

5. Transit Investment Definition and Evaluation

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5. Transit Investment Definition and Evaluation

Transit Investment Alternatives Evaluation Process and Criteria

At the detailed level, the **Build** alternative is evaluated against two baseline scenarios, the **Transportation System Management (TSM)** and **No-Build** alternatives. All three investment alternatives use the recommended alignment from Chapter 3 and as described below. The Build alternative also includes the recommended fixed-guideway technology alternative, **urban rail**, while the TSM alternative includes the **better bus** technology. These investment strategies are subjected to a quantitative and qualitative assessment of each alternative’s ability to meet the six overall goals established for the study. The three transit investment alternatives are described in greater detail below.

Recommended Alignment

The recommended alignment for the Build, TSM, and No-Build alternatives, previously described in Chapter 3, is summarized below and shown in Figure 5-1. The alignment consists of the following segments:

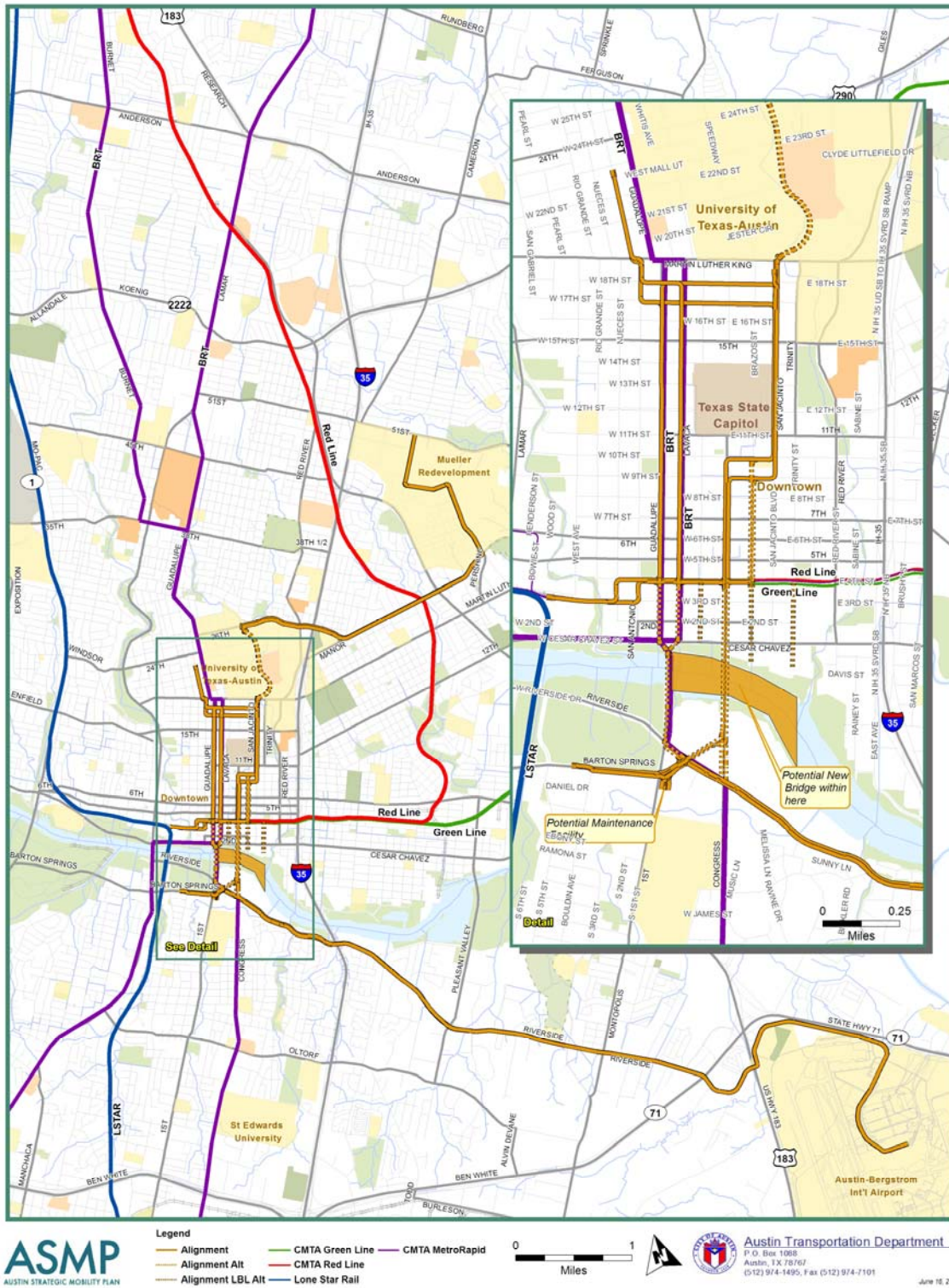
- *Mueller Redevelopment Internal*
- *University of Texas to MLK, Jr. Commuter Rail Station/Mueller South*
- *Downtown/Capitol Complex to University of Texas (East & West CBD)*
- *Downtown Commuter Rail Station to Seaholm Redevelopment*
- *Lady Bird Lake Crossing*
- *East Riverside to Austin-Bergstrom International Airport (ABIA)*
- *Palmer/Long Center Spur*

Recommended Technologies

The recommended technologies are **urban rail** for the Build alternative and **better bus** for the TSM alternative. Of the 11 modal technologies evaluated in Chapter 4, urban rail ranked the highest and was selected as the fixed-guideway build alternative. Better bus, similar to the MetroRapid system being implemented by Capital Metro, was the highest scoring non-fixed-guideway technology alternative and, therefore, advanced to the investment alternative evaluation.



Figure 5-1. Recommended Alignment



Source: City of Austin, 2010.

Investment Alternatives Definition (Build/TSM/No-Build)

Based on the conceptual evaluations of **routes** and vehicle **technologies** described in Chapters 3 and 4, the following **transit investment alternatives** are identified for detailed evaluation using the recommended **alignment** shown in Figure 5-1:

- **No-Build Alternative**, consisting of the existing transportation and transit facilities and services in the corridor, along with any planned improvements.
- **Better Bus Alternative (TSM)**, consisting of enhanced service over conventional bus, including intelligent transportation system (ITS) technologies and other priority measures to minimize travel delay. This is the TSM alternative.
- **Urban Rail Alternative (Build)**, consisting of a hybrid streetcar/LRT service running both in mixed traffic and semi-exclusive rights-of-way. Urban Rail also includes ITS and other priority measures. This is the Build alternative.

No-Build Alternative

All elements of the No-Build alternative are part of each of the other alternatives, except where an alternative replaces existing services or facilities in the study area. Under the No-Build alternative, existing transit services in the Manor Road, University Area, Capitol Complex, Downtown, and East Riverside corridors are assumed to remain much as they are today. For instance, UT shuttles now serving the student housing along East Riverside would continue to operate and expand in order to keep pace with growth in student populations. No-Build assumes Capital Metro's current investments in Rapid Bus and other emerging express transit routes would be implemented, with MetroRapid in the North Lamar/South Congress corridor coming online in mid-2012. Under the Capital Metro *ServicePlan2020*, existing bus services will continue and will be adjusted to match rider demand and changing travel patterns, in addition to integration with other new transit modes to be introduced as part of the plan. Another planned transit service within the study area is the Lone Star Rail District's LSTAR regional rail service along the Union Pacific Railroad/MoPac corridor. Inclusion of this transit investment is consistent with the CAMPO 2035 Plan.

Existing Services

Nearly every type of transit service currently offered by Capital Metro operates within the study area boundaries.

- **Local Service Routes:** These buses provide multiple stop service to and from downtown, serving specific neighborhoods and areas of the community with frequent stops.
- **Limited and Flyer Routes:** These routes provide limited-stop service to and from neighborhoods and downtown. Limited Routes, as the name suggests, stop less frequently than local routes to move people with less delays between key origins and destinations. Flyer Routes offer direct service between residential neighborhoods and the UT Main Campus or Downtown Austin and ABIA (through the Airport Flyer).
- **UT Shuttle Routes:** The shuttles provide limited-stop service from student living centers and the UT Main Campus, with a comprehensive schedule of service between several Austin neighborhoods and the campus. The UT Shuttle System is the largest university shuttle system in the United States, with 16 routes and over 7.5 million passengers annually and has been in service for more than 40 years. This service provided by Capital Metro is subsidized by UT.

- **Express Routes:** Express buses provide limited-stop service to and from UT, Downtown, and nine park-and-ride facilities located in outlying portions of the CMTA Service Area (none are located in the study area).
- **Cross-Town Routes:** Cross-town bus routes provide direct, multiple-stop services in all directions that do not directly access downtown.
- **AISD Magnet Route:** Capital Metro provides service to Austin Independent School District (AISD) students enrolled in the Magnet Arts and Sciences Program at Kealing Middle School (located in the study area) and LBJ High School.
- **MetroRail Red Line Service:** MetroRail Red Line service opened in March 2010. Operating on Capital Metro's existing freight tracks, this line from Leander to downtown provides commuter rail service to both suburban and downtown passengers. The system includes nine stations, eight within the City of Austin. The passenger rail vehicles are diesel multiple units (DMU).

