## OVERVIEW AND RECOMMENDATION

Goals and Their Relationship to Evaluation Criteria

In the initial stages of this study, seven goals to be achieved in the introduction of a Circulator route within Central Austin were articulated. Subsequently, an evaluation methodology was developed, by which the definition of the Circulator could be resolved. The evaluation methodology identifies 16 criteria or performance measures, which provide a means of determining how well various alternative Circulator features would contribute to goal attainment.

At this stage in the study, a preliminary recommended route has been selected. The remaining major decision in defining a "Locally Preferred Alternative" is to select the preferred mode, or transportation technology. Eligible technologies were narrowed to two, so the choice is between streetcar and bus. The evaluation addressed in this report is to support making that choice.

In that context, Table 1 indicates the criteria that relate to each of the seven goals.

**Table 1 Criteria Related to Each Goal**

| GOALS / CRITERIA | 1. Improve place connectivity | 2. Improve transit connectivity | 3. Improve circulation within central Austin | 4. Maximize community benefits | 5. Maximize accessibility | 6. Maximize environmental benefits | 7. Maximize economic benefits for the community |
|---|---|---|---|---|---|---|---|
| Ridership | ■ | ■ | ■ | | ■ | | |
| Transit to Transit Transfers | | ■ | | | | | |
| Transit Travel Time | ■ | ■ | ■ | | | | |
| Permanence | ■ | | | | | | |
| Need for Traffic Revisions | | | ■ | | | | |
| Land Use Compatibility | | | | ■ | | | |
| Development Potential | | | | ■ | | | |
| Long-Term Environmental Impacts/Benefits | | | | | | ■ | |
| Construction Impacts | | | | | | ■ | |
| Neighborhood Plan Compatibility | | | | | | ■ | |
| Implementation Cost | | | | | | | ■ |
| Supportive of Transit Oriented Development | | | | | | | ■ |
| CMTA Recurring Cost | | | | | | | ■ |
| Supportive of Private Financing Partnerships | | | | | | | ■ |
| Mueller Development Potential | | | | | | | ■ |
| Cost Effectiveness | | | | | | | ■ |

Evaluation Criteria and Their Measures

The ability to satisfy each of the criteria is measured in a specific qualitative or quantitative way. This measurement is summarized in Table 2:

**Table 2 How the Criteria are Satisfied**

| | |
|---|---|
| A. Ridership | A. Achieve maximum Circulator and CMTA system ridership |
| B. Transit to Transit Transfers | B. Opportunity for riders to minimize their travel time |
| C. Transit Travel Time | C. Opportunity for riders to minimize their travel time |
| D. Permanence | D. Make visible and significant fixed capital investment |
| E. Need for Traffic Revisions | E. Minimize changes in functional traffic management systems |
| F. Land Use Compatibility | F. Minimize conflicts with existing and planned land use |
| G. Development Potential | G. Provide focal points that encourage development |
| H. Long-Term Environmental Impacts or Benefits | H. Minimize adverse effects and provide enduring environmental benefits |
| I. Construction Impacts | I. Minimize noise, air pollution, and disruption of access and activities during construction |
| J. Neighborhood Plan Compatibility | J. Consistent with and supportive of neighborhood plans and goals |
| K. Implementation Cost | K. Capital cost is minimized |
| L. Supportive of Transit Oriented Development | L. Provide conditions that attract developer, resident, and business interest |
| M. CMTA Recurring Cost | M. Minimize CMTA operating and maintenance costs |
| N. Supportive of Private Financing Partnerships | N. Provides evident financial benefit opportunities to investors |
| O. Mueller Development Potential | O. Supports development plans and promises to maximize density bonus |
| P. Cost Effectiveness | P. Measurable benefits to transportation users and desired economic development are in favorable proportion to costs |

Performance of the Alternatives

Three possible alternative actions were examined to assess how well each would satisfy the criteria, according to the measures cited in Table 2. The three alternatives are:

- **No Build:** Continue normal operation and refinement of the existing and committed Capital Metro services
- **Streetcar:** Implement the Circulator as a streetcar system
- **Bus:** Implement the Circulator as a special, easily identifiable bus service

This report provides that assessment in detail, as supported by the current level of progress in project development. That level does not fully determine as much as may later be known about the expected performance of the Streetcar and Bus alternatives, but provides enough information to achieve a reliable ranking of these two transit modes with regard to all except the last of the named criteria, Cost Effectiveness. In Table 3, the results of evaluation for each of the Criteria are presented.

The Alternatives and the Goals

Finally, the performance of these 16 measures was evaluated as they relate to each of the seven goals. The results indicate how well each alternative would respond to each goal. In the body of this report, each goal is presented with its related measures and the rating of the alternatives for those measures, followed by the concluding summary finding for each goal. Table 4 summarizes these findings.

Recommendation

It is the expressed desire of the community to develop a circulator route serving central Austin. The two alternatives, Streetcar and Bus, have been examined and evaluated in terms of 16 criteria that respond to the seven agreed goals for the Circulator project. The evaluation finds that the Streetcar Alternative consistently out-performs the Bus Alternative. The Streetcar Alternative ranks higher in most criteria and as summarized by goal, for all seven goals. Consequently, it is concluded that the Streetcar Alternative would best satisfy the purpose of the Circulator project.

## Table 3 How the Alternatives Perform for Each Measure

| | NO BUILD | STREETCAR | BUS |
|---|---|---|---|
| A. Achieve maximum Circulator and CMTA system ridership | Neutral | Best - 11,500 per weekday in 2017, 13,100 by 2030 | Not as good - 7,600 per weekday in 2017, 9,400 by 2030 |
| B. Opportunity for riders to minimize their travel time | Neutral | Better for rail-to-Circulator and bus-to-Circulator | Not as good for rail-to-Circulator, nor for bus-to-Circulator |
| C. Opportunity for riders to minimize their travel time | Neutral | Running time and service frequency expected to be same | Running time and service frequency expected to be same |
| D. Make visible and significant fixed capital investment | Neutral | Good potential | Minimal potential |
| E. Minimize changes in functional traffic management systems | Best - requires no change | Worst - requires most change; alignment and stops are fixed | In between - some changes necessary |
| F. Minimize conflicts with existing and planned land use | Neutral | Generally better accepted | Not as well accepted as streetcar |
| G. Provide focal points that encourage development | None | Best - higher ridership; prominent visible investment | Not as good, lower ridership and minimal fixed investment |
| H. Minimize adverse effects and provide enduring environmental benefits | Neutral | Best - higher ridership (less traffic), pollution-free operation | Not as good, lower ridership, minimal to no air quality impact |
| I. Minimize noise, air pollution, and disruption of access and activities during construction | Best - normal street maintenance only | Construction period may be short; effects may be significant but tolerable | Minor construction (stops, traffic signals) |
| J. Consistent with and supportive of neighborhood plans and goals | Neutral | Strongly supportive of neighborhood plans and goals | Not as supportive of neighborhood plans and goals |
| K. Capital cost is minimized | Neutral | Moderately favorable transit investment; good economic development potential | Probably best overall; low in economic development potential |
| L. Provide conditions that attract developer, resident, and business interest | None | Best - higher ridership; prominent visible investment | Not as good - lower ridership and minimal fixed investment |
| M. Minimize CMTA operating and maintenance costs | Neutral | Most expensive to operate and maintain | Increases operating and maintenance costs |
| N. Provides evident financial benefit opportunities to investors | Neutral | Best - higher ridership; prominent visible investment | Not as good - lower ridership and minimal fixed investment |
| O. Supports development plans and promises to maximize density bonus | Limited service to Mueller site | Best - 12 percent density bonus estimate (Circulator + MLK Rapid Bus) | Not as good - 6 percent density bonus estimate |
| P. Measurable benefits to transportation users and desired economic development are in favorable proportion to costs | Neutral | To be determined | To be determined |

**Table 4 Goal Satisfaction by Each Alternative**

| GOALS | NO BUILD | STREETCAR | BUS |
|---|---|---|---|
| 1. Improve place connectivity | ○ | ● | ◑ |
| 2. Improve transit connectivity | ○ | ● | ◑ |
| 3. Improve circulation within central Austin | ○ | ◑ | ◑ |
| 4. Maximize community benefits | ○ | ● | ◑ |
| 5. Maximize accessibility | ○ | ● | ◑ |
| 6. Maximize environmental benefits | ○ | ● | ◑ |
| 7. Maximize economic benefits for the community | ○ | ● | ◑ |

Evaluation Key:

○ Neutral rating, as compared to other alternatives

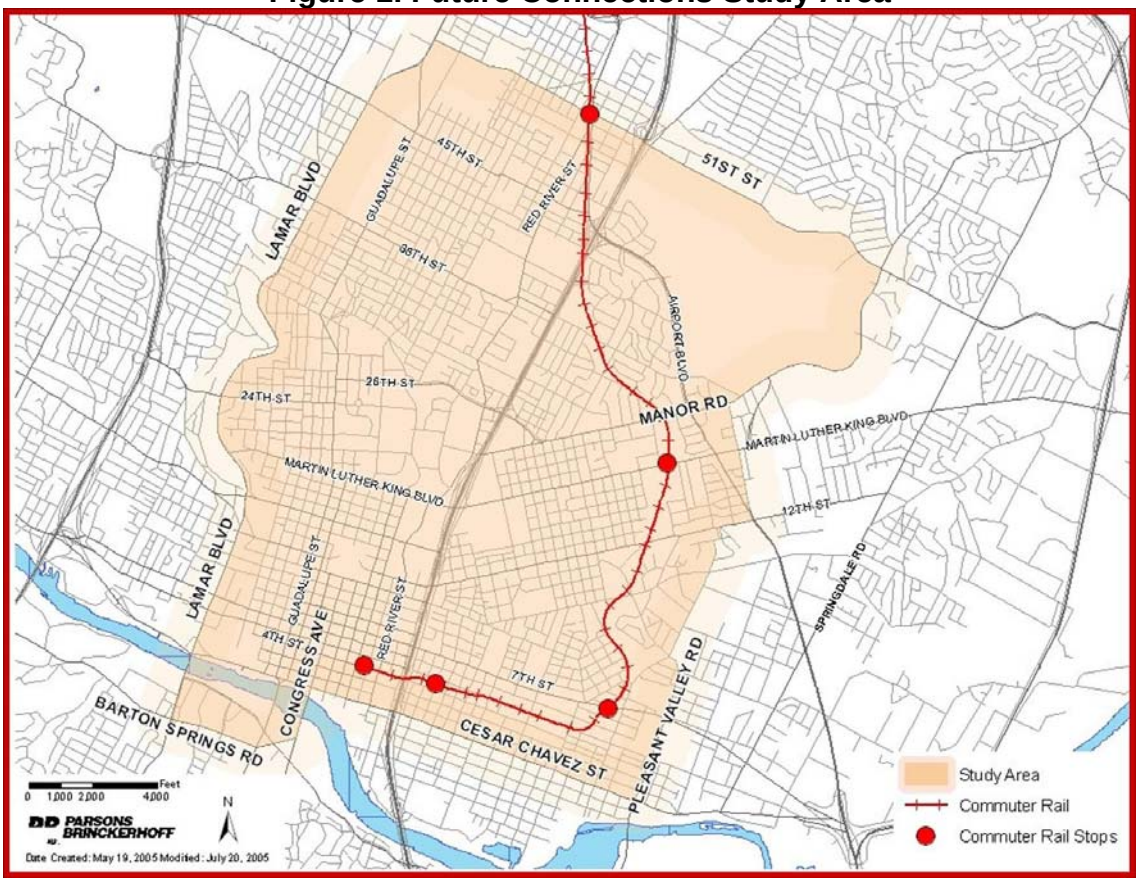
◑ Alternative provides somewhat better performance as compared to other alternatives

● Alternative provides better performance as compared to other alternatives

# INTRODUCTION

The Capital Metropolitan Transportation Authority (Capital Metro) has initiated the Alternatives Analysis phase of project development for a transit circulator system for the Future Connections Study Area in central Austin, Texas. The proposed project provides for the development of transit facilities and services in the study area to support the planned Capital MetroRail system and serve major destinations in Central Austin not directly connected to the rail system. The study area is shown in Figure 1.

**Figure 1. Future Connections Study Area**




The Alternatives Analysis phase of the project includes the conceptual engineering design, planning, and analysis necessary to identify and define the alternatives, prepare cost estimates, and support subsequent environmental analyses and evaluation. This Alternatives Evaluation Report is the central instrument within the Alternatives Analysis process for refining the alternatives and recommending a Locally Preferred Alternative.

In 2004, Capital Metro established the All Systems Go Long-Range Transit Plan, including the Capital MetroRail line approved by voters in the Capital Metro service area. The Plan calls for improving transit circulation options within

Central Austin and connecting major regional destinations to the Capital MetroRail line. This Plan and commitment to the voters point to the underlying need for improved circulation-based travel options within Central Austin. Furthermore, this portion of the Austin region is ideal for redevelopment and infill. Through public participation, a need has been stated for a transit investment that will further encourage efficient urban development.

Specifically, the proposed project is needed to:

- Address the growing potential market for transportation services and mobility resulting from continuing population and employment growth in Central Austin and the Austin metropolitan area;
- Accommodate and complement urban redevelopment and land use change in Central Austin by providing transit services appropriate for the community that Central Austin is becoming;
- Expand transportation system capacity by providing more premium travel choices for the growing numbers of Central Austin residents, employees, students and visitors; and
- Provide needed connections between major population and employment centers (place connectivity) and between existing transit facilities or services and the planned elements of the All Systems Go Long-Range Transit Plan (transit connectivity).

Based on these needs, the purpose of a Central Austin Transit Circulator System can best be described by a set of goals and objectives jointly developed through the involvement of the public, community advisory groups, and technical advisors.

**Project Goals and Objectives**

In responding to the study area's transportation needs, the development and selection of goals and objectives serves to frame and describe the purpose of the proposed action. Capital Metro developed these goals and objectives in cooperation with citizen advisory groups and technical advisers from multiple agencies to formulate strategies to best address the study area's unique problems and needs.

**Goal 1 - Improve Place Connectivity:** Improve the regional transportation system by connecting existing and emerging destinations within Central Austin.

**Objectives:**

- Provide direct transit service connections among downtown, the Capitol Complex, University of Texas (UT), and the Mueller redevelopment site.
- Link key destinations within Central Austin to the Capital MetroRail investments.

- Plan for system flexibility to accommodate special events and venues, such as UT sports events and civic events downtown.
- Provide connections to existing and future concentrations of student housing.
- Provide convenient and reliable service to key destinations.
- Serve existing residents and neighborhoods, as well as emerging centers.
- Provide connections among east and west portions of the study area.

**Goal 2 - Improve Transit Connectivity:** Improve the regional transportation system by providing connections among modes, including Capital MetroRail, Regional Commuter Rail, and bus.

**Objectives:**

- Provide a downtown bus-train and bus-bus transfer location.
- Provide a location/facility that encourages efficient and easy transfers among transit options.
- Provide a transit facility that is well connected to the major transit destinations within the region (i.e., UT, capitol complex, and downtown).
- Reduce number of buses in Downtown Austin and minimize number of corner transfer points.
- Minimize number of transfers.
- Provide amenities for bikes to encourage ridership.
- Develop options that provide future flexibility, extensions, and expandability.
- Consider non-transit modes in developing transit alternatives (such as bicycles, walking, car sharing, taxis, rickshaws, etc.).
- Assure access to transit via walking and biking.
- Coordinate transit system investments with other public infrastructure projects, such as the proposed Lance Armstrong Bikeway, Austin to San Antonio Rail Corridor, and other roadway and traffic projects.
- Maximize service efficiency.
- Use transit technology that can be expanded to additional locations in the future.

**Goal 3 - Improve Circulation within Central Austin:** Provide internal transit circulation within Central Austin and among key districts within the core to encourage transit ridership and improve overall mobility.

**Objectives:**

- Provide connection and distribution opportunities to Seaholm and the proposed Austin-San Antonio commuter rail service (should that service be initiated).
- Provide fast and convenient service between and within lower downtown, the Capitol Complex, UT, and the Mueller redevelopment site.
- Provide multiple connections between the Capital MetroRail line and the circulator network, allowing multiple opportunities to transfer between the two systems so as to promote a variety of access options for users.
- Plan layover locations to minimize traffic congestion.
- Provide circulator service to meet arriving and departing trains on initial Capital MetroRail operations.
- Decrease dependency on cars/single-occupancy vehicles by increasing use of multi-occupancy methods of transportation.
- Increase market share of transit.
- Maximize the predictability and reliability of transit service.
- Minimize traffic congestion on affected streets.

**Goal 4 - Maximize Community Benefits:** Develop transit services that enhance and reinforce the characteristics of the existing and planned land uses and community environment.

**Objectives:**

- Reinforce land use strategies that encourage development density in existing and planned developments.
- Provide access to a variety of existing and future housing opportunities, facilitating access to residential land uses of various economic levels.
- Reinforce the existing historic and urban character of Central Austin by selecting service attributes, modes, corridors and alignments that reflect existing and planned land use patterns and development styles.
- Maximize community benefits when identifying opportunities and when developing concepts to serve identified transit demands within the study area.
- Develop systems that are coordinated with and support the neighborhood planning process/neighborhood plans.
- Maximize potential for transit-oriented development (TOD).
- Use circulators to build community: reflect community and neighborhood character through high quality urban design.

- Coordinate with existing and future retail corridors.
- Consider effect of transit modes in shaping land use decisions.
- Coordinate transit stops with future and existing development.

**Goal 5 - Maximize Accessibility:** Maximize the accessibility of existing and proposed transit services by selecting cost effective and appropriate transit modes, routes, and alignments that provide frequent, accessible passenger boarding opportunities.

**Objectives:**

- Proposed transit services should meet the requirements of the Americans with Disabilities Act.
- Provide frequent transit service and boarding opportunities for transit users accessing or using transit within Central Austin.
- Incorporate universal design concepts that make the system accessible to people with disabilities, bicyclists, strollers, etc.
- Design platforms to be flexible for future options.
- Design streetscape/sidewalk improvements to assure access and provide connectivity through collaboration with city, county, and state government entities.

**Goal 6 - Maximize Environmental Benefits:** Develop transit services that maximize the positive benefits to the natural environment.

**Objectives:**

- Respect the importance of parks, green spaces, and water resources in choosing transit options.
- Maximize air quality benefits anticipated from the resulting circulation transit modes by encouraging walk-to-transit and bike-to-transit access opportunities.
- Respect the integrity of existing neighborhoods and reinforce neighborhood identity, characteristics and cohesiveness where possible.
- Look to efficient and clean renewable energy sources where possible.
- Minimize noise pollution.
- Minimize visual pollution.

**Goal 7 - Maximize Economic Benefits for the Community:** Develop transit services that help increase economic opportunities and build wealth for local communities, while minimizing demands for increased local expenditures.

