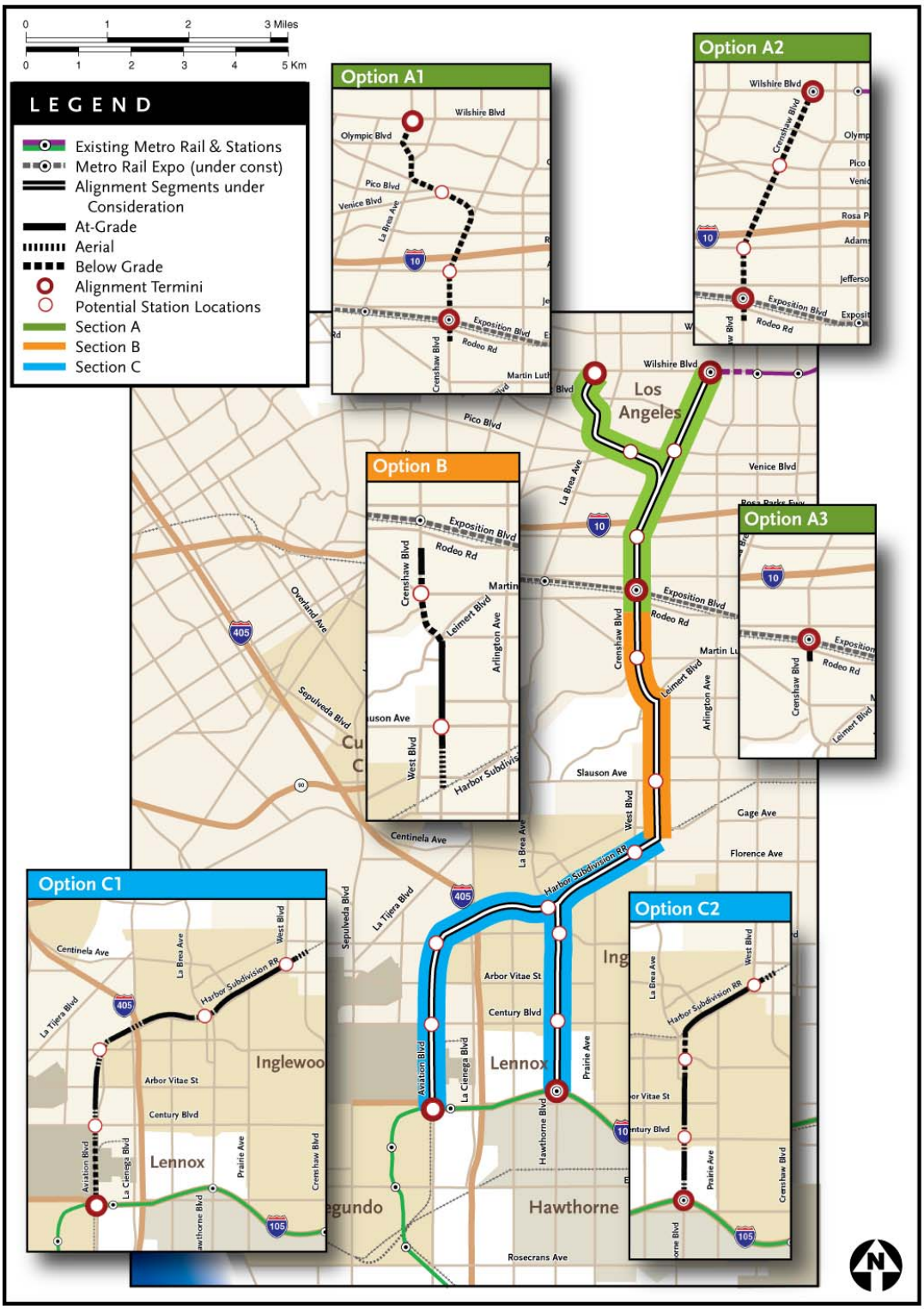
Figure 2-3 presents the conceptual LRT alignment alternatives for screening by corridor section. The LRT alternatives included three alignments in Section A, one alignment in Section B, and two alignments in Section C.

Figure 2-2. BRT Alignment Alternatives for Screening



Source: Parsons Brinckerhoff 2008

Figure 2-3. LRT Alignment Alternatives for Screening



Source: Parsons Brinckerhoff 2008

2.1.1.4 Conceptual Alignment Alternatives Screening

The detailed screening of conceptual alternatives focused on the LRT alternatives. The BRT alternatives were assumed to provide a lower cost option to the LRT alternatives. Therefore, the alignments for the BRT alternatives consist of the same alignment alternatives as the LRT alternatives.

The screening was conducted sequentially, first analyzing alignments within the northern (Section A) and southern (Section C) corridor sections and then analyzing the six possible combinations of the Section A, B, and C alignments, at a corridor level.

Evaluation Criteria and Performance Measures

The following evaluation criteria were used for the conceptual alternatives screening:

- Regional Connectivity
- Environmental Effects
- Economic Development/Land Use
- Community Support
- Capital and Operating Costs
- Cost-Effectiveness
- Financial Capability
- Federal New Starts Funding Criteria
- Ridership
- Travel Time Savings

Table 2-1 describes the evaluation criteria and corresponding performance measures used to screen the conceptual alternatives.

Section A Alignment Alternatives Screening

Two alignment alternatives were considered in Section A, from Wilshire Boulevard to Exposition Boulevard. As can be seen on Figure 2-3, Option A1 would begin at the Wilshire Boulevard/La Brea Avenue intersection, follows (from north to south) La Brea Avenue to San Vincente Boulevard, follows San Vincente Boulevard to Venice Boulevard, follows Venice Boulevard to Crenshaw Boulevard and ends at Exposition Boulevard. Option A2 would begin at the Wilshire/Crenshaw Boulevards intersection and follows Crenshaw Boulevard to Exposition Boulevard. Options A1 and A2 are below grade. An additional Option A3 is shown at the intersection of Crenshaw Boulevard and Exposition Boulevard where an at-grade LRT alignment would start with a shared use station platform on the Exposition Line under (construction) for passengers to transfer to the Exposition Line for access to downtown Los Angeles rather than the Crenshaw Line continuing to Wilshire Boulevard.

Regional Connectivity – Both options improve access to major activity centers and travel markets in West Los Angeles, Hollywood, and Downtown Los Angeles. Option A1 improves access to West Los Angeles better than Option A2, while Option A2 improves

Table 2-1. Evaluation Criteria and Performance Measures

Evaluation Criteria	Performance Measures
▪ Regional Connectivity – To what extent could each alignment improve regional connectivity or have the potential to?	▪ Connections to Existing/Future Transit Lines – Transfers to rail – Direct rail connections/interline – Transfers to bus ▪ Potential for Future Extension from Termini ▪ Access to Activity Centers and Travel Markets
▪ Environmental Effects – To what extent could each alternative impact the environment and community?	▪ Displacements & Relocations – Residential – buildings and units – Business – buildings, businesses, and parking areas ▪ Traffic – Traffic Lane-miles removed to accommodate the proposed alternative – Parking lane-miles removed to accommodate the proposed alternative – Intersections with a volume to capacity ratio of 0.9 or higher ▪ Visual – Estimated level of impact (minimal, moderate, or high) – Landmarks of visual importance ▪ Noise and Vibration – Sensitive receptors by type: residences, schools, other (hospital, parks, etc.) ▪ Cultural and Natural Resources – Historic properties by listing type: National Register of Historic Places, California Register of Historical Resources, Local Landmarks, California Historical Landmarks, California Points of Historical Interest, etc. ▪ Safety – At-grade crossings
▪ Economic Development and Land Use – Could the alternatives provide TOD potential or support local land use policies?	▪ Existing Land Uses – Predominant land use types – Population density within 1/4 mile of alignment (per sq mi) – Employment density within 1/4 mile of alignment (per sq mi) – Low-income households within 1/4 mile of alignment – Households with no vehicle within 1/4 mile of alignment ▪ Transit Oriented Development (TOD) Potential – Need/desire for redevelopment (yes/no) – Local land use policies (supportive/opposed)
▪ Community Support – Was the public strongly against or supportive of the alternative?	▪ General Public/Stakeholders – Strongly supportive, supportive, neutral, or strongly opposed to the proposed alternative ▪ Local Jurisdictions – Strongly supportive, supportive, neutral, or strongly opposed to the proposed alternative

Table 2-1. Evaluation Criteria and Performance Measures (continued)

Evaluation Criteria	Performance Measures
▪ Capital and Operating Costs, Cost-Effectiveness, Financial Capability, and Eligibility for Federal New Starts Funding	▪ Planning (Order of Magnitude) Capital Cost Estimate (2008 dollars) ▪ Total Capital Cost per Mile ▪ Total Annualized Capital Cost ▪ Incremental Annual Operations and Maintenance (O&M) Costs ▪ Total Annual Cost ▪ Cost-Effectiveness per Benefit Hour ▪ FTA Cost-Effectiveness Rating Medium or Higher (yes/no) ▪ Consistency with Metro's 2001 Long Range Transportation Plan (yes/no)
▪ Ridership – What ridership potential could each alternative achieve in 2030?	▪ Crenshaw Line Daily Boardings ▪ Change in Daily Rail Boardings Over No-Build ▪ Change in Daily Systemwide Boardings Over No-Build ▪ Total User Benefits Over No-Build (hours) ▪ User Benefits per Passenger Mile Over No-Build (minutes)
▪ Travel Time Savings – To what extent could each alternative reduce forecasted 2030 transit travel times along the corridor?	▪ Travel Time Savings for Representative Origin-Destination Pairs – Minutes of travel time saved relative to No-Build conditions for the following representative origin-destination (O-D) pairs: – Study Area – Downtown Los Angeles District – Study Area – Westside District – Study Area – Martin Luther King Jr. District – Study Area – Redondo District

Source: Parsons Brinckerhoff 2008

access to Mid-Wilshire and Central Los Angeles better than Option A1. Option A1 provides a future opportunity to extend service north via La Brea Avenue compared to Option A2. Because Crenshaw Boulevard terminates at Wilshire Boulevard, at the Hancock Park residential neighborhood boundary, extending Option A2 north would have physical constraints (i.e., there is not adequate public right-of-way available to extend further north.)

Environmental Effects - Both options impact the environment and the community. At the terminus station areas, Option A1 results in more displacements/relocations, affecting residential and business properties, while Option A2 affects business properties. When considering compatibility with adjacent land uses, a station at Wilshire/Crenshaw Boulevards (Option A2), surrounded by low density residential development, is less compatible than a station at Wilshire Boulevard/La Brea Avenue (Option A1), where only commercial development exists. In addition, compared to Option A1, Option A2 nearly doubles the vibration impacts. In contrast, the visual impacts are "minimal" for Option A1, while "moderate" for Option A2. Option A1 has less potential for affecting cultural and natural resources than Option A2.

Economic Development and Land Use - Both options support transit and transit oriented development (TOD), and include commercial development and medium to high density residential development. Population and employment densities, and the low-income and zero-vehicle households within 1/4 mile of both options, are approximately the same. Options A1 and A2 are located within, or adjacent to, the Community Redevelopment

Agency of the City of Los Angeles (CRA/LA) Mid-City Recovery Redevelopment Project area. A greater percentage of the Option A2 alignment is within, or adjacent to, the redevelopment area.

Community Support – The Hancock Park residential community raised concerns regarding whether Option A2 is consistent with existing land use plans. The general public and stakeholders supported Option A1.

Section B Alignment Alternatives Screening

Since Section B has only one alignment alternative, screening was not required. The Section B alignment is on Crenshaw Boulevard between Exposition Boulevard and Harbor Subdivision/Florence Avenue.

Section C Alignment Alternatives Screening

Two LRT alignment alternatives were considered in Section C, from the Harbor Subdivision/Florence Avenue to the Metro Green Line. As shown on Figure 2-3, Option C1 uses the Harbor Subdivision right-of-way to the Metro Green Line. Option C2 uses the Harbor Subdivision right-of-way to Market Street, follows Market Street/La Brea Avenue/Hawthorne Boulevard right-of-way to the Metro Green Line. Options C1 and C2 have at-grade, above grade, and below grade sections.

Regional Connectivity – Both options could potentially improve regional connectivity; however, Option C1 could provide a potential direct connection to the planned Los Angeles International Airport (LAX) Automated People Mover (APM). Under Option C2, access to LAX would require a transfer to the Metro Green Line, at the Metro Green Line Hawthorne Station, and, at the Metro Green Line Aviation/LAX Station, a second transfer to the planned LAX APM. Also, Option C1 would provide a direct connection to the Metro Green Line, whereas Option C2 would provide a transfer connection. While the Option C2 construction costs are estimated to be less than Option C1, the potential ridership of Option C2 is below that of Option C1. Option C2 was therefore eliminated from further consideration.

Environmental Effects – Since Option C1 is within the existing Harbor Subdivision railroad right-of-way, Option C1 has fewer environmental effects than Option C2, which is located primarily within roadway rights-of-way.

Economic Development and Land Use – Plans and policies governing land use along both alignments support transit oriented development (TOD). Although Option C2 has higher population densities within 1/4 mile of the alignment, the residential areas located with ¼ mile of Option C1 are predominately low-income and zero vehicle households. These households may benefit from improved transit facilities and the economic development that such an investment may stimulate. In addition, employment density within 1/4 mile of Option C1 is higher than Option C2. Option C2 would proceed through downtown Inglewood (Market Street/La Brea Avenue) near city hall, disturbing many businesses and employers. As a result of these disturbances, the Option C2, downtown Inglewood section, was eliminated from further study. Option C1 provides City of Inglewood access from the city perimeter.

Community Support – The general public, stakeholders, or local jurisdictions did not express opposition to Options C1 or C2; however, the general public and stakeholders support Option C1 and are neutral towards Option C2. Similarly, local jurisdictions support Option C1 and are neutral towards Option C2.

2.1.1.5 Corridor Alternatives Screening

The Section A, B, and C alignment options were combined into full corridor alternatives extending from the northern termini, at Wilshire Boulevard/La Brea Avenue, Wilshire/Crenshaw Boulevards, or Exposition/Crenshaw Boulevards, to Aviation Boulevard/Imperial Highway or Hawthorne Boulevard/the I-105 Freeway. As shown in Figure 2-4 and briefly described below, six full corridor alternatives were identified for screening:

- Alignment Alternative 1 – Starts at Wilshire Boulevard, south on La Brea Avenue, east on San Vicente and Venice Boulevards, south on Crenshaw Boulevard, and along the Harbor Subdivision right-of-way to the Metro Green Line Aviation/LAX Station at Aviation Boulevard/Imperial Highway (Options A1, B, and C1). (11.9 miles)
- Alignment Alternative 2 – Starts at Wilshire Boulevard, south on Crenshaw Boulevard, and along the Harbor Subdivision right-of-way to the Metro Green Line Aviation/LAX Station at Aviation Boulevard/Imperial Highway (Options A2, B, and C1). (10.6 miles)
- Alignment Alternative 3 – Starts at Wilshire Boulevard, south on La Brea Avenue, east on San Vicente and Venice Boulevards, south on Crenshaw Boulevard, and along Market Street/La Brea Avenue/Hawthorne Boulevard to the Metro Green Line Hawthorne Station at Hawthorne Boulevard/the I-105 Freeway (Options A1, B, and C2). (10.1 miles)
- Alignment Alternative 4 – Starts at Wilshire Boulevard, south on Crenshaw Boulevard, and along Market Street/La Brea Avenue/Hawthorne Boulevard to the Metro Green Line Hawthorne Station at Hawthorne Boulevard/the I-105 Freeway (Options A2, B, and C2). (9.8 miles)
- Alignment Alternative 5 – Starts at Exposition Boulevard, south on Crenshaw Boulevard, and along the Harbor Subdivision to the Metro Green Line Aviation/LAX Station at Aviation Boulevard/Imperial Highway (Options A3, B, and C1). (8.5 miles)
- Alignment Alternative 6 – Starts at Exposition Boulevard, south on Crenshaw Boulevard, and along Market Street/La Brea Avenue/Hawthorne Boulevard to the Metro Green Line Hawthorne Station at Hawthorne Boulevard/the I-105 Freeway (Options A3, B, and C2). (7.0 miles)

The alignment alternatives screening used the evaluation criteria and performance measures that were used in screening the alignment options for sections A and C, above. These criteria include travel time savings, ridership, costs, and cost-effectiveness. Table 2-2 summarizes the alignment alternatives characteristics and screening results using LRT operating characteristics as an assumption.