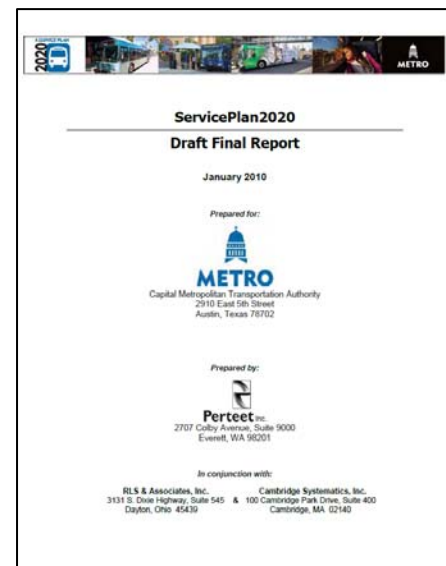
Planned Services

The planned improvements in Capital Metro service are assumed for all three investment alternatives and include elements of the 2004 *All Systems Go Long-Range Transit Plan*, the recently adopted *ServicePlan2020*, and LSTAR regional rail service, as noted above. Planned Capital Metro transit improvements in the study area include.

- **MetroRapid Bus Service:** New, technologically advanced buses will use a traffic signal priority system to move buses with less delay throughout Austin. This service will significantly improve bus commutes between major residential and employment origins and destinations. These vehicles will also provide real-time arrival information. The system will include a starter line from North Lamar Boulevard to South Congress Avenue, scheduled for initial operations in 2012. A second line is planned for Burnet Road to South Lamar Boulevard. Extensions may include but are not limited to: Riverside Drive, East 7th Street/Austin-Bergstrom International Airport, Oltorf Street, Pleasant Valley Road, 51st Street, Northeast Austin, Mueller redevelopment site, Rundberg Lane, Research Boulevard, Parmer Lane, Ben White Boulevard, and Oak Hill. Inclusion of these service lines is consistent with the CAMPO 2035 Plan.
- **Commuter/Express and Local Service¹:**
 - **Frequent Service Corridors:** Implement a network of frequent bus routes throughout the urbanized area. Frequent Service Corridors can either be MetroRapid routes, or regular fixed routes.
 - **Downtown Austin:** Improve speed and reliability and customer amenities; consolidate routes on main corridors and reduce the number of bus stops.
 - **East Austin:** Improve frequency on several routes; improve route directness; use flexible service in low-density areas; provide direct service from East Austin to the South Congress Transit Center; improve connectivity to Cross Park and Rutherford areas.

¹ Capital Metropolitan Transportation Authority, 2010, *ServicePlan2020 Draft Final Report, January 2010*, by Perteet, Inc., <http://www.capmetro.org/serviceplan2020/docs/ServicePlan2020%20-%20Final%20Report.pdf>, accessed July 9, 2010.

- **West Austin:** Consolidate UT and regular fixed routes into two full-time routes; the Lake Austin route should operate as a “Frequent Service Route” year-round; replace fixed-route bus service with flexible service in several lower density neighborhoods.
- **North Central Austin:** Improve directness and frequency of trips to the Cameron and St. John’s areas and Rutherford shopping; improve directness to East Austin.
- **North Austin:** Consolidate several feeder routes into a cross-town route; delete service to low ridership areas; adjust commuter services commensurate with demand once the Red Line begins.
- **South Central Austin:** Delete service from underperforming neighborhood routes; improve connectivity and frequency from South Congress Transit Center to East Austin and Barton Creek Square Mall.
- **South Austin:** Shift the focal point of service in South Austin from Bluff Springs to Southpark Meadows and extend South Austin routes to more destinations.
- **Southeast:** Improve frequency and directness between downtown, Riverside and ABIA. Provide a direct connection to Ben White Boulevard and the South Congress Transit Center.
- **Southwest Austin:** Increase park-and-ride service in the SH 71 West and South Loop 1 (Mopac) corridors; reduce the level of local bus service in some neighborhoods; extend service further south to serve new development.
- **University of Texas:** Utilize existing regular service routes to supplement or replace UT Shuttles; adjust frequencies by day based on demand.
- **Mueller Redevelopment Area:** In the short-term, connect the high density residential areas along Mueller and Aldrich directly to downtown and UT; in the next ten years, connect Mueller with downtown and UT via a MetroRapid corridor.
- **New Commuter Service:** Add commuter service from the east, south, and southwest; add regional park-and-rides in Manor, the I-35 South corridor, south Mopac, and in the SH 71 West corridors.
- **New Flexible Service:** A Tarrytown Flexible Service route should replace three existing fixed-routes; a Decker – Springdale route should serve areas of East Austin; and a Riata – Millwood – Domain route should connect residential and commercial areas of Northwest Austin with the Domain and Kramer Station.
- **Rails with Trails:** Capital Metro is working with local biking organizations to provide access to right-of-way along existing Capital Metro tracks to build safe and accessible hike-and-bike trails. Funding sources to construct the trails have not been determined but could be provided by federal grants and other existing local agency programs.



- **MetroRail Green Line Service:** The Green Line is proposed as the first expansion of Capital Metro's MetroRail system. This 28-mile system would operate from downtown Austin east to Manor and Elgin. Any future extensions would require detailed analysis and a referendum, under current state law. Inclusion of the MetroRail Green Line Service is consistent with the CAMPO 2035 Plan.
- **LSTAR Regional Rail Service:** The Lone Star Rail District (LSRD) is planning regional rail service between Georgetown, TX (to the north of Austin) and San Antonio, TX (to the south of Austin). The proposed 120-mile route will utilize existing Union Pacific right-of-way and run up to 12 trains a day through up to 16 stations, with five slated for Austin, including one at Seaholm on the proposed transit investment alignment. Inclusion of this rail service is consistent with the CAMPO 2035 Plan.

Better Bus Alternative (TSM)

Better Bus technology offers enhanced convenience to passengers by incorporating a variety of features distinguishing it from conventional bus, including, for example, employment of intelligent transportation system (ITS) technologies and other priority measures to minimize travel delay, use of special stops or stations to distinguish the service and add visibility (prominence) to the route, and the use of special, distinctive vehicles, possibly with added passenger amenities.



Better Bus vehicles may be technologically advanced buses using a traffic signal priority (TSP) system to move with less delay through traffic. This modal alternative would also employ other ITS technologies, such as off-board fare collection, also known as 'honor system', and would stop curbside approximately every three blocks. The Better Bus alternative *may* use rapid loading features incorporated into the vehicle design. Unlike Urban Rail, Better Bus does not include a dedicated right-of-way, though like Urban Rail it could include a transit-only lane for portions of the alignment.



Because this alternative still uses the bus as the basic mode of transportation, improving the level of service by the introduction of new operating scenarios and/or enhancement technologies, this alternative is considered the FTA Transportation Systems Management (TSM) alternative. Under FTA's New Starts program, a TSM alternative is used for a baseline for comparison against the proposed guideway alternative at the preliminary engineering phase. The TSM alternative is characterized as the "best that can be done" to improve transit service in the corridor via operational modifications and lower-cost capital improvements, without constructing a new transit guideway. From FTA's draft *Definition of Alternatives*:

Generally, the TSM alternative emphasizes upgrades in transit service through operational and small physical improvements, plus selected highway upgrades through intersection improvements, minor widenings, and other focused traffic engineering actions. A TSM alternative normally includes such features as bus route restructuring, shortened bus headways, expanded use of articulated buses, reserved bus lanes, contra-flow lanes for buses and HOVs on freeways, special bus ramps on freeways, expanded park/ride facilities, express and limited-stop service, signalization improvements, and timed-transfer operations.²

The Better Bus vehicle can also run in a more express mode; for example, this type of service could operate within the East Riverside Corridor portion of the study area, providing express service through the Corridor and access to ABIA. Dedicated bus lanes would be required for the express mode, similar to the dedicated, or semi-exclusive, trackway envisioned for the Urban Rail alternative. Stops would be similar to those envisioned under the Urban Rail alternative as well.

The alignment for both the Better Bus and Urban Rail alternatives is the same as shown above in Figure 5-1. All the elements of the No-Build alternative are incorporated into the Bus alternative. It is likely that if a higher-capacity transit mode is introduced into the corridors under study, individual bus transit routes would be modified to provide direct and efficient access to the higher capacity systems. Therefore, some bus or shuttle routes might be truncated at a new transit station within the corridor to provide the maximum access to a higher-capacity bus or rail system and minimize the redundancy of services.

Although the Lady Bird Lake Crossing segment of the proposed alignment includes further consideration for a new bridge, it is unlikely that an independent crossing for Better Bus would be contemplated.

Urban Rail Alternative

Urban Rail is the City of Austin’s term for an overhead-electric-powered fixed-guideway service that blends the technological and operational characteristics of modern streetcar and light rail transit (LRT). Urban Rail can operate in both mixed-traffic and within a dedicated right-of-way. When operating in a mixed-flow environment, Urban Rail vehicles typically operate at speeds comparable to surrounding traffic. However, within a dense urban environment and when provided with dedicated right-of-way, Urban Rail vehicles can provide operational characteristics comparable to that of light rail. Urban Rail vehicles range from the “modern streetcar” currently used in Seattle, Portland, and Tacoma (approximately 66 feet long with a total passenger capacity up to 120, with a top speed of approximately 45 miles per hour) to new cross-over vehicles such as the S70 Ultra Short proposed for use in Salt Lake City



² Federal Transit Administration, 2010, "Definition of Alternatives," *Procedures and Technical Methods for Transit Project Planning*, http://www.fta.dot.gov/planning/newstarts/planning_environment_9717.html#252 The TSM Alternatives, accessed June 14, 2010.

that is approximately 79 feet long with a total passenger capacity of 160 and a top speed approaching 60 miles per hour. Urban Rail vehicles can be designed to operate in multi-vehicle trains, if needed. In addition, alternative power modes such as batteries are under development by some manufacturers and warrant further investigation as an alternative to a system powered completely by overhead electric wires.

