TYLER TRANSIT ROUTE STUDY

Prepared for

Prepared by

December 2, 2010

Prepared in cooperation with the Texas Department of Transportation, U.S. Department of Transportation, Federal Highway Administration and the Federal Transit Administration

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1 Introduction

The City of Tyler has recognized the need for a balanced transportation system in order to meet the City's livability and economic development goals. Over the last five decades, the population of the City of Tyler grew two and a half times while its land area has quadrupled in size.[1] The City recognizes that transit solutions are seen as important element of the local transportation system. Improved transit services and new capital investments are integral in meeting the Tyler 21 Vision.

1.1 STUDY PURPOSE

Tyler City staff identified the following key indicators as impetus for undertaking this Tyler Transit Bus Route Study:

- Increasing headway delays
- Difficulties changing bus lines
- Long delays at transfer point(s)
- Feeling of underserved areas throughout the city

The system's last major route change occurred in October 2001 when Yellow Line was added and the other bus lines were reconfigured. The most recent change was when the Red Line was split into two lines and service was extended along Broadway Avenue.

The goal of this study is to develop an evaluation of the City's public transportation service and identify possible modifications to the existing system. The study will examine and assess expansion/ modification of current operations, as well as develop alternative routes and a decision matrix for evaluation purposes. The study will focus on options for service and facility improvements that would promote expanded use of bus services for work and non-work travels in Tyler.

1.2 TRANSIT GOALS AND OBJECTIVES

The basis for any transit plan is the careful consideration of realistic service options. Passenger needs, travel patterns, and funding often dictate the type of service to be provided in an area. The goals and priorities of the local community are significant factors to determine the level and quality of service to be provided. The City of Tyler recognized the importance of transit as a means for improving livability, enhancing mobility and increasing economic development. The following discussion outlines the goals and objectives for transit services in Tyler.

1.2.1 Tyler 21 Comprehensive Plan

The **Vision** and **Principles** are the guiding framework for the elements of the Tyler 21 Comprehensive Plan. Principles supportive of the City's public transportation system include:

- Provide neighborhoods that are attractive centers of community:

[1] *Tyler 21 Comprehensive Plan, Chapter 3, page 47. Plan adopted on November 14, 2007*

- Enhance and create neighborhoods containing walkable centers with a mix of housing and shopping to serve residents.

- Provide transportation options:
  - Provide continuous bicycle and pedestrian routes and trails that connect city destinations.
  - Adopt land use strategies that create higher-density, mixed-use clusters of "transit- ready" development that can support expansion of the public transportation system.

1.2.2 Tyler Area Metropolitan Transportation Plan

The Tyler Area Metropolitan Planning Organization (MPO) Policy Committee has adopted on December 4, 2009 the Metropolitan Transportation Plan 2035 (MTP). The overall goal of the MTP 2035 is *to develop a safe, efficient, and economically feasible multi-modal transportation system that will accommodate the mobility needs of all people and goods traveling within and through the Tyler area over the next 25 years.*

Specific objectives were developed to accomplish this goal, including the following transit supportive objectives:

- To develop improved pedestrian facilities, such as sidewalks and trails, that connect residential areas to major developments, schools, and transit services;
- To provide for improved transit services, including local bus service, commuter bus service, and long distance rail transportation

1.2.3 Tyler Transit Goal and Objectives

The goal of the present transit route study is to develop a practical public transportation service expansion that is financially feasible and sustainable. The objectives are to examine and assess expansion/ modification of current operations, as well as to develop alternative routes and operations decision matrix.

1.3 TRANSIT STUDY METHODOLOGY

The following three key tasks were identified to accomplish the goal of this study:

1. Evaluate Current Operations

To evaluate current bus operations, opinions, comments and recommendations from both the travelling public and the stakeholders were gathered through surveys and interviews.

- Surveys

  Two types of transit surveys were administered to collect data from Tyler residents.

  - Household Community Surveys – collected 413 completed responses. Questionnaires were mailed to randomly selected households throughout the City of Tyler. The survey was administered by a private consulting firm.
  - On-Board Transit Passenger Surveys – gathered 162 completed responses from current transit users. The on-board survey was administered by Tyler Transit bus drivers to bus riders boarding their buses at the time of the survey.

- Project Advisory Committee (PAC) Meetings

  Interviews were conducted with key stakeholders that include transit administrators, transportation agency representatives, bus drivers, and major employers in Tyler. Stakeholders were asked for their views, comments, and suggestions concerning bus services in Tyler. Specifically, stakeholders were asked about the current bus routes, frequency of service, and most importantly, their vision for future transit services in Tyler.

Chapter 4 provides more details of the feedback received from the surveys and the key stakeholder interviews.

2. Evaluate Expansion / Modification of Current Operations

- Inventory of Existing Transit Services
  - Inventory of bus stop location and amenity - City staff has recognized that its current Geographic Information System (GIS) map of bus stops needs updating. Thus, one important element of this study is an inventory of existing bus stop locations. The aim is to establish an updated GIS map that shows the correct positions of bus stops, as well as updated features (e.g., whether a stop has a shelter, bench, or sign only) of each bus stop location.
  - Boarding/ alighting counts – Ridership by route was observed for a week of bus operation. The number of passengers boarding and alighting at each stop and transfer point location was recorded each day from Monday to Saturday on April 5-10, 2010.
- Transit Demand Indicators

  The study utilized the Census 2000 and the demographic and employment forecasts developed for the Tyler Area Metropolitan Planning Organization (MPO). Population and employment densities and transit demographics were analyzed for their influence on potential transit ridership. The elderly, below poverty population, and those with no access to vehicles are generally considered transit-dependent. These types of data are important for estimating demand for alternative transit service options.

3. Develop Alternative Decision Matrix

- Public Meeting – conducted to present the results of the surveys and key stakeholder interviews. In addition input from attendees was solicited for service expansion/ modification and prioritization issues.
- Evaluate Alternative Routes versus Current Routes

  In evaluating alternative routes, the needs of the elderly, low-income, disabled persons, and work commuters were considered.

- Refine a Matrix of Alternatives – involvement of Tyler Transit and Tyler Area MPO staff in the final selection of recommended bus alternative options.
- Draft / Final Report
- Presentation to MPO Policy Board

1.4 REPORT ORGANIZATION

Chapters 2 through 5 of this report provide a summary of existing transit services and proposed improvements.

- Chapter 2 profiles the City of Tyler with respect to transit demand and use.
- Chapter 3 summarizes current fixed route services in Tyler and highlights the infrastructure in place to support the use of transit in Tyler.
- Chapter 4 summarizes community opinions on transit service that were received from the key stakeholder interviews, household surveys, and the on-board survey of existing bus riders.
- Chapter 5 outlines recommended service options.

2 Community Profile

The City of Tyler is the county seat of Smith County. It is also the center of the Tyler Metropolitan Statistical Area (MSA), which is a geographic unit defined by the federal government for the purposes of measuring and reporting data on a metropolitan area. An MSA is an area that contains a core urban area of at least 50,000 people. Thus, Tyler serves as the employment, civic, cultural, and retail center for Smith County and the Tyler MSA.

This section of the report outlines key demographics and socio-economics characteristics useful in identifying transit performance indicators.

2.1 POPULATION AND EMPLOYMENT

2.1.1 Historical Population

Figure 2-1 presents a comparison of historical population for the City of Tyler and Smith County. The historical data indicates that over the last five decades the population of the City of Tyler grew two and a half times. Population has continued to increase in both the City of Tyler and Smith County. Growth in county population is much higher over the last 3 decades compared to the increase within Tyler City.