Figure 2-4. Alignment Alternatives

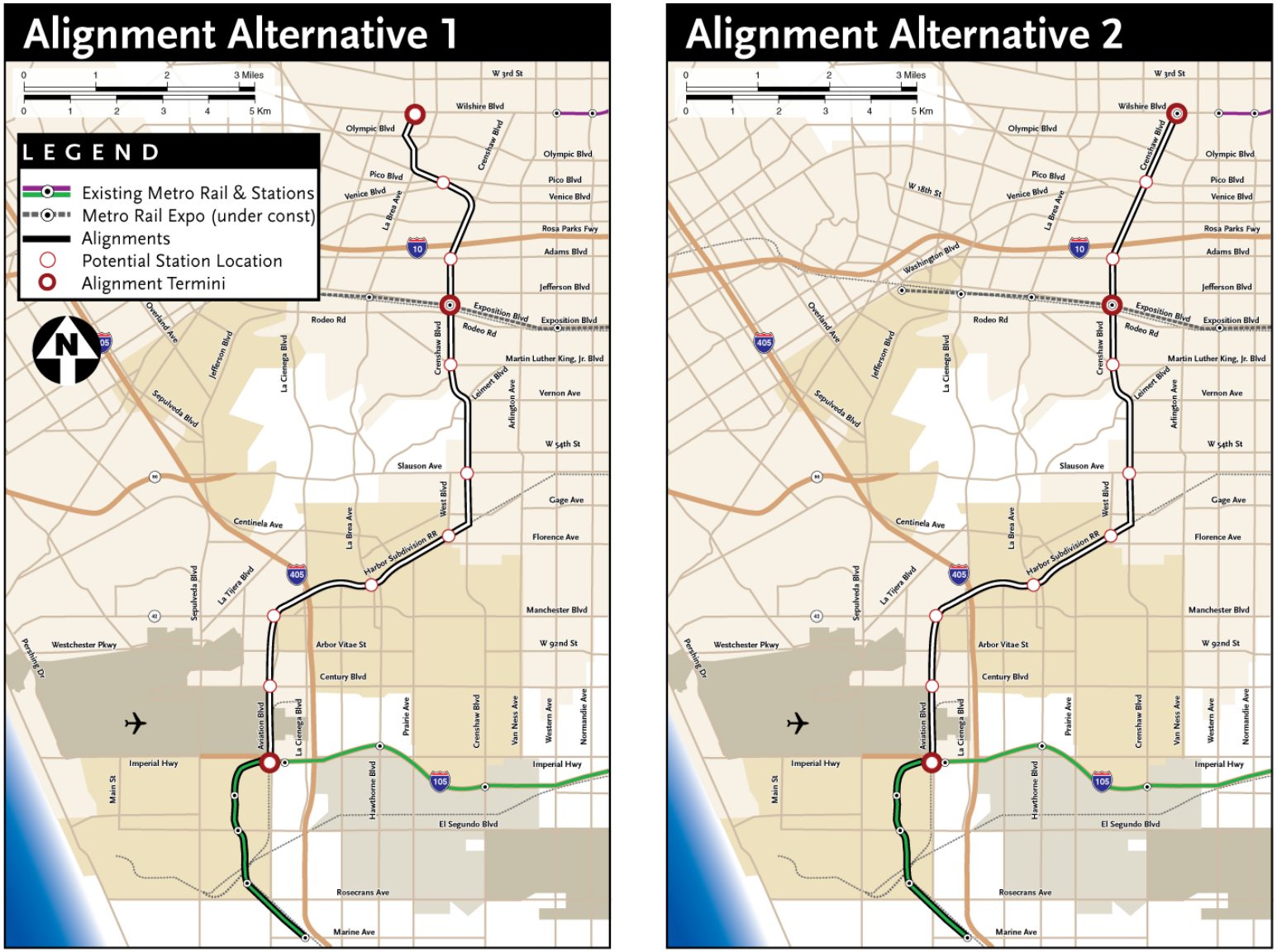
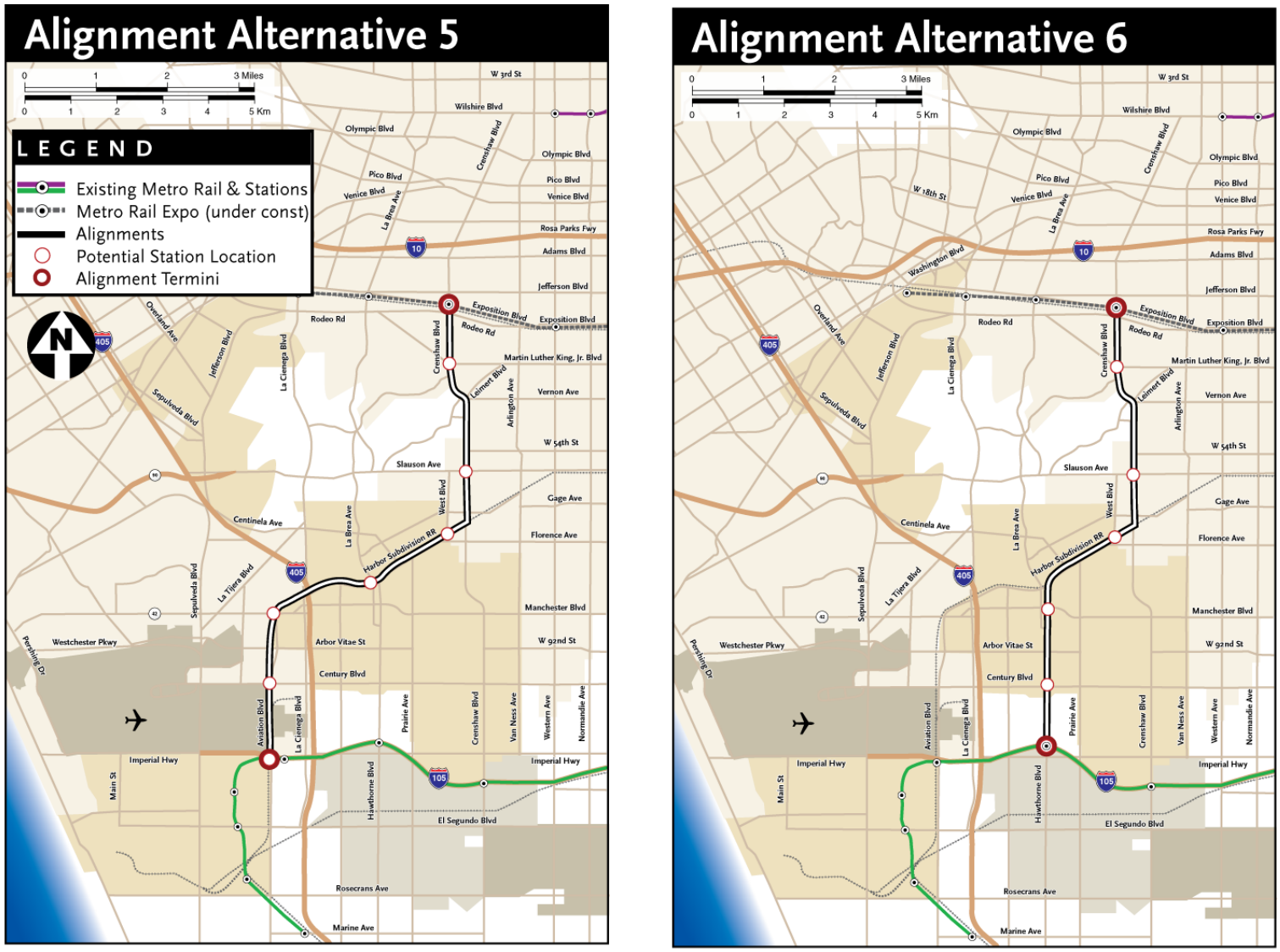


Figure 2-4. Alignment Alternatives (continued)

Figure 2-4. Alignment Alternatives (continued)



Source: Parsons Brinckerhoff 2008

Table 2-2. Alignment Alternatives Characteristics and Screening Results Summary

Criteria	Alignment Alt 1 A1, B, C1	Alignment Alt 2 A2, B, C1	Alignment Alt 3 A1, B, C2	Alignment Alt 4 A2, B, C2	Alignment Alt 5 A3, B, C1	Alignment Alt 6 A3, B, C2
Environmental Effects	Good	Good	Fair	Fair	Best	Better
Economic Development and Land Use	Lower population density; higher population without household vehicle; higher employment density	Lower population density; higher population without household vehicle; highest employment density	Higher population density; higher low income population; lower employment density	Highest population density; highest low income population; lower employment density	Lowest population density; higher employment density	Higher population density; higher low income population; lowest employment density
Capital and Operating Costs, Cost-Effectiveness, Financial Capability, and Federal New Starts Funding Criteria	Highest cost; best cost-effective value	Moderately high cost	Moderately high cost	Moderately high cost; low cost-effectiveness value	Low cost; consistent with Metro's *2001 Long Range Transportation Plan*	Lowest cost; lowest cost-effectiveness value; consistent with Metro's *2001 Long Range Transportation Plan*
Ridership/User Benefits	Highest daily boardings, high user benefits per passenger mile	Moderate user benefits per passenger mile	Highest user benefits per passenger mile	Moderate user benefits per passenger mile	Lowest user benefits per passenger mile	Lowest daily boardings, low user benefits per passenger mile
Travel Time Savings	Best within study area, to Westside District, and Redondo District	Best to Redondo District	Best within study area and to Westside District	Moderate; high within study area and to Westside District	Moderate; high to Redondo District	Moderate

Source: Final Alternatives Screening Report, June 2008.

2.1.2 Conceptual Station Locations Considered

Stations are a key component of the transit alternatives under consideration. Their location and design must balance transportation, urban design, architectural, and engineering factors. The conceptual alternatives refinement process included analyzing proposed station locations using pedestrian, automobile, and transit access; proximity to major cross streets, bus stops, Metro Rail stations, and other transit services; and, area development projects and plans (existing, planned, and potential). Proposed station location constraints were also evaluated, including: unfavorable existing land uses; environmental impacts; potential conflicts between pedestrian, automobile, and train traffic; right-of-way impacts, including surrounding businesses and/or properties and LRT design issues; and, standards to be maintained. To facilitate the process, these issues were divided into the following four categories: pedestrian access, neighborhood character, linkages/development, and other issues.

2.1.3 Maintenance and Operations Facilities Screening

While the maintenance and storage of additional buses needed for the No-Build and TSM Alternatives could be accommodated within existing Metro facilities, the BRT and LRT Alternatives would require additional maintenance and storage capacity. The size, location, construction, and operations of the required light rail vehicle (LRV) maintenance and operations facilities must be considered as part of the BRT and LRT Alternatives evaluation.

BRT maintenance and operations facilities would be capable of performing all levels of BRT vehicle service and maintenance and would also serve as a storage area for vehicles that are not in service. LRT maintenance and operations facilities generally include LRV storage and repair, administrative and functional uses including offices, materials, tools, parts storage, and communications equipment rooms among others. Figure 2-5 illustrates four potential maintenance and operations facility sites for the Crenshaw Transit Corridor Project. The site locations are:

- Site A is approximately 13 acres and bound by 67th Street, Crenshaw Boulevard, Harbor Subdivision right-of-way, and West Boulevard.
- Site B is approximately 16.3 acres and bound by 83rd Street, Harbor Subdivision right-of-way, and Isis Avenue.
- Site C is approximately 16.9 acres and bound by Manchester Avenue, Osage Avenue/ Harbor Subdivision right-of-way, and Bellanca Avenue.
- Site D is approximately 14.8 acres and in close proximity to the Metro Green line and bound by the Harbor Subdivision, a Union Pacific Branch Line and Rosecrans Avenue.

These sites were compared using: (1) size and proximity; (2) land use and zoning; (3) land ownership; (4) buffers; (5) potential expansion; (6) community disruption; and (7) most valuable and best use. Table 2-3 summarizes the maintenance and operations facility screening.

Based on the analysis, the four potential sites were ranked as follows: 1) Site D, 2) Site B, 3) Site C, and 4) Site A.

Figure 2-5. Alternative BRT and LRT Maintenance and Operations Facility Locations

Source: Parsons Brinckerhoff 2008

Table 2-3. Maintenance and Operations Facility Screening Summary

Criteria	Site A	Site B	Site C	Site D
Size and Proximity	13 acres; directly adjacent to alignment	16.3 acres; directly adjacent to alignment	16.9 acres; directly adjacent to alignment	14.8 acres; not directly adjacent to alignment
Land Use and Zoning	Residential; displaces approximately 182 dwelling units	Industrial; requires building demolitions	Industrial; requires building demolitions	Vacant; zoned commercial and industrial
Land Ownership	Private; requires public agency to displace residents	12% owned by County of Los Angeles Public Works	Private	Private
Buffers	Requires buffers	Requires buffers	Buffers unnecessary	Buffers unnecessary
Potential Expansion	Severely limited	Severely limited	Severely limited	Greatest potential
Community Disruption	High	Moderate	Moderate	Low
Pre-Emption of Most Valuable/ Best Use	Fair	Good	Good	Best

Source: Parsons Brinckerhoff 2008

2.1.4 Additional LRT Alternative Options Considered and Eliminated

Prairie and Crenshaw Boulevards Alternatives

Through coordination with the City of Inglewood, the City suggested two new alternatives be studied that would serve the proposed redevelopment of Hollywood Park on the site north of Century Boulevard between Prairie and Crenshaw Boulevards. They were suggested as alternatives to the proposed alignment along the Harbor Subdivision and service to downtown Inglewood. The alternatives would follow an alignment on either Prairie or Crenshaw Boulevards to serve a proposed station at Hollywood Park and Century Boulevard. While Prairie and Crenshaw Boulevards alternatives were previously evaluated in the initial screening, process, they did not consider the proposed redevelopment of Hollywood Park. At Century Boulevard, both alternatives would then continue west along Century Boulevard to serve LAX and connect with the existing Metro Green Line at Aviation Boulevard. A study of the reasonability of the alternatives in comparison to the Harbor Subdivision alignment included consideration of ridership potential, travel time, connections to other transportation facilities and services, physical constraints, capital costs, and environmental impacts.

A comparison of the two alignment alternatives determined that the Prairie/Century alignment would be shorter in length and have fewer physical constraints than the Crenshaw/Century alignment. The Crenshaw/Century alignment would require tunneling under residences, abandoned oil wells, and earthquake faults. It was also estimated to be approximately $200 million higher in capital costs than the Prairie/Century alignment. For these reasons, the Prairie/Century alignment was selected for comparison with the Harbor Subdivision alignment.

The comparison of the Prairie/Century alignment to the Harbor Subdivision alignment found that the Prairie/Century alignment would result in lower ridership and would have a capital cost of approximately $700 million, or 40 percent more than the Harbor Subdivision alignment. Although more population would be served by the Prairie/Century alignment, the number of employees served would be significantly less than the Harbor Subdivision alignment with service to downtown Inglewood. The proposed station in downtown Inglewood on the Harbor Subdivision alignment would also have more transit connections than the proposed station at Hollywood Park on the Prairie/Century alignment. There would also be significant unavoidable parkland and cemetery impacts with the Prairie/Century alignment. The Harbor Subdivision alignment is generally within an existing railroad corridor and would have fewer environmental impacts. For all of these reasons, the Prairie/Century alignment was eliminated from further consideration.

The screening of alternatives which resulted in alignment sections and alignment configurations being eliminated from further analysis is also referenced in the Final Alternatives Screening Report (September 2008).

Crenshaw Boulevard - 60th and Harbor Subdivision

Additional alignment options were considered for the LRT Alternative along Crenshaw Boulevard, between 60th Street and the Harbor Subdivision, including an at-grade option, aerial option and a below grade option. The aerial and below-grade options have been carried forward for further environmental analysis; the at-grade option was eliminated as noted below in Section 2.1.4.1.

2.1.4.1 LRT At-Grade Option along Crenshaw Boulevard, between 60th Street and the Harbor Subdivision

Between 60th Street and the Harbor Subdivision, Crenshaw Boulevard has a 100 feet wide right-of-way, with three traffic lanes in each direction. An at-grade LRT alignment would require 27 to 35 feet of additional right-of-way. The additional right-of-way width variation depends on the number of feet that can be gained by narrowing the existing sidewalks. This additional right-of-way is needed to maintain all existing traffic and left-turn lanes. The additional right-of-way would be taken from either the east or the west side of Crenshaw Boulevard. This right-of-way acquisition would result in businesses being relocated or displaced. In comparison, an aerial structure does not require additional right-of-way, except for a small easement. Because the at-grade option has increased costs, narrows the sidewalks, and displaces numerous businesses, it was removed from further consideration.

2.1.4.2 LRT Aerial Alignment and Elevated Station at Slauson Avenue

A LRT aerial alignment between 57th Street and 60th Street where the alignment is already proposed to be aerial under the LRT Alternative 3 was evaluated and removed from further consideration because it eliminates additional vehicular crossing movements, has visual impacts, and has a higher cost compared to an at-grade alignment.

2.1.4.3 LRT At-Grade Alignment Modifications and Split Platform at Slauson Avenue

On Crenshaw Boulevard on either side of Slauson Avenue, an at-grade alignment option with a platform station was eliminated from further consideration because it would reduce operating speeds and create potential safety issues.

2.2 Alternatives Considered in this AA/DEIS/DEIR

2.2.1 No-Build Alternative

The No-Build Alternative includes: (1) all existing highway and transit services and facilities; (2) the current Metro *2001 Long Range Transportation Plan* committed highway and transit projects that are environmentally cleared or under construction; and (3) the Southern California Association of Governments' *2008 Regional Transportation Plan* (RTP) committed highway and transit projects. Also, projects that are unfunded in the Metro *2001 Long Range Transportation Plan* are not included in the No-Build Alternative. There are additional projects which have not yet completed their environmental study or are unfunded as of fall 2008 (e.g., Exposition Phase II, Westside Extension, and the Regional Connector) that are not included in the No Build Alternative.

2.2.1.1 Highway System

The only major highway improvement affecting the Crenshaw Transit Corridor Project, between now and 2030 is the I-405 Freeway high occupancy vehicle (HOV) lane, between State Route 90 (SR 90) and the I-10 Freeway that is under construction. HOV are lanes currently on the I-405 Freeway, south of SR 90; on the I-105 and I-110 Freeways, in the study area vicinity; and, on other freeways throughout the region. The highway system that is assumed under the No-Build Alternative will be used when evaluating the build alternatives.

2.2.1.2 Transit System

Several transit agencies provide bus and rail transit services within the Crenshaw Transit Corridor Project study area. Metro, the Los Angeles Department of Transportation (LADOT), the Santa Monica Big Blue Bus, Torrance Transit, Beach Cities Transit, and the Culver City Bus provide public transit service. Figure 2-6 identifies the Metro Rapid lines and other transit lines serving the Crenshaw Transit Corridor under the No-Build Alternative.

For this AA/DEIS/DEIR, including the alternatives comparison, the Expo Phase 2 LRT Line fixed guideway being studied is not included in the No-Build Alternative because the project has not obtained environmental clearance.

Metro Rail

The Metro Purple and Green Lines serve the Crenshaw Transit Corridor. These lines operate along the northern and southern study area boundaries. The No-Build Alternative includes the Expo Phase 1 LRT line (under construction). This LRT line is approximately 9 miles long, parallels the congested I-10 Freeway, and is scheduled to open in June 2010. This future line will operate LRT along the Metro-owned Exposition right-of-way, from Downtown Los Angeles to Culver City. As it leaves Downtown Los Angeles, the Expo LRT line will share track and two stations (Metro 7th Street/Metro Center Station and the Metro Pico Station) with the Metro Blue Line. It will operate along the Metro-owned Exposition right-of-way to the current Washington/National Boulevards terminus.