The Urban Rail alternative is proposed to include both exclusive right-of-way and mixed flow operations. Urban Rail vehicles would operate in mixed traffic (with automobiles) in more congested urban areas such as downtown where extra ROW for independent guide way is scarce. In the Riverside Corridor, where street rights-of-way are typically wider, there is generally sufficient room to create a semi-exclusive or dedicated right-of-way by widening the overall street to the outside to provide replacement auto capacity for those lanes converted for transit use.

The Urban Rail alternative generally consists of two sets of tracks – one set in each direction. In many areas, where streetcar-like mixed-flow operations are proposed, curbside tracks would be employed and stops would use existing or expanded sidewalks. In areas where LRT-like dedicated or semi-exclusive rights-of-way are proposed, a center-running system could be used. Placement of tracks in the center of streets would entail use of narrow side-platform or center-platform stops, which could reduce the street width available for traffic in some locations. Under streetcar-like operations, Urban Rail stops would be spaced approximately every two to four blocks; whereas under LRT-like service, stops would be placed generally every $\frac{1}{4}$ to $\frac{1}{2}$ mile. These rapid service stops would be strategically located and consistent with neighborhood plans to maximize ridership generation, connection to cross transit routes, and efficiency of the system. Urban Rail would incorporate similar features and amenities to the Better Bus alternative, like off-board fare collection and ITS technologies, such as signal priority (TSP) and queue jump³, as well as additional enhancements, like level boarding.

³ Queue jump refers to a combination of intersection lane geometry and signalization used to expedite transit service. Refer to the Federal Transit Administration (FTA): http://www.fta.dot.gov/research_4359.html.

Investment Alternatives Evaluation Criteria

Table 5-1 lists the criteria and describes the individual measures of effectiveness (MOEs) used to determine how well an alternative meets the criteria. Table 5-2 lists the six goals and shows which criteria are applied to each goal. Note that many of the criteria apply to more than one goal and are, therefore, evaluated in the context of each of its corresponding goals.

Table 5-1. Investment Alternatives Evaluation Criteria and Measures of Effectiveness (MOEs)




Criteria	Measures of Effectiveness (MOEs)
Ridership	Achieve maximum Build alternative and transit system ridership.
Transit-to-Transit Transfers	Provide opportunity for riders to minimize travel time through efficient transfers.
Transit Travel Time	Provide opportunity for riders to minimize end-to-end travel time between and among all stations.
Permanence	Make a visible and significant fixed capital investment.
Access	Provide increased access to places and transit.
Capacity	Increase the person-moving capacity of the transportation network.
Land Use Compatibility	Minimize conflicts with existing and planned land uses and maximize support for formal land use plans.
Development Potential	Provide focal points that support and attract development, redevelopment, and infill.
Environmental Benefits	Minimize adverse environmental impacts and provide long-term environmental benefits.
Construction Impacts	Minimize noise, air pollution, and disruption of access and activities during construction.
Neighborhood Compatibility	Supportive of neighborhoods.
Implementation Costs	Minimize capital costs.
Compact, Mixed-Use Development	Provide conditions that attract developer, resident, and business interest.
Operating Costs	Minimize operations and maintenance costs.
Private Investment	Has the potential to attract private investment.
Cost-Effectiveness	Provide measurable benefits to users and desired economic development in favorable proportion to costs.

Table 5-2. Investment Alternatives Evaluation Criteria per Goal

Criteria	Goals					
	Goal 1. Improve place connectivity	Goal 2. Improve transit connectivity	Goal 3. Improve mobility	Goal 4. Maximize community benefits	Goal 5. Maximize environmen- tal benefits	Goal 6. Maximize economic benefits
Ridership	X	X	X	X	X	
Transit-to-Transit Transfers		X				
Transit Travel Time		X	X			
Permanence	X			X		
Access	X		X	X		
Capacity			X			
Land Use Compatibility	X			X		
Development Potential				X		X
Environmental Benefits					X	
Construction Impacts					X	
Neighborhood Compatibility	X			X		
Implementation Costs						X
Compact, Mixed-Use Development	X			X	X	X
Operating Costs						X
Private Investment						X
Cost-Effectiveness						X

Detailed Evaluation of Investment Alternatives

This section summarizes the results of the detailed evaluation process. In evaluating the ability of each alternative to meet the goals and criteria, the following ranking system is used:

-  = Neutral rating/baseline
-  = Alternative provides somewhat better performance
-  = Alternative provides significantly better performance

As noted in the Need and Purpose statement (Chapter 2), the following six goals have been established for this study:

1. **Improve Place Connectivity**
2. **Improve Transit Connectivity**
3. **Improve Mobility**
4. **Maximize Community Benefits**
5. **Maximize Environmental Benefits**
6. **Maximize Economic Benefits**

Goal 1. Improve Place Connectivity






















The purpose of this goal is to improve connections to and between key existing and emerging destinations ("place connectivity") within the study area. By improving connectivity to places within Central Austin, and beyond, the transit investment can improve the *practical* value of these places to the community. Put another way, a place with high *intrinsic* value may have little *practical* value if it is difficult to get to. Most of the objectives in support of this goal were also considered during the preliminary screening of connection needs and vehicle technologies that ultimately resulted in the proposed investment alternatives.

The proposed alignment provides direct service connections among the Seaholm District, Downtown, Capitol Complex, UT campus, Mueller Redevelopment, and ABIA, as well as links those destinations with the CMTA MetroRail and planned MetroRapid systems and the proposed Lone Star regional rail system. Development of the proposed alignment also addresses objectives to provide connections east to west (Mueller to UT; Convention Center to Seaholm; and Downtown to ABIA), between and among existing and emerging activity centers, that serve existing and future student housing (UT area, East Riverside, and Mueller), and that accommodate special event venues (UT's Darrell K. Royal-Texas Memorial Stadium, Convention Center, Long Center for the Performing Arts, and Palmer Events Center).

Criteria used to evaluate the performance of the alternatives against the objectives of Goal 1 and the results of that evaluation are provided below. Table 5-3 summarizes the relative rankings of the alternatives under Goal 1 and its criteria. Urban Rail is ranked highest in this category.

Goal 1 Evaluation Results

Table 5-3. Detailed Evaluation for Goal 1. Improve Place Connectivity

Criteria	No-Build	Better Bus	Urban Rail
1.1 Ridership			
1.2 Permanence			
1.3 Access			
1.4 Land use compatibility			
1.5 Neighborhood compatibility			
1.6 Supportive of compact, mixed-use development			
1.0 OVERALL RATING			

Goal 1 Evaluation Discussion

- Ridership:** The average weekday ridership, based on the forecast discussed in Chapter 6, is much greater for the Urban Rail alternative as compared to the Better Bus alternative average. Daily ridership on Urban Rail is projected to be approximately 27,600 in 2030, compared with 9,000 riders per day for Better Bus. The much higher ridership forecast for Urban Rail suggests that this alternative provides better place connectivity because it connects more people to the same places than Better Bus.

A note on ridership: data from across the country have demonstrated a positive bias towards rail transit in the traveling public:

When these service conditions are equal, it is evident that rail transit is likely to attract from 34 percent to 43 percent more riders than will equivalent bus service. The data do not provide explanations for this phenomenon, but other studies and reports suggest that the clearly identifiable rail route; delineated stops that are often protected; more stable, safer, and more comfortable vehicles; freedom from fumes and excessive noise; and more generous vehicle dimensions may all be factors.⁴

⁴ Tennyson, Edson L., 1989, "Impact on Transit Patronage of Cessation or Inauguration of Rail Service", *Transportation Research Record 1221*, Transportation Research Board, <http://www.publictransit.us/ptlibrary/TRB1221.pdf>, accessed June 14, 2010.

- **Permanence:** Urban Rail is a permanent infrastructure service due to its fixed-guideway and related facilities. While Better Bus implementation involves bus stop construction, the absence of guideway construction means that it is neither 'fixed' nor permanent. There are numerous benefits to building a permanent system, including changes to land use patterns, reductions in vehicle miles traveled, reductions in CO₂ emissions, and accelerated and increased development. According to the American Public Transportation Association (APTA), a notable benefit of Urban Rail-type systems is:

once fixed guideway transit investments are committed and station locations set, the private sector will build transit-oriented developments which produce dramatic reductions in vehicle travel and transportation-related emissions.⁵

The benefits of permanence extend from land use to economic to environmental.