**Objectives:**

- Reinforce land use strategies that encourage development density in existing and planned developments.
- Solicit information and suggestions from major central business district employers to maximize ridership and community acceptance.
- Determine whether there may be reverse commute demand for commuter rail by riders who may commute out of the central business district.
- Utilize cost-effective systems for added transit services.
- Determine whether it is feasible to use interim transit systems for commuter rail connectivity until a more permanent system is in place; consider a phased approach to providing connectivity.
- Reinforce existing and proposed community plans by focusing service on existing and planned future dense residential land uses and major employment/educational facilities.
- Maximize ridership and provide affordable transit options.
- Minimize negative construction impacts.
- Provide connections for housing and jobs of all income levels.
- Support economic benefits for impacted communities, including lower income areas.

The following sections describe how the universe of Circulator alternatives was screened to arrive at two feasible build alternatives, in addition to a no build alternative. A discussion of the evaluation is also provided of these three alternatives. The evaluation methodology is described in Appendix A. More in-depth discussion of the evaluation follows in a series of appendices. Appendix B describes the transit ridership evaluation. Appendix C includes a discussion of land use and development potential. Appendix D addresses environmental constraints. Appendix E addresses potential effects on the Capitol View Corridors. Appendix F is a discussion of traffic and parking issues. Appendix G presents capital cost estimates for the alternatives. Appendix H is an operational plan for the alternatives that provides estimates of operations and maintenance costs.

# DEVELOPMENT OF ALTERNATIVES

## Identifying Connection Needs

Working with the public advisory committees, the study team identified 12 connection needs within the study area. These connection needs were developed to represent the circulation and distribution coverage envisioned by the public and Capital Metro within the defined study area. The 12 connection needs are shown in Figure 2 and can be described as follows:

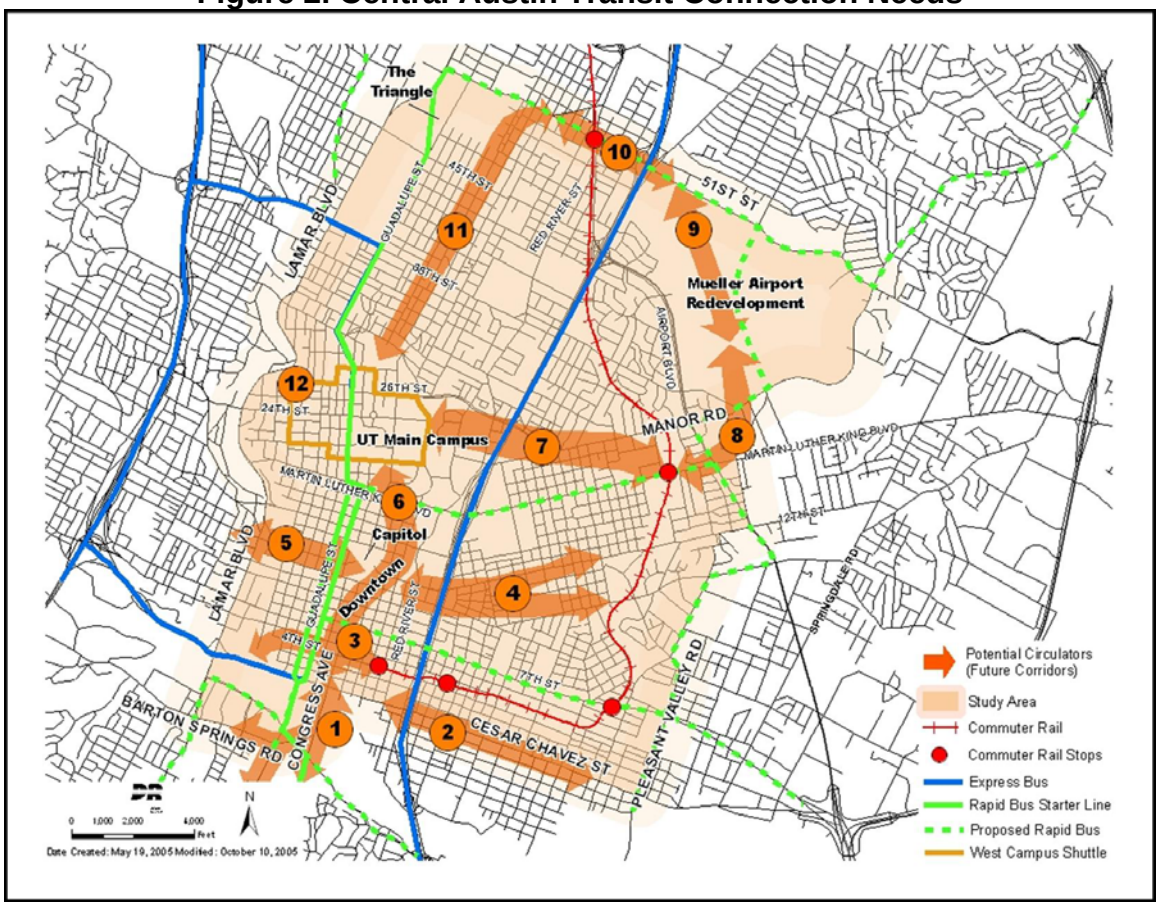
1. South Central Austin to Downtown
2. Downtown to East Austin (César Chávez Street Connection)
3. Convention Center Capital MetroRail Station to Seaholm Redevelopment Site
4. State Capitol Complex to East Austin (11th/12th Street Connection)
5. State Capitol Complex to West Central Austin (12th Street Connection)
6. Downtown/State Capitol Complex to University of Texas (UT) Campus
7. UT Campus to Martin Luther King Jr. Boulevard (MLK) Capital MetroRail Station
8. MLK Capital MetroRail Station to Mueller Redevelopment Site (south connection)
9. Mueller Redevelopment Site to 51st Street (transit spine circulation and connection to north end)
10. Mueller Redevelopment Site (51st Street) to possible Airport Boulevard/Highland Mall Capital MetroRail Station (north connection)
11. Hyde Park – North Central Austin to UT Campus
12. UT Campus/West Campus Loop

To identify a corridor for more detailed study, the twelve connection needs were evaluated at a conceptual level against the seven primary goals of this study:

1. Improve Place Connectivity
2. Improve Transit Connectivity
3. Improve Circulation within Central Austin
4. Maximize Community Benefits
5. Maximize Accessibility
6. Maximize Environmental Benefits
7. Maximize Economic Benefits for the Community

Scores for each connection need range from 1 to 3, with “1” being neutral and “3” indicating the connection need as being among those best able to respond to a stated goal. Table 5 provides a matrix showing how each connection need was scored. Scores were assigned by the project team staff in cooperation with community advisory committees, a technical advisory group, and with public participation.

**Figure 2. Central Austin Transit Connection Needs**




The connection need evaluation scale used to produce the results reported in Table 5 is keyed to each of the project's goals and is as follows:

- Place Connectivity
  - 3 = Connects primary destination to primary destination
  - 2 = Connects primary destination to Capital MetroRail station opportunity
  - 1 = Connects primary destination to close-in Central Austin neighborhood
- Transit Connectivity
  - 3 = Connects Capital MetroRail / Rapid Bus station or major transit center to primary destination or Capital MetroRail / Rapid Bus / major transit center to Regional Commuter Rail
  - 2 = Connects close-in neighborhood near a primary destination to Capital MetroRail / Rapid Bus station or major transit center
  - 1 = Provides internal circulation or connects close-in neighborhood to primary destination

- Circulation Improvement
  - 3 = Improves internal circulation within study area key destination(s)
  - 2 = Improves circulation within surrounding neighborhood linked to a primary destination and Capital MetroRail station
  - 1 = Improves circulation within close-in neighborhood linked to one primary destination, no direct connection to Capital MetroRail
- Community Compatibility
  - 3 = Primary destination area: high-density employment/educational use or planned development
  - 2 = Close-in neighborhood seeking transit investment
  - 1 = Close-in neighborhood to benefit from, but not actively for or against transit investment
- Environmental Benefits
  - 3 = Within high-density employment/educational land use or master planned area
  - 2 = Within residential neighborhood with parallel major arterial roadway
- Accessibility
  - 3 = Within areas where good or fair accessibility for disabled, pedestrians and bicyclists exists or planned
  - 2 = Within areas where improved access for disabled, pedestrians and bicyclists still needed
- Economic Benefits
  - 3 = Within high-density employment/educational areas or major redevelopment site
  - 2 = Within traditional neighborhoods

**Table 5. Priority Corridor Evaluation Matrix**

| | Identified Need | Place Connectivity | Transit Connectivity | Circulation | Community Compatability | Environmental Benefits | Accessibility | Economic Benefits | TOTAL SCORE |
|---|---|---|---|---|---|---|---|---|---|
| 1 | River South to CBD | 1 | 3 | 1 | 1 | 2 | 2 | 2 | 12 |
| 2 | CBD to East Austin | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 11 |
| 3 | Convention Center to Seaholm | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 19 |
| 4 | Capitol to East Austin | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 10 |
| 5 | Capitol to West Austin | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 10 |
| 6 | CBD/Capitol to UT | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 21 |
| 7 | UT to MLK Station | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 17 |
| 8 | MLK to Mueller | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 17 |
| 9 | Mueller Internal | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 17 |
| 10 | Mueller to Airport Blvd Station | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 17 |
| 11 | Hyde Park to UT | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 14 |
| 12 | UT Loop | 1 | 1 | 3 | 3 | 2 | 2 | 3 | 15 |

**Scale:** 1 - Neutral ⟶ 3 - Best able to respond to stated goal

As shown in Table 5, connection need corridors 3, 6, 7, 8, 9, and 10 met the project goals better than the remaining corridors with total scores of "17" or higher. Furthermore, these connection needs, when linked together, defined a potential single corridor for analysis. The remaining connection needs fall into a secondary category for future analysis, and may be considered future extensions of the initial corridor, or they may be independent circulator systems.