Figure 2-6. No-Build Alternative

Source: Parsons Brinckerhoff 2008

Eight new stations will be constructed along the Expo LRT line. In addition to the Washington/National Boulevards station, new stations will be constructed at the following locations: (1) Flower/23rd Streets, (2) Flower Street/Jefferson Boulevard, (3) Exposition Boulevard/Vermont Avenue, (4) Exposition Boulevard/Western Avenue, (5) Exposition/Crenshaw Boulevard, (6) Exposition Boulevard/La Brea Avenue, and (7) Jefferson/La Cienega Boulevards. The line is proposed to operate at 5 and 10 minute headways during the peak and off-peak, respectively, in 2030.

Los Angeles International Airport Automated People Mover (LAX APM)

In addition to the Expo Phase 1 LRT Line, the No-Build Alternative includes the proposed LAX APM, which is part of the LAX Master Plan. As shown in Figure 2-7, the proposed APM will operate between the proposed Intermodal Transportation Center, north of the existing Metro Green Line Aviation/LAX Station, and the LAX terminals. This APM may be developed in two phases. The first phase would extend from the terminals to the Manchester Square area, near Century Boulevard/Aviation Boulevard. The second phase would extend from Century Boulevard/Aviation Boulevard to Aviation Boulevard/Imperial Highway. The proposed APM would operate at 2-minute headways during peak and off-peak periods. The Los Angeles World Airports (LAWA) will construct and operate the APM. The final APM route and technology have not yet been finalized.

Metro Rapid

The completed Metro Rapid Bus Program is included in the No-Build Alternative. The Metro Rapid Lines 710 and 740, which operate on Crenshaw Boulevard, serve the Crenshaw Transit Corridor. Metro Rapid Line 710 operates from the Metro Purple Line Wilshire/Western Station to the South Bay Galleria in Redondo Beach. Metro Rapid Line 740 operates from Union Station in Downtown Los Angeles, traveling west on Martin Luther King Jr. Boulevard, to Crenshaw Boulevard, and south to the South Bay Galleria. These two lines currently operate at 10-minute frequencies during peak periods and 20-minute frequencies during off-peak periods. Service is provided from approximately 5:00 a.m. to 9:30 p.m., Monday through Saturday. No service is operated on Sunday.

Other Metro Rapid Lines provide east-west services within the corridor. These routes include Metro Rapid Lines 720 and 920 on Wilshire Boulevard, Metro Rapid Line 728 on Olympic Boulevard, Metro Rapid Express, Metro Rapid Line 711 on Florence Avenue, Metro Rapid Line 705 on Vernon Avenue, and Metro Rapid Line 757 on Imperial Highway.

2.2.2 Transportation System Management (TSM) Alternative

The TSM Alternative enhances the No-Build Alternative by expanding the Metro Rapid bus services operating in the Crenshaw Transit Corridor, as shown in Figure 2-8.

2.2.2.1 Metro Rapid Improvements

Under the TSM Alternative, a new Metro Rapid line would be added along Crenshaw Boulevard, La Brea Avenue, and Hawthorne Boulevard to complement the existing Metro Rapid Lines 710 and 740. The new Metro Rapid line would operate from the Metro Purple Line Wilshire/Western Station to the Metro Green Line Aviation/LAX Station. It would operate along Wilshire and Crenshaw Boulevards, to Florence Avenue, and then along Florence Avenue and Aviation Boulevard to the Metro Green Line Aviation/LAX Station, located at the Aviation Boulevard/Imperial Highway intersection.

Figure 2-7. Proposed LAX Automated People Mover

Source: Parsons Brinckerhoff 2008

Figure 2-8. Transportation Systems Management Alternative

Source: Parsons Brinckerhoff 2008

The proposed new Metro Rapid line would have the same stop locations on Crenshaw Boulevard as the Metro Rapid Lines 710 and 740. On Florence Avenue and Aviation Boulevard, the new Metro Rapid line would have stops at West Boulevard, La Brea Avenue, Manchester Boulevard, Century Boulevard, and the Imperial Highway, at the Metro Green Line Aviation/LAX Station.

Intersection improvements such as improved signal timing and allowing buses better signal priority would constitute systems costs for the TSM alternative.

2.2.2.2 Vehicles

The new Metro Rapid line would use rapid bus vehicles similar to the one shown in Figure 2-9.

Figure 2-9. Typical Rapid Bus Vehicle

Source: Metro 2008

2.2.2.3 Support Facilities

For the TSM Alternative, additional vehicle storage will be required to support the expanded vehicle fleet. It is assumed that the vehicles would be maintained and stored at existing Metro facilities that may require expansion to accommodate the additional vehicles.

2.2.2.4 Operating Plan

The new Metro Rapid line would operate in both directions at 5-minute headways during peak periods and 10-minute headways during the mid-day, off-peak period. Longer headways would apply during the early morning and evening periods, when demand is lower than during the mid-day period. Service frequency on the existing Metro Rapid lines and other lines in the corridor would be the same as the No-Build Alternative.

The estimated peak-period one-way running time for this route is 52.5 minutes. At the 5 minute, peak-period headway and with an allowance for layover and recovery, this Metro Rapid line will require 125 minutes per round trip, resulting in a maximum of 25 vehicles in service. Including spares, the total fleet requirement is 30 vehicles.

2.2.3 Bus Rapid Transit Alternative

The BRT Alternative provides new transit services in the Crenshaw Transit Corridor, which would travel in mixed-traffic and in exclusive curb lanes. The BRT services would use low-floor, compressed natural gas (CNG) powered (or other clean burning alternative), articulated vehicles, with multi-doors for boarding. Enhanced BRT stops and stations would be constructed for passengers to access the system. Intersection

improvements such as improved signal timing and allowing BRT vehicles better signal priority would constitute systems costs for the TSM alternative.

2.2.3.1 Alignment – BRT Alternative

This section describes the proposed BRT Alternative alignment and station locations that are shown in Appendix A. The description is from north to south, but the Appendix A plans are from south to north, to connect with the Metro Green Line. Figure 2-10 shows, the BRT alignment would extend approximately 12 miles from the Metro Purple Line Wilshire/Western Station to the Metro Green Line Aviation/LAX Station. The BRT Alternative includes 12 stations.

Wilshire Boulevard/Crenshaw Boulevard Mixed-Traffic Lanes

The proposed new BRT route would begin at the Metro Purple Line Wilshire/Western Station. It would extend west operating in mixed traffic lanes, from Wilshire Boulevard to Crenshaw Boulevard, with stations located at the Wilshire Boulevard/Western Avenue and the Wilshire/Crenshaw Boulevards intersections.

On Wilshire Boulevard, the existing Metro Purple Line Wilshire/Western Station and the Wilshire/Crenshaw Boulevards intersection stop would be used for BRT route access. A new BRT station/stop would be located on Crenshaw Boulevard, south of Wilshire Boulevard.

From Wilshire Boulevard, BRT vehicles operate in mixed-traffic on Crenshaw Boulevard south to Exposition Boulevard. BRT stations/stops are located at Pico, Adams, and Exposition Boulevards. The BRT station at Exposition Boulevard allows transfers to the Expo LRT line (under construction).

A Rapid Bus extension or a BRT line from Exposition Boulevard/Crenshaw Boulevard and Wilshire Boulevard/La Brea Avenue would be implemented when the Purple Line is extended west from Western Avenue.

Crenshaw Boulevard Exclusive Lanes

On Crenshaw Boulevard, between Exposition Boulevard and the Harbor Subdivision right-of-way, semi-exclusive BRT lanes would be provided in each direction, using the outside curb lane (except where exclusive BRT lanes would be built, as described below). During peak periods, the BRT service operates in lanes restricted to buses and right-turning vehicles. During off-peak periods, the BRT vehicles would operate in mixed-traffic, in the inside traffic lane on some sections and on exclusive lanes that are restricted to buses and right-turn vehicles, on the remaining sections.

- Exposition Boulevard to Rodeo Road – Exclusive BRT lanes would be provided during peak periods by restricting the outside curb lanes to buses and right-turning vehicles, and prohibiting parking or general vehicles use during peak periods. As a result, the peak period traffic lanes would be reduced to two lanes in each direction. During off-peak periods, the BRT vehicles would operate in mixed-traffic, in the inside traffic lane, and would not change current on-street parking provisions or the general traffic lanes available during off-peak periods. On-street parking is typically needed by local businesses during the day during off-peak periods.

Figure 2-10. Bus Rapid Transit Alternative

Source: Parsons Brinckerhoff 2008

- Rodeo Road to North of Martin Luther King Jr. Boulevard – Exclusive BRT lanes would be provided during the peak and off-peak periods by reconstructing the street and using an undeveloped area within the existing right-of-way, along the east side. The exclusive BRT lanes would be located along the outside curb lane and would only be used by buses and right-turning vehicles. The existing general traffic lanes would be maintained; however, on-street parking would be reduced, from both sides of the frontage roads to one side.
- From North of Martin Luther King Jr. Boulevard to Vernon Avenue – Exclusive BRT lanes would be provided during peak periods by restricting the outside curb lanes to buses and right-turning vehicles, and by prohibiting parking or general vehicles use during peak periods. As a result, the peak period traffic lanes would be reduced to two lanes in each direction. During off-peak periods, the BRT vehicles would operate in mixed-traffic in the inside traffic lane, and current on-street parking provisions and general traffic lanes available during off-peak periods remain as they are today.
- Vernon Avenue to West 60th Street – Exclusive BRT lanes would be provided during peak and off-peak periods by reconstructing the street and using excess lane areas, or areas where frontage roads exist along the east and west sides. The exclusive BRT lanes would be located along the outside curb and only be used by buses and right-turning vehicles. The existing general traffic lanes would be maintained; however, on-street parking would be reduced from both sides of the frontage roads to one side.
- West 60th Street to Harbor Subdivision (just south of 67th Street, north of Florence Avenue)– Exclusive BRT lanes would be provided during peak periods by restricting the outside curb lanes to buses and right-turning vehicles, and prohibiting parking or general vehicles used during peak periods. As a result, the peak period traffic lanes would be reduced to two lanes in each direction. During off-peak periods, the BRT vehicles operate in mixed-traffic, in the inside traffic lane, and current on-street parking and the general traffic lanes available remain as they are today.

Stations would be located at the Crenshaw/Martin Luther King Jr. Boulevards and the Crenshaw Boulevard/Slauson Avenue intersections. In addition, an optional station near the Crenshaw/Leimert Boulevards intersection would also be considered.

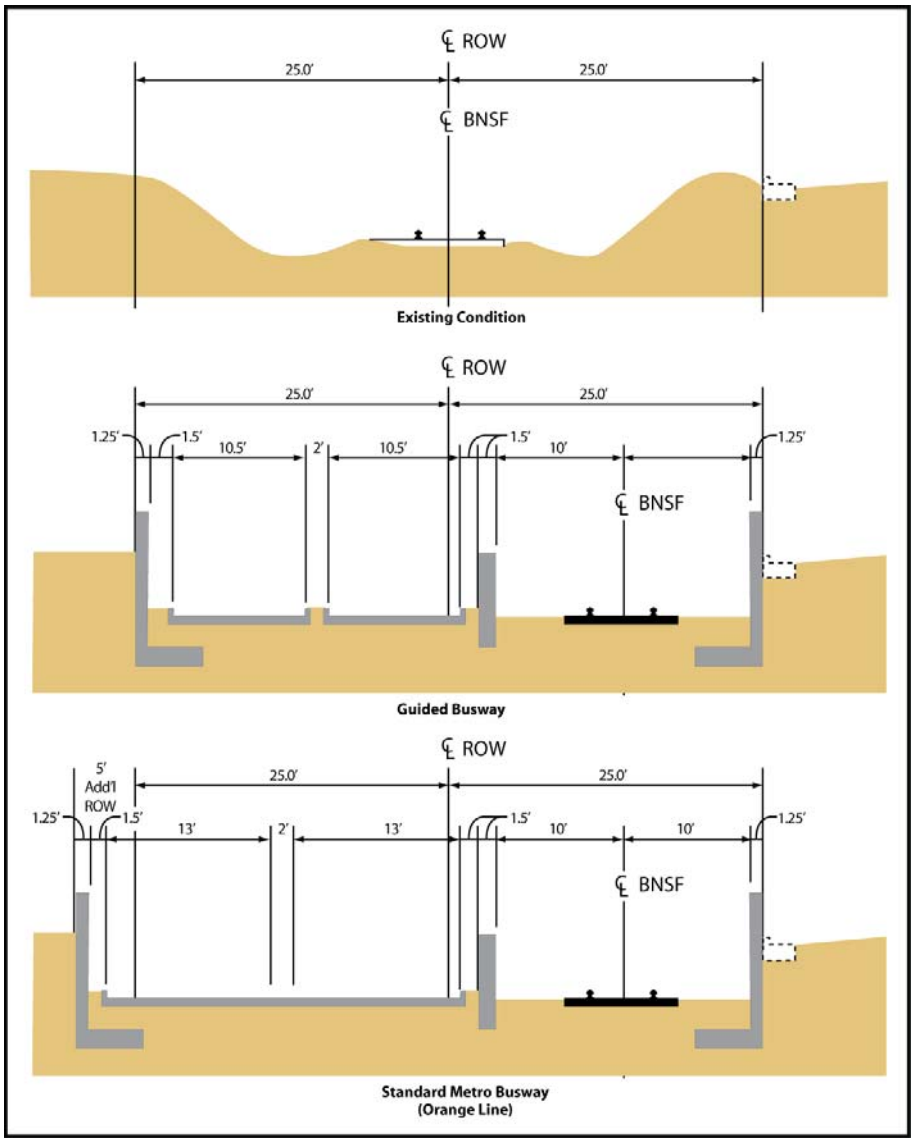
Harbor Subdivision Busway

A BRT busway would be provided within the Harbor Subdivision right-of-way, from Crenshaw Boulevard south to the Aviation Boulevard/104th Street intersection, where the busway transitions to mixed traffic operation. The BRT mixed traffic operations continue from 104th Street and terminate at the Metro Green Line Aviation/LAX Station. The Harbor Subdivision right-of-way is approximately 50 feet wide within the study area. Although Metro currently owns the right-of-way, the Burlington Northern Santa Fe Railway (BNSF) has an agreement to operate freight trains on the railroad. The railroad is single track throughout most of the study area and is generally located in the center of the right-of-way.

The BRT Alternative assumes that the existing BNSF railroad tracks would be maintained. However, to accommodate a two-lane busway, the existing BNSF railroad track within the study area, would be relocated closer to the southern/eastern right-of-way line. The proposed busway would be located north and west of the relocated BNSF railroad track.

The BRT facility standards Metro used for the Metro Orange Line extensions required a cross section of 55 feet. This standard busway system provided two 13-foot bus lanes separated by a 2-foot painted buffer line in the center of the busway and a relocated BNSF track. Because this cross section could not be accommodated without acquiring additional right-of-way, a guided-busway system would be used to accommodate narrow bus lanes. If mechanical guidance technology is confirmed, two 10.5-foot wide curbed bus lanes would be provided. A rubber guide following a raised curb on each side of the bus lane would guide the BRT vehicles. The busway would be separated from the railroad track by a 1.5-feet wide barrier wall. Figure 2-11 presents the different Harbor Subdivision right-of-way cross sections.

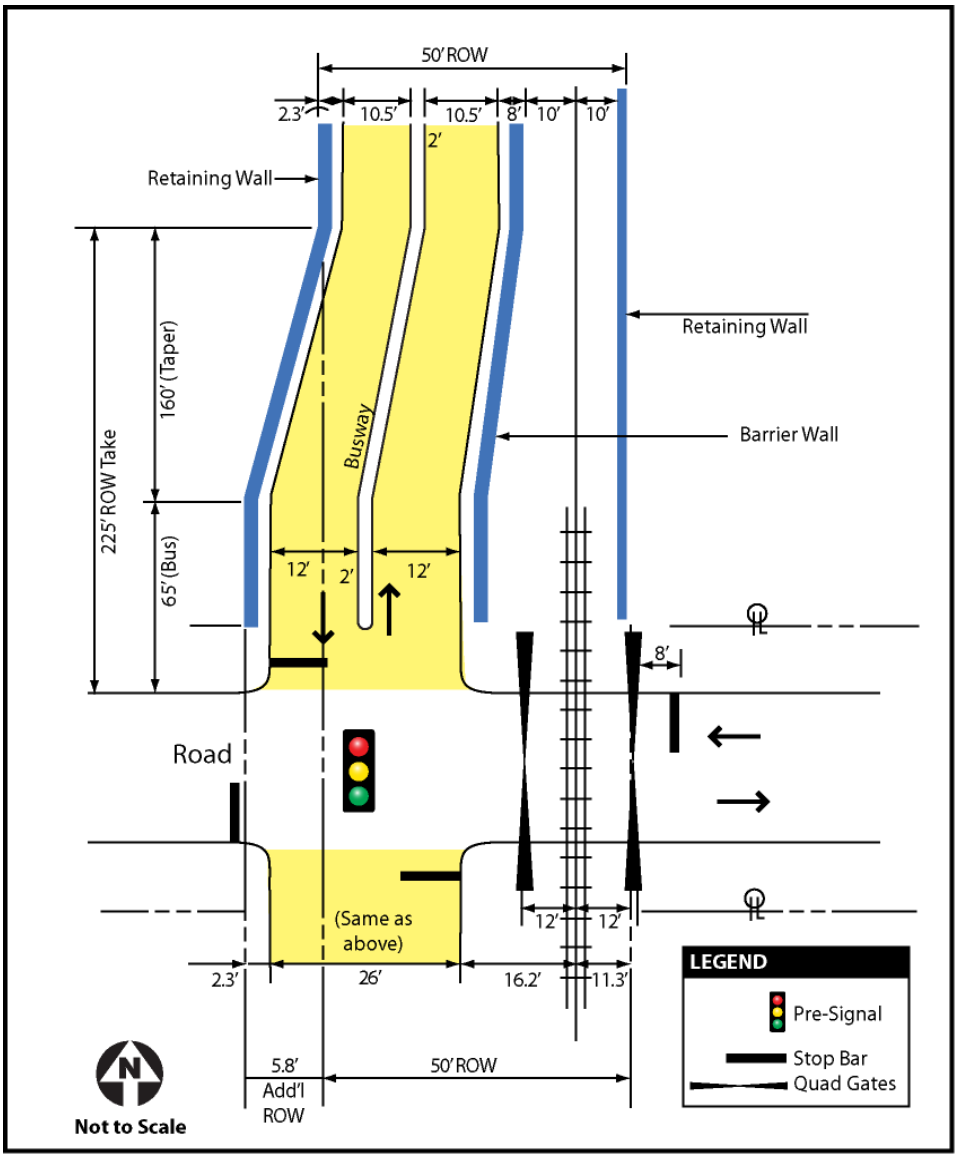
Figure 2-11. Harbor Subdivision Busway Cross Sections



Source: Parsons Brinckerhoff 2008

At the existing grade crossings, the railroad track would be protected by railroad gates and flashing lights. Between Crenshaw Boulevard and the Imperial Highway, there are 19 at-grade BNSF railroad crossings within the Harbor Subdivision right-of-way. These crossings would be modified to accommodate the busway crossing, where busway lanes would increase from 10.5 feet to 12 feet wide because the raised curbs for the guided BRT vehicles would not be able to continue through the crossings. Traffic signals would control the busway crossings, because railroad gates and flashing lights cannot be used to control the busway. The wider busway and railroad gate setback requirements would require approximately 6 feet of additional right-of-way at these crossings. A typical busway crossing is shown in Figure 2-12.