- **Access:** Improving access to places improves the connectivity of those places, and vice versa. By providing direct connections between key destinations in and around Central Austin, both Urban Rail and Better Bus improve access. Urban Rail's superior ability to focus development along its alignment (as discussed above under "Permanence") implies that it is better at providing access than is Better Bus. Additionally, given that Urban Rail offers level boarding, off-board fare collection, vehicles with more doors, and clearly delineated alignments, access to transit is improved beyond what Better Bus can offer.
- **Land Use Compatibility:** Urban Rail and Better Bus are both compatible with existing land uses in Central Austin. Both fit within the existing rights-of-way and neither requires changes in land use, despite any beneficial influences. However, Urban Rail-type transit is cited specifically in a number of formal land use plans, including the Downtown Austin Plan, East Riverside Corridor Master Plan, Seaholm District Master Plan, and the emerging Imagine Austin Comprehensive Plan; whereas bus service beyond conventional or local is not though it is assumed to address the general intent for enhanced transit service of those plans.

⁵ American Public Transportation Association, 2008, *Testimony of William W. Millar, President, APTA, Before the House Committee On Ways And Means on September 18, 2008*, <http://www.apta.com/gap/testimony/2008/Pages/testimony080918.aspx>, accessed June 14, 2010.

- Neighborhood Compatibility:** Both Urban Rail and Better Bus are compatible and supportive of neighborhoods. Many neighborhood plans propose improvements in conventional bus transit amenities and establish access to transit as a high priority. Urban Rail may be viewed as somewhat more supportive of neighborhood planning efforts as evidenced by its specific inclusion in many neighborhood plans and City master plans. For instance, the North Loop Neighborhood Plan (at the north end of the study area), clearly establishes rail transit as vital to the neighborhood, "*This neighborhood sees light rail as part of the neighborhood vision, and recognizes the important link between mixed-use development, increased residential densities, access to services, greater use of non-automobile transport and access to public transit such as light rail, as well as to buses.*"⁶ Simply put, Urban Rail/Streetcar systems "connect neighborhoods."⁷
- Compact, Mixed-Use Development:** While both Urban Rail and Better Bus support compact, mixed-use development by reducing auto use, Urban Rail-type systems have been demonstrably better at catalyzing this kind of development. Cities across the country, including Austin, developed compactly around streetcar systems from the late 1800s to the 1920s.⁸ Contemporary Urban Rail/Streetcar systems have "*demonstrated the...ability to attract and shape development that was compact, walkable, high-density, and mixed-use, with a very high-quality streetscape.*"⁹

Goal 2. Improve Transit Connectivity

The purpose of this goal is to improve the regional transportation network by providing connections among transit modes, including bus, commuter rail, and regional rail systems. As with place connectivity, the supporting objectives of this goal were considered during the conceptual screening of connection needs (or routes) and vehicle technologies.

The proposed alignment serves as the backbone of the developing regional transit network and provides a vital collection/distribution system for MetroRail's Red Line and planned Green Line commuter rail systems, the planned MetroRapid bus service, and the proposed Lone Star regional rail line. The proposed alignment encourages efficient and easy downtown rail-to-rail, bus-to-rail, and bus-to-bus transfers. Implementation of a new high-capacity transit investment is anticipated to reduce the number of buses and curbside transfer points in downtown by focusing transit service along its alignment.

To consider further how the proposed alternatives would serve the objective of providing convenient and reliable connections between transit modes and routes, an alternative's ability to facilitate transfers

⁶ City of Austin, 2002, *The North Loop Neighborhood Plan*, May 23, 2002, http://www.ci.austin.tx.us/planning/neighborhood/downloads/northloop/intro_top10_toc.pdf, accessed June 14, 2010.

⁷ Nasser, Haya El, 2007, "Cities rediscover allure of streetcars," USA TODAY, January 10, 2007, http://www.usatoday.com/news/nation/2007-01-08-streetcars_x.htm, accessed July 9, 2010.

⁸ Melosi, Martin V., "The Automobile Shapes the City," *Automobile in American Life and Society*, http://www.autolife.umd.umich.edu/Environment/E_Casestudy/E_casestudy3.htm, accessed July 9, 2010.

























⁹ Reconnecting America, 2009, "Streetcars and Cities in the 21st Century", edited by Gloria Ohland and Shelley Poticha. http://www.reconnectingamerica.org/public/display_asset/090305streetcarbook, accessed May 18, 2010.

between transit modes is considered a measure of its ability to improve transit connectivity. It is also generally accepted that riders are more likely to transfer between similar transit modes or from a transit mode of lesser quality service to one that is perceived as providing greater quality service. For example, a rail-to-rail transfer would tend to be more preferable than a rail-to-bus transfer. Similarly, a bus-to-rail transfer would be preferable to a transfer from rail-to-bus.

Evaluation criteria used to evaluate the performance of the alternatives against Goal 2 and the results of that evaluation are provided below. Table 5-4 summarizes the relative rankings of the alternatives under Goal 2 and its criteria. Urban Rail and Better Bus received equal overall ratings for this goal.

Goal 2 Evaluation Results

Table 5-4. Detailed Evaluation for Goal 2. Improve Transit Connectivity

Criteria	No-Build	Better Bus	Urban Rail
2.1 Ridership			
2.2 Transit-to-Transit Transfers			
2.2.1 LSTAR to alternative	 ↑	 ↑	 ↑
2.2.2 MetroRail to alternative	 ↑	 ↑	 ↑
2.2.3 MetroRapid to alternative	 ↑	 ↑	 ↑
2.2.4 Conventional bus to alternative	 ↑	 ↑	 ↑
2.3 Transit Travel Time			
2.0 OVERALL RATING			

Goal 2 Evaluation Discussion

- **Ridership:** The much higher ridership forecast for Urban Rail suggests that this alternative provides better transit connectivity because it connects more people to other transit modes than does Better Bus.

- Transit-to-Transit Transfers:** The higher ridership forecast for Urban Rail implies that more passengers will transfer to other modes, thus improving each mode's ridership. Additionally, given the tendency of riders to favor transfers to like or better quality service, Urban Rail was evaluated as having a modest advantage over Better Bus. Another factor influencing the slightly more favorable ratings earned by Urban Rail relate to the ability of Urban Rail to attract compact, mixed-use (i.e., transit-oriented or TOD) development, as noted elsewhere in this study. This type of supportive development is known to increase ridership and encourage transfers.¹⁰
- Transit Travel Time:** Both the Build and TSM alternatives are expected to improve travel times for transit riders over the No-Build alternative, which includes conventional bus service with frequent stops and without ITS technologies, level boarding, and off-board fare collection. Under a No-Build scenario a transit patron would also need to make several transfers to reach the same destinations. Better Bus and Urban Rail are assumed to have similar travel times due to ITS technologies, including traffic signal priority (TSP), similar stop-spacing and off-board fare collection. The estimated travel time for both the Build and TSM alternatives is 33 minutes end-to-end, for either route, under the conceptual operating plan detailed in Chapter 6. Many trips anticipated on the transit alternative route would be much shorter than the end-to-end trip and have even shorter travel times, typically ten to twelve minutes. Other factors influencing travel time may likely offset each other, such as Urban Rail's use of level boarding, which reduces station dwell times, countered with Better Bus' ability to go around obstructions, etc.

A note on travel time: despite improvements in transit travel time offered by both Urban Rail and Better Bus over the No-Build alternative, travel time in the corridor is not likely to be significantly improved over auto travel time. However, travel time has a minimal impact on transit ridership for choice riders (i.e., not transit-dependent), as noted below:

among travelers who do have a choice, the data analyzed shows that differences in travel times between automobile and transit modes does little to influence the choice of whether or not to use transit.¹¹

Goal 3. Improve Mobility

The purpose of this goal is to increase the person-moving capacity of the transportation network by providing a new higher-capacity option. A secondary goal is to provide improved access to places, services, activities, and goods within Central Austin and throughout the study area. An alignment was developed that provides connections between places and existing and proposed major transit modes. This provides for multiple opportunities to promote added transportation options for the community.
















¹⁰ Victoria Transport Policy Institute, 2010, *TDM Encyclopedia*, updated February 17, 2010, <http://www.vtpi.org/tdm/tdm112.htm>, accessed June 14, 2010.

¹¹ Beimborn, Edward A., Michael J. Greenwald, and Xia Jin, date unknown, "Transit Accessibility and Connectivity Impacts on Transit Choice and Captivity", Center for Urban Transportation Studies and Department of Urban Planning, University of Wisconsin-Milwaukee.

To evaluate how well the investment alternatives serve the objective of improving mobility in/out/around Central Austin, performance indicators were selected that suggest the ability of one alternative over the other to respond to travel demands within the study area. Under both the Build and TSM alternatives, mobility within Central Austin, the study area, and the region are expected to be improved, because both alternatives present an additional transportation option. Table 5-5 summarizes the relative rankings of the alternatives under Goal 3 and its criteria. Urban Rail and Better Bus are ranked equally in this category.

