final report

El Paso Rail Transit Study

prepared for
Texas Department of Transportation

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Executive Summary

STUDY PURPOSE AND SCOPE

This study has been authorized by the Texas Department of Transportation in cooperation with the City of El Paso, as a task of the El Paso Regional Ports of Entry Operations Plan Contract being performed for the Department by HNTB Corporation. The purpose of the study is to provide an engineering feasibility analysis for up to four possible routes and order-of-magnitude costs, as well as a market, benefit, and constraint analysis for a rail transit system in downtown El Paso.

The scope of work included:

- Collecting previous plans and drawings of the possible routes,
- Performing a site visit to provide photo documentation of the routes and to identify fatal flaws;
- Analyzing streetcar system alternatives to provide a recommendation on the preferred system technology;
- Providing a conceptual-level alignment for the preferred system for up to four route alternatives;
- Identifying infrastructure requirements and order of magnitude capital costs estimates;
- Analyzing market demand by identifying the potential populations that would benefit;
- Identifying order-of-magnitude economic benefits and return on investment based on a review of comparable transit systems;
- Identifying potential constraints to implementing a system and potential next steps required to move the system forward; and
- Preparing a final report and presentation documenting the findings.

It should be noted that this study is preliminary in nature and limited in scope. If Federal funds are requested, additional study would be required, including an environmental assessment (EA) or environmental impact statement (EIS) pursuant to the National Environmental Protection Act (NEPA). (Texas Commission on Environmental Quality reporting and permitting requirements also apply even if no Federal funding is used.) Furthermore, if New Starts/Small Starts grants are sought, an Alternatives Analysis would be required in accordance with the guidelines or that program. An Alternatives Analysis could cost about $1 million and require at least one year to complete. An environmental study...
would depend on the level of study required. While a streetcar operating in the existing roadway would be less likely to require an EIS than a system on exclusive right-of-way, consistent with the scope of work, the consultant team did not conduct any environmental analysis as part of the fatal flaw analysis and therefore cannot ascertain the level of analysis or budget for the environmental study that would be required.

STUDY CORRIDOR AND CANDIDATE ALIGNMENTS

The study corridor was identified to extend from the University of Texas – El Paso (UTEP) Campus to the Golden Horseshoe District and the International Crossings located at Santa Fe and Stanton Streets. The specific alignment would utilize either Oregon Street, Mesa Street, or Stanton Street or some combination to link these endpoints. Oregon Street was specifically identified as one of the routes to be considered.

It is important to note that the streetcar system would not operate in a vacuum but be part of an overall local transit system that includes Sun Metro bus routes, proposed Sun Metro Bus Rapid Transit (BRT) routes (currently in the planning stage), UTEP shuttle bus routes and other services. The City of El Paso and Sun Metro are pursuing the development of a BRT system consisting of four corridors, one of which – the Mesa Corridor – overlaps with the proposed streetcar corridor. This has raised questions regarding the feasibility of operating both in the same corridor, including questions regarding the ability of the market to support more than one service in the same general corridor. To address initial concerns on the part of City officials, the study scope was designed to consider some alignment options for the streetcar that would avoid operation on the same street. At the same time, it should be noted that while the City Council approved the BRT plans, several members noted their interest in a rail transit system in the downtown. This study scope includes consideration of the degree to which the streetcar and BRT would be mutually supportive or duplicative.

The following exhibit illustrates the study corridor also showing the proposed BRT alignments. An overall comprehensive study area envelope was defined for the purposes of the market and economic benefits analysis to take into account the catchment area of a range of possible alignments.

METHODOLOGY

This study was designed to provide Texas DOT and the City of El Paso with a quick-response assessment of the likely return on investment in a streetcar project along the identified corridor. The primary goals are to answer the following questions:
1. Does there appear to be a market for a streetcar system in the corridor?

2. Are there fatal flaws with the overall concept or with any of the primary candidate alignments?

3. Is there a particular type of technology that would be preferred?

4. What is the order of magnitude of the resources needed to create this rail system?

5. What is the order of magnitude of economic development benefits that can be expected based on the experience of similar projects elsewhere?

6. What kind of return on investment can be expected based on the above cost and benefits?

7. Are there critical funding or other constraints that will have to be overcome?

8. What are the next steps to advance the project and overcome key constraints?
Exhibit ES.1 Streetcar Corridor Study Area and Planned BRT Routes
To accomplish this, the methodology employed the following:

- **Market Methodology** – Information on population, employment, and key travel generators was examined for the walk distance catchment area surrounding corridor, including contrasting alternative alignments. Ridership on intersecting bus routes was examined and the potential for transfers or duplication with the BRT was examined. A ridership estimate was not prepared.

- **Fatal Flaw Methodology** – Site reconnaissance of the corridors and candidate route alignments as well as review of plans and documents were used to identify fatal flaws from a physical or operational perspective.

- **Technology Methodology** – Candidate technologies were identified and contrasted in terms of infrastructure requirements, vertical and horizontal geometry and clearances, compatibility with current traffic operations, and costs.

- **Resource and Cost Methodology** – Resource requirements were estimated for each route alignment using industry unit costs and engineering design. These requirements included rolling stock, track infrastructure, electrification, and ancillary maintenance facilities. Costs were not estimated for any right-of-way or land acquisition.

- **Economic Development Impacts** – Research on the economic development impacts of similar systems was conducted, focusing on several examples whose urban and system characteristics were deemed to be most similar to the proposed application. Economic development conditions in El Paso were researched to identify factors that could be applied to extrapolate the experience of other cities to the project in El Paso.

**SUMMARY OF KEY CONCLUSIONS**

- **Market Identification** – The proposed streetcar corridor clearly encompasses the major employment centers, cultural and entertainment venues and areas of considerable population density in the downtown – UTEP corridor. The market for the streetcar consists of several submarkets, including: 1) Resident Work/School Trips, 2) Resident Nonwork Trips and Nonhome-Based Trips, 3) Special Event Trips, 4) Border Crossings From Mexico, and 5) Other Visitor Trips. Each submarket was examined using available data: the following describes key findings:
  - The border crossing market is one that appears to have strong potential, particularly since a very large number of pedestrians enter the U.S. each day to make local trips for work, shopping, medical and other purposes.
  - The streetcar would have its largest appeal for trips that can be made entirely on the streetcar route and do not require a transfer to other buses. However, there are opportunities among some types of trips that would transfer from other buses, particularly at the Downtown Transfer Center where connections can be made to many other routes, including BRT routes from the east.
- The market among local residents is constrained by the small number of current downtown residents, although the streetcar can serve as a catalyst to encourage greater residential development downtown.

- The UTEP market may be limited since UTEP is a commuter school and the streetcar does not extend directly to the major residential neighborhoods where the majority of UTEP students live. The streetcar is not very likely to serve transfer trips to UTEP at Glory Road unless it replaces Miner Metro routes which may offer advantages in frequency, branding, routing, and fare (if the streetcar charges a fare). Miner Metro routes serve remote parking lots along Sun Bowl Drive that the streetcar would not serve directly unless it were extended beyond the Glory Road terminus to and beyond Kern Drive (about three-quarters to one mile depending on the routing).

- A key market for the streetcar would be serving entertainment districts; as part of continuing project development, some refinements might be made to the alignment in order to better serve the Union Plaza district and to ensure maximum coverage of cultural, employment and other activity centers in the downtown core.

- The streetcar could serve as a shuttle from remote parking for special events at the Sun Bowl, Don Haskins Center, and a potential new downtown sports arena as well as during large festivals downtown.

- With good coverage of cultural and entertainment venues, there should be opportunities to serve visitors staying in hotels or making day trips, but this market was particularly hard to quantify based on existing information sources on visitors.

- Unlike the BRT the streetcar would target local trips in the corridor and would be designed for convenience rather than speed. While the streetcar and BRT target different ridership markets to some extent (i.e., local trips versus commuter trips), their markets do overlap. Locating the streetcar on an adjacent arterial as opposed to Oregon Street would serve to reduce the overlap somewhat but would reduce the accessibility to jobs and activities on the UTEP campus and the potential for using the bus lanes on Oregon Street. The subject of service duplication and the impacts of the streetcar on BRT ridership needs further study.

- There are not major differences in the markets served by the four alignments.

- **Fatal Flaws** – There were no fatal flaws identified during the engineering evaluation. Four possible alignments were developed to serve the market using the three primary arterials identified in the scope of work – Oregon Street, Mesa Street and Stanton Street. All seem to be physically feasible. Each alternate route offers challenges, such as steep grades, existing bridges, overhead obstacles, etc., but nothing that cannot be resolved. Strategies to
overcome these challenges include specifying design requirements to be incorporated into the new or renovated cars, such as the ability to lower the trolley pole and operate on battery power and sufficient power to overcome the grades. The streetcar is envisioned to travel in mixed traffic (except where bus lanes are available). A rail transit system operating on dedicated lanes or exclusive right-of-way was not explored as part of this study. Generally, the shared-use lane will be accompanied by other vehicle-only lanes for general traffic, however, there are some instances where this is not the case. Further evaluation of traffic impacts would be needed at these locations. Simple streetcar stations are envisioned on the sidewalk and using bulb-outs where there currently is parking; three parking spaces would need to be eliminated at each station along existing parallel parking locations.

- **Preferred Technology** – Four types of equipment were considered, including LRT cars, modern streetcars, replica/vintage streetcars, and renovation of the old PCC streetcars. The design applications, sizes, capacities, speeds, and costs were considered for each type of car. The replica/vintage type of streetcar seems to be most compatible given the project parameters at a competitive cost. It was determined that four cars are needed to provide a 10 to 15-minute headway between cars, based on the time needed to travel the entire route, including allowance for stops at stations, stop signs, and traffic signals. An additional two spare cars are recommended to provide a rotation for maintenance bringing the total fleet size to six cars.

- **Infrastructure Requirements** – Six fundamental infrastructure items will be needed to implement the streetcar. Each of these items is relatively consistent across the alternative route alignments examined. These basic items are: 1) a track slab for the streetcars to run on; 2) an overhead wire; 3) electrical power source, including substations; 4) modifications to existing utilities and bridges; 5) passenger stations; and 6) a maintenance and storage facility.

- **Additional Implications** – The implementation of a streetcar system will require several adjustments to the current conditions. There will be six notable changes, including: 1) modified traffic patterns; 2) modified or eliminated bus routes; 3) replacement/modification of some bus stops; 4) removal of some parallel parking spots; 5) utility and bridge modifications; and 6) overhead wire supports.

- **Order-of-Magnitude Cost Estimate** – Besides the six basic infrastructure requirements listed above, there is the cost of the streetcars themselves. The unit costs of these basic items are the same regardless of the route alternative. Using these unit costs, the only variables that impact the overall cost estimate would be: 1) selection of type of car; 2) the number of cars; 3) number of stations; 4) route alignment selected; and 5) location of the maintenance facility. The overall order of magnitude cost, including contingency is estimated at about $90 million excluding land acquisition costs. Changing the number of stations, type, or number of cars, or location of the maintenance facility could increase or decrease the overall cost substantially.
• **Economic Benefits** – The analysis of transit-oriented development impacts was based on El Paso-specific data regarding land use, comparisons to other already completed streetcar systems (Little Rock, Memphis, Portland, and Tampa), and interviews with a variety of local stakeholders.

  - All comparison cities demonstrate significant transit-oriented development. The estimated values of development nearby the comparison streetcar systems ranges from $700 million for Little Rock to $3.5 billion for Portland.

  - While the development reported has occurred since the inception of the streetcar systems and is geographically proximate to the streetcar lines, since the streetcars tend to go through the most economically intensive parts of these cities – their downtowns and major activity centers, it is likely that some of this development might have taken place without the streetcar (though how much cannot be discerned).

  - The streetcars in the comparison cities are reported to have served as catalysts for urban development. Main goals of introducing streetcars are to provide definition to urban districts, create a sense of urban vitality, increase public awareness of the district within the region, and attract shoppers, visitors, residents, and workers. These goals have largely been met in the comparison cities.

  - El Paso’s economy though hit by the recession is showing resilience. The growth fundamentals for El Paso, both economically and demographically, are positive. A dynamic, growing economy with an expanding population provides a foundation for the proposed streetcar catchment area to attract more development.

  - The types of industries that are growing in El Paso – healthcare, education, professional services, tourism, and government – also are concentrated in the proposed streetcar corridor catchment area.

  - There are several economic and demographic constraints that could limit growth in the proposed streetcar catchment area. These include low-income levels, high dependence on autos for mobility, a proclivity towards greenfield development for both new residences and commercial space in El Paso, high-vacancy rates for commercial space downtown, border crossing delays, and uncertainties about the Juarez economy and crime situation.

• **Return on Investment** – All the comparison cities (Little Rock, Memphis, Portland, and Tampa) showed strong return on investment based on comparing tabulated transit-oriented development to streetcar construction costs. Two growth scenarios were developed for El Paso, pivoting from a baseline scenario (assuming no streetcar) to illustrate possible development levels resulting from the implementation of the proposed streetcar. The moderate ("restorative") scenario was based on the streetcar catchment corridor
capturing future growth proportional to its present share of population and jobs. This would arrest the long-term loss of share and result in significant development to accommodate jobs and people. This scenario estimated a transit-oriented development impact ($360 million), four times greater than the estimated cost of the proposed streetcar. A second, higher (“catalytic”) growth scenario was based on the experience of Portland – showing significantly higher shares of commercial and residential development in the streetcar corridor. This scenario estimated a transit-oriented development impact of greater than $1 billion or 11 times higher than the estimated cost of the streetcar. For El Paso to achieve these levels of transit-development, strategies and initiatives would need to be put in place to concentrate development into the city’s traditional center.

- **Critical Constraints** – Critical constraints are envisioned to include funding, public concerns, and consistency with the planned bus rapid transit (BRT). Funding constraints revolve around obtaining a Federal Small Starts grant and funding the local share assumed to be about 50 percent of the roughly estimated $90 million construction cost, particularly given the City’s plans for four BRT corridors using similar funding sources. While the study did not include a public involvement process, potential public concerns can be assumed to include: traffic impacts, noise impacts, cost and relocation of utilities, catenary, cost to the taxpayer, potential duplication of the BRT project, fear of potential reduction in bus service, perception of public subsidy of benefits to developers, and public desires for different route alignments or station locations, or for a higher speed rail project. Consistency with the BRT plans is an issue that needs to be more thoroughly studied. Despite the somewhat different target markets, there is substantial overlap in the coverage (within a quarter-mile walk distance) of the BRT and streetcar stations. Finally, while the BRT projects in four corridors are included the long-range plan, the streetcar project is not. If the City were to seek Federal assistance for the streetcar, the long-range plan would need to be amended to include the project.

- **Next Steps** – The following identifies these some future activities to advance the project.
  - **Alignment Definition**
    - Refine alignments, including a closer examination of the potential for providing more convenient access to key travel generators that are several blocks from the proposed alignments.
    - Review streetcar stop locations and spacing.
    - Examine traffic impacts particularly at key intersections and at locations where the shared use lane would not be accompanied by an additional travel lane.
    - Select a single preferred alignment.
- **Market Research and Demand**
  » Conduct more detailed demand study, including market research designed to document the need for the streetcar and the ridership response as well as to examine impacts on BRT ridership (see BRT Coordination).

- **Cost Estimation**
  » Conduct more study of the utility relocations required for the chosen alignment or for more than one preferred alignment to determine if this is a significant cost factor that could influence the final alignment.
  » Examine the availability of land for a maintenance facility and land acquisition costs.

- **BRT Coordination**
  » Coordinate the streetcar concept with the design of the BRT.
  » Evaluate the impact of the streetcar on the projected BRT ridership.
  » Determine whether streetcars can share BRT stations.
  » Determine funding priorities among the BRT projects and the streetcar project.

- **Funding and Project Support**
  » Identify champions for the project and market the concept to opinion leaders, including the El Paso Central Business Association.
  » Examine the availability of local and other grant funding.
  » Determine the potential for private sector funding.
  » Coordinate project development with the MPO as well as with FTA, Texas DOT, and City agencies.
1.0 Engineering Feasibility Analysis

Alternative streetcar routes were developed to determine the engineering feasibility of streetcar operations in El Paso on potential routes along Oregon Street, Mesa Street, and Stanton Street. The feasibility evaluation includes:

- A screening criteria that identifies issues and concerns considered in the analysis,
- An engineering fatal-flaw analysis of potential streetcar infrastructure and equipment needs,
- Types of streetcars and the infrastructure requirements for streetcar operations,
- An order-of-magnitude capital cost estimate for each alternative, and
- Implications resulting from streetcar operations and system design.

The report sections below expand the evaluation of these items. A preferred alternative has not been recommended as part of this study.

Four alternative routes were identified and evaluated throughout this report. These alternative routes are:

- Alternative 1: Unidirectional flow using Oregon and Mesa Streets;
- Alternative 2: Unidirectional flow using Mesa and Stanton Streets;
- Alternative 3: Bidirectional flow along Oregon Street; and
- Alternative 4: Bidirectional flow along Mesa Street in the north and Oregon Street in the south.

Maps of each of these alternative routes can be found in Exhibits 1.4 through 1.11.

Unlike modern light rail systems, streetcars do not require exclusive right-of-way and often operate in mixed traffic on existing travel lanes traveling at similar speeds as other traffic and complying with traffic regulations (traffic signals, stop signs, and speed restrictions). As a result, they are low-cost alternatives suitable for short-distance routes in downtown areas where high speed is not required. This study examined such low-cost mixed traffic operations and did not examine any alternatives with dedicated lanes, except where existing or programmed bus or BRT lanes could be used. It is noteworthy that the BRT Alternatives Analyses conducted by the City examined BRT on dedicated lanes and in mixed traffic and concluded that the travel time benefits of dedicated lanes did not justify the
added cost. As more detailed study of the streetcar concept progresses, including detailed traffic impact analysis, it may be appropriate to examine segments of dedicated lanes where advantageous and feasible.

1.1 **SCREENING CRITERIA**

Possible streetcar routes were identified and evaluated to determine the engineering feasibility of a streetcar system within the Oregon/Mesa/Stanton Street area. The feasibility of possible streetcar alignment alternatives was evaluated based on the following engineering-based screening criteria:

- Requirements for a typical streetcar infrastructure cross section,
- Streetcar track geometry,
- Current street and lane widths,
- Traffic and parking patterns on each street:
  - Unidirectional flow – using two adjacent streets; and
  - Bidirectional flow – using same street for both directions.
- Capabilities and limitations of available equipment,
- Shared-use traffic lanes (bus and/or vehicles), and
- Order-of-magnitude cost estimate.

Existing data such as aerial photography, existing digital terrain model (DTM) data, photos and video of the roadway system, roadway measurements along possible streetcar routes, and roadway plans within the project area were collected for determination and evaluation of the possible streetcar routes.

The evaluation of the roadway/streetcar typical sections included verifying the existing roadway widths to accommodate streetcar operations, identifying shared-use lanes for both vehicles and streetcars where applicable, and identifying locations where parking may be impacted due to existing facilities near businesses and residences. The traffic patterns and transportation routes were evaluated based on possible impacts on the existing vehicular and bus traffic with streetcar operations as well as shared-use lane impacts on vehicular and bus traffic. The evaluation of the impacts on existing infrastructure focused on permanent impacts due to the streetcar infrastructure and possible impacts during the construction of the streetcar system. Estimated order-of-magnitude construction costs to implement the streetcar system were determined for each alternative; these estimates are included and discussed as part of Section 1.5.
1.2 Fatal Flaw Analysis

A fatal flaw analysis was conducted for each of the streetcar route alternatives by defining issues and concerns with the compatibility of existing versus needed infrastructure, including evaluations based on the screening criteria listed in section 1.1 above such as:

a. Traffic and parking patterns;
b. Passenger Stations;
c. Shared-use traffic lanes;
d. Vertical and horizontal track geometry;
e. Utilities and traffic control;
f. Existing bridges; and
g. Overhead Obstructions.

The fatal-flaw analysis did not include identifying environmental impacts of the alternative alignments.

The project study area includes Oregon Street, Mesa Street, and Stanton Street from Glory Road near the University of Texas - El Paso (UTEP) campus to Father Rahm Avenue near the Paso Del Norte border crossing. Given these limits, each streetcar route crosses over I-10 and the Bataan Memorial Railroad Trench. The land use is primarily residential on the north end of the study limits along Mesa and Stanton Streets, while other land use within the study limits is generally commercial. The UTEP campus is located on the northwest portion of the study limits with a hospital complex southeast of the campus.

The possible alternatives for the streetcar system utilize shared-use lanes in many locations to provide dual use of proposed facilities. For some alternatives, a shared-use lane (introduction of the streetcar into a lane of traffic) does not adversely affect traffic operations, while in other alternatives there will be effects on traffic operations as discussed further for each of the possible alternatives below.

In most of the alternatives, the streetcar route travels along existing bus routes. For this study, it is assumed that the streetcar operations will include stations at existing bus stops along these routes. Further, the possible alternative routes provide stops at the Glory Road Transfer Center at UTEP and the Bert Williams Downtown Transfer Center on the southwest end of the project. It should be noted that changes to bus routes and schedules may occur with implementation of a streetcar system along similar routes as well as with the proposed bus rapid transit (BRT) system and the SMART 101 route, which has been set up as a pilot program for the BRT.

Bus lanes are currently being implemented along Oregon Street from Glory Road to Schuster Avenue in place of existing parallel parking for use by the existing
bus routes as well as the BRT. These bus lanes could also be used by the streetcar to limit impacts to vehicular traffic by providing a vehicle-only lane in each direction in addition to the bus lane.

The topography and vertical grades were analyzed using the Texas Natural Resource Information System (TNRIS) DTM data and as-built drawings from Oregon Street between Glory Road and Yandell Drive. Generally, it is assumed that streetcar system may not be able to operate as efficiently on vertical grades greater than nine percent; however, the streetcar supplier would be able to design the streetcar for grades greater than nine percent. There are certain segments of roadway within the project limits that have been identified as over nine percent vertical grade. Note that these grades are based on preliminary data and a field survey or as-built drawings should be used to determine the actual vertical grades. These locations are:

- Mesa Street from University Avenue to Blanchard Avenue and from Rim Rd to River Avenue; and
- Stanton Street from University Avenue to Blanchard Avenue and from Hague Road to River Avenue.

Maximum grades would be clearly defined when a route is determined, and these grades would need to be included in the specifications when ordering the streetcars. The manufacturer of the streetcars would incorporate this information, together with maximum expected car capacity, into the design and supply of the streetcar equipment so that it will be capable of routine travel on these roadway grades.

Determination of possible routes for the streetcar system used the following methodology:

- The scope of services identified that the routes are to use Oregon Street, Mesa Street, or Stanton Street or a combination of these streets. See Exhibits 1.1 through 1.3 for the traffic flows of each route.
- The northern and southern limits of the routes use the Glory Road Transfer Center and the Bert Williams Downtown Transfer Center, respectively, to connect with additional transit services.
- Unidirectional routes using two adjacent parallel streets (one for northbound operations and one for southbound operations) are identified based on available street widths and existing traffic patterns. A maximum one-block distance between these routes is used to limit the distance between northbound and southbound stations.
- The use of a single street for bidirectional streetcar movements has been evaluated based on the available street width for use by the streetcar system and other vehicles. Thus, Stanton Street has not been considered for a bidirectional route on a single street due to existing roadway width constraints.
Exhibit 1.1  Oregon Street Traffic Flows
Exhibit 1.2  Mesa Street Traffic Flows
Exhibit 1.3  Stanton Street Traffic Flows
Streetcar operations may be more challenging along Stanton Street south of Mills Avenue due to existing traffic patterns and parking. In particular, a merge condition for Myrtle Avenue into Stanton Street would likely be an issue for traffic operations in the area with a streetcar route along Stanton Street.

The angles of existing intersections have been analyzed for the streetcar routes. In some cases the turning radius limits the use of a certain intersection due to skewed streets. In particular, Texas Avenue and San Antonio Avenue presented challenges for the turning movements of the streetcar system.

The routes for Alternatives 1 and 2 use two streets (northbound on one street and southbound on another street) for operations and routes for Alternatives 3 and 4 use a single street for bidirectional operations. Descriptions of the possible alternatives that were evaluated are as follows:

- **Alternative 1** generally travels along Mesa and Oregon Streets. Alternative 1 travels northbound along Mesa Street from Father Rahm Avenue to Glory Road and then travels westbound on Glory Road to Oregon Street. The alignment heads southbound along Oregon Street to 4th Avenue, where it travels west to Santa Fe Street. The alignment then heads south on Santa Fe Street, with a station serving the Bert Williams Downtown Transfer Center, makes a left onto Father Rahm Avenue, and then travels east to Mesa Street to complete the route. See Exhibits 1.4 and 1.5 for the alignment of Alternative 1.

- **Alternative 2** generally travels along Mesa and Stanton Streets. Alternative 2 travels northbound on Mesa Street from Father Rahm Avenue and zigzags to Stanton Street by way of Mills Avenue. The alignment then proceeds northbound on Stanton Street until Glory Road, where it follows Glory Road westbound to Oregon Street, circles around the block using Cincinnati Avenue, and then travels south on Mesa Street to Mills Avenue. At Mills Avenue the alignment zigzags back to Oregon Street and heads south to 4th Avenue. From there it travels west to Santa Fe Street, with a station serving the Bert Williams Downtown Transfer Center, and back to Mesa Street by way of a left turn onto Father Rahm Avenue as in Alternative 1. See Exhibits 1.6 and 1.7 for the alignment of Alternative 2.

- **Alternative 3** generally travels both northbound and southbound along Oregon Street. Alternative 3 travels northbound on Oregon Street from Father Rahm Avenue to Cincinnati Avenue near UTEP, where it goes around the block utilizing Mesa Street and Glory Road. From Glory Road the alignment heads south on Oregon Street to 4th Avenue, where it travels west to Santa Fe Street, with a station serving the Bert Williams Downtown Transfer Center, and takes a left onto Father Rahm Avenue. From Father Rahm Avenue the alignment completes the route at Oregon Street. See Exhibits 1.8 and 1.9 for the alignment of Alternative 3.
Alternative 4 generally travels along Mesa Street on the northern portion and Oregon Street on the southern portion of the route traveling on each street in both directions. Alternative 4 travels northbound on Oregon Street from Father Rahm Avenue and zigzags to Mesa Street by way of Mills Avenue. The alignment then heads northbound on Mesa Street to Glory Road, where the route travels west to Oregon Street and south to Cincinnati Avenue. The route then continues south on Mesa Street to Mills Avenue, where it zigzags back to Oregon Street and heads southbound. The alignment then travels south to 4th Avenue, west to Santa Fe Street, with a station serving the Bert Williams Downtown Transfer Center, and back to Oregon Street by way of a left turn onto Father Rahm Avenue. See Exhibits 1.10 and 1.11 for the alignment of Alternative 4.

Each alternative is evaluated below based on the screening criteria in section 1.1.
Exhibit 1.4 Alternative 1
Exhibit 1.5  Alternative 1 (continued)
Exhibit 1.6 Alternative 2
Exhibit 1.7  Alternative 2 (continued)
Exhibit 1.8 Alternative 3
Exhibit 1.9 Alternative 3 (continued)
Exhibit 1.10 Alternative 4
Exhibit 1.11 Alternative 4 (continued)
Alternative 1

The typical sections for Alternative 1 are shown in Exhibits 1.12 through 1.17. Below is a summary of the details in the typical sections:

- A shared-use lane would be utilized in most locations southbound along Oregon Street and northbound along Mesa Street.
- Along Oregon Street from Glory Road to Schuster Avenue it is anticipated that a proposed BRT/bus lane will be available in addition to a vehicle-only lane.
- There are areas where the southbound shared-use lane would not be accompanied by another lane to serve as a southbound vehicle-only lane. These locations are from Schuster Avenue to Yandell Drive and from Paisano Drive to 4th Avenue.
- There are five lanes along Mesa Street north of Franklin Avenue, including two northbound travel lanes. One of these travel lanes would be used as a northbound shared-use lane.
- There are four lanes along Mesa Street between Franklin Avenue and Main Street. There are two lanes in each direction; one lane northbound would be a shared-use lane.
- There is a three-lane section along Mesa Street between Main Street and San Antonio Avenue. One lane northbound would be a shared-use lane.
- There is only one lane in each direction along Mesa Street between San Antonio Avenue and Father Rahm Avenue. The northbound lane would become a shared-use lane.

Along Oregon Street, a BRT/bus lane is anticipated to be available for streetcar operation in addition to a vehicle-only lane in each direction from Glory Road to Schuster Avenue. Due to differing stop locations and travel speeds, the implementation of a streetcar system may impact bus operations in the BRT/bus lane but should not impact vehicular traffic on this segment.

Along Mesa Street, a shared-use lane would be utilized northbound in addition to a potential vehicle-only lane north of San Antonio Avenue. This situation would be similar to the existing condition where a bus stops in a travel lane to allow passengers to board at a station and, although it may decrease the average speed of traffic, would likely not differ much from existing conditions.

Bus routes currently exist along segments of the Alternative 1 alignment. Also, the Smart 101 bus route travels along Oregon Street from the Bert Williams Downtown Transfer Center to Kerbey Street and to the Glory Road Transfer Center during Sun Bowl events; this route operates approximately every 10 minutes on weekdays during peak hours and every 15 minutes during non-peak weekday hours. These existing bus routes coincide with the proposed streetcar route alignment and assumed stop locations. Alternative 1 station stops would also include the Glory Road Transfer Station and the Bert Williams Downtown Transfer Center.
Besides the required implementation of streetcar infrastructure, existing infrastructure that will be impacted includes the bridge structures over I-10 and the Bataan Memorial Railroad Trench along Oregon and Mesa Streets. The street deck across these bridges will need to be removed, additional stringers added, and a new bridge deck installed that includes the tracks for the streetcar. Overhead pedestrian bridges in the hospital area cross over Oregon Street creating a vertical clearance problem for the overhead power line. This conflict can be resolved by stopping the overhead power line on each side of the overhead pedestrian bridge which will require the streetcar to lower the trolley pole and operate on battery power until it crosses the obstruction. The capability of streetcars to operate on battery power is a common capability built into the streetcar when it is ordered.
Exhibit 1.12 Alternative 1 Typical Section
Exhibit 1.13 Alternative 1 Typical Section (continued)
Exhibit 1.14 Alternative 1 Typical Section (continued)
Exhibit 1.15 Alternative 1 Typical Section (continued)
Exhibit 1.16 Alternative 1 Typical Section (continued)
Exhibit 1.17 Alternative 1 Typical Section (continued)
Alternative 2

The typical sections for Alternative 2 are shown in Exhibits 1.18 through 1.24. Below is a summary of the details in the typical sections:

- A shared-use lane would be utilized southbound along Mesa Street and northbound along Stanton Street.
- There are five lanes along Mesa Street north of Franklin Avenue, including two southbound travel lanes. One of these travel lanes would be used as a southbound shared-use lane.
- There are four lanes along Mesa Street between Franklin Avenue and Main Street providing two lanes in each direction; one southbound lane would be a shared-use lane.
- There are three lanes along Oregon Street south of Mills Avenue, including two southbound travel lanes. One southbound lane would be used as a shared-use lane.
- There are four lanes along Stanton Street from Glory Road to Crosby Avenue, two in each direction. One lane northbound would be used as a shared-use lane.
- There is a three-lane section along Stanton Street from Crosby Avenue and Mills Avenue, including two northbound lanes; one of these would be used as a shared-use lane.
- There is a three-lane section along Mesa Street between Mills Avenue and San Antonio Avenue, including a northbound travel lane which would become a shared-use lane.
- There would be one lane in each direction along Mesa Street between San Antonio Avenue and Father Rahm Avenue. The northbound lane would be shared-use.