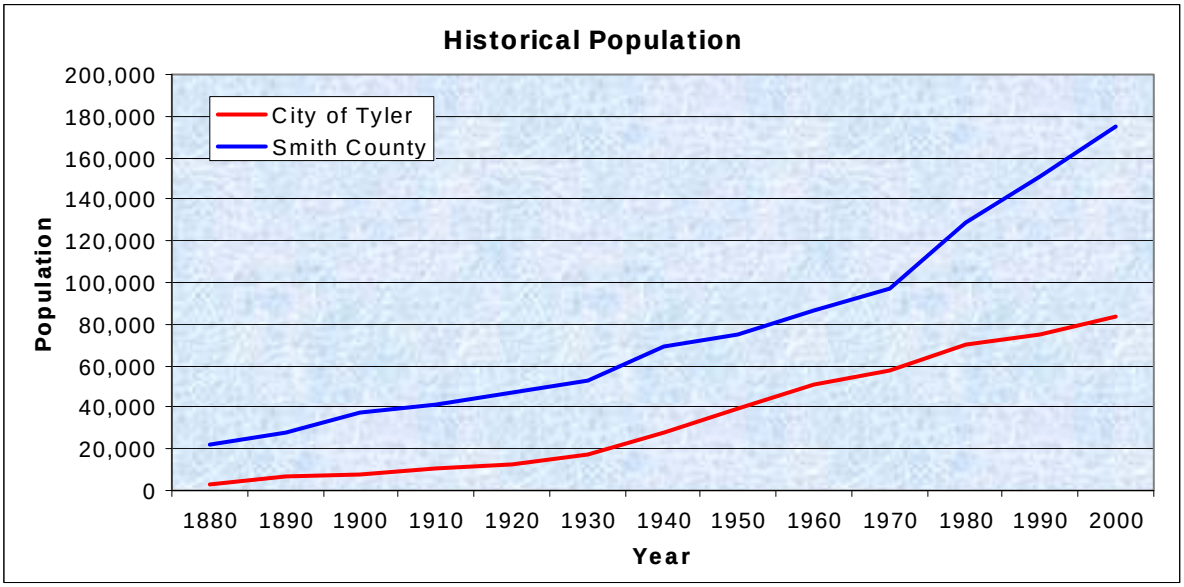


FIGURE 2-1 CITY OF TYLER AND SMITH COUNTY HISTORICAL POPULATION

2.1.2 Forecast Population

In 2009, forecast of population and households to year 2035 for the entire metropolitan planning area (MPA) and Smith County was completed. These forecasts were used as input into the travel demand model to generate traffic forecasts that were used as basis in identifying capital improvement projects for the Metropolitan Transportation Plan update that was completed in November 2009.

Table 2-1 summarizes the forecast population for Tyler Urbanized Area, rural portion of Smith County, and the total for Smith County. By the year 2020, over 10,000 residents are anticipated to be added to the estimated 2007 Tyler Urbanized Area population of 126,968; a yearly increase of approximately 0.6%.

TABLE 2-1 FORECAST POPULATION FOR TYLER URBANIZED AREA AND SMITH COUNTY

		Tyler Urbanized Area	Smith Rural	Smith County
2000	Population	102,295	72,411	174,706
	% Growth	28.1%	1.4%	15.5%
2007	Population	126,968	71,907	198,875
	% Growth	24.1%	-0.7%	18.8%
2010	Population	131,419	74,394	205,813
	% Growth	5.3%	5.3%	5.3%
2015	Population	134,228	79,441	213,669
	% Growth	2.1%	6.8%	3.8%
2020	Population	137,037	82,016	219,053
	% Growth	2.1%	3.2%	2.5%

Source: Tyler Area MPO

2.1.3 Increase in Year 2020 Population from 2007

For the present bus route study, population forecast to year 2020 is used in the analysis. Figure 2-2 illustrates where growth in population is anticipated by year 2020 using 2007 as the base year. As shown, little population growth is expected inside Loop 323 over this time frame.

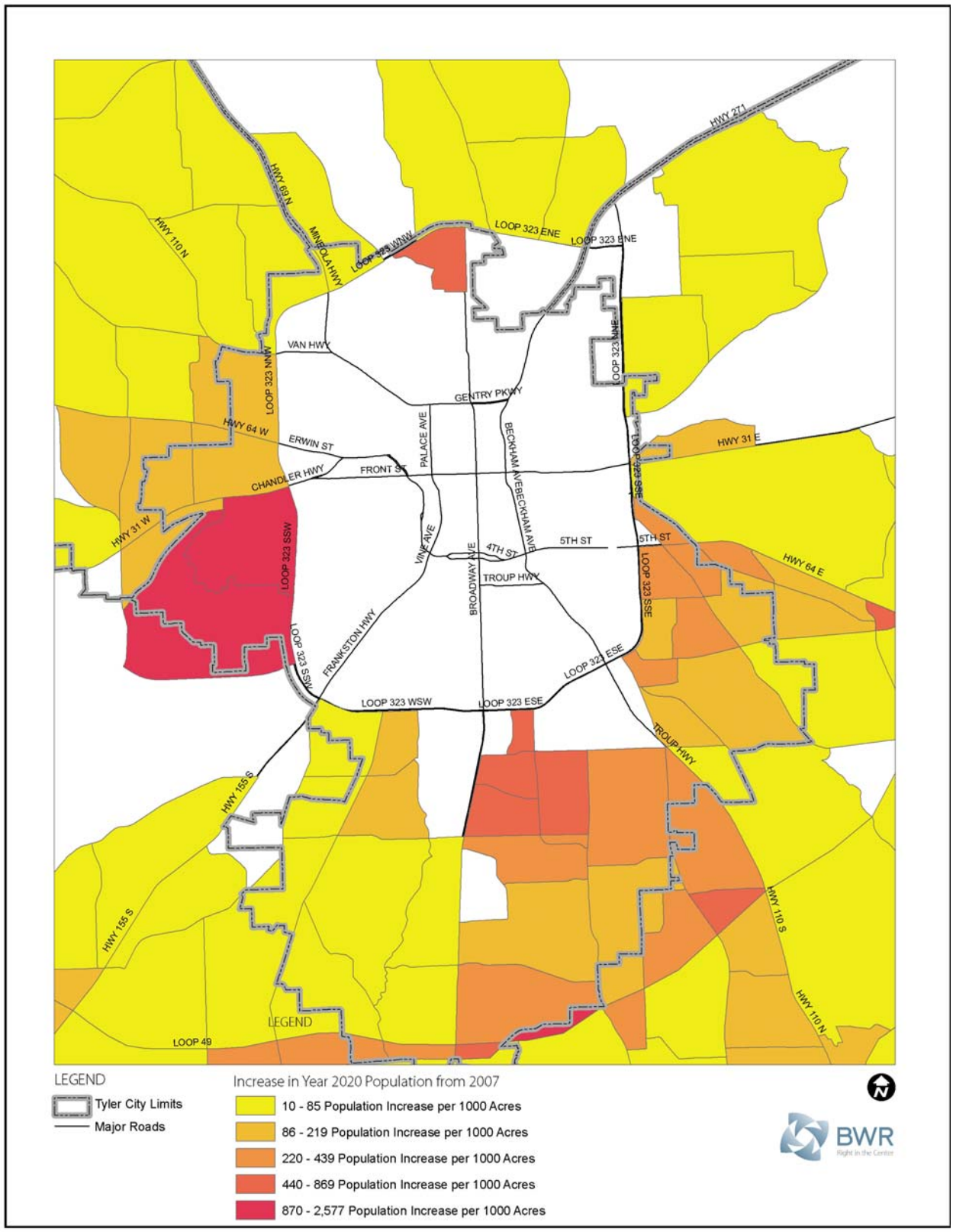
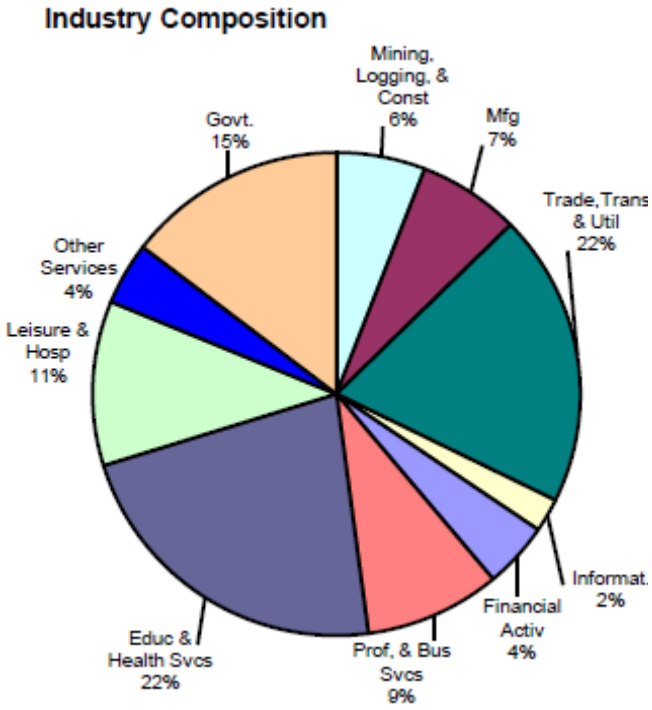