Figure 2-12. Typical Busway Crossing



Source: Parsons Brinckerhoff 2008

Stations along the Harbor Subdivision would be located at: West Boulevard, La Brea Avenue, Manchester Boulevard, and Century Boulevard. A station is also proposed at the Metro Green Line Aviation/LAX Station. Passengers would be able to transfer to the planned LAX APM system at the proposed Century Boulevard Station.

2.2.3.2 Stations

BRT stations would be located approximately 1 mile apart. The BRT stations would be at grade and comprised of two separate platforms, one for each travel direction. The station platforms would accommodate three conventional (40- to 45-feet long) buses or two articulated (60-feet long) buses. The BRT platforms would accommodate low-floor vehicles to improve the boarding and alighting process and help reduce vehicle travel times.

Two stations are proposed to be located on aerial structures: Century/Aviation and Florence/La Brea. Platform design will be similar to at-grade stations with the addition of vertical circulation elements.

Fare collection equipment, consisting of ticket vending machines (TVMs) and stand alone validators (SAVs), would be provided at each platform where boarding occurs or on station mezzanines or entrances as appropriate. Canopies would partially cover portions of the platforms, including the fare collection areas. Platforms would be well-lighted and include amenities, such as seating, bike lockers, bike racks, trash receptacles, and artwork. They would also include signage and safety and security equipment, such as closed circuit televisions (CCTVs), public announcement (PA) systems, passenger assistance telephones (PTELs), and variable message signs (VMSs), which would provide real-time information.

2.2.3.3 Vehicles

BRT services would be provided by articulated buses similar in design to the existing Metro Orange Line vehicles (Figure 2-13). These vehicles would be powered by low emission propulsion systems proposed initially by compressed natural gas (CNG) engines.

Figure 2-13. Typical BRT Vehicle

Source: Metro 2008

The BRT vehicles would have low-floors and would allow passengers to board from the curb and from all doors. Each vehicle would accommodate up to 100 passengers.

The vehicles would require an additional feature not present in Metro's current bus fleet. Vehicles would need to be equipped with a guidance system. With mechanical guidance, this involves a lateral guide wheel attached to the front wheel assembly.

2.2.3.4 Supporting Facilities

A new maintenance and operations facility would be required to accommodate the expanded vehicle fleet under the BRT Alternative. The facility would be a stand-alone facility for vehicle service and maintenance and a storage area for vehicles that are not in service for both BRT service and general service. To be consistent with the operation of Metro's other bus divisions, the facility would ultimately be large enough to support approximately 100 buses with an initial capacity of 24 buses. The ultimate facility size would be determined after the project operating plan is finalized. Figure 2-14 shows the two proposed maintenance and operations facility being evaluated. These two sites are also being evaluated for the LRT Alternative.

The major BRT facility features include:

- A BRT vehicle storage yard, with an adjacent 40,000 square-foot transportation or administrative office building, including a parking facility (approximately 150 parking spaces) that would also accommodate visitors.
- A maintenance area that would include a 30,000 square-foot maintenance building for daily servicing, preventive maintenance, repairs, parts storage, material control, component troubleshooting and repair, and maintenance administration, plus employee welfare and support areas.
- A paint and body shop with associated sheet metal, welding, and paint storage areas.
- A bus wash building and four to five fuel islands.

2.2.3.5 Operating Plans

A conceptual BRT Alternative operating plan was developed for ridership forecasting and capital and operating cost estimating purposes. The BRT line would operate seven days per week, including holidays. Service hours would be similar to those on the existing Metro Orange, Purple, Red, Blue, Green, and Gold Lines. Service would be provided from approximately 4:30 a.m. to 1:00 a.m.

Weekday BRT service in 2030 is proposed to operate every 5 minutes during peak periods (i.e., 6:00 to 9:00 a.m. and 3:00 to 7:00 p.m.) and every 10 minutes during the off-peak midday period (i.e., 9:00 a.m. to 3:00 p.m.). Longer headways would apply during the early morning and evening periods (e.g., 4:00 to 6:00 a.m. and 7:00 p.m. to 1:00 a.m.). Weekend and holiday service would be the same as Metro operates on its other BRT and LRT lines. Service hours and headways for opening day would be operated according to this same operating plan and adjusted according to demand.

The BRT Alternative operating plan provides for a single line operating from end-to-end, in both directions, stopping at all stations. The line would begin at the Metro Green Line Aviation/LAX Station and would end at the Wilshire Boulevard/Western Avenue

Figure 2-14. Alternative BRT Maintenance and Operations Facility Sites

Source: Parsons Brinckerhoff 2008

intersection. As shown in Table 2-4, the line would be approximately 12 miles long and would have a 39 minute end-to-end travel time, achieving over 18 miles per hour average speed. The estimated travel time includes a 20 second average dwell time per station. Based on this estimate, 24 vehicles, consisting of 20 peak and four spare vehicles, would be required for the proposed new BRT service.

Table 2-4. BRT Alternative Operating Plan

Station	Station Name	Distance (miles)	Cumulative Distance (miles)	Average Speed (mph)	Travel Time (min.)	Cumulative Travel Time (min.)
1.	Aviation/Imperial (existing Aviation/LAX) Station					
2.	Aviation/Century Station	1.3	1.3	19.2	4.2	4.2
3.	Aviation/Manchester Station	0.9	2.2	21.2	2.6	6.8
4.	Florence/La Brea Station	1.5	3.7	20.4	4.5	11.3
5.	Florence/West Station	1.3	5.0	18.2	4.2	15.5
6.	Crenshaw/Slauson Station	1.1	6.1	16.2	4.0	19.5
7.	Crenshaw/Vernon Station	1.1	7.2	18.1	3.7	23.2
8.	Crenshaw/Martin Luther King Jr. Station	0.5	7.7	15.5	2.0	25.2
9.	Crenshaw/Exposition Station	0.8	8.5	18.4	2.6	27.8
10.	Adams Station	0.6	9.1	15.6	2.4	30.2
11.	Pico Station	1.2	10.3	19.1	3.8	34.0
12.	Crenshaw/Wilshire Station	1.0	11.3	20.1	3.1	37.1
13.	Wilshire/Western Station	0.8	12.1	24.1	2.1	39.2
ENTIRE LENGTH		12.1		18.8	39.2	

Source: Parsons Brinckerhoff 2008

2.2.4 Light Rail Transit Alternative

The Crenshaw Transit Corridor LRT Alternative would be operated using high-floor articulated vehicles, electrically powered by an overhead wire, and operating along a new, two direction fixed guideway, located in both exclusive and semi-exclusive rights-of-way. The alternative would include seven stations, park-and-ride and bus transfer facilities at the stations, a vehicle maintenance and operations facility, and traction power substations.

2.2.4.1 Alignment – Base LRT Alternative

This section describes the proposed LRT Alternative alignment and station locations and is referred to as the Base LRT Alternative, which is the basis for comparison of alternatives. The LRT plan set is in Appendix A. The description is from north to south, but the Appendix A plans are from south to north, to connect with the Metro Green Line. As shown in Figure 2-15, the LRT alignment would extend approximately 8.5 miles from the Expo LRT line (under construction) at the Crenshaw/Exposition Boulevards intersection to the Metro Green Line Aviation/LAX Station. The LRT alignment would be double-tracked and would be comprised of at-grade street, at-grade railroad, aerial, and below grade sections.

Figure 2-15. LRT Alignment Alternative and Stations

Source: Parsons Brinckerhoff 2008

As will be described later in Section 2.2.4.6, LRT operation will extend from Exposition/ Crenshaw Station in the north to the Metro Green Line, joining the Metro Green line at Mariposa Station and terminating at the Redondo Beach Station. Metro Green Line service can also be extended north to serve the new Aviation/Century Station for transfers to the Los Angeles International Airport.

Crenshaw Boulevard Alignment

The proposed LRT alignment northern terminus would be located east of Crenshaw Boulevard, where it would connect with the Expo LRT line (under construction). The Expo LRT line will have a split, side platform station with the westbound platform located on the east side of Crenshaw Boulevard and the eastbound platform located on the west side of Crenshaw Boulevard. Because the split platform station would not provide convenient passenger transfers between the Crenshaw and Expo LRT lines, it is recommended that the station be modified under the Base LRT Alternative to a single center platform station, located on Exposition Boulevard east of Crenshaw Boulevard.

The present station location would have to be shifted east to provide the Expo LRT line track connection. A pocket track would be provided east of the station for Crenshaw LRT line trains to reverse direction. A curved transition track would be needed between the Crenshaw/Exposition station and the Crenshaw Boulevard alignment. This configuration would require additional right-of-way at the southeast corner Exposition and Crenshaw.

From the Exposition/Crenshaw station, the proposed LRT alignment would turn south along the Crenshaw Boulevard east side and would cross the northbound lanes, north of Rodeo Road, to the center of Crenshaw Boulevard. There would be a traffic signal at the Crenshaw Boulevard/Rodeo Road intersection to control traffic. A new median would be constructed for the double-track LRT alignment. To maintain the existing traffic lanes on Crenshaw Boulevard, the east side of the street would be widened south to Rodeo Place.

The alignment would continue south, at grade, in a new median on Crenshaw Boulevard to approximately West 39th Street, where the alignment would transition to below grade. The portal for the transition would be approximately 600 feet long.

After transitioning to below grade, the LRT alignment would continue below grade south along Crenshaw Boulevard. A below grade station would be located at Martin Luther King Jr. Boulevard.

Between Leimert Boulevard and West 48th Street, the alignment would transition from below grade to at grade in the center of the street, and would continue at-grade to West 59th Street. Crenshaw Boulevard would be reconfigured to minimize the frontage roads' width by eliminating parking on one side of each of the two frontage roads on the sides of the boulevard. An at-grade station would be located south of Slauson Avenue.

The LRT alignment would be on an aerial structure south of West 60th Street because the street right-of-way width is 100 feet, which would be insufficient to accommodate an at-grade LRT without reducing roadway lane capacity. The alignment would transition from at-grade to aerial between West 59th and West 60th Streets, and would continue on an aerial structure south to the Harbor Subdivision right-of-way.

Stations would be located at Crenshaw/Martin Luther King Jr., and Crenshaw/Slauson Avenue. The Crenshaw/Exposition station would result in modifying the existing Expo LRT line Crenshaw Station (under construction) to a center platform station design under the Base LRT Alternative.

Harbor Subdivision Alignment

From Crenshaw Boulevard, the proposed aerial LRT alignment would turn west onto the Harbor Subdivision right-of-way. The aerial LRT alignment would continue to the west of Victoria Avenue, where it would transition to at-grade. There would be an at-grade station west of West Boulevard.

The alignment would continue at-grade to east of La Brea Avenue, where it would transition to an aerial LRT. There would be an aerial station just west of La Brea Avenue (directly over the BNSF railroad track) with a mezzanine that may allow for a potential connection to a pedestrian bridge over Florence Avenue. This would serve the Inglewood Civic Center and shopping complex. The aerial alignment would continue to west of Eucalyptus Avenue, where it would descend to at-grade.

The LRT alignment would continue at-grade to approximately Hyde Park Boulevard, where it would transition to an aerial configuration across the I-405 Freeway and La Cienega Boulevard. The LRT alignment would return to at-grade west of La Cienega Boulevard, where there would be an at-grade station west of Hindry Avenue (i.e., the Aviation/Manchester Avenue Station). The alignment would continue at-grade to the Aviation/Century Boulevard Station, near the 96th Street/Aviation Boulevard intersection. This station would provide transfers to the planned LAX APM. Figure 2-16 presents the different Harbor Subdivision right-of-way cross sections.

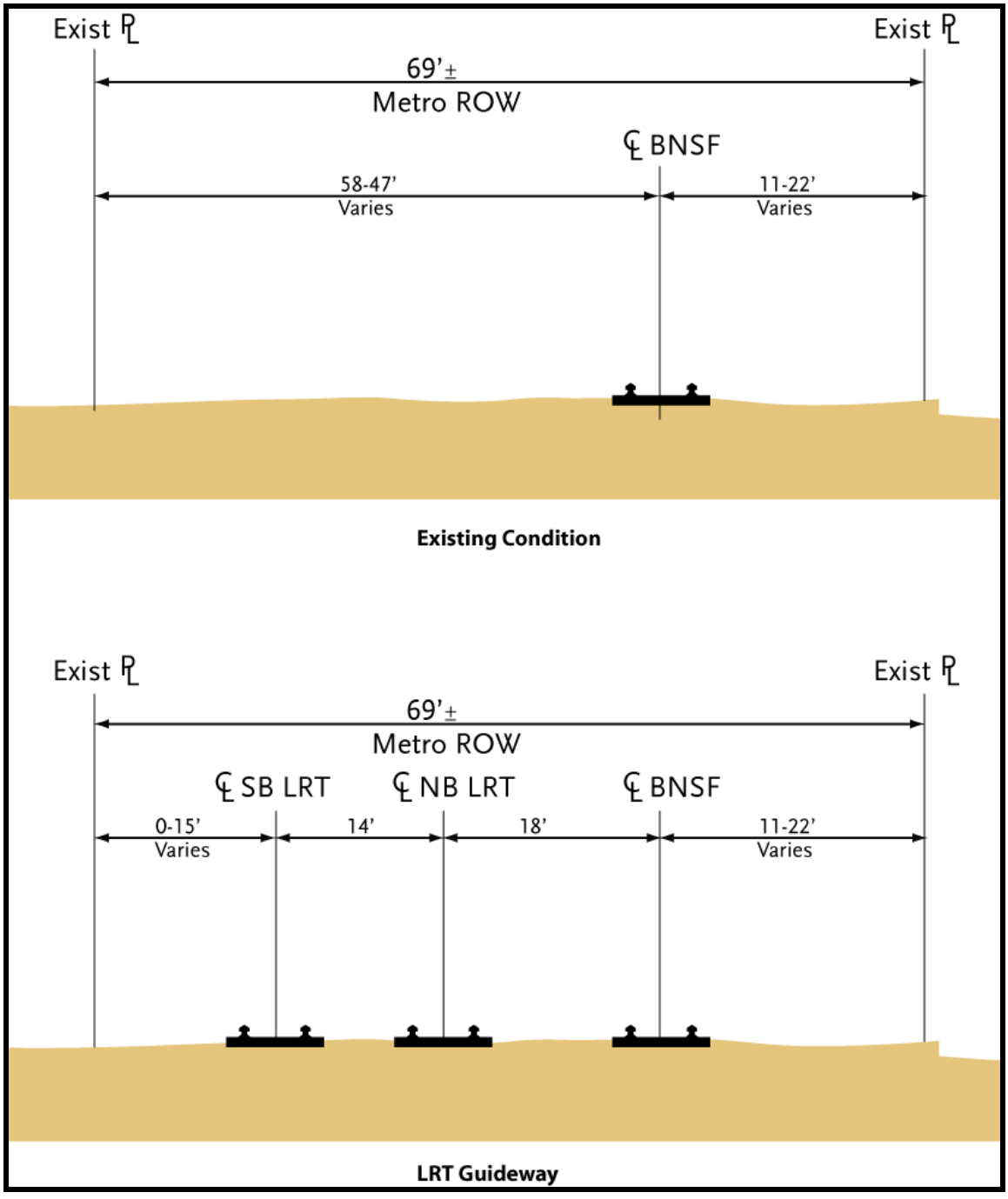
The alignment would transition to an aerial configuration north of Century Boulevard. At Century Boulevard, the LRT alignment would be on a new bridge constructed west of, and adjacent to, the existing railroad bridge. After crossing Century Boulevard, the LRT alignment would descend to below grade, mostly within the Metro owned right-of-way, and would continue south past the LAX south runways. This segment of below-grade alignment is subject to a determination of necessity by the Federal Aviation Administration (FAA). Approximately 20 feet of additional right-of-way or easement would be required in some sections.

South of West 111th Street, the alignment would transition to an aerial configuration, where it would join the existing Metro Green Line, which has provisions for a future north extension. At the Metro Green Line junction, the LRT alignment could proceed east and enter the Aviation/Imperial (existing Aviation/LAX) Station or proceed west and continue to the existing Metro Green Line Redondo Beach Station at Marine Avenue.