The southbound shared-use lane would be accompanied by a potential vehicle-only lane along Mesa Street north of Mills Avenue and along Oregon Street north of Paisano Drive. The northbound shared-use lane would be accompanied by a vehicle-only lane along Stanton Street north of Mills Avenue. As noted above, there would not be a second vehicle-only lane in one of the directions on Mesa Street between Mills Avenue and Father Rahm Avenue.

This situation would be similar to the existing condition where buses stop in a travel lane to allow passengers to board at a station and, although it may decrease the average speed of traffic, would likely not differ much from existing conditions.

Bus routes currently exist along segments of the Alternative 2 alignment. These existing bus routes coincide with the proposed streetcar route alignment and assumed stop locations. Alternative 2 station stops would also include the Glory Road Transfer Station and the Bert Williams Downtown Transfer Center.
Besides the required implementation of streetcar infrastructure, existing infrastructure that may be impacted includes bridge locations over I-10 and the Bataan Memorial Railroad Trench along Oregon and Mesa Streets as noted in Alternative 1.
Exhibit 1.18 Alternative 2 Typical Section
Exhibit 1.19 Alternative 2 Typical Section (continued)
Exhibit 1.20 Alternative 2 Typical Section (continued)
Exhibit 1.21 Alternative 2 Typical Section (continued)
Exhibit 1.22 Alternative 2 Typical Section (continued)
Exhibit 1.23 Alternative 2 Typical Section (continued)
Exhibit 1.24 Alternative 2 Typical Section (continued)
Alternative 3

The typical sections for Alternative 3 are shown in Exhibit 1.25 and 1.26. Below is a summary of the details in the typical sections:

- A shared-use lane would be utilized in most locations northbound and southbound along Oregon Street.

- Along Oregon Street from Glory Road to Schuster Avenue it is anticipated that a proposed BRT/bus lane will be available and will be used by the streetcar in addition to a vehicle-only lane in each direction.

- Based on plans that are currently being constructed along Oregon Street, the northbound and southbound shared-use lanes would not be accompanied by another lane to serve as a vehicle-only lane in each direction from Schuster Avenue to Yandell Drive.

- There would be only two lanes, both shared-use, along Oregon Street from Paisano Drive to 4th Avenue.

Due to differing stop locations and travel speeds, the streetcar may impact bus operations in the BRT/bus lane but would not impact vehicular traffic.

Currently, Oregon Street south of Arizona Avenue is one-way southbound. The proposed streetcar route includes a northbound movement. A solution in this area is to provide a northbound shared-use lane for streetcar operations. This solution, however, would require adjustment of existing traffic operations.

Bus routes currently exist along the Alternative 3 alignment. Also, the Smart 101 bus route travels along Oregon Street from the Bert Williams Downtown Transfer Center to Kerbey Street, and this route operates approximately every 10 minutes on weekdays during peak hours and every 15 minutes during non-peak weekday hours. These existing bus routes coincide with the proposed streetcar route alignment and assumed stop locations. Alternative 3 station stops would also include the Glory Road Transfer Station and the Bert Williams Downtown Transfer Center.

The same infrastructure issues associated with Alternative 1 are found in this Alternative.
Exhibit 1.25 Alternative 3 Typical Section
Exhibit 1.26 Alternative 3 Typical Section (continued)
Alternative 4

The typical sections for Alternative 4 are shown in Exhibits 1.27 through 1.29. Below is a summary of the details in the typical sections:

- Shared-use lanes would be utilized northbound and southbound along Mesa Street from Glory Road to Mills Avenue and along Oregon Street from Mills Avenue to 4th Avenue.

- There are five lanes along Mesa Street north of Franklin Avenue with two travel lanes in each direction. In each direction, one lane would be used for a shared-use lane and the other would be a vehicle-only lane. The middle lane would be used as a dual-direction left-turn lane.

- Four lanes are present along Mesa Street between Franklin Avenue and Main Street, including two lanes in each direction; one lane in each direction would become a shared-use lane.

- There is a three-lane section along Mesa Street between Main Street and Mills Avenue. One lane in each direction would become a shared-use lane. There would be one vehicle-only lane which would be used either in a northbound or southbound direction.

- There are three lanes along Oregon Street south of Mills Avenue, two of which would be used as southbound and northbound shared-use lanes. There would be one vehicle-only lane which would be used either in a northbound or southbound direction.

For most of the route along Mesa Street, a shared-use lane and a vehicle-only lane would be provided in both directions. Since parking is not provided along Mesa Street north of Main Street, the situation with the streetcar would be similar to the existing condition where buses stop in a lane to allow passengers to board at a station and, although it may decrease the average speed of traffic, would likely not differ much from existing conditions.

Currently, Oregon Street south of Mills Avenue is one-way southbound. The proposed streetcar route includes a northbound movement. A solution in this area is to provide a northbound shared-use lane for streetcar operations. This solution, however, would require adjustment of existing traffic operations.

Bus routes currently exist along the Alternative 4 alignment. These routes would, at a minimum, coincide with the proposed streetcar route alignment and assumed stop locations. Alternative 4 station stops would also include the Glory Road Transfer Station and the Bert Williams Downtown Transfer Center.

Besides the required implementation of streetcar infrastructure, existing infrastructure that may be impacted includes bridge locations over I-10 and the Bataan Memorial Railroad Trench along Mesa Street as noted in Alternative 1.
Advantages/Disadvantages between Routes

Through the evaluation of the screening criteria, most of the alternatives for the streetcar routes have similar features from an engineering perspective. The only notable issue is:

- Alternatives 1, 3, and 4 have locations where a shared-use lane may not have a vehicle-only lane in the same direction. In particular, these locations are along Oregon Street from Schuster Avenue to Yandell Drive, along Oregon Street from Paisano Drive to 4th Avenue, and along Mesa Street between Main Street and Mills Avenue. Vehicular traffic may see additional delay without a vehicle-only lane in addition to the shared-use lane.

- Alternatives 1 and 2 split the streetcar alignment by direction while Alternatives 3 and 4 include both directions on the same arterial street. Operating both directions on one street is likely to be more easy for riders to understand and is likely to have greater impact on the development of that street. The infrastructure requirements would be slightly less with all the catenary power infrastructure on one street. On the other hand, the impacts on traffic and parking on the selected street may be greater with bidirectional streetcar service on one street.

Conclusion of Fatal-Flaw Analysis

Based on the evaluation of routes using the screening criteria, there are not any engineering fatal flaws along the possible alternative routes.
Exhibit 1.27 Alternative 4 Typical Section
Exhibit 1.28 Alternative 4 Typical Section (continued)
Exhibit 1.29 Alternative 4 Typical Section (continued)
1.3 **PREFERRED TECHNOLOGY**

There are several options available for the type of equipment for the new streetcar system:

- Modern LRT (Light Rail Transit) cars,
- Modern Streetcars,
- Replica/Vintage Streetcars, and
- Restored Streetcars.

The modern LRT car is commonly used in many new transit and commuter systems throughout the United States. These vehicles are normally used for route distances around 20 miles. LRT vehicles generally travel up to speeds of 66 mph, which is a faster speed than those on a typical streetcar system. The LRT vehicles are located on lines needing a higher capacity and needing higher boarding elevations than a typical streetcar. The articulated vehicles are usually over 90 feet in length, considerably longer than a streetcar, and they usually have two or more rail cars coupled together in train consists. An example of this type of system is the MetroRail system in operation in Houston.

The modern streetcar is used more in urban areas and operates at slower speeds, of around 43 mph, generally has a lower boarding elevation than the LRT, and typically is around 66 feet in length. These modern streetcars generally cost $3.5 million to $4.5 million each.

Replica/Vintage streetcars are newly constructed vehicles, including body, trucks, wheels, equipment, and interiors, designed to look like the older streetcars. The new equipment can accommodate curves with a 50-foot radius (40-foot radius minimum) and can be produced in about nine months from the date of order at cost of $1.0 to $1.2 million. These streetcars are typically around 50-feet long, have a capacity of 88 people, and travel at speeds of 30 mph.

Restored streetcars include the potential restoration of the existing nine Presidents’ Conference Committee (PCC) cars currently in storage in El Paso. Three previous studies, conducted in 1993, 2002, and 2008, evaluated the condition of these cars and provided estimated costs needed to rehabilitate and remanufacture the cars to meet today’s streetcar standards. These studies found that the cars deteriorated over time while in storage, and the estimated cost to restore and bring them to standard increased 63 percent from 1998 to 2002. The most recent report indicates a total cost of up to $20.4 million and approximately 30 months to get the existing nine PCC cars ready for active service. This estimate considered total reconstruction of the cars with new modern running gear, along with restoration of the vintage streetcar bodies and interiors at an average cost of about $2.28 million per car. These estimates not only include renovation work, but upgrades such as air conditioning, optional battery operated power, and handicapped access. These types of improvements will require major upgrade work such as developing a location under the car to support a unit to
convert AC electric power to DC electric power, routing the air conditioning duct work through the car, and placing air conditioning units and power units for handicapped lifts.

Technology now provides the ability for both the new and renovated streetcars to operate on battery power for up to six hours before recharging through the overhead electric system or, for instance, at the maintenance facility overnight. Just as purchasing a new family car, each upgrade comes with an additional cost. Upgrades to either new or renovated cars would include the ability to have air conditioning, travel using battery power, and handicapped lifts. It should be noted that rail technology has been analyzed for this study since this study is a trail transit study. Rubber-tire technology, such as streetcars with tires, has not been examined.

Based on the constraints of turning movements along the streetcar routes, typical travel speed, capacity, as well as costs and the timeframe to implement the system, the replica/vintage streetcars are recommended with their respective estimated cost incorporated into the overall cost estimates in Section 1.5. These streetcars allow an acceptable turning radius to make movements at Mills Avenue and are more cost effective than the other streetcar options. These streetcars would need to use battery power when vertical conflicts occur or when traveling to and from the maintenance facility locations where the overhead electric line would be eliminated.

1.4 **INFRASTRUCTURE REQUIREMENTS**

The operation of a streetcar system generally requires the following infrastructure:

- Roadway track slab supporting the rail,
- Overhead power line,
- Substations for overhead wire,
- Maintenance and storage facility/crew facility,
- Existing utility modifications, and
- Passenger stations.

These requirements will be needed for each of the alternatives discussed in section 1.2.

**Roadway Infrastructure**

General streetcar infrastructure includes a concrete pad for the proposed streetcar track as well as an overhead wire along the route to provide electricity to run the streetcars. The concrete pad is generally eight feet in width and would utilize a standard track gauge of 4’-8 ½” between rails. This pad would be located in the shared-use lanes as discussed in the evaluated alternatives in section 1.2.
Additionally, rails will be in a rubber rail boot to provide electrical isolation. Locations where turnouts and other track geometry are present may increase the width of the concrete pad.

The overhead wire would be located about five feet above the streetcar making it about 18’ above the top of rail and would likely connect to supporting structures outside of the roadway width. This wire typically carries a voltage of 600 volts. As the streetcar and trolley pole pass along the overhead wire, the wire would rise about 6” to 12” then drop back to its normal level. Connections to the overhead wire may be connected to adjacent buildings or to utility poles along the sidewalk area; the connection locations would need to be further analyzed to take into account structure heights, available width outside of the roadway, and aesthetics.

There are existing utilities along the streetcar routes that will be impacted by the required infrastructure for the streetcar system. According to as-built drawings for Oregon Street, existing underground utilities along Oregon Street include water, gas, and storm sewer systems; it is likely that sanitary sewer lines as well as fiber optic cable lines are in the area. Available drawings for Mesa and Stanton Streets could not be located to determine utility impacts to these routes. It is likely, however, that utility adjustments and relocations would need to be included as part of the installation of infrastructure improvements for the streetcar system for all route locations. In addition, adjustments to the existing traffic signals may be required in certain locations to avoid conflicts with the overhead wire. The costs of utility relocation are included in the cost estimate of section 1.5 using standard percentages of the track costs.

**Maintenance and Storage Facility**

A maintenance and storage facility is necessary for the implementation of a streetcar system. The maintenance facility provides a location for general maintenance and cleaning of the streetcars and includes the equipment and tools necessary to implement routine maintenance and long-term repairs. The storage portion of the facility provides an area in which to house additional streetcars that may not be in day-to-day service as well as the active streetcars during non-operational hours.

Generally, a maintenance facility would be designed similar to that shown in Exhibit 1.30. The facility would likely include two repair bays in the building; one bay would include an inspection pit and the other bay would utilize a jib crane for repairs on the streetcars. Welding equipment and cleaning equipment, including vacuum connections, would be provided in the maintenance facility. A building for use by operations and maintenance staff with restrooms and an office would also be included as part of the facility. The operations/maintenance staff building may also be used for switching of streetcar crews.

Four potential locations have been identified for a maintenance and storage facility. The first two locations are located on existing UPRR right-of-way. One is
located south of Loop 375 and east of Oregon Street. This location would require additional track for five blocks along Oregon Street from Father Rahm Avenue to south of Loop 375 and would include a maintenance and storage facility extending under the Stanton Street overpass south of Loop 375 near the UP International Yard. The second location would be south of the Bert Williams Downtown Transfer Center and on the south end of the BNSF Santa Fe Yard. This location would require additional track for two blocks from Father Rahm Avenue to 7th Avenue along Santa Fe Street.

Two additional locations were identified by members of the advisory committee based on likely availability. One alternative would be the old streetcar facility location at Olive Avenue and Colton Street, which would require approximately nine blocks of additional track from the nearest streetcar route. The other location is between I-10 and Paisano Drive west of Durango Street at an existing bus storage facility; these buses would be stored at a new location prior to implementation of the streetcar facility. This location would require additional track for approximately 21 blocks to provide streetcar access to the facility.

Cost estimates for the maintenance facility can all be considered identical because the overall footprint of the facility would be the same for each location. Since this study does not address property and real estate costs, these costs are not included in the estimates. The only remaining variable that impacts the maintenance facility cost would be the additional track feet needed to construct the embedded track structure from the streetcar route to the maintenance facility. Given the current technology of streetcars being able to travel up to six hours on battery power gives them the ability to travel to and from their primary route to the maintenance facility without the need to install the overhead lines. Of the four potential locations for a maintenance facility, their relative travel distances between their primary route and the maintenance facility is two blocks, five blocks, nine blocks, and 21 blocks. For the purpose of this report the five-block distance was used in the overall cost estimate.

The most significant cost associated with the maintenance facility centers on its site location and would be impacted by land acquisition costs. Given this fact, it is recommended that an additional study be made regarding the maintenance facility location noting the site requirements in this report.
Exhibit 1.30 Maintenance Facility
Substations for Overhead Wire

As noted earlier, part of the infrastructure for the operation of the streetcar system is an overhead wire to provide electricity to the streetcar. This overhead wire would collect its electricity from substations placed in locations along the route of the streetcar system. Generally, each of these substations requires 10 feet by 10 feet (100 square feet) for installation.

The substations may be needed at the northern, central, and southern sections of the streetcar route. There would likely be a break in the overhead wire due to clearance issues under the overhead pedestrian bridges along Oregon Street, which would likely create a break in substation limits. A counterweight mechanism would be needed at the pedestrian bridges to maintain tension in the overhead wire.

Passenger Stations

Each streetcar passenger station would include lighting and a shelter. It would likely be similar to a bus or BRT shelter with a raised platform. We have assumed for the purposes of this preliminary study that streetcar passenger stations would generally be placed approximately two city blocks apart. Also, all of the streetcar stops must meet requirements set by the Americans with Disabilities Act (ADA). It is anticipated that adjustments for the platforms and adjacent wheelchair ramps would be minimal since the platform edge would be elevated approximately 12 inches above the roadway profile.

The streetcars would travel with the flow of traffic either adjacent to the curb or, where parallel parking currently exists, in the lane adjacent to the parallel parking spaces. In the locations where parallel parking spaces are at a streetcar passenger station, it is envisioned that a sidewalk bulb-out would be created to use the space in the parking lane for the streetcar station and at least one of the parking spaces would need to be removed to provide the required footprint for the passenger station. This station footprint would include space for the boarding platform, access ramp, station structure, and amenities (seating, waste-basket, ticket vending if needed, etc.). The width of the streetcar passenger station would include at a minimum the required two-foot warning strip running the full length of raised boarding curb, an additional minimum width of three feet for accessibility at the passenger station to meet ADA requirements, and the width of the proposed station shelter. Exhibit 1.31 shows an example of a streetcar passenger station located in an area with parallel parking spaces. The other alternative for a streetcar passenger station used when parallel parking is not present would be on the existing sidewalk along the curb. These locations would be consistent with the dimensions as shown in Exhibit 1.31.

In many cases, the streetcar passenger station may be in the same location as an existing bus stop. In this situation, the existing bus stop may require adjustments to existing infrastructure and additional amenities. This study has not examined or included the capital costs for a system for collecting fares or dispensing tickets at each streetcar passenger station. A fare collection method would need to be addressed in a subsequent study.
Exhibit 1.31 Typical Station Layout
1.5 **Order of Magnitude Capital-Cost Estimates**

Estimated order-of-magnitude costs for implementation of each of the streetcar alternative routes are included in Appendix A showing the detailed line item values. Since the streetcar system is still highly conceptual and not fully designed at this stage, the costs shown in the following estimates represent a preliminary estimate of probable costs prepared in good faith and with reasonable care. HNTB has no control over the costs of construction labor, materials, or equipment, nor over competitive bidding or negotiating methods and does not make any commitment or assume any duty to assure that bids or negotiated prices will not vary from this estimate. The cost estimates included in this study do not include operating and maintenance costs or projected revenues or any land acquisition costs.

Generally, the order-of-magnitude costs are similar for each alternative. The following assumptions were used for the estimates:

- There would not be any right-of-way costs since the streetcar infrastructure would be installed within existing right-of-way.
- A maintenance facility cost, including track infrastructure to the facility, is based on a track distance of five blocks from the streetcar route to the maintenance facility and design as described in Section 1.4 excluding any potential land acquisition costs.
- The replica/vintage streetcars were assumed for the estimate.
- A cost of 8 percent of the overall construction costs was estimated for utility relocations and adjustments. A cost of 2 percent of the overall construction costs was estimated for drainage improvements. This is based on engineering judgment and not on as-built drawings or utility investigations.
- A contingency of 20 percent of the overall construction cost was added for specific items that would not be included in an order-of-magnitude estimate.

The number of streetcars (four) required for operations was determined by developing preliminary estimates of the time for the streetcar to travel between passenger stations and to make stops at stations, traffic signals, and stop signs. Acceleration and deceleration was included as part of the calculations for each alternative. Speeds between the passenger stations would come close, but not achieve, the 30 mph speed limit throughout the alternative route alignments. This provided an overall trip time along the route for an individual streetcar. The route trip time divided by the time between streetcars (headways), of between 10 minutes and 15 minutes, ultimately identified the number of active streetcars for the system. An additional two streetcars (50 percent of the peak vehicle requirement) were also included in the cost estimates as spare vehicles to be used during routine maintenance or long-term repairs of the active streetcars.
The cost estimate summary for each of the routing alignment alternatives shows the following:

- Alternate 1: $88.9M;
- Alternate 2: $92.1M;
- Alternate 3: $88.4M; and
- Alternate 4: $89.6M.

These estimated values do not show a large difference in cost. This shows that items that will create the largest impact to the project cost will be specific line items defined by the local input. For instance, if there is a large desire to renovate the PCC cars rather than use the replica/vintage streetcars, the cost could increase by $6 million. If the decision were to obtain only five cars (one spare rather than two), that would reduce the cost by $1 million. Also, if the number of stations were changed, the overall cost would change. Given the above costs for the four alternative route alignments, the overall cost estimate can be characterized as about $90 million with the recommended replica cars, or $96 million with the renovated PCC.

1.6 **IMPLICATIONS FOR ULTIMATE ROUTE/SYSTEM DESIGN**

The implementation of a streetcar system along the evaluated routes will require adjustment of certain aspects of the roadways and surroundings where the streetcars operate. These include:

- Changes to traffic patterns and implementation of shared-use lanes,
- Possible elimination of or modification to some existing bus routes,
- Replacement of certain bus stops with streetcar passenger stations and removal of parking at stations as needed,
- Utility relocations/adjustments, including traffic signals, and
- Additional infrastructure along the route due to overhead wires and structures.

There are multiple locations where the operation of the streetcar would require adjustments to existing traffic patterns along the routes. In particular, along Oregon Street from Arizona Avenue to Main Street the existing roadway includes three southbound lanes; in Alternatives 3 and 4 the streetcar system would require a northbound movement. Also, the implementation of shared-use lanes may impact the flow of traffic where additional vehicle-only lanes are not available in the same direction. Locations where this occurs in the evaluated alignments are along Oregon Street from Schuster Avenue to Arizona Avenue and Paisano Drive to 4th Avenue, and along Mesa Street from San Antonio
Avenue to Father Rahm Avenue. This situation affects all alternatives in at least one location.

It should also be noted that market analysis has identified travel generators that suggest further refinement of the route to meet market needs. These alignments are physically and operationally feasible routes that serve the general market that has been identified and use the arterials identified in the project scope of services.

Depending on the streetcar route chosen by the City of El Paso, there is the possibility that existing bus routes may be eliminated or modified. It is also anticipated that a BRT system will be implemented in the near term. Removing the possible duplication of bus and streetcar routes would decrease the operating costs for the bus services if a streetcar route is constructed. Potential duplication of service is discussed further in sections 2.5 and 4.3.

In some instances there may be bus stops and streetcar passenger stations at the same street location. For these locations the bus stop would need to be reconfigured to meet the requirements of the streetcar passenger station as described in section 1.4. There are multiple locations throughout each alternative where existing bus stations may be used as streetcar passenger stations.

Utilities likely exist throughout each evaluated streetcar route. These utilities may include, but are not limited to, storm and sanitary sewer lines, gas lines, fiber optic cables, water lines, and underground electric lines. Existing utility lines under the streetcar track would likely need to be relocated to avoid closing the streetcar track for utility repairs. Further, traffic signal locations may be affected and need to be adjusted due to the overhead wire that would be required for the streetcar system.

The overhead wire would also require support from additional structures and additional wires to hold the overhead wire in place. These additional structures may include existing buildings, depending on the height of the buildings, as well as poles outside of the roadway limits. Aesthetics would need to be considered during the design of the streetcar system since poles and additional wires may affect the overall visual appearance of the area.
2.0 Market Demand Analysis

The market demand analysis performed in this study included an identification of the potential populations that may benefit from the rail transit system as part of an effort to document the existence of a market for the service and the overall value of the system. However, the scope did not call for the development of ridership estimates, a task that would require substantial additional effort.

To identify the markets that could benefit from the possible rail transit system, the study team examined information describing the travel markets. This information included population, employment, traffic conditions, ridership on intersecting bus routes, including proposed bus rapid transit (BRT) routes recently approved by the El Paso City Council. In addition to examining readily available information from a variety of sources, interviews were conducted with representatives of a number of key stakeholders, including City Representative Steve Ortega, Deputy City Manager Jane Shang, staff members from the planning, engineering and economic development departments of the City, and representatives from Sun Metro, El Paso MPO, El Paso Convention and Visitors Bureau, El Paso Regional Economic Development Corporation, El Paso Downtown Management District, UTEP and consultants working with the City on other transportation and development projects.

2.1 Target Markets Who Could Benefit

Table 2.1 identifies major target markets for the streetcar. These fall into six general groups:

1. Resident Work/School Trips,
2. Resident Nonwork Trips and Nonhome-Based Trips,
3. Special Event Trips,
4. Border Crossings From Mexico, and
5. Other Visitor Trips.

The streetcar would have most appeal to those who can make their entire local trip on the streetcar, i.e., have a one-seat ride, however, among some markets there may be potential for use of the streetcar in combination with other local travel modes such as the proposed BRT or other Sun Metro bus routes.
### Table 2.1 Identification of Potential Streetcar Markets

<table>
<thead>
<tr>
<th>Travel Market</th>
<th>One-Seat Ride</th>
<th>Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resident Work/School Trips</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home to work/school within the corridor</td>
<td></td>
<td>Primarily</td>
</tr>
<tr>
<td>BRT transfers for trips outside the corridor</td>
<td></td>
<td>All</td>
</tr>
<tr>
<td><strong>Resident Nonwork and Nonhome-Based Trips</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Downtown Workers to UTEP/Cincinnati Avenue Area and Kern Place Business District</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>UTEP/Cincinnati Avenue and Kern Place Business District Workers to Downtown Area</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>Corridor Residents to Union Plaza District</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>Corridor Residents to Cincinnati Avenue Area and Kern Place Business District</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td><strong>Special Event Trips</strong></td>
<td>From Remote Parking; To Bars and Restaurants</td>
<td>Primarily</td>
</tr>
<tr>
<td>Sun Bowl and Haskins Center</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Downtown Sport Arena</td>
<td>Primarily; Also from Remote Parking</td>
<td></td>
</tr>
<tr>
<td>Other Downtown Events</td>
<td>Primarily; Also from Remote Parking</td>
<td></td>
</tr>
<tr>
<td><strong>Border Crossings from Mexico</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexican residents commuting to work</td>
<td>Primarily</td>
<td>Some</td>
</tr>
<tr>
<td>Mexican college students commuters to UTEP</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>Mexican day visitors to shopping, medical, entertainment</td>
<td>Primarily</td>
<td>Some</td>
</tr>
<tr>
<td><strong>Other Visitor Trips</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visitors staying in hotels in the corridor</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>“Park-Once” tourist travel and “fun” trips</td>
<td>All</td>
<td></td>
</tr>
</tbody>
</table>

Each of the markets is discussed below.

#### Resident Work/School Trips

**Home to Work/School within the Corridor**

By providing frequent service along the corridor, the streetcar will provide convenient access to jobs and schools for residents of the corridor. A one-seat ride could be provided to those students and workers who live along the corridor. Others may use the streetcar with a transfer if they do not have a one-seat ride on their bus route or there is not another preferred option. It should be noted that
the Sun Metro Route 70 provides a direct express bus from the east side of El Paso to UTEP and El Paso Community College (EPCC) Rio Grande Campus (via Oregon Street) carrying about 5,000 to 6,000 students per month. Competition between the streetcar and the BRT may be key issue particularly for transfer trips from other routes at key transfer locations served by both. Factors in the choice between BRT and the streetcar would consider travel time, frequency, fare policy, and location of the bus stops.

UTEP is the largest educational institution along the corridor with a student enrollment of about 22,000 (in 2010). Note that UTEP is primarily a commuter school and involves daily trips by the vast majority of the students; there are only 625 student beds on campus (including 200 opening this fall) although some students also live in adjacent areas such as the Sunset Heights area south of the campus. The vast majority of the students are undergraduate students and about 60 percent are full-time. Very few students would be served with a one-seat ride from home to the campus although others might use the streetcar as part of a transfer trip. Information provided by UTEP on the registered residential zip code of students from fall 2004 indicated that 2,023 (full-time equivalent) students – just under 13 percent of the student body – lived in the south central and downtown zip codes (the former extending beyond the end of the streetcar corridor at Glory Road up to Executive Boulevard). Only a subset of these can be expected to reside within walk distance of the proposed streetcar. While some of the campus is within the study area envelope, the route alignment of the streetcar as envisioned would require a several block walk (at least one-third of a mile) to reach the center of the campus. The walk would be one to two blocks shorter if the alignment were on Oregon Street as opposed to Mesa Street or Stanton Street. Currently, SunTran Smart 101 buses operate on Oregon Street as does the Miner Metro, which makes additional stops at other campus perimeter locations; buses are not allowed to use University Avenue or Hawthorne Street to enter the campus core. The proposed Mesa BRT would assume the Smart 101 alignment on Oregon Street. Thus all of the transit service would require a several block walk from Oregon Street. The BRT does not have a planned station at University Avenue and we understand that local bus service will be modified to provide access to the bus stops along the perimeter of the UTEP campus.

It should also be noted that student parking is limited to the most remote parking lots (Blue, Green, and Silver lots) and that students who drive to UTEP must use Miner Metro shuttle buses to get near their campus destinations. The total number of parking spaces outside the inner campus numbers about 8,300. The Green lots are the most remote with the lowest cost passes and are located primarily on Sun Bowl Drive north of the Haskins Center. With the proposed northern terminus of the streetcar alignment at Glory Road, the streetcar would not serve this market. An extension of the streetcar from the proposed corridor’s Glory Road terminus to these lots was not examined in this study; it was noted by UTEP representatives that it may be difficult to do so due to the existing street network and topography.
UTEP has 2,549 employees, of which 954 are faculty. Most employees drive and have access to closer-in parking spaces.

Besides UTEP, there are other educational institutions located directly along the corridor, including El Paso Community College’s Rio Grande Campus, with an enrollment of 5,000. Cathedral High School, a private Roman Catholic institution located on Stanton Street, has an enrollment of 500.

