
7.0 Comparative Analysis of Alternatives

7.1 Approach

This section summarizes the analysis of the five build alternatives, the no-build alternative, and the TSM alternative based on how well they serve the goals set forth in Section 2. It provides a general overview of factors including mobility, land use, cost effectiveness, environmental impacts, equity, and community needs for each alternative. Section 2-6 provides more detailed discussion of the proposed routes and the alternatives evaluation process. The five preferred build alternatives identified in the preceding sections are:

- Route 60 (SR-60) LRT
- SR-60 Bus Rapid Transit (Busway)
- Beverly LRT
- Whittier LRT
- Washington LRT

The comparative evaluation information presented in this section is organized by the six goals of the Eastside Transit Corridor Phase 2 project. It includes and expands upon FTA New Starts Evaluation and Rating criteria (such as mobility improvements, environmental benefits, operating efficiencies, cost-effectiveness, and transit-supportive land use).

7.2 Effectiveness in Improving Mobility

The objectives of Goal 1 were designed to evaluate mobility improvements gained by a fixed guideway transit system. They include:

Goal 1: Improve Mobility, Accessibility, and Connectivity of the Transit System and Region

- Provide convenient access and improve connectivity to the regional transit system
- Increase transit ridership
- Provide improved access to employment centers
- Minimize transfers and improve connectivity with other modes of transit
- Provide for the long-term expansion of the transit system

Table 7-1 compares the five fixed guideway alternatives and the No-Build and TSM options using several criteria that support the overall goal of improving the regional transit system. The table identifies each alternative's potential to lure riders and provide travel time savings over existing transit service and driving on local highways during peak hours.

Table 7-1 Mobility, Accessibility, and Connectivity

Alternative	No-Build	TSM	1	2	3	4	5
1.a. Travel Time Savings from end of line compared to No-Build (Minutes)							
To Atlantic Blvd.	-	SR-60 28 Beverly 13 Whittier 15 Washington 12	64	64	27	28	32
To Union Station	-	SR-60 28 Beverly 13 Whittier 15 Washington 12	64	64	27	28	32
Headway (minutes)	-	-	5 peak / 10 off-peak	5 peak / 10 off- peak	5 peak / 10 off- peak	5 peak / 10 off- peak	5 peak / 10 off- peak
Average Speed (mph)	-	-	33.3	33.7	22.6	22.8	33
Average Station Spacing (miles)	-	-	1.4	1.4	0.7	0.8	1.3

Table 7-1 Mobility, Accessibility, and Connectivity

Alternative	No-Build	TSM	1	2	3	4	5
1.b. Travel Time (station to station travel time) from Eastside Gold Line Extension terminus (Minutes)							
To Atlantic Blvd.	SR-60 80 Beverly and Whittier 52 Washington 49	SR-60 52 Beverly 39 Whittier and Washington 37	16	15	23	24	17
To Union Station	SR-60 99 Beverly and Whittier 72 Washington 69	SR-60 72 Beverly 56 Whittier and Washington 57	35	41	43	43	36
1.c. Transit ridership potential							
Project Boardings	-	-	13,319	7,516	13,469	14,358	15,893
Net new transit riders	-	-	4,301	2,116	5,010	4,992	6,407
1.d. Hours of transportation	-	-	3,867	1,745	5,316	5,169	6,403

Table 7-1 Mobility, Accessibility, and Connectivity

Alternative	No-Build	TSM	1	2	3	4	5
user benefits							
1.e. Congestion relief (reduction in highway travel demand in the PSA) (VMT)	4,540,774	4,540,112	4,539,616	4,539,513	4,540,351	4,539,636	4,540,266
1.f. Peak period total highway time (from TAZ to TAZ) from end of line (Minutes)							
To Atlantic Blvd.	SR-60 35 Beverly, Whittier, and Washington 27	SR-60 35 Beverly, Whittier, and Washington 27	35	35	27	27	27
To Union Station	SR-60 52 Beverly and Whittier 46 Washington 44	SR-60 52 Beverly and Whittier 46 Washington 44	52	52	46	46	44
1.g Peak period total transit time (from TAZ to TAZ) from end of line (Minutes)							

Table 7-1 Mobility, Accessibility, and Connectivity

Alternative	No-Build	TSM	1	2	3	4	5
To Atlantic Blvd.	SR-60 121 Beverly and Whittier 71 Washington 67	SR-60 76 Beverly 55 Whittier 53 Washington 52	35	35	41	40	32
To Union Station	SR-60 147 Beverly and Whittier 97 Washington 93	SR-60 103 Beverly 81 Whittier and Washington 79	52	52	61	59	52
1.h. Estimated change in transit mode share	6.362%	6.826%	7.109%	7.005%	7.337%	7.331%	7.463%
1.i. Ability to extend farther east	N/A	N/A	Extension east to San Gabriel Valley	Extension east to San Gabriel Valley	Extension southeast to Orange County	Extension southeast to Orange County	Extension southeast to Orange County

- Travel Time Savings (Table 7-1, 1.a) – All five alternatives would provide travel time savings compared to the No-Build. In addition, the Build alternatives would also yield significantly higher improvement over the No-Build compared to the TSM improvements.
- Station to Station Travel Time (Table 7-1, 1.b) – Whereas the TSM would improve station to station travel times by about 12 minutes compared to the No-Build, the Build alternatives would cut travel times by about 13 to 22 minutes compared to the TSM, and by about 25 to 34 minutes compared to the No-Build.
- Transit Ridership Potential (Table 7-1, 1.c) – Project Boardings would range from about 7,500 riders (Alternative 2, SR-60 Busway) to nearly 16,000 riders (Alternative 5, Washington LRT), with all of the LRT alternatives serving more than 13,000 daily riders. Net new transit riders compared to the TSM would range from 5,000 to 6,400 for Alternatives 3 through 5 (Beverly, Whittier and Washington LRT), and from 2,100 to 4,300 riders for Alternatives 2 and 1 (along SR-60), respectively.
- User Benefits (Table 7-1, 1.d) – All five of the Build Alternatives would yield travel time benefit hours over the TSM Alternative. User benefits ranging from about 5,200 hours to 6,400 hours would result from implementation of Alternatives 3, 4, and 5 (Beverly, Whittier and Washington LRT). Alternative 1 (SR-60 LRT) would yield significantly lower user benefits, with about 3,800 hours and Alternative 2 (SR-60 Busway) would provide a low level of user benefit at about 1,750 hours.
- Congestion Relief (Table 7-1, 1.e) – All five Build alternatives would reduce Vehicle Miles of Travel (VMT) compared to the No-Build. Alternatives 1, 2, and 4 would also reduce VMT compared to the TSM Alternative; however, Alternatives 3 and 5 (Beverly LRT and Washington LRT) would not.
- Peak Period Total Highway Time (Table 7-1, 1.f) – Highway travel times between travel zones at the beginning and end of line would not be significantly changed either with the TSM Alternative or with any of the Build Alternatives.
- Peak Period Total Transit Time (Table 7-1, 1.g) – By contrast, all five of the Build Alternatives would yield transit time savings compared to the TSM and No-Build Alternatives as tabulated in criterion 1.g. The greatest savings would occur with the two SR-60 alternatives (in part due to the relatively poor transit access provided under the No-Build and TSM Alternatives). For Alternatives 3 through 5 (Beverly, Whittier and Washington LRT, respectively) transit travel time savings of 13 to 20 minutes relative to the TSM Alternative would be provided.
- Estimated Change in Transit Mode Share (Table 7-1, 1.h) – Although the regional transit mode share is projected to increase by about 6.3 to 6.8 percent under the No-Build or TSM Alternative, the Build Alternatives would increase the mode share to over

7.0% (with Alternative 2, SR-60 Busway) or nearly as high as 7.5% (with Alternative 5, Washington LRT).

- Ability to Extend Farther East (Table 7.1, 1.i) – Alternatives 1 and 2 along the SR-60 Freeway are potentially extendable to the east in the San Gabriel Valley whereas Alternatives 3 through 5 would be potentially extendable to the southeast into Orange County.

Figure 7-1 is a graphic comparison of the station-to-station travel times, including the total time to Union Station. SR-60 LRT, which is the shortest, has the lowest travel time, closely followed by Washington LRT, which is fully grade-separated. The Beverly and Whittier LRT alternatives are the slowest.