Goal 3 Evaluation Results

Table 5-5. Detailed Evaluation for Goal 3. Improve Mobility

Criteria	No-Build	Better Bus	Urban Rail
3.1 Ridership			
3.2 Transit Travel Time			
3.3 Access			
3.4 Capacity			
3.0 OVERALL RATING			

Goal 3 Evaluation Discussion

- Ridership:** The much higher ridership forecast for Urban Rail suggests that this alternative provides better mobility because it moves more people than Better Bus.
- Transit Travel Time:** Both Build alternatives are expected to improve travel times for transit riders by about the same amount over the No-Build alternative. This modest reduction in travel time improves mobility and access because patrons can get farther and/or more places within a given amount of time. Better bus includes technology to interact with the signal system, allowing for better travel times over the No-Build. Rail includes this signal controlling technology, but also uses a dedicated Right of Way in portions of the corridor, thus providing improved travel times, even over the better bus alternative.
- Access:** Access is the ability to reach destinations and, perhaps, the overall goal of transportation. How well an alternative improves access to places, services, activities, and goods indicates how well it improves mobility, or the ease by which a destination is reached. Whereas "mobility" refers to the process of transportation, "access" refers to the result. Alternatives that improve the result – getting 'there' – make the process of getting there easier, whether it's by reducing travel time or distance or other barriers. Urban Rail's ability to stimulate and accelerate compact, mixed-use development (as discussed above under "Permanence") means that many more of those destinations are closer and therefore more accessible. By concentrating and aggregating those 'theres' – by affecting land use – Urban Rail can indirectly reduce travel time by reducing travel distance. Additionally, given that Urban Rail

offers level boarding, off-board fare collection, vehicles with more doors, and clearly delineated alignments, access to transit is improved beyond what Better Bus can offer.

- Capacity:** Both the Build and TSM alternatives are expected to increase the person-moving capacity of the transportation network, over the No-Build, by providing an additional higher-capacity mode within the study area. While some modes have reached saturation (i.e., autos) and others are inherently limited in scale (i.e., pedestrian and bicycle), Urban Rail and Better Bus both offer significant increases in capacity *within* the existing roadway network. Urban Rail does have a slight advantage over Better Bus in its vehicle size and ability to couple vehicles, though it is assumed that single trains would be the most likely configuration. Urban Rail (and higher-/high-capacity rail transit in general) is a scalable mode that can add capacity for much smaller incremental increases operating costs than Better Bus because a single vehicle operator can carry more people by attaching more units to the train. This is also accomplished without the environmental impacts attendant with Better Bus expansion.

























Goal 4. Maximize Community Benefits

The purpose of this goal is to provide benefits to the community by supporting sustainable land use planning, adding public amenities, and improving access to destinations.

To evaluate how well the investment alternatives maximize benefits throughout the study area, performance indicators were selected that reflect an assortment of community benefits that higher-capacity transit can provide. Table 5-6 summarizes the relative rankings of the alternatives under Goal 4 criteria. The Urban Rail alternative ranked highest.

Goal 4 Evaluation Results

Table 5-6. Detailed Evaluation for Goal 4. Maximize Community Benefits

Criteria	No-Build	Better Bus	Urban Rail
4.1 Ridership			
4.2 Permanence			
4.3 Access			
4.4 Land Use Compatibility			
4.5 Development Potential			
4.6 Neighborhood Compatibility			
4.7 Compact, Mixed-Use Development			
4.0 OVERALL RATING			

Goal 4 Evaluation Discussion

- **Ridership:** The much higher ridership forecast for Urban Rail suggests that this alternative provides greater benefit to the community because it affects more people than Better Bus.
- **Permanence:** A permanent public investment in infrastructure is a direct benefit to the community. As discussed above, a fixed-guideway transit system is an inherently 'more permanent' investment than the more modest roadway and streetscape improvements typically associated with Better Bus systems. In contrast, Better Bus represents a 'less permanent' improvement given that the alignment can be changed and therefore reflects a lower commitment to the community.
- **Access:** As discussed previously, Urban Rail's ability to stimulate and accelerate compact, mixed-use development means that many more destinations are closer and therefore more accessible, whether to home or work for instance. Additionally, Urban Rail vehicles, stops, and guideways offer improved access to transit – and therefore destinations – beyond what Better Bus and No-Build can provide. The easier access to transportation facilities provides greater community benefits by encouraging transit use.
- **Land Use Compatibility:** Both the Build and TSM alternatives are compatible with various City of Austin plans (i.e., Downtown Austin Plan, Seaholm District Master Plan, East Riverside Corridor Master Plan, and the emerging Imagine Austin Comprehensive Plan), which all call for more transit-oriented, compact, mixed-use development. However as noted previously in this study, rail transit is cited specifically by these plans and Urban Rail is a better catalyst for realizing these types of sustainable developments. Higher densities maximize benefits to the community by preserving open space and the character of lower-density outlying areas (like West and Southwest Austin) because it draws population and employment to established/desired zones, thus relieving pressures on more sensitive areas. Development that relies on transit more and autos less is more sustainable and imposes a lesser burden on other City infrastructure, which is less expensive to upgrade than to extend.
- **Development Potential:** Urban Rail's permanence and ridership potential are characteristics that would much more likely catalyze and accelerate re-/development along the alignment than Better Bus. Two examples are the East Riverside and Far West Boulevard corridors, which have high (bus) transit ridership, yet low-density commercial and retail development. The UT shuttle bus service can be credited with supporting these higher-density residential developments; however it has not generated much in the way of development, which was established prior to the system's extension to these corridors. In the two years since the Downtown Austin Plan Phase One proposed rail transit (in the form of streetcar) for this corridor, two new higher-density, mixed-use developments at the west end near I-35 have begun. According to an article in the November 3, 2008 edition of the Austin American-Statesman, the design of the new mixed-use development by Grayco Partners at East Riverside Drive and South Lakeshore Boulevard is directly influenced by the expectation of rail transit on East Riverside Drive. As this example shows, along with others documented elsewhere in this report, development can happen just in response to an announcement that rail transit is being planned.

- **Neighborhood Compatibility:** As discussed above, both Urban Rail and Better Bus are compatible with, and supportive of, most neighborhood plans. However, while many plans cite relatively minor bus improvements, generally related to stop amenities, several within the study area call for a substantial Urban Rail-type investment.
- **Compact, Mixed-Use Development:** The Urban Rail alternative is far more likely to catalyze compact, mixed-use development than the Better Bus alternative, as notes previously, which will maximize community benefits by increasing the tax base, introducing new retail, residential, and commercial opportunities, and placemaking. Another significant community benefit due to compact, mixed-use development is improved public fitness and health: "*transit users are four times as likely to achieve the target of 20 minutes or more of walking per day as people who do not use transit on a particular day.*"¹²
















Goal 5. Maximize Environmental Benefits

The purpose of this goal is to invest in transit improvements with the greatest benefits to the natural environment.

To evaluate how well the investment alternatives maximize environmental benefits, performance indicators were selected that focus on minimizing impacts, in addition to adding benefits. Table 5-7 summarizes the relative rankings of the alternatives under Goal 5. Urban Rail ranked highest in this category.

Goal 5 Evaluation Results

Table 5-7. Detailed Evaluation for Goal 5. Maximize Environmental Benefits

Criteria	No-Build	Better Bus	Urban Rail
5.1 Ridership			
5.2 Environmental Benefits			
5.3 Construction Impacts			
5.4 Compact, Mixed-Use Development			
5.0 OVERALL RATING			

Goal 5 Evaluation Discussion

- **Ridership:** Both the Build and TSM alternatives encourage greater transit use, which reduces impacts related to auto use, or the growth thereof, such as air and noise pollution, carbon emissions. But, the much higher ridership forecast for Urban Rail suggests that this alternative

¹² Litman, Todd, 2009, "Comprehensive Evaluation of Transit Oriented Development Benefits", *Planetizen*, June 7, 2009, <http://www.planetizen.com/node/39133>, accessed June 14, 2010.

provides greater environmental benefits to the community as it encourages greater transit use than Better Bus.

- **Environmental Benefits:** Urban Rail minimizes environmental impacts, thus maximizing benefits compared to other alternatives, due primarily to two factors: 1) use of electrical power and 2) support for more compact, transit-oriented land uses. Austin Energy will supply electrical power for the Urban Rail alternative and it has a substantial renewable portfolio; therefore, Urban Rail will have far fewer environmental impacts related to its power source than Better Bus. Although cleaner engine technologies are becoming more widely available for buses, including hybrid motors and clean diesel, the internal combustion engine remains the primary power source for the majority of buses, which makes the all-electric Urban Rail vehicle more beneficial to the community. While No-Build alternative is advantageous because there would be no additional operational impacts within the study area, those benefits are far outweighed by the unsustainable perpetuation of a reliance on single-occupant vehicles to handle existing and additional trip capacity. Maximized environmental benefits due to compact, transit-oriented land uses are discussed below.
- **Construction Impacts:** Better Bus would have minimal construction impact, as compared to Urban Rail since there is no guideway to construct. Construction impacts under the No-Build alternative provide, by definition, the least environmental impact of the investment alternatives.
- **Compact, Mixed-Use Development:** As noted previously, the Urban Rail alternative is the most supportive of compact, mixed-use development. This type of development provides significant environmental benefits because the concentration of multiple uses reduces the need to travel – by any motorized mode whether it's by auto, bus, or even rail. Research has shown that transit-oriented developments generate half as many auto trips as typical residential development.¹³ Travel contributes to a whole host of harmful environmental impacts, from polluted runoff to consumption of open space to increased emissions. The direct environmental benefits of the type of compact, mixed-use development generated by the Portland Streetcar have been estimated as "[reducing] the carbon footprint by 60 percent over conventional suburban development – providing a 76 percent reduction in transportation-related GHG emissions and reducing the development footprint by 46 percent."¹⁴

Goal 6. Maximize Economic Benefits

The purpose of this goal is to invest in transit improvements that support existing economies, catalyze economic growth, and provide economic benefits for users. Supporting objectives include maximizing the cost-effectiveness of both capital investments and operating costs, each of which is predicated on a full cost accounting.






