There are a number of major employers along the corridor; the largest concentrations of employment are in the Downtown Core, at UTEP and at the two private hospitals along Oregon Street and Mesa Street. Table 2.2 summarizes major employment locations:

Table 2.2  Major Employment Locations

<table>
<thead>
<tr>
<th>Employer/Building</th>
<th>Location</th>
<th>Blocks from Oregon Street</th>
<th>Employees</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTEP</td>
<td>West of Oregon</td>
<td>4-5</td>
<td>2,549</td>
<td>954 are faculty</td>
</tr>
<tr>
<td>(Center of Campus at Hawthorne and University)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>El Paso Community College- Rio Grande Campus</td>
<td>Oregon</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Las Palmas Hospital</td>
<td>Oregon</td>
<td>0</td>
<td>1,400</td>
<td></td>
</tr>
<tr>
<td>Providence Hospital</td>
<td>Oregon</td>
<td>0</td>
<td>1,600</td>
<td></td>
</tr>
<tr>
<td>Cathedral High School</td>
<td>Stanton</td>
<td>1</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Cortez</td>
<td>Mesa</td>
<td>1</td>
<td>300</td>
<td>estimated</td>
</tr>
<tr>
<td>City Hall</td>
<td>West of Santa Fe</td>
<td>1</td>
<td>1,100</td>
<td></td>
</tr>
<tr>
<td>Chase Building</td>
<td>El Paso</td>
<td>1</td>
<td>1,200</td>
<td>estimated</td>
</tr>
<tr>
<td>Wells Fargo</td>
<td>Kansas</td>
<td>2</td>
<td>1,200</td>
<td>estimated</td>
</tr>
<tr>
<td>Stanton Building</td>
<td>Stanton</td>
<td>2</td>
<td>600</td>
<td>estimated</td>
</tr>
<tr>
<td>300 E. Main Street</td>
<td>Stanton – Kansas</td>
<td>2</td>
<td>400</td>
<td>estimated</td>
</tr>
<tr>
<td>County Court</td>
<td>Campbell – Florence</td>
<td>3</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>State Building</td>
<td>Kansas</td>
<td>3</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td>New Federal Courthouse</td>
<td>Florence</td>
<td>5</td>
<td>500</td>
<td>estimated</td>
</tr>
</tbody>
</table>

An analysis of home to work trips in the El Paso MPO’s regional travel demand model\(^1\) for 2007 indicates that only approximately 1,030 one-way trips (500 round trips) are made by all modes of travel from home to work entirely within the corridor due to the reliance on information at the traffic analysis zone (TAZ) level, which does not exactly match the catchment area boundary, this is a “best estimate” subject to considerable uncertainty.\(^2\) (Exhibit 2.1 shows the selection of 55 TAZs as the best match for the catchment area.) Of course, only a percentage of the internal work trips would use the streetcar since some may find it more convenient to walk or use a private automobile, bus, future bus rapid transit vehicle, bicycle, etc. Applying a percentage to this small base of trips undoubtedly would yield a small ridership estimate. If the future residential population of the downtown and the corridor increases (as is one objective of the 2015 Downtown Plan, which identified a goal of up to 2,300 new units of housing in its somewhat different downtown study area), this number would also increase.

From this same data source, we observe that about 40,000 home-based work one-way trips\(^3\) are made between the study area and external locations.\(^4\) These trips which have only one trip end in the catchment area (either home or work place but not both) would need to transfer to another travel mode (e.g., bus or BRT vehicle) to make use of the streetcars a result they are much less likely to use the streetcar, particularly if they have a one-seat ride on another bus or BRT route. BRT transfers are discussed further in the next section.

To shed some additional light on the current mode choice for home to work trips, Exhibit 2.2 shows the share of work trips by residents of the various TAZs in the catchment area that are made by transit and walking, based on 2000 Census Journey to Work data. Note there are a number of downtown area TAZs both north and south of I-10 where there are substantial mode shares for each mode even though transit accounts for a tiny share (2 percent) for the county as a whole.

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1 The El Paso MPO regional travel demand model is undergoing revision. This information is from the current model.

2 To understand the uncertainty associated with this approximation, note that about 160 trips are made to and from TAZs contained entirely within the catchment area but 2,280 are made to and from TAZs partially contained in the catchment area.

3 One-way trips include trips in each direction; that is, each round trip equals two one-way trips.

4 As explained above, this “best estimate” is subject to similar uncertainty, varying from 17,000 including only TAZs fully contained in the catchment area to 50,000 including any TAZ partially contained in the catchment area.
Exhibit 2.1  Estimation of Trips in Catchment Area

<table>
<thead>
<tr>
<th>Trip Purpose</th>
<th>Intra-catchment area trips</th>
<th>All trips with one end outside of the catchment area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home-based non-Work</td>
<td>11,607</td>
<td>78,635</td>
</tr>
<tr>
<td>Home-based Work</td>
<td>1,029</td>
<td>39,964</td>
</tr>
<tr>
<td>Non-home-based</td>
<td>11,724</td>
<td>62,044</td>
</tr>
</tbody>
</table>

Source:  TAZ, El Paso Metropolitan Planning Organization.
BRT Transfers for Home-Based Work and School Trips that Originate Outside the Corridor

BRT will serve as a commuter mode linking the downtown area with residential communities and activity centers to the north and east of downtown. It will provide a higher speed travel mode compared to local bus service and will have more widely spaced bus stops. Some BRT travelers will make their entire trip on the BRT bus without transferring to other routes while others will require a transfer either at their origin or destination or perhaps at both within the corridor, the streetcar could be used in the same manner as any local bus or circulator service to reach locations not directly served by a BRT station. It is particularly noteworthy that the Mesa BRT will have not have a station at University Avenue near the center of the UTEP Campus but will stop only at the Glory Road Transfer Center, Hague Road, and Rio Grande Avenue. The BRT project team has indicated that existing local bus service will be modified to allow for transfers at the Glory Road Transfer Center to provide access to the campus. The Miner Metro operates along Oregon Street and the perimeter of the campus and could provide such circulation unless it or another circulator service gains access to the core of the campus at the intersection of Hawthorne Street and University Avenue. It is our understanding that vehicular access to this area has been restricted by UTEP policy. Even if the Miner Metro is limited to its current route, it is likely to capture a greater share than the streetcar of the transfers destined to UTEP since it provides more coverage, it is very frequent, and it is a free service provided by UTEP.

The streetcar could provide more convenient access than the BRT to other destinations in the Golden Horseshoe District (along Oregon Street and Mesa Street) and along Mesa Street and Stanton Street north of the District if those route alignments are selected.
Exhibit 2.2  Journey to Work by Mode within the Comprehensive Study Area
2000

Source: 2000 Census SF3.
Resident Nonwork and Nonhome-Based Trips

While few home to work trips are currently made entirely within the streetcar corridor catchment area, many more trips are currently made from home to nonwork locations (e.g., home to shopping, home to recreation, home to personal business, etc.) and between two nonhome locations (e.g., workplace and shopping, workplace and medical, etc.). Before discussing specific types of such locations and the likely markets, it is useful to note the size of these current markets based on the MPO regional travel model data from 2007. The “best estimate” approximation of the streetcar corridor catchment area using the information at the TAZ level indicates that 11,600 one-way trips are made for home-based nonwork trips and 11,700 one-way trips are made for nonhome-based purposes entirely within the catchment area.\(^5\) It is these trips that would be the primary market for the streetcar. Again, only a percentage of the trips would use the streetcar, depending on the relative attractiveness versus other travel options. In addition, it should be noted, that the provision of a convenient and attractive travel mode connection could induce some latent demand among home-based nonwork and nonhome-based trips. That is, some individuals might opt to visit a particular nonwork location or make a trip that they are not making now because of the availability of the streetcar. While there are many more trips that have only one trip end within the catchment area (78,600 home-based nonwork and 62,000 nonhome-based trips in the best estimate), these may be much less likely to use the streetcar since a transfer would be required although some will do so.

Some specific submarkets are discussed further below.

*Downtown Workers to UTEP/Cincinnati Avenue Area (Kern Place Business District)*

Downtown El Paso has a significant and growing number of employees largely in the revitalizing core. Based on 2007 estimates, it appears that over 25,000 people work in the study area, about half (about 12,750) of these in the core downtown area within the study area (the streetcar catchment area) currently, the restaurant and shopping activities are concentrated in the newer area north of downtown known as the Kern Place Business District. By linking the downtown workers to these restaurant and shopping activities, the streetcar could serve a midday and after-work market. This nonhome-based market could include induced trips.

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\(^5\) This best estimate is subject to uncertainty with a range of 2,600 to 22,700 for home-based nonwork trips and 2,900 to 16,600 for nonhome-based trips considering only TAZs fully in the catchment area and considering all TAZs partially in the catchment area.
**UTEPE/Cincinnati Avenue Workers to Downtown Area**

The northern part of the corridor is host to many employees, including those at UTEP, the two hospitals, El Paso Community College and the Kern Place Business District. The total number of employees within the streetcar catchment area is almost 11,000 with about 8,000 of these north of Schuster Avenue. The streetcar could serve trips to the downtown area during the midday and after-work hours for personal business, entertainment, meals, etc. The downtown district contains about 35 restaurants as well as other attractions. This nonhome-based market could include induced trips.

**Corridor Residents to Union Plaza Entertainment District**

The Union Plaza District near the Convention Center and Union Train Depot is the primary nighttime entertainment district for young people in El Paso with numerous bars and restaurants. It is located several blocks west of the corridor. Sun Metro free shuttle service on Route 4 (Union Plaza Circulator) and Route 9 (Golden Horseshoe Circulator) is provided to this area. The potential to serve this market with a one-seat ride is further limited by the origin locations of these trips, particularly for home-based trips. It is likely that relatively few of these trips originate in downtown area residences, although there is a residential population in the northern part of the study area that could use the streetcar to access Union Plaza and the core of downtown. The streetcar might also be used for nonhome-based trips between the Union Plaza District and other dining and entertainment destinations such as the Cincinnati Avenue Entertainment area. A streetcar alignment that directly served the Union Plaza District might boost ridership potential.

**Corridor Residents to Cincinnati Avenue Entertainment Area and Kern Place Business District**

The Cincinnati Avenue Entertainment Area and the larger Kern Place Business District are key destinations for restaurants and bars and other businesses. The district contains over 20 restaurants. This area is beyond walk distance and is located uphill from the core of downtown El Paso. The proposed streetcar corridor would directly serve these districts and connect them to the downtown. A growing residential community in downtown could make use of the streetcar for access to this area for home-based nonwork trips. However, the number of residents in the downtown area is relatively small at the present time. The core of downtown (within the streetcar catchment area) is home to less than 750 residents (in 2007) however another 2,400 live south of Paisano Drive but within the catchment area of the streetcar. The portion of the catchment area between I-10 and Schuster Avenue is host to the largest number of residents, about 4,100. Fewer residents, about 2,000, live north of Schuster Avenue and very close to the Cincinnati area. Thus over 7,000 residents live south of Schuster Avenue in the catchment area and might use the streetcar to access the Cincinnati District. Providing the streetcar to connect these business districts to the downtown core
and adjacent neighborhoods could serve as a catalyst to residential development in the corridor. The Chamber of Commerce representative interviewed for this study believed that residential growth was key to the success of downtown and the link between the downtown and the Kern Place business district/Cincinnati Avenue entertainment areas was an important component of the strategy to encourage this development.

**Special Event Trips**

Many downtown transit projects serve high numbers of special event travelers. Many individuals who do not rely on transit on an everyday basis look to transit as a means of access when parking is constrained, including using transit for access from peripheral parking.

**UTEP Venues – Sun Bowl, Haskins Center, and Magoffin Auditorium**

The Sun Bowl is a football stadium on the campus of UTEP that has a seating capacity of 51,500 and is home to the UTEP Miners of Conference USA (that play six home games per season), and the late December college football bowl game, The Brut Sun Bowl. It also is a venue for large concerts. During Sun Bowl games, there is major traffic congestion and insufficient parking near the venue. Currently, some attendees reportedly use the parking at the Union Plaza Garage and take the Smart 101 bus to the UTEP campus. The proposed streetcar might serve a similar purpose linking the campus with remote parking for such events as well as providing a link to the other bus routes which terminate at the Bert Williams Downtown Transfer Center. As noted earlier, there is a very small residential market in the downtown core, so few riders would have a one-seat ride from home to the event venues. The alignments studied in this report did not directly serve the Union Plaza site. The potential use of the streetcar for this purpose may be very dependent on the final alignment of streetcar. The Glory Road Transfer Center is a few blocks from the Sun Bowl and is envisioned as the terminus in all of the alignment options. (This terminus was identified in the project scope of work.) While Union Plaza may not be adjacent to any of the proposed alignments, there are a number of other downtown parking facilities that could serve as remote parking for events particularly during non-business hours (evenings and weekends).

In addition to the Sun Bowl, the UTEP campus houses the Don Haskins Center, which is located adjacent to the Glory Road Transfer Center. The Don Haskins Center is the home of UTEP Miners men’s and women’s basketball as well as the site of numerous concerts. The seating capacity is 12,222. The streetcar would directly connect the Don Haskins Center with the core of Downtown. It should be noted that the Mesa BRT would also serve the Glory Road Transfer Center and provide similar connections from key BRT stations and the Downtown Transfer Center and would likely offer a faster trip. However, to the extent that the streetcar is designed as a fun mode of travel, it could attract riders on recreational trips.
Finally, the Magoffin Auditorium, a large lecture hall on the UTEP Campus with seating for 1,166, also is used as a site for smaller concert events. This facility is located in the core of the academic campus near the intersection of Hawthorne and University. This location is a few blocks’ walk from Oregon Street and from any of the candidate streetcar alignments or the existing bus or proposed BRT alignments.

**Potential New Downtown Sports Arena**

There has been discussion about locating a sports arena in downtown El Paso in or adjacent to the Golden Horseshoe District. The 2015 Downtown Plan identified three sites that had been identified by the City, all located just west of Santa Fe. The arena envisioned was to have up to 18,000 seats. If such an arena were built, it would create another strong market for special event trips. First, evening and weekend events at the downtown arena could make use of remote parking lots located at UTEP and the Sun Bowl. The streetcar could serve some of this shuttle demand if its alignment were close enough to the lots and the arena. The potential location of an arena and the status is unclear. As noted in the above discussion of UTEP trips, the currently proposed alignment does not directly serve the perimeter or remote parking lots at UTEP. Linking the Kern Place Business District with the arena would link a strong restaurant and entertainment district with a sport venue.

**Other Downtown Events**

There are events of various kinds held in downtown El Paso throughout the year. Al Fresco Fridays concerts held 24 times over the spring and summer at the Arts Festival Plaza attract up to 2,500 people per event. There is a two-day downtown street festival (Street Fest) held on two days, including Independence Day, which attracted some 30,000 people in 2009. Other downtown festivals and events include outdoor concerts in San Jacinto Plaza (five midday weekdays), the Plaza Classic Film Festival (10 days), and the Gay Pride Parade and Street Festival (1 day). The streetcar could provide the same function during these large events as described above for the Arena.

**Border Crossings from Mexico**

The streetcar would be designed to serve pedestrians and bus travelers entering the U.S. at the Paso Del Norte point of entry. The *Texas Center for Border Economic and Enterprise Development* (located at Texas A&M International University) provides monthly statistics on border crossings by mode and direction. The annual statistics for 2008, the last year with complete data for every month in both border directions, are provided below.

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6 The southbound data is provided by U.S. bridge operators and is compiled by the Center while the northbound data is provided by Mexico’s *Oficina de Caminos y Puentes Federales*.  

---
directions, show 6.97 million northbound and 5.12 million southbound crossings by pedestrians (yielding a daily average of 19,097 and 14,015, respectively) for all El Paso crossings combined. Comparing complete statistics for 2009 in the south-bound direction to 2008, we see a slight increase (1.6 percent), although a comparison of 2010 year-to-date crossing through August with the same period in 2009 shows a similar (1.4 percent) decrease. Anecdotally, we hear that Mexicans are dissuaded from coming to downtown El Paso by long border crossing delays; improving the rate of processing pedestrians would increase the market for the streetcar. The El Paso MPO has estimated that total pedestrian crossings between El Paso and Ciudad Juarez will increase 12 percent by 2025, although these forecasts may be subject to revision.

Data from the U.S. DOT Bureau of Transportation Statistics indicate 7.64 million pedestrian entries in the El Paso region in 2009, compared to 18.4 million in private vehicles and 0.3 million in buses. (This would translate to 20,925 pedestrians, 50,348 in private vehicle passengers and 854 bus passengers on an average day.) Most pedestrians enter the U.S. at the Paso del Norte although some use the Ysleta-Zaragoza Bridge or Bridge of the Americas. Buses use several crossings with the largest number at Bridge of the Americas, followed by Paso Del Norte.

Data from Texas DOT shows 72 percent or 5.38 million pedestrians crossed northbound at the Paso Del Norte in 2009, compared to 12 percent at the Bridge of Americas and 16 percent at Ysleta-Zaragoza. As a result, the number of pedestrians at Paso Del Norte is estimated at about 14,700 per day. Data for 2010 through September indicates that pedestrian crossings at Paso Del Norte are down 22 percent from 2009, perhaps related to the current situation in Juarez; the numbers would likely increase if the situation improved. Due to the current conditions in Juarez, it is assumed that the market consists largely of Mexicans entering the U.S. (as opposed to U.S. residents visiting Mexico), particularly in the case of pedestrians. The pedestrians come to El Paso for a variety of reasons, including work, school, shopping, medical, and entertainment purposes. These pedestrians may walk to activities located close the border in the downtown and Segundo Barrio area, including the Golden Horseshoe District or transfer to buses at the Downtown Transfer Center to travel to other destinations. While the potential market for the proposed streetcar has been distinguished in this report by trip purpose, the number of crossings by purpose is not available. However, data from a 1996 survey carried out by IMIP (the Juarez MPO) and supplied by the El Paso MPO (in the form of a summary presentation) sheds some light on trip purpose and access and egress characteristics, as described below. The summary indicated that there were 190,097 person-crossings per day (in all modes) at that time and that 88 percent (166,501) of these had both trips ends in the El Paso-Juarez region (thus, classified as local trips). Another 7 percent (13,162) had one trip end in the region and one external to the region (external-local trips). The remaining 5 percent (10,434) had neither end in the region (through trips). Pedestrian crossings are limited to those trips with at least one trip end in the region. Thirteen (13) percent (21,645) of local person crossings were on foot and 20 percent of external-local crossings (2,632) were on foot, yielding a total of 24,277 pedestrian crossings.
In 1996, two-thirds of the crossings were made by Juarez residents and one-third by El Paso residents. The Juarez residents were more likely to cross the border on foot – 18 versus 8 percent of El Paso residents. The survey provided information on the access and egress modes used to and from the point of entry (see Exhibit 2.3); this information was tabulated separately for each direction and for residents of El Paso and Juarez. Very few made automobile connections on both sides of the border and almost no one used taxis on either side of the border. Pedestrian crossers tended to be pedestrians on at least one side of the border. Among Juarez residents crossing on foot the most common mode combination was walking and bus (42 percent in the northbound direction and 55 percent in the southbound direction). (Based on the summary presentation data, it cannot be discerned on which side of the border the bus is used; it may be the case that the bus is used primarily on the Juarez side of the border.) The next most common mode combinations are walk-walk and walk-auto. Each has a similar share with about 17-18 percent in the northbound direction and 11 percent in the southbound direction. Bus-Bus is the next largest with 12 percent in the northbound and 10 percent in southbound. This is followed by bus-auto with less than 10 percent in each direction. El Paso residents show somewhat similar patterns. The greatest difference is that El Paso residents are much less likely to make walk-bus connections and more likely to make walk-walk and walk-auto connections.

**Exhibit 2.3  Comparison of Access Mode of Pedestrian Crossers – El Paso Residents Entering Mexico versus Juarez Residents Entering the U.S.**

Trip purpose reported on the survey (for all crossings not just pedestrians) shows that over three-quarters of trips are based at home (See Exhibit 2.4). For both home-based and nonhome-based trips, there were similar purpose categories – work, school, shopping, university, immigration business, and other (possibly including social-recreational and medical trips). The single biggest share was home-based
other (HBO) (34 percent), followed by home-based shopping (HBSH) (23 percent), home-based work (HBW) (14 percent). Nonhome-based (NHB) trips account for 22 percent overall, the largest share of which is nonhome-based other (12 percent). (These largely reflect return trips). Juarez residents were more likely to make trips to El Paso for work, school, university, and shopping than El Paso residents going to Juarez. The latter were largely for shopping or home-based other purposes.

While the data does not allow us to quantify each submarket, the following discusses the submarkets in somewhat more detail.

**Mexican Residents Commuting to Work**

The data from the 1996 survey suggest that 21 percent of Juarez residents crossing into the U.S. are making home-based work trips. Thus work trips could be an important component of the travel market given the large number of border crossings. These home-based work trips are not reflected in the current MPO demand model, but will be in the revised version of the model. Data was not available to examine the work-trip destinations of Mexican residents. Since many bus routes to all part of the El Paso region emanate from the Bert Williams Downtown Transfer Center, only those who work in the corridor would be in the streetcar market and some of them might still use other bus routes, BRT routes or other travel modes.

**Exhibit 2.4  Comparison of Trip Purpose for El Paso Residents Entering Mexico and Juarez Residents Entering the U.S.**

<table>
<thead>
<tr>
<th></th>
<th>El Paso SB</th>
<th>Juarez NB</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HB-O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HB-Sh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HB-Im</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HB-Sc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HB-U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HB-W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Key: NHB=Nonhome-Based, HB-O = Home-Based Other, HB-Sh = Home-Based Shopping, HB-Im = Home-Based Immigration Business, HB-Sc = Home-Based School, HB-U = Home-Based University, HB-W = Home-Based Work.
Mexican College Student Commuters to UTEP

UTEP reported that there are 1,800 Mexican nationals who attend UTEP and that the majority of these currently commute daily, using the Sun Metro Smart 101 bus from the Downtown Transfer Center. These students could use the proposed streetcar or the Mesa BRT which will replace the Smart 101 (which was a pilot for the BRT). It should be noted that the BRT will have limited stops and will likely have a travel-time advantage over the streetcar which would limit the market for the streetcar; a further limitation to use of the streetcar would be any alignment that is located east of Oregon Street since it will require a longer walk to the campus. If the BRT were to have a station at University Avenue it would likely be the more attractive option for travel from the Downtown Transfer Center, but the current plans do not show such a station identifying Hague Road and Glory Road as the nearest stations and suggest that transfers to a local bus connections would have to be made to reach the campus. The streetcar would provide a one-seat ride to University Avenue and would be very likely to attract riders in this market.

Mexican Day Visitors to Shopping, Medical, Entertainment

El Paso is a significant draw for Mexican visitors from Juarez. Several factors contribute to this. Reportedly, Mexicans favor the quality, selection and price of products in the U.S. (although price has become less of a factor than it had been) and they enjoy the shopping experience in the U.S. Shopping and entertainment in the U.S. has become even more attractive given the current circumstances in Juarez. However, day visitors currently prefer to be home in Juarez before dusk limiting their visit time in the winter. REDCO cited that spending by Mexican nationals accounts for about $1.5B of the total $8B El Paso retail economy or nearly 20 percent. This statistic highlights the potential importance of Mexican shoppers as a market for the streetcar provided that it serves attractive shopping destinations. While there is a considerable lower-end retail business in the Segundo Barrio adjacent to the border, Mexicans also are attracted to other shopping opportunities, including big box retailers and malls. These are largely located beyond the streetcar corridor and are served by other bus routes. Medical facilities in the U.S. also reportedly attract Mexican visitors, although the larger medical facilities are in the east side of El Paso.

The proposed streetcar may encourage trips to other shopping, entertainment and medical areas along the corridor that are beyond a short walk, in particular the Cincinnati Avenue entertainment area (Kern Place Business District), and the two hospitals on Oregon Street. However, it should be noted however, that these areas are now accessible by Sun Metro bus and that there is free circulator bus service in the downtown area.
Other Visitor Trips

Besides residents of El Paso and Juarez, visitors to the region may form a part of the market for the streetcar. Case studies of other streetcars have identified tourism as an important market. For example, the streetcar in Little Rock has enhanced the various tourism attractions in the area, including the newly built Clinton Presidential Library and the convention center, as well as events in the area, including concerts and the annual Riverfest. Tampa’s TECO line streetcar system serves the Florida Aquarium, the Convention Center, and the cruise ship terminal and was designed to serve tourists from Tampa’s cruise industry and conventions.

El Paso is part of the New Mexico tourist region. Visitation to El Paso includes conventioneers attending state and regional conventions at the Convention Center located on Santa Fe Street between Main Street and San Antonio Avenue at the northwest corner of the “horseshoe.” The primary hotel for the Convention Center is the Camino Real Hotel (357 rooms) across Santa Fe Street but larger conventions include visitors in hotels throughout El Paso. There are many day visitors who stop in El Paso while passing through on I-10; for travelers headed to California, El Paso is a convenient overnight stop. The vast majority of visitors are reported to be relatives and friends of residents. Fort Bliss is an important source of visitors since many visitors are associated with military families. Note that both U.S. military and German air force families are stationed at Fort Bliss for three to five-year periods. Visitation from Juarez and from the large Mexican State of Chihuahua is large and growing, with an increase reportedly attributed to the current violence in Mexico.

The El Paso Convention and Visitor Bureau does not maintain visitation statistics, but supplied information for the entire El Paso Metropolitan Statistical Area (MSA) prepared by the State’s Economic Development Tourism Division (Texas Destinations 2007-2008). Among the 2008 statistics on tourism were the following: 1) there were 2.27 million visitors and 6.26 million visitor-days in the El Paso MSA, 2) business purposes constituted 54 percent versus 30 percent statewide, 3) over 10 percent attended cultural venues, 4) only 39 percent arrived by auto versus 74 percent statewide, 5) transportation was nearly 50 percent of the cost per day versus 35 percent statewide, 6) over 65 percent were non-Texans versus just over 35 percent statewide, and 7) nearly 36 percent came from over 1,000 miles away versus nearly 16 percent statewide. With limited data on visitation, it is difficult to quantify this market, however, we describe two submarkets below.

Visitors Staying in Hotels in the Corridor

There are relatively few hotel rooms in the downtown numbering about 600, including the Doubletree (200 rooms), the Holiday Inn Express (110 rooms) as well as the primary convention hotel – the Camino Real (357 rooms). The Hilton Garden (153 rooms) is near downtown at UTEP. Most of the city’s 8,400 hotel rooms are near the airport in the east part of the city, far from the proposed...
streetcar corridor. The El Paso Convention and Visitor Bureau reported that during the recent Women’s bowling convention which brought 30,000 bowlers over a 100-day period in 2010, transportation was noted as a key issue since downtown restaurants did not stay open late or on weekends to serve the hotel guests – transportation to the Cincinnati Avenue area is deemed critical to serving these visitors and the streetcar was viewed by a Bureau representative as an ideal way to serve this market which may be averse to using a local bus.

A key factor influencing the likelihood of streetcar use among hotel visitors is whether they have a personal or rental car. While the data on visitors shows that many come from long distances and did not arrive in El Paso by car, no data was available on the relative use of rental cars.

“Park-Once” Tourist Travel and “Fun” Trips

Depending on the nature of the proposed rail system, there may be opportunities to make a ride on the streetcar an attraction in itself, for example, by using historic or heritage-look trolleys. Tourists in El Paso may find it convenient to park once and use a day pass on the streetcar to visit a variety of venues of interest.

Downtown El Paso contains a variety of attractions for visitors, including historic buildings, restaurant, bars, hotels, shopping, theaters, and museums.

The Golden Horseshoe District surrounding the corridor has over 300 shops with $350 million in annual retail sales. It was voted to be among the Greatest Places in America 2008. The Downtown Plan strategically targets this area for revitalization.

Table 2.3 lists the relevant cultural, entertainment and tourism venues in the corridor.
### Table 2.3  Cultural, Entertainment and Tourism Venues

<table>
<thead>
<tr>
<th>Venue</th>
<th>Location</th>
<th>Blocks from Oregon Street</th>
<th>Market Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Paso Public Library</td>
<td>Oregon – El Paso</td>
<td>0- 1/2</td>
<td>NA</td>
</tr>
<tr>
<td>El Paso Museum of Art</td>
<td>Santa Fe – El Paso</td>
<td>1 1/2</td>
<td>100,000 visitors per year</td>
</tr>
<tr>
<td>El Paso Museum of History</td>
<td>Santa Fe – El Paso</td>
<td>1/2</td>
<td>NA</td>
</tr>
<tr>
<td>Insights Science Museum</td>
<td>Santa Fe</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>Holocaust Museum</td>
<td>Oregon – El Paso</td>
<td>0</td>
<td>thousands of visitors per year</td>
</tr>
<tr>
<td>Lynx Exhibits</td>
<td>Chihuahua/Overland</td>
<td>2</td>
<td>NA</td>
</tr>
<tr>
<td>Plaza Theatre</td>
<td>Pioneer Plaza (El Paso)</td>
<td>1/2</td>
<td>2,000+ seats</td>
</tr>
<tr>
<td>Railroad and Transportation Museum</td>
<td>Durango</td>
<td>4</td>
<td>NA</td>
</tr>
<tr>
<td>Abraham Chavez Theater</td>
<td>Santa Fe</td>
<td>2</td>
<td>2,500 seats</td>
</tr>
<tr>
<td>Judson Williams Convention Center</td>
<td>Santa Fe</td>
<td>2</td>
<td>130,000+ SF, including 80,000 SF of exhibit space</td>
</tr>
<tr>
<td>Union Plaza Entertainment District</td>
<td>Durango – Anthony</td>
<td>5</td>
<td>NA</td>
</tr>
<tr>
<td>Cincinnati Entertainment District</td>
<td>Mesa – Stanton</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>San Jacinto Plaza (Park)</td>
<td>Oregon – Mesa</td>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>Arts Festival Plaza</td>
<td>Santa Fe</td>
<td>1</td>
<td>Hosts Al Fresco Fridays during the summer</td>
</tr>
<tr>
<td>Mills Pedestrian Plaza</td>
<td>Oregon</td>
<td>0</td>
<td>NA</td>
</tr>
</tbody>
</table>

The locations are shown in Exhibit 2.5.
Exhibit 2.5  Major Travel Generators within the Comprehensive Study Area
A summary of the markets identified in the section is provided in Table 2.4 below:

### Table 2.4  Summary of Potential Streetcar Markets (Not Ridership)

<table>
<thead>
<tr>
<th>Travel Market</th>
<th>One-Seat ride</th>
<th>Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resident Work Trips</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home to work/school within the corridor</td>
<td>1,030 daily work trips with the corridor in 2007; can expect some share to use the streetcar</td>
<td>40,000 daily work trips with one end in the corridor in 2007; very low share expected to use the streetcar</td>
</tr>
<tr>
<td>BRT transfers for trips outside the corridor</td>
<td>NA</td>
<td>2,400 BRT trips/day, some for work or school and included in above</td>
</tr>
<tr>
<td><strong>Resident School Trips</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>School trips are included in nonwork trips in model; About 25,000 U.S.</td>
<td>A small share of about 22,500 commuting students who live outside the corridor might use the streetcar for a transfer trip.</td>
</tr>
<tr>
<td></td>
<td>commuting students; about 10 percent or 2,500 in corridor catchment area; can expect some share to use the streetcar</td>
<td></td>
</tr>
<tr>
<td><strong>Resident Nonwork and Nonhome-Based Trips</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NHB Trips: Downtown Workers to</strong></td>
<td>23,300 daily trips within the corridor in 2007; can expect some share to use the streetcar</td>
<td>140,600 daily trips with one end in the corridor in 2007; very low share expected to use the streetcar</td>
</tr>
<tr>
<td>UTEP/Cincinnati Avenue Area and Kern Place Business District</td>
<td>25,000 downtown workers; some of these might use the streetcar for occasional midday/after work trips (some induced)</td>
<td>NA</td>
</tr>
<tr>
<td><strong>NHB Trips: UTEP/Cincinnati Avenue and Kern Place Business District Workers to Downtown Area</strong></td>
<td>8,000 area workers; some of these might use the streetcar for occasional midday/after work trips (some induced)</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Nonwork Trips: Corridor Residents to</strong></td>
<td>2,000 residents; some of these might use the streetcar for occasional entertainment trips</td>
<td>NA</td>
</tr>
<tr>
<td>Union Plaza District</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nonwork Trips: Corridor Residents to</strong></td>
<td>7,000 residents; some of these might use the streetcar for occasional entertainment trips</td>
<td>NA</td>
</tr>
<tr>
<td>Cincinnati Avenue Area and Kern Place Business District</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Market</td>
<td>One-Seat ride</td>
<td>Transfer</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Special Event Trips</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sun Bowl and Haskins Center</td>
<td><strong>51,500 and 12,200 seats respectively on event days only; possible use for remote parking access and link to Union Plaza district as well as some access for residents of catchment area</strong></td>
<td></td>
</tr>
<tr>
<td>New Downtown Sport Arena</td>
<td>18,000 seats; on event days only; possible use for remote parking access and link to Cincinnati district as well as some access for residents of catchment area</td>
<td>NA</td>
</tr>
<tr>
<td>Other Downtown Events</td>
<td>Event days only (not quantifiable); possible use for remote parking access as well as some access for residents of catchment area</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Border Crossings from Mexico</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedestrians</td>
<td>21,000 entries per day; mostly Mexican residents; most use walk or bus from POE; 20 percent work, 30 percent shopping; 9 percent school, 4 percent university</td>
<td>Some</td>
</tr>
<tr>
<td>Bus Passengers (all destinations)</td>
<td>Estimated 350-850 per day; very likely market among the share of these traveling in catchment area</td>
<td></td>
</tr>
<tr>
<td>Mexican college students commuters to UTEP</td>
<td>1,800 students (included in above); very likely market</td>
<td></td>
</tr>
<tr>
<td><strong>Other Visitor Trips</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visitors staying in hotels in the corridor</td>
<td>750 hotel rooms; use largely by those without autos/rental cars</td>
<td>NA</td>
</tr>
<tr>
<td>“Park-Once” tourist travel and “fun” trips</td>
<td>2,500 auto visitors per day</td>
<td>NA</td>
</tr>
</tbody>
</table>
2.2 **Population, Employment, Key Travel Generators and Transit Use**

**Population**

This section first describes overall population characteristics of the general study area and then the characteristics of the streetcar corridor catchment area and any differences discerned among the alternative route alignments.