Figure 7-1 Station to Station Travel Times

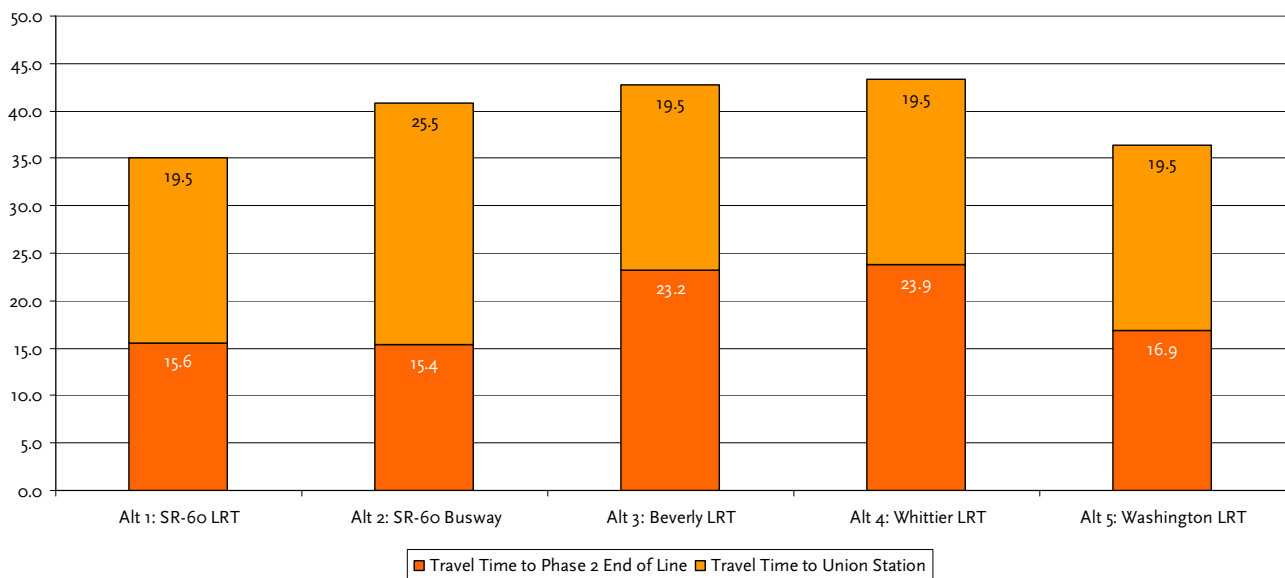


Figure 7-2 depicts the ridership results graphically, including the total Gold Line ridership. The Washington LRT alternative has the highest ridership both in terms of total daily riders as well as net new transit trips. This is closely followed by the Whittier LRT alternative and Beverly LRT. The two SR-60 alternatives have the lowest ridership.

Figure 7-2 Project and Total Gold Line Ridership (Year 2030)

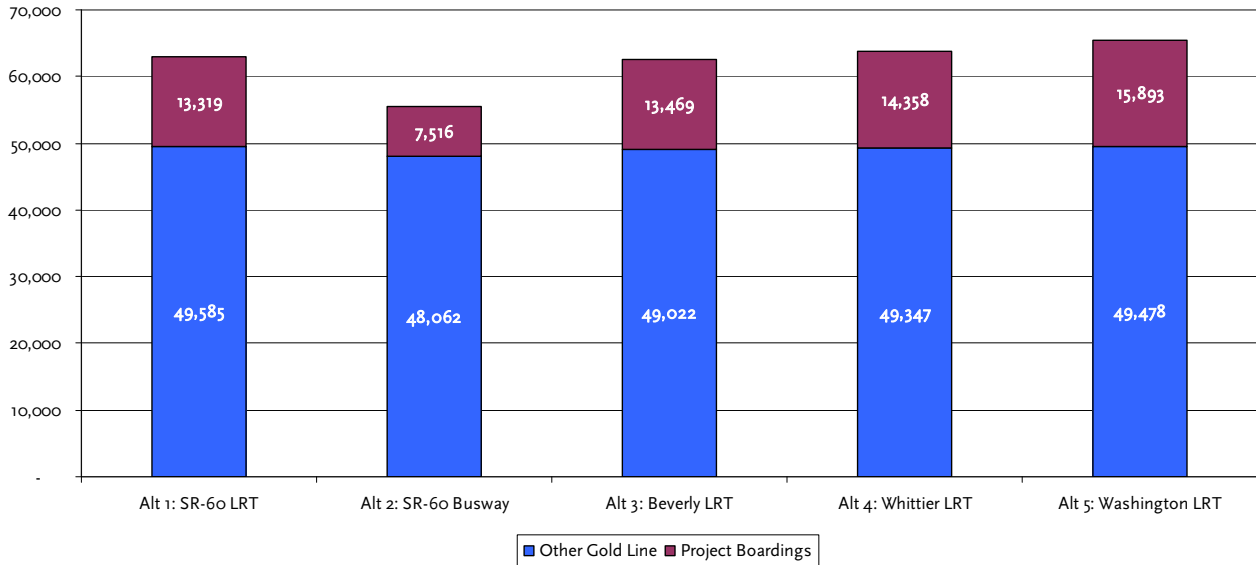
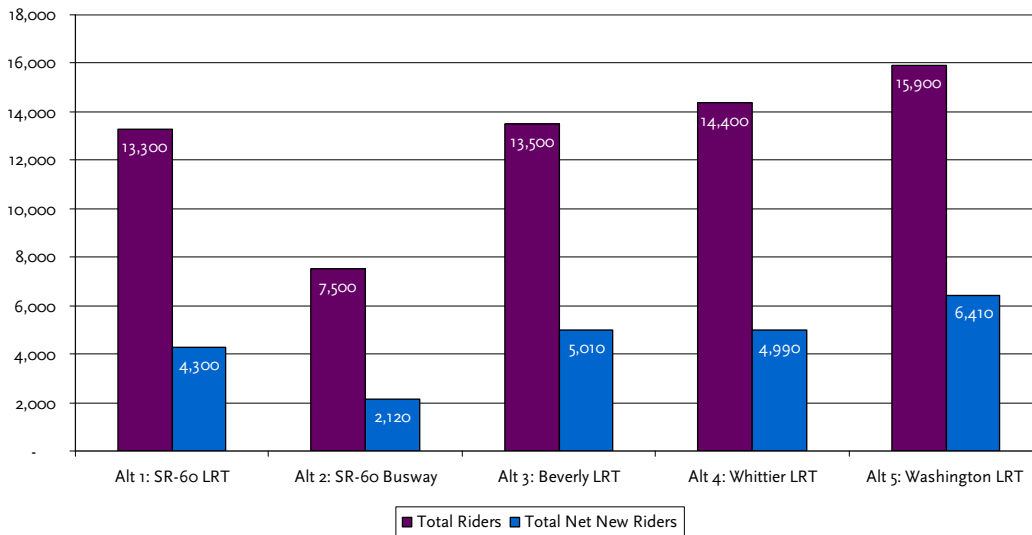
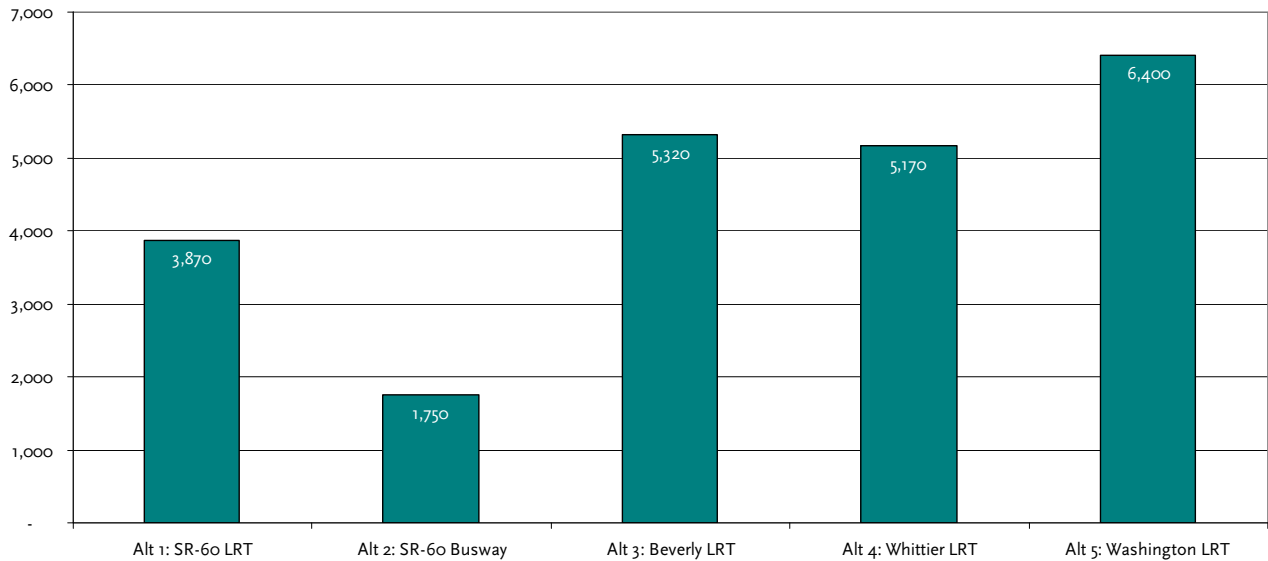


Figure 7-3 provides a graphic comparison of total daily riders and net new transit riders (compared to the TSM alternative). Alternative 5, Washington LRT, has the highest total ridership and the greatest number of net new transit riders. However, Alternative 3, Beverly LRT, which has the third highest total ridership, has the second highest number of net new riders, indicating it is second only to Washington LRT in drawing motorists out of their cars.