Based on the analysis of how well the identified connection needs met the project goals, a preliminary initial corridor emerged, linking the planned Capital MetroRail station proposed in the vicinity of 4th and Trinity Streets west to the Seaholm district and north through the State Capitol Complex to the University of Texas, then eastward to the proposed MLK Capital MetroRail station, through the proposed Mueller Airport Redevelopment project and terminating in the vicinity of a potential Capital MetroRail station near Airport Road and 51st Street.

**Evaluating Modal Technologies**

The Central Austin Circulator system is intended to provide the major centers within Central Austin with good circulation linkages. The trips on these circulation routes would be of short to medium length, and may include many trips by passengers who had not previously used transit. Passengers served by these special-purpose circulator routes will represent both local residents of the Capital Metro service area as well as regional residents making connections between the regional or suburban services and one of the primary destinations within the study area.

The functional characteristics required of a circulator technology include:

- Moderate maximum speed – high speed may not be needed because of the short distances between stops, operating on-street and in mixed traffic, and the nature of neighborhoods being served.
- Moderate capacity, because passenger peak loads are not likely to be extremely high and should be well distributed along the route.
- Convenient, quick boarding and alighting including efficient means of fare payment. Passengers will be attracted by these features and operating efficiency will be enhanced.
- Good acceleration and braking, to minimize travel time for the anticipated station spacing, and to provide safety wherever the route may entail exposure to other traffic or pedestrians.
- Attractive, distinctive vehicles offering a quiet, comfortable ride. The service should be easy to recognize, and minimize noise impacts.

These characteristics tend to eliminate some transit technologies from meeting the study's goals and objectives. Other technologies can be eliminated due to cost and physical constraints.

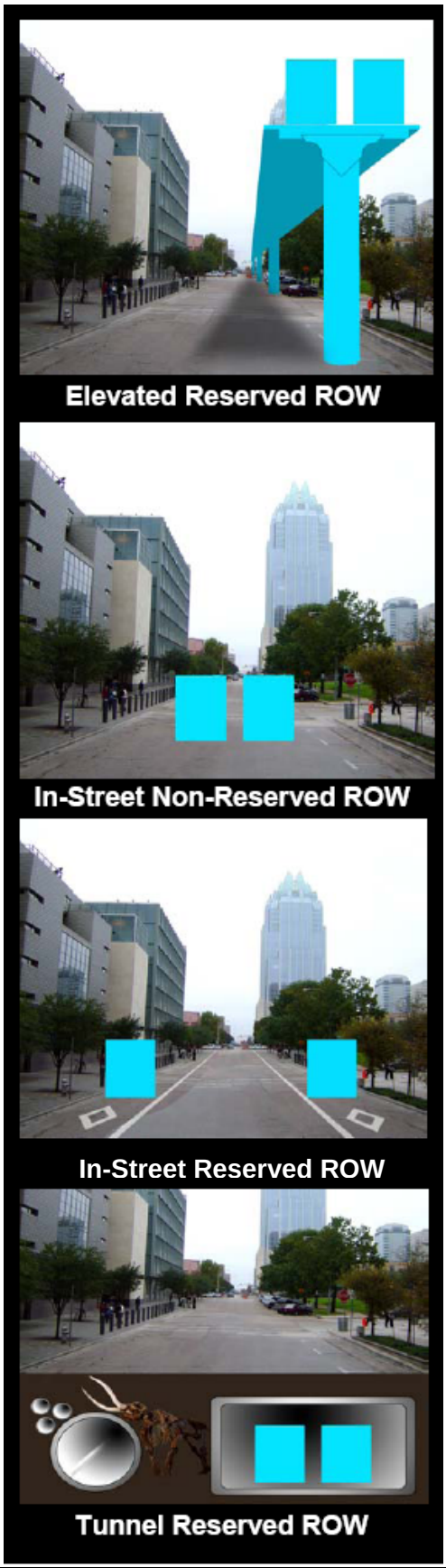
Transit technologies are defined by the vehicle and the guideway. Some vehicles require specific guideway characteristics; others can operate in more than one

type of guideway. The four basic types of guideway are shown in the photo representations below:

- **Elevated Reserved Guideway**
- **In-Street Non-Reserved Guideway**
- **In-Street Reserved Guideway**
- **Tunnel Reserved Guideway**

For any transit vehicle, the ideal right-of-way is typically the tunnel guideway—entirely separated from other traffic and out of the weather—because this provides the greatest efficiency in terms of transit operations. Any dedicated guideway promotes safety and offers unimpeded movement of the transit vehicles. However, the tunnel option could be the most expensive option, especially in urban areas such as Central Austin. A dedicated guideway will cost more in areas of greater development intensity; generally, in these areas, a separated guideway would require either an underground or an elevated system. Elevated transit is typically two to three times more expensive than surface transit, and underground transit is likely to be two to three times more expensive than elevated.

In the proposed corridor, there are physical impediments to successfully deploying either an elevated or tunnel reserved right-of-way. The primary impediment seems to be Interstate 35 between 15th Street and 51st Street. In this portion of I-35, the highway is double decked, with freeway lanes elevated above the natural ground surface and lanes depressed below the natural surface level. An elevated guideway across this barrier would likely have to span the elevated freeway lanes, necessitating a very long approach track. Similarly, a tunnel would have to pass well beneath the depressed freeway lanes, placing the transit service deep underground.



Both the elevated and the tunnel options would make the proposed system less accessible for the average user as well as for persons with disabilities. These factors do not meet the project goals and objectives. Furthermore, the extreme construction techniques that would likely be necessary to accomplish an elevated or tunnel crossing of I-35 in the vicinity of the identified priority corridor could increase costs substantially. This extra cost may not be considered financially feasible. In addition, significant public opposition to the introduction of elevated transit structures in certain areas has been noted in public comments. Systems requiring exclusive or reserved right-of-way are at least problematic in Central Austin. There are no known rights-of-way not already dedicated to street use, and street capacities are regarded as critical in most locations, to the extent that it would be difficult to reserve lanes for the exclusive use of transit vehicles. Hence, an at-grade reserved guideway approach for implementation of transit technologies within the identified study area and proposed priority corridor is not feasible at this time. There may be some sections of the circulation service that can operate within a reserved right-of-way; however, the circulation system as a whole cannot do so. Vehicles that require reserved guideways would not be appropriate for this service.

As with the various connection needs, technologies were evaluated on a scale of 1 to 3, with “1” being ‘neutral’ and “3” being ‘best able’ to meet the goals of the study. For the technology evaluation, the goals are stated as the ability to provide:

- Moderate speed;
- Moderate capacity;
- Ease of boarding and alighting;
- Distinctive vehicles;
- Good acceleration; and
- Low infrastructure cost.

Based on the evaluation of the ten technologies shown in Table 6, the inherent characteristics required of a circulator system, plus cost reasonableness, indicated that the following transit technologies should not be studied further for circulation service:

- Automated guideway transit, which requires total separation from pedestrians and other traffic;
- Manually-operated, special guideway transit, such as monorail, which requires total separation from pedestrians and other traffic;
- Heavy rail rapid transit, which requires total grade separation and provides unneeded high capacity and speed, at high cost;

- Commuter rail, which operates mainly on existing railroad rights-of-way and typically lacks the acceleration, deceleration, maneuverability and ease of boarding/alighting needed in a circulator system;[1] and
- Light rail transit, which usually operates in a reserved right-of-way, often at speeds higher than would be useful in this circulator application, with less maneuverability.

Transit technologies satisfying the following basic requirements were analyzed further:

- operation in shared right-of-way;
- provision of required capacity;
- convenient, quick boarding and alighting of passengers; and
- needed performance capability.

Two transit technologies were recommended for further analysis: Streetcar and Bus. These two modes are described in more detail in the "Definition of Alternatives."

**Table 6. Technology Evaluation Matrix**

| | Technology | Moderate speed | Moderate capacity | Easy getting on and off | Distinctive vehicles | Good acceleration and braking | Low infrastructure need | TOTAL |
|---|---|---|---|---|---|---|---|---|
| 1 | Bus | 3 | 3 | 2 | 1 | 3 | 3 | 15 |
| 2 | Rapid Bus | 2 | 2 | 3 | 3 | 3 | 3 | 16 |
| 3 | Better Bus | 3 | 3 | 3 | 2 | 3 | 3 | 17 |
| 4 | Streetcar | 3 | 3 | 3 | 3 | 3 | 3 | 18 |
| 5 | Light Rail | 2 | 1 | 3 | 3 | 2 | 2 | 13 |
| 6 | Urban Commuter Rail | 2 | 1 | 3 | 3 | 2 | 2 | 13 |
| 7 | Intercity Commuter Rail | 1 | 1 | 2 | 3 | 1 | 1 | 9 |
| 8 | Heavy Rail | 1 | 1 | 1 | 3 | 1 | 1 | 8 |
| 9 | People Mover | 1 | 1 | 1 | 3 | 3 | 1 | 10 |
| 10 | Monorail | 1 | 1 | 1 | 3 | 2 | 1 | 9 |

### Streetcar Feasibility

Prior to the Central Austin Circulator study, several feasibility studies were conducted to evaluate the ability of various transit technologies to operate within the region. None of these studies specifically explored streetcar as a possible solution to meet identified connection needs. As part of the Circulator study, the

[1] Urban commuter rail, such as the Capital MetroRail, may operate on street and provide circulator-type service functions in some locations; however, this is not the most efficient use of this technology.

feasibility of streetcar technologies as a transportation option for the central Austin area was studied.