*The County*

The Census estimates the 2009 population of El Paso County as 751,296 reflecting a growth of 10.5 percent since 2000. This growth rate is somewhat slower than the growth exhibited by the State as a whole (18.8 percent).

The percentage of the population 65 years of age and over was 10.6 percent which is slightly higher than the statewide figure of 9.9 percent. In 2009, 81.8 percent were of Hispanic or Latino origin. While 92.3 percent were white persons, only 13.6 percent were non-Hispanic white persons. Only 3.8 percent were black persons.

The median household income was $36,519 in 2008 (the latest available), which is well below the statewide level of $50,049. Similarly, the percentage of persons below the poverty level was 25.2 percent which is considerably higher than the statewide share of 15.8 percent.

*The City*

According to the Census, the City of El Paso contained the vast majority of the county’s residents, 609,415 (2006 estimate). The average population density in the city was 2,263 persons per square mile. The 2006 population was 8.1 percent higher than in 2000 (a roughly similar growth rate to the county when viewed on an annual basis).

The percentage of the population 65 years of age and over was 10.7 percent. In 2000 (the latest available), 76.6 percent were of Hispanic or Latino origin. While 73.3 percent were white persons, 3.1 percent were black persons.

Median household income in 1999 (the latest available) was $32,124 which was somewhat below the statewide level of $39,927. The percentage of persons below the poverty level was 22.2 percent in 1999.

*The Corridor*

The population density was examined for the streetcar corridor catchment area. For 2007 for which information was available by traffic analysis zone (TAZ), the density was thematically mapped in Exhibit 2.6. As can be seen there are pockets of high density (over 15,000 persons per square mile) in the catchment area, specifically in the downtown area (south of Magoffin and Paisano Drive, east of El
Paso Street especially east of Campbell) as well as in eastern Sunset Heights (west of El Paso Street) and east of Campbell between Arizona and East River Avenues. There are areas of moderate density (between 5,000 and 15,000 persons per square mile) in the Segundo Barrio near the border, in the area north of I-10 up to University Avenue and finally in the northernmost corner of the catchment area. The areas of lowest residential density are in the downtown core area located south of I-10 to Paisano Drive, due the preponderance of business uses there and also in the institutional and entertainment/business areas north of Schuster Avenue and University Avenue. The catchment area of the streetcar corridor does not include all of the highest density residential areas which extend eastward from the corridor.

The distribution of the total 2007 population is shown for four distinct parts of the catchment area in Exhibit 2.7. The largest number of residents (about 4,000) is contained in the portion between Schuster Avenue and I-10 while the smallest number (under 750) is in the core of downtown between I-10 and Paisano Drive. It also is noteworthy that the population within the downtown core tends to be located at the eastern and western fringes of this area.
Exhibit 2.6  2007 Population Density within the Comprehensive Study Area

Source: TAZ, El Paso Metropolitan Planning Organization.
Exhibit 2.7  2007 Population and Employment Totals by TAZ Regions within the Comprehensive Study Area

Source: TAZ, El Paso Metropolitan Planning Organization.
Contrasting the Four Route Alignment Options

The four route alignments examined exhibit small differences in the coverage of residential populations with each having at least 7,000 residents. The alignments that are located farther to the east (i.e., #2 and to a lesser extent #4) tend to cover a larger part of the high-density residential areas to the east. Perhaps a bigger factor contributing to the apparent differences is that because route alignments #1 and #2 consist of one-way pairs, the resulting coverage appears to be greater; this may not reflect real coverage benefits since the catchment area really is smaller for travel in each direction. Table 2.5 below shows the population within a catchment area for each alignment using a quarter mile walk distance.

Table 2.5  Comparison of Coverage by Route Alignment

<table>
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</thead>
<tbody>
<tr>
<td>#1</td>
<td>8,399</td>
<td>25,771</td>
<td>4,799</td>
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<tr>
<td>#2</td>
<td>8,626</td>
<td>25,094</td>
<td>4,816</td>
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<tr>
<td>#3(^{a})</td>
<td>7,007</td>
<td>24,194</td>
<td>4,684</td>
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<tr>
<td>#4(^{a})</td>
<td>7,115</td>
<td>23,497</td>
<td>4,700</td>
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</table>

\(^{a}\) Two-way operation on one street.

Key Demographic Characteristics of the Corridor

Transit use is typically highest among certain demographic groups, including low-income households, households without private vehicles, and among senior citizens. These demographic characteristics are described for the overall catchment area below.

Exhibit 2.8 show the locations in the catchment area which have the greatest share of persons below the poverty line based on 2000 Census block group data. The highest share of people below the poverty line (more than 75 percent) is exhibited in the areas just north of I-10 and a few pockets south of Paisano Drive and along the Border Highway. In general over half of the population is below the poverty level in the southern half of the catchment area.

Exhibit 2.9 shows the locations in the catchment area which have the greatest share of occupied households without vehicle access based on 2000 Census block group data. The highest share (over 75 percent) is exhibited in the core of the downtown. Over half of households are without vehicle access along the southern half of the corridor as well as in certain areas farther to the east. Generally, at least 25 percent of households are without vehicle access south of Schuster Avenue/Rim Road. On the other hand, the vast majority of the households to the northwest have vehicle access.

Exhibit 2.10 shows the locations in the catchment area which have the greatest share of persons aged 65 or over. The largest share (over 50 percent) is found in the
Exhibit 2.8  Percent of Population At or Below the Poverty Line within the Comprehensive Study Area

Source:  TAZ, El Paso Metropolitan Planning Organization.
Exhibit 2.9  Percent of Occupied Households without Vehicle Access within the Comprehensive Study Area

Source:  2000 Census SF3.
Exhibit 2.10 Percent of Population Age 65+ within the Comprehensive Study Area Envelope

Source: 2000 Census SF3.
core of the downtown. Other high shares (25 percent and over) can be found in the northern part of the corridor (north of University and Schuster Avenues and west of Oregon). In general, outside the downtown core, the share of senior citizens is lower in the areas with greater poverty.

Employment

The TransBorder 2035 Metropolitan Transportation Plan noted that employment in El Paso has increased considerably at an annual average rate of 2.3 percent between 1970 and 2004. It also noted that El Paso is an important provider of services to the maquiladoras located south of the border in Juarez and that its economy is closely tied to that industry. Unemployment in the city of El Paso remains above the state level but appears now to be under the national level (See Exhibit 2.11).

Exhibit 2.11 Employment Rates: City of El Paso versus State of Texas and USA

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<th>Year</th>
<th>El Paso</th>
<th>Texas</th>
<th>USA</th>
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<tbody>
<tr>
<td>2008</td>
<td>5.76%</td>
<td>4.85%</td>
<td>5.78%</td>
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<tr>
<td>2009</td>
<td>8.16%</td>
<td>7.50%</td>
<td>8.33%</td>
</tr>
<tr>
<td>2010 JUL-YTD</td>
<td>9.25%</td>
<td>8.88%</td>
<td>9.91%</td>
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</table>

Source: Data (preliminary figures subject to revision) provided by the Texas Workforce Commission and compiled by Texas A&M International University, Texas Center for Border Economic and Enterprise Development.

Note: Cities and State of Texas numbers represent “Actual” figures; U.S.A. numbers represent “Seasonally Adjusted” figures.

The Streetcar Corridor

Exhibit 2.12 shows the density of employment (at the job location) within the streetcar corridor catchment area. This is based on 2007 information by TAZ from the MPO. The greatest employment density (over 50,000 employees per square mile) is of course in the core of the downtown between I-10 and Paisano Drive and is largely east of Mesa Street except for the City Hall area located at
Exhibit 2.12 2007 Employment Density within the Comprehensive Study Area

Source: TAZ, El Paso Metropolitan Planning Organization.
the western end of downtown. The streetcar catchment area covers these areas well. The second greatest employment density (over 20,000 employees per square mile) can be found in the remainder of the downtown area between I-10 and Paisano Drive, as well as at UTEP and in the corridor between Mesa and El Paso Streets between Yandell Drive and River Avenue. The streetcar catchment area covers these fairly well although the UTEP campus is only partially covered (the size of the TAZs here may exaggerate the uncovered area but it is clear that the center of the academic campus is several blocks west of the candidate streetcar alignments and partially beyond the catchment area).

The distribution of the total 2007 employment is shown for four distinct parts of the catchment area in Exhibit 2.7 (previously cited). The largest number of jobs (about 12,750) is contained in the core of downtown between I-10 and Paisano Drive while the second largest number in the portion north of Schuster Avenue (over 8,000).

**Comparing the Four Route Alignment Options**

Differences among the route alignments in terms of coverage of employment (total and retail) are minor. The alignments that are on Oregon Street in the north part of the corridor tend to have better coverage since the employment there is concentrated in the west while the alignments that use Mesa Street for one direction in the south part of the corridor (Golden Horseshoe District) have better coverage since the employment there tends to be concentrated in the east. While employment coverage could be improved by shifting farther west in the north and east in the south, none of the candidate alignments examined use of any street west of Oregon in the north part of the corridor or any street east of Mesa in the south part of the corridor (consistent with the corridor definition in the scope of work).

Table 2.5, shown in the earlier section on population, also shows the employment (jobs) covered by each of the alignments. The total employment is the most relevant indicator of serving work trip-related travel. Retail employment is shown here as a proxy for retail activity and relates to shopping purposes. As can be seen in the table, the route alignments cover over 23,000 jobs. Given the location of the streetcar in a downtown area, it is logical that the number of jobs exceeds the residential population. As noted earlier, route alignments #1 and #2 consist of one-way pairs making the resulting coverage appear to be greater; this may not reflect real coverage benefits since the catchment area really is smaller for travel in each direction. Thus it is difficult to compare alignments #1 and #2 versus #3 and #4. Comparing alignment #1 with alignment #2 and alignment #3 with alignment #4, we can see that shifting from one arterial to another results in opposite effects on coverage of jobs and residential population; this is logical since the land uses vary by arterial.
Future Growth in Population and Employment

The El Paso MPO Study Area is forecast to grow significantly in the coming years. According to TransBorder 2035, the population in the El Paso MPO Study Area would be 1.13 million by 2035 reflecting a growth of 66 percent since 2000 and 51 percent since 2009. The population of the entire region, including Las Cruces, NM and Ciudad Juarez (Mexico) would reach 4.52 million by 2035, 114 percent over the 2000 population. Regional forecasts are being updated but are not yet available.

In the near term, the expansion of Fort Bliss brought about by the Army’s BRAC program is expected to bring approximately 20,000 additional troops (about double the 2008 numbers) and their civilian families by 2011 and the expansion of the Texas Tech Medical School to a four-year medical school is expected to draw in numerous students and professors, increasing employment by 5,600 by 2013. The economic impact is estimated at $20.9B for Fort Bliss by 2013 and at $316.3 million for Texas Tech Medical School by the time the school is fully expanded. While these developments are outside the streetcar corridor area, they affect the overall economic conditions in the city.

It should also be noted that the UTEP Master Plan Update for 2005 envisions 2.1 million gross square feet of new buildings at an average of three stories accompanied by 5,600 new parking spaces in eight garages. UTEP plans to develop underutilized parcels such as surface parking lots and/or redevelop sites with outdated buildings. Parking would be consolidated in perimeter decks and infill of new buildings would create higher density. Or particular relevance to the streetcar would be the plan to create a potential research and mixed use district on the North Campus infilling the area between Sun Bowl Drive and Mesa Street. Vehicular access would be from Mesa Street or Sun Bowl Drive but a path for pedestrians would be extended from the Oregon Street right-of-way (at Glory Road). The potential at this site is estimated to be 600,000 gross square feet of research space and 150,000 gross square feet of commercial/retail space supported by 1,600 parking spaces in three decks plus some surface short-term parking. Alternatively, UTEP could develop student housing there instead of research space and still incorporate some mixed use development. The 2005 plan envisioned a pedestrian zone in the core campus with University Avenue closed at the student union (just west of Oregon Street), as is the case today. The plan is undergoing further revision and refinement and development plans for the North Campus are underway.

The Corridor

Projected growth within the streetcar corridor catchment area is illustrated in Exhibit 2.13, which shows the projected growth in population by TAZ from 2007 to 2035. Growth areas tend to be in the northern half of the corridor catchment area, although some growth is also projected in the Union Plaza area and to a lesser extent in the southeast corner of the catchment area (the Segundo Barrio). Exhibit 2.14 shows the resulting population density in 2035 which looks largely
the same as 2007, except for some increases in density in the northeast corner of the study area between University Avenue and Cincinnati Avenue and between Schuster Avenue and River Road.

Exhibit 2.15 shows the projected growth in employment (jobs) by TAZ from 2007 to 2035. Growth is anticipated throughout the catchment area but it varies from TAZ to TAZ. The highest rate of growth (100 to 600 percent) is found in the middle of the corridor, between University Avenue and River Road and generally towards the east. The downtown core and the Segundo Barrio shows the lowest percentage increase (under 50 percent) as does the UTEP campus. However, these lower percentages are on a larger current base. As a result, it is more instructive to examine the projected 2035 employment density. Exhibit 2.16 shows that the 2035 employment density looks much the same except from some increases in the downtown and north of I-10 east of Stanton Street.

Retail employment growth is projected to occur in some parts but not all of the streetcar corridor catchment area or downtown area. Exhibit 2.17 displays the areas with the highest percentage increase in retail employment between 2007 and 2035. High-growth locations include the downtown core, the area to the east of the Stanton Bridge border crossing, the UTEP area and the area of Oregon Street between River Road and Yandell Drive.

**Key Travel Generators**

The streetcar corridor catchment area covers a wide variety of major travel generators, including the following types:

- Border crossings to Mexico (Points of Entry);
- Transit transfer centers and intercity transportation hubs;
- Educational institutions, including the University (UTEP), community College and high school;
- Government buildings and courthouses;
- Hotels;
- Hospitals and health clinics;
- Cultural centers, including museums, libraries, theaters;
- Entertainment districts, including restaurants and bars;
- Shopping and commercial business districts;
- Sports arenas, stadiums and concert venues; and
- Other public recreational locations.
Exhibit 2.13 Percent Population Growth within the Comprehensive Study Area
2007 to 2035

Source: TAZ, El Paso Metropolitan Planning Organization.
Exhibit 2.14 2035 Population Density within the Comprehensive Study Area

Source: TAZ, El Paso Metropolitan Planning Organization.
Exhibit 2.15 2035 Employment Density within the Comprehensive Study Area

Source: TAZ, El Paso Metropolitan Planning Organization.
Exhibit 2.16 Percent Employment Growth within the Comprehensive Study Area
2007 to 2035

Source: TAZ, El Paso Metropolitan Planning Organization.
Exhibit 2.17  Percent Change in Retail Employment within the Comprehensive Study Area
2007 to 2035

Source:  TAZ, El Paso Metropolitan Planning Organization.
The Corridor

Exhibit 2.5 (previously cited) shows the locations of these major travel generators in the overall streetcar catchment area. Note that the corridor catchment area includes many major travel generators but a few are located at the fringe or just beyond walk distance such as the Sun Bowl, much of the Union Plaza Entertainment District and the new Federal Courthouse. Venues distant from the corridor are not shown.

When looking at particular travel generators rather than overall density or growth, it is particularly useful to look at the coverage of particular route alignments, as described in the next section.

Comparing the Four Route Alignment Options

Exhibits 2.18 through 2.21 show the coverage of major travel generators for the four route alignments. The four route alignments vary somewhat in their coverage of the travel generators. Even if the travel generators are within the walk distance catchment area, it may be desirable to enhance the convenience of the streetcar to some major generators by making adjustments to the streetcar alignment in future refinement work.

Route alignment #1 uses Oregon Street in the southbound direction and Mesa Street in the northbound direction. As a result it is close to travel generators on the UTEP Campus. Route alignment #3 offers a similar advantage using Oregon Street in both directions. Route alignment #2 uses Mesa Street in southbound direction and Stanton Street in the northbound direction (north of Mills Avenue) and Route alignment #4 uses Mesa Street in both directions (north of Mills Avenue). This places them about one block farther away from UTEP campus locations, the hospitals and the Rio Grande Campus of EPCC, while placing them similarly closer to the Health Science Building of UTEP (which is being relocated to a new site on the campus at Schuster Avenue and Sun Bowl Drive), Cathedral High School, and the Holiday Inn Express hotel. Given the size of the UTEP Campus compared to the other travel generators, this suggests a distinct advantage from a market perspective for route alignments #1 and #3. A counterbalancing factor is that operation on Oregon Street more directly duplicates the Mesa BRT service on Oregon Street.

In the core downtown area, the alignments are more similar to one another. Route alignments #1 and #2 use Oregon Street southbound and Mesa Street northbound while route alignments #3 and #4 use Oregon Street in both directions. All alignments deviate to the Bert Williams Downtown Santa Fe Transfer Center so as to connect with all bus and BRT services there. This results in minimal differences among the alignments from a market perspective. Oregon Street and Mesa Street have less current retail activity than either El Paso Street or Stanton Street so there would be less interference with parking or loading access for the retail businesses. Oregon and Mesa Street bisect the Golden Horseshoe District offering convenient access to the retail establishments while providing
Exhibit 2.18 Major Travel Generators within the Catchment Area of Route Alternative 1
Exhibit 2.19 Major Travel Generators within the Catchment Area of Route Alternative 2
Exhibit 2.20 Major Travel Generators within the Catchment Area of Route Alternative 3
Exhibit 2.21 Major Travel Generators within the Catchment Area of Route Alternative 4
northbound and southbound services only one block apart when used as a one pair. All the downtown alignments present essentially the same drawbacks – that is, the distance from some major generators located at the east and west ends of the downtown core, namely the Convention Center, Chavez Theater, Union Plaza District, City Hall, County and Federal courthouses, and government office buildings. While most of these locations are within walking distance, more convenient stop locations could increase ridership potential. However, shifting the alignment to either the east or west would favor some travel generators at the expense of the others, pushing some beyond walk distance. The area appears too large to serve as a loop if the loop is part of a liner corridor service between the two transfer centers. Currently free shuttle services operate a smaller loop in this area.

**Current Transit Ridership in El Paso**

Sun Metro, the City Mass Transit Department, operates bus service in El Paso. The standard fare is $1.25 and transfers are $0.25. Two downtown circulators operate free. A passenger survey conducted in April 2007 provided a profile of the current users. These users are largely transit dependent people who have few travel choices – nearly 3 of 4 riders (73.4 percent) reported that they do not own a car and another 11.4 percent reported that they did not have a car available for their trip. The riders have very low incomes – 40 percent reported incomes of $5,000 or less, 64.5 percent reported incomes of $10,000 or less and 90.8 percent reported incomes of $20,000 or less. To complete their trips 57.4 percent reported that they transfer to another route. A substantial share of riders surveyed were making work trips (38.7 percent) and rely on Sun Metro at least five days per week (47.2 percent). The vast majority of riders (80.4 percent) indicated that running buses more frequently was the most important service improvement needed. The Bus Rapid Transit project is one attempt to provide a frequent, faster, high-quality transit service in key corridors that can attract new riders as well as serve existing riders better. Note that only 2 percent of El Paso County residents use transit to get to work, according to the 2000 Census. The proposed streetcar would also address riders concerns by offering frequent service in a major corridor.

### 2.3 Traffic Conditions

From a market perspective high-traffic volumes on the arterials would be an indicator of demand conditions provided the travel includes origins and destinations within the streetcar catchment area. From an operational perspective, high-traffic volumes might indicate potential problems. The following section provides a brief overview of traffic conditions to address both perspectives. Exhibit 2.22 shows traffic volumes at intersections in the streetcar corridor catchment area based on available information from recent traffic counts conducted by the City of El Paso. As can be seen, there are substantial traffic volumes in the catchment area, including many locations potentially traversed by the streetcar, particularly Mesa Street north of I-10.
Exhibit 2.22 Traffic Volumes at Selected Intersections

Source: City of El Paso, 1999 to 2009.
The TransBorder 2035 MTP analyzed the level of mobility based on 24-hour volume-to-capacity ratios on area roadways in 2007, 2015, 2025, and 2035. Locations with severe congestion (defined as a ratio of 1.25 or higher) are expected to increase significantly in downtown El Paso over the time periods examined. While these areas are largely limited to one primary east-west artery in 2007, they would expand to include north-south roadways in 2035. Several downtown street segments were identified as congested in 2035, including North Mesa Street from Texas Avenue to Wyoming Avenue. The proposed BRT would operate along Oregon Street, a parallel street one block west of Mesa Street, as far south as Franklin where it turns west to Santa Fe Street, thus avoiding this congested segment. This study is examining the market for, costs of, benefits of and constraints associated with a streetcar that would operate through this area either on Oregon Street, Mesa Street or Stanton Street. Thus the Mesa Street congestion is relevant. Other congested streets include Alameda Avenue/Texas Avenue (between Mesa Street and Gateway North Boulevard) and East Paisano Drive (between San Antonio and Bridge of the Americas) as well as I-10 Eastbound and Westbound ramps. The BRT and streetcar alignments would not be directly affected by these other congested locations although each would cross East Paisano Drive (and Texas Avenue). Based on City-supplied information, intersection level of service appears to be quite good in recent years in both the downtown area (see Exhibit 2.23) and in the northern part of the study corridor (see Exhibit 2.24).
Exhibit 2.23 Traffic Level of Service in the Downtown Core

Source: City of El Paso, based on counts from 2001-2002.
Exhibit 2.24 Traffic Level of Service in the Northern Part of the Study Corridor

Source: City of El Paso, based on counts from 2008-2009.
2.4 **INTERSECTING TRANSIT ROUTES**

The study identified intersecting public transportation routes to describe the potential market associated with transfer trips. Intersecting local transit routes include Sun Metro bus routes and Miner Metro Shuttle Buses. Besides local transit service, there are intercity Amtrak train service and domestic and international intercity bus services.

**Sun Metro**

Currently, there are a number of Sun Metro routes that intersect the proposed alignment. These routes and the number of bus trips and total boardings are shown in Table 2.6 below. Note that ridership entering the corridor (which is typically smaller than the total number of boardings) was not available, so these volumes of passengers overstate the intersecting volumes of riders. The subsequent discussion describes better estimates of those existing riders who might use the streetcar based on somewhat older data.

Recent (but not current) information on bus travel in the corridor was used to determine how many bus trips are made that might be served by the streetcar. The primary market would be travelers whose current trip patterns are served entirely by the streetcar, that is, whose origin (boarding) and destination (alighting location) are within the streetcar catchment area. Of course this does not mean that other bus riders might not use the streetcar for a portion of their trip; however, if these riders have a one-seat ride on a bus, they may be very unlikely to make a transfer to a streetcar for a part of the trip.

One source of information was the ridechecks (i.e., onboard boarding and alighting counts) conducted by Sun Metro in 2007 on weekdays. These were provided to the study team by TTI which was working for the City on assembling data for the Bus Rapid Transit study. Ridechecks were provided for routes 10, 11, 12, 13, 14, 15, 16, 17, 18, and 70, which were identified as routes serving the Mesa Corridor as well as for Downtown Circulator Routes 4 and 8. Although Routes 12, 13, 17, and 18 operate in the larger Mesa Corridor, they do not provide service in the streetcar corridor catchment area. Route 70 is simply a shuttle connecting the University and the east side of the city and therefore is not serving any trips within the catchment area (UTEP supplied ridership information on this route suggesting approximately 550 one-way or 275 round-trip riders per day). The remaining routes do serve trips within the catchment area, although Route 4 does not serve trips that are oriented in a north-south direction like the streetcar. Note also that the Smart 101 and Downtown Circulator Route 9 were not operating at that time and that the Downtown Circulator services provided by Routes 4 and 8 were reconfigured, including the elimination of Route 8 and the introduction of Route 9.
### Table 2.6  Intersecting Sun Metro Routes

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<th>Route No.</th>
<th>Route Name</th>
<th>Service Type/Location</th>
<th>Weekday Daily Bus Trips May 2010</th>
<th>Average Daily Ridership (2010) (based on recent counts)</th>
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<td>Weekday</td>
<td>Saturday</td>
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<td>Sunset Heights/UTEP/Bridge</td>
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<td>11</td>
<td>Mesita via Kern Place</td>
<td>Westside</td>
<td>26</td>
<td>218</td>
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<td>Country Club via Sunland Park</td>
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<td>Paisano via Fox Plaza</td>
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<td>Hacienda via Carolina</td>
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</table>

Source: Sun Metro Ismael Segovia, Senior Service Planner.

Ridechecks contained boardings and alighting by bus stop for each trip. Generally the number of boardings and the number of alightings should be the same over the entire one-way trip but there were some discrepancies. Looking at the daily totals for inbound and outbound trips, the number of boardings and number of alightings within the streetcar corridor catchment area were tabulated and expressed as percentages of total boardings and alightings respectively. The percentage of trips that are made entirely within the streetcar corridor catchment area was estimated as the product of the two percentages. Thus, if half of the boardings and half of the alightings were in the streetcar catchment area, it was estimated that one quarter of trips had both their boarding and alighting stops within the catchment area; clearly this is an estimate since boarding and alighting counts do not provide origin-destination information. The resulting percentage was applied to the average of the total boardings and alightings for the route (by direction) to obtain a rough estimate of the trips within the catchment area. This number was summed for all routes in each direction to obtain a total number of trips within the streetcar catchment area for a weekday. This estimate was just under 1,000 (excluding Routes 4 and 8) (see Table 2.7). Routes 4 and 8 are/ were operated as free services. If the streetcar operated at a fare, it would not be likely to draw trips away from the free circulators. Furthermore, Route 4 operates with minimal overlap with streetcar, as it operates east to west in the downtown and then operates north-south in an area several blocks east of the corridor. Route 8 overlaps more with the streetcar corridor south of Franklin Street. Route 8 ridership would add another about 1,400 trips bringing the total to about 2,400.

Note that since ridechecks are collected on a single route at a time, and do not include origin-destination information for the whole trip, we do not know if
some of the riders within the catchment area are transferring from other routes. Since there are many boarding and alighting at the Downtown Transfer Center it is likely that many of the riders boarding and alighting within the catchment area are actually transferring from other bus routes. These riders could use the streetcar in the same manner and it is legitimate to include them in the above market.

This does not mean that all of these riders would use the streetcar instead of their current route but it does suggest that they are in the market that could use the streetcar. Many factors would influence whether they would choose to use a bus or a streetcar, including frequency, span of service, schedule, speed, ride quality, fare and transfer policy, amenities, marketing, stop spacing and convenience, and crowding. If the streetcar were introduced, there might be changes made to other bus service to reallocate resources efficiently and encourage more ridership on the streetcar. Of course, another factor influencing use of streetcar would be the introduction of the BRT routes, particularly the Mesa BRT route in this corridor. That issue is discussed separately.

Besides the ridecheck data, there is a source of origin-destination data. Texas Transportation Institute (TTI) was working with Sun Metro to develop origin-destination matrices of bus trips in each of the BRT corridors. These were based on origin-destination surveys conducted on the routes and at the transfer centers. In the Mesa Corridor, only Routes 13, 14, 15, 16 were surveyed and the surveys were conducted only during the 6 a.m. to 12 noon period on selected trips. TTI expanded the survey results using the 2007 ridechecks discussed above. The surveys collected stop-to-stop origin-destination information as well as information on transfers from and to other bus routes. For transfers to and from other bus routes within the general corridor, the ultimate boarding and alighting bus stops were used instead of the boarding and alighting location on the surveyed route (location of the transfers). For transfers to and from other bus routes outside the general corridor, the boarding and alighting locations on the bus route in the corridor were used. TTI provided the bus stop origin-destination information for peak and off-peak periods for inbound and outbound trips in the Mesa Corridor. To examine the size of the markets, CS examined the locations of the origin and destination bus stops to identify which bus stops were in the streetcar corridor catchment area. Using this information, trips were divided into three categories – both trip ends in the catchment area, only one trip end in the catchment area, and neither trip end in the catchment area. The results showed that there were 2,868 trips per day of which 24 percent (688) had both ends in the catchment area, 70 percent (2,008) has one end in the catchment area, and 8 percent (229) had neither end in the catchment. Again, it is more likely that bus trips that have both ends in the catchment area would consider using the streetcar than those trips that have only one end in the catchment area (see Table 2.7).