Figure 7-3 Daily Ridership (Year 2030)



The distribution of user benefit hours is graphically depicted in Figure 7-4. Similar to net new transit riders, the user benefit is relative to the travel time computed for the TSM alternative. The results closely follow the Net New Transit Trips rankings, with the Washington LRT delivering the highest user benefit, followed by the Beverly LRT and then Whittier LRT alternatives. The SR-60 alternatives yield the lowest level of user benefit hours.

Figure 7-4 User Benefit Hours


Summary

The two alternatives along SR-60 would yield the greatest travel time savings over existing bus service, given the potential for full grade separation, but they would generate the fewest riders because land uses surrounding freeways are typically not ideal for transit and pedestrian accessibility. Transit stations located along freeways are often unpleasant for passengers to access on foot, and few residents choose to locate their homes within walking distance of freeways. The SR-60 Busway alternative would achieve speeds similar to the SR-60 LRT alternative, but using a different transit mode than the Phase 1 Eastside LRT Extension would require passengers to transfer at the Atlantic Station. This transfer would lengthen the overall travel time from Union Station to stops east of Atlantic Blvd., thus causing the Busway option to attract fewer riders than the LRT option.

Alternatives 3 and 4 (Beverly LRT and Whittier LRT, respectively) would take longer than the SR-60 alternatives to traverse the full length of the PSA because trains would be operating at lower speeds, mostly at-grade in the medians of busy arterial streets. This track configuration also introduces the potential for trains to spend time stopped at red lights. Nevertheless, Alternatives 3 and 4 would attract more riders than either SR-60 alternative, largely because the adjacent land uses are more pedestrian-oriented and stations are within ½ mile of more residential areas and activity centers.

The elevated Washington LRT (Alternative 5) features both full grade separation and transit-supportive adjacent land uses, allowing it to provide travel times only two minutes longer than the SR-60 LRT alternative while outperforming all of the other alternatives from the standpoint of

ridership and user-hours of benefit. This is likely because the Washington LRT alternative combines the speed advantages of grade separation with proximity to some residential and employment centers. It should be noted, however, that the ridership, congestion relief, and transit mode share change estimates for Alternatives 1 and 3 through 5 are probably close enough together to be considered virtually equal, given the wide margin of uncertainty inherent in such predictions.

7.3 Transit Supportive Land Use

The objectives of Goal 2 take into consideration current and anticipated future planning efforts to maximize and create land use opportunities along the Eastside Transit Corridor.

Goal 2: Support Local Land Use Objectives

- Work with local planning agencies to identify and implement transit improvements in support of infill development
- Provide transit service to regionally significant education, medical, and shopping sites
- Help create community and transit centers
- Identify joint development opportunities
- Enhance urban design features

Table 7-2 outlines the projected year 2030 population and employment densities within one-half mile of the proposed stations along each alternative alignment. High densities within walking distance of stations can promote ridership when the transit system provides direct connections to major activity centers. Having a station within walking distance is typically more attractive to riders than having to drive or take a feeder bus to the station, since the latter two options require an additional transfer. The final row of the table briefly summarizes the planned developments near each alignment, as well as the transit-supportive policies adopted by the municipalities along the proposed alignments.

The SR-60 stations (Alternatives 1 and 2) are located in areas with lower population and employment densities than the stations along the other alternative alignments. This is likely because the stations are located near freeway interchanges with major cross streets, which consume much of the land within walking distance.

The other three alternatives have much higher population and employment densities near their stations. Alternative 4, Whittier LRT, serves the area with the highest population density, and Alternative 5, Washington LRT, stations are located near the most jobs. However, the densities around Alternatives 3 through 5 are all within 1,000 jobs and persons per square mile of each other.

Table 7-2 Population Density, Employment Density, and Local Land Use Policies

Alternatives	1		2		3		4		5	
2. a. Population Density, 2030										
2030 Population Density (per square mile) within 1/2 mile of stations along alignments	6,131	M	6,131	M	11,145	H	11,959	H	11,003	H
2.b. Employment Density, 2030										
2030 Employment Density (per square mile) within 1/2 mile of stations along alignment	2,099	M	2,099	M	3,581	H	3,778	H	4,125	H
2.c. Right-of-Way Impacts (Sq. ft/land use)										
2.d. Urban fit potential, including pedestrian accessibility and urban design enhancement opportunities	long-term development growth for Montebello Town Center; potential transit village at Santa Anita; Whittier Narrows open space access; Monterey Park General Plan supports multi-modal transit centers; Rosemead General Plan stresses improved transit near development		long-term development growth for Montebello Town Center potential transit village at Santa Anita; Whittier Narrows open space access; Monterey Park General Plan supports multi-modal transit centers; Rosemead General Plan stresses improved transit near development		Montebello General Plan goal to improve transit facilities servicing new development; Pico Rivera General Plan seeks adequate connections to regional transit network; Whittier Specific Plan specifies high-density residential w/ street enhancements		Whittier Blvd Specific Plan targets mixed-use development & coordination of transportation services; in addition, mixed-use zone to expand from Downtown Montebello to support higher density TODs		Commerce General Plan supports development situated along major corridors, supported by transit system; however, area currently zoned for heavy commercial/ light industrial uses, not conducive for mixed-use/ urban TOD	

Note: Criteria ranked comparatively. H=High, M=Medium, L=Low

Ranking scale of “high”, “medium”, “low” based on various statistics, including weighted average calculation of projected total population and employment density served within ½ mile of station locations along alignment.

7.4 Cost Effectiveness and Financial Feasibility

This section presents a comparative evaluation of the efficiency of the refined alternatives. A number of efficiency metrics have been evaluated. The efficiency metrics compare the performance of the various build alternatives in terms of estimated travel time savings and projected ridership compared to project characteristics, such as cost and route miles.

Goal 3: Cost Effectiveness & Financial Feasibility

The objectives of Goal 3 are to measure the cost and financial benefits of a fixed guideway transit solution these include:

- Provide a cost effective project which moves the most people at the lowest cost
- Improve operating efficiency and cost effectiveness

7.4.1 Efficiency Metrics

There are a number of evaluation criteria that provide a comparison between the five alternatives based upon the measures of ridership benefit compared to cost and other project metrics.

For the purpose of this evaluation, the following criteria were considered:

- Dollars per Net New Hour of User Benefit – Annualized capital plus operations & maintenance dollars per annual hour of travel time savings (net over TSM, 2008 dollars)
- Dollars per Net New Transit Rider – Annualized capital plus operations & maintenance dollars per annual additional system-wide transit riders (linked trips; net over TSM)
- Riders per Route Mile – Total daily riders per route mile of the extension
- Riders per Million Capital Dollars Invested – Total annual riders per 2008 capital cost (millions)

Key cost-effectiveness criteria are evaluated by comparing the benefits beyond the TSM alternative to the costs in excess of the TSM alternative, as described further below.

7.4.2 TSM Data

For the purpose of comparison to the build alternatives, the TSM option was evaluated. The following considerations were used to develop the cost of the TSM alternative:

- TSM Facilities Capital Cost – Includes “rapid bus” type intersection and running way improvements, such as traffic signal controller upgrades, field communications, signage, and striping coupled with bus stops and enhanced bus transfer facilities at Phase 1 terminal site. The total capital cost of the TSM improvements is estimated at \$190-million.

- TSM Vehicles Cost – Includes addition of about 175 to 190 buses (standard length and 60 foot) with 2.5 replacements over the life of the fixed capital facilities.
- TSM Operations and Maintenance Cost – Savings of about \$4,000,000 per year in bus operations with the build alternatives. (This would be more than offset by the increase in LRT or bus operating cost for the build alternatives; however the TSM operational cost is netted out in the cost effectiveness calculations.)
- TSM Ridership – The modeling of the TSM alternative identified total Gold Line ridership of about 54,500 daily riders, which represents an increase over the No-Build of about 6,150 daily riders and an improvement of user benefit hours of 6,070 daily hours compared to the No- Build Alternative.