Streetcar feasibility was studied within the geographical context of the preliminary corridor established by the connection needs analysis. Within this context, the feasibility study had three primary objectives:

(1) Identify a route within the corridor with grades that could be negotiated by streetcar technology, assuming that limited slope modification is possible;

(2) Identify utilities that could present a barrier to implementation;

(3) Develop a preliminary capital cost estimate for implementation of a potential streetcar network.

This phase of the study also analyzed the dual use of track by both streetcar and diesel multiple units (DMUs), along the segment that links the future downtown Capital MetroRail station with a possible station at the Seaholm site.

A slope analysis of potential on-street routes throughout the proposed corridor eliminated a number of arterials as feasible alignment options and contributed to the selection of the proposed alignment as a streetcar-feasible route. Major streets that would have required substantial re-engineered slope modifications and, consequently, incurred higher design and construction costs included San Jacinto Boulevard south of 9th Street and MLK east of I-35. Steeper slopes also occur at the Dean Keeton Street underpass of I-35; however, by ruling out any stops within the approaches to the underpass, the momentum as rail vehicle would gain during the underpass descent would facilitate its ascent at the other end, especially if dedicated lanes are implemented at that location. The remainder of the alignment presents no notable grade obstacles to an electrically-propelled streetcar.

An investigation of the general locations of underground utilities within the proposed corridor indicated areas to avoid, such as the northwestern part of the Downtown area where underground telecommunications lines are more densely located. A major focus of the feasibility study with regard to utilities was the 3rd Street / 4th Street corridor. Since the City of Austin designated 4th Street as a transit corridor, utility installation in the area has shifted to 3rd Street, which was also considered for the Circulator alignment. The 4$^{th}$ Street alignment is preferred to an alternate alignment on 3$^{rd}$ Street because of the potential impact to Austin Energy's chilled water lines under 3rd Street, which would have to be relocated if a 3rd Street alignment were selected. In other areas of the proposed alignment, no need for extensive underground utility relocation was indicated if a Streetcar rail guideway were to be constructed. Installation of rails for streetcar on city streets is expected to require an excavation of 18 inches or less.

Preliminary estimates of costs were also included in the feasibility study. Estimates have been reviewed and refined for each alternative as part of this evaluation. The study found that, after evaluating the constraints of topographical slope, underground utility relocation requirements, and estimated capital costs, the Streetcar mode is a feasible alternative.

## Definition of Alternatives

### No Build Alternative

The No Build Alternative is a stand-alone alternative. By definition, the No Build Alternative is part of both the Bus and Streetcar Alternatives. Under the No Build Alternative, no new Circulator vehicles or service would be introduced to central Austin. However, Capital Metro is committed to the All Systems Go Long-range Transit Plan, which will provide additional transit services beyond what already exists and currently operates. Under the All Systems Go plan, 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 All Systems Go plan.

Nearly every type of fixed-route bus service currently offered by Capital Metro operates within the study area boundaries. These include:

- Local Service Routes: These buses provide multiple stop service to and from downtown, serving specific neighborhoods and areas of the city 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 more people between key transfer points and key destinations. Flyer Routes offer direct service between neighborhoods and the UT Main Campus or Downtown Austin.
- 'Dillo and Special Services Routes: 'Dillos are free, central area circulator buses serving Downtown, the UT campus, and nearby neighborhoods. They are historic reproductions of trolley cars. Special Services Routes cover a route for a unique event or on a limited schedule.
- 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.
- Express Routes: Express buses provide limited-stop service to and from UT, Downtown, and park-and-ride facilities.
- Crosstown Routes: Crosstown bus routes provide direct, multiple-stop service that does 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 (MS) and LBJ High School. Kealing MS is located in the study area.

In addition to the proposed Circulator that is the subject of this evaluation, new elements of the All Systems Go Long-range Transit Plan includes the following:

- *Capital MetroRail Service:* Operating on Capital Metro's existing freight tracks, this line from Leander to downtown will provide urban commuter rail service beginning in 2008 to both suburban and central city passengers. This Downtown-Northwest line will operate on existing freight rail trackage owned by Capital Metro, and will serve east, northwest and central Austin, plus suburban passengers, as noted. The system will include at least nine stations, eight within the City of Austin. Future extensions would require detailed analysis and a referendum, under current state law. The vehicles, which will be diesel multiple units (DMU), will be fully accessible for persons with disabilities. Transit Circulator services developed from the Future Connections Study would connect to the Capital MetroRail system.
- *Regional Commuter Rail Service:* Regional Commuter Rail service from Georgetown (north of Austin) south to San Antonio is currently in the planning stage as Capital Metro collaborates with the Austin-San Antonio Commuter Rail District and other regional transportation organizations to determine the future of this service. This system would use existing tracks along MoPac Expressway and the abandoned MoKan rail right-of-way, which is currently being preserved for transit by the Texas Department of Transportation. Regional Commuter Rail service could potentially be extended to Manor and Elgin (east of Austin) along existing Capital Metro freight tracks.
- *Rapid Bus Service:* New, technologically advanced buses will use a traffic signal priority system to move buses more quickly throughout Austin. This service will significantly speed up 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 on North Lamar Boulevard and South Congress Avenue, scheduled for initial operations in 2009. Extensions may include but are not limited to: Burnet Road, 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.
- *Express and Local Bus Service:* Both express and local bus services will be expanded as part of the long-range plan. Higher-speed express bus service will be provided to suburban Capital Metro service area locations, including park-and-ride facilities at North I-35, South I-35, Oak Hill, Manor, RM 620 / RM 2222 intersection, and South MoPac Expressway. Core local bus service will be increased, providing frequent-stop access; cross-town service will also be increased; and routes will be realigned to enhance other bus and rail connections.
- *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 municipal programs.

**Bus Alternative**

Circulator Bus technology offers enhanced convenience to passengers by incorporating a variety of features distinguishing it from traditional bus, including, for example, employment of intelligent transportation system (ITS) technologies and other priority measures to minimize 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.

The Circulator Bus vehicle would be a large, distinctive bus (possibly articulated), running on low-sulfur, "clean" diesel fuel (Figure 3). These would be technologically advanced buses using a traffic signal priority system to move more quickly through traffic. The Bus vehicle would hold the traffic light green as it passed through intersections. It would also employ other ITS technologies, such as off-vehicle payment methods. Buses would stop curbside approximately every three blocks using rapid loading features incorporated into the vehicle design. Both the vehicles and the stops would be designed with a distinctive appearance so that they would be instantly recognizable as part of the Circulator system.

**Figure 3. Circulator Bus Examples**



The locational alignment of the Bus and Streetcar alternatives is the same and is described in the section that follows—"The Proposed Alignment: Streetcar and Bus Alternatives." All the elements of the No Build Alternative are incorporated into the Bus Alternative.

**Streetcar Alternative**

Streetcar is a fixed-guideway technology similar to light rail but usually with smaller vehicles and lower maximum speed capability, and most often operating in mixed traffic. Except where multimodal rail operation is planned, track construction would be simpler and cheaper than typically employed for light rail, and involve shallower excavation of the street.

The Streetcars would be bi-directional, low-floor, single-car, articulated vehicles (Figure 4). They are typically 66 feet long, 11.4 feet high and 8 feet wide and run on standard gauge tracks. Vehicles would be powered by an overhead electrical system similar to those used by streetcars in cities such as Portland, Oregon, and Tacoma, Washington.

The Streetcar vehicles would operate in mixed traffic (with automobiles) in most areas, although there are limited locations where they could operate off street on dedicated right-of-way (see description of alignment in following section). The Streetcar Alternative consists of two tracks – one in each direction. In most areas, curbside tracks would be employed and station platforms would share sidewalk space, except on Congress Avenue, where the tracks would be in the inside (center) lanes. Placement of tracks in the center of streets would entail use of narrow side-platform or center-platform stations, which would reduce the street width available for traffic. Stops would be located approximately every three blocks and would incorporate the same features and amenities as the Bus Alternative. Similar to the Bus Alternative, Streetcar vehicles would use ITS technology, including signal priority.

**Figure 4. Streetcar Examples**

The locational alignment of the Bus and Streetcar Alternatives is the same and is described in the section that follows—"The Proposed Alignment: Streetcar and Bus Alternatives."

## The Proposed Alignment: Streetcar and Bus Alternatives (Figure 5)

### West End to the Capital MetroRail Station

In Downtown Austin, the proposed alignment starts at Bowie and 3rd Street running east on 3rd Street. Just east of Bowie, an intermodal transit station would connect with future Regional Commuter Rail in the Austin-San Antonio (ASA) Corridor.

The proposed alignment continues east on 3rd Street, turning north onto San Antonio Street and east on 4th Street, and then continues on 4th Street to Trinity Street, extending beyond Congress Avenue to connect with the Capital MetroRail station. The 4th Street alignment is preferred to an alternate alignment on 3rd Street because of the projected impacts that would be anticipated by construction in 3rd Street, specifically the potential impact to the chilled water lines owned by Austin Energy.