FIGURE 2-2 INCREASE IN YEAR 2020 POPULATION FROM 2007

2.1.4 Employment by Industry

Employment is a major factor in determining land use impacts on transportation. The location and concentration of jobs in a region or city has strong influence in the feasibility of transit services. Increases in the employment base of an area can be used as a gauge of the growth of the area and emerging needs for access to and from the workplace.

According to the Tyler Economic Development Council, the Tyler MSA/Smith County economy is more diverse today than it has ever been. The region is no longer dependent on one or two drivers for economic support. The pie chart in **Figure 2-3** details the Tyler Metropolitan Statistical Area (MSA) employment by business sector.



Source: Texas Workforce Commission, April 2010

FIGURE 2-3 TYLER MSA/ SMITH COUNTY EMPLOYMENT BY BUSINESS SECTOR

2.1.5 Employment Forecast

Table 2-2 summarizes employment forecast for Smith County produced by the Tyler Area MPO. Projected employment is aggregated into three broad categories, namely: Basic, Retail, and Service. Basic employment category generally consists of industrial uses. Retail category generally includes commercial uses while service category generally consists of office uses, including institutional uses. Trip generating characteristics are significantly different for the land uses in these categories.

Total employment is projected to grow annually by roughly 0.9%.

TABLE 2-2 FORECAST EMPLOYMENT BY CATEGORY FOR SMITH COUNTY

	2002	2007	2012	2020
Basic Employment	25,908	27,917	28,238	29,841
Retail Employment	18,331	19,768	20,772	22,000
Service Employment	47,976	52,709	55,046	57,828
Total Employment	92,215	100,394	104,056	109,669

Source: Tyler Area MPO

2.1.6 Increase in Year 2020 Employment from 2007

Figure 2-4 illustrates where growth in total employment is anticipated by year 2020. In contrast to population increase, significant employment growth is anticipated inside Loop 323.

2.1.7 Major Employers in Tyler

Medical service providers, such as the East Texas Medical Center and Trinity Mother Frances are the top 2 employers in Tyler. Based on 2007 business data, the Tyler Economic Development Council has published the major employers in Tyler MSA as presented in **Table 2-3**.

TABLE 2-3 MAJOR EMPLOYERS IN TYLER MSA

Company Name	Product/Service	Employees†
East Texas Medical Center*	Medical Care	3,650
Trinity Mother Frances*	Medical Care	3,567
Tyler Independent School District	Education	2,572
Brookshire Grocery Company*	Grocery Distribution	2,190
Trane Co.*	Air Conditioning Units	1,949
Wal-Mart	Retail	1,670
Carrier Corporation	Air Conditioning Units	1,201
Suddenlink*	Cable, Internet Services, and Phone	1,057
Tyler Junior College	Education	998
The University of Texas at Tyler	Education	854
CB&I	Engineering Contracting	853
City of Tyler	Government	785
Smith County	Government	773
Target Distribution Center	Retail Distribution	735
Tyler Pipe	Cast Iron Pipe, Iron Fittings	703
UT Health Center at Tyler	Medical Care/Research	580
Southside Bank*	Banking Services	505
John Soules Foods	USDA Meat Processing	461

Source: Tyler Economic Development Council, Inc.
† Full-time equivalents
** Company has headquarters in Tyler, TX*

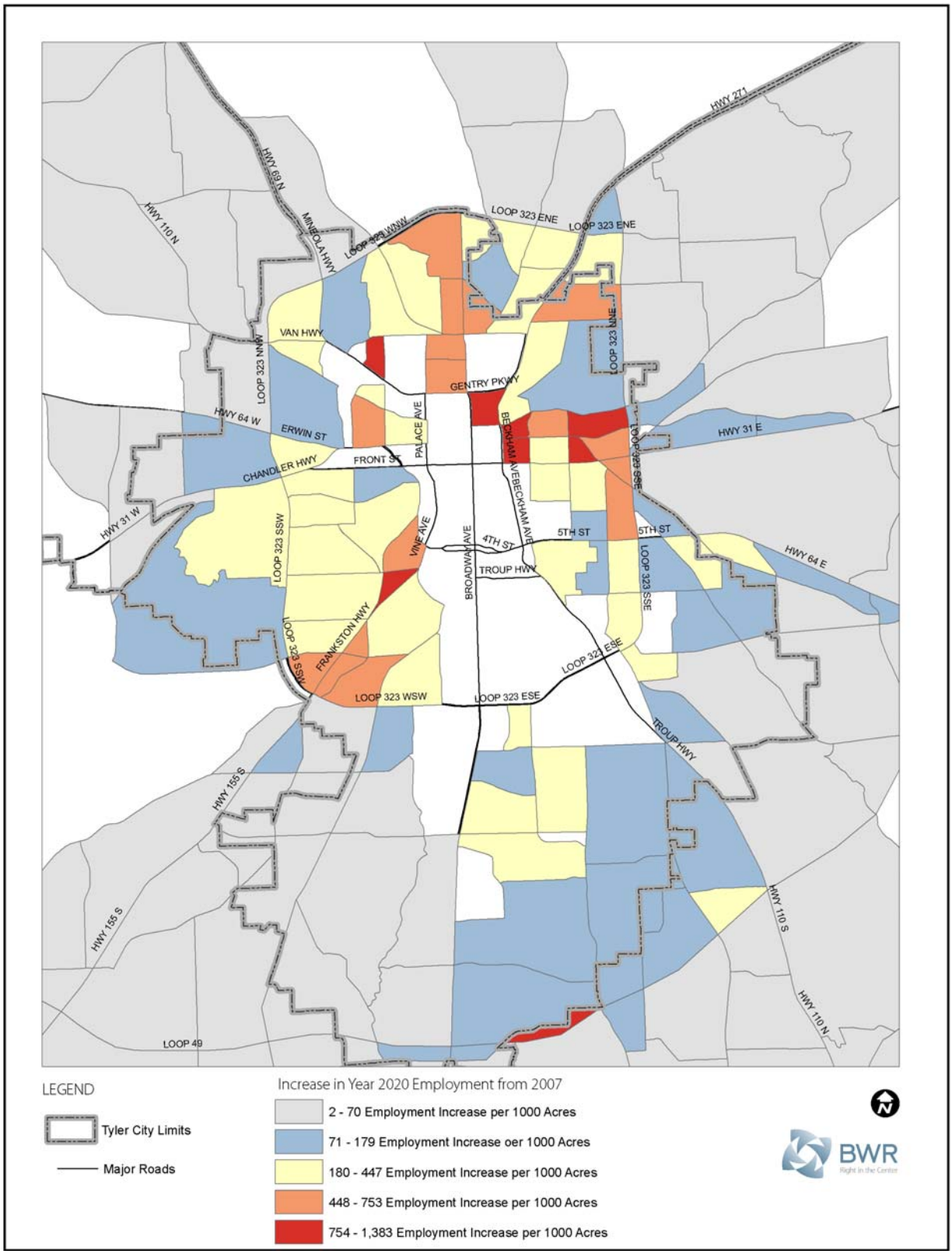


FIGURE 2-4 INCREASE IN YEAR 2020 EMPLOYMENT FROM 2007

2.2 KEY TRANSIT DEMOGRAPHICS

Public transit performance can be linked to a number of demographics. Key demographics that indicate a need for transit service include the density of population and employment and the socio-economic characteristics of the population such as low income (residents living below the poverty level), households without access to an automobile (either by choice or due to financial constraints) lower, and seniors over 65 years of age. All these groups tend toward higher than average utilization of transit services. Selected maps of these demographics are shown in **Figures 2-5 to 2-8**. These maps are superimposed with maps of existing bus routes.