7.4.3 Efficiency Results

Table 7-3 summarizes the cost and user benefits efficiency evaluation results. The LRT alternatives had significantly higher operating costs than the Busway, No-Build, and TSM alternatives. However, in the case of Alternative 3 (Beverly LRT), these costs were offset by high volumes of new daily transit trips, thus lowering the cost per new daily transit trip and cost per hour of user benefit well below half those for the Busway alternative. The annualized cost per new daily transit trips and hour of user benefit for Alternative 3 is \$69 and \$65 respectively. Both Alternatives 1 and 2 fared poorly with respect to these two criteria, and Alternatives 4 and 5 yielded results moderately higher than those of Alternative 3.

Based upon the improvement over the TSM alternative, Alternative 3, Beverly LRT, yields the lowest cost per net new rider and also delivers the lowest cost per user benefit hour. Alternatives 4 and 5, the Whittier LRT and Washington LRT, are moderately cost-effective whereas the two SR-60 alternatives are the least cost-effectiveness. These results are depicted graphically in Figures 7-5 and 7-6.

It should be noted that \$20 per net new rider historically represents the order of magnitude threshold defining a cost effective project according to federal funding provisions. Currently, the Federal Transit Administration New Starts threshold for federal funding eligibility is a cost-effectiveness of \$24.99 per user benefit hour. While none of the alternatives achieves this level of cost-effectiveness, further route and project refinement in the Draft EIR/EIS phase should result in a more cost effective project. Improvements in the bus-rail interface, station placement, and construction cost reductions should be identified to improve overall project efficiencies.

Table 7-3 Costs and User Benefits

Alternatives	No-Build	TSM	1	2	3	4	5
3.a Capital Cost Estimate	N/A	N/A	\$1,719M	\$1,401M	\$1,086M	\$1,383M	\$1,765M
3.b. User benefits hours	N/A	N/A	3,867	1,745	5,316	5,169	6,403
3.c. Annual O&M costs	\$42M	\$77M	\$107M	\$50M	\$117M	\$111M	\$108M
3.d. Annualized cost per new daily transit trips compared to No-Build and TSM Alternatives	N/A	N/A	\$109	\$160	\$67	\$79	\$75
3.e. Annualized cost per hour of transit system user benefit compared to No-Build and TSM Alternative	N/A	N/A	\$121	\$193	\$63	\$77	\$75

All monetary figures presented in 2008 dollars

Figure 7-5 Dollars per User Benefit Hour

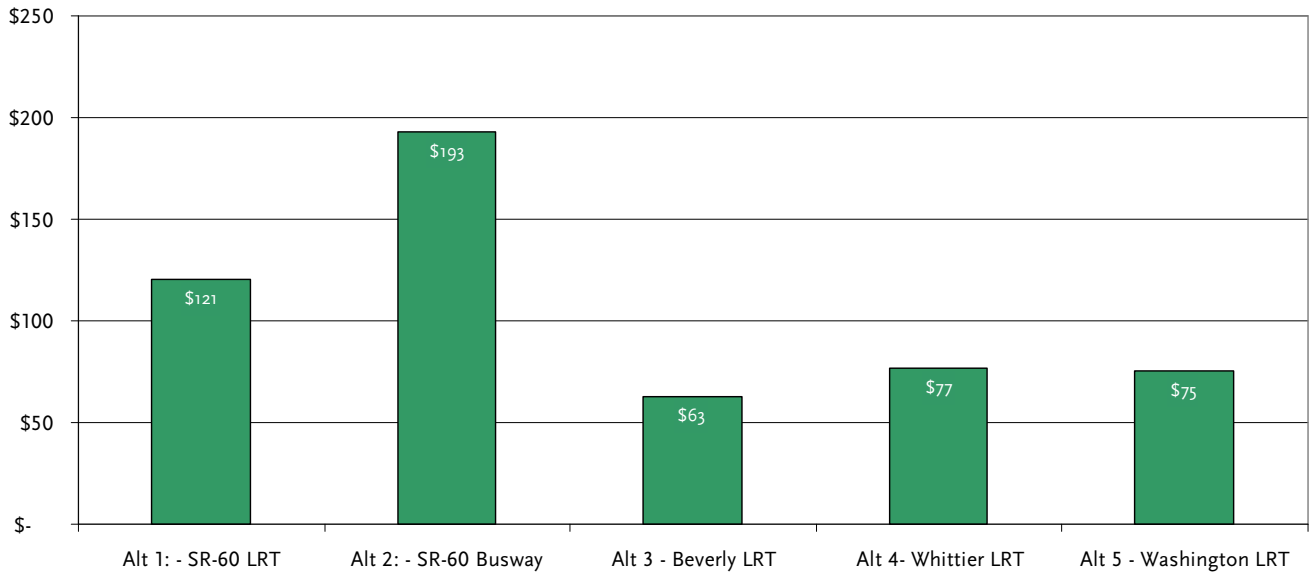
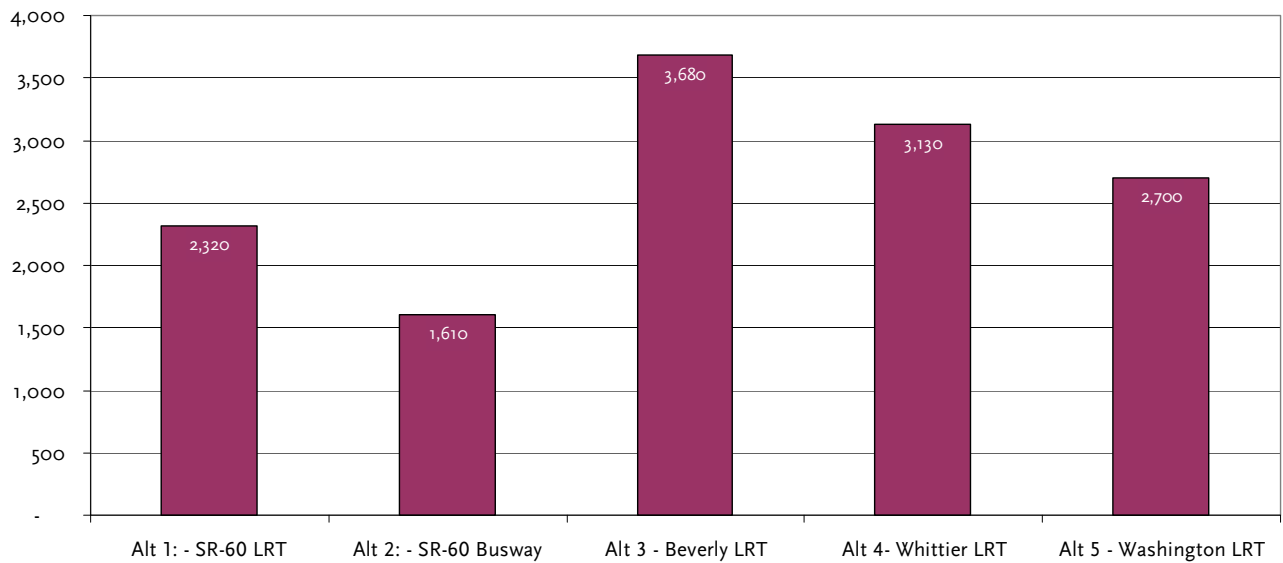
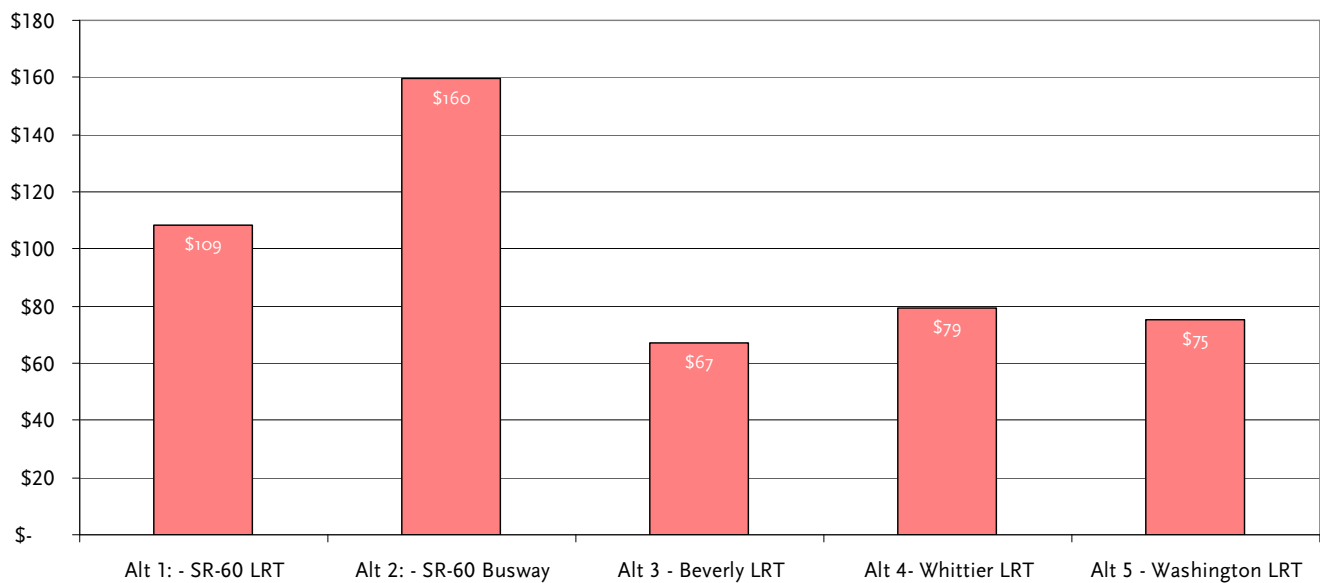