¹³ Cervero, Robert and Arrington, G.B., 2008, "Vehicle Trip Reduction Impacts of Transit-Oriented Housing", *Journal of Public Transportation*, Vol. 11, No. 3, 2008, <http://www.nctr.usf.edu/jpt/pdf/JPT11-3Cervero.pdf>, accessed June 14, 2010.

¹⁴ Reconnecting America, 2009, "Streetcars and Cities in the 21st Century", edited by Gloria Ohland and Shelley Poticha. http://www.reconnectingamerica.org/public/display_asset/090305streetcarbook, accessed May 18, 2010.

Table 5-8 summarizes the relative rankings of the alternatives under Goal 6 and its criteria. Urban Rail ranked highest in this category.

Goal 6 Evaluation Results

Table 5-8. Detailed Evaluation for Goal 6. Maximize Economic Benefits

Criteria	No-Build	Better Bus	Urban Rail
6.2 Development Potential			
6.3 Implementation Costs			
6.4 Compact, Mixed-Use Development			
6.5 Operating Costs			
6.6 Private Investment			
6.7 Cost-Effectiveness			
6.0 OVERALL RATING			

Goal 6 Evaluation Discussion

- Development Potential:** As discussed above, Urban Rail's permanence and ridership potential are characteristics that have been shown to catalyze and accelerate re-/development along its alignment more so than Better Bus. When compared to the No-Build alternative, the argument that development has happened, is happening, and will continue – irrespective of a new transit investment – misses the point of this measure of effectiveness. Ultimately, a more robust public transit system will attract some additional development that wouldn't otherwise come to Austin; but, high quality transit's, especially rail's, true power is to attract and accelerate development that's already going to come. The benefits of this development engine are twofold: 1) development along the route is that which is drawn from environmentally sensitive areas, outlying areas, and/or even competing nearby communities, etc. and 2) the time value of money means that development now, rather than later, is more valuable due to the effects of compounding. And, this development has the power to catalyze and concentrate additional development. Austin has experienced this in several industries, most notably in high tech. The ability of Urban Rail to maximize economic benefits by attracting, catalyzing, and accelerating development makes it more than a mobility alternative.
- Implementation Costs:** The estimated construction cost for Urban Rail is only part of the overall cost of implementation. For the Urban Rail alternative, the construction cost is approximately \$955.1 million in 2010 dollars. Although some of this cost will be shared with the Federal government, other public agencies, and even private entities, this represents the full construction cost for the system. By comparison, the Better Bus alternative is estimated to cost \$132 million in 2010 dollars, as extrapolated and escalated from Capital Metro's 2006 *Future*

Connections Study. It is important to note that the No-Build alternative should not be considered 'free', as there is a cost of doing nothing to improve mobility and encourage desirable development, etc. These costs are discussed below under recurring costs. Nevertheless, when considering the full cost of implementing a higher-capacity transit system, Urban Rail is actually much more competitive with Better Bus. Figure 5-2 below shows the full external costs for various transportation modes and includes the costs of:¹⁵

- Parking infrastructure
- Land value
- Resource externalities
- Traffic services
- Barrier effects¹⁶
- Road facilities
- Land use impacts
- Congestion
- Transport diversity

When reviewing the comparisons made in the figures below, Better Bus as defined in this *Transit Study* is a cross between "Trolleybus" and "Diesel Bus", while Urban Rail is akin to "Modern Streetcar/Tram". "Trolleybus" is actually based on Vancouver's New Flyer electric rubber wheeled, low floor trolley bus with regenerative braking technology. Note that the full cost of even an electric-hybrid auto is more expensive than both the Urban Rail and Better Bus corollaries.

¹⁵ Condon, Patrick M. and Kari Dow, 2009, "A Cost Comparison of Transportation Modes", Foundational Research Bulletin No. 7, November. 2009, http://www.sxd.sala.ubc.ca/8_research/sxd_FRB07Transport.pdf, accessed June 15, 2010.

¹⁶ Barrier effects "refers to delays, discomfort and lack of access that vehicle traffic imposes on non-motorized modes (pedestrians and cyclists)". Victoria Transport Policy Institute, *Transportation Cost and Benefit Analysis II – Barrier Effect*, <http://www.vtpi.org/tca/tca0513.pdf>, accessed June 24, 2010.

Figure 5-2. Full Implementation Costs of Various Modes^{17,18}

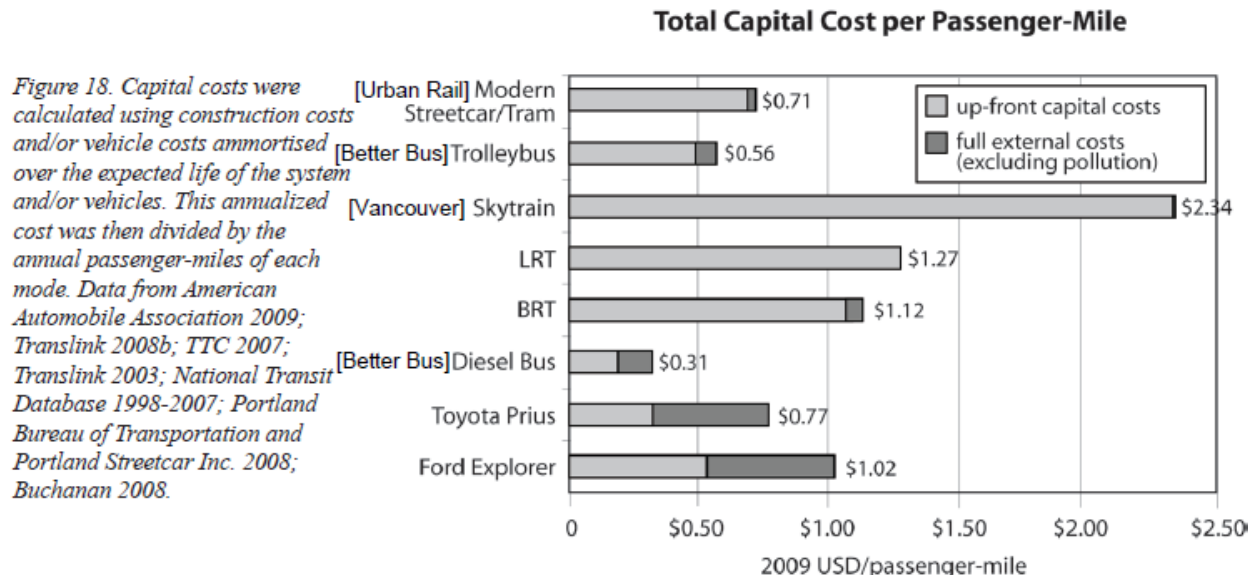


Figure 18. Capital costs were calculated using construction costs and/or vehicle costs amortised over the expected life of the system and/or vehicles. This annualized cost was then divided by the annual passenger-miles of each mode. Data from American Automobile Association 2009; Translink 2008b; TTC 2007; Translink 2003; National Transit Database 1998-2007; Portland Bureau of Transportation and Portland Streetcar Inc. 2008; Buchanan 2008.

- Compact, Mixed-Use Development:** As noted previously, Urban Rail is the alternative that is most supportive of compact, mixed-use development. The transit-oriented development that can be generated by rail transit could provide substantial economic benefits to the community at-large and to users and nearby residents. The community can benefit from an increase in the tax base and in economic activity (i.e., sales tax) due to new development clustered around rail transit facilities and from an increase in property values of 5-15%.¹⁹ Users and nearby residents alike can benefit from compact, mixed-use development in terms of improved connectivity, mobility, access, air quality, and exercise, as noted above. And, beyond those quality of life benefits citizens can benefit economically from lower personal transportation costs – whether they use transit or not. Residents and employees in and around compact, mixed-use development can save expenses by walking and bicycling more and using cars less (saving gas and wear and tear) or even by reducing the number of autos per household.

¹⁷ Text in [brackets] added by *Transit Study* team for clarification.

¹⁸ Condon, Patrick M. and Kari Dow, 2009, "A Cost Comparison of Transportation Modes", Foundational Research Bulletin No. 7, November, 2009, http://www.sxd.sala.ubc.ca/8_research/sxd_FRB07Transport.pdf, accessed June 15, 2010.

¹⁹ Victoria Transport Policy Institute (VTPI), 2010, "Transit Oriented Development: Using Public Transit to Create More Accessible and Livable Neighborhoods", *TDM Encyclopedia*, updated June 4, 2010, <http://www.vtpi.org/tdm/tdm45.htm>, accessed June 14, 2010.

- Operating Costs:** The largest part of the operating costs for the Build and TSM alternatives is labor. For bus operations labor and fuel alone can represent from 50-80% of an agency's expenses.^{20,21} Because rail transit, from streetcar to heavy rail, is a higher capacity mode than bus transit, from conventional bus to bus rapid transit, labor costs are inherently lower for the same level of service. Additionally, electrically-powered modes have lower, and less volatile, fuel costs than their internal combustion-powered counterparts. As shown in Figure 5-3 below, the proxy comparison between Better Bus and Urban Rail, as noted above, shows that Urban Rail can be less than half as expensive to operate as Better Bus.