The key transit demographics described in this section along with the transit need index developed by the Texas Transportation Institute for the East Texas Transfer Study were utilized in formulating recommended changes to the current transit services in Tyler.

2.2.1 Household and Employment Density

Figure 2-5 shows the current distribution of household and employment in the City of Tyler. Research has shown that land use density (population/household and employment) are by far the two most crucial factors in determining ridership demand in a transit corridor or service area. Here, density information is presented with the use of a bi-chromatic density map that illustrates combined employment and household density by Traffic Analysis Zone (TAZ) to illustrate the relationship between land use and transit demand. Household densities are displayed using four gradations of blue. Similarly, employment densities are shown via shades of yellow. When combined, gradations of green indicate the intensity of combined household and employment activity.

2.2.2 Minority and Low Income

Figure 2-6 shows median household incomes by Census Block Groups (CBG) from Census 2000. As observed on the map, census block groups having high concentration of low-income population are generally located in Tyler inside Loop 323.

2.2.3 No Car Households

Figure 2-7 shows the concentrations of households without access to cars. Typical in many urban areas, communities with higher concentrations of no car households tend to be within inner areas of the urban center, such as downtown areas.

2.2.4 Age

Figure 2-8 shows the distribution by Census Block Groups of population age 65 and over. There are several pockets that exhibit higher shares of senior citizens, largely in the southern portion of the city.