### Capital MetroRail Station to State Capitol Complex

The proposed alignment runs north on Congress Avenue to 11th Street. Congress Avenue is the historic streetcar location in downtown and serves the heart of the major downtown office and retail core. The proposed alignment runs east on 11th Street and then turns north on San Jacinto Boulevard.

### State Capitol Complex through University of Texas Campus

The alignment on San Jacinto Boulevard serves the State Capitol Complex area, and continues north through the University of Texas campus. The final alignment designation will be made by the UT Board of Regents.

### University of Texas Campus to Mueller Redevelopment Site

At the intersection of San Jacinto Boulevard and Dean Keeton Street, the proposed alignment turns east and continues directly to the Manor Road corridor and on to its intersection with the Capital MetroRail line. This routing is recommended over the use of MLK because of the less steep grades and generally lower traffic volumes on Manor, compared to MLK. Likewise, the route along Dean Keeton is preferred to an alignment that might use Red River Street to reach Manor Road because it is shorter and can make use of the existing underpass beneath IH-35. The Red River alternative would require replacement of the Manor Road Bridge over IH-35.

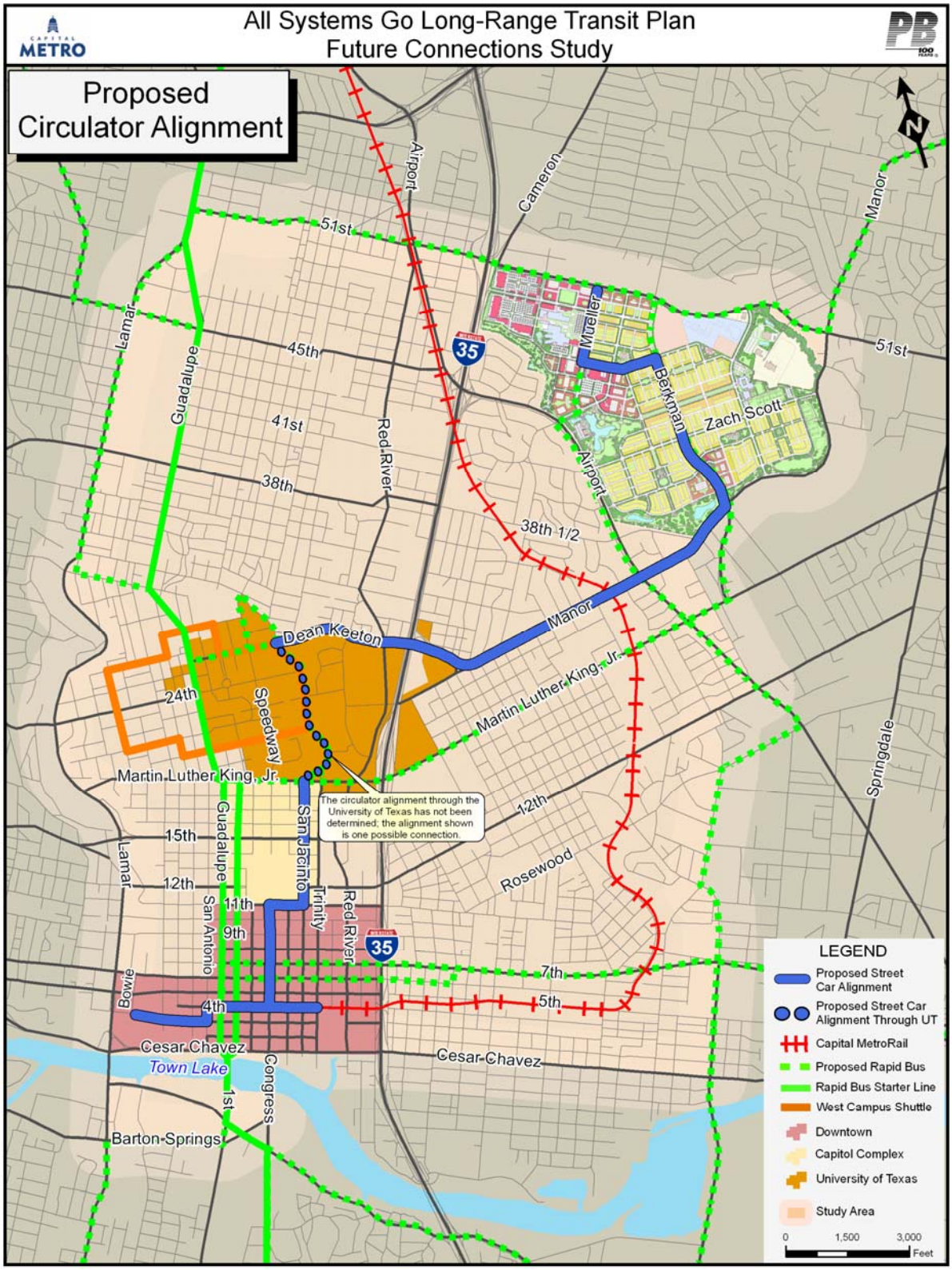
At the intersection of the Capital MetroRail line and Manor Road, a transfer station is envisioned. The Circulator – Capital MetroRail interface is better accomplished by adding a MetroRail stop at Manor Road than by diverting the Circulator route to the MLK Station to the south. The relatively infrequent Capital MetroRail trains would stop for less than two minutes, while the Circulator diversion would have a major effect on Circulator cost and efficiency. The proposed Circulator alignment would then continue east along Manor Road to Berkman Drive where it would enter the Mueller Redevelopment project.

**Mueller Redevelopment Site to 51st Street**

Within the Mueller Redevelopment project, the proposed alignment runs northward along Berkman Drive, turning west on Philomena Street and then north on Mueller Boulevard. This alignment connects the two proposed town centers within the Mueller Redevelopment project. It is preferred to an alternative routing on Airport Boulevard because it serves both of the town centers, while the Airport alignment would miss the southern town center. The Berkman - Philomena alignment is also recommended over an alignment continuing north on Berkman to 51st Street. The alternate alignment portion that would have continued north on Berkman Drive was a proposed LRT alignment from when that technology was being planned. The more maneuverable streetcar technology can bring rail transit into the north town center at Mueller.

The Circulator alignment would terminate at 51st Street with the terminal station located on Mueller Boulevard. This end point satisfies the goals and objectives of the study to connect the major activity centers (Mueller, University of Texas, Capitol Complex, and Downtown). Should a more direct route between the Capital MetroRail and the northern town center at Mueller be desired, a shuttle van or bus system that would make the connection during the peak commute periods is recommended, at least in the initial phases of implementation. The Circulator route could be extended in a future phase if desired, and this leaves the option open for other extension routes to be considered. Terminating the initial phase of Circulator implementation at the Mueller Boulevard – 51st Street location would penalize neither future option.

## Figure 5. Proposed Circulator Alignment



# EVALUATION OF ALTERNATIVES

The Streetcar and Bus alternatives, as described in the previous chapter, have been evaluated against the identified Goals and Objectives established by Capital Metro and the Future Connections Study Steering Committee. The alternatives are compared against various performance criteria that reflect the ability of each alternative to meet individual Goals. Performance criteria are described in the evaluation methodology, incorporated in Appendix A of this report.

The evaluation of alternatives and the resulting observations are reported in the following subsections of this chapter. A summary of the evaluation results is presented in the Executive Summary of this report.

Goal 1 - Improve Place Connectivity

The purpose of this goal is to improve the regional transportation system by connecting existing and emerging destinations within central Austin. Most of the objectives in support of this goal were critically considered during the preliminary screening of connection needs and modal technologies that ultimately resulted in the proposed alignment and project alternatives. A corridor was developed that would provide direct service connections among the Seaholm area, Downtown, the State Capitol Complex, UT campus, and Mueller Redevelopment site, as well as linking those destinations with the planned Capital MetroRail and Regional Commuter Rail systems. Development of the proposed alignment also took into consideration objectives to provide connections east to west (Mueller to UT; Convention Center to Seaholm), between existing and emerging activity centers, serving existing and future student housing (UT area, east Austin, Mueller), and accommodating special event venues.

To consider further how the proposed alternatives would serve the objective of improving place connectivity and how they might provide convenient and reliable service between destinations, the ridership generated by each alternative is considered. The ability of an alternative to attract ridership is an indicator of how efficiently that alternative improves the connections between places. Higher ridership implies that more people are moving between key destinations within the study corridor. Transit travel time is also considered. However, this measure of performance only highlights the difference between the Build (Circulator) and No Build alternatives and not between the Circulator alternatives themselves. In addition, a qualitative measure of the perceived permanence of an individual investment can be incorporated into the evaluation to highlight the difference between alternatives in reinforcing the notion of community and place. Evaluation criteria used to evaluate the performance of the alternatives against Goal 1 and the results of that evaluation are provided below.

Evaluation Criteria Goal 1:

- Ridership: The average weekday ridership, as gleaned from the ridership forecast analysis, is greater for the Streetcar Alternative as compared to the Bus Alternative (average daily ridership on the Streetcar is projected to be approximately 11,500 in 2017 and the average daily ridership for the Bus

Alternative is projected to be 7,600 in 2017). Higher transit ridership implies that an alternative better meets the goal for improving place connectivity because that alternative would be assumed to allow more people to reach their destinations or place; thereby supporting higher densities within defined community destinations. Higher densities are assumed to reinforce the notion of place and therefore the alternative that generates the higher ridership provides a higher degree of place connectivity. Both the Bus Alternative and the Streetcar demonstrate increased transit ridership over what would be expected in the No Build Alternative.