The above indicates that among current bus riders some 700-900 riders per day make trips (on buses that charge a fare) entirely within the catchment area of the streetcar. Another 1,400 make trips on free circulators that operate in the corridor. Finally another 2,000 bus riders travel in the Mesa Corridor to places
beyond the streetcar catchment area. Some of this latter group may also make use of the streetcar under certain conditions. In addition, to the latter, there are current riders on other bus routes from other corridors that enter the downtown area and might be a source for some additional ridership.

A survey conducted in June 2009 by TTI at four transfer centers (Downtown, North Gate, East Side and Four Points) and yielding over 1,600 responses found that those using the centers were very low-income and transit-dependent – 47 percent had household incomes under $10,000 and another 28 percent between $10,000 and $19,999; 85 percent reported having no car in the household. The information collected about trip purpose, destinations and trip frequency showed a variety of responses. It is noteworthy that Juarez was the top origin with over one-quarter of the responses, and that the leading trip purpose was work (45 percent) followed by social (20 percent) and shopping (16 percent).
### Table 2.7 Calculation of Sun Metro Trips within Corridor

<table>
<thead>
<tr>
<th>Route</th>
<th>Name</th>
<th>Direction</th>
<th>Weekday Route Ridership (2007) All Trips</th>
<th>Ons</th>
<th>Offs</th>
<th>Average</th>
<th>Ons/Offs Within Corridor</th>
<th>Estimated Percent of Trips Within Corridor</th>
<th>Estimate of Trips Within Corridor</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Union Plaza Circulator (free)</td>
<td>IB</td>
<td>338</td>
<td>457</td>
<td>397.5</td>
<td></td>
<td>280 0%</td>
<td>444 0%</td>
<td>0% 0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OB</td>
<td>470</td>
<td>344</td>
<td>407</td>
<td></td>
<td>412 0%</td>
<td>331 0%</td>
<td>0% 0.0</td>
</tr>
<tr>
<td>8</td>
<td>North-South Trolley (free)</td>
<td>NA</td>
<td>1,306</td>
<td>1,481</td>
<td>1,393.5</td>
<td></td>
<td>1,248 100%</td>
<td>1,468 100%</td>
<td>100% 1,393.5</td>
</tr>
<tr>
<td>10</td>
<td>UTEP/Sunset Heights</td>
<td>IB</td>
<td>167</td>
<td>184</td>
<td>175.5</td>
<td></td>
<td>109 65%</td>
<td>171 97%</td>
<td>64% 111.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OB</td>
<td>308</td>
<td>291</td>
<td>299.5</td>
<td></td>
<td>286 93%</td>
<td>96 32%</td>
<td>30% 89.1</td>
</tr>
<tr>
<td>11</td>
<td>Mesita</td>
<td>IB</td>
<td>104</td>
<td>109</td>
<td>106.5</td>
<td></td>
<td>58 56%</td>
<td>102 96%</td>
<td>53% 56.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OB</td>
<td>144</td>
<td>143</td>
<td>143.5</td>
<td></td>
<td>139 97%</td>
<td>52 36%</td>
<td>35% 50.2</td>
</tr>
<tr>
<td>14</td>
<td>Westwind</td>
<td>IB</td>
<td>896</td>
<td>820</td>
<td>858</td>
<td></td>
<td>211 24%</td>
<td>624 73%</td>
<td>17% 146.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OB</td>
<td>972</td>
<td>967</td>
<td>969.5</td>
<td></td>
<td>790 81%</td>
<td>172 18%</td>
<td>14% 139.8</td>
</tr>
<tr>
<td>15</td>
<td>Mesa</td>
<td>IB</td>
<td>971</td>
<td>981</td>
<td>976</td>
<td></td>
<td>152 16%</td>
<td>761 78%</td>
<td>12% 119.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OB</td>
<td>1,172</td>
<td>1,131</td>
<td>1,151.5</td>
<td></td>
<td>936 80%</td>
<td>275 24%</td>
<td>19% 219.6</td>
</tr>
<tr>
<td>16</td>
<td>Sunland Park/Buena Vista</td>
<td>IB</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td></td>
<td>32 34%</td>
<td>76 80%</td>
<td>27% 25.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OB</td>
<td>149</td>
<td>136</td>
<td>142.5</td>
<td></td>
<td>125 84%</td>
<td>24 17%</td>
<td>14% 20.1</td>
</tr>
<tr>
<td>All</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>979.1</td>
<td>2372.6</td>
</tr>
</tbody>
</table>

**Source:** TTI Counts.

**Note:** Smart Route 101 and Downtown Circulator Route 9 were not operating at this time. Also note that Route 10 and Route 4 have been changed and Route 8 has been eliminated.
Miner Metro Shuttle

Miner Metro Shuttle routes are operated by UTEP to provide circulation around the campus and, most importantly, to provide shuttle service from remote parking lots. Thus the Miner Metro Shuttle is an important part of the parking management strategy at UTEP. The remote lots are much cheaper than the more convenient parking on campus. For example, remote lots cost the students $85 per month versus $135 for perimeter parking lots, $185 for silver parking lots, $210 for garage deck parking and $260 for garage premium parking. Faculty and staff rates are higher than for the students and faculty have access to inner campus parking that students do not. (Carpool rates are lower to encourage carpooling by faculty, staff, and students.)

The shuttle service is free for faculty, staff, students, and visitors. Service is operated frequently during weekday hours and less frequently in non-peak times; no service is operated when classes are not in session, that is, on weekends, University holidays, intersession, winter-mester or summer mini-mesters, except during UTEP football games and special events. On Mondays through Thursdays the parking shuttles operate until about 9 p.m. There are four routes (see Exhibits 2.25 and 2.26):

- **Route 1 (East/Blue)** – This route operates between the northern remote parking facilities on Sun Bowl Drive and southeast corner of the campus via Miner Village and Oregon Street.

- **Route 2 (Campus Loop/Green)** – This route operates a loop around the campus, including Sun Bowl Drive, Glory Road, Oregon Street, Rim Road, and Schuster Avenue, but does not serve the northern remote parking lots and does not operate in the evening. This route does serve parking lots on Schuster Avenue at the southern end of the campus.

- **Route 3 (West/Orange)** – This route operates between the northern remote parking facilities on Sun Bowl Drive and Dawson Drive at the Sun Bowl.

- **Route 4 (College of Health Sciences/Nursing)** – This is a shuttle between the main campus (Rim and Hawthorne) and the off-site College of Health Sciences/Nursing located at Kansas Street and Arizona Avenue. The College of Health Sciences/Nursing is being relocated to the main campus at Schuster Avenue and Sun Bowl Drive.

The Miner Metro carries about 470,000 trips per year. During peak months, there are nearly 60,000 riders. With a typical number of 20 weekdays in a peak month, this suggests as many as 3,000 riders per day.

Miner Metro would largely interface with the proposed streetcar at the Glory Road Transfer Center and perhaps along Oregon Street if one of the route alignments that uses Oregon Street is selected. It does not appear that transfers to and from Miner Metro would constitute a large market for the streetcar since a transfer to the streetcar would only be useful to reach locations in the downtown,
Golden Horseshoe District, Segundo Barrio and other locations south of Schuster Avenue. The streetcar would stop at locations along Oregon, Mesa, or Stanton near the campus so streetcar travelers might be able to have a one-seat ride. If a rider was to need to use the Miner Metro making a transfer at the Glory Road Transfer Center, they might prefer to use the BRT from downtown to make a faster trip.

Exhibit 2.25 Miner Metro Campus Shuttles
Exhibit 2.26 Miner Metro Off-Campus Shuttle

Amtrak Intercity Train Service

Within the U.S., Amtrak operates train service. During FY 2009 there were 9,397 boardings plus alightings in El Paso. Passengers who use train service to access downtown locations might be in the market for the streetcar, while passengers whose origin or destination in the El Paso area is outside the streetcar corridor would not be likely users. There is no available data to determine the origins or destinations of Amtrak riders. Furthermore, the streetcar alignment does not directly serve the train station. Given the very small number of daily train riders and the location of the train station, this does not appear to be a significant market.
Intercity Bus Service

Intercity bus service in El Paso includes domestic and international bus service. Each is described below.

International bus service to and from Mexico includes service that terminates at the International Bus Terminal located at Santa Fe Street and Overland Avenue and services that pick up and drop off passengers on the street. *Autobuses Americanos* operates to a streetside location at 901 South El Paso Street at 6th Avenue and to 1,007 South Santa Fe Street south of Calleros Court where Santa Fe Street transitions to the Border Highway (a few blocks south of the Downtown Transfer Center). The streetcar corridor would be readily accessible to most of these riders particularly if the alignment serves the Downtown Transfer Center at Santa Fe Street and 4th Avenue. Of course, the BRT services also will serve the Downtown Transfer Center.

Domestic bus services include Greyhound service whose terminal is located at 220 West San Antonio Avenue at Santa Fe Street. This location also is fairly close to the Oregon Street alignment south of Franklin Street.

No information was available from the private operators on the size of these intercity bus markets (or the nature of their trip destinations). The border crossing data identifies the number of crossings in buses. Some 331,749 bus passengers entered El Paso on 19,474 buses in 2009, or a daily average of 909 passengers on 53 buses. The number of buses at the Paso Del Norte crossing in 2009 was 7,474 or an average of 20 per day; if the per vehicle load was uniform across the El Paso crossings, this suggests that some 127,323 passengers arrived in 2009 via the Paso Del Norte or 349 per day.

Intercity bus travelers would be very likely to make use of local bus, BRT, and streetcar services. Their use of the streetcar would be limited, of course, by the small catchment area the streetcar serves. The streetcar and the BRT could compete to some extent for trips within the corridor.

2.5 Consideration of the Proposed BRT System

Several bus rapid transit projects were included in the Gateway MTP 2030 and have since been advanced. The BRT system approved by the City of El Paso for phased implementation is shown in Exhibit 2.27. There are four corridors that converge on the downtown and meet at the Bert Williams Downtown Transfer Center located at Santa Fe Street and 4th Avenue. One corridor, the Mesa Corridor extends to the north, while the others (Alameda, Dyer, and Montana) head east from downtown diverging to service different corridors.
Exhibit 2.27 BRT Plan

The Mesa Corridor is envisioned to operate on Oregon Street from Franklin Avenue until the Glory Road Transfer Center where it shifts onto Mesa Street to proceed north to the West Side Transit Terminal as shown in Exhibit 2.28.

The other corridors proceed south from the Downtown Transfer Center on Santa Fe Street to Border Highway where they travel east to Campbell Street where they turn north. In the reverse direction, these routes use Kansas Street since Kansas and Campbell are each one-way streets.

The BRT is envisioned as a BRT “Lite” system which will not have exclusive lanes except on Oregon Street between Schuster Avenue and Glory Road. (In fact it emerged from the Transportation Systems Management Alternative, as opposed to the guideway-based BRT alternatives.) The Alternatives Analysis has proven that barrier lanes would be much more costly yet would not be likely to generate the time savings needed to justify a Small Start or New Start. The BRT will have signal priority and more widely spaced stations than the existing local bus service in order to increase travel speed. Between the station at Glory Road Transfer Center and the Downtown Transfer Center, there will be stations at Hague Road and Rio Grande Avenue on Oregon Street, and on Franklin Avenue (at El Paso Street). No BRT station is envisioned at University Avenue.
Although it had been originally envisioned that BRT could ultimately lead to light rail or commuter corridors and there would ultimately be rail service across the border that is not the current expectation of the BRT. Nevertheless, City Council representatives have expressed interest in rail transit in the core of the City.

The 9-mile, $27.1 million Mesa Corridor will be the first BRT corridor to be implemented. Current estimates are that Mesa BRT will open in March 2014. An application for FTA Small Starts funds to fund 50 percent of the project was submitted in early September 2010 and the City is awaiting a response from FTA; the City is hoping to split the remaining cost with the State of Texas (30 percent State, 20 percent City).

The Mesa BRT without new dedicated lanes (defined as the TSM Alternative in Mesa Corridor BRT Alternatives Analysis) is expected to have just over 2,400 daily boardings in 2015 and to increase corridor-wide transit boardings by 13 percent over the No-Build Alternative. The travel time from the Glory Road Transfer Center to the Downtown Transfer Center is envisioned to be reduced by
4.7 minutes (23 percent) in the morning peak period in the inbound direction and by 6.7 minutes (45 percent) in the outbound direction in 2015.\footnote{Center for International Intelligent Transportation Research, Texas Transportation Institute, \textit{El Paso Transit Corridors Alternative Analysis, Transit User Benefit Estimation, Analysis of Traffic Movement, and Ridership Forecast on Mesa Street Corridor Due to Proposed Bus Rapid Transit Alternatives, Final Technical Memorandum, June 21, 2010, p.13.}

While a streetcar along the same corridor would potentially compete with the Mesa Corridor BRT, it should be noted that the BRT would have longer distances between stops than a streetcar, presenting a tradeoff between speed and proximity for travelers within the common corridor. For example, travelers to UTEP would have to transfer from the BRT at Glory Road to a local service (e.g., Miner Metro, local bus or streetcar) since the BRT will not have a stop at University Avenue and most campus destinations are several blocks from the current local bus stop on Oregon Street at University Avenue. Increasing the distance between the two alignments would reduce duplication somewhat. While the Downtown Transfer Center which will host a BRT station on all BRT routes is located only two blocks from the border crossing, passengers at the border crossing may be more likely to choose a streetcar over BRT if it provided comparable travel times and/or offered more convenient stop locations.

## 2.6 Conclusions/Implications for Ultimate Route Design

The above analysis has indicated that there are a variety of submarkets that compose the overall market for a streetcar in the study corridor. There are uncertainties regarding the size of the each submarket. The ultimate viability of the streetcar depends on the size of the overall market. A more detailed ridership study would need to be conducted to assess with assurance the viability of the concept. Nevertheless there are indicators that there is potential and that the concept would benefit from further refinement and study. The following summarizes the primary findings:

- It is estimated that the streetcar corridor is host to between 700 and 2,400 internal daily transit riders (based on 2007 data). There is some uncertainty in estimating those who have trip origins and destinations within the corridor. Many more have one trip end in the corridor. While all of these might not use the streetcar, they form the basic current market.

- The border crossing represents a large potential market for the streetcar provided these travelers are attracted to destinations more than a few blocks from the border.
- The streetcar corridor encompasses many major travel generators and areas of high population and employment density.

- While many key generators are generally within the catchment area, some large generators are at the perimeter of the catchment area and may be a subject for future refinement of the route alignment.

- The current UTEP policy on vehicle access limits the ability to serve the campus directly as does the street network.

- As a commuter school which draws students from a wide area, UTEP would not be the residential end for many trips on the streetcar. The streetcar would have limited potential for serving the home to university commute market except as a transfer from other routes, in which it could be in competition with the Miner Metro, BRT and other local and circulator services.

- The presence of major downtown travel generators at opposite (east and west) ends of the downtown may lend itself to a loop service or an east-west connector rather than a north-south linear route.

- It may be important to serve the Union Plaza entertainment district and parking garage more directly to serve trips to the district and to use Union Plaza as a remote parking facility during Sun Bowl games.

- The small population of downtown residents and the small share making trips within the corridor for work trips limits the current ridership market among residents. While the streetcar could be a selling point for downtown residential development, it will need to rely on other markets to be viable.

- Midday and perhaps after-work travel from downtown to the Cincinnati entertainment district may constitute a submarket with potential but this may suggest serving the larger employment concentrations on the east side of the downtown core more directly.

- Currently there are only a small number of downtown hotels, offering another potential market for the circulator. Insufficient information on visitor activity prevents a full assessment of the potential for serving visitors to downtown El Paso.

- There are minor differences in market among the four route alignments. Those alignments that use Oregon Street in at least one direction offer better coverage of the UTEP campus. These alignments however more directly compete with the Mesa BRT route.

- Because the BRT route is designed to have more widely spaced stations than a local bus route, the streetcar could complement the BRT provided that other local bus service is not also provided in the same corridor. The streetcar would provide local distribution while the BRT would be providing commuter-oriented, higher speed travel.

- More detailed analysis of the ridership impacts of the streetcar on the BRT would be needed to assess if the market can support both services.
3.0 Economic Benefits Analysis

As part of this project, Cambridge Systematics has developed a preliminary assessment of the economic development potential of the proposed streetcar in El Paso. These economic development impacts are estimated in terms of the potential for transit-oriented development (TOD) along the corridor. The analysis of transit-oriented development impacts was based on El Paso-specific data regarding land use, comparisons to other already completed streetcar systems in the United States, and interviews with a variety of local stakeholders, including economic development officials, downtown development organizations, and college/university officials.

The economic benefits analysis is divided into five sections:

- **A review of the economic benefits of four selected streetcar systems in the United States.** These four systems were selected based on characteristics of the cities and streetcar systems that are expected to be the most closely applicable to what El Paso may experience in terms of performance and transit-oriented development.

- **Analysis of economic factors in El Paso and the proposed streetcar corridor.** The relative success of development along the proposed streetcar line will respond to the economic conditions and generators of economic activity in El Paso. This section analyzes historical and possible future trends affecting the area.

- **Opportunities for transit-oriented development.** Based on the analysis of the El Paso economy, interviews with local stakeholders and economic development experts, and data from the El Paso Planning Department, the likely effects of the proposed streetcar project on development near the possible alignments are quantified (in terms of dollar value).

- **Benefits of future connections.** El Paso’s proposed streetcar will be a component of a larger, expanded network of transit services in El Paso. In this section, the possible synergies, specifically those between the streetcar and proposed bus rapid transit (BRT) is analyzed.

- **Order of magnitude benefits estimate and return on investment.** Based on the estimates of potential transit-oriented development and order-of-magnitude estimates of the cost of the streetcar project (described in Section 1.0), an order-of-magnitude return on investment for the proposed streetcar line is estimated. Due to uncertainties inherent in projecting future growth, a range of return-on-investment scenarios (e.g., high and low) are shown.
3.1 **Economic Benefits of Comparable Systems**

Data, including population, capital costs, operational characteristics, and documented transit-oriented development, were collected for four existing streetcar systems that are comparable, in various aspects, to the streetcar line proposed for El Paso. The streetcar systems evaluated include Little Rock, Memphis, Portland, and Tampa. All of the systems included in the comparison were completed within the last 17 years. A line on the Memphi’s Trolley network is the oldest, having been completed in 1993, and Little Rock’s is the newest, completed in 2004. The systems use different railstock, ranging from heritage trolleys (both refurbished vintage and replica) to modern streetcars. Similar to the proposed El Paso streetcar, each streetcar system in the comparison cities serves activity centers that generate ridership by university students, people making trips for events and leisure, visitors, medical clients, and workers. The experiences of these systems are used in this analysis to formulate a range of possible development benefits that may take place along El Paso’s proposed streetcar corridor.

The estimated capital costs for building El Paso’s streetcar line is $90 million. This is most similar to the City of Portland’s investment of $127 million (completed in 2001; adjusted for inflation to 2010 dollars).

While El Paso differs somewhat from the other cities, namely its border location and sister city relationship with Juarez, similarities can be drawn between El Paso and the four comparison cities, including:

- **Population Size.** Streetcars in areas of a size similar to El Paso were selected instead of those in much smaller or much larger urban areas. These ranged from metropolitan Little Rock (685,000) to Tampa (2.7 million). This is in line with El Paso County’s population (750,000) as well as the El Paso-Juarez regional population (2.4 million).

- **Geographic Location.** Streetcars in western and sunbelt cities with characteristics (e.g., moderate to fast growth) similar to El Paso were selected rather than denser and slower-growth eastern cities.

- **Downtown Orientation of Streetcar Alignment.** Streetcars that provide circulation in downtown areas and that connect downtown to other key urban neighborhoods and major activity centers were selected instead of those that focus specifically on recreational centers or serve more remote locations. This is similar to the proposed El Paso streetcar that will serve the city’s downtown and a radial corridor lined with universities, major hospitals, and other activity centers.

Each of the four comparable systems is described, in detail, below:
Little Rock’s River Rail Streetcar

Description

The River Rail streetcar in Little Rock, Arkansas is operated by the Central Arkansas Transit Authority (CAT). The route connects the River Market area in downtown Little Rock to North Little Rock across the Arkansas River. Phase 1 of the system (2.5 miles) opened in 2004, and a half-mile extension was added in Phase 2 during 2007 (see Exhibit 3.1, a map of the current streetcar network). A three-mile extension of the streetcar, connecting to the Little Rock Airport, has been proposed.

Using replica heritage trolleys and an overhead power supply, the streetcar operates two routes, providing circulator service within downtown Little Rock (South Route) and between the downtowns of the two cities (North Route). Serving the cultural and entertainment center of Little Rock, it also caters to the tourism market, including the Clinton Presidential Library, Verizon Arena, City Halls of both cities, museums, restaurants, and a convention center. Ridership is the lowest of the four case studies; Little Rock also is the least populous city and metropolitan area of the four. A summary of Little Rock and its streetcar system are included in Table 3.1.

Table 3.1 Characteristics of Little Rock’s River Rail Streetcar

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>City Population</td>
<td>191,930</td>
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<tr>
<td>Metro Population</td>
<td>685,488</td>
</tr>
<tr>
<td>Year Opened</td>
<td>2004</td>
</tr>
<tr>
<td>Length</td>
<td>3.4 track-miles</td>
</tr>
<tr>
<td>Ridership</td>
<td>200,000 per year</td>
</tr>
<tr>
<td>Vehicle Type</td>
<td>Heritage (Replica)</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$28 million</td>
</tr>
<tr>
<td>Fare</td>
<td>$1.00</td>
</tr>
<tr>
<td>Right-of-Way</td>
<td>Mixed Traffic and Exclusive</td>
</tr>
<tr>
<td>Location</td>
<td>Downtown to North Little Rock via multiple activity centers</td>
</tr>
</tbody>
</table>

Source: U.S. Census 2009, Central Arkansas Transit Authority
Construction Costs and Funding

The cost of Phase 1 of the project, which included 2.5 track-miles, three vehicles, and a maintenance facility, was $20.5 million, including design and construction management. Phase 2, which opened three years later, added 4,500 feet of track, extending the service to the Clinton Presidential Library. Two trolley vehicles were added, and Phase 2 costs totaled $7.5 million, including design.
In total, 80 percent of the construction costs in each phase came from Federal government sources. The majority of this came from the New Starts program, and was supplemented by the Federal Highway Administration’s Section 1602 Flex Funds as well as High-Priority Funds from TEA 21 (see Table 3.2).

A unique aspect of the River Rail streetcar is the river crossing. Main Street Bridge was modified to allow the trolley to cross the Arkansas River without removing any of the four lanes of traffic crossing the bridge.

Table 3.2  Funding Sources for the Little Rock River Rail Streetcar

<table>
<thead>
<tr>
<th>Source</th>
<th>Funding ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Sources</td>
<td>$22.5</td>
</tr>
<tr>
<td>New Starts</td>
<td></td>
</tr>
<tr>
<td>FTA STP Funds</td>
<td></td>
</tr>
<tr>
<td>TEA 21 High-Priority Funds</td>
<td></td>
</tr>
<tr>
<td>Local Sources</td>
<td>$5.5</td>
</tr>
<tr>
<td>City of Little Rock</td>
<td></td>
</tr>
<tr>
<td>City of North Little Rock</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$28</td>
</tr>
</tbody>
</table>

Source: Portland Streetcar, Inc.

Economic Development Benefits

It is estimated that over $700 million in new development has been built or planned in the River Market area following the implementation of the streetcar.\(^8\) With the installation of the streetcar, River Market became the center of Little Rock’s cultural, entertainment, and retail district. Developer Jimmy Moses points out that “the job of the streetcar is to animate downtown, and it is doing just that.” Another developer notes that the streetcar “breaks down [the] barrier” between Little Rock and North Little Rock.

Major development projects along the streetcar corridor include the full range of land uses. Several residential condominium towers have been built, as well retail and restaurant facilities.\(^9\) Offices have been added, and hotels have been introduced or expanded. A minor-league baseball park was built in North Little Rock, and the Historic Arkansas Museum was built in Little Rock.

The streetcar has enhanced, both in terms of access and attractiveness, the various tourism destinations in the area as well, including the newly built Clinton


Presidential Library and the convention center. It also enriches events in the area, including concerts and the annual Riverfest event.

**Memphis Trolley**

**Description**

The Memphis trolley network, operated by the Memphis Area Transit Authority (MATA), consists of three intersecting services: the Main Street Trolley Line, the Riverfront Trolley Loop, and the Madison Avenue Trolley Line. The services connect downtown with several parts of the city; they include two north-south routes running parallel to the Mississippi River and an east-west route beginning in downtown Memphis (see Exhibit 3.2, a map of the current streetcar network). While most of the service operates in mixed traffic, about 40 percent of the service’s route-miles have dedicated right-of-way. The streetcar system uses authentic vintage trolleys and an overhead power supply.

The first of the streetcars, the Main Street Trolley, opened in 1993. Installed as part of a redevelopment of a downtown pedestrian mall, the service helped to revive the downtown area. The route, which extends 2.5 miles, serves the Pinch District, the Cook Convention Center, a baseball stadium and professional basketball arena, Beale Street entertainment district, the National Civil Rights Museum, and the South Main Historic Arts District.

The second streetcar line in Memphis was the Riverfront Loop Trolley, which opened in 1997 and runs in a 5-mile, one-way loop using the Main Street Line as one leg. Among the attractions served are the River Walk, Amtrak’s Central Station, and the Mississippi River Museum.

In 2004, Memphis opened its Madison Avenue Trolley, which was built as a precursor to light rail transit in the region. The 2.5-mile route connects with both of the existing trolley routes, running down Madison Avenue through the Medical District (an important employment center) into the Midtown district. The infrastructure is built to light rail standards, allowing for a straightforward upgrade in the future. A summary of Memphis and its streetcar system are included in Table 3.3.
### Table 3.3 Characteristics of Memphis Trolleys

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Population</td>
<td>676,640</td>
</tr>
<tr>
<td>Metro Population</td>
<td>1,304,926</td>
</tr>
<tr>
<td>Year Opened</td>
<td>1993, 1997, 2004</td>
</tr>
<tr>
<td>Length</td>
<td>12 track miles, 7 route miles</td>
</tr>
<tr>
<td>Ridership</td>
<td>1,000,000 per year</td>
</tr>
<tr>
<td>Vehicle Type</td>
<td>Heritage (Vintage)</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$104.3 million</td>
</tr>
<tr>
<td>Fare</td>
<td>$1.00</td>
</tr>
<tr>
<td>Right-of-Way</td>
<td>Exclusive and Mixed Traffic</td>
</tr>
<tr>
<td>Location</td>
<td>Downtown</td>
</tr>
</tbody>
</table>

Source: U.S. Census 2009, Memphis Area Transit Authority.
Note: Length cited is sum of three lines.
Exhibit 3.2  Map of the Memphis Streetcar Network

Source: Memphis Area Transit Authority
Construction Costs and Funding

The first of the streetcars, Main Street Line, largely used funds that were originally designated for a freeway extension that could not be built for environmental reasons. Funding for expansion has come from usual transit funding sources – a mix of Federal New Starts, State, and Local sources as shown in Table 3.2.

The Riverfront Loop faced lower construction costs since it was built using primarily existing track, including using the Main Street Line for a portion of the loop. The western leg of the loop along the Mississippi River used existing double-track rail right-of-way, with the streetcar using one track and Amtrak using the other.

The Madison Avenue Line is built to Light Rail standards in anticipation of a conversion to a light rail network in the future. A 10-mile extension from the downtown area to the Airport is planned which would feed into the current streetcar circulator network in downtown Memphis.

Table 3.4  Funding Sources for the Memphis Streetcar

<table>
<thead>
<tr>
<th>Source</th>
<th>Funding ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 (Main St. Line, 1993)</td>
<td>$34.9</td>
</tr>
<tr>
<td>FTA – Interstate Transfer</td>
<td>$24</td>
</tr>
<tr>
<td>FTA – Formula</td>
<td>$3</td>
</tr>
<tr>
<td>Tennessee DOT</td>
<td>$2.5</td>
</tr>
<tr>
<td>City of Memphis</td>
<td>$4</td>
</tr>
<tr>
<td>MATA</td>
<td>$1.3</td>
</tr>
<tr>
<td>Private</td>
<td>$0.05</td>
</tr>
<tr>
<td>Phase 2 (Riverfront Loop, 1997)</td>
<td>$9.4</td>
</tr>
<tr>
<td>FTA – Interstate Transfer</td>
<td>$4.1</td>
</tr>
<tr>
<td>FTA – Formula</td>
<td>$3.5</td>
</tr>
<tr>
<td>Tennessee DOT</td>
<td>$0.8</td>
</tr>
<tr>
<td>City of Memphis</td>
<td>$0.9</td>
</tr>
<tr>
<td>Private</td>
<td>$0.015</td>
</tr>
<tr>
<td>Phase 3 (Madison Avenue Line, 2004)</td>
<td>$60</td>
</tr>
<tr>
<td>FTA New Starts</td>
<td>$48</td>
</tr>
<tr>
<td>City of Memphis</td>
<td>$6</td>
</tr>
<tr>
<td>Tennessee DOT</td>
<td>$6</td>
</tr>
<tr>
<td>Total</td>
<td>$104.3</td>
</tr>
</tbody>
</table>

Economic Development Benefits

Since opening, Memphis’ streetcar lines have attracted over $2 billion in transit-oriented development within three blocks of the service. Developments have included a full range of land uses, including residential, office, entertainment, retail, dining, among others.

Two new sporting event facilities have been built near the trolley routes: AutoZone Park, a minor league baseball stadium, and FedEx Forum, an NBA arena.

The southern end of the trolley routes, around Central Station, has seen development as well. Following installation of the Main Street Line, the station was redeveloped into an intermodal transportation terminal surrounded by both apartments and commercial space. The area has now emerged as an arts district.

The streetcar services have stimulated mixed-density development along the river to the south of downtown and conversion of office buildings along Main Street. Between 1990 and 2000, Memphis’ downtown residential population increased dramatically, from less than 1,000 to over 5,000 people. More recently, 4,000 residential units have been built within a block of the streetcar, expanding the downtown residential population even further. A 2009 study showed that, from 2002 to 2008, aggregate value of residential structures along the Madison Street line increased from $9 million to $83 million, far outpacing development in the rest of the city, which only grew 23.5 percent during that timeframe.