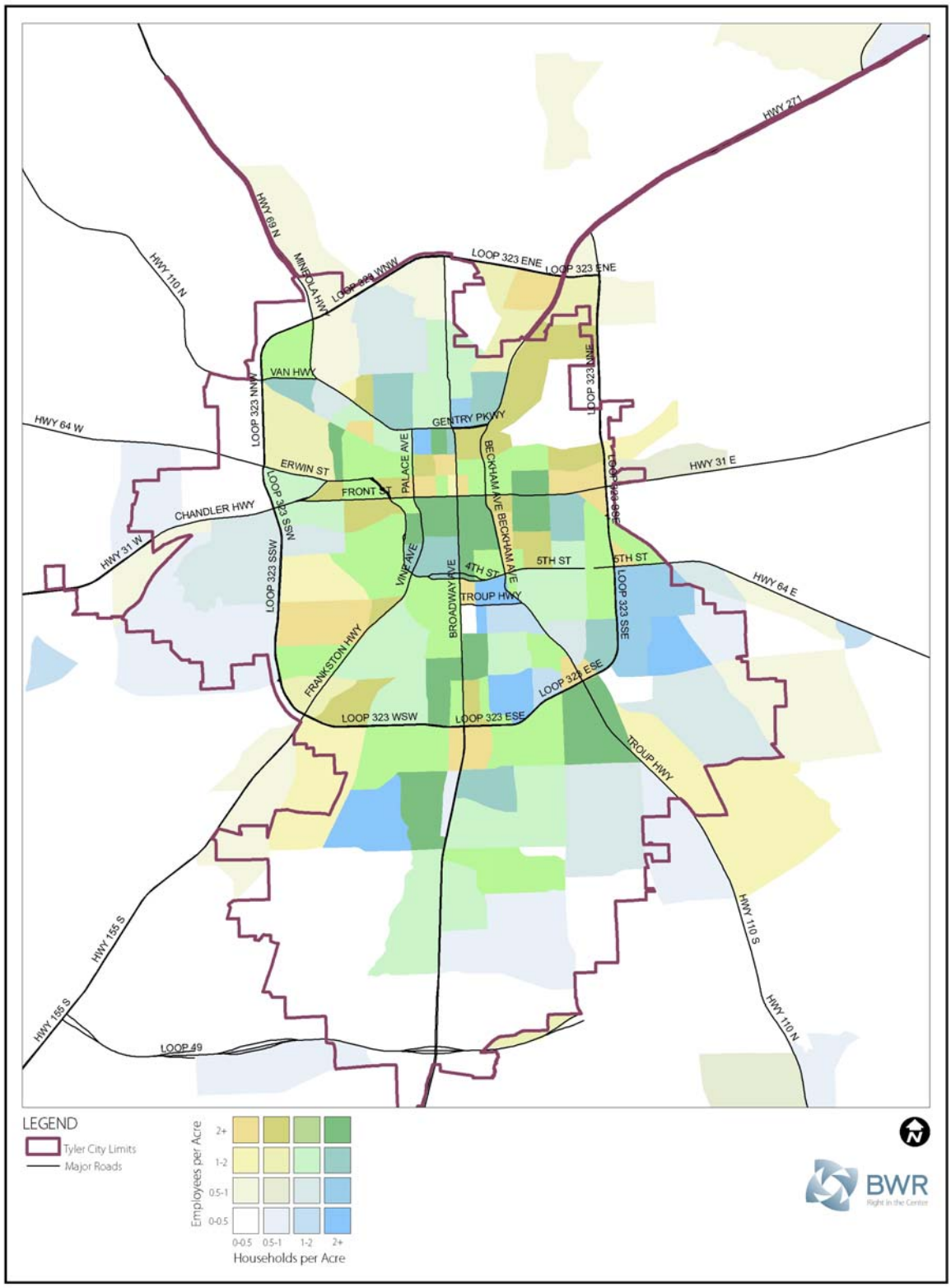


FIGURE 2-5 YEAR 2020 POPULATION AND EMPLOYMENT DENSITIES

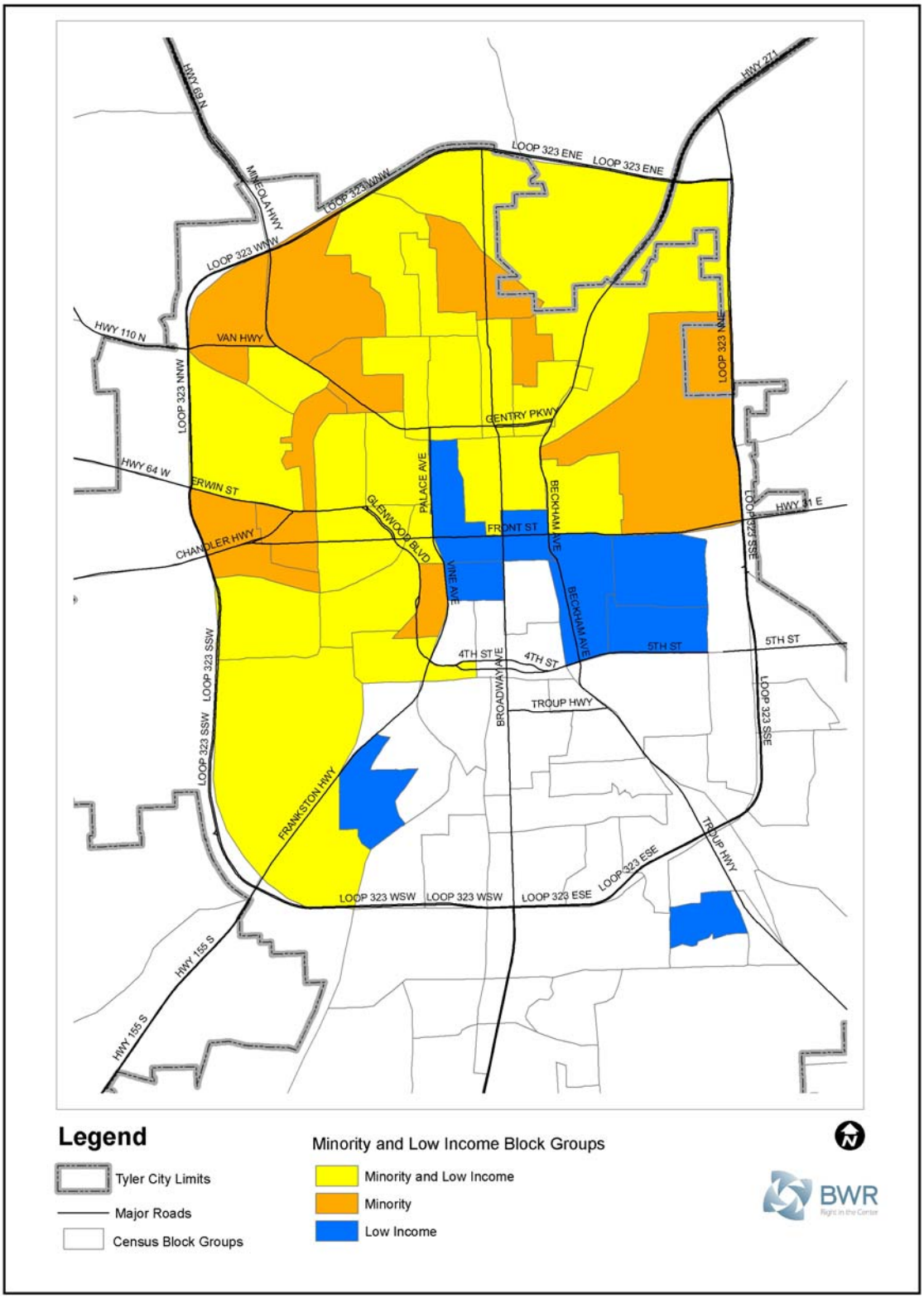


FIGURE 2-6 MINORITY AND LOW INCOME DISTRIBUTION

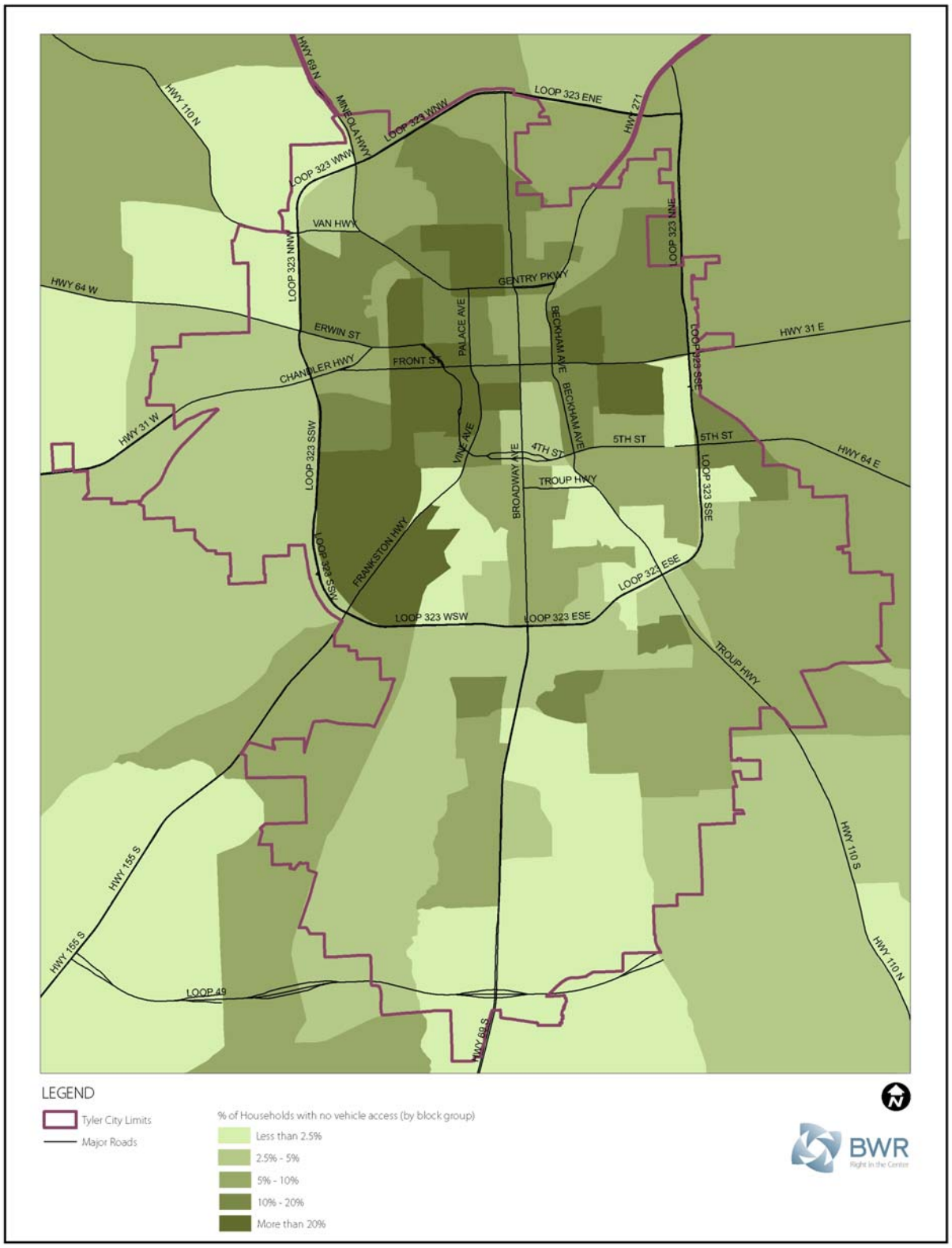


FIGURE 2-7 NO CAR HOUSEHOLDS

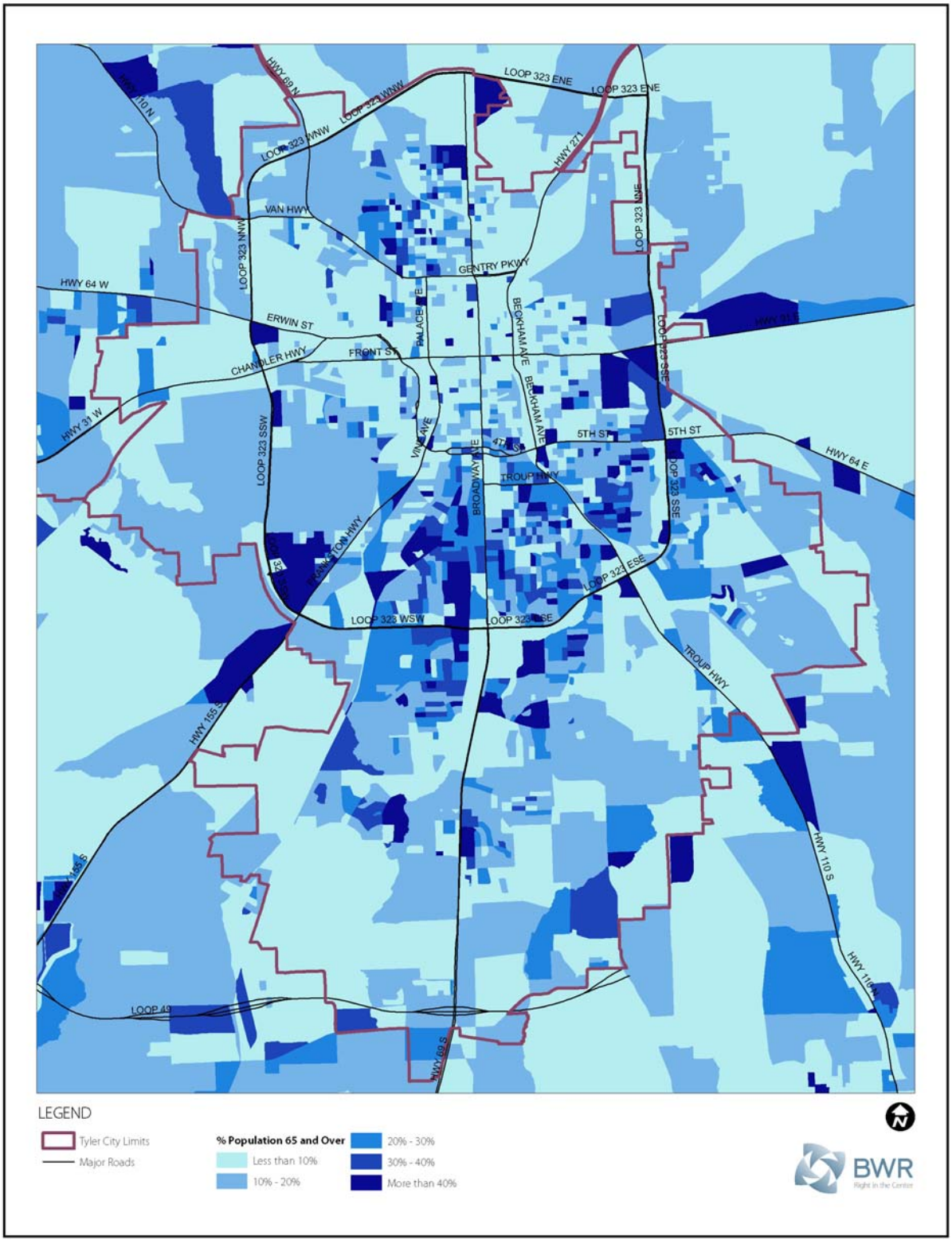


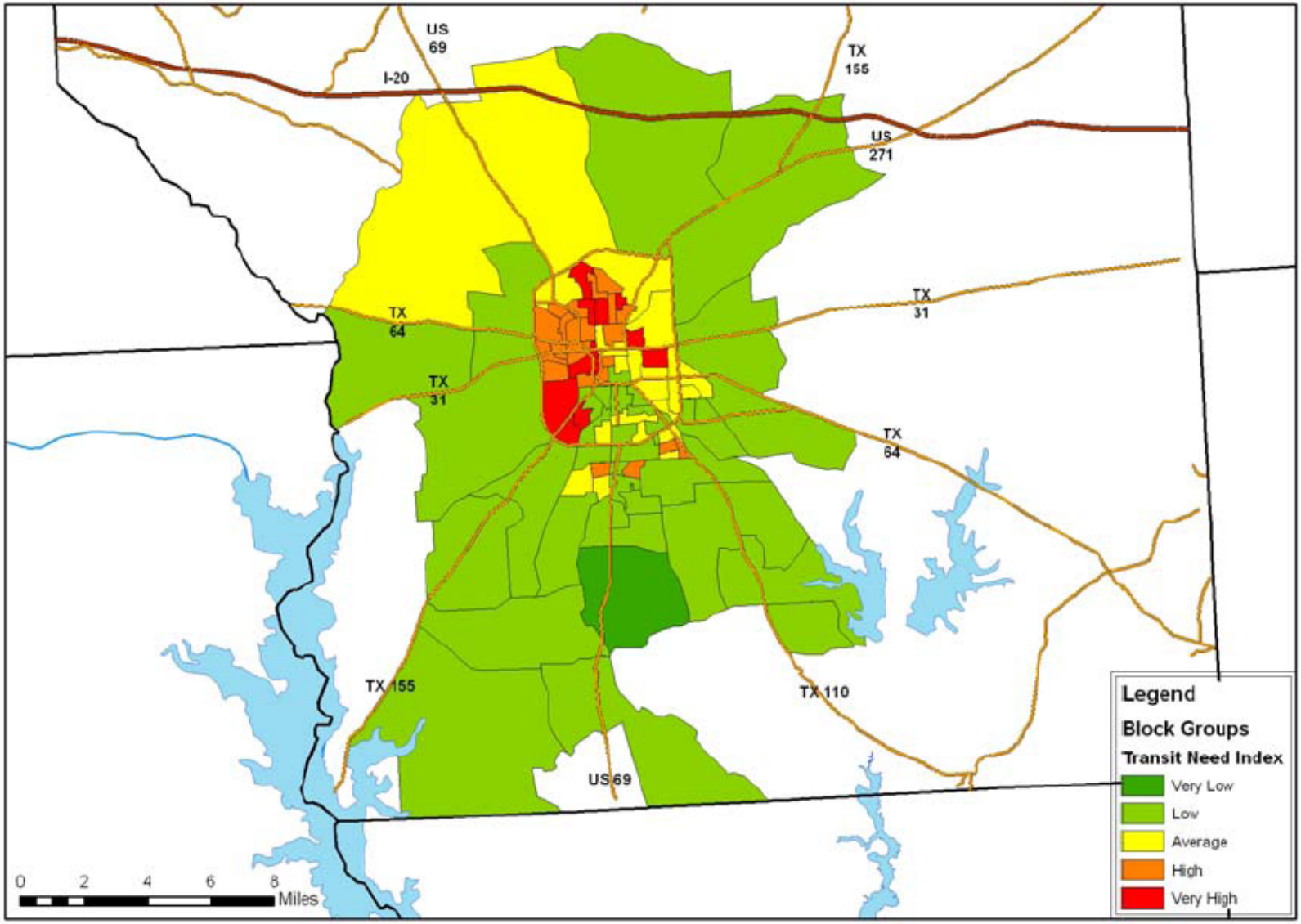
FIGURE 2-8 SHARE OF POPULATION 65 YEARS AND OVER

2.2.5 Transit Need Index

The Texas Transportation Institute (TTI) conducted the East Texas Transfer Study for the East Texas Regional Transportation Coordination Planning Steering Committee. The purpose of the study was to undertake a comprehensive study for a regional coordination of public transportation services for the East Texas region, as well as to identify potential transfer points.

The TTI study established a methodology to assess the need for transit services by the general population within the urbanized areas of Longview and Tyler and also the rural area of the East Texas region. A transit need index was used to rank census block groups for relative transit need based on demographic characteristics. Demographic categories that typically indicate transit needs that were used in the analysis include: population, household income, auto availability, race and ethnic origin, age distribution, and disabled population.

The transit need index and weights developed for the Tyler Urbanized Area is depicted in **Figure 2-9** and summarized in **Table 2-4**. Ranking characteristics were each assigned a weight, which corresponds to the relative importance of the different types of need attributes based on industry knowledge. With few exceptions, the highest transit need is located within Loop 323 in the northwest and southwest quadrants of the city. Two additional block groups of very high transit need are to the east of the center of town. Beyond Loop 323, transit need is average to the northwest along U.S. Highway 69, and small clusters of high transit need are located to the south along U.S. Highway 69 and to the southwest along State Highway 110. Transit need is lowest on the southern edge of town and farther to the south, west, and east in Smith County.