- Transit Travel Time: The proposed Streetcar and Bus alternatives are assumed to provide comparable estimated travel times between all destinations served by the proposed routing. Travel times by either circulator would be improved over the No Build alternative because a consistent transit alternative serving the primary destinations within the identified corridor does not exist today or under the No Build alternative. A transit patron would need to make several transfers to reach the same destinations under the assumed No Build alternative. Travel times for the circulator technologies are projected to be no more than 32.6 minutes end to end. It should be noted that many trips anticipated on the circulator route would be much shorter then the end-to-end trip and have much shorter travel times, typically ten to twelve minutes.

- Permanence: Building a fixed rail line can be a component in influencing developers, residents and businesses to invest in areas near a rail line. Transit-oriented development is more likely to materialize around streetcar station stops due to the perceived permanence provided by the construction and implementation of rail technologies. Within the Austin area, and specifically related to the student-friendly developments along UT shuttle routes, some existing transit-oriented development can be observed (for example the Red River Street and Riverside Drive corridors). However, the response from the development community to construction of a rail technology would be anticipated to include notably higher densities, in comparison. This observed densification with the UT shuttle bus system might be expected with the Bus Alternative if a long-term commitment is made to the service. In addition to the ability to encourage development, the compatibility of each alternative with established neighborhood plans must be considered. Higher densities due to transit-oriented development are only possible if such development and the underlying transit alternative are concurrent with Austin's neighborhood plans. Concurrence with neighborhood plans was evaluated as part of the initial environmental investigation completed as part of the Circulator Study. The results of the preliminary environmental analysis are included in Appendix D.

| Goal 1: Improve Place Connectivity | No Build | Streetcar | Bus |
|---|---|---|---|
| Overall Rating | ○ | ● | ◑ |
| Ridership | ○ | ● 11,500 Riders/day | ◑ 7,600 Riders/day |
| Transit Travel Time | ○ | ◑ 32.6 minutes | ◑ 32.6 minutes |
| Permanence | ○ | ● | ◑ |
| Ability to generate supportive transit oriented development | ○↑ | ●↑ | ◑↑ |
| Concurrence with neighborhood plans | ○↑ | ●↑ | ◑↑ |

Evaluation Key:

○ Neutral rating, as compared to other alternatives

◑ Alternative provides somewhat better performance as compared to other alternatives

● Alternative provides better performance as compared to other alternatives

Goal 2 - Improve Transit Connectivity:

The purpose of this goal is to improve the regional transportation system by providing connections among modes, including the Capital MetroRail, Regional Commuter Rail, and Bus. As with place connectivity, the supporting objectives of this goal were critically considered during the preliminary screening of connection needs and modal technologies that ultimately resulted in the proposed alignment and project alternatives. A corridor was developed that would provide a well connected Circulator system to serve as a collection and distribution system to the Capital MetroRail system and to encourage efficient and easy downtown bus-to-train and bus-to-bus transfers. Circulator service is anticipated to reduce the number of buses and corner transfer points in downtown Austin by providing a preferred transit mode for many trips as well as a collection and distribution network for the Capital MetroRail system (assuming connection through a future downtown transit transfer facility).

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 ridership, travel times provided, and ability to facilitate transfers between transit modes

are considered as measures of its ability to improve transit connectivity. Evaluation criteria used to evaluate the performance of the alternatives against Goal 2 and the results of that evaluation are provided below.

Evaluation Criteria Goal 2:

- Total Ridership: The average weekday ridership, as indicated previously, is greater for the Streetcar Alternative as compared to the Bus Alternative (average daily ridership on the Streetcar is projected to be 11,500 in 2017, growing to 13,100 by 2030, and the average daily ridership for the Bus is projected to be 7,600 in 2017 and 9,400 by 2030). Higher transit ridership implies that the overall alternative is working efficiently within the overall transit network being offered to the traveling public. It implies that, as an overall mode, transit is more appealing to the public and likely to encourage greater transit usage throughout the day (i.e., if a person uses transit to access their place of work, they are likely to use transit or some form of non-motorized travel for additional trips during the day instead of a private vehicle). Hence, the higher the daily transit ridership on a specific route due to a modal definition, the higher the likelihood that other transit trips will be encouraged.

- Desirability of Transit-to-Transit Transfers: Ridership due to the transfer of passengers between one transit mode and another is an indicator of the desirability of the two transit modes and the efficiency with which the two modes are linked. Qualitatively, patrons will be more likely to transfer between similar transit modes or from a transit mode of lesser passenger amenities to another that is perceived as providing greater passenger amenities. For example, a rail-to-rail transfer would be more preferable then a rail-to-bus transfer. Similarly, a bus-to-rail transfer would be preferable to a transfer from rail to bus.

- Transit Travel Time: The estimated Streetcar and Bus alternatives are assumed to provide comparable travel times (not more than 32.6 minutes end-to-end). Further analysis during preliminary engineering may demonstrate a modest difference between the two modes. Both circulator modes are anticipated to provide better travel times than would the No Build Alternative because a single route serving the identified corridor does not exist in the No Build Alternative.

| Goal 2: Improve Transit Connectivity | No Build | Streetcar | Bus |
|---|---|---|---|
| Overall Rating | ○ | ● | ◑ |
| Total Ridership | ○ | ● 11,500 Riders/day | ◑ 7,600 Riders/day |
| Transit-to-Transit Transfers | ○ | ● | ○ |
| Capital MetroRail to Circulator alternative | ○↑ | ●↑ | ○↑ |
| Bus to Circulator alternative | ○↑ | ●↑ | ○↑ |
| Transit Travel Time | ○ | ◑ | ◑ |

Evaluation Key:

○ Neutral rating, as compared to other alternatives

◑ Alternative provides somewhat better performance as compared to other alternatives

● Alternative provides better performance as compared to other alternatives

Goal 3 - Improve Circulation within Central Austin

The purpose of this goal is to improve the regional transportation system by providing internal transit circulation within Central Austin and among key districts within the core to encourage transit ridership and improve overall mobility. As with transit connectivity and place connectivity, the objectives in support of this goal were critically considered during the preliminary screening of connection needs and modal technologies that ultimately resulted in the proposed alignment and project alternatives. A corridor was developed that would provide connections between the proposed Austin-San Antonio Regional Commuter Rail line at the Seaholm site and the Circulator system, and between the Circulator and the Capital MetroRail system. This would allow for multiple opportunities to transfer between the systems to promote a variety of access options for users. In addition, decreased dependency on automobiles/single-occupancy vehicles would be expected to increase through use of multiple-occupancy transportation modes.

To consider further how the proposed alternatives would serve the objective of improving transit circulation within central Austin, performance indicators such as ridership and travel time may suggest the ability of one alternative over the other to respond to travel demands within the study area. Likewise, during implementation and

operation of an alternative, each Circulator alternative will need to be fit within the existing travel network. By definition of the implementation process, each will require that revisions be made to the existing transportation network. The ability of an alternative to minimize the need for traffic revisions is an indicator of the alternative's ability to maintain existing traffic patterns and flows. Under any alternative, it is believed that traffic flows can be maintained and that mobility within the region can be improved. So a qualitative evaluation of the ability to minimize traffic revisions is only a measure of how much effort must be expended after implementation to maximize the mobility characteristics of each option.

Evaluation Criteria Goal 3:

- Ridership: As previously identified, the average weekday ridership for the Streetcar Alternative is greater than that predicted under the Bus Alternative. The higher ridership predicted as a result of the Streetcar Alternative suggests that this alternative provides better mobility then does the Bus Alternative and is therefore a better circulator from a ridership-only perspective in 2017 (11,500 trips per day for the Streetcar versus 7,600 trips per day for the Bus Alternative).

- Transit Travel Time: As previously identified, the estimated Streetcar and Bus alternatives are assumed to provide comparable travel times (not more than 32.6 minutes end-to-end). Based on this criterion, the two Circulator alternatives provide comparable improvements to circulation.

- Minimize the Need for Traffic Revisions: The alignments of the two Circulator alternatives are assumed to be identical, regardless of mode. This assumption generates the need for similar traffic revisions necessary to implement either alternative. However, the Streetcar Alternative will likely require some traffic revisions that are not required for implementation of the Bus Alternative:

  - The Streetcar Alternative may require special signaling at some intersections to allow it to maneuver through the intersection safely and efficiently or to maneuver from an outside lane configuration to an inside lane configuration.
  - The introduction of a frequent transit route (regardless of mode) in an outside lane will require coordination of the design of that route with driveways that may access the roadway along the route. This coordination is more critical for the Streetcar Alternative because the transit vehicle is not able to maneuver around an obstacle or obstruction as compared to a bus.
  - The Streetcar Alternative may require the modification of some parking for curb-side stations or for general routing efficiencies. This may be the case with the Bus Alternative as well and is not anticipated to be a major differentiator between the build alternatives.
  - Introduction of rails into Austin's urban arterial network will require coordination with the City regarding existing and planned bicycle facilities.
  - The construction impacts to traffic flow from the development of the Streetcar Alternative are expected to be greater than those required for implementation of the Bus Alternative. The construction technique anticipated for

implementation of the Streetcar would be a rolling construction approach. Construction mitigation would be required within discrete blocks along the alignment and not all of the alignment would be affected at the same time. For the Bus Alternative, a similar method would be applied, with stations constructed sequentially.

| Goal 3: Improve Central Austin Circulation | No Build | Streetcar | Bus |
|---|---|---|---|
| Overall Rating | ○ | ◑ | ◑ |
| Ridership | ○ | ● 11,500 Riders/Day | ◑ 7,600 Riders/Day |
| Transit Travel Time | ○ | ◑ 32.6 Minutes | ◑ 32.6 Minutes |
| Minimize the Need for Traffic Revisions | ● | ○ | ◑ |

Evaluation Key:

○ Neutral rating, as compared to other alternatives

◑ Alternative provides somewhat better performance as compared to other alternatives

● Alternative provides better performance as compared to other alternatives

Goal 4 - Maximize Community Benefits

The purpose of this goal is to improve the regional transportation system by developing transit services that enhance and reinforce the characteristics of the existing and planned land uses and community environment. During the preliminary screening of community benefits and modal technologies, a corridor was developed that incorporated areas where the objectives of this goal were seen to be compatible and consistent with the local community's land use and development needs and aspirations, such as the Mueller Redevelopment site, Manor Road corridor, and Downtown. The criteria to consider how the proposed alternatives would serve to enhance the characteristics of existing or planned land uses and the community environment included development potential and impacts. The specific measures of these criteria are a qualitative assessment of land use and economic development potential and compatibility of the proposed alternatives with existing neighborhood plans.