Portland Streetcar

The Portland Streetcar is one of the nation’s most well-known streetcar systems. It opened in 2001, becoming the first “modern” streetcar in the U.S. Following two extensions, it connects the Northwest Portland, Pearl District, downtown, Portland State, RiverPlace, and South Waterfront districts, as shown in Exhibit 3.3. Its current ridership is over 11,000 trips per weekday – the highest of the four case studies. It also is the only one of the four that operates completely in mixed traffic.

The tremendous level of economic development that is occurring along the streetcar route in Portland has sparked interest in streetcars around the country. Since 2001, several cities have opened streetcars, while dozens of other cities are in various stages of planning for new streetcar systems in hopes of capturing the economic development opportunities seen in Portland. A summary of Portland and its streetcar system are included in Table 3.5.

10 CCDC. Boise Streetcar Information. Fall 2009.


<table>
<thead>
<tr>
<th>Table 3.5 Characteristics of the Portland Streetcar</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Population</td>
</tr>
<tr>
<td>Metro Population</td>
</tr>
<tr>
<td>Year Opened</td>
</tr>
<tr>
<td>Length</td>
</tr>
<tr>
<td>Ridership</td>
</tr>
<tr>
<td>Vehicle Type</td>
</tr>
<tr>
<td>Construction Cost</td>
</tr>
<tr>
<td>Fare</td>
</tr>
<tr>
<td>Right-of-Way</td>
</tr>
<tr>
<td>Location</td>
</tr>
</tbody>
</table>

Exhibit 3.3  Map of the Portland Streetcar

Source: Portland Streetcar, Inc.
The streetcar runs approximately every 13 minutes on most days, and up to every 20 minutes during the early mornings, evenings, and weekends. The service is equipped with a real-time arrival information system that can be accessed from the Internet or cellular phone.

The system is managed and operated by Portland Streetcar, Inc., a nonprofit entity whose board of directors is comprised of representatives of institutions, businesses, and constituents in both the public and private sectors. The organization was contracted by the City of Portland to build and operate the streetcar system. Buy-in from these stakeholders was seen as critical to getting the streetcar developed. A leader of the Streetcar Board took the lead in building support among business owners along the route. While chairing the Local Improvement District committee, he convinced fellow businesses to be voluntarily taxed to help finance the streetcar, arguing that the project would significantly improve their property values. This support from the business community was very important in moving the streetcar project forward.

Construction Costs and Funding

Capital funding for the project came from a combination of Federal and State funds and variety of local sources. The latter included a short-term parking rate increase for city-owned garages, tax-increment financing, property owner contributions, and various other local sources. Total capital costs amounted to $12.9 million per track mile, including the purchase of 10 vehicles. The distribution of these funding sources is listed in Table 3.2.

<table>
<thead>
<tr>
<th>Source</th>
<th>Funding ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Portland</td>
<td>$34.1</td>
</tr>
<tr>
<td>State of Oregon</td>
<td>$2.1</td>
</tr>
<tr>
<td>Federal Funds</td>
<td>$7.0</td>
</tr>
<tr>
<td>Tax Increment Funds (TIFs)</td>
<td>$21.5</td>
</tr>
<tr>
<td>Local Improvement Districts</td>
<td>$19.4</td>
</tr>
<tr>
<td>System Development Charges</td>
<td>$2.5</td>
</tr>
<tr>
<td>Regional Transportation Funds</td>
<td>$10.0</td>
</tr>
<tr>
<td>Misc. City funds</td>
<td>$6.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$103.2</strong></td>
</tr>
</tbody>
</table>

Source: Portland Streetcar, Inc.

Construction began in 1999 on the first phase of the project which opened for service in July 2001. The most recent extension, to South Waterfront, opened in 2006. The variety of funding sources for construction, including new Local
Improvement Districts and TIFs, allowed for creative leveraging of Federal, State, and local funding sources.

Operating costs for the system are paid by a combination of TriMet (the regional transit agency) and the City of Portland. Sponsorships and advertising also contribute to operations. Most of the service is in a fare-free zone, although those traveling beyond the zone pay a $2.00 fare.

The streetcar is managed by the Portland Office of Transportation, which contracted with Portland Streetcar, Inc. to construct and operate the system. Staff associated with the system include a combination of employees from the City of Portland, TriMet, and Portland Streetcar, Inc.

Economic Development Benefits

A 2008 study by the Portland Office of Transportation and Portland Streetcar, Inc. estimated that $3.5 billion in development has occurred within 2 blocks of the service. Since 1997, 55 percent of development in the CBD has been within 1 block of the route, where development is being built at 90 percent of allowable density. This contrasts with development three or more blocks from the streetcar, where development is occurring at 43 percent of allowable density. Prior to 1997, only 19 percent of CBD development was within a block of the current route.

Over 10,000 units of high-density housing have been built in the streetcar corridor, with affordable housing making up 25 percent of this total. Parking ratios in these residential buildings are lower than anywhere else in the region. Portland set a record for number of building permits issued seven years in a row.

The streetcar has catalyzed development in the Pearl District, a large portion of which was an environmentally contaminated rail yard. Today, the district is filled with high-rise condominiums, art galleries, boutiques, and restaurants.

Similar development is occurring in the South Waterfront district, to which the streetcar was extended in 2006. One of the largest urban redevelopment sites in the country, it is host to nine high-rise buildings with others under construction. These towers include several condominiums and apartments, a senior living community, and a university medical research and health center.

Key to the success of these investments are agreements between developers and the Portland Development Commission (PDC). These agreements often commit public resources, including infrastructure and parks, in return for building higher density, mixed-income, and mixed-use housing. Used in both the Pearl and South Waterfront districts, the PDC’s agreements have helped ensure economic development in the neighborhoods along the streetcar.

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While the streetcar was not solely responsible for all of this development, it was instead part of a concerted effort combining planning, policy, and partnerships to create an environment where development could take off. Highlighting this, developer John Carroll said, “the Portland streetcar demonstrated that the City was serious about developing downtown.”\textsuperscript{14} Investment agreements and policy measures, combined with the implementation of the streetcar, allowed for development to be maximized in downtown Portland.

**Tampa TECO Line Streetcar**

*Description*

Tampa’s TECO line streetcar system connects downtown Tampa, Channelside, and the Ybor City historic district. It serves the Florida Aquarium, the Convention Center, and the cruise ship terminal (see Exhibit 3.4, a map of Tampa’s current streetcar network). It is designed to serve tourists from Tampa’s cruise industry and convention-goers, as well as to link businesses and parking structures in the city.

A one-third-mile extension of the service from the convention center deeper into the central business district is under construction and is expected to be completed in 2010.

A summary of Tampa and its streetcar system are included in Table 3.7.

<table>
<thead>
<tr>
<th>Table 3.7</th>
<th>Characteristics of the Tampa TECO Line Streetcar</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Population</td>
<td>343,890</td>
</tr>
<tr>
<td>Metro Population</td>
<td>2,747,272</td>
</tr>
<tr>
<td>Year Opened</td>
<td>2002</td>
</tr>
<tr>
<td>Length</td>
<td>2.4 track and route miles</td>
</tr>
<tr>
<td>Ridership</td>
<td>400,000 per year</td>
</tr>
<tr>
<td>Vehicle Type</td>
<td>Heritage (Replica)</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$57.6 million</td>
</tr>
<tr>
<td>Fare</td>
<td>$2.50</td>
</tr>
<tr>
<td>Right-of-Way</td>
<td>Exclusive</td>
</tr>
<tr>
<td>Location</td>
<td>Downtown to entertainment district via cruise terminal</td>
</tr>
</tbody>
</table>


Exhibit 3.4  Map of the Tampa Streetcar

Source: TECOline Streetcar System
The streetcar is governed by a nonprofit organization called Tampa Historic Streetcar, Inc., whose board has six members appointed by the City of Tampa and three appointed by HART, the area’s transit agency. Tampa Historic Streetcar is responsible for managing, operating, and maintaining the streetcar system, and contracts with HART for operations.15

The replica heritage streetcars began service in 2002. Operating on a single track, the service has dedicated rights-of-way on city streets. Several passing sidings are available to support bidirectional service. The streetcar is in operation seven days per week, running every 15 to 20 minutes.

Public support for the streetcar was high when the service opened in 2002, but recent budget and economic problems in both Tampa and Florida have created some opposition to an extension of the service now under construction.

Construction Costs and Funding

Funding for the construction of the streetcar line came from a wide variety of sources, as described in Table 3.2. Federal money made up over half of the funding, primarily from Congestion Mitigation – Air Quality (CMAQ) grants. The State of Florida contributed over $9 million for the streetcar, including over $4 million in “State intermodal funds.” The local share of nearly $20 million was funded largely through gasoline tax revenue.

Tampa Electric Company bought the naming rights for the system for $1 million. Vehicle and station naming rights also are offered. The revenue from the naming rights goes into an endowment which helps to fund ongoing operations costs. Other operating funding comes from a special assessment district surrounding the streetcar line, advertising, and fares.

Economic Development Benefits

In 2006, it was estimated that the streetcar line generated $1 billion in development within three blocks of the service. Included in this were over 2,700 new residential units.16 Furthermore, at least 24 former industrial properties have been converted into nonindustrial uses.17

Tampa uses the TECO Line streetcar in promoting the city and in attempts to attract events like conventions or the Super Bowl. The convention center’s proximity to the streetcar line helps this case, and allows conventioneers to easily explore parts of Tampa that they may otherwise have not visited.

________________________________________


16 CCDC. Boise Streetcar Information. Fall 2009.

### Table 3.8  Funding Sources for the Tampa TECO Line Streetcar

<table>
<thead>
<tr>
<th>Source</th>
<th>Funding ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Federal</strong></td>
<td></td>
</tr>
<tr>
<td>Congestion Mitigation – Air Quality (CMAQ)</td>
<td>$14.3</td>
</tr>
<tr>
<td>5,307 Urbanized Area Formula</td>
<td>$6.8</td>
</tr>
<tr>
<td>New Starts</td>
<td>$5.0</td>
</tr>
<tr>
<td>TSCP</td>
<td>$2.0</td>
</tr>
<tr>
<td>STP</td>
<td>$1.0</td>
</tr>
<tr>
<td><strong>State</strong></td>
<td>$9.1</td>
</tr>
<tr>
<td>Intermodal funds</td>
<td>$4.3</td>
</tr>
<tr>
<td>DDR</td>
<td>$2.0</td>
</tr>
<tr>
<td>CMAQ</td>
<td>$1.1</td>
</tr>
<tr>
<td>Urban Transit Capital Funds</td>
<td>$1.0</td>
</tr>
<tr>
<td>Fast Track</td>
<td>$0.4</td>
</tr>
<tr>
<td>Public Transit Funds</td>
<td>$0.3</td>
</tr>
<tr>
<td><strong>Local</strong></td>
<td>$19.4</td>
</tr>
<tr>
<td>Gas Taxes</td>
<td>$13.9</td>
</tr>
<tr>
<td>Land Sale proceeds</td>
<td>$4.2</td>
</tr>
<tr>
<td>HART</td>
<td>$0.9</td>
</tr>
<tr>
<td>Impact Fees</td>
<td>$0.3</td>
</tr>
<tr>
<td>City Rail Contribution</td>
<td>$0.1</td>
</tr>
<tr>
<td>Port Authority</td>
<td>$0.04</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$57.6</strong></td>
</tr>
</tbody>
</table>

Source: Reconnecting America

In the Channelside District, much of the new development has been housing. Several of the new condominium buildings in this area are over 20 stories high. Hotels and retail also have been incorporated into the residential development. Similarly, Ybor City has seen an influx of residential development, mixed with retail, office, and entertainment spaces.

The construction of so many residential buildings along the streetcar route has contributed to a change in the types of riders. While the service is situated in a location that captures large visitor and tourist demand, the addition of housing has shifted the ridership profile towards local residents.
Overall, the economic development following the streetcar implementation in Channelside and Ybor City has been very successful. As former Tampa Mayor Dick Greco said, “[the streetcar] may not have been the only reason, but I have no doubt that much of what you see there today wouldn’t exist if we hadn’t built the streetcar.”

3.2 RELEVANT ECONOMIC FACTORS IN EL PASO AND THE CORRIDOR

Introduction

Ultimately, the strength of El Paso’s economic and demographic growth will be a key factor contributing to the proposed streetcar’s ability to attract ridership and foster a more urbanized land use that attracts transit-oriented development. Dynamic growth in El Paso will help nurture the conditions that will encourage development along the corridor. This section analyzes jobs, population, economic, and real estate trends in El Paso, emphasizing those trends that will either support or not support more intensive development along the proposed streetcar corridor.

Supported by international trade, the U.S. Army’s large-scale expansion at Fort Bliss, and the expansion of medical and educational services, the El Paso economy in 2010 is proving considerably more resilient to the “Great Recession” than most other cities in the country. These relatively positive conditions set a foundation for future growth in El Paso, that if directed to the streetcar corridor area, would allow for more intensive development accompanied by higher ridership.

Overall Jobs Trend Underlines Resilience and Opportunity of the El Paso Economy

El Paso’s economic growth slowed in 2009, but the city’s economy continued to be one of the strongest in the nation. For much of the previous decade, El Paso’s growth had been robust, fueled by the relaxing of trade regulations and growing services and logistics sectors, benefiting from its role as an international trade gateway and the symbiotic links with its cross-border sister city, Juarez. See Exhibit 3.5 which shows jobs growth in El Paso County compared to the nation. Today, the city’s stability can be traced to the continuing expansion of Fort Bliss, the growing healthcare industry anchored by the new medical school and the University of Texas at El Paso (UTEP). The city’s relative economic resilience and projections for future growth supported by the Fort Bliss expansion provide El Paso with fundamental conditions for growth that will help support housing and commercial development in future years. The fundamental question is how much of this growth and development can be channeled into the downtown and the corridor to be served by the proposed streetcar.
The proposed streetcar corridor area which includes El Paso’s downtown as well as the Mesa corridor to the north is the historic center of economic activity in the city. The streetcar corridor area, although it contains a high concentration of government, healthcare, education, finance, and professional services jobs as well as retail, entertainment, and some hotels, has experienced very little jobs growth in recent years (see Exhibit 3.6), as El Paso’s jobs growth has gone to newer, more peripheral areas. A major corporate employer and formerly large user of office space, El Paso Natural Gas, moved its headquarters to Houston about 20 years ago, part of a trend towards consolidation of the U.S. energy industry in Houston. El Paso Natural Gas had been headquartered downtown and the area hasn’t fully recovered since the headquarters left. As can be seen in Exhibit 3-6, the number of jobs in the proposed streetcar corridor area has remained relatively constant, between 30,000 and 34,000, for years. While jobs have increased markedly in the rest of El Paso County, the corridor area’s share of the county’s employment has declined from 19.4 percent in 1994 to 14.6 percent in 2008. However, while commanding a lower share of the county’s jobs, the wage structure of the central parts of the city on the corridor has remained the same – substantially higher than the county, overall. This demonstrates that the corridor area continues to have a higher share of jobs in higher-end finance, education, government, and healthcare services. The average wage per worker in the corridor area in 2008 was $33,585, 27 percent higher than the $26,389 average for the rest of El Paso County.
The streetcar corridor area, as proposed, does include, within the confines of a fairly compact area, a concentration of several of the city’s main economic generators (downtown, University of Texas-El Paso, two large hospitals, and El Paso Community College Rio Grande Campus). These types of activity centers and institutions explain the higher wage levels found in the corridor compared to the rest of the county. The concentration of economic activity centers within the proposed streetcar corridor is a characteristic shared by the alignments of other streetcar systems in the country.

Exhibit 3.6   Jobs in Corridor Area, 1994-2008

![Bar chart showing jobs growth in the corridor area from 1994 to 2008.]

Source: County Business Patterns, U.S. Census Bureau; data not available for some years due to disclosure issues; “Corridor Employment” is for zip codes 79901 and 79902.

The reasons for slower growth in the corridor area are numerous, ranging from prevailing El Paso development trends to issues regarding the border crossings. Future prospects also are affected by the current recession and much more local issues. These conditions will influence how and whether the proposed streetcar can be a catalyst to attract development to El Paso’s core. In some instances, policy decisions and focused development strategies can help counteract trends that pose obstacles to development along the corridor. The trends and issues affecting growth in El Paso’s central areas are discussed, below.

Slow Jobs Growth in El Paso’s Core Results from Development Patterns Pushing Growth to the Urban Periphery

El Paso’s current development patterns largely explain why jobs growth in the downtown and corridor area has lagged the rest of the county. The predominant areas of new development in El Paso are concentrated on the greenfield peripheries of El Paso to the northeast, east and far west sides of the city. The availability of large tracts of land are driving this development. The relatively higher cost
of infill (e.g., downtown) versus greenfield development has hampered efforts to concentrate more of the El Paso region’s growth into the downtown area. The lower land and development costs on the periphery is a challenge that downtown El Paso and the proposed streetcar corridor area need to overcome in order to gain a greater share of El Paso’s long-term development. This is especially important for injecting vitality into urban districts as opposed to auto-dependent development on the periphery.

The City already offers numerous incentives to encourage development, including reduced permit fees, zoning bonuses, parking requirement waivers, and tax abatements. There also are incentives to promote the refurbishment of existing buildings. There has been some redevelopment activity, including refurbishing older buildings (e.g., the Mills Building) in the downtown area. There is a need for more housing to help revitalize downtown but the market cannot command the prices needed to spur development. The recent development of some loft projects, it is hoped, will start a trend towards greater downtown housing opportunities. However, this is a very small step. Longer term, downtown El Paso will likely benefit from a shift in worker preferences to have jobs in downtown areas, particularly for younger people. Businesses, in response, will locate where their employees want to work.

**Effects of Recession**

Due to the current recession, there has been only limited progress in developing properties in downtown El Paso recently. Commercial developers, however, have purchased numerous properties and are waiting for the recession to subside according to a City of El Paso development official. Developers presently have a “wait and see” attitude concerning their development plans, riding primarily on emerging more robustly from the current down-cycle.

**Movement of Downtown Bus Hub Has Affected Retail Activity**

There is considerable concern that the opening in October 2009 of a new Sun Metro bus hub at Paisano/Santa Fe has shifted riders away from the downtown area. The main bus hub had formerly been located at San Jacinto Plaza. The switch has hurt downtown El Paso’s retail activity with many retail properties near San Jacinto Plaza becoming vacant after Sun Metro moved its downtown bus hub from the plaza. Activity north of 4th Street has become very slow. Riders are going north to shopping malls and big box strip centers.

**Downtown’s Legacy Has Not Included Housing**

The legacy of the El Paso downtown area is tied to serving merchants coming up from Mexico. El Paso’s downtown was shaped by this legacy and its retail hours traditionally followed “wholesale hours” – opening and closing early with the wholesalers. Hotels also sprung up to serve Mexican merchants. For these reasons, downtown does not have a legacy of housing. More housing and a stronger tourist attraction (e.g., the Arts Walk area as envisioned by the 2015
Downtown Plan would help) to serve as anchors for the downtown area were believed by a downtown official as being complementary to the streetcar and as factors that will help ridership.

Factors Beyond El Paso’s Direct Control – the U.S. Economic Cycle, Juarez Crime, and Border Crossing Delays – Will Be Key Determinants to Future Growth Opportunities in El Paso and Its Downtown

Improvement in downtown El Paso will be challenging until the economy recovers (this is crucial) and the Mexico situation is resolved (crime in Juarez and chronic border crossing delays). By serving Mexican shoppers, anything that slows the propensity for people to cross the border can weaken retail activity in downtown El Paso. In the 1990s, the peso devaluation stymied retail sales and, today, it is border crossing delays and crime in Juarez. While crime pushes some commercial activity (e.g., shoppers, restaurants, and entertainment) into El Paso from Mexico its overall effect is to reduce business confidence in Juarez thus undermining El Paso, as well.


Continued growth in El Paso’s economy toward services bodes well for the types of industries – education, healthcare, professional services, finance, and government – that are particularly concentrated within the proposed streetcar corridor. Trends in key El Paso industries and their possible effects on the streetcar corridor are analyzed, below.

Growth in Education, Healthcare, and Services

El Paso’s growth industries, including education, healthcare, and professional services, are the types of intensive office space users that can be accommodated along the streetcar corridor (Exhibit 3.7 shows jobs growth by major industry sector in El Paso County from 2003 to 2010). The target industries selected by the El Paso Regional Economic Development Corporation (REDCO), including life sciences, defense, automotive, and clean renewable energy, also are industries that use office as well as research and development space that is suitable for the proposed streetcar corridor. REDCO emphasizes the higher-end technical support aspects of such industries as automotive and defense which would also be suitable for locating on the streetcar corridor.
The streetcar corridor includes major institutions, University of Texas El Paso, El Paso Community College (Rio Grande Campus), and the Las Palmas and Providence medical facilities. These institutions are the cornerstones for El Paso’s largest and most robust economic sector – education and healthcare. The concentration of this key industry along the streetcar corridor will help contribute to the further development of properties near the streetcar alignment. Long term, institutions like UTEP are anticipating continued growth as they increase enrollment and expand further into research and development but on very limited land. All parking lots, including those at UTEP, are potential expansion areas. UTEP has a goal to become a national research institution and this will increase the need for buildings, both for academic and housing purposes. Improved transit, including the streetcar, would strengthen access to UTEP and lessen the need for parking lots and garages that could be converted to more productive uses (e.g., academic buildings, research and development space, and student housing).
Retail

Retail is the second largest industry in El Paso in terms of employment. The industry is supported by the influx of Mexican shoppers who account for approximately 20 percent of El Paso’s total retail sales. Violence in Juarez has helped push shoppers north, especially to regional malls, but by reducing the draw for U.S. tourists to cross the border from El Paso, it has slowed some retail activity in El Paso’s downtown area.

Lengthy delays at the border crossings from Juarez also have had a very negative impact on commercial activity in downtown El Paso. There are frequent two-hour waits for both pedestrians and cars. This is hurting the vitality of downtown. Shoppers in cars who do cross the border from Mexico often bypass downtown for El Paso’s shopping malls and big box retail outlets. Downtown officials recommend opening more inspection lanes at U.S. Customs facilities and hiring more inspectors to expedite flows. It also is believed that a streetcar crossing the border would be helpful (though not plainly feasible), especially if riders were prescreened in Juarez so the streetcar could readily cross into El Paso.

Leisure and Hospitality

Presently employing over 28,000 people, leisure and hospitality (restaurants, hotel accommodations, performing arts, etc.) has become the fourth largest major industry sector in El Paso County. According to the Texas Governor’s Office’s Economic Development and Tourism Division, El Paso attracts about 2.3 million visitors per year, with a direct spending impact of over $1.2 billion. The spending of these travelers, including large numbers of Mexicans from the State of Chihuahua who come to El Paso for shopping, entertainment, and medical services, increased markedly between 2002 and 2008 but slowed down in 2009 with the recession (see Exhibit 3.8). The violence in Juarez has contributed to larger numbers of Mexican visitors according to the El Paso Convention and Visitors Bureau (CVB) even if many are dissuaded from walking across the border to El Paso’s downtown by long border crossing delays. A concern for El Paso is that the crucial tourism linkages (e.g., the “two nation vacation”) with Juarez are basically gone right now. Formerly, large numbers of Americans had used downtown El Paso as a springboard into Juarez but violence has brought that to an end. The reintroduction of these travelers to El Paso’s downtown area would also enhance the urban vitality of the area and help to further encourage development along the streetcar alignment.

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18 According to the El Paso Regional Economic Development Corporation.
Exhibit 3.8  Value of Travel Spending in El Paso, 2002-2009

Source: Texas Office of the Governor, Economic Development and Tourism

There are 8,400 hotel rooms located in El Paso, with a particularly strong concentration near the airport, according to the El Paso Convention and Visitors Bureau. Although expanding, with the recent opening of the Doubletree, El Paso’s downtown hosts a relatively small number of hotel rooms. Without the downtown capacity, many convention-goers must stay in hotels outside downtown and use shuttles (or rent a car) to reach the convention center. A streetcar would help the mobility of conventioneers and could also help El Paso attract more large-scale events. This, in turn, might stimulate the development of additional hotels and restaurants while supporting retail activity. However, the current convention center is relatively small and limited restaurant hours (and days of operation) would need to change to encourage further growth of convention activity within El Paso’s central core. Visitors to recent events are reported as having to leave downtown for restaurant and entertainment options, with many going to outlying malls (Cielo Vista, Trans-Mountain Outlet Mall, Sunland Park Mall) and the Sunland Park Casino in nearby New Mexico. The proposed streetcar, by connecting downtown’s hotels to the Cincinnati entertainment district to the north would help make downtown El Paso more attractive to conventioneers and better contain economic activity to the city.

Just to the west of the streetcar catchment area, the Union Plaza entertainment district/club area is doing very well but there’s a missing urban linkage with downtown El Paso. The success of Union Plaza has not had a complementary effect thus far on downtown because the Durango Street overpass forms a visual barrier between them. The barrier, real or perceived, makes it not conducive to walk between Union Plaza and downtown. The City is conducting a “wayfinding” study to encourage people to walk between downtown and Union Plaza. Drawing this entertainment district activity into the downtown area
would further enhance the urban feel of El Paso’s central core and add to its appeal for future development, complementary to the urbanizing effects expected from the proposed streetcar.

Manufacturing

El Paso has lost a large number of manufacturing jobs according to data from the Texas Workforce Commission. Between 2003 and 2010, El Paso shed 11,500 manufacturing jobs, a decline of 41 percent. During this period, manufacturing went from being the third largest major industry sector (following education/healthcare and retail trade) to the seventh largest. While the El Paso manufacturing sector can be complementary with the production of goods in Juarez’s factories, benefiting the city, it has been hit by the wholesale movement of its formerly large apparel and textiles industries to other locations in Mexico and overseas. Although manufacturing tends not to locate in the more services-oriented corridor for the proposed streetcar, its long-term health will be an important underpinning for the overall El Paso economy. A stronger, more diverse economy that also includes manufacturing will help the long-term development prospects for the corridor.

Logistics and Distribution

El Paso’s economy is closely linked to the flows or people and goods across the border, whether related to retail, education, tourism, manufacturing, or logistics and distribution. El Paso has a massive amount of industrial distribution space (some 55 million square feet) for the dispersal of goods assembled in Juarez and then trucked across the border prior to moving to destinations throughout the United States. In 2009, $43.4 billion worth of imports and exports passed through El Paso’s international bridges and railroad crossings to and from Mexico, making El Paso the second largest U.S.-Mexico border crossing following Laredo. The high volume of trade in El Paso is a reflection of Juarez’s role as the top location in Mexico for maquiladoras (export-focused assembly plants incentivized by low taxes and customs duties). About 300 maquiladoras in Juarez employed approximately 190,000 people in 2010. A significant share of these jobs (10-15 percent) are in higher paid technical professions that use El Paso as a place to shop, learn, receive healthcare, be entertained, or, increasingly, to live – all activities that are concentrated on the proposed streetcar corridor in El Paso. For these reasons, the vitality of the Juarez economy and its maquiladoras also are a critical underpinning of the El Paso economy. Juarez has shown recent strength, despite significant threats from ongoing violence, in maquiladora jobs after having posted some declines earlier in the 2000s. Long

19 El Paso Regional Economic Development Corporation, based on data from Mexican statistical agencies.
term, a thriving Juarez will also translate into a more robust El Paso which is critical to the development prospects along the proposed streetcar corridor.

**Population Growth and the Fort Bliss Expansion**

The expectation that population growth will continue to be strong in El Paso in future decades will also help to stimulate growth along the streetcar corridor and encourage ridership. Between 2009 and 2035, El Paso County is forecast to add 155,000 people, an increase of over 20 percent (see Exhibit 3.9). The importance of El Paso as a regional center serving a vast area, its role as an international gateway, and the major expansion of Fort Bliss are factors that contribute to the strong population growth projections for El Paso County. Drug violence in Juárez also is driving many of that city’s entrepreneurs and residents to El Paso in what one local city councilman calls “the largest migration of wealthy Mexican nationals to El Paso since the Mexican Revolution.”

**Exhibit 3.9   El Paso County Population and Forecast, 2000-2035**

![Bar chart showing population growth from 2000 to 2035](chart.png)

Source: U.S. Census Bureau and Texas State Data Center (Scenario 2000-2007 projection)

**Fort Bliss Expansion**

The recent $4.5 billion expansion at Fort Bliss is a positive for the El Paso economy and has helped it weather the recession better than most other parts of the country. The addition of about 20,000 soldiers and as many as 25,000 family members (see Exhibit 3.10) is expected to create demand for housing, education,

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20 Note that an even higher growth is forecast in the El Paso MPO’s TransBorder 2035 Long Range Transportation Plan.
and healthcare. This demand is expected to result in thousands of jobs to support the growth at the base. The influx of soldiers and their families may also result in an upside population forecast for El Paso County, giving the region considerably more people by 2025 than the current 876,000 Texas State Data Center projection.  

Exhibit 3.10 Fort Bliss Expected Expansion in Soldiers and Associated Family Members, 2006 and 2013

Source: Team Bliss Base Transformation Office

The massive growth of Fort Bliss, while providing a more robust foundation to the El Paso economy, will also influence land development trends, potentially pushing them away from the proposed streetcar corridor. Housing and commercial growth to support the base are expected to be in the more immediate Fort Bliss area, including areas nearby El Paso International Airport and the Butterfield Trail area. A self-contained retail center, Freedom Crossing, is being built at Fort Bliss which will also limit retail spill-over into other parts of El Paso, including downtown and the proposed streetcar corridor.

Income Levels

El Paso County income levels are significantly lower than national averages (see Exhibit 3.11) which may have an effect on the number of households able to afford the types of housing associated with transit-oriented development that would accompany the development of the streetcar. The lower-income levels on

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21 Population forecast according to the Texas State Data Center’s 2000-2007 growth scenario.
one side create a relatively larger transit-dependent population potentially stimulating use of the streetcar. However, on the other side, lower incomes also mean that the population in El Paso that is able to afford the prices required by transit-oriented development projects also is relatively small. In 2008, about half of El Paso County households had incomes below $35,000 and only 20 percent were above the $75,000 threshold (see Exhibit 3.11). This will lower the universe of households able to afford new or refurbished housing on the streetcar corridor at market prices that reflect the cost of land and construction. By promoting a mix of public and private housing projects, the streetcar corridor can cater to families of various economic backgrounds and thus provide a critical mass of housing activity to strengthen the urban vitality of the area.