Figure 5-3. Operating Costs of Various Modes^{22,23}

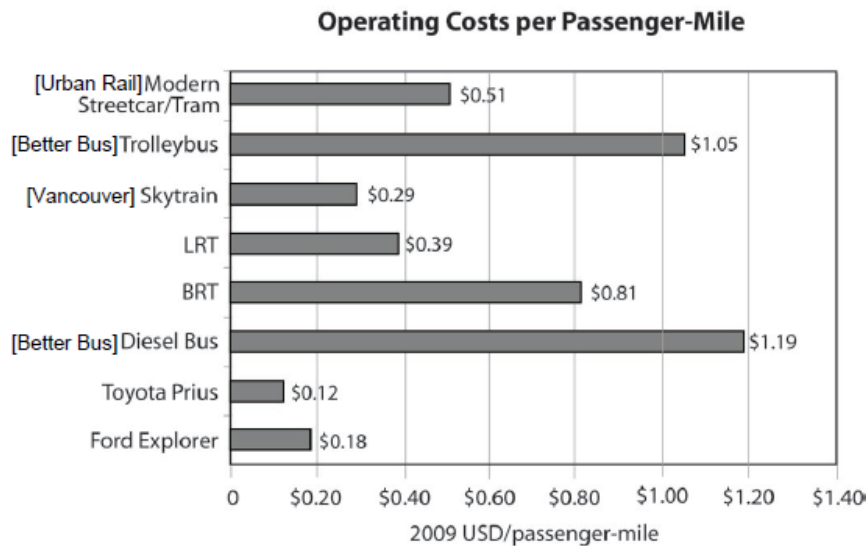


Figure 19. Operating costs for private automobile include parking, insurance, maintenance and fuel. Operating costs for transit modes also include employee salaries.

For local context, Capital Metro's reported operating costs for the fixed routes they operated in 2008 (latest full statistics available) were \$0.79 per passenger-mile.²⁴ Another differentiator between the Build alternatives in terms of operating cost is the service life of the vehicles. FTA sets the "minimum normal service life" for large transit buses (including Better Bus-type) at 12 years, while rail vehicles (including Urban Rail-type) are 25 years.^{25,26}

²⁰ Capital Metropolitan Transportation Authority, 2008, *Comprehensive Annual Financial Report for the Year Ended September 30, 2008*, http://www.capmetro.org/docs/cafr_08.pdf, accessed June 15, 2010.

²¹ Valley Metro, 2003, "Bus Program Operating Costs", Presentation to Transportation Policy Committee on July 2, 2003, <http://www.mag.maricopa.gov/pdf/cms.resource/TPC7-2-transit-costs79421.ppt>, accessed June 15, 2010.

²² Text in [brackets] added by *Transit Study* team for clarification.

²³ Condon, 2009.

²⁴ CMTA, 2008.

²⁵ Federal Transit Administration, 1998, Capital Program: Grant Application Instructions, October 1, 1998, http://www.fta.dot.gov/funding/grants/grants_financing_4128.html#chapter3, accessed June 15, 2010.

²⁶ FTA, 1998, http://www.fta.dot.gov/funding/grants/grants_financing_4128.html#chapter4, accessed June 15, 2010.

Under the No-Build alternative it's important to note that there are significant recurring costs for 'doing nothing' to adequately address the mobility needs of Central Austin. Some are opportunity costs, though not quantified in this study, and include savings related to travel time reductions, mobility and access improvements, air quality and community health improvements, and increased and accelerated private investment.

- Private Investment:** The ability of an alternative to attract private investment – whether around a proposed higher-capacity transit system or directly into the system – is good indicator as to how well that alternative can maximize economic benefits. But while considerable data is available for rail transit systems, little exists for bus systems. Prior discussion has established that Urban Rail is much more likely to attract and catalyze development than Better Bus and Table 5-9 quantifies the impact that rail transit systems similar to the Urban Rail alternative have had on ancillary private investment.

Table 5-9. Private Returns on Public Investment in Streetcar

System	Start of Service	Initial Track Miles	Initial System Cost Per Mile	Initial System Cost	Development Investment	Return on Investment
		<i>mi</i>	<i>\$/mi</i>	<i>\$/M</i>	<i>\$/M</i>	
Kenosha	2000	2.0	3.10	6.20	150	2319.35%
Little Rock	2004	2.5	7.84	19.60	200	920.41%
Tampa	2003	2.4	20.13	48.30	1000	1970.39%
Portland (1)	2001	4.8	11.50	55.20	1046	1794.93%
Portland (Ext)	2005	1.2	14.83	17.80	1353	7501.12%

Source: Reconnecting America and the Center for Transit-Oriented Development, "Why Transit-Oriented Development and Why Now?", *TOD101*, <http://www.reconnectingamerica.org/public/show/tod101full>, accessed June 15, 2010.

The other way that Urban Rail has the potential to maximize economic benefits is in its ability to attract private investment directly into they system, beyond advertising. Streetcar systems in Portland, Seattle, and Tampa have been successful at leveraging their services to generate operating income from various sponsorship opportunities. Revenues from sponsorship can be spread out over a series of payments and invested in an operations fund to support the system. Table 5-10 includes a summary of the sponsorship rates for various system elements for Portland, Seattle, and Tampa.

Table 5-10. Sponsorship Fees for Selected Streetcar Systems

	Portland ²⁷	Seattle ²⁸	Tampa ²⁹
System Naming Rights			\$1,000,000/40 years
Car-Exterior	\$25,000/car/year	\$50,000/car/year	\$250,000/car/year
Car-Interior			\$3600-20,000/car/year
Stop/Station	\$6,000/stop/year	\$18,000-40,000/stop/year	\$100,000/stop/year
Shelter Glass			
Ticket	\$50/book of 50 tickets		
Restaurant	\$600/year		
Brochure			

- Cost-Effectiveness:** Cost-effectiveness is the traditional means for evaluating the financial advantage of one transit alternative over another and is ultimately required by the Federal Transit Administration when applying for federal funding. At this stage in the alternatives evaluation process, additional planning elements remain to be completed before a comprehensive cost effectiveness evaluation can be conducted. However, using national cost averages for various transit modes provides a useful comparison of the Build and TSM alternatives. 2008 data (latest year available) from the National Transit Database³⁰ shows that the average operating cost per rider trip for all bus systems in the US is \$3.30 (Capital Metro is \$3.18). For light rail, the national average cost per trip is \$2.80, while the cost for the five most recent streetcar systems in the US is \$2.33. Using the projected operating costs discussed in detail in Chapter 6, the operating cost per trip for the entire Urban Rail system is estimated at approximately \$3.05 (assuming daily ridership in 2030 of 27,600 and an annual operating cost of \$25.3 million, using 10-minute peak/off-peak headways), indicating that the system’s operating characteristics would be similar to other Urban Rail-type systems around the country. Table 5-11 below includes the Better Bus operating plan assumptions and estimated costs, similar to the calculations for Urban Rail provided in Chapter 6. The Better Bus cost per trip is estimated at \$3.88 (note that 2-minute peak headways would be required in order to match the estimated 2030 ridership).

²⁷ Portland Streetcar, "Sponsorship Page", <http://www.portlandstreetcar.org/sponslist.php>, accessed June 16, 2010.

²⁸ Melone, Ethan, Seattle Streetcar Program Manager, email correspondence June 16, 2010.

²⁹ Moudon, Anne Vernez, Mark Hallenbeck, and others, 2007, Financing Options for an Expanded Seattle Streetcar System and Network, April 2007, <http://depts.washington.edu/trac/bulkdisk/pdf/Streetcar.pdf>, accessed June 16, 2010.

³⁰ Federal Transit Administration, 2010, *National Transit Database*, <http://www.ntdprogram.gov/ntdprogram/>, accessed June 15, 2010.

Table 5-11. Better Bus Operating Plan and Costs: 2-Minute Peak/10-Minute Off-Peak Headways

BETTER BUS Operating Plan	Route A	Route B	Totals
Length (one-way route miles)	6.5	10	16.5
Round-trip travel time (minutes)*	65.0	66.2	
Vehicles needed (does not include 2 spares)	33	34	67
Peak-hour capacity (65/vehicle)	2,145	2,210	4,355
Peak-hour capacity needed			4,140
Difference			215
Passenger Trips/day	960	960	
Vehicle miles/day	6,240	9,600	15,840
Annual vehicle miles (Annualization = 300)			4,752,000
Vehicle hours/day			1072
Annual vehicle hours**			321,600
Annual O&M costs (\$100/veh/hr YoE)			\$32,160,000
Annual O&M cost/lane mile (34 lane miles)			\$974,545

Source: URS Corporation/City of Austin, 2010.

*12 mph average speed on shared segments and 25mph average speed on semi-exclusive segments.

Table 5-12. Comparison of Cost-Effectiveness (Operating Cost per Trip) by Transit Mode

Mode	Operating Cost per Trip
Average for Bus	\$3.30
Capital Metro MetroBus	\$3.18
Average for Light Rail	\$2.80
Average Streetcar	\$2.33

Source: FTA National Transit Database, 2010.