2.2.4.2 Additional LRT Alternative Design Options

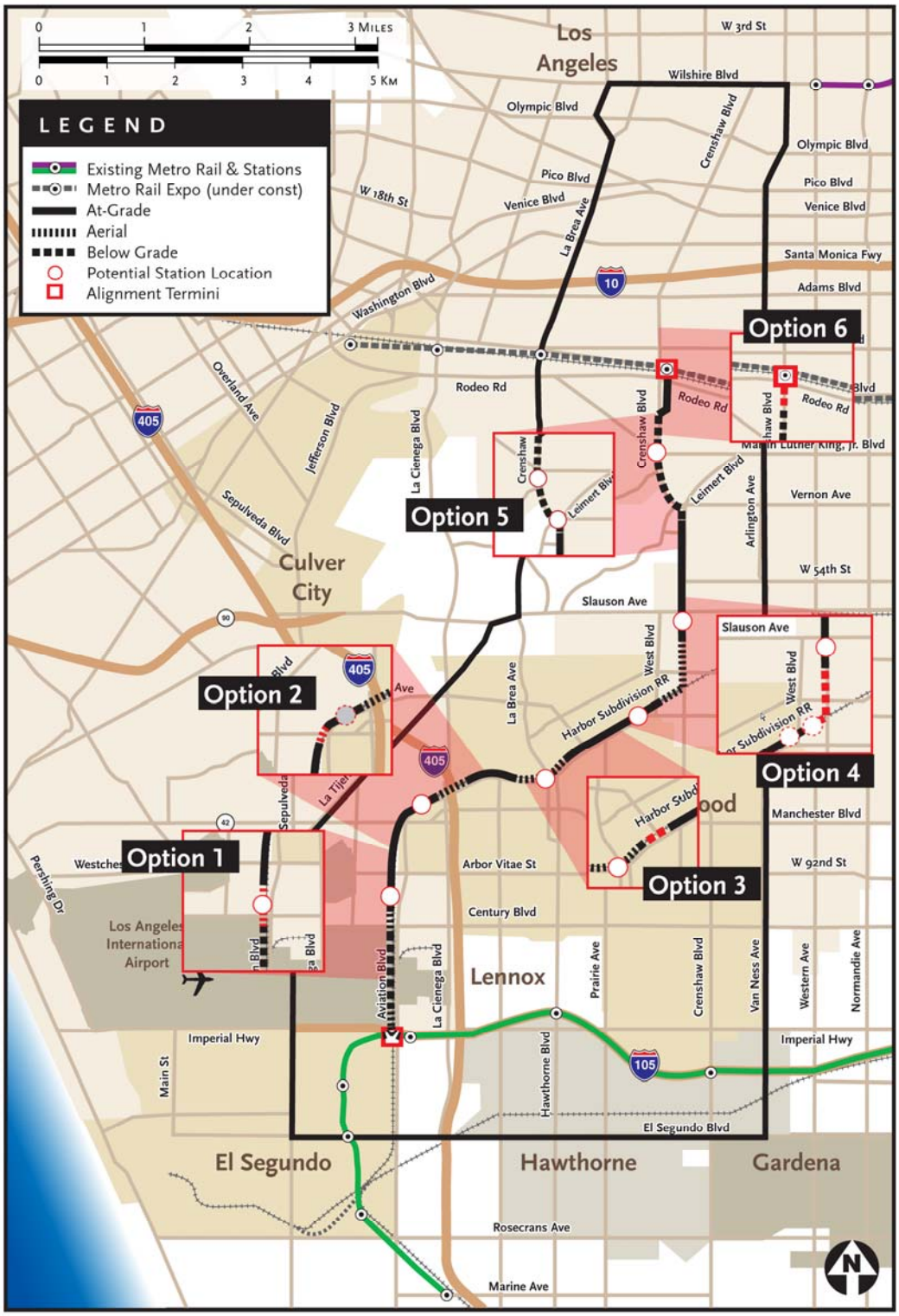
Six additional LRT Alternative design options are being considered as variations of the Base LRT Alternative, as shown in Figure 2-17. These design options may be included as part of the LRT Alternative based upon results of environmental analysis and public comment. These design options include the following:

Figure 2-16. Harbor Subdivision LRT Cross Section



Source: Parsons Brinckerhoff, 2009

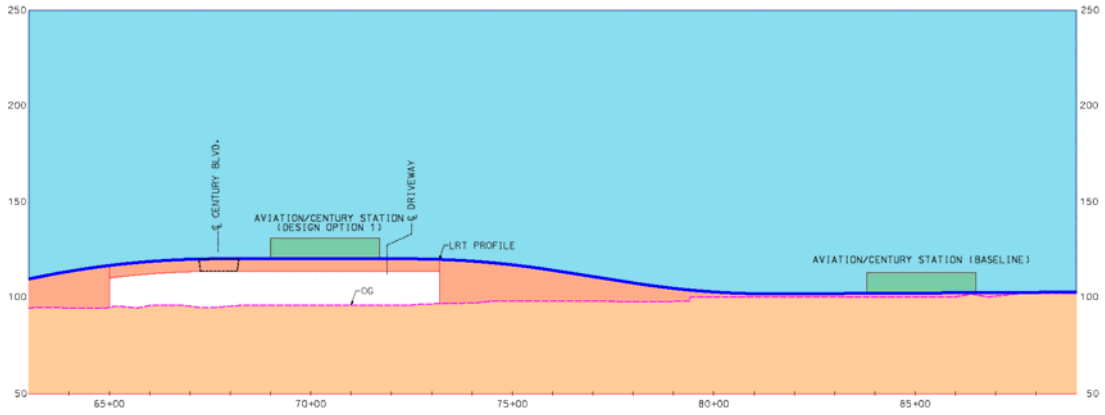
Figure 2-17. Additional LRT Alternative Design Options



Source: Parsons Brinckerhoff, 2008.

- LRT Alternative Design Option 1, as shown in Figure 2-18, involves an aerial station at Century Boulevard instead of an at-grade station at LAX. An Aviation/Century station option includes an aerial station design option on the north side of Century Boulevard as compared to the Base LRT Alternative at-grade station located approximately 1,500 feet north of Century Boulevard near 96th Street.

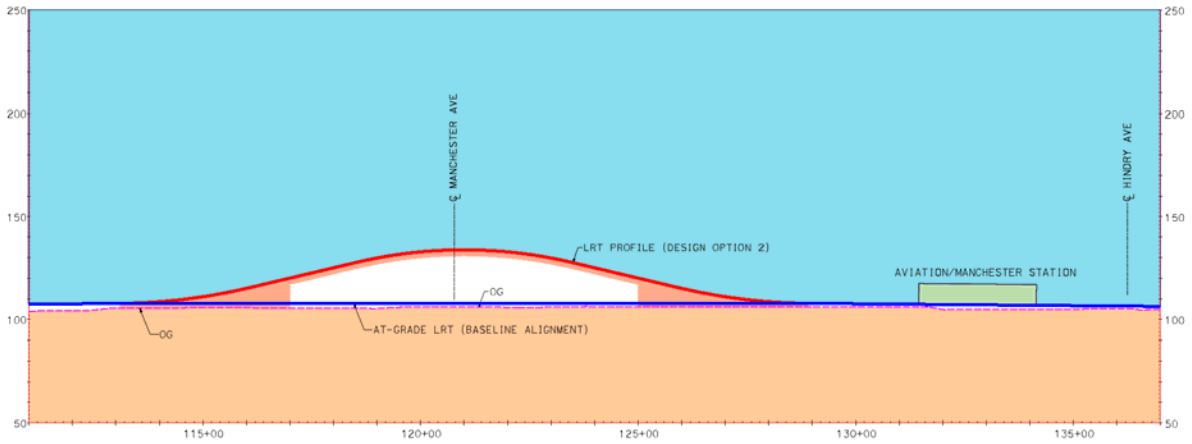
Figure 2-18. LRT Alternative Design Option 1



Source: Parsons Brinckerhoff 2008

- LRT Alternative Design Option 2, as shown in Figure 2-19, involves an aerial crossing instead of an at-grade crossing at Manchester Avenue. An aerial crossing over Manchester would replace the at-grade LRT alignment proposed under the Base LRT Alternative and would extend an aerial alignment approximately 1,300 feet within the Harbor Subdivision right-of-way. The over crossing would consist of an 800 foot bridge and 250 feet approaches on each bridge. The aerial alignment would return to grade on the north side of Manchester Avenue before the at-grade station proposed on the north side of Hindry Avenue. A final decision on inclusion of this aerial crossing design option in the LRT Alternative would be dependent on further traffic analysis, and an evaluation of the grade separation analysis. The grade separation analysis, required by Metro's Grade Separation Policy, is a review of physical conditions at the site, and a cost evaluation.

Figure 2-19. LRT Alternative Design Option 2

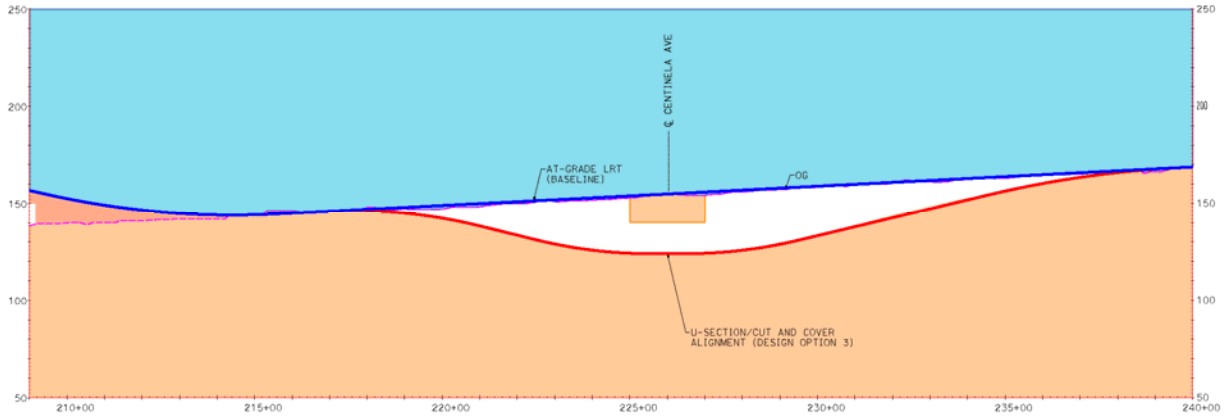


Source: Parsons Brinckerhoff 2008

- LRT Alternative Design Option 3, Figure 2-20 involves a cut and cover crossing instead of an at-grade crossing at Centinela Avenue. An LRT under crossing at Centinela Avenue would replace the at-grade LRT alignment proposed under the Base LRT Alternative and would extend approximately 2,000 feet within the Harbor Subdivision. The under crossing would consist of a 200 foot bridge with a 700 foot depressed LRT alignment section on the west and an 1,100 foot depressed section on the east side of Centinela Avenue. A final decision on inclusion of this Centinela Avenue under-crossing design option in the LRT Alternative would be dependent on further traffic analysis and an evaluation of the grade separation analysis.

  An aerial design option at Centinela Avenue was also evaluated, but was eliminated from further consideration as a result of the higher cost and visual impacts.

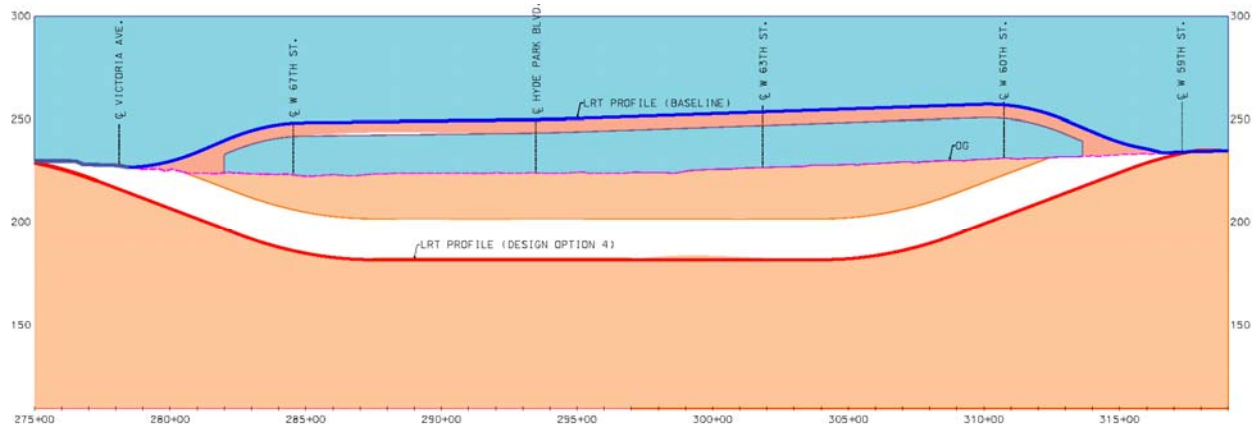
Figure 2-20. LRT Alternative Design Option 3



Source: Parsons Brinckerhoff 2008

- LRT Alternative Design Option 4, as shown in Figure 2-21, involves a cut and cover alignment instead of an aerial alignment between Victoria Avenue and 60th Street. A below-grade alignment between South Victoria Avenue and 60th Street would replace the aerial alignment proposed under the Base LRT Alternative, starting on Crenshaw Boulevard and extending into the Harbor Subdivision. The below-grade alignment would be built as a cut and cover tunnel. A final decision on a below-grade alignment would be dependent on further analysis of environmental impacts and cost evaluation.

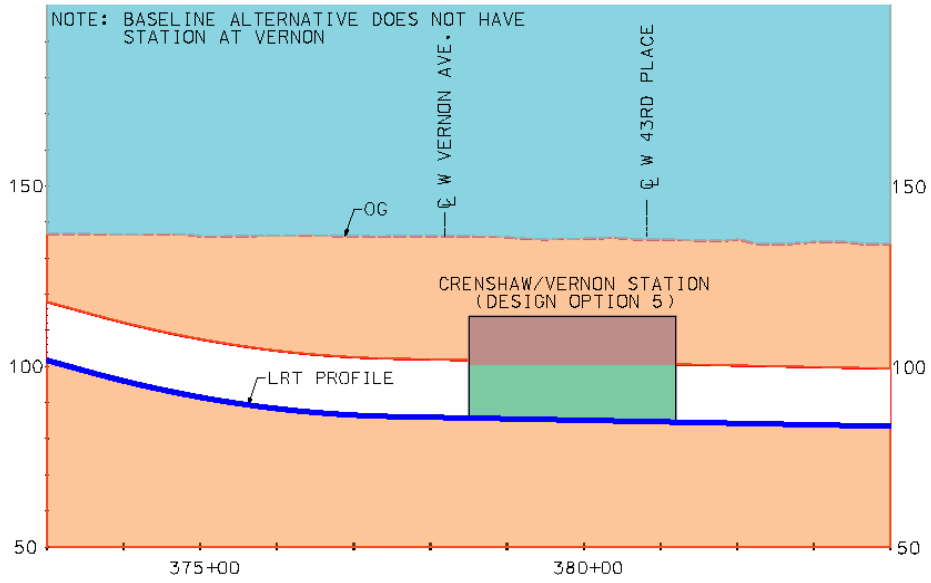
Figure 2-21. LRT Alternative Design Option 4



Source: Parsons Brinckerhoff 2008

- LRT Alternative Design Option 5, as shown in Figure 2-22, involves a below-grade station at Vernon Avenue in Leimert Park. The Crenshaw/Vernon station is an optional below-grade station. If the optional station at Crenshaw/Vernon is not included in the selection of the Locally Preferred Alternative, consideration will be given to shifting the Crenshaw/Martin Luther King Jr. Station to between Martin Luther King Jr. Boulevard and Stocker Avenue to improve pedestrian access to Leimert Park Village. This results in two scenarios for LRT stations in this area: (1) One station (Base LRT Alternative) – the Crenshaw/Martin Luther King Jr. Station lies closer to Stocker Avenue and (2) Two stations (LRT Alternative with Design Option 5) – a Crenshaw/Martin Luther King Jr. Station and a Crenshaw/Vernon Station.

Figure 2-22. LRT Alternative Design Option 5

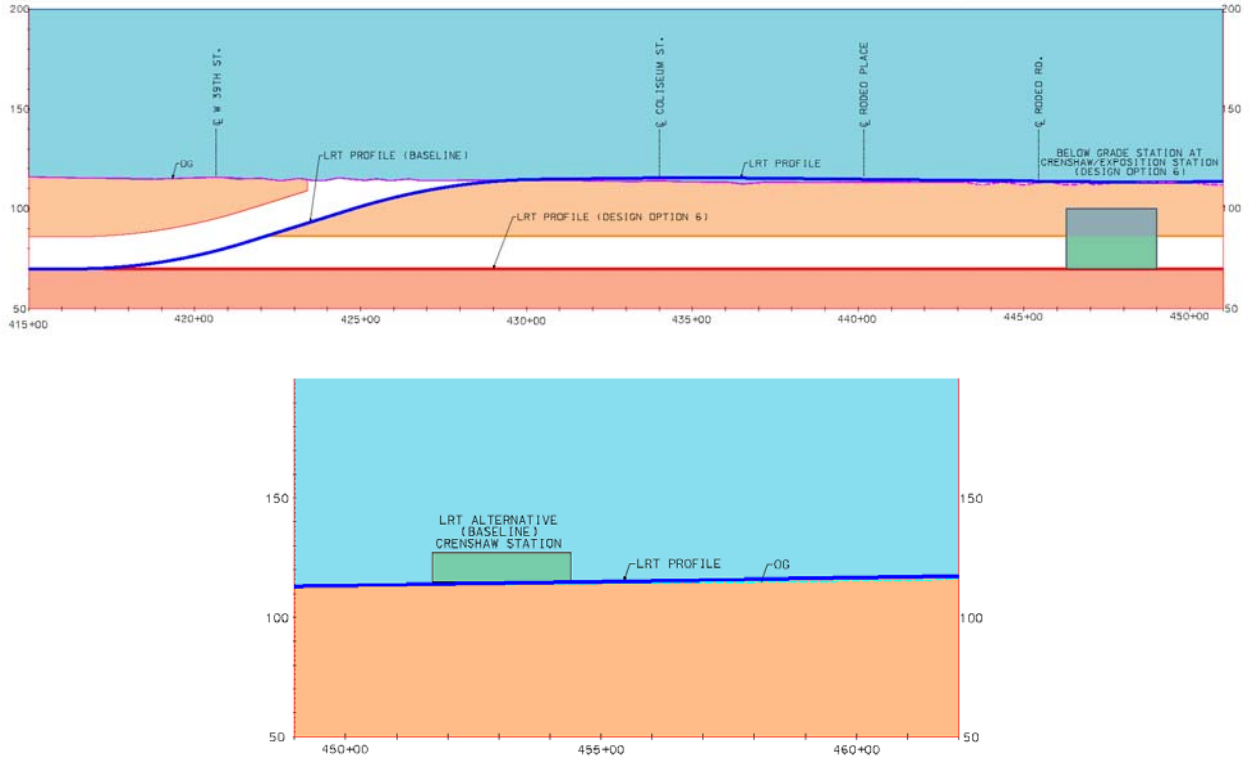


Source: Parsons Brinckerhoff 2008

- LRT Alternative Design Option 6, as shown in Figure 2-23, involves a below-grade alignment between 39th Street and Exposition with a below-grade station at Crenshaw Boulevard and Exposition Boulevard. A below-grade alignment between 39th Street and Exposition Boulevard would replace the at-grade Base LRT Alternative alignment and would extend the tunnel north of Martin Luther King Jr. Boulevard to Exposition Boulevard with a below-grade station. The below-grade station would provide street level access for transferring to the Expo LRT line (under construction). The below-grade alignment could be built as either a bored or cut and cover tunnel. The choice of tunneling methodology will be based on an analysis of the length and depth of the tunnel section.