Figure 7-6 Annual Riders per \$ Capital (millions)



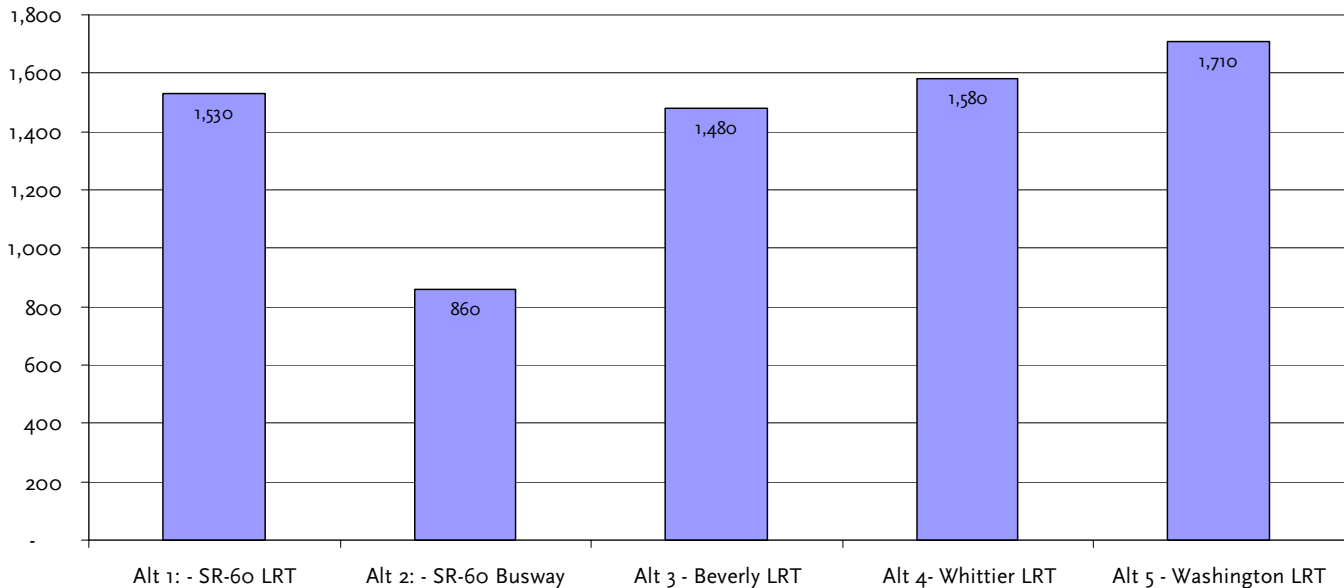
A criterion sometimes used to measure cost effectiveness is total annual riders versus the capital investment in millions of dollars. For the purposes of this computation, riders have been annualized assuming 319 revenue days per year (based upon data for systems which operate seven days a week shown in the National Transit Database). Figure 7-7 depicts the results graphically. Consistent with some of the other criteria, Alternative 3 (Beverly LRT), is the most productive. Alternative 4 (Whittier LRT) and Alternative 5 (Washington LRT) are in the middle of the range, and the two SR-60 alternatives are ranked lowest.

Figure 7-7 Dollars per Net New Rider



One other metric that was evaluated was the productivity of the alternatives in terms of total daily riders per route mile of guideway. These results are presented in Figure 7-8. Similar to the other criteria, the LRT options performed better than the busway option, and Alternative 5, Washington LRT, performed the best. However, there is not much variation between Washington LRT and the other LRT alternatives.

Figure 7-8 Daily Riders per Route Mile



7.4.4 Uptown Whittier Streetcar Loop

The conceptual engineering process included development of an “Uptown Whittier Streetcar Loop”, which consisted of a one-way counterclockwise loop around Uptown Whittier that could be used as a design option with either the Beverly LRT or the Whittier LRT alternatives. This option would result in measurably different ridership and cost performance and was therefore evaluated as a sub-alternative.

The results of the Uptown Whittier Streetcar Loop evaluation include the following:

- Increased Travel Time – The Loop option would increase the travel time for the Beverly alternative from 23.2 minutes to 29.4 minutes. A similar change would be expected if it were used in combination with the Whittier LRT.
- Reduced Riders – Although the Loop was found to increase total riders slightly from 13,500 to 13,560 (which is not significantly higher); the net new transit ridership compared to the TSM option was reduced slightly from 5,010 to 4,690 (most likely due to the increased run time).
- Increased Cost – The Loop would increase the length of the alignment from 9.1 to 10.5 route miles and would also result in higher capital costs, rising from \$870 million to \$930 million.

- Decreased Cost Effectiveness – As a result of the higher cost and lower ridership, the cost-effectiveness of the Beverly alternative would drop from \$67 per net new rider to \$87 per net new rider and from \$63 per user benefit hour to \$80 per user benefit hour.
- Operational Issues – In addition to the negative cost-effectiveness findings, the Loop would introduce negative operational factors due to the fact that the alignment would need to share the travel lanes with automobile traffic due to narrow street widths.

As a result of these cost-effectiveness and operational issues, the Uptown Whittier Loop is not recommended for further consideration, neither as an option for the Beverly LRT alternative as specifically evaluated, nor as an option to the Whittier LRT, which would yield similar results. The summary of recommendations (Section 7.10), lists the recommendations identified for further evaluation.

7.5 Environmental

Goal 4 evaluates various measures of sustainability that seek to minimize impacts of projected growth and offset this with the benefit of a transit investment. A more detailed environmental evaluation will be conducted as part of the Eastside Transit Corridor Phase 2 Draft EIR/EIS. The information below is a preliminary assessment and identification of topics to address in greater detail in the next phase.

Goal 4: Plan for Projected Growth in a Sustainable Manner

- Implement an alternative that minimizes adverse impacts on the environment
- Decrease dependency on the single occupancy vehicle
- Reduce VMT within the PSA
- Reduce growth in traffic congestion and improve air quality

Table 7-4 summarizes each alternative's potential to minimize physical impacts to the environment and reduce vehicle delay and emissions. The table provides a broad, general comparison of the alternatives' effects using "low," "medium," and "high" rankings. The rankings presented in Table 7-4 were estimated using an unweighted average of the resource specific rankings presented in Section 4. The rankings generally indicate for a "low" rating minimal or no effect and in some cases a potentially beneficial effect, for "medium ratings a moderate effect and for "high" ratings a large and in some cases potentially significant effect. All of the alternatives present the potential to reduce vehicular delay by drawing solo drivers off of the road and onto the transit system (4a). However, some of these benefits are offset by the removal of roadway lanes for use as transit right-of-way that will be necessary under some alternatives. The expected level of impact to resources (4b) refers to the negative effects of constructing and operation the alternative. The last row (4c) compares each alternative's impact on reducing emissions of PM10 or less, NOx, and SOx, all of which can harm air quality. Since cars stuck in

traffic tend to generate more harmful emissions per mile driven, a reduction in congestion would impart environmental benefits.