Source: Report Summarizing the Findings of the East Texas Regional Coordination Transfer Study

FIGURE 2-9 TRANSIT NEED INDEX FOR TYLER URBANIZED AREA

TABLE 2-4 TYLER URBANIZED AREA TRANSIT NEED INDEX WEIGHTS

Need Characteristic	Transit Need Index Weight
Population Density	2.0
Percent zero car households	2.0
Percent minority population	1.5
Percent population 65 and older	1.5
Percent population density	1.5
Percent persons below poverty	1.5

Source: Report Summarizing the Findings of the East Texas Regional Coordination Transfer Study

2.3 JOURNEY TO WORK

Table 2-5 presents a comparison of mode split (percentage of residents who drive alone, take transit, bike, and walk) between Tyler and Longview, as well as a comparison with state average. As shown, nearly 80 percent of Tylerites traveled to work alone via their private automobiles while approximately 15 percent carpooled with only 0.6% took public transit. Moreover, Tyler's commuting pattern shows a slightly higher percentage of workers drove alone compared with the statewide average while slightly lower compared with Longview. With respect to commuting by other modes, Tyler commuting pattern showed a slightly lower percentage than statewide while relatively better than Longview's non-auto modal share.

TABLE 2-5 COMPARISON OF MODE SPLIT

Mode	Texas	Texas Percentage	Tyler	Tyler Percentage	Longview	Longview Percentage
Drove alone	7,115,590	77.7%	29,250	79.5%	25,803	82.9%
Carpooled	1,326,012	14.5%	5,396	14.7%	3,681	11.8%
Public transportation:	170,268	1.9%	207	0.6%	64	0.2%
Motorcycle	12,068	0.1%	40	0.1%	14	0.0%
Bicycle	21,551	0.2%	33	0.1%	59	0.2%
Walked	173,670	1.9%	502	1.4%	463	1.5%
Other means	86,692	0.9%	592	1.6%	275	0.9%
Worked at home	252,024	2.8%	789	2.1%	751	2.4%
Total	9,157,875	100.0%	36,809	100.0%	31,110	100.0%

Source: Census 2000

3 Tyler Public Transit

This section of the report documents the review and inventory of existing and planned transit programs, services, and facilities in Tyler.

3.1 HISTORY OF SERVICE

The City of Tyler established bus services on March 6, 1936. It offered six fixed routes with a six cent fare. In 1959, the City terminated its operations and a privately-owned transit company, Tyler City Lines, began to offer the service. The change reduced the number of fixed transit routes from six to four. After a number of years, Tyler City Lines was purchased by another firm and the number of transit routes was again reduced from four to one — the reduction was attributed to the declining ridership over the years. In 1977, the City of Tyler began providing an operating subsidy to the transit operator. The subsidy continued until 1981 when the City of Tyler resumed operations of the transit service. At first the system operated with a fleet of two twelve-passenger vans on one fixed route. In 1989, a review of the transit system showed many unmet transit needs in the community and recommended expansion of the system.

The City contracted with Ryder/ATE to manage the city bus system. Transit Management of Tyler (TMT) was formed in July of 1993. TMT started operation under the trade name "Tyler Transit." In 1994, a second route was added to cover the East-West Tyler area. Paratransit services were along added to meet the needs of the disabled community in accordance with the requirements of the American with Disabilities Act (ADA).

The expansion continued in February 1999 when a third route was added and the existing routes were reconfigured. To better distinguish the routes, color coded names were given to each - the Red Line, Blue Line, and Green Line. Several transfer points were also added along the routes to allow riders to transfer between lines without having to arrive at the Bergfeld Center transfer point. However, Bergfeld Center remained in place as the main transfer point between all three routes. It was meant to be a temporary location for the transfer center. In October 2001, a fourth fixed route (the Yellow Line) was added and the lines were again reconfigured slightly.

3.2 EXISTING SERVICE CHARACTERISTICS

Tyler Transit provides a fixed route service and a paratransit service within the City. Characteristics of each service are described below.

3.2.1 Fixed-Route Bus Services

Tyler Transit offers five fixed routes or lines as shown in **Figure 3-1**. The Yellow Line serves the southern area of the City while the Blue and Green Lines primarily serve the west and east sides of Tyler, respectively. Red Line North serves the north part of Tyler and Red Line South makes stops along South Broadway Avenue. Broadway Avenue is one of Tyler's busiest corridors. As a single route, the Red Line bus could not complete its journey without occurring excess delay due to traffic signals and congestion.

Service frequency is best described by bus headway, or the time interval between transit revenue vehicles at a specific location. The Tyler Transit system has grown to a system that operates five fixed route buses throughout the City of Tyler. These buses operate on a timed point system, where the bus stops and departs from the timed stop as scheduled. The transit system was designed with headways ranging from 30 minutes to 1 hour and 20 minutes. The system also features four transfer points so passengers could schedule their trips with minimum wait time. Transfer points are destinations where various routes meet at the same time to allow passengers to transfer to another bus route.

The current Tyler Transit fleet consists of five fixed route buses operating between the hours of 6:00 AM and 8:15 PM from Monday to Friday and between 9:00 AM and 6:00 PM during Saturday. No Sunday service is currently available.

The basic fare per trip is currently $0.75 for adults; $0.35 for elderly or disabled; and $0.25 for children under 12. Monthly passes are $30 (or $15 for students) and permit the pass-holder to ride an unlimited number of times during the month in which the pass is purchased.

3.2.2 ADA Complementary Paratransit Services

Tyler Transit offers paratransit services to persons with disabilities. Paratransit is an alternative mode of flexible passenger transportation that does not follow fixed routes or schedules. To use this service a rider must be determined as eligible under the Americans with Disabilities Act and live within the City limits of Tyler. Riders simply call in a request and the paratransit buses are dispatched to their locations. This service allows persons with disabilities the freedom to access shopping centers, medical facilities, or other locations within the City.

There are currently three paratransit vans serving the area. Paratransit services have the same operational hours as the fixed route system – from 6:00 AM to 8:15 PM during the weekday and on Saturday from 9:00 AM and 6:00 PM. No Sunday service is currently available.

The cost per trip to the elderly and the disabled for such a demand response service is $1.50.