  A final decision on a below-grade alignment would be dependent on further analysis of environmental impacts and cost evaluation.

Figure 2-23. LRT Alternative Design Option 6



Source: Parsons Brinckerhoff 2008

2.2.4.3 Stations

The LRT Alternative would include stations for passenger access. Seven new stations and potential park and ride facilities may be provided at the station locations indicated in Table 2-5:

Table 2-5. Potential Parking Spaces at Station Locations

Station Locations	Approximate Park-and-Ride (Spaces)
Crenshaw/Exposition	300-870*
Crenshaw/Martin Luther King Jr.	100-300
Crenshaw/Slauson	
Florence/West	100-300
Florence/La Brea	100-300
Aviation/Manchester	100-300
Aviation/Century	

* Spaces shared with Exposition LRT Line at a common station location at Crenshaw/Exposition Park-and-ride facilities at this location are assumed to be initially developed as part of the Exposition Line project.

For transit passengers' convenience and to control capital, operating, and maintenance costs, the proposed stations, including signage, maps, fixtures, furnishings, lighting, and communication equipment, would have a consistent design similar to the existing Metro LRT stations.

Dependent on the ability to secure property, five of the seven proposed stations may include park-and-ride lots at: Crenshaw/Exposition, Crenshaw/Martin Luther King Jr. Florence/La Brea Avenue, Florence/West and Aviation/Manchester Avenue. The park-and-ride lots at Crenshaw/Exposition and Crenshaw/Martin Luther King Jr. would possibly be shared with adjacent land uses.

Station Platforms

LRT stations would consist of either center or side platforms, which are 270 feet long, to accommodate LRT trains with up to three cars. Center platform stations would have a single platform, allowing passengers to access trains from either direction. This configuration would make it easier for passengers to transfer across platform and to use the system in general. Side platform stations would have platforms on either side of the tracks, with separate entrances to each platform. A side platform configuration would require that patrons transfer to a different platform to access the trains. Platforms would be approximately 18 feet wide for center platform stations and 14 feet wide for side platform stations. The platforms would be 39 inches high to allow level-boarding for full accessibility. Platform widths are determined in accordance with Metro's Design Criteria and Directive Drawings.

The future Crenshaw/Exposition station on the Expo LRT line (under construction), at the Crenshaw/Exposition Boulevards intersection, would be modified from a split

platform to a center platform under the Base LRT Alternative. The existing Metro Green Line Mariposa, Douglas, and Redondo Beach Stations were constructed to accommodate two-car trains. If the Metro Green Line or proposed Crenshaw Line ridership demand increases, it may warrant that the platforms be extended to accommodate three-car trains.

All platforms would be fully accessible and comply with the Americans with Disabilities Act (ADA). Outdoor platforms would be well-lighted and include amenities, such as canopies that cover a minimum 30 percent of the platform area, seating, bike lockers, bike racks, trash receptacles, and artwork. As described for the BRT stations, the LRT stations would also include signage, safety, and security equipment, such as CCTVs, PA systems, PTELs, and VMSs, which would provide real-time information. The fare collection area would include TVM, SAVs, and information cases. The SAVs would function as fare gates, defining the "free" and "paid" areas, where patrons would be required to have a ticket. Fare gates would be per Metro Policy and installed at major stations along the line.

Station Types

LRT station types would be either at-grade, aerial, or below grade, and are comprised of 270 feet long platforms that accommodate LRT trains with up to three cars.

At Grade

At-grade station platforms would be accessed from either a single ramp to a center platform or from separate ramps to each of the side platforms. At-grade stations located in the street median would be accessed from a designated crosswalk. California Public Utilities Commission (CPUC) regulations require that an at-grade station platform boarding area be located at least 180 feet from the nearest street curb to allow adequate safe braking distances for the LRVs.

Elevated or Aerial Stations

Elevated station structures would be supported by columns spaced approximately 80 to 120 feet apart. The platforms would be accessed either directly from grade or from an intermediate concourse above grade through vertical circulation elements (i.e., stairs, escalators, elevators). Platform widths would be determined by ADA clearances at the stairs, escalators, or elevator structures, and by Metro's Fire/Life Safety Criteria for exiting requirements, which is based on patronage data.

Below Grade Stations

Below grade stations would have off-street entrances comprised of vertical circulation elements that bring patrons to a mezzanine level where the ticketing functions would be located. The platforms would be accessed from the mezzanine level. The platform widths, and the widths of the stairs, escalators, and emergency exits, would be determined by patronage data and ADA required clearances.

2.2.4.4 Supporting Facilities

The LRT Alternative construction would include installing trackwork, an overhead contact system (OCS) distributing electricity to LRVs, traction power substations (TPSS) located about 1 mile apart, signaling and communication systems, and a vehicle maintenance and operations facility which would operate 24 hours a day, seven days a week.

Systems

The LRT fixed guideway would consist of continuously welded rails. The rails would be embedded in a concrete slab or installed on crossties and ballast. The LRT OCS would consist of steel poles installed along the operating right-of-way to support the electrical power line. The poles would be approximately 25 feet tall and would be installed at 90 to 170 feet intervals. The poles would generally be located in the center of the right-of-way, between the two tracks, wherever possible. In some locations, the poles would be located on both sides of the LRT tracks. The overhead electrical power lines are suspended above the LRT tracks.

Electricity for LRT operations would be supplied to the OCS from traction power substations (TPSS), located along the proposed LRT alignment and shown in Figure 2-24. (A more detailed depiction of the initial TPSS sites is located in the Plan and Profile Drawings included in Volume II of this document.) These electrical substations would be enclosed structures located near the LRT alignment. Development of the substations, in some cases, would require an access roadway for maintenance vehicles. Electrical substations would be required for approximately each mile of single or double track.

Communications and signaling (C&S) buildings house train control and communications for LRT operations in a central facility at each station. Each facility is an enclosure located within the station site area, typically adjacent to a station platform. Positioning of a C&S building must be done to provide clearances for maintenance and servicing, and to maintain sight lines for LRT operations.

Maintenance and Operations Facility

The LRT Alternative would require a new maintenance and operations facility. The facility would be a stand-alone facility for LRV service and maintenance and storage for vehicles that are not in service. The facility would operate 24 hours a day, seven days a week. The facility would ultimately be large enough to support approximately 60 vehicles. The ultimate facility size would be determined after the project operating plan is finalized. The two proposed maintenance and operations facility sites evaluated are shown in Figure 2-25.

The proposed maintenance and operations facility site major features include:

- A storage yard for approximately 60 LRVs, with an adjacent 50,000 square-foot transportation or administrative office building, including a parking facility (200 parking spaces) that would also accommodate visitors.
- A maintenance area to store five LRVs, including a 5,000 square-foot maintenance building with facilities for daily servicing, preventive maintenance, repairs, wheel truing, parts storage, material control, component troubleshooting and repair, and maintenance administration, and employee welfare and support areas.
- An approximately 5,000 square-foot paint and body shop with associated sheet metal, welding, and paint storage areas.
- A 15,000 square-foot operations center (as a second floor to a portion of the maintenance building) which would house rail operations, maintenance and operation training, and the signals and communications department. The overall maintenance area would have its own parking facility (100 parking spaces).

Figure 2-24. Traction Power Substation Locations

Source: Parsons Brinckerhoff, 2009

Figure 2-25. Alternative LRT Maintenance and Operations Facility Sites

Source: Parsons Brinckerhoff 2008

- A 10,000 square-foot maintenance-of-way building to serve the track department, including a storage track and a lay down area.
- A 4,000 square-foot LRV cleaning platform.
- A 7,500 square-foot car wash building.
- A 4,000 square-foot vehicle blow down building.
- A traction power substation for the yard and shop.

2.2.4.5 Vehicles

The LRT Alternative transit services would use LRVs equivalent to those Metro operates on the existing Metro Blue, Green, or Gold Lines and the Expo LRT line (under construction) with compatible train subsystems (see Figure 2-26). These vehicles are double-ended, articulated, six-axle LRVs capable of multiple unit operation in trains of up to three vehicles.

Figure 2-26. Typical LRT Vehicle

Source: Metro 2008

Based on the existing LRV vehicles Metro uses, each future vehicle would be approximately 90 feet long and would have 55 miles per hour maximum design speed, although capable of achieving 24 miles per hour average speed including normally-spaced stops and anticipated delays in street-running sections. The project would be designed to accommodate up to three-car trains. Each three-car train set could carry up to 500 passengers. Each vehicle would be equipped for independent two-way operation, with a driver's cab at each end and would have equal performance in either direction.

2.2.4.6 Operating Plan

A conceptual LRT Alternative operating plan was developed for ridership forecasting and capital and operating cost estimating. The proposed LRT line would operate seven days per week, including holidays. Service hours would be similar to the existing Metro Orange, Purple, Red, Blue, Green, and Gold Lines. Service would be provided from approximately 4:00 a.m. to 1:00 a.m.

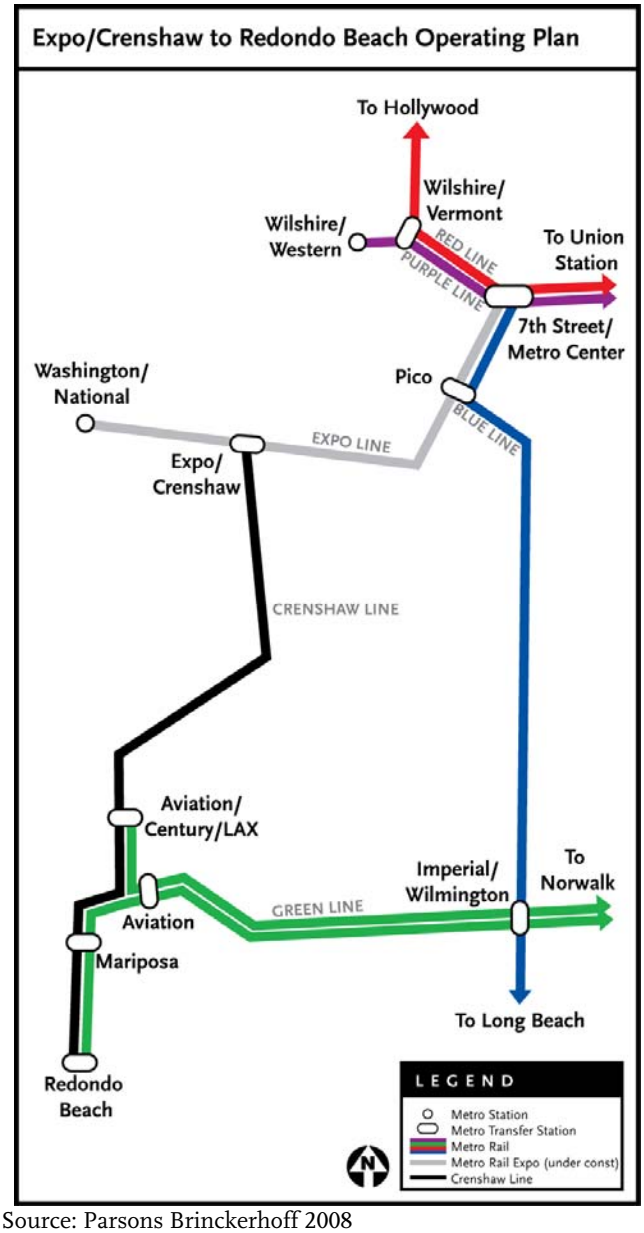
Weekday LRT service in 2030 would operate approximately every 5 minutes during peak periods (i.e., 6:00 to 9:00 a.m. and 3:00 to 7:00 p.m.) and every 10 minutes during the off-peak midday period (i.e., 9:00 a.m. to 3:00 p.m.). Service headways would be longer during the early morning and late night periods (i.e., 4:00 to 6:00 a.m. and 7:00 p.m. to 1:00 a.m.). Weekend and holidays would have reduced service hours. With growth of transit demand, the service span could be expanded at some

point to 24-hour operation. Service hours and headways for operating day would be operated according to the same operating plan. After commencement of operation, service hours, headways, and train lengths for opening day would be adjusted according to demand.

As shown in Figure 2-27, the LRT Alternative operating plan would provide for running a single LRT line providing service from end-to-end, in both travel directions, stopping at all stations. The line would operate between Metro Green Line Redondo Beach Station and the Exposition/ Crenshaw Station termini.

The LRT system would be approximately 12 miles long and have an end-to-end travel time of approximately 30 minutes, including a portion along a section of the existing Metro Green Line, with 23 miles per hour average speed. The Green Line currently operates with two car consists and with the Crenshaw infrastructure, service will be split equally with half of the trains routed between the Metro Green Line Norwalk and Aviation/Century Stations and the other half between the Metro Green Line Norwalk and Redondo Beach Stations. (See Table 2-6)

Figure 2-27. LRT Alternative Operating Plan



Source: Parsons Brinckerhoff 2008

The proposed LRT operations, with 5 minute headways would require 16 trains to be in service. Ridership forecasts indicate that single-car trains would provide adequate capacity, resulting in a requirement for 16 LRVs. With spares, the fleet size is estimated at 20 vehicles. The split service on the Metro Green Line would require the same number of vehicles as does the current end-to-end service pattern. Considering the potential for future system expansion, provisions are made for up to three-car consists. The interaction with the Metro Green Line would indicate a potential need to integrate all service patterns to ensure reliability for service on each pattern.

Table 2-6. LRT Alternative Operating Plan

Station	Station Name	Distance (miles)	Cumulative Distance (miles)	Average Speed (mph)	Travel Time (min.)	Cumulative Travel Time (min.)
1.	Metro Green Line Redondo Beach Station					
2.	Metro Green Line Douglas Station	1.1	1.1	22.2	3.0	3.0
3.	Metro Green Line El Segundo Station	0.8	1.9	24.0	2.0	5.0
4.	Metro Green Line Mariposa Station	0.5	2.4	15.3	2.0	7.0
5.	Aviation/Century Station	2.3	4.7	28.6	4.8	11.8
6.	Aviation/Manchester Station	0.9	5.6	30.1	1.8	13.6
7.	Florence/La Brea Station	1.2	6.8	28.2	2.7	16.3
8.	Florence/West Station	1.2	8.0	29.2	2.4	18.7
9.	Crenshaw/Slauson Station	1.1	9.1	22.2	3.1	21.8
10.	Crenshaw/Vernon Station (Optional)	1.2	10.3	20.7	3.4	25.2
11.	Crenshaw/Martin Luther King Jr. Station	0.5	10.8	19.0	1.7	26.9
12.	Crenshaw/Exposition Station	0.9	11.7	15.6	3.5	30.4
Total Length of Line in Miles		11.7		23.1	30.4	

Source: Parsons Brinckerhoff 2008

Note:
1. Table includes the optional Crenshaw/Vernon Station, near the Leimert/Crenshaw Boulevards intersection. Without this station, the running time would be reduced by 0.6 minutes.
2. The Metro Green Line Redondo Beach, Douglas, El Segundo, and Mariposa Stations were included in the operating plan for the LRT Alternative.
3. Note that the length of the Crenshaw LRT service (11.7 miles) is longer than the proposed project length of 8.5 miles. The proposed service operates both over new infrastructure and existing infrastructure (the existing Metro Green Line).

2.3 Construction Scenarios

This section describes the construction scenarios for the alternatives under consideration. The BRT and LRT Alternatives would require different construction activities, while the construction activities associated with the No-Build and TSM Alternatives are not components of the Crenshaw Transit Corridor Project.

2.3.1 No-Build Alternative

The No-Build Alternative includes operational improvements that would not require any construction activities. This alternative also includes constructing the I-405 Freeway HOV lane, but this is not a component of the Crenshaw Transit Corridor Project and is being implemented as a separate project.

2.3.2 TSM Alternative

The TSM Alternative does not require substantial construction, as all improvements would be operational improvements rather than physical improvements. Changes to existing facilities, such as changing signs at bus stops to improve services, are assumed to be minor.

2.3.3 BRT Alternative

The BRT Alternative would be constructed using conventional construction techniques and equipment, specific to the Southern California region. Major project elements would include the following:

- The demolition of existing structures;
- Roadway and busway improvements;
- Utility relocations;
- The relocation of existing freight lines; and,
- The construction of stations.

All work would conform to industry specifications and standards. Construction equipment would include pile drilling and trenching equipment, bulldozers, rollers, cranes, concrete trucks, pumping equipment, flatbed trucks, dump trucks, and rail-mounted equipment. Additionally, temporary traffic detours and truck routes would be required during construction.

Easements that would be required for construction, including additional areas (besides the actual project footprint) needed on a temporary basis, would vary depending upon the type of construction and the adjacent land uses. Generally, easements would be minimized to the extent possible to avoid impacts to adjacent traffic and land uses. Also, right-of-way that is already owned by Metro would be utilized as much as possible. Lane and/or road closures would be scheduled to be the least disruptive, and traffic management plans would be approved by the individual cities prior to construction starting. Freight movements would be affected as little as possible, although temporary suspension of freight movements during the construction period would be pursued to facilitate construction and reduce construction costs. Potential construction staging areas would be identified during the Preliminary Engineering (PE) phase of project development.