Exhibit 3.11  Share of Total Households by Income Level, 2008

![Bar chart showing share of total households by income level for El Paso and United States in 2008](chart.png)

Source: U.S. Census Bureau, American Community Survey; data are a three-year average for 2006-2008 adjusted to 2008 dollars.

La Fe Community Development Corporation broke ground in September 2010 on the upscale, 91-unit Magoffin Park Villas (just to the east of the proposed streetcar corridor catchment area), which will cater to young professionals looking to live in downtown El Paso. This is considered a catalyst project for the downtown area, and if successful, would attract other developers to construct similar projects in the corridor. The proposed streetcar would provide an urban amenity that would help to further develop the area by attracting the segment of households able to afford to live in new construction at market rates. Young professionals might also be likely to use the streetcar to access entertainment and other activities in the corridor.
Congestion and the Use of Public Transportation

In addition to household income levels, other factors will play into the potential development of the streetcar corridor, including El Paso’s relatively low levels of existing roadway congestion and its continued dependence on autos for travel.

Exhibit 3.12 Congestion Levels (hours of travel delay) for El Paso and Comparison Cities, 1985-2007

High levels of congestion are an impetus for people to use public transportation and live closer to their jobs. As can be seen in Exhibit 3.12, roadway congestion in El Paso is not as bad as in the cities with the comparison streetcar systems. Long commutes will also push people into public transportation in order to save time, but they are relatively short in El Paso (22 minutes in 2008). These factors, in themselves, while not critical to the development of the streetcar corridor, do reduce an impetus in El Paso for people to live closer to their work as a matter of convenience as opposed to lifestyle preference.

El Paso also is very auto-oriented, a fact borne out by recent Census data showing that less than two percent of commuters use public transportation (see Exhibit 3.13). With much of the population unaccustomed to using public transportation, they also may not readily recognize the advantages of living within the streetcar corridor in the center of El Paso. With the exception of Portland, however, the other cities with the comparison streetcar systems also are auto-dependent and their streetcars have proven to be successful in attracting development.
Due to a combination of factors – relatively low household income levels and low home prices, a proclivity to build new residences and commercial space on greenfield sites, low congestion levels, and a population that is not accustomed to using public transportation for trips – there will be significant challenges as El Paso encourages more centralized development patterns. Constructing new homes and commercial buildings on the periphery will continue to be less costly than refurbishing older buildings in the center or constructing new mixed-development projects. In congested cities, people will pay a premium to live nearby transit lines to save time and to avoid the frustrations and delays of heavy traffic. The premiums they are willing to pay allow the market to build or refurbish housing profitably at these locations, stimulating developer interest. A similar dynamic works for commercial construction – developers can build in the transit-served center city (or corridors) because higher rents can justify the higher costs.

This is not to say that the proposed streetcar system in El Paso cannot succeed as an urban amenity attracting attention to and reinvigorating the city’s core, but it does demonstrate that active efforts will need to be made to counteract the effects of some underlying trends in El Paso that deter more centralized development.

Source: U.S. Census Bureau, American Community Survey; data are a three-year average for 2006-2008; data are for metropolitan areas.
3.3 OPPORTUNITIES FOR TRANSIT-ORIENTED DEVELOPMENT

Introduction
The proposed El Paso streetcar will help to focus growth in the city’s downtown and along its 2.2-mile corridor, already lined with significant activity centers, including hospitals, colleges, a major university, entertainment districts, visitor attractions, retail, and office (government, finance, and business services) facilities. By providing frequent, high-capacity connections between these centers of activity and allowing workers, students, and visitors to circulate, the streetcar in El Paso can be a shaper of land use and an economic development tool for the city. For these same reasons (connectivity and capacity), the streetcar will make it easier for people and firms to interact and connect with one another, a key factor to encourage the types of connections that foster an innovative, more advanced economy. As such, the proposed streetcar will encourage higher densities, more concentrated development, and economic growth in El Paso.

In a sense, the return of the streetcar and associated higher density development in downtown and in the corridor represents a return to El Paso’s pre-automobile development patterns that concentrated economic and residential activity into a more geographically contained space. Today, as in many other U.S. cities, the car has become the main form of transportation in El Paso, a condition that emphasizes highway access to dispersed suburban areas rather than more centralized development in downtown areas. The proposed streetcar can help El Paso encourage growth to return to its traditional center.

Compared to light rail and commuter rail, streetcar lines are generally shorter in length, operate with single cars, and have more frequent headways. They operate at lower speeds on the same lanes as automobiles and stop every one-to-two blocks. These characteristics also make it possible for streetcars, in combination with other urban-enhancing improvements to define urban districts by allowing dense, mixed-use development along the entire length of the alignment. By comparison, light rail (and commuter rail) stations are much farther apart, and thus foster development only within a defined radius of the stations.

In El Paso, the proposed streetcar would define and brand a denser, more cohesive mixed-use urban area stretching from the border and Golden Horseshoe District, through downtown to UTEP and Glory Road. Encompassing several commercial, medical, and educational activity centers, it will help to meld the corridor and thus create a more cohesive and better defined urban core at El Paso’s traditional center. Ultimately, the streetcar corridor can embody a sustainable relationship between land use, walking, and transportation by linking jobs, services (healthcare, education, retail), and housing. Streetcars encourage land uses that support shorter trips and are thus more efficient than modes that spread out land use patterns (e.g., modes designed for long distance, high-speed trips). However, for this vision to take hold, the El Paso streetcar plan will need
to be accompanied by an urban infill strategy to encourage higher densities and a
diverse mix of uses and amenities along the proposed corridor. Ideally, the
streetcar will induce shifts away from vehicle use and appreciably increase pri-
vate, public, and institutional investments along the corridor. In effect, the pro-
posed El Paso streetcar is a tool that can help fulfill the vision set forth by the El
Paso Downtown 2015 Plan which includes goals to reuse downtown buildings
by filling them with offices, lofts, restaurants, and new places to shop.

This section estimates the likely development impacts on the immediate areas
surrounding the proposed El Paso streetcar corridor. This process was informed
by reviewing El Paso-related studies, plans, and data, as well as interviews with
leaders and stakeholders with interests in the streetcar corridor. The interviews
provided perspectives on the proposed streetcar, how it will affect land use, and
its possible effects on the quantity of future development.

El Paso’s Central Appraisal District (CAD) database was used in this study to
provide parcel-level information (e.g., land use type, parcel size) of the land
along the proposed streetcar corridor.

The following plans and analyses also helped to guide this study:

- “Plan El Paso (draft section),” Urban Advisors, September 2010.
  Center, Texas A&M University.
- “El Paso Transit Corridor Alternatives Analysis,” “Mesa Corridor Purpose
  2006.

Interviews were conducted with the following institutions and organizations:

- University of Texas at El Paso (UTEP)
- Central Business Association (Downtown Management District)
- El Paso Regional Economic Development Corporation (REDCO)
- El Paso Convention and Visitor’s Bureau
- Greater El Paso Chamber of Commerce
- City of El Paso Economic Development
- Urban Advisors (transit-oriented development consultants)

The next part of the analysis describes the transit-oriented development expe-
riences of the four comparison streetcar systems and their results may be extra-
polated to El Paso.
Development Experiences of Comparable Streetcar Systems in Little Rock, Memphis, Portland, and Tampa

Using the transit-oriented development data from the four case study systems, the development potential of the proposed system in El Paso could then be evaluated. The estimates for El Paso yielded by this evaluation, while based on the experiences of four systems in other cities, do provide a sense of what would be possible in El Paso. The transit-oriented development impacts of the four comparison cities ranged from $700 million for Little Rock to $3.5 billion for Portland. In Table 3.9, the values of reported transit-oriented development compared to reported costs to build the streetcar systems are compared. Data for Kenosha and Seattle also were added because the data was readily available even though these cities were not the subject of case studies.

### Table 3.9 Reported Cost of Streetcar System Construction and Reported Value of Transit-Oriented Development

<table>
<thead>
<tr>
<th>System</th>
<th>Reported Cost</th>
<th>Reported Transit-Oriented Development</th>
<th>Ratio, Development to Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little Rock</td>
<td>$28</td>
<td>$700</td>
<td>25:1</td>
</tr>
<tr>
<td>Memphis</td>
<td>$104</td>
<td>$2,000</td>
<td>19:1</td>
</tr>
<tr>
<td>Portland</td>
<td>$103</td>
<td>$3,500</td>
<td>34:1</td>
</tr>
<tr>
<td>Tampa</td>
<td>$58</td>
<td>$1,000</td>
<td>17:1</td>
</tr>
<tr>
<td>Kenosha</td>
<td>$4</td>
<td>$175</td>
<td>44:1</td>
</tr>
<tr>
<td>Seattle</td>
<td>$52</td>
<td>$1,400</td>
<td>27:1</td>
</tr>
</tbody>
</table>

Sources: Various. All cost and transit-oriented development figures in $millions.

Looking at Table 3.9, it is very important to note that the values of transit-oriented development are not necessarily exclusively attributable to the new streetcar systems. The streetcars tend to go through the most economically intensive parts of these cities – their downtowns and major activity centers. While the development reported has occurred since the inception of the streetcar systems and is geographically proximate to the streetcar lines, a large portion of this development might have taken place without the streetcar (though this cannot be discerned). Nevertheless, through the case studies and other data, it is clear that the streetcars have worked to act as catalysts and focus development. The value of transit-oriented development to streetcar cost ratios for all the case study cities as well as for Kenosha and Seattle are very high, ranging from 17:1 for Tampa to 44:1 for Kenosha, a smaller, low-cost system.

The experiences of streetcar systems in these other cities provide a reasonable comparison of the magnitude of development that could be expected in El Paso. The proposed El Paso streetcar would be similar in length with those in Little
Rock, Portland, and Tampa, while considerably shorter than the 12-mile system in Memphis. Each of these systems provides links to downtown areas and major activity centers (hospitals, universities, entertainment districts), similar to the streetcar being proposed in El Paso. A main goal of introducing streetcars is to provide definition to urban districts, create a sense of urban vitality, increase public awareness of the district within the region, and attract shoppers, visitors, residents, and workers. These goals have largely been met in Little Rock where the streetcar has animated the downtown area and reinforced the city’s River Market section as the center of Little Rock’s cultural, entertainment, and retail activity. In Memphis, the trolley has helped to define an emerging arts district. In Portland, the modern streetcar has been a catalyst for redevelopment and has stimulated denser development in the city’s central business district. Importantly, the streetcar in Portland sent a message to developers that the City was serious about developing its downtown. In Tampa, the streetcar has been used as a promotional tool to attract conventions and major events such as the Super Bowl.

Although El Paso is not similar to the comparison cities in every respect of economic structure and demographics or in its proposed streetcar operation, it is possible to estimate ranges of transit-oriented development that could occur in the streetcar corridor based on the comparison cities. If El Paso follows the patterns of the other cities, it could attract analogous levels of development. The other systems emulate what is planned in El Paso in terms of length (other than the Memphis system), downtown connectivity, and links to similar types of entertainment and activity centers. The four comparison systems undoubtedly benefited from a stronger U.S. economic cycle since their inaugurations, so the timing of how quickly El Paso would see the development benefits of the proposed streetcar is uncertain. However, as can be seen in Exhibit 3.14, El Paso’s economy is performing markedly better than all the comparison cities in terms of jobs growth. Basically, as of 2010, El Paso’s economic fundamentals are significantly better than the comparison cities. A quicker recovery in employment growth in El Paso, especially if directed to the streetcar corridor area, will also help encourage transit-oriented development in the city.
Regardless of the speed of the economic recovery, the development benefits of the streetcar over a longer period of time in El Paso, may also reach the levels achieved in the other comparison cities. This will depend on how the factors discussed in the previous section of this report transpire (e.g., economic cycles, services industry growth, strength of the Juarez economy, etc.) as well as strategies and incentives to encourage more centralized growth in El Paso.

**Parcel Analysis**

Data from the El Paso CAD were used to identify the uses of all the parcels within a one-half mile wide catchment area along the length of the 2.2-mile proposed streetcar corridor. Two different categories of land use were considered – parking lots and vacant land. These are the types of land uses that could be easily developed, given sufficient demand, adjacent to the streetcar alignment. It was then assumed that the development of the vacant parcels would follow the prevailing land-use mix already present along the corridor – a combination of office, institutional, residential, and retail. A map of the parking lots and vacant lots is shown in Exhibit 3.15 and summarized in Table 3.10. With nearly four million square feet of potentially buildable land, the capacity for the core of El Paso to accommodate growth is massive. Even accounting for the addition of significant new public spaces on these sites, El Paso’s proposed streetcar corridor could support tens of millions of square feet of multistory residences, office buildings, retail centers, hotels, clubs, and restaurants. It is the market and the desire to build in the area that will determine the amount of future growth, not land capacity limitations.
Exhibit 3.15 Parking Lots and Vacant Parcels in Streetcar Catchment Area
The development potential of the El Paso streetcar is evaluated by estimating the square feet of potential development and the corresponding number of jobs and change in residential population generated by that development. These estimates pivot from the comparisons with already operational streetcar systems in other cities and are informed by the interviews as well as El Paso-specific economic, demographic, and development trends. The parcel analysis covers the catchment area of the proposed El Paso streetcar. Because transit-oriented development takes time to be realized, the development impacts are estimated for 2025 (one decade after the earliest possible completion of the streetcar line).

Table 3.10  Total Area of Parking Lots and Vacant Parcels in Catchment Area

<table>
<thead>
<tr>
<th></th>
<th>Area (square feet)</th>
<th>Percent of Catchment Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking Lots</td>
<td>2,216,746</td>
<td>7.66 percent</td>
</tr>
<tr>
<td>Vacant Parcels</td>
<td>1,778,031</td>
<td>6.15 percent</td>
</tr>
<tr>
<td>TOTAL (parking lots and vacant parcels)</td>
<td>3,994,777</td>
<td>13.81 percent</td>
</tr>
</tbody>
</table>

The development potential of the streetcar is demonstrated in two different growth scenarios (and a baseline scenario), each representing a possible outcome depending on prevailing growth conditions over the next few decades, unique characteristics of the corridor, and El Paso’s ability to channel new growth into the corridor. Key assumptions for each scenario include the following:

- **Baseline Scenario.** The baseline assumes no impact from the streetcar and is based on the El Paso MPO’s forecast for jobs and population in the catchment area.

- **Moderate ("Restorative") Growth Scenario.** Historically, the streetcar catchment area in El Paso’s central core has been losing share of both El Paso County’s total jobs and total population. The “restorative” growth scenario assumes that the streetcar is able to arrest this trend and that the catchment area captures future jobs and population growth in proportion to its shares, today (e.g., the area will attract nine percent of El Paso’s future jobs growth – in proportion to its current nine percent share of El Paso County’s total jobs). After years of significantly less growth than the county and an eroding share of the county’s economic base, this scenario represents a noteworthy recovery for El Paso’s traditional center area of economic activity.

- **Higher “Catalytic” Growth Scenario.** The higher “catalytic” growth scenario assumes that the streetcar, other transit improvements, and successful strategies to concentrate development in El Paso’s core have a “catalytic” effect on development and give the catchment area much higher shares of El Paso County’s jobs and population growth. The higher “catalytic” follows growth trends similar to what has occurred near the Portland streetcar, generally considered the most successful new system in the country. Based on the
Portland experience, an assumption is made that the catchment area can capture a much greater share of population growth (3.8 percent capture rate versus its current share 1.05 percent share of El Paso’s population). This follows Portland’s pattern which saw the share of new housing units built in the downtown area near the streetcar more than triple in the 2000s (post streetcar) versus the 1990s and is further supported by the fact that other streetcar systems, like Memphis, have seen dramatic rises in population adjoining the streetcar routes. In the Memphis example, population nearby the streetcar in the city’s downtown quintupled. Portland, which has recorded higher levels of transit-oriented development (including 10,200 additional housing units) associated with its streetcar than any other comparison city, has enacted land-use laws to focus growth into the city’s central area. The growth management restrictions Portland places on development are unique in the United States and not commonly replicated. The areas adjacent to Portland’s streetcar system also attracted about 26 percent of net new office development in the metropolitan area between 2000 and 2008. For El Paso, because the proposed streetcar guideway is shorter than Portland’s, it was estimated that the El Paso streetcar’s catchment area would capture 14 percent of the county’s commercial growth.

Results from Parcel Analysis

Similar to the experiences of the streetcar systems in the comparison cities, El Paso has the potential to experience significant growth in transit-oriented development within the catchment area of the proposed streetcar. Table 3.11 summarizes the outcomes for the three potential growth scenarios. Exhibit 3.16 illustrates the comparative values of the TOD construction.

Table 3.11 Summary of Results for Baseline, Moderate, and High-Growth Scenarios

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Baseline</th>
<th>Moderate, “Restorative” Scenario (change beyond baseline)</th>
<th>High “Catalytic” Scenario (change beyond baseline)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Change in Population</td>
<td>150</td>
<td>3,000</td>
<td>10,800</td>
</tr>
<tr>
<td>Net Change in Households</td>
<td>70</td>
<td>1,400</td>
<td>5,100</td>
</tr>
<tr>
<td>Net Change in Services and Retail Jobs</td>
<td>4,550</td>
<td>7,000</td>
<td>13,700</td>
</tr>
<tr>
<td>Net Change in Commercial Sq. Ft.</td>
<td>0</td>
<td>1.2 million</td>
<td>2.4 million</td>
</tr>
<tr>
<td>Estimated Value of Construction</td>
<td>$10 million</td>
<td>$360 million</td>
<td>$1,040 million</td>
</tr>
</tbody>
</table>
The baseline scenario illustrates what currently is expected to take place between 2010 and 2025 without the streetcar and complementary initiatives to increase the concentration of El Paso’s future growth to the city’s center. The scenario shows very little construction to accommodate growth because current commercial vacancies in El Paso should be able to satisfy demand. The jobs increase in the baseline scenario would require an estimated 700,000 square feet of commercial space, an amount that existing buildings in El Paso could meet.

The moderate “restorative” scenario assumes that the streetcar and other initiatives will succeed to concentrate more growth into the catchment area. By capturing jobs and households growth between 2010 and 2025 in proportion to the catchment area’s current share of both these factors, the amount of development activity in El Paso’s center area would increase markedly above the baseline. This would reverse the long-term trend that has seen the steady erosion of this area’s share of county jobs and population. If this scenario were to occur, the catchment area would add about 7,000 jobs and 1,400 households, respectively, over the baseline. This would require additional building construction to meet the greater demand. The value of home and commercial construction in this scenario is approximately $361 million.

In the last scenario, the higher growth “catalytic” scenario, it is assumed that the catchment area will gain a share of new growth in El Paso County that is out of proportion with its current shares of jobs and people, following the experience of Portland’s successful streetcar system. For example, rather than capturing just over nine percent of jobs growth (the area’s current share of jobs) in El Paso County, this scenario has the catchment area gaining 14.3 percent of regional growth. The higher growth scenario would result in 13,700 more people working in the catchment area than the baseline and 5,080 more households. In terms of net new construction, the higher growth scenario would require $1.04 billion of investments in buildings to accommodate the demand for more commercial space and residences. Given the growth fundamentals of El Paso, this magnitude of investment could be reached, if not more, if the City can encourage more of its growth to take place in its traditional core.
Exhibit 3.16 shows the dramatic differences between possible construction levels, based on dollar value, for the three scenarios. As mentioned previously, there is very little construction associated with the baseline because existing available space in El Paso’s center would be able to accommodate growth. The moderate (restorative) and higher “catalytic” growth scenarios underline what could occur in the catchment area should El Paso be able to effectively use the new streetcar line as a tool to concentrate more development activity into its central districts. The total values for these two scenarios (including the baseline), are about $370 million and $1.04 billion, respectively. This is in line with experiences in the other four comparison streetcar systems, and may underestimate the total dollar value of construction in the corridor as these estimates do not include spending on public infrastructure. The values of transit-oriented development are only representative of construction costs and do not include land purchases.22

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22 Construction costs assume an average of $143,000 per new household, based on an average 1,100 square foot unit with a building cost of $130 per square foot. Commercial space is assumed to cost $130 per square foot to construct based on RS Means Construction Cost data for building a 2-4 story office building in Dallas adjusted to reflect lower labor costs in El Paso.
El Paso Real Estate Conditions and Preferences and Their Effects on Transit-Oriented Development

Although the potential for transit-oriented development in El Paso is significant, current conditions regarding its housing and commercial real estate markets need to be taken into consideration that will have a bearing on the degree to which transit-oriented development meets its potential in El Paso’s streetcar catchment area.

**Housing**

The growth of transit-oriented development will depend, in part, on El Paso’s future residential and commercial growth to place greater value and a higher preference for urban neighborhood locations than exists today. ESRI Business Information Systems does show that about 25 percent of El Pasoans would prefer to live in an urban center or urban neighborhood location, indicating potentially significant demand for the type of denser housing and mixed-use commercial activities associated with transit-oriented development. These preferences indicate that there is a demand for the lifestyle and associated land use and development that would be likely to occur along the proposed streetcar corridor. A more significant barrier to this growth, however, is the lower cost of development on the El Paso periphery rather than lifestyle preference.

There is a definite opportunity for greater housing within the corridor. The catchment analysis shows only 9,200 residents in 2007 compared to 26,400 workers. Jobs in the corridor are primarily in the higher-paying services industries (healthcare, finance, business services, education) that employ educated professionals and have also been more resilient during the economic downturn, especially compared to El Paso’s manufacturing sector. These types of workers also are more attracted to the urban living that the streetcar would help to encourage along the corridor, thus generating a demand for the type of denser, mixed-use housing associated with transit-oriented development. By attracting more workers to live in the corridor, the area’s retail, restaurant, and entertainment activities will also be further supported, providing more of a vibrant urban culture that can set the foundation for additional growth.

**Commercial**

Presently, there is significant vacant office space in El Paso’s Downtown (between 950,000 and 1.6 million square feet according to the Texas Real Estate Center at Texas A&M University). The weak economy has resulted in very slow net office space absorption in downtown El Paso (a net of about 65,000 square feet became newly leased in 2009). Suburban areas of El Paso fared somewhat better in 2009, absorbing about 175,000 square feet (net) and with a significantly

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23 Plan El Paso (draft section), Urban Advisors, September 2010.
lower vacancy rate (11 percent versus 24 percent for downtown). Retail space shows a lower vacancy rate, 10 percent, but the inventory measured does not include boarded up store fronts or vacant space designed for retail but not on the market. As mentioned previously, there is a plentiful supply of commercial space available in El Paso, including within the catchment area, which would be sufficient to meet short- to medium-term commercial leasing needs.

Prior to new development, significant vacant space in downtown El Paso will need to be absorbed, much of it requiring refurbishing prior to lease. When the economic recovery gains speed and the demand for commercial space rises, El Paso will need to have plans to focus that demand into the downtown and streetcar corridor area. Adding the workers associated with this demand is crucial to ensure the successful revitalization of the proposed streetcar corridor. An increase in jobs would also support new or refurbished housing, and thus help create a critical mass of workers and residents needed to support new retail. The corridor will need to be considered attractive, regionally, to encourage infill and new development. The proposed streetcar provides an urban amenity that will help the downtown and the corridor become more appealing to both business and residents.

3.4 Benefits of Future Connections

Due to the limited scope of this study as well as the unique characteristics of streetcar systems compared to larger-scale and higher-speed light rail projects, the benefits analyzed in this study were confined to those related to the streetcar’s transit-oriented development potential. Transit-oriented development is appropriate for evaluating the economic benefits of a streetcars because a main effect of a streetcar is to create an urban amenity that helps to form a more intensively used (and developed) urban district.

However, the benefits of transit investments to add services and expand networks are not limited to transit-oriented development. The combination of the streetcar with El Paso’s proposed bus rapid transit network has the potential to have significant benefits in terms of congestion relief and affordable mobility benefits (descriptions of these benefit concepts are described, below) in addition to transit-oriented development. As a package, the benefits of the streetcar and BRT network could be estimated as part of another project. Beyond transit-oriented development, the other types of benefits frequently considered and quantified when analyzing the benefits of transit network expansions and transit service improvements include the following:

- **Enterprise benefits.** The ongoing operations of El Paso’s streetcar will require expenditures on labor, supplies, utilities, and other goods and services. These expenditures will reverberate through the County’s economy.

- **Affordable mobility benefits.** In creating an affordable transportation alternative, transit investments raise the economic standard of living for
many members of the community, including students, elderly, second-income earners, and low-income households. By lowering or eliminating the need to operate a vehicle, expenses (gasoline, maintenance, and parking) are reduced. In some instances, people without access to a car are able to have jobs that would have been unreachable without transit. In El Paso, the affordable mobility benefits specific to the streetcar are likely to be limited due to already available bus services as well as the proposed bus rapid transit line on Mesa Street. However, if the streetcar encourages higher density urban development patterns, mixing commercial and residential land uses, more El Pasoans will be able to leave their cars resulting in potentially significant cost savings.

- **Congestion relief benefits.** Traffic congestion gives rise to inefficiencies and competitive disadvantages. Traffic delays reduce work hours and worker productivity. They add to the amount of gas and oil people need to buy at the expense of goods and services they highly value. Congestion causes accidents with tragic costs in the form of death and injuries as well as property damage, it adds pollution of air and water, and it increases pollution in terms of noise. Economic savings thus arise whenever someone uses transit in lieu of making a car trip, especially during rush hour. In El Paso, the primary outcome of the proposed streetcar would be to better define and form a more urbanized central area rather than to reduce congestion in the city.

- **Construction benefits.** The construction of El Paso’s street car line will have a stimulus impact on the area’s economy. The construction of the transit improvements, such as fixed guideways (stations, rail lines, etc.) and maintenance facilities, will create construction jobs as well as jobs in industries providing the required materials and professional services.

The direct jobs and monetized benefits that result from these types of benefits could be used as inputs into “input-output” models such as IMPLAN and REMI (Regional Economic Models, Inc.) to show the multiplier effects of the transit projects and thus capture the induced and indirect effects of the transit investment. These would provide a more comprehensive assessment of the total economic benefits of El Paso’s streetcar and bus rapid transit proposals beyond scope of this study.

### 3.5 Order of Magnitude Benefits Estimate and Return on Investment

The estimated cost of El Paso’s proposed streetcar is presently estimated to be about $90 million. Based on the analysis of potential transit-oriented development benefits shown in Exhibit 3.16, “Value of Construction for Transit-Oriented Development, Baseline, Moderate (“Restorative”), and High (“Catalytic”) Scenarios,” El Paso’s proposed streetcar has the potential to generate development, similar to other streetcar systems, far in excess of its costs. The moderate-
growth scenario shows transit-oriented development four times higher than the cost of the streetcar while the more optimistic higher growth scenario shows development nearly 12 times greater than the streetcars cost.

Although these benefits seem substantial, it must be stressed that it is difficult to attribute development causality to the streetcar and, as has been stressed in this study, successful transit-oriented development in the streetcar catchment area must also be accompanied by effective strategies to channel a higher share of future growth in El Paso County to the City of El Paso’s traditional central core.

Lastly, a shifting of growth to the streetcar catchment corridor from other parts of El Paso County may be seen as a zero sum game as it redistributes housing and commercial growth that would have happened elsewhere. However, there is an argument to be made that the shift encouraged by the streetcar from peripheral development in El Paso to the city center goes well beyond redistribution. Transit-oriented development and more centralized growth can also contribute to other tangible improvements for El Paso, including: lower costs of infrastructure and City services, lower greenhouse gas emissions, a healthier populace, a higher quality of life that helps attract economic development, and conservation of resources and open space.
4.0 Constraints and Steps to Advance the Project

This section provides a summary of next steps to advance the project and discusses some of the likely key constraints to advancing the streetcar project, including funding, public concerns, and consistency with the existing and future planned transit system.

4.1 Funding

Based on the order-of-magnitude capital cost estimates of Section 1.5, it appears that the capital cost of the El Paso streetcar project would be approaching $100M, excluding any land acquisition costs. Such a large investment will require a variety of funding sources (i.e., Federal, state, city, and private sector) and a carefully developed financing plan. If a Federal Small Starts grant were obtained for $75M, the maximum for a Small Starts grant, then about $25 million would still be needed from local or other sources. It is more reasonable to assume a 50 percent Federal Small Starts share than a 75 percent share; thus, about $50 million in local funding would be needed. (Note that the project appears to be too large for a Very Small Starts grant, so the more rigorous Small Starts application process would apply.) In addition, a stable and reliable source of funding would be needed for the long term to pay for ongoing operating and maintenance.

This section identifies the potential sources of funds for the streetcar, beginning with a description of the current funding sources for Sun Metro. Expected funding sources for the Mesa BRT project are then summarized, followed by sources used by the case study cities for their streetcar projects. A discussion of each source of funding is provided, with a primary focus on the capital funding.

Sun Metro Funding

Sun Metro is the operating name of the transit system operated by the Mass Transit Department of the City of El Paso. The department operates 112 buses and 47 demand response vehicles and contracts for another 20 vehicles for its demand response service.

The operating budget in 2008 was $45.1 million. Fare revenue provided 16 percent of the operating funding. Federal funding provided 25 percent and local funding provided 57 percent. The remainder (2 percent) was from other funds. No state funding was provided. The source of the $12.2 million in Federal funds was largely Urbanized Area Formula Funding ($11.7 million) supplemented by $0.5 million in other Federal. The $28.1 million in local funding came from a
dedicated sales tax. (The City has a ½ cent sales tax that was passed in 1988 and is dedicated to transit through its Transportation District.

Sun Metro expended $13.3 million for capital needs in 2008. Federal funding provided for 59 percent of this expense ($7.9 million and consisted entirely of Urbanized Area Formula Funding. The remaining share, 41 percent or $5.5 million, came from local funding. The bulk of this was $5.2 million categorized as directly generated and $0.25 million from the dedicated local sales tax. No state funding was provided.

Thus the total funding from the dedicated local sales tax was about $28.4 million. The current half cent sales tax is the maximum permitted by state legislation for municipal transit departments. The revenue yield of the local sales tax is subject to economic conditions such as the recent recession. As noted above, it appears the bulk of this funding is used for operating rather than capital costs.

Given the continuing development of transfer centers and the proposed BRT projects, developing a funding plan for the streetcar may be a challenge.

The approved Sun Metro capital program for Fiscal Years 2011-2017 totals $71.2 million. This includes $12.8 million for an Operations Center and $35.5 million for the Alameda BRT, both assuming 100 percent City funding. It also includes $5.4 million for the local share of the Mesa BRT, $6.1 million for the local share of the Dyer BRT and $8.6 million for the local share of the Montana BRT as well as additional funds for Arts and Bond Issuance Costs.