Better Bus (estimated)	\$3.88
Urban Rail (estimated)	\$3.05

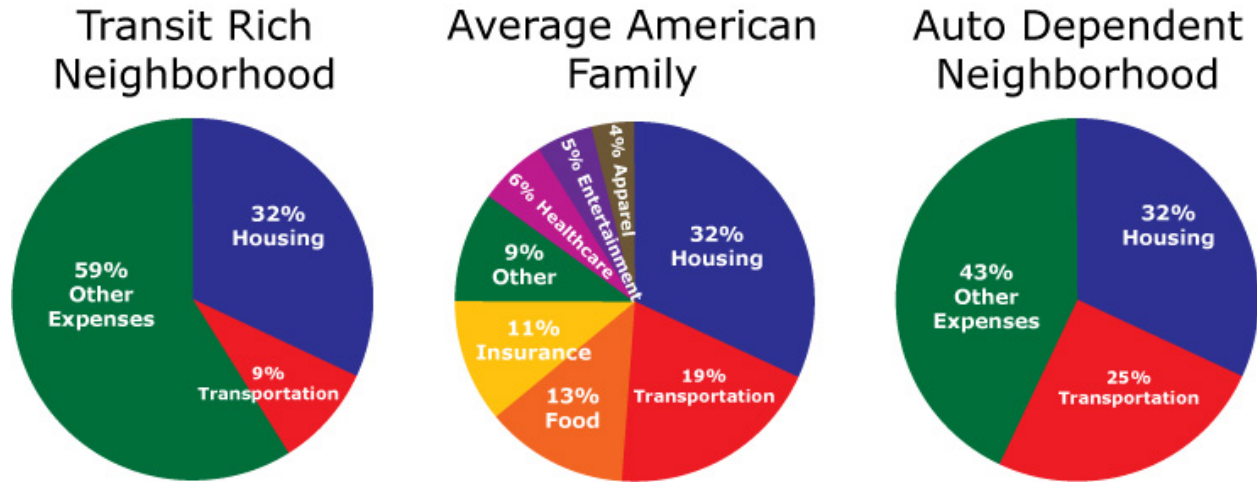
Source: URS Corporation/City of Austin, 2010.

Another aspect of cost-effectiveness is how well the transit investment alternative benefits the user. As noted above, residents and employees in and around compact, mixed-use development can save on expenses. Figure 5-4 on the following page shows the benefits to households in transit-rich neighborhoods. However, it is system users that can see the greatest benefits. The American Public Transit Association (APTA) reports that transit riders can save an average of \$770 per month based on national averages for just gas and parking (note that there is no 'free parking', as urban surface spots can cost up to \$10,000 each and structured parking can be two- to four-times that, and these costs are borne by developers, owners, employers, and eventually workers)^{31,32}. It is assumed that a Better Bus system can be similarly cost-

³¹ APTA, 2010, "Riding Public Transit Saves Individuals \$9,242 Annually", Media Advisory January 12, 2010, http://www.apta.com/mediacenter/pressreleases/2010/Pages/100112_Transit_Savings.aspx, accessed June 15, 2010.

effective for users; however, given the higher ridership forecast, the ancillary benefits to the non-users (due to the better ability to attract compact, mixed-use development), and the lower operating cost per trip, the Urban Rail alternative is rated highest for this criterion.

Figure 5-4. Impact of Transit on Household Expenses³³



Source: Center for TOD Housing + Transportation Affordability Index, 2004 Bureau of Labor Statistics

Summary of Detailed Evaluation






















The Urban Rail alternative clearly outperformed both the Better Bus and No-Build alternatives for each of the goals, due primarily to its ability to attract both riders and economic development. Table 5-9 summarizes the results of the detailed evaluation.

* Additional detailed cost information for the Recommended Preferred Alternative will be developed and published as part of the proposed financing plan.

³² Victoria Transport Policy Institute (VTPI), 2009, *Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications [Second Edition]*, Updated January 2009, <http://www.vtpi.org/tca/tca0504.pdf>, accessed June 15, 2010.

³³ Reconnecting America, 2007, "Where You Live Impacts Affordability," <http://www.reconnectingamerica.org/public/factoids/171>, accessed July 13, 2010.

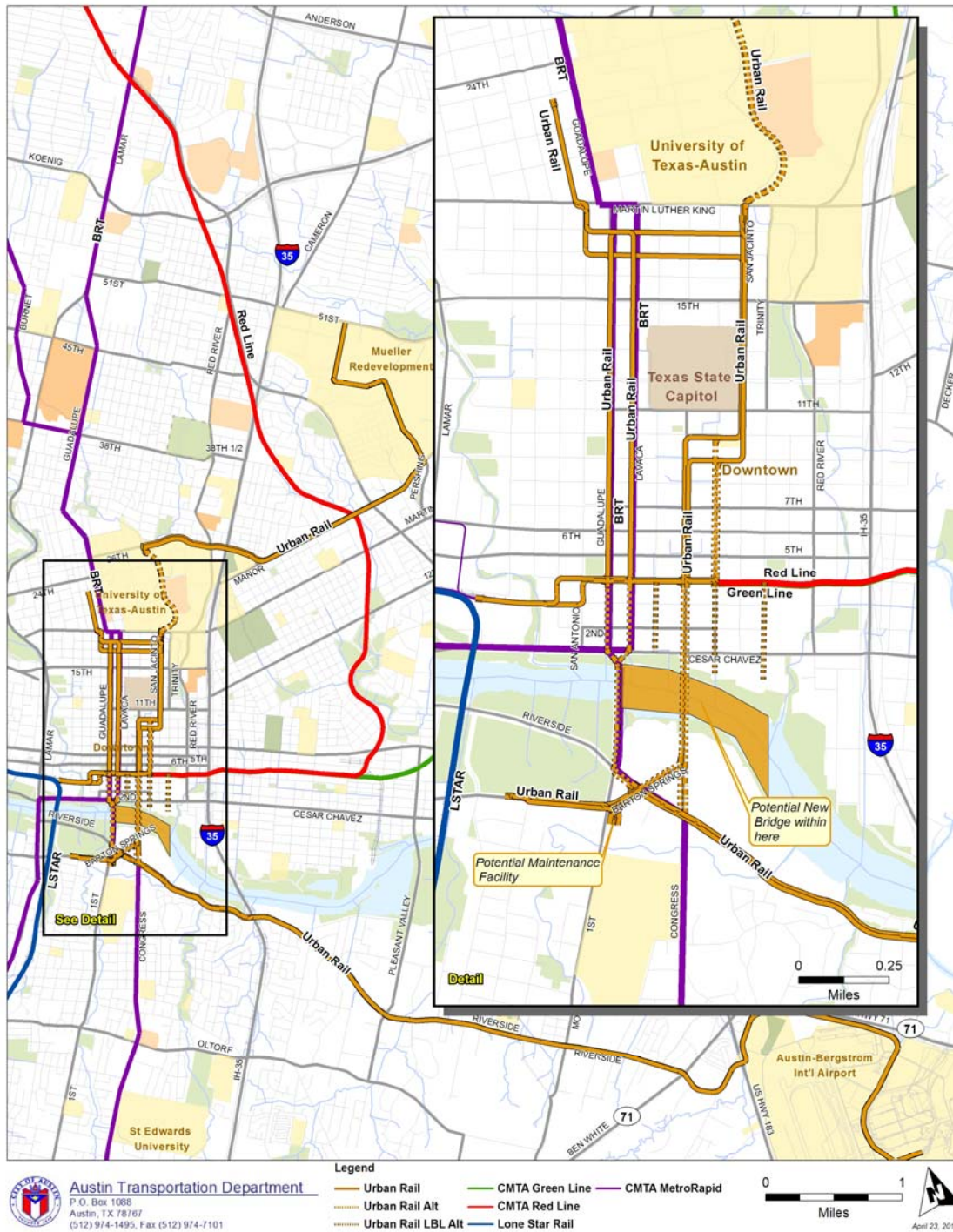
Table 5-13. Summary of Detailed Evaluation

Goal	No-Build	Better Bus	Urban Rail
1. Improve Place Connectivity			
2. Improve Transit Connectivity			
3. Improve Mobility			
4. Maximize Community Benefits			
5. Maximize Environmental Benefits			
6. Maximize Economic Benefits			
OVERALL RATING			

Recommended Locally Preferred Alternative

As a result of the detailed evaluation, the recommended **Locally Preferred Alternative** is **Urban Rail** on the conceptual alignment as illustrated in Figure 5-4. Urban Rail consistently out-performed the TSM and No-Build alternatives due to its ability to attract more riders and development, as well as its use of cleaner source power.

Figure 5-5. Recommended Urban Rail Locally Preferred Alternative



Source: City of Austin, 2010.

Next Steps

The next step in the program development process is for the City Council to adopt this Locally Preferred Alternative (LPA) recommendation. This step will also designate the LPA as a project for additional study, under the auspices of the National Environmental Policy Act (NEPA) and will allow for the initiation of more detailed environmental study, such as an Environmental Assessment or Environmental Impact Statement. As part of the NEPA process, the City will identify a lead federal agency, publish a notice of intent (NOI), and begin additional public outreach and project development, including capital and operations funding plans, operations and governance strategies, and system phasing; as well as resolution of the design issues noted above for further consideration.

*Additional detailed information, including refined ridership, financing, costs, and environmental benefits, will be published in subsequent reports once a first investment for the Preferred Alternative is identified. Additional public comment will be sought throughout the process.