Evaluation Criteria Goal 4:

- Land Use: A baseline land use survey at the onset of the study helped to identify specific areas along the route that may possess characteristics compatible with

the local community's land use and development needs. The Streetcar Alternative has a stronger potential for supporting existing community plans.

- Developmental Potential: The Streetcar Alternative possesses characteristics that would support new development and/or transit-oriented development (TOD) along the circulator route. New development potential is such that the proposed transit service has the ability to attract growth and economic investment. Development potential is stronger in areas with the mixed uses and higher densities that would generate more transit ridership.

| Goal 4 - Maximize Community Benefits | No Build | Streetcar | Bus |
|---|---|---|---|
| Overall Rating | ○ | ● | ◑ |
| Land Use (Compatibility with existing plans) | ○ | ● | ◑ |
| Developmental Potential | ○ | ● | ◑ |
| Ability to generate supportive development (TOD) | ○ ↑ | ● ↑ | ○ ↑ |
| Ability to maximize densification in the Mueller Development as allowed under traffic impact analysis | ○ ↑ | ● ↑ | ○ ↑ |

Evaluation Key:

○ Neutral rating, as compared to other alternatives

◑ Alternative provides somewhat better performance as compared to other alternatives

● Alternative provides better performance as compared to other alternatives

Goal 5 - Maximize Accessibility

The purpose of this goal is to improve the regional transportation system by maximizing the accessibility of existing and proposed transit services by selecting cost effective and appropriate transit modes, routes, and alignments that provide frequent, accessible passenger boarding opportunities. Some objectives in support of this goal will be more practically addressed during the on-going planning and design phases of the project. However, the objective of providing frequent transit service and boarding opportunities for transit users accessing or using transit within central Austin can be assessed by evaluating ridership.

Evaluation Criteria Goal 5:

- Ridership: The average weekday ridership is greater for the Streetcar Alternative than for the Bus Alternative (11,500 trips per day versus 7,600 trips per day).

Higher ridership implies that the Streetcar Alternative improves unmet mobility needs, especially with respect to improved boarding opportunities.

| Goal 5 - Maximize Accessibility | No Build | Streetcar | Bus |
|---|---|---|---|
| Overall Rating | ◯ | ● | ◑ |
| Ridership | ◯ | ● 11,500 Riders/Day | ◑ 7,600 Riders/Day |

Evaluation Key:

◯ Neutral rating, as compared to other alternatives

◑ Alternative provides somewhat better performance as compared to other alternatives

● Alternative provides better performance as compared to other alternatives

Goal 6 - Maximize Environmental Benefits

The purpose of this goal is to improve the regional transportation system by developing transit services that maximize the positive benefits to the natural environment and built community. Most of the objectives in support of this goal are supported by the selection of connection technologies that are typically environmentally friendly by definition. Technologies such as streetcar, which runs on electrical power, and modern clean bus technologies are assumed to have an improved ability to provide environmental benefits, compared to the existing transit system, which relies on existing technologies. The introduction of improved circulation systems that generate higher transit ridership as compared to the No Build Alternative will ultimately have a long-term positive benefit to the community. The criterion of impact avoidance is applied to the proposed alternatives in support of this goal. Specifically, potential environmental constraints and compatibility with neighborhood plans are examined. Evaluating compatibility of alternatives with approved neighborhood plans supports the objective to respect the integrity of existing neighborhoods and reinforce neighborhood identity, characteristics and cohesiveness. Other environmental constraints to be considered in support of this goal include noise, visual, historic resources, parks, and water resources. Attention is also given to construction and utility relocation effects.

Evaluation Criteria Goal 6:

- Avoidance of Environmental Impacts: The Streetcar Alternative is preferable with regard to neighborhood compatibility, air quality, and environmental justice, although the No Build Alternative is advantageous in terms of having no real impacts and effects on land and water resources. No substantial difference is expected in historic resources and aesthetics regardless of alternative chosen.

- Construction: The Streetcar Alternative would have some traffic impact during the construction of the route. There would be minimal impact from the Bus Alternative. Construction impacts anticipated at the current level of planning are all considered normal and routine construction related impacts.

- Neighborhood Plan Compatibility: The Streetcar Alternative would be most compatible for existing and new development. The Bus Alternative may also be supportive..

| Goal 6 - Maximize Environmental Benefits | No Build | Streetcar | Bus |
|---|---|---|---|
| Overall Rating | ○ | ● | ◑ |
| Ability to Minimize Environmental Impacts and Maximize Environmental Benefits | ○ | ● | ◑ |
| Ability to Minimize Construction Impacts | ○ | ◑ | ● |
| Ability to Maximize Compatibility with Neighborhood Plans | ○ | ● | ◑ |

Evaluation Key:

○ Neutral rating, as compared to other alternatives

◑ Alternative provides somewhat better performance as compared to other alternatives

● Alternative provides better performance as compared to other alternatives

Goal 7 - Maximize Economic Benefits for the Community

The purpose of this goal is to improve the regional transportation system by developing transit services that help increase economic opportunities and build wealth for local communities, while minimizing demands for increased local expenditures. Many of the objectives in support of this goal were considered during the preliminary screening of connection needs and modal technologies that resulted in the proposed alignment and project alternatives. Objectives considered included: soliciting input from major CBD businesses; utilizing the circulator concept for Capital MetroRail connectivity; focusing service on dense residential areas, major employers, and educational facilities; providing connections for housing and jobs at all income levels; and supporting

economic benefits to lower income areas. The development potential criterion supports the objective of reinforcing land use strategies that encourage development density in existing and planned developments. The cost criterion furthers the objective of utilizing cost-effective systems for added transit services. The performance criterion is used to help determine whether there may be reverse commute demand for Capital MetroRail. The evaluation of construction impacts noted in the previous section furthers the objective of minimizing those impacts and their costs to the community. Specific measures of Circulator system costs include capital costs (including vehicle costs), operational and maintenance costs, and cost effectiveness.

Evaluation Criteria Goal 7:

- Minimize Cost of Implementation: The implementation cost required to initiate transit service is a measure of the economic hurdle that must be overcome by the greater community in reaching its vision of a new circulator service to serve central Austin. The estimated initiation cost for the Streetcar Alternative is approximately $230 million in 2006 dollars (including transit construction, vehicles, engineering and management, right-of-way required for the maintenance facility and bridge across Shoal Creek, and utility adjustments). This full implementation cost does not take into account the potential for future sharing of costs or distribution of costs to other responsible agencies, but is a measure of total cost for comparison only. The estimated cost for the Bus Alternative is $29.3 million (including transit construction, vehicles, engineering and management, right-of-way for the bridge over Shoal Creek). No utility adjustments or need for an expanded maintenance facility are assumed.

- Ability to Facilitate Transit-Oriented Development (TOD): The ability of an alternative to encourage or facilitate higher densities and to generate economic investment within a community generates economic benefits for the community. The Streetcar Alternative is estimated to provide a greater ability to facilitate transit-oriented development as compared to a Bus Alternative.

- Ability to Maximize Development Potential within Mueller: The Mueller Redevelopment project has been targeted by the City of Austin to be a future transit-friendly urban development. It is the desire of the surrounding community and the City of Austin, as evidenced by the supportive neighborhood plan, to maximize the density within Mueller. The current Mueller development agreement allows Mueller to reach maximum density by the implementation of transit technologies and other transportation demand management techniques that allow travel without increasing the number of total trips generated by the project. Alternatives that attract the greatest number of transit trips within Mueller represent those options which reduce existing projected trips and therefore allow greater “back fill” or densification of development.

- 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 analysis process, additional planning elements

remain to be completed before comprehensive cost effectiveness criteria can be evaluated. Cost effectiveness is therefore not evaluated in this analysis.

| Goal 7: Maximize Economic Benefits for the Community | No Build | Streetcar | Bus |
|---|---|---|---|
| Overall Rating | ○ | ● | ◑ |
| Ability to minimize initial cost of implementation | ○ | ◑ | ● |
| Ability to facilitate transit oriented development | ○ | ● | ◑ |
| Ability to maximize development potential within Mueller | ○ | ● | ◑ |
| Ability to generate private financing opportunities and partnerships | ○ | ● | ○ |
| Ability to minimize increase in existing system operations and maintenance costs | ● | ○ | ◑ |

Evaluation Key:

○ Neutral rating, as compared to other alternatives

◑ Alternative provides somewhat better performance as compared to other alternatives

● Alternative provides better performance as compared to other alternative