Of the five build alternatives, Alternatives 1 and 2 (SR-60 LRT and Busway) would provide the greatest reductions in emissions and vehicle delay, but the impacts associated with its construction and operation would be relatively high. The other alternatives would yield a more modest change in emissions, but also fewer impacts to resources, similar to TSM. Alternatives 3 and 4 have less potential to reduce overall vehicle delay in the PSA because, unlike the other alternatives, they would permanently remove long stretches of arterial street lanes for rail use. Alternative 5 (Washington LRT), would generate small reductions in emissions and relatively few impacts to resources, similar to the No-Build Alternative.

Table 7-4 Sustainability and Environmental Impacts

Alternative	No-Build	TSM	1	2	3	4	5
4.a Reduction in vehicular delay compared to No-Build Alternative	-	-	H	H	L	M	H
4.b. Expected level of impact after mitigation to biological, social and physical resources	L	L	M	M	L	L	L
4.c. Potential for reductions in PM10, NOx and SOx emissions	L	M	H	H	M	M	L

7.6 Equity

One of the goals of a transit investment is to ensure that it benefits transit dependent communities within the PSA in an environmentally just way. Goal 5 identifies the ways in which the Eastside Transit Corridor Phase 2 project can do that.

Goal 5: Meet the Needs of the Transit Dependent

- Maintain or enhance transit services
- Provide affordable access to education, employment, and health resources in Los Angeles County
- Provide outreach and communications to transit dependent populations within the corridor

Table 7-5 identifies information relevant to transit dependent communities. There are a number of characteristics used to define transit dependent communities, such as number of low-income households within one-half mile. Explanations of the criteria used to identify equity issues in the table below are as follows:

- Zero-car household -occupants are reliant on transit, bicycles, walking, and rides from friends and relatives for mobility. They generate transit trips when the system effectively serves local activity centers.
- A transit dependent household is different from a zero-car household in that transit is the only mode by which its occupants may complete a trip. Transit dependency varies based on trip length and type, and can thus be difficult to measure in absolute terms.
- Most transit riders reside in low-income households. As such, proximity to low-income households can boost ridership on a transit line. However, the majority of low-income people still have access to a car, and they will only use transit if it provides viable, inexpensive transportation to their desired destinations. It is important to note that some low-income households might also be counted in the “zero-car households” figure.
- People age 18 and under and 65 and over are likely to benefit from improved transit service because they may not be old enough to obtain a drivers licenses, have lost the physical ability to drive due to deteriorating sensory and motor skills, or cannot afford to drive.

In addition, access to employment opportunities, education facilities, and health resources is vital to a community, and transit service to these locations can be beneficial, especially to people in the categories described above.

Table 7-5 Transit-Supportive Demographics

Alternatives	1		2		3		4		5	
5.a Evaluation of support provided to transit dependent populations 1/2 mile of stations along alignments (2005)										
Zero Car Households	2,711	L	2,711	L	7,152	H	7,695	H	5,873	M
Public Transit Dependent	975	L	975	L	2,016	H	2,311	H	1,833	M
# of Low-income HH	6,270	M	6,270	M	8,315	M	12,261	H	10,245	H
Population 18 and under	13,736	M	13,736	M	29,583	H	31,483	H	27,702	H
Populations 65 and older	6,300	L	6,300	L	11,212	H	10,771	H	9,654	H
5.b. Potential construction impacts on transit dependent communities	L		L		M		M		L	
Alternatives were ranked relative to the support for transit-using communities based on a scale of "high", "medium", or "low". The ranking scale is based on various statistics, including total, high, median, and low values within 1/2 mile of station locations in 2005.										

Stations along Alternatives 3 through 5 are located with one-half mile of significantly more low-income, zero-car, and transit dependent households, as well as persons 18 and under and 65 and over. This is likely because Alternatives 1 and 2 are adjacent to the Pomona Freeway (SR-60) and are near fewer households of any income level. As such, the data does not necessarily indicate that the people living near Alternatives 3 through 5 are poorer or more transit dependent than those near Alternatives 1 and 2. The figures for Alternatives 3 through 5 are all reasonably close to each other, though Alternative 5 lags slightly behind the other two for most of the criteria

The greatest numbers of potential right-of-way acquisition sites occur along Alternatives 3 and 4. Because these two alternatives have long stretches of median-running at-grade right-of-way and several at-grade stations, it is likely that private property on either side of the street will need to be used for roadway widening. These possible acquisition sites are mostly located near stations at major intersections and involve only commercial properties. It should be noted that none of the acquisition sites along any of the alternative alignments are residential parcels. The extent to which property acquisitions will be necessary is unclear, and further study will be conducted during the EIR/EIS phase. As such, Alternatives 3 and 4 have been tentatively assigned acquisition impact ratings of “medium” (row 5b).

Alternatives 1 and 2 have been assigned “low” acquisition impact ratings because they travel entirely within the existing right-of-way of SR-60. Any acquisition sites will be limited to areas adjacent to stations. Similarly, Alternative 5 follows an entirely aerial alignment beyond SR-60. Only minor property acquisitions on Washington Blvd. are anticipated since the aerial support columns require considerably less roadway space than at-grade tracks.

Nearly all of the property acquisition impacts are in areas with high volumes of low-income families and in areas where the population is mostly Hispanic. Many of the areas also have a sizeable White population, though not a majority. These demographic trends are predominant throughout the PSA and are not unique to the property acquisition sites. That is to say, the property acquisitions occur in areas that are typical of the entire PSA and do not appear to be targeted at any one minority or income group. Again, detailed evaluation of impacts to environmental justice communities and mitigation measures will be conducted in the Draft EIR/EIS phase.

7.7 Community Involvement Response

Involving the community and stakeholders in the decision-making process is an important part of identifying a transit solution that addresses the needs of the PSA. The following objectives listed under Goal 6 were identified during the AA study process.

Goal 6: Respond to Community Needs and Support

- Involve the community in a meaningful and productive planning process
- Build community and political support through effective communication and integration with local and regional plans

Several public input workshops have been held for the Eastside Transit Corridor Phase 2 project in order to involve PSA communities as much as possible in the planning process, build political and local support for the extension, and establish effective lines of communication. The following table summarizes public comments from the April public meetings, where participants were presented with the results of the 17 initial alternatives and introduced to the five refined alternatives. Not all participants provided direct feedback on the five alternatives. Table 7-6

summarizes those comments recorded and any specific considerations that members of the public identified. The “high”, “medium, and “low” ratings on the table are based on number of favorable comments that each alternative received relative to the others.

Overall, Alternative 1 and 4 garnered the most public support. However, meeting participants were concerned about possible impacts to the OII Superfund Site on the south side of the Pomona Freeway. With regard to Alternative 4, Whittier Blvd. was the preferred alignment. In particular, the eastern portion of this alternative would provide greater access to Whittier College and Uptown Whittier. Public comments called for coordination with the Whittier Uptown Specific Plan and mitigation of parking and traffic impacts during construction. There was few public comments specific on the remaining alternatives. Alternative 3, Beverly LRT, received a small number of people in support and others opposed. Alternative 2, SR-60 Busway, did not receive any public support. In general, participants favored LRT. Alternative 5 was the only proposal that received more negative comments than favorable ones. Though this corridor was identified as a secondary choice in some cases, this was largely due to participants perceiving this alignment to have fewer right-of-way impacts than the others.

Table 7-6 Public Comments

Alternatives	1	2	3	4	5
6.a Pubic Input (based on April public comments on five refined alternatives)	H	L	M	H	L
In-favor	34	0	3	28	2
Opposed	5	0	3	1	4
Mode	LRT	LRT	LRT	LRT	LRT
Additional Considerations	Impacts to OII Superfund site. Consider combining truck route with LRT extension. SR-60 secondary choice for alignment.	Impacts to OII Superfund site. Preference for LRT over Busway.	Use aerial crossing at portions along Beverly where right-of-way is constrained. Potential Impacts to nearby schools and parks.	Whittier was preferred corridor alignment, with grade separations. Improves access at eastern end to Whittier College. Consider Whittier Uptown Specific Plan. Impacts to parking and traffic during construction. Concerns about aerial structure and graffiti.	Use of eminent domain. Washington Blvd was preferred as a secondary choice in alignment after Whittier and SR-60.

7.8 Summary of Key Comparison Measures

Based on the project's six stated goals and the environmental analysis, transportation analysis, and public outreach performed as part of this alternatives analysis study, the following table summarizes the benefits and disadvantages of each promising build alternative. The criteria used are:

- Ridership forecasts
- Expected travel time
- Impacts to arterial streets
- New transit trips and change in transit mode share
- User benefits
- Transit-supportive land use
- Employment density
- Population density
- Amount of property acquisition needed
- Proximity to historic resources, sensitive receptors, biological resource areas, and hazardous materials sites
- Proximity to noise and vibration-sensitive receptors
- Geologic constraints
- Construction and operation costs
- Public response

Table 7-7 provides a summary of the comparison of alternatives identified in this report.