For the Mesa BRT project, the City is anticipating that a Very Small Starts grant would be obtained to cover half the total capital cost of $27.1 million (although this is by no means assured as the project is still in the application stage). The remaining $13.5 million was envisioned to be funded by a $2 million Federal CMAQ grant, Texas DOT Category 2 (pass-through toll revenues) and Category 5 (Congestion Mitigation and Air Quality Improvement) funds ($6.1 million) and City-funded debt ($5.4 million). Operating funding would be supported approximately equally by fares and CMAQ funds. The Mesa BRT project, scheduled to open in March 2014, is just the first of four BRT projects. The other three corridors are estimated to cost nearly $136 million. We understand that the City is hoping to fund the Dyer and Montana projects in the same manner – 50 percent Federal, 30 percent State, and 20 percent City, while funding the Alameda project with 100 percent local funds.

**Funding Sources of Streetcar Projects in Other Cities**

The case studies of four streetcar projects in Little Rock, Memphis, Portland, and Tampa conducted as part of this study identified the following funding sources for the construction cost of the projects; note that this just reflects a small sample of streetcar projects nationwide:
• **Little Rock** – In total, 80 percent of the construction costs in each phase came from Federal government sources. The majority of this came from the New Starts program, and was supplemented by the Federal Highway Administration’s Section 1,602 Flex Funds as well as High-Priority Funds from TEA 21. This project was considered “exempt” (a category that is no longer available) and all Federal funds were provided through congressional earmarks. The high share of Federal participation in this 1990s era project is not likely to be replicated in current era projects. Furthermore, the total amount of Federal dollars provided was comparatively small.

• **Memphis** – The first of the streetcar lines was built largely with funds that were originally designated for a freeway extension that could not be built for environmental reasons. Funding for expansion has come from usual transit funding sources – a mix of Federal New Starts, state, and local sources.

• **Portland** – Capital funding for the project came from a combination of a short-term parking rate increase for city-owned garages, tax-increment financing, property owner contributions, and various other local sources. The variety of funding sources for construction, including new Local Improvement Districts and TIFs, allowed for creative leveraging of Federal, state, and local funding sources. Operating costs for the system are paid by a combination of TriMet, the regional transit agency, and the City of Portland. Sponsorships and advertising also contribute to operations. Most of the service is in a fare-free zone.

• **Tampa** – Construction of the streetcar line came from a wide variety of sources. Federal money made up over half of the funding, primarily from CMAQ grants. The State of Florida contributed over $9 million for the streetcar, including over $4 million in state intermodal funds. The local share of nearly $20 million was funded largely through gasoline taxes. Tampa Electric Company bought the naming rights for the system for $1 million. Vehicle and station naming rights are also offered. The revenue from the naming rights goes into an endowment which feeds into operations costs. Other operating funding comes from a special assessment district surrounding the streetcar line, advertising, and fares.

**Federal New Starts and Small Starts Grants**

Federal funds through Section 5309 offer discretionary grants for New Starts, that is, fixed guideway projects meeting certain Project Justification and Financial Feasibility criteria. This is a highly competitive program which has historically funded a small share of the candidate projects that have Federal earmarks and strong local financial commitments and are deemed to be cost-effective through a very detailed analysis process. It should be noted that the current administration, in response to industry pressure as well as legislative direction in SAFETEA-LU, has identified its intention to reduce reliance on the cost-effectiveness index and to incorporate other measures such as economic development and environmental benefits into its decision-making process, but the
specifics are still to be determined and a Notice of Proposed Rulemaking is expected to clarify FTA intentions. As a result, the likelihood of streetcar projects being funded by Small Starts is expected to improve. However it should be noted that more than 40 cities were in various stages of planning streetcar projects at the time this change in policy was announced in January 2010.

To enable more low cost bus rapid transit and streetcar projects to obtain access to this program, SAFETEA-LU created a special Small Starts program. This program was designed to modify the requirements and make funds available to smaller projects from a dedicated portion of the 5309 funds. The Small Starts program offers grants of up to $75 million on projects whose total costs in year of expenditure dollars are no greater than $250 million. The Small Starts program includes a Very Small Starts program as well, which funds projects with grants up to $25 million for projects whose total costs are less than $50 million, however these are restricted to corridors that currently have at least 3,000 riders per day. The requirements for documenting Project Justification and Financial Commitment for Small Starts are somewhat less than for New Starts; for Very Small Starts the requirements are significantly streamlined.

Little Rock and Memphis are among the streetcar projects funded with New Starts funds. The Portland Streetcar Eastside Loop Project obtained a grant for $75 million awarded in October 2009 was the first-ever FTA Small Starts grant for streetcars in the U.S. Tucson obtained a grant for final design of a modern streetcar under the New Starts program, and a Small Start application for Fort Lauderdale is pending.

Small Starts and New Starts funds are insufficient to fund all the projects that seek these funds and it has been advantageous to increase the local share beyond the minimum required to increase chances of selection. As a practical matter, and despite the statute that allows for up to 80 percent Federal funding, New and Small Starts grants are capped at 50 percent Federal funding share. As a result, identification of a local funding source and the extent of resources available is critical.

**Urban Circulator Funding**

Unallocated Section 5309 funds were made available to urban circulator projects in December 2009 (a total of $130 million was available for grants up to $25 million). In July 2010, another $293 million was made available through two competitive grant programs, the Urban Circulator Grant Program and the Bus and Bus Livability Grant Program for major transit improvements, including new streetcars, buses, and transit facilities.

The six cities that submitted successful Urban Circulator proposals include Dallas and Fort Worth, Texas; Chicago, Ill.; St. Louis, Mo.; Charlotte, N.C.; and Cincinnati, Ohio. The six projects were selected from 65 applications totaling more than $1 billion in requests. Projects were eligible to receive up to 80 percent in Federal funding, with a maximum of $25 million for Urban Circulator projects. All but Chicago’s project were streetcars:
- Fort Worth Streetcar Loop ($24,990,000);
- Dallas Olive/St. Paul Street Loop ($4,900,000);
- Cincinnati Streetcar Project ($24,990,000);
- Charlotte Streetcar Starter Project ($24,990,000); and
- St. Louis Loop Trolley Project ($24,990,000).

FTA Administrator Peter Rogoff said in announcing the grants that “Streetcars are making a comeback because cities across America are recognizing that they can restore economic development downtown - giving citizens the choice to move between home, shopping and entertainment without ever looking for a parking space,” “These streetcar and bus livability projects will not only create construction jobs now, they will aid our recovery by creating communities with the potential to be more prosperous and less congested.”

This is not an ongoing program and it is expected that the revised Small Starts criteria will address this need in the future.

**Stimulus Funding**

Stimulus funding has been helpful in funding transit improvements since the economic crisis. These funds were designed to stimulate the economy at a key point in the economic cycle and do not represent ongoing programs for the future. They typically have funded shovel-ready projects. Several streetcar projects (New Orleans, Dallas, Portland, and Tucson) have been funded using funds from the Transportation Investment Generating Economic Recovery (TIGER) grant program under the American Recovery and Reinvestment Act (ARRA). A second set of grants were made available under TIGER II Discretionary Grants. Applications for this source were due in late August 2010 and awards were made in October; streetcar projects in Atlanta and Salt Lake City received TIGER II grants. Since this is a special economic stimulus program, future funding from this source is very uncertain unless new stimulus funds are authorized.

**State Funding Sources**

The State does not offer funding for transit capital or operating costs in large urban areas only in rural and small urban areas. The State does have a Statewide Mobility Program with funding in 12 different categories. Most is formula funded and devoted to roadways; some categories are for maintenance of existing systems and some are for new construction. The state funding for the BRT is envisioned to utilize funds from two categories. Category 2 is a formula-funded program for Metropolitan Area Corridor Projects that address mobility and added capacity within a Transportation Management Area. Category 5 is a formula-funded Congestion Mitigation and Air Quality Improvement program for non-attainment areas such as El Paso.
Regional Funding Sources

County vehicle registration fees in Texas are dedicated to roads and bridges. Metropolitan rapid transit authorities may also impose a vehicle emissions tax to fund transit infrastructure and service but we understand that this has not been implemented anywhere in the state.

City Funding Sources

While the current half cent sales tax is the maximum permitted by state legislation for municipal transit departments, there may be other tax options to fund transit improvements. Metropolitan rapid transit authorities and regional transportation authorities are allowed to pass sales taxes up to one percent and the former also have access to pass vehicle emissions taxes; all of these need to pass by popular vote. It should also be noted that other sales taxes are permitted. Any city can pass up to a half cent sales and use tax by popular vote to provide funding for any purpose other than repaying bonds and any county can pass up to a one percent sales and use tax for the same purpose. Cities meeting certain size requirements can pass up to a half cent Economic and Industrial Development Sales Tax (Section 4a) for capital and maintenance costs of infrastructure projects serving economic development, provided that total local taxes are kept below two percent. El Paso has already reached the local tax maximum so this source would not be available.

Private Funding Sources

The El Paso Downtown Management District was established in 1997 after groups of property owners and business leaders petitioned the Texas Natural Resources Conservation Commission. This District was approved by majority vote of the downtown commercial property owners within the geographical boundaries of Interstate Highway 10 and Loop 375 (Border Highway). The mission of the Downtown Management District is to improve public property, the environment, public facilities, streets, and alleyways in downtown El Paso. The property owners within this area are assessed an extra $.12 per $100.00 of property value creating a $295,327 tax assessment for FY 2010-2011. The overall budget for FY 2010-2011 is $394,752 and uses some reserves from prior years. The budget is used to address downtown issues of sanitation, security, parking, and transportation and promotion of downtown. The budget allocated less than 1 percent to transportation and parking. The vast majority of the budget goes to sanitation and administration. Of course, there would need to be strong support from the Downtown Management District (El Paso Central Business Association) members and leadership to obtain financial support that could mean an increase in the assessment. An interview with the association representative suggests that the streetcar proposal lacks that support at this time.
Tax Increment Financing (TIFs)

El Paso’s downtown area is within Tax Increment Reinvestment Zone Number 5 (TIRZ #5). The designation provides a funding stream for upgrades to the downtown area based on anticipated higher property tax revenues in the future resulting from the improvements. According to the “Implementation of the El Paso Downtown 2015 Plan: Phase Two” (July 2008), this funding stream could amount to $103 to $109 million over the next thirty years. The TIRZ has a board of directors that submits a project and funding plan to the City for approval on an annual basis. Improvements funded by the TIRZ, per ordinance, go to the construction of streets, sidewalks, drainage, sewer and water utilities, street lights, park development, and “other public improvements.” The ordinance can be amended to include related projects such as façade restoration and maintenance. In Houston, TIRZ funding was used to finance the MetroRail’s Red Line’s (light rail) signage, lighting, landscaping, fountains, bus transfer shelter, and connections to the bus system by tunnel. Clearly, TIRZ funding could be used in El Paso to support streetscape improvements related to the streetcar. TIRZ #5 was designated specifically for the downtown area and does not extend north of I-10 so does not include a significant segment of the proposed streetcar corridor.

Summary

Given the proposed use of Federal Small Starts funds for the BRT projects, it will be important to establish the priority of the streetcar project relative to the four BRT corridors. A funding plan should be developed reflecting the priorities and phasing, since FTA would want to see that. The proposed streetcar project will likely require about $50 million in local funding even if a Small Start grant can be obtained from the Federal government. The current sales tax for transit is at the legal maximum as is the total local tax so there is no opportunity to make use of an Economic and Industrial Development Sales Tax. More detailed analysis of the City’s financial capacity to fund the construction and operation of the streetcar along with other planned projects is needed. The existence of a Downtown Management District which can tax local businesses could facilitate some private funding provided the businesses are convinced that the project is a valuable to them.

4.2 PUBLIC CONCERNS

This study did not involve a public involvement element and therefore this report does not summarize actual concerns expressed by the public. It does however identify potential public concerns based on the following sources:

1. Comments made by key stakeholders interviewed in the process
2. Comments on transit or streetcars identified in earlier published studies
3. Possible issues identified by the consultant planning staff based on judgment
4. Issues that we have identified in case studies conducted of streetcars elsewhere that might arise in El Paso.
The following describes likely concerns that should be anticipated and planned for.

- **Dilution of Border Retail Market** – Retail merchants in the Golden Horseshoe District may be concerned that a relative captive market of pedestrians who cross the border to shop in the border retail shops may use the streetcar to shop elsewhere.

- **Parking Impacts** – Businesses along the route may be concerned that any rail transit project may impact parking in front of their businesses.

- **Traffic Impacts** – Automobile drivers, residents and business owners may be concerned about delay and congestion impacts of streetcar operations on major arterials and at congested intersections and roadway segments. Similarly, City traffic department personnel may have concerns about degrading traffic level of service.

- **Noise** – Residents and business owners along the corridor may be concerned about noise impacts of a rail service particularly during evening or early morning hours.

- **Utilities** – Utility companies may be concerned about access to the underground utilities affected by the rail track, impacts during construction and the cost of relocation.

- **Catenary Easements** – Property owners may be concerned about the use of their buildings to anchor support wires for the overhead catenary system or the addition of support columns.

- **Aesthetics** – Neighborhood associations, historic preservationists and residents and business owners may be concerned about the aesthetic impacts of catenary. Similar concerns may be raised about any impacts on trees or sidewalks.

- **Cost to the Taxpayer** – Taxpayer groups and individual taxpayers may be concerned that the project will involve subsidies and either impact their taxes or cause reductions in other service.

- **Duplication of the BRT Project** – BRT supporters may be concerned that the project will duplicate the BRT and result in low ridership for each investment.

- **Reduction in Bus Service** – Bus riders may be concerned that Sun Metro may reduce service on existing bus routes in order to devote resources to the streetcar service and project.

- **Public Subsidy of Benefits to Developers** – Some may object to public funding for a project that they perceive will accrue benefits to developers along the corridor.
• **Desire for a Different Route Alignment or Station Locations** – Some may question why the route alignment or station locations do not serve their trip purposes better or particular travel generators more directly.

• **Desire for a Higher Speed Rail Project** – Some may feel that a rail transit project should provide higher speed service and may question the lack of exclusive right-of-way.

Some specific concerns already expressed have included:

The University representatives interviewed for the purposes of this project noted several concerns:

1. Potential noise from a streetcar on Oregon Street could disturb the students at the Miner Village dormitories.

2. Upper Oregon Street could become a bottleneck of congestion with BRT and streetcar and increased traffic, particularly if they close the inner campus to traffic completely as is desired.

3. A streetcar to Glory Road would not eliminate the need for the parking shuttles unless the streetcar were to be extended from the proposed Glory Road terminus to the remote lots along Sun Bowl Drive toward and beyond Kern Drive (about three-quarters to one mile), which the University representatives thought might be difficult due to topography and roadway alignments.

4. Operation of BRT and the streetcar on the same corridor was considered ill-advised. Students who have a choice between the BRT and the streetcar are likely to choose the faster option – that is, the BRT.

5. While the streetcar may be appealing for recreational travel, the route proposed does not serve the primary entertainment area (Union Plaza) and does not link it with students’ residences.

During the community involvement activities associated with the Sun Metro Comprehensive Service Plan (and as documented in the September 2008 Final Report), one public comment was to “avoid expanding service between San Jacinto Plaza and the border crossing due to the potential effect on area business that cater to Juarez residents.”

City Planning Department and Mass Transit Department representatives have raised concerns that the streetcar will cannibalize the market for BRT, interfere with BRT operations, and have a detrimental impact on the approval of Federal funding for the planned BRT system.

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4.3 CONSISTENCY WITH EXISTING AND FUTURE TRANSIT

Relationship to the Long-Range Plan

TransBorder 2035 Metropolitan Transportation Plan (MTP), prepared in November 2007, is the fiscally constrained long-range plan for the metropolitan area. The TransBorder 2035 MTP is an update to the previous Gateway 2030 MTP. The streetcar would support several of the goals of the TransBorder 2035 MTP, including:

- Improve access to commercial centers, regional facilities and the international ports of entry; and facilitate efficient intermodal transfers.
- Provide convenient intermodal connections between all elements of the regional transportation system (transit, rail, and surface, air) to achieve a seamless travel network.
- Integrate land use and transportation solutions that offer the best opportunities to reduce vehicle miles traveled, promote alternative modes and protect the natural environment.
- Recommend that planning efforts regarding transportation facilities and service should support compact, pedestrian-oriented land use development

While the bus rapid transit projects for the four corridors are included in the long-range plan, the streetcar project is not. If the City were to seek Federal assistance for the streetcar, the long-range plan would need to be amended to include the project.

Relationship to the Planned Bus Rapid Transit System

A key improvement that Sun Metro and the City of El Paso has been pursuing is the development of Bus Rapid Transit in four corridors, including the Mesa Corridor which begins at the Downtown Transfer Center, and extends through downtown, along the Oregon Street corridor north of Franklin Avenue to the Glory Road Transfer Center and the Westside. The goal of the BRT is to offer faster and more reliable service that will benefit the large number of travelers in the corridor, address future growth in the corridor, and serve new riders. It is estimated (in the Mesa Corridor BRT Alternatives Analysis) that the half of the daily boardings on the Mesa BRT will be new transit riders. Wider station spacing, signal priority and a short segment of bus lanes will serve to reduce travel delays. While a streetcar along the same corridor would potentially compete with the Mesa Corridor BRT, it should be noted that the BRT would have longer distances between stops than a streetcar, presenting a tradeoff between speed and walk-distance for travelers within the common corridor. Increasing the distance between the two alignments would reduce duplication, although locating the bus routes on adjacent arterials would still involve some duplication.
Exhibit 4.1  Population and Employment in BRT Catchments Inside the Comprehensive Study Area

<table>
<thead>
<tr>
<th>Geographic Area</th>
<th>Population 2007 (amt.)</th>
<th>Employment 2007 (amt.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Catchment Area</td>
<td>9,213</td>
<td>26,436</td>
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<td>Remaider of Catchment Area</td>
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<td>3,710</td>
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<td>Mesa BRT Catchment Area</td>
<td>4,628</td>
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<td>Alameda BRT Catchment Area</td>
<td>1,400</td>
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<td>Montana BRT Catchment Area</td>
<td>2,334</td>
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<td>Dyer BRT Catchment Area</td>
<td>2,334</td>
<td>10,098</td>
</tr>
</tbody>
</table>

Note: Montana BRT and Dyer BRT stations are identical within this Catchment Area. Only Montana is visible.

Source: TAZ, El Paso Metropolitan Planning Organization.
A detailed analysis of ridership was not part of this study and therefore it is difficult to assess the impact of overlap on ridership.

To examine the potential overlap in coverage between the proposed streetcar and the proposed BRT, Exhibit 4.1 shows the walk catchment areas (one-quarter mile radius) around each BRT station contrasted with the overall streetcar catchment area (that results from all streetcar alignments). Due to the closer stop spacing of the streetcar stops, the catchment area was based on a quarter mile distance from the entire route alignment rather than around each streetcar stop. This fact along with the use of the overall catchment area based on all four alignments combined does tend to overstate the streetcar catchment area. The result indicates that the coverage of the proposed BRT stations would overlap substantially with the streetcar catchment area, covering at least 62 percent of the population and 86 percent of the employment. Of course with more closely spaced stops, the streetcar may offer shorter walk distances to some riders who are within the BRT station catchment area. The exhibit is simply illustrative of the substantial overlap in markets.

**Relationship to Circulator Services**

Sun Metro currently operates two free circulator routes using smaller buses. These include Route 4 – Union Plaza Circulator and Route 9 – Golden Horseshoe Circulator. Exhibits 4.2 and 4.3 show the alignments for these routes respectively. Route 4 would largely complement the proposed streetcar since the circulator provides east-west connections to locations east of Stanton and West of Santa Fe. There is some minimal overlap in markets. Route 9, however, has more substantial overlap in markets with the proposed streetcar since it provides north-south connections between the core of downtown and the Downtown Transfer Center, Segundo Barrio and border crossing. Between 6th Avenue and San Antonio Avenue, Route 9 provides parallel service to the streetcar about one block away – Route 9 operates along El Paso and Stanton where the current concentrations of retail activity are, while the streetcar would operate on Oregon and/or Mesa Streets. If the streetcar were to charge a fare which is assumed to be likely, the circulator would certainly be the preferred mode for the trips served by both. Thus, some reconfiguration of the free circulator services would be needed if the streetcar were to move forward in this corridor.
Exhibit 4.2  Route 4 – Union Plaza Circulator
Relationship to Miner Metro

Miner Metro provides a link between various parts of the UTEP campus, including between remote parking lots and the major campus activity centers. Currently, Miner Metro routes operate largely on the perimeter of the campus and do not penetrate the center of the campus. Miner Metro operates the East Route (Blue Route/# 1) and Campus Loop (Green Route/# 2) along Oregon Street from Robinson Avenue near the Glory Road Transfer Center (under construction) to Rim Road and Schuster Avenue at the south end of the campus. (When the Glory Road Transfer Center is complete, the route may be realigned to serve it.) The streetcar will not serve all or the primary functions of these routes
and so it is envisioned that they will remain largely if not wholly unchanged. If the streetcar route could be extended to serve the remote parking lots north of Glory Road, Miner Metro service could be reconfigured, however, based on preliminary discussions with UTEP, this does not appear to be the case. If the streetcar operated on Oregon Street in one or both directions, there would be some overlap with these two Miner Metro routes along the campus. As noted earlier in this report, the streetcar could be in competition to serve local trips in this area and to serve BRT transfer trips at Glory Road or Hague Road. If the streetcar charged a fare, the Miner Metro would have a fare advantage since it is fare free. In addition, the Miner Metro’s high frequency and branding would likely be an advantage. So it is likely that the streetcar would be unlikely to capture these trips.

4.4 **Next Steps/Future Activities**

This brief preliminary study has identified markets that would benefit from the streetcar, developed four route alignment concepts and order of magnitude costs associated with them, examined economic development impacts from similar projects elsewhere, developed an order of magnitude return on investment based on likely economic development impacts and identified some possible constraints associated with moving the project forward. There are many issues that require more study. The following identifies some follow-up activities to advance the project.

- Refine alignments based on City preferences, including a closer examination of the potential for providing more convenient access to key travel generators that are several blocks from the proposed alignments (e.g., UTEP remote lots, Union Plaza).
- Select a single preferred alignment.
- Once a preferred alignment is chosen, contact the utility companies, research City engineering plans and conduct more detailed study of the utility relocations required for the preferred alignment to refine the cost estimate and to determine if this is a significant cost factor that could influence the final alignment.
- Examine the availability of land for a maintenance facility and estimate land costs.
- Review streetcar-stop locations and spacing.
- Determine through discussions with the City and BRT study team whether streetcars can share BRT stations and examine the operational impacts on BRT.
- Examine traffic impacts, including those at key intersections and at locations where a shared use lane would not be accompanied by an additional travel lane.
- Coordinate the streetcar concept with the design of the BRT.
- Conduct a more detailed ridership demand study that would include market research to further document the need for the streetcar and the likely ridership response (and desirable frequency service) and would evaluate the impact of the streetcar on the projected BRT ridership.
- Identify champions for the project and market the concept to opinion leaders, including the El Paso Central Business Association.
- Discuss the project with the FTA to assess the likelihood of New Starts/Small Starts and other Federal funding.
- Examine the availability of local funding and coordinate with City agencies.
- Discuss the potential for private sector funding with business leaders and identify champions and supporters of the concept.
- Coordinate project development with the MPO and the Texas Department of Transportation.
Appendix

Cost Estimates
**El Paso Streetcar (ALTERNATIVE 1 - Oregon St and Mesa St)**

*Opinion of Probable Construction Costs (PRELIMINARY)*

*September 2010*

### TRACK

<table>
<thead>
<tr>
<th>Streetcar Track</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
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<td>Track &amp; Electrification</td>
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<tr>
<td>Bridge Over UPRR tracks</td>
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**See Cost Estimate For Maintenance Facility Option 1 and Option 2**

### ROADWAY

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<thead>
<tr>
<th>Roadwork</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Quantity</th>
<th>Cost</th>
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<th>Unit Cost</th>
<th>Quantity</th>
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El Paso Streetcar (ALTERNATIVE 2 - Mesa St and Stanton St)
Opinion of Probable Construction Costs (PRELIMINARY)
September 2010

### TRACK

<table>
<thead>
<tr>
<th>Streetcar Track</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
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Subtotal: $59,715,200

** Maintenance Facility Option 1 **
- $5,855,750

** See Cost Estimate For Maintenance Facility Option 1 and Option 2

### ROADWAY

<table>
<thead>
<tr>
<th>Roadwork</th>
<th>Unit</th>
<th>Unit Cost</th>
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Subtotal: $71,656,730

** Mobilization (7%)**
- $5,015,971

** BARRICADES, SIGNS, AND TRAFFIC HANDLING**
- $120,000

** Contingency (20%)**
- $15,358,540

** Total**
- $92,151,241

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El Paso Streetcar (ALTERNATIVE 2 - Mesa St and Stanton St)  
Opinion of Probable Construction Costs (PRELIMINARY)  
September 2010

<table>
<thead>
<tr>
<th>Maintenance Facility Option 1</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Quantity</th>
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## El Paso Streetcar (ALTERNATIVE 3 - Oregon St)
### Opinion of Probable Construction Costs (PRELIMINARY)
#### September 2010

### TRACK

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<tr>
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**Subtotal**  
$57,021,400

**Maintenance Facility Option 1**  
$5,899,250

**See Cost Estimate For Maintenance Facility Option 1 and Option 2**

### ROADWAY

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<th>Roadwork</th>
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<th>Cost</th>
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**Subtotal**  
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**Mobilization (7%)**  
$4,811,184

**BARRICADES, SIGNS, AND TRAFFIC HANDLING**  
$120,000

**Contingency (20%)**  
$14,732,477

**Total**  
$88,394,861

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### El Paso Streetcar (ALTERNATIVE 3 - Oregon St)
#### Opinion of Probable Construction Costs (PRELIMINARY)
September 2010

<table>
<thead>
<tr>
<th>Maintenance Facility Option 1</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>(Located south of Bert Williams Downtown Transit Center)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track &amp; Electrification</td>
<td>TF</td>
<td>$750</td>
<td>2,023</td>
<td>$1,517,250</td>
</tr>
<tr>
<td>Furnish &amp; Construct Turnout</td>
<td>EA</td>
<td>$125,000</td>
<td>3</td>
<td>$375,000</td>
</tr>
<tr>
<td>Install Turnout</td>
<td>EA</td>
<td>$15,000</td>
<td>3</td>
<td>$45,000</td>
</tr>
<tr>
<td>Maintenance &amp; Storage Facilities</td>
<td>LS</td>
<td>$2,250,000</td>
<td>1</td>
<td>$2,250,000</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$4,187,250</strong></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>TRACK</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track &amp; Electrification</td>
<td>TF</td>
<td>$2,100</td>
<td>23,728</td>
<td>$49,828,800</td>
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<tr>
<td>New Streetcar Station</td>
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<td>$13,000</td>
<td>15</td>
<td>$195,000</td>
</tr>
<tr>
<td>Upgrade Bus Stop to Streetcar Station</td>
<td>EA</td>
<td>$13,000</td>
<td>16</td>
<td>$208,000</td>
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<tr>
<td>New Streetcar</td>
<td>EA</td>
<td>$1,200,000</td>
<td>6</td>
<td>$7,200,000</td>
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<tr>
<td>Substation</td>
<td>EA</td>
<td>$85,000</td>
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<td>$255,000</td>
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<tr>
<td>Bridge Over UPRR tracks</td>
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<tr>
<td>Bridge Over I-10</td>
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<tr>
<td><strong>Subtotal</strong></td>
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<td></td>
<td></td>
<td>$57,916,800</td>
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<tr>
<td>Maintenance Facility Option 1 **</td>
<td></td>
<td></td>
<td></td>
<td>$5,876,000</td>
</tr>
<tr>
<td><strong>See Cost Estimate For Maintenance Facility Option 1 and Option 2</strong></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>ROADWAY</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>REMOVING STAB BASE AND ASPH PAV (Main Route)</td>
<td>SY</td>
<td>$5</td>
<td>22,067</td>
<td>$110,335</td>
</tr>
<tr>
<td>Drainage Improvements (2% Of Track Subtotal)</td>
<td>LS</td>
<td>$1,158,336</td>
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<td>$1,158,336</td>
</tr>
<tr>
<td>Utility Relocation/Modification (8% Of Track Subtotal)</td>
<td>LS</td>
<td>$4,633,344</td>
<td>1</td>
<td>$4,633,344</td>
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<tr>
<td><strong>Subtotal (Average)</strong></td>
<td></td>
<td></td>
<td></td>
<td>$69,694,815</td>
</tr>
<tr>
<td>Mobilization (7%)</td>
<td>LS</td>
<td>$4,878,637</td>
<td>1</td>
<td>$4,878,637</td>
</tr>
<tr>
<td>BARRICADES, SIGNS, AND TRAFFIC HANDLING</td>
<td>MO</td>
<td>$5,000</td>
<td>24</td>
<td>$120,000</td>
</tr>
<tr>
<td>Contingency (20%)</td>
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<td>$14,938,690</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
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<td>$89,632,143</td>
</tr>
</tbody>
</table>

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El Paso Streetcar (ALTERNATIVE 4 - Mesa St)
Opinion of Probable Construction Costs (PRELIMINARY)
September 2010

<table>
<thead>
<tr>
<th>Maintenance Facility Option 1</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Located south of Loop 375 and east of Oregon St)</td>
<td>TF</td>
<td>$750</td>
<td>4,088</td>
<td>$3,066,000</td>
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<tr>
<td>Furnish &amp; Construct Turnout</td>
<td>EA</td>
<td>$125,000</td>
<td>4</td>
<td>$500,000</td>
</tr>
<tr>
<td>Install Turnout</td>
<td>EA</td>
<td>$15,000</td>
<td>4</td>
<td>$60,000</td>
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<tr>
<td>Maintenance &amp; Storage Facilities</td>
<td>LS</td>
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<td>1</td>
<td>$2,250,000</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$5,876,000</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Maintenance Facility Option 2</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Located south of Bert Williams Downtown Transit Center)</td>
<td>TF</td>
<td>$750</td>
<td>1,988</td>
<td>$1,491,000</td>
</tr>
<tr>
<td>Furnish &amp; Construct Turnout</td>
<td>EA</td>
<td>$125,000</td>
<td>3</td>
<td>$375,000</td>
</tr>
<tr>
<td>Install Turnout</td>
<td>EA</td>
<td>$15,000</td>
<td>3</td>
<td>$45,000</td>
</tr>
<tr>
<td>Maintenance &amp; Storage Facilities</td>
<td>LS</td>
<td>$2,250,000</td>
<td>1</td>
<td>$2,250,000</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$4,161,000</strong></td>
</tr>
</tbody>
</table>

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