BRT Alternative construction could occur at several locations along the selected route. Project construction would follow all applicable local, state, and general building and safety laws. Working hours would vary to accommodate special circumstances. Standard construction methods would be used for traffic control and noise, vibration, and dust control, consistent with all applicable laws, as described below. The actual duration of construction activities would depend upon many variables, including final design, the contractors' means and methods, project funding, and restrictions on working hours, among others. Construction of the BRT alternative would occur during an approximate two- to three-year period, with surfaces streets being impacted due to lane reductions for a period of approximately 12 to 18 months. The construction times estimated are based on experience from similar projects and conceptual designs.

2.3.3.1 Construction

Demolition of Existing Structures

In some locations, the demolition of existing structures, and the associated reconstruction of structures, could be required to widen cross sections within the right-of-way. Demolitions would comply with applicable regulations, and the disposal and/or recycling of materials would be performed in accordance with standard construction practices and in accordance with Metro's GEN-51: Construction and Demolition Debris Recycling and Reuse Policy. For further discussion on the disposal of hazardous materials, refer to Chapter 4 of this AA/DEIS/DEIR. Demolition activities are estimated to occur at several locations.

Utility Relocations

Both above ground and underground utilities would need to be relocated, modified, or protected in areas where they would interfere with construction, or if they become damaged as a result of construction. In some cases, major utilities, such as water supply and distribution lines and sewer main lines, would need to be relocated to maintain access and appropriate spacing. Most of this work would be completed prior to the commencement of other construction activities. Chapter 4 includes more information on the types and locations of utilities that could be affected. Utility relocations, including the relocation of major utilities, would be completed prior to constructing busways, street, or stations in the area.

Street Improvements

In some segments, BRT Alternative construction would require eliminating on-street parking to widen the existing Crenshaw Boulevard. This work would start before the busways are constructed to accommodate detouring traffic.

At the final construction stage, streets and crossings would be restored to their pre-construction conditions. In some cases, street improvements would result, such as new site modifications, landscaping, traffic control modifications, signage, and lighting. Some of these improvements could be accomplished simultaneously.

Bus Lane Construction

Within the Harbor Subdivision right-of-way, a busway for BRT operations, from Crenshaw Boulevard south to the Aviation Boulevard/Imperial Highway intersection would be constructed. Busway construction would involve relocating the existing freight line. The BRT Alternative assumes that the existing BNSF railroad track would be maintained; however, to accommodate a two-lane busway, the existing BNSF railroad track, within the study area, would be relocated closer to the southern/eastern right-of-way edge. It would be desirable to consider the feasibility for diversion of freight operations, at least on a temporary basis during the construction period. The proposed busway would be located on the northern/western side of the relocated BNSF railroad track. In areas where the freight alignment runs next to, and parallel to, a local street, periodic lane closures could be required for delivering materials. Minor cross streets could be temporarily closed, but access to adjacent properties would be maintained through detours or alternative access routes. Major cross streets would require partial lane closures.

Stations

Stations could be constructed at the same time as other BRT Alternative components. At-grade station construction would involve removing existing surface materials, preparing the subgrade, and forming and constructing raised low floor concrete platforms, ramps, and stairs, and installing other station items, such as canopies, hand railings, lighting, signage, finishes and TVMs. Design and installation would occur in accordance with Metro Design Criteria.

Special Construction Issues

The BRT Alternative would cross several freeways along the corridor, including the I-10 and I-405 Freeways. Coordination with Caltrans would be required for each crossing. Within the Caltrans right-of-way, Caltrans design and construction standards, and approvals, are typically required.

2.3.3.2 Maintenance and Operations Facility

Maintenance and operations facility construction would require clearing and grubbing (i.e., removing plant and root materials), followed by site grading, installing drainage, sewer and water lines, paving, lighting , fire protection, and constructing maintenance buildings, and perimeter walls or fences. Construction methods used would be similar to those used for constructing typical industrial building sites.

2.3.4 LRT Alternative

The LRT Alternative would be constructed using conventional construction techniques and equipment, specific to the Southern California region. Major project elements would include the following:

- The demolition of existing structures;
- Roadway improvements;
- The relocation of the existing freight lines;
- The construction of new bridges and bridge renovations;
- The construction of at-grade track and stations;
- The construction of aerial stations and pedestrian tunnels;
- The construction of below grade track and stations. Near the LAX airport runways, cut-and-cover tunnel construction methods would be utilized, subject to a determination of necessity by the FAA. The alignment along Crenshaw Boulevard from 39th to 48th Streets could be constructed using either bored tunnels or cut-and-cover tunnels because the tunnel would be deeper, which is necessary to support tunnel boring operations. Station locations would still require cut-and-cover construction. The design option for a below grade track between South Victoria Avenue and 60th Street would be built using cut and cover tunnel construction methods. Where cut and cover construction would be required, techniques that minimize surface disruptions would be evaluated in later project phases.

- The installation of specialty system work, such as OCS, C&S systems, ventilation and fire protection systems; and
- The construction of TPSS.

All work would conform to industry specifications and standards. Construction equipment would include pile drilling and trenching equipment, bulldozers, rollers, cranes, concrete trucks, pumping equipment, flatbed trucks, dump trucks, and rail-mounted equipment. Additionally, temporary traffic detours and truck routes would be required during construction.

Construction easements, including additional areas (besides the actual project footprint) needed on a temporary basis, would vary depending upon the type of construction and the adjacent land uses. Generally, easements would be minimized, to the extent possible to avoid adjacent traffic and land uses impacts. Also, existing Metro right-of-way would be used as much as possible. Lane and/or road closures would be scheduled to be the least disruptive. Individual cities would approve the traffic management plans before construction begins. Freight movements would be affected as little as possible although it would be desirable to consider the feasibility for diversion of freight operations, at least on a temporary basis during the construction period. Potential construction staging areas would be identified during the PE project development phase.

The LRT Alternative would be constructed at several locations along the selected route. Please refer to Appendix A, Final Conceptual Engineering Plans for additional alignment information along the corridor. Project construction would follow all applicable local, state, and general building and safety laws. Working hours would vary to accommodate special circumstances. Standard construction methods would be used for traffic control and noise, vibration, and dust control, consistent with all applicable laws, as described in the following paragraphs. Construction activity duration would depend upon many variables, including final design, the contractors' means and methods, project funding, and restrictions on working hours, among others. The construction times estimated below are based on experience from similar projects and conceptual designs.

2.3.4.1 At-Grade Construction

Demolition of Existing Structures

In some locations, demolishing existing structures, and reconstructing new structures, would be required to widen cross sections within the right-of-way. Demolitions would comply with applicable regulations, and the disposal and/or recycling of materials would be performed in accordance with standard construction practices and Metro's GEN-51: Construction and Demolition Debris Recycling and Reuse Policy. See Chapter 4 of this AA/DEIS/DEIR for further hazardous materials disposal discussions.

Utility Relocations

Both above ground and underground utilities would be relocated, modified, or protected where they would interfere with construction or if they become damaged as a result of construction. In some cases, major utilities, such as water supply and distribution lines and sewer main lines, would be relocated to maintain access and appropriate spacing.

Most of this work would be completed prior to construction starting. Chapter 4 includes more information on the types and locations of utilities that could be affected.

Street Improvements
In some segments, the LRT Alternative construction would require eliminating on-street parking to widen the existing Crenshaw Boulevard. This work would start before the rail components are constructed, for detouring traffic during construction. At the final construction stage, streets and crossings would be restored to their pre-construction conditions. In some cases, street improvements would result, such as new site modifications, landscaping, traffic control modifications, signage, and lighting. Some of these improvements could be accomplished simultaneously.

Trackwork
Within the Harbor Subdivision rights-of-way, trackwork construction would involve relocating the existing freight line, preparing the track bed and ballast, and building the new LRT tracks. Where the rail alignment runs next to, and parallel to, a local street, trackwork construction would require periodic lane closures for delivering materials. Minor cross streets could be temporarily closed, but access to adjacent properties would be maintained through detours or alternative access routes. Major cross streets would require partial lane closures, with half of the street closed at a time unless otherwise approved by the local jurisdiction.

Stations
Stations could be constructed at the same time as other LRT Alternative components. At-grade station construction would involve removing existing surface materials, preparing the subgrade, and forming and constructing elevated concrete high floor platforms, ramps, and stairs, and installing station furnishings, such as canopies, hand railings, lighting, signage, and TVMs. Bicycles would be accommodated depending on space. Design and installation of all station items would occur in accordance with Metro Design Criteria.

Operating Systems Installation
The LRT Alternative operating system components would include communication, train control, and traction power supply systems. The traction power supply system would consist of an OCS, which would involve installing poles, connecting to concrete foundations, with brackets supporting overhead wires, to supply power to the LRVs. (See Traction Power Substations, described in Section 2.3.4.5). Communication and train control systems would also be installed in conduits along the alignment. Installing the operating system components would generally occur after the trackwork is installed.

Special Construction Issues
The LRT Alternative would cross the I-405 Freeway. Coordination with Caltrans would be required for this crossing. Within Caltrans right-of-way, Caltrans design and construction standards, and approvals, are typically required. The LRT Alternative would also require close coordination with Metro Green Line operations for trackwork tie-ins during non revenue hours. Coordination is also required with the Exposition Line (currently under construction) and the level of coordination is dependent on the selection of either an at-grade track and platform connection proposed under the Base LRT

Alternative or a below- grade design option which terminates in a below-grade station on Crenshaw Boulevard just south of Exposition Boulevard.

2.3.4.2 Elevated Construction

Depictions of locations of proposed elevated sections are located in the Plan and Profile Drawings included in Volume II of this document.

Demolition of Existing Structures

In some locations, demolishing existing structures, and reconstructing structures, would be required to widen cross sections within the right-of-way. Demolitions would comply with applicable regulations and material disposal and/or recycling would be performed in accordance with standard construction practices and Metro's recycling policy. For further discussion of the disposal of hazardous materials, refer to Chapter 4 of this AA/DEIS/DEIR.

Utility Relocations

Some utilities would be relocated, modified, or protected in place near elevated portions of the LRT Alternative. This work would be limited to areas where there are conflicts with the existing overhead utilities, or where the underground utilities would be affected by column foundations and street level entrances.

Foundations and Support Columns

Portions of the track alignment and several stations would be elevated and constructed on aerial guideway and columns. The elevated track column foundations, would be constructed using cast-in-place drilled shafts, rather than driven piles. These shafts could be 80 to 100 feet deep. Temporary or permanent steel casings could be required to support drilled holes where the water table is high. After placing the steel reinforcement, the concrete would be placed into the drilled shaft. Once these foundations are complete, the columns would be formed and cast in place on the shafts. Foundations and support columns would be constructed in alternate blocks to limit traffic impacts. The columns construction period is included with the overhead structure (superstructure) or retained fill section of the bridge approaches.

Stations

Stations could generally be constructed at the same time as other LRT Alternative components. Elevated station construction would involve removing existing surface materials, forming and constructing elevated concrete platforms, elevators, and stairs, and installing other station items, such as canopies, hand railings, lighting, signage, finishes and TVMs. Design and installation would occur in accordance with Metro Design Criteria. Some of these improvements could be accomplished simultaneously.

Installation of Other System Components

Trackwork, the overhead contact system, station furnishings, and other components would be installed during construction.

Transitions

To transition from an at-grade or below-grade alignment to an elevated alignment, retained approach fills would extend from the bridge abutments on both sides of the

aerial guideway. Much of this construction could occur at the same time as other LRT Alternative elevated construction components. Additionally, foundations and retaining walls would be constructed, fill materials would be imported and placed, the track bed would be constructed, and the track would be laid. Safety features and other minor components would also be installed.

2.3.4.3 Below-Grade Construction

Demolition of Existing Structures

In some locations, demolishing existing structures and reconstructing structures, could be required to widen cross sections within the right-of-way. Demolitions would comply with applicable regulations, and the disposal and/or recycling of materials would be in accordance with standard construction practices and Metro's recycling policy. For further discussion of the disposal of hazardous materials, refer to Chapter 4 of this AA/DEIS/DEIR.

Utility Relocations

Some utilities would be relocated, modified, or protected in place near the below grade LRT Alternative alignments. This work would be limited to areas where the underground utilities would be affected by construction.

Below-Grade Segments

The below-grade alignment segments would be built either as cut and cover or by tunnel boring machine depending on the tunnel segment depth. Cut and cover construction would be used for shallow tunnel segments and would involve shoring using sheet pile walls or solider piles and lagging, excavation, construction of foundations, retaining walls, struts, a reinforced concrete roof, ventilation shafts and compacted fill materials placement. Tunneling could be done in deeper segments where cut and cover would be less practical using a tunnel boring machine.

Stations

Stations could be constructed at the same time as other LRT Alternative components. Below-grade station construction would involve shoring, excavation and removing existing underground materials, utilities, preparing the subgrade, and forming and constructing reinforced walls, concrete platforms, mezzanine levels, elevators, escalators, and stairs, plus installing other station items, such as ventilation, fire protection, hand railings, lighting, signage, finishes and TVMs. Design and installation would occur in accordance with Metro Design Criteria.

Installation of Other System Components

Installing the track, overhead contact system, communication, signaling and other components such as ventilation and fire protection would be accomplished during construction.

Transitions

Alignment transitions from at grade or aerial to below grade, would require excavating and constructing open depressed sections with supporting walls as the alignment transitions into a tunnel segment Much of this construction could occur at the same time as other below-grade LRT Alternative components. Additionally, foundations and

retaining walls would be constructed, fill materials would be imported and placed, the track bed would be constructed, and the track would be laid. Necessary safety features, and other minor components, would also be installed.

2.3.4.4 Maintenance and Operations Facility

The maintenance and operations facility construction would require clearing and grubbing (removing plant and root materials), followed by: site grading; paving; installing track, the OCS, and other systems equipment; constructing maintenance buildings; lighting, fire protection and, constructing the perimeter walls or fences. Construction methods used would be similar to constructing typical industrial building sites, with the addition of site work and trackwork. Construction of new yard leads for Yard Site Alternative D from the Metro Green Line would need to be coordinated with Metro Green Line operations with tie-in of trackwork scheduled outside the revenue service day.

2.3.4.5 Traction Power Substations

TPSSs require an approximate 1,000-square-foot footprint. Each site would include a substation concrete slab with grounding mat. The TPSS would be a pre-fabricated structure, approximately 14 feet wide by 43 feet long and 16 feet high. It would be delivered to the site, connected to the slab, and connected to the utilities. Fencing would be installed around the site perimeter and architectural and landscaping treatments would be provided, as appropriate.

2.4 Capital Cost Estimates

The capital cost estimates prepared for the TSM, BRT and LRT alternatives, LRT design options and the methodology used to develop the estimates, are presented in this section.

2.4.1 Methodology

The methodology used to estimate the capital cost was developed in general conformance with the FTA guidelines for estimating capital costs for New Starts projects. The capital cost estimates are based on the conceptual engineering plans contained in Appendix A of this AA/DEIS/DEIR and corresponding unit costs

The unit costs were derived from Metro's historical data from comparable transit system applications. Where historical data from Metro was not available, other data sources, such as the latest Caltrans Cost Data, was used. Adjustments for differences between the historical cost data publication date and the current base year of the cost estimates used an escalation factor calculated using the Construction Cost Index (CCI) value published by the *Engineering News Record* (ENR), for each of the periods. All unit costs include the contractor's direct construction costs, plus all taxes, general expenses, overhead, and profit. The unit costs for construction items do not include engineering, construction management, owner's administrative costs, and allowances for contingencies, which are added as percentage add-ons to the cost estimate.

The basic assumptions and criteria used in developing the cost data are as follows:

- The estimates were prepared using 2008 dollars;
- No premium time on labor costs were included;
- Adequate, experienced craft labor is available;
- Normal productivity rates, as historically experienced, were utilized;
- Compatible trade agreements exist in the region;
- No strike impacts would be experienced by the project;
- There are sufficient, experienced contractors available to perform the work;
- Normal Los Angeles area weather impacts have been considered in the development of the construction schedule and costs; and,
- Existing state-of-the-art construction technology, including tunnel boring machines, would be available.

The financial analysis results are presented in Chapter 5.0, Cost and Performance Considerations.

2.4.2 Cost Estimate Results

The capital cost estimates (in constant 2008 dollars) prepared for the TSM and build alternatives are presented in Table 2-7. The capital cost estimates (in constant 2008 dollars) prepared for the six LRT Alternative design options are presented in Table 2-8. The LRT Alternative design options are listed below for reference:

- Design Option 1 – Base LRT Alignment with aerial station at Century Boulevard
- Design Option 2 – Base LRT Alignment with LRT aerial crossing at Manchester Avenue
- Design Option 3 – Base LRT Alignment with LRT under crossing at Centinela Avenue
- Design Option 4 – Base LRT Alignment with cut and cover tunnel alignment between Victoria Avenue and 60th street
- Design Option 5 – Base LRT Alignment with below-grade station north of Vernon Avenue in Leimert Park
- Design Option 6 – Base LRT Alignment with below-grade tunnel alignment between 39th Street and Exposition Boulevard

2.5 Operating and Maintenance Cost Estimates

The Operating and Maintenance (O&M) cost estimates prepared for the No-Build Alternative and the build alternatives, and the methodology used to develop the estimates, are presented in this section.

Table 2-7. Summary of Capital Cost Estimates (Thousands 2008 Dollars)

Cost Categories	TSM Alternative	BRT Alternative	Base LRT Alternative
Guideway and Track Elements	-	107,758	339,718
Stations, Stops, Terminals, Intermodal	375	76,500	139,500
Support Facilities: Yards, Shops, Administrative Buildings	1,250	32,650	55,625
Sitework and Special Conditions	-	76,175	139,314
Systems**	5,590	30,127	69,704
Construction Subtotal	**7,215**	**323,210**	**743,861**
Right-of-Way, Land, Existing Improvements	-	56,160	109,793
Vehicles	13,499	26,028	87,780
Professional Services	2,381	98,579	245,474
Unallocated Contingency	2,309	50,398	118,691
Finance Charges	-	-	-
Total Cost (2008) Dollars	**25,404**	**554,375**	**1,305,598**
Year of Expenditure Cost	**29,678**	**647,649**	**1,525,266**
Total Length in Miles		11.3***	8.5

Source: Parsons Brinckerhoff, 2009.