Table 7-7 Comparison of Alternatives
Alternatives

	SR-60 LRT	SR-60 Busway	Beverly LRT	Whittier LRT	Washington LRT
Transportation	<u>Travel Time:</u> Fastest overall (16 minutes)	<u>Travel Time:</u> 16 minutes, but all riders continuing on Phase 1 will incur a 6-minute transfer at Atlantic Station.	<u>Travel Time:</u> Slower than most other alternatives (23 minutes) <u>Daily Ridership:</u> Nearly lowest ridership of LRT Alternatives (13,500)	<u>Travel Time:</u> Slowest of the build alternatives (24 minutes)	<u>Travel Time:</u> Nearly fastest overall (17 minutes)
	<u>Daily Ridership:</u> Lowest of LRT alternatives (13,500)	<u>Daily Ridership:</u> Lowest overall (7,500)	<u>Net New Transit Riders:</u> Second highest overall (5,010)	<u>Daily Ridership:</u> Second highest (14,400)	<u>Daily Ridership:</u> Highest overall (15,900)
	<u>Net New Transit Riders:</u> Lowest overall (4,300)	<u>Net New Transit Riders:</u> Lowest overall (2,120)	<u>User Benefit Hours:</u> Second highest overall (5,320)	<u>Net New Transit Riders:</u> (4,990) is nearly as high as Alternative 2	<u>Net New Transit Riders:</u> Highest overall (6,410)
	<u>User Benefit Hours:</u> Fewest of LRT alternatives (3,870 daily)	<u>User Benefit Hours:</u> Fewest overall (1,750)	<u>Impacts to Arterial Streets:</u> Potentially greatest, due to extensive at-grade segments	<u>User Benefit Hours:</u> Second highest (5,170)	<u>User Benefit Hours:</u> Greatest overall (6,400)
	<u>Impacts to Arterial Streets:</u> Minimal, due to freeway alignment	<u>Impacts to Arterial Streets:</u> Minimal, due to freeway alignment	<u>Impacts to Arterial Streets:</u> Potentially high, but mitigated by aerial segments	<u>Impacts to Arterial Streets:</u> Potentially high, but mitigated by aerial segments	<u>Impacts to Arterial Streets:</u> Low, due to aerial alignment
	<u>Other:</u> Only LRT alternative which is located to conveniently serve communities north of SR-60	<u>Other:</u> Similar to SR-60 LRT, location is convenient to communities north of SR-60			

		Alternatives				
		SR-60 LRT	SR-60 Busway	Beverly LRT	Whittier LRT	Washington LRT
Environment	<u>Transit-Supportive Land Uses:</u> Fewest overall	<u>Transit-Supportive Land Uses:</u> Fewest overall	<u>Transit-Supportive Land Uses:</u> Greatest overall	<u>Transit Supportive Land Uses:</u> Moderate	<u>Transit-Supportive Land Uses:</u> Moderate amount	
	<u>Employment Density:</u> Lowest overall	<u>Employment Density:</u> Lowest overall	<u>Employment Density:</u> High	<u>Employment Density:</u> High	<u>Employment Density:</u> Highest overall	
	<u>Population Density:</u> Lowest overall	<u>Population Density:</u> Lowest overall	<u>Population Density:</u> High	<u>Population Density:</u> Highest overall	<u>Population Density:</u> High	
	<u>Property Acquisitions:</u> Most overall, mostly vacant	<u>Property Acquisitions:</u> Most overall, mostly vacant	<u>Property Acquisitions:</u> Fewest overall, mostly vacant	<u>Property Acquisitions:</u> Moderate amount, none vacant (most non-vacant acquisitions overall)	<u>Property Acquisitions:</u> Moderate amount, mostly vacant	
	<u>Historic Resources:</u> None nearby	<u>Historic Resources:</u> None nearby	<u>Historic Resources:</u> None nearby	<u>Historic Resources:</u> Moderate amount nearby	<u>Historic Resources:</u> None nearby	
	<u>Noise-Sensitive Receptors:</u> Fewest overall	<u>Noise-Sensitive Receptors:</u> Fewest overall	<u>Noise-Sensitive Receptors:</u> Second most overall	<u>Noise-Sensitive Receptors:</u> Most overall	<u>Noise-Sensitive Receptors:</u> Moderate number	
	<u>Other:</u> Crosses potentially-sensitive biological resource and hazmat areas	<u>Other:</u> Crosses potentially-sensitive biological resource and hazmat areas	<u>Other:</u> Crosses 100-year flood zone	<u>Other:</u> Crosses 100-year flood zone	<u>Other:</u> Crosses 100-year flood zone	

		Alternatives				
		SR-60 LRT	SR-60 Busway	Beverly LRT	Whittier LRT	Washington LRT
Cost/Public Support	<u>Capital Costs</u> : Nearly highest (\$1.72 billion)	<u>Capital Costs</u> : Moderate	<u>Capital Costs</u> : Lowest of the build alternatives (\$1.1 billion)	<u>Capital Costs</u> : Mid-range (\$1.38 billion)	<u>Capital Costs</u> : Highest (\$1.765 billion)	
	<u>Annual O&M Costs</u> : Moderately high (\$26.5 million)	<u>Annual O&M Costs</u> : Lowest (\$11 million)	<u>Annual O&M Costs</u> : Highest (\$34 million)	<u>Annual O&M Costs</u> : Mid-range (\$31 million)	<u>Annual O&M Costs</u> : Second lowest (\$28 million)	
	<u>Cost Per User Benefit Hour</u> : Second worst (\$121)	<u>Cost Per User Benefit Hour</u> : Poorest (\$193)	<u>Cost Per User Benefit Hour</u> : Best (\$63)	<u>Cost Per User Benefit Hour</u> : Mid-range (\$77)	<u>Cost Per User Benefit Hour</u> : Mid-range (\$75)	
	<u>Cost Per Net New Rider</u> : Second worst (\$109)	<u>Cost Per Net New Rider</u> : Poorest (\$160)	<u>Cost Per Net New Rider</u> : Best (\$67)	<u>Cost Per Net New Rider</u> : Mid-range (\$79)	<u>Cost Per Net New Rider</u> : Mid-range (\$75)	
	<u>Public Comment Support</u> : Greatest (38 in favor, 5 opposed)	<u>Public Comment Support</u> : 2 in favor, none opposed	<u>Public Comment Support</u> : 3 in favor, 3 opposed	<u>Public Comment Support</u> : High, 29 in favor, 1 opposed	<u>Public Comment Support</u> : Lowest, 2 in favor, 7 opposed	

In short, the compromises made by each alternative between speed, cost, and transit-preferential route are as follows.

Alternative 1 – SR-60 LRT

- Transit unfriendly route, but achieves a high enough speed to offset the drop in ridership
- High speed and nearly full grade separation comes at a high cost
- Serves communities north of SR-60.

Alternative 2 – SR-60 Busway

- Transit unfriendly route, and a time-consuming transfer is required to switch between modes at Atlantic station
- High speed and nearly full grade separation come at a high construction cost, but operating costs are very low compared to LRT
- Using a mode with low operating costs comes at the expense of an additional transfer and a large loss of riders
- Serves communities north of SR-60.

Alternative 3 – Beverly LRT

- Lowest cost to construct, but at-grade crossings slow down trip times
- Surrounding land uses are conducive to transit use, but the lower speeds still yield somewhat fewer riders per route mile than the faster SR-60 Alternatives and the Washington Alternative.

Alternative 4 – Whittier LRT

- Moderate cost to construct, potential for traffic and/or land use impacts due to corridor constraints
- Surrounding land uses are conducive to transit use, but the lower speeds still result in less riders per route mile than the Washington Alternative.

Alternative 5 – Washington LRT

- High cost to construct, but also yields high speeds
- Surrounding land uses are moderately conducive to transit use, and, combined with the high speeds, this alternative draws the most riders
- Serves communities along the southern portion of the PSA.

7.9 Trade-Offs Between Alternatives

Alternatives 1, 2, and 5 are grade separated and would allow the shortest travel times along the Phase 2 segment. Alternatives 3 and 4 would be slower, but they would pass through more densely populated areas than Alternatives 1 and 2 (the SR-60 routes). Despite its suboptimal location, Alternative 1 ridership volumes would be comparable to Alternatives 3 and 4 because the higher operating speed would be more attractive to potential users. Though Busway is not inherently slower than LRT, Alternative 2 (SR-60 Busway) would attract fewer riders than Alternative 1 (SR-60 LRT) because Phase I of the Eastside Extension is currently under construction as an LRT line, and using a different mode for Phase 2 would require a transfer at the Atlantic Station. Alternative 5 would have the highest ridership because it traverses a well-established employment corridor at speeds similar to Alternatives 1 and 2.