* Construction cost covers BRT Alternative from Aviation/Imperial (existing LAX station) to Crenshaw/Wilshire; operating plan extends to Wilshire/Western.

* Construction cost covers LRT Alternative from existing Metro Green Line structure to Crenshaw/Exposition Line; operating plan extends to existing Metro Green Line Redondo Beach station.

** Systems costs for the BRT Alternative include communications and passenger information systems at stations, transit signal priority systems, traffic signal and safety systems and on-board vehicle systems.

*** The BRT Alternative limits of construction are shorter than the length of the entire service. BRT service operates in existing street infrastructure at the north and south ends.

Table 2-8. Summary of LRT Alternative Design Options - Capital Cost Estimates (Thousands 2008 Dollars)

Cost Categories	Base LRT Alternative + Design Option 1	Base LRT Alternative + Design Option 2	Base LRT Alternative + Design Option 3	Base LRT Alternative + Design Option 4	Base LRT Alternative + Design Option 5	Base LRT Alternative + Design Option 6	Base LRT Alternative inclusive of Design Options 1 thru 6
Guideway and Track Elements	339,718	349,841	346,768	357,715	339,718	400,031	435,201
Stations, Stops, Terminals, Intermodal	146,500	139,500	139,500	139,500	235,500	229,875	335,625
Support Facilities: Yards, Shops, Administrative Buildings	55,625	55,625	55,625	55,625	55,625	55,625	55,625
Site work and Special Conditions	140,014	140,327	140,007	140,908	148,958	154,129	167,862
Systems	69,704	69,704	69,704	69,704	70,141	69,704	68,304
Construction Subtotal	**751,561**	**754,996**	**751,603**	**763,451**	**849,942**	**909,363**	**1,062,616**
Right-of-Way, Land, Existing Improvements	109,793	109,793	111,540	109,793	109,793	104,034	105,690
Vehicles	87,780	87,780	87,780	87,780	87,780	87,780	87,780
Professional Services	248,015	249,149	248,029	251,939	280,481	300,090	350,663
Unallocated Contingency	119,715	120,172	119,895	121,296	132,800	140,127	160,675
Finance Charges	-	-	-	-	-	-	-
Total Cost of Base LRT Alternative + Design Option (2008 Dollars)	**1,316,863**	**1,321,889**	**1,318,848**	**1,334,259**	**1,460,795**	**1,541,394**	**1,767,424**
Net Incremental Costs of Design Option	**11,265**	**16,291**	**13,249**	**28,661**	**155,197**	**235,796**	**461,826**
Year of Expenditure Cost	**1,538,426**	**1,544,298**	**1,540,745**	**1,558,749**	**1,706,575**	**1,800,735**	**2,064,794**
Total Length in Miles	8.5	8.5	8.5	8.5	8.5	8.5	8.5

Source: Parsons Brinckerhoff, 2009.

2.5.1 Methodology

The O&M cost estimation methodology was designed to satisfy the Federal Transit Administration (FTA) criteria for cost modeling. O&M cost estimates were prepared for the No-Build Alternative, the TSM Alternative, and the build alternatives using a fully allocated cost methodology. Actual O&M cost information from existing Metro services was used to prepare the estimates. Metro maintains detailed data on existing transit services and costs, including annually updated service plans and fully-detailed budgets for capital and operating expenditures. These data are readily adaptable to use for the planning and evaluating of prospective transit system improvements, including those being investigated in this study. Included costs consisted of fleet inventory, route miles by characteristics and types of service, passenger boardings, passenger miles, and transit stops/stations.

The future service characteristics of the No-Build Alternative can be projected based on Metro's on-going budgeting process, which recognizes anticipated demographic and economic changes within the Metro service area. For consistency in comparing the No-Build Alternative, the TSM Alternative, and the build alternatives, the primary service and use descriptors for all three transit-future categories were drawn from the same travel demand modeling process. That process included routes, stations, running times, service periods and durations, peak vehicles and consequent fleet requirements, passenger boardings, and passenger miles – all for the 2007 base year and the 2016 and 2030 forecast years. These data were drawn from defined travel demand forecasting model networks, and modeling results including network equilibration to balance transit service with passenger demand.

The Crenshaw Transit Corridor Project O&M cost model addressed each transit mode operated within the region separately. The modes differ in labor intensiveness, energy requirements, extent of fixed facilities required, and capital investment to be maintained.

2.5.2 Cost Estimate Results

The escalation of O&M costs to future price levels was accomplished at the individual cost component level, allowing the specific identification of escalation rates anticipated to apply to the different cost categories. The model output for Metro is in fiscal year 2007. O&M cost estimates, for future years, were obtained by inserting estimated independent variables into the Input Data Form of the cost model. Service expansion quantities were predicted by the travel demand forecasting model.

The financial analysis results are presented in Chapter 5.0, Cost and Performance Considerations. Based on the O&M factors presented for the build alternatives, the annual operating costs for the BRT Alternative would be less than the annual operating costs for the LRT Alternative. As the Crenshaw Transit Corridor Project proceeds into PE, the alignments and their supporting transit operating plans will be refined. The O&M cost estimates prepared for the No Build, TSM, build alternatives and LRT design options are presented in Table 2-9.

Table 2-9. Summary of O&M Cost Estimates

Annual Amounts	No Build	BRT TSM	LRT TSM	BRT	LRT Base or LRT Option 1	LRT Option 2	LRT Option 3	LRT Option 4	LRT Option 5	LRT Option 6	LRT All Options
HEAVY RAIL											
Labor Hours	1,375,895	1,375,895	1,375,895	1,375,895	1,375,895	1,375,895	1,375,895	1,375,895	1,375,895	1,375,895	1,375,895
Electrical Energy (kwh)	122,931,296	122,931,296	122,931,296	122,931,296	122,931,296	122,931,296	122,931,296	122,931,296	122,931,296	122,931,296	122,931,296
Diesel Fuel (gallons)	-	-	-	-	-	-	-	-	-	-	-
CNG (gallon equivalents)	-	-	-	-	-	-	-	-	-	-	-
Wages, Salaries, and Fringes	$62,285,523	$62,285,523	$62,285,523	$62,285,523	$62,285,523	$62,285,523	$62,285,523	$62,285,523	$62,285,523	$62,285,523	$62,285,523
Services	$24,066,392	$24,066,392	$24,066,392	$24,066,392	$24,066,392	$24,066,392	$24,066,392	$24,066,392	$24,066,392	$24,066,392	$24,066,392
Fuels and lubricants dollars	$119,788	$119,788	$119,788	$119,788	$119,788	$119,788	$119,788	$119,788	$119,788	$119,788	$119,788
Tires and tubes	$447	$447	$447	$447	$447	$447	$447	$447	$447	$447	$447
Other materials and supplies	$7,032,911	$7,032,911	$7,032,911	$7,032,911	$7,032,911	$7,032,911	$7,032,911	$7,032,911	$7,032,911	$7,032,911	$7,032,911
Utilities	$11,518,548	$11,518,548	$11,518,548	$11,518,548	$11,518,548	$11,518,548	$11,518,548	$11,518,548	$11,518,548	$11,518,548	$11,518,548
Casualty and liability costs	$8,378,829	$8,387,042	$8,383,956	$8,423,031	$8,375,790	$8,375,790	$8,375,790	$8,375,790	$8,372,751	$8,375,790	$8,372,751
Taxes	$155,285	$155,285	$155,285	$155,285	$155,285	$155,285	$155,285	$155,285	$155,285	$155,285	$155,285
Miscellaneous Expenses	$644,488	$644,488	$644,488	$644,488	$644,488	$644,488	$644,488	$644,488	$644,488	$644,488	$644,488
TOTAL COST, HEAVY RAIL	$114,202,211	$114,210,425	$114,207,339	$114,246,413	$114,199,173	$114,199,173	$114,199,173	$114,199,173	$114,196,134	$114,199,173	$114,196,134
LIGHT RAIL											
Labor Hours	3,014,305	3,014,305	3,014,305	3,014,305	3,571,484	3,572,244	3,574,371	3,576,650	3,574,219	3,578,017	3,731,303
Electrical Energy (kwh)	164,080,289	164,080,289	164,080,289	164,080,289	189,759,472	189,759,472	189,759,472	189,759,472	189,759,472	189,759,472	189,759,472
Diesel Fuel (gallons)	-	-	-	-	-	-	-	-	-	-	-
CNG (gallon equivalents)	-	-	-	-	-	-	-	-	-	-	-
Wages, Salaries, and Fringes	$143,015,183	$143,015,183	$143,015,183	$143,015,183	$169,377,149	$169,412,141	$169,510,117	$169,615,092	$169,503,119	$169,678,077	$176,739,397

Table 2-9. Summary of O&M Cost Estimates (continued)

Annual Amounts	No Build	BRT TSM	LRT TSM	BRT	LRT Base or LRT Option 1	LRT Option 2	LRT Option 3	LRT Option 4	LRT Option 5	LRT Option 6	LRT All Options
Services	$44,491,307	$44,491,307	$44,491,307	$44,491,307	$52,846,627	$52,849,855	$52,858,895	$52,868,580	$53,081,342	$53,097,484	$53,996,848
Fuels and lubricants dollars	$228,406	$228,406	$228,406	$228,406	$265,595	$265,595	$265,595	$265,595	$265,595	$265,595	$265,595
Tires and tubes	$2,004	$2,004	$2,004	$2,004	$2,256	$2,256	$2,256	$2,256	$2,256	$2,256	$2,256
Other materials and supplies	$15,295,979	$15,295,979	$15,295,979	$15,295,979	$17,744,844	$17,749,448	$17,762,341	$17,776,154	$17,748,376	$17,771,398	$18,686,078
Utilities	$25,493,440	$25,493,440	$25,493,440	$25,493,440	$29,546,573	$29,547,136	$29,548,712	$29,550,401	$29,548,599	$29,551,414	$29,665,018
Casualty and liability costs	$11,642,140	$11,629,788	$11,647,794	$11,602,625	$12,148,769	$12,148,769	$12,148,769	$12,148,769	$12,179,435	$12,148,769	$12,179,435
Taxes	$165,941	$165,941	$165,941	$165,941	$192,508	$192,558	$192,698	$192,848	$192,546	$192,796	$202,719
Miscellaneous Expenses	$2,347,569	$2,347,569	$2,347,569	$2,347,569	$2,781,505	$2,782,096	$2,783,753	$2,785,528	$2,783,635	$2,786,592	$2,905,973
TOTAL COST, LIGHT RAIL	$242,681,969	$242,669,617	$242,687,623	$242,642,454	$284,905,826	$284,949,855	$285,073,136	$285,205,223	$285,304,903	$285,494,383	$294,643,320
BUS INCLUDING BRT											
Labor Hours	22,725,554	22,945,858	22,874,065	22,963,223	22,762,265	22,762,265	22,762,265	22,762,265	22,762,265	22,762,265	22,762,265
Electrical Energy (kwh)	-	-	-	-	-	-	-	-	-	-	-
Diesel Fuel (gallons)	-	-	-	-	-	-	-	-	-	-	-
CNG (gallon equivalents)	60,812,023	61,404,698	61,207,139	61,364,288	60,883,862	60,883,862	60,883,862	60,883,862	60,883,862	60,883,862	60,883,862
Wages, Salaries, and Fringes	$906,426,171	$915,138,264	$912,282,655	$916,236,663	$907,809,302	$907,809,302	$907,809,302	$907,809,302	$907,809,302	$907,809,302	$907,809,302
Services	$73,394,099	$73,767,307	$73,624,928	$80,111,361	$73,443,103	$73,443,103	$73,443,103	$73,443,103	$73,443,103	$73,443,103	$73,443,103
Fuels and lubricants dollars	$69,491,042	$70,165,213	$69,939,022	$70,125,352	$69,565,341	$69,565,341	$69,565,341	$69,565,341	$69,565,341	$69,565,341	$69,565,341
Tires and tubes	$6,924,206	$6,983,348	$6,960,184	$6,993,600	$6,914,368	$6,914,368	$6,914,368	$6,914,368	$6,914,368	$6,914,368	$6,914,368
Other materials and supplies	$74,413,521	$75,038,098	$74,799,068	$75,527,944	$74,345,905	$74,345,905	$74,345,905	$74,345,905	$74,345,905	$74,345,905	$74,345,905
Utilities	$28,293,764	$28,568,047	$28,478,664	$28,589,667	$28,339,470	$28,339,470	$28,339,470	$28,339,470	$28,339,470	$28,339,470	$28,339,470
Casualty and liability costs	$61,420,514	$61,663,692	$61,582,894	$62,042,160	$61,423,415	$61,423,415	$61,423,415	$61,423,415	$61,411,576	$61,423,415	$61,411,576
Taxes	$2,563,120	$2,577,942	$2,571,797	$2,769,723	$2,561,066	$2,561,066	$2,561,066	$2,561,066	$2,561,066	$2,561,066	$2,561,066

Table 2-9. Summary of O&M Cost Estimates (continued)

Annual Amounts	No Build	BRT TSM	LRT TSM	BRT	LRT Base or LRT Option 1	LRT Option 2	LRT Option 3	LRT Option 4	LRT Option 5	LRT Option 6	LRT All Options
Miscellaneous Expenses	$4,317,199	$4,359,050	$4,345,412	$4,362,349	$4,324,173	$4,324,173	$4,324,173	$4,324,173	$4,324,173	$4,324,173	$4,324,173
TOTAL COST, BUS INCLUDING BRT	$1,227,243,637	$1,238,260,961	$1,234,584,624	$1,246,758,818	$1,228,726,144	$1,228,726,144	$1,228,726,144	$1,228,726,144	$1,228,714,305	$1,228,726,144	$1,228,714,305
LACMTA TOTAL SYSTEM COST	$1,584,127,817	$1,595,141,003	$1,591,479,585	$1,603,647,685	$1,627,831,143	$1,627,875,172	$1,627,998,453	$1,628,130,540	$1,628,215,343	$1,628,419,700	$1,637,553,759
OTHER SYSTEMS											
Santa Monica	$75,739,423	$75,733,149	$75,731,349	$75,256,439	$75,748,809	$75,748,809	$75,748,809	$75,748,809	$75,749,830	$75,748,809	$75,749,830
Culver City	$22,184,135	$22,184,070	$22,184,066	$21,439,080	$22,184,131	$22,184,131	$22,184,131	$22,184,131	$22,184,114	$22,184,131	$22,184,114
Los Angeles DOT	$61,170,687	$61,171,578	$61,172,048	$61,169,204	$61,170,638	$61,170,638	$61,170,638	$61,170,638	$61,170,069	$61,170,638	$61,170,069
Torrance Local	$26,630,080	$26,624,652	$26,623,608	$27,942,259	$27,918,737	$27,918,737	$27,918,737	$27,918,737	$27,915,953	$27,918,737	$27,915,953
Torrance MAX	$3,181,975	$3,179,303	$3,186,984	$3,139,565	$3,142,905	$3,142,905	$3,142,905	$3,142,905	$3,142,237	$3,142,905	$3,142,237
Cost Compared with No Build	NA	$10,999,638	$7,343,524	$19,560,117	$44,962,245	$45,006,274	$45,129,555	$45,261,642	$45,343,429	$45,550,802	$54,681,845
BRT Compared with BRT TSM	NA	NA	NA	$8,560,479	NA	NA	NA	NA	NA	NA	NA
LRT Compared with LRT TSM	NA	NA	NA	NA	$37,618,721	$37,662,750	$37,786,031	$37,918,118	$37,999,905	$38,207,278	$47,338,322

2.6 Uses of this AA/DEIS/DEIR Document – Selection of a Locally Preferred Alternative for Implementation

The FTA planning and project development process, within which federal, state, and local officials plan and make decisions regarding major transit capital investments, contains five phases: (1) system planning; (2) alternatives analysis, formerly known as a major investment study; (3) preliminary engineering; (4) final design; and (5) construction. As projects are conceived and advanced through these phases, their design, costs, benefits, and impacts are more clearly defined, with alternatives being successively eliminated until the alternative remains that is the most cost-effective and provides the greatest benefit with the fewest adverse impacts. Final design and construction of the project is then initiated.

Preparing the Crenshaw Transit Corridor Project AA/DEIS/DEIR together with its required circulation and review, provides the assurance that an evaluation is conducted of all reasonable design alternatives, that transportation and environmental impacts are assessed, and that public participation and comments are solicited to help guide the decision-making process. The reasonable alternatives impacts identification and analysis are necessary to meet NEPA requirements. The environmental impacts analysis identifies the type and severity of environmental impacts under each alternative. Measures to avoid and mitigate adverse environmental impacts then can be developed for the build alternative in the FEIS/FEIR, along with estimates of the costs and effectiveness of such measures.

The purpose of the AA/DEIS/DEIR is to help Metro and other local decision-makers select from among the alternatives under consideration an alternative for implementation in the Crenshaw Transit Corridor. Decisions to be made following the circulation of this document include transit technology (i.e., BRT or LRT), location of the alignment, station locations, and the location of any required maintenance and storage yard and shop. The selected LPA should best accommodate population growth and transit demand, and be compatible with land use and future development opportunities.

A FEIS/FEIR will be prepared in the PE phase of project development, incorporating all the newly developed information as well as the comments and responses made regarding the AA/DEIS/DEIR during the public review and comment period. These comments will be addressed and commitments will be made for implementing mitigation measures.

Appropriate local, state, regional, and Federal agencies will review the FEIS/FEIR to determine if all comments reflecting community issues of concern have been addressed properly and to determine if interagency agreements and project mitigation measures have been incorporated into the document. The FTA may issue a Record of Decision (ROD) culminating the environmental review process. Metro may then apply to the FTA for permission to enter the final design and construction phases of the project.

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