Alternatives 1, 2, and 5 offer travel times up to 20 minutes faster than driving on nearby highways during peak hours. Alternatives 3 and 4's travel times would be nearly the same as driving.

Each alternative's potential to change the PSA's overall transit mode share is similar.

All alternatives pass near potential TOD project sites, and the municipal governments along the alignments are supportive of improved transit services. Alternative 5 (Washington LRT) passes through commercial manufacturing areas that house many jobs, but are zoned in a way that is not ideal for future TOD projects.

Busway would have among the highest capital costs, but very low operating costs. Nevertheless, the loss of ridership due to the added transfer makes it the most cost-inefficient option from the standpoint of cost per unit of user benefit. Alternative 3 fares best under this measure; it attains the same ridership estimates as the faster Alternative 1 and 5 options because it runs through a denser corridor, but costs less to build and operate.

Alternative 1 presents the best opportunities for reducing greenhouse gas emissions, but its construction and operation would negatively impact local biological, social, and physical resources the most. Alternative 2 would have similar negative impacts, and only reduce emissions to a moderate degree. Alternatives 3 and 4 would have relatively small negative impacts, but would still provide a moderate reduction in emissions. Alternative 5, like the No-Build Alternative, would have few negative impacts and few opportunities for emissions reductions.

Alternatives 3, 4, and 5 are near more low-income, zero-car, and transit-dependent households than Alternatives 1 and 2. This is because Alternatives 1 and 2 are near fewer households altogether. Similarly, there are more people age 18 and under and age 65 and over near Alternatives 3, 4, and 5.

Public input from the April Public meetings overwhelmingly favors Alternatives 1 and 4, practically to the exclusion of the others. Alternative 1 is preferred for its access to northern tiers cities,

access to the Montebello Town Center (regional shopping center), Whittier Narrow's regional park, and minimal roadway impacts (given that it is side-running along the SR-60 Freeway). Alternative 4, garnered for its notable location along Whittier Blvd., which is a major east-west corridor in the PSA connecting major residential, educational and recreational activity centers within the PSA, such as Whittier College, Uptown Whittier (a major retail/cultural center with a main street feel), and major commercial developments along Whittier Blvd.

7.10 Summary of Recommendations

The evaluation of alternatives documented in this report considered five separate build alternatives as well as a No-Build Alternative and a Baseline/TSM Alternative. The No-Build and Baseline/TSM Alternatives will be carried forward for further evaluation as part of a Draft EIS/EIR. Three of the five fixed-guideway (Build) alternatives are recommended for Metro Board approval and detailed environmental study during the Draft EIS/EIR. The recommendations represent the most promising alternatives for the Eastside Transit Corridor Phase 2 and are based on the evaluation presented in this report. Furthermore, the recommendations factor in additional refinements that have emerged from this analysis in order to improve cost-effectiveness, minimize negative impacts and capture the greatest benefit.

Two of the build alternatives, Alternative 2: SR-60 BRT and Alternative 4: Whittier LRT, are not recommended for further consideration due to the following factors:

Alternative 2: SR-60 BRT

- Lowest ridership and net new transit riders of any alternative
- Lowest user benefit hours of any alternative
- Only alternative that would require a modal transfer between Eastside Phase 2 and the Gold Line
- Cost effectiveness is far lower than any other alternative
- Contains the least transit-supportive land use of the alternatives
- Contains the lowest employment and population density of the alternatives

Alternative 4: Whittier LRT

- Slower travel time than most other alternatives
- Potential for significant impacts to arterial streets
- Potential for substantial change in neighborhood character since land use in many areas is up to the sidewalk and aerial configuration would result in aesthetic changes that might be undesirable.

The three recommended alternatives proposed for further study are listed below. Figure 7-9 provides an illustration.

- **SR-60 LRT**
 - Reduce project length to Peck Rd.
 - Evaluate potential for transit oriented development at each potential station site

- **Beverly LRT**
 - Re-evaluate candidate station locations
 - Further evaluate Whittier Greenway option through West and Central Whittier
 - Evaluate combining with Whittier LRT east of Montebello Blvd. (refer to Whittier alternative below)

- **Beverly/Whittier LRT**
 - Evaluate feasibility of alignment of alignment along Whittier Blvd. from Montebello Blvd. east to Mar Vista St. (combined with Beverly LRT as described above)
 - Further evaluate at-grade v.s. grade separated alignment sections

- **Washington LRT**
 - Evaluate feasibility of potential at-grade configuration east of Rosemead Blvd.

Alternative 1: SR-60 LRT

Alternative 1 was retained for further consideration largely due to its proximity to the communities north of SR-60. The alternative has lower ridership and user benefit hours than the other recommended alternatives, but does have the advantages of the fastest travel time and the ability to intercept traffic from SR-60. This alternative also had the greatest public support based on the public meetings conducted to date.

Alternative 3: Beverly LRT

Alternative 3 scored well in categories related to ridership and user benefits despite its longer travel time than Alternative 1. There is a high concentration of transit-supportive land use and high employment and population density which make this alternative attractive from the standpoint of serving transit dependent and providing opportunities for transit oriented development. The capital cost of this alternative is the lowest of all alternatives, but operating costs would be high. Nevertheless, it is the most cost-effective of all alternatives with respect to cost per user benefit hour and cost per net new transit rider. Public opinion on this alternative was evenly split.

Alternative 5: Washington LRT

Alternative 5 has the second fastest travel time despite having greater route miles than other alternatives. The daily ridership and net new transit riders are the highest of all alternatives studied. The alternative also has the highest level of user benefit hours and low potential for substantial disruption to arterial streets due to a predominant aerial alignment. There is a moderate amount of transit-supportive land use and the highest level of employment density in the area surrounding Alternative 5. This alternative has the highest capital cost due to the length of the route and the amount of aerial structure which would be necessary. Its cost-effectiveness is in the middle range of all the build alternatives and the alternative has the lowest level of public support based on comments received at public meetings.

The recommendations of the study team are to further refine the three fixed-guideway alternatives discussed above to identify a locally preferred alternative. Some of the necessary refinement will focus on the design options associated with Alternative 3: Beverly LRT. It is the opinion of the study team, based on the data and analysis conducted thus far and substantial field review, that a combination of alignments utilizing portions of Beverly Boulevard and Whittier Boulevard need to be further investigated. This reasoning is based on the likelihood that such design options could capture the high employment and residential density of these areas, capitalize on the transit-supportive land use features, and minimize potentially substantial impacts which would occur with either a complete alignment on Beverly or Whittier Boulevards.

Additional recommendations of the study team include further analysis of SR-60 LRT and Washington LRT in order to determine which of these corridors could benefit more from provision of fixed-guideway transit.

Recommendations to Improve Cost Effectiveness

In order to better position the project for potential federal funding, measures should be taken to improve the cost effectiveness as the project is further developed. The following strategies and/or measures should be considered during the EIR/EIS phase:

- SR-60 LRT – As the end-of-line station is primarily a freeway intercept location, and as the Peck Rd. station is generally situated to intercept the same traffic as the Crossroads Pkwy. terminal station studied in the AA, it is recommended that this alternative be cut back to Peck Rd. and re-evaluated both with respect to land use opportunities and stations as well as capital cost for a reduced length to improve its cost-effectiveness.
- Beverly LRT – The Beverly LRT option may be difficult to implement west of Montebello Blvd. due to constraints; however, stations along Whittier Blvd. east of Montebello Blvd. are good attractors of trips. A combination of segments of Beverly LRT west of Montebello Blvd. and segments of Whittier LRT east of Montebello Blvd. may improve the cost-effectiveness of the Beverly LRT option and could be studied in the EIR/EIS phase of the project.
- Washington LRT – The Washington LRT was defined as fully grade-separated. However, there are sections where the alignment could potentially be brought to grade, which may result in a more cost-effective solution. These potentials could be studied in the EIR/EIS phase of the project.
- Minimum Operable Segment – Due to the crossing of the Rio Hondo between Montebello and Pico Rivera as well as the combined crossing of the San Gabriel River and I-605 Freeway between Pico Rivera and Whittier, construction of the full project studied in the AA is costly. A shorter extension would have similar operational feasibility, reduced cost, and potentially high enough ridership to result in improved cost-effectiveness (similar to the suggestion for SR-60 LRT) and should be studied in the EIR/EIS phase.