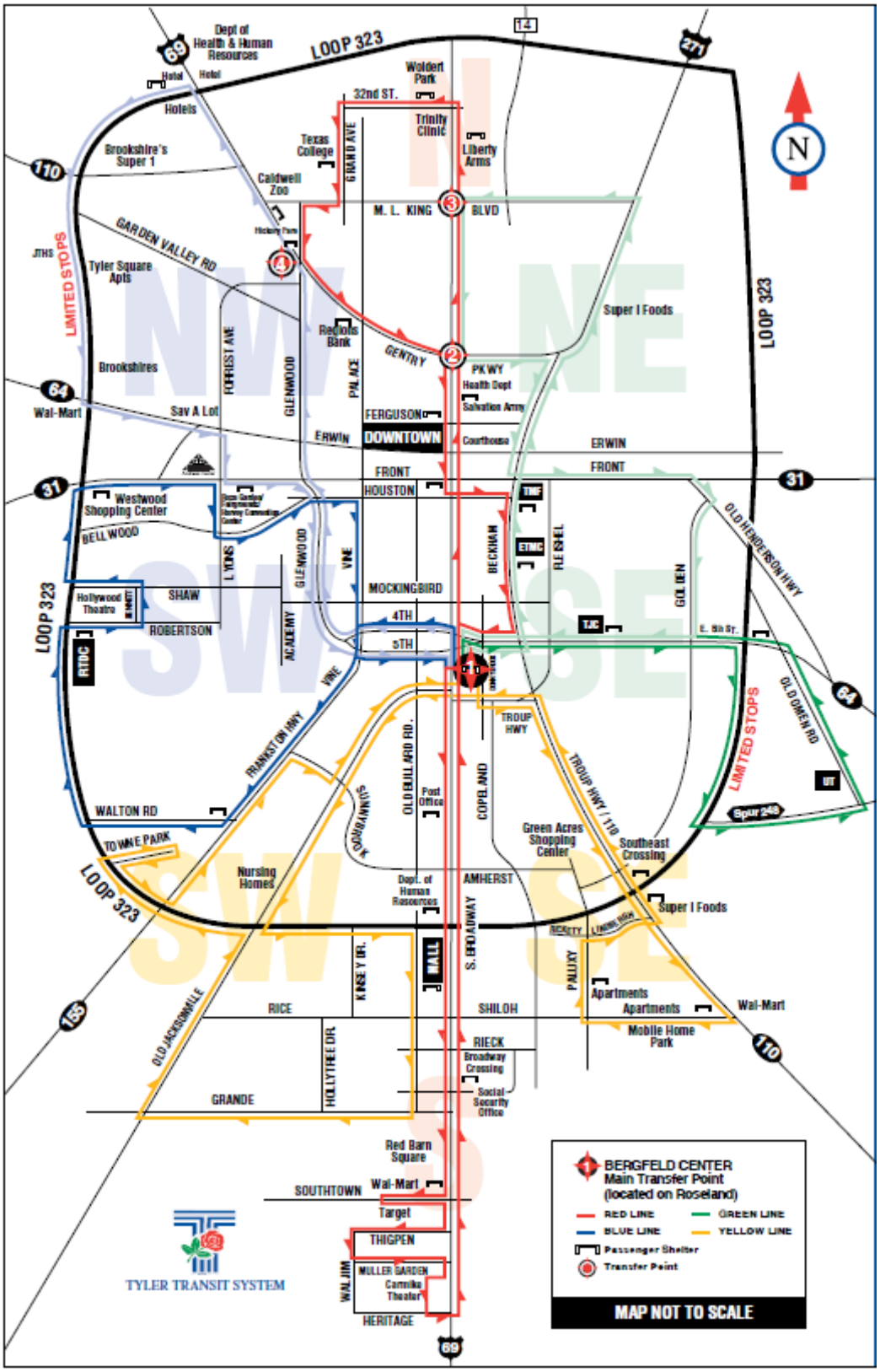


FIGURE 3-1 EXISTING TYLER BUS LINES

3.3 TRANSIT RELATED INFRASTRUCTURE

3.3.1 Transfer Points

Tyler Transit's main transfer point is located in Bergfeld Center. Here passengers can transfer to any of the five fixed routes offered. As mentioned previously, Bergfeld Center was meant to be a temporary location for the transfer point. There are no permanent restroom facilities at this location. There are three other minor transfer points (refer **Figure 3-1**) located along Red Line North route. At these locations riders may transfer from the Red Line North bus to either the Blue or Green lines.

3.3.2 Bus Stop Amenities

One of the tasks of this study was to conduct an inventory of existing bus stop locations. The inventoried data was used to create a GIS layer that stores information of various features of each bus stop, including the types of facility available, the condition of facilities, whether sidewalks are present, number of boarding's, photographs, etc.

There are a total of 222 bus stop locations along the five bus lines. The types of facilities provided are summarized in **Table 3-1** and shown graphically in **Figure 3-2**. Only a fifth of the stops has amenity, such as a shelter or a bench.

TABLE 3-1 BUS STOP FACILITY TYPES

Facility Type	Number
Bench	2
Covered Bench	2
Shelter	38
Sign Only	180
Total	**222**

3.3.3 Pedestrian Access

Access to bus stops is critical to the success of a transit system. Missing, narrow or deteriorated sidewalks are deterrents to the use of transit. Similarly, dangerous intersections or a lack of crosswalks put transit riders at risk and also cut down on the number of residents willing to use transit when they otherwise could.

In the City of Tyler, sidewalks are typically provided on both sides of a roadway. Their presence is dense near the downtown district and hospital area. However, the majority of these sidewalks do not meet current ADA requirements. At many locations the pedestrian ramps are not present or if available the slope exceeds current standards. Also in some cases, the sidewalks' overall widths are too narrow. The City of Tyler has recently completed an inventory of the sidewalks located within the city limits.

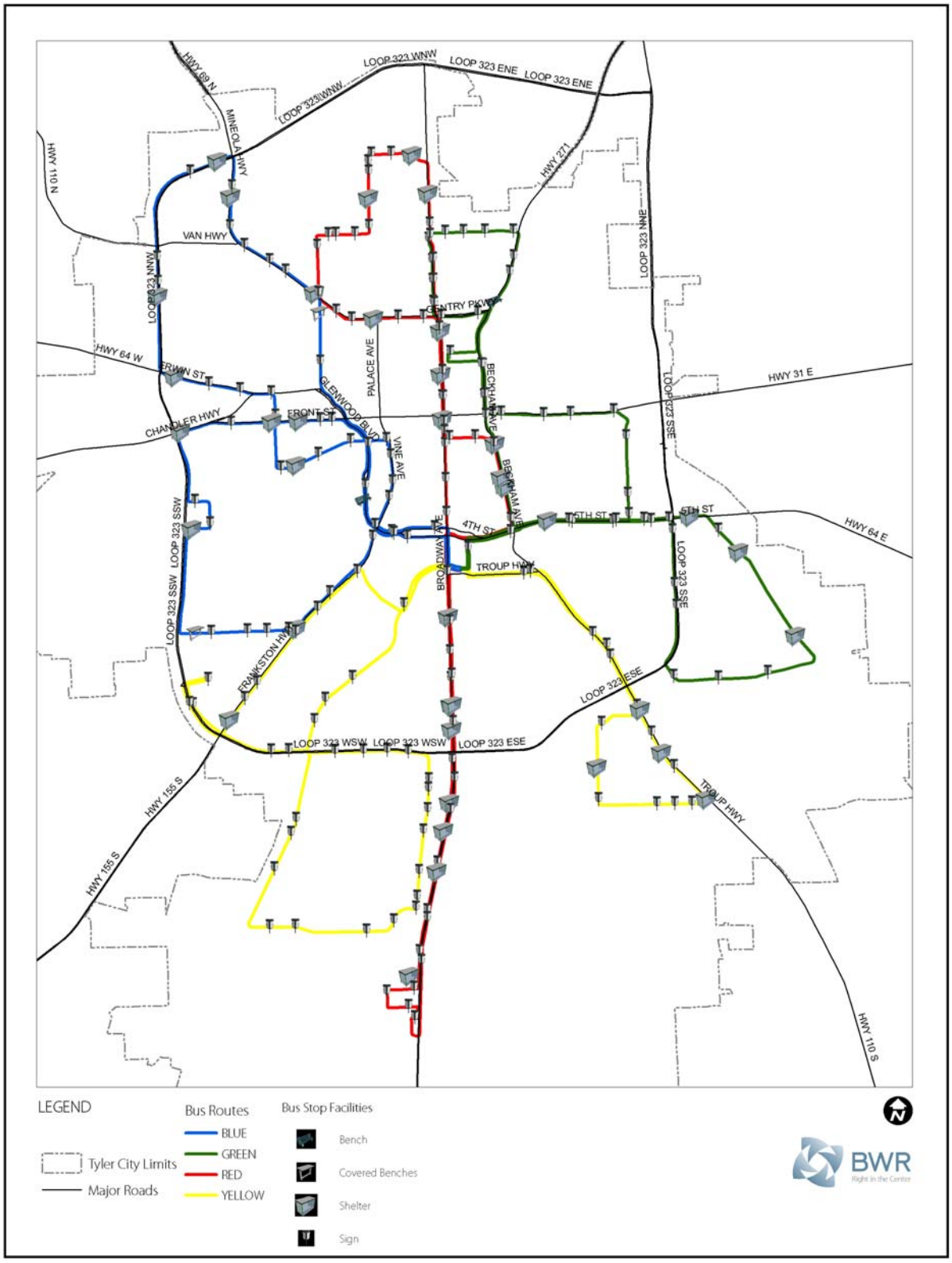


FIGURE 3-2 EXISTING BUS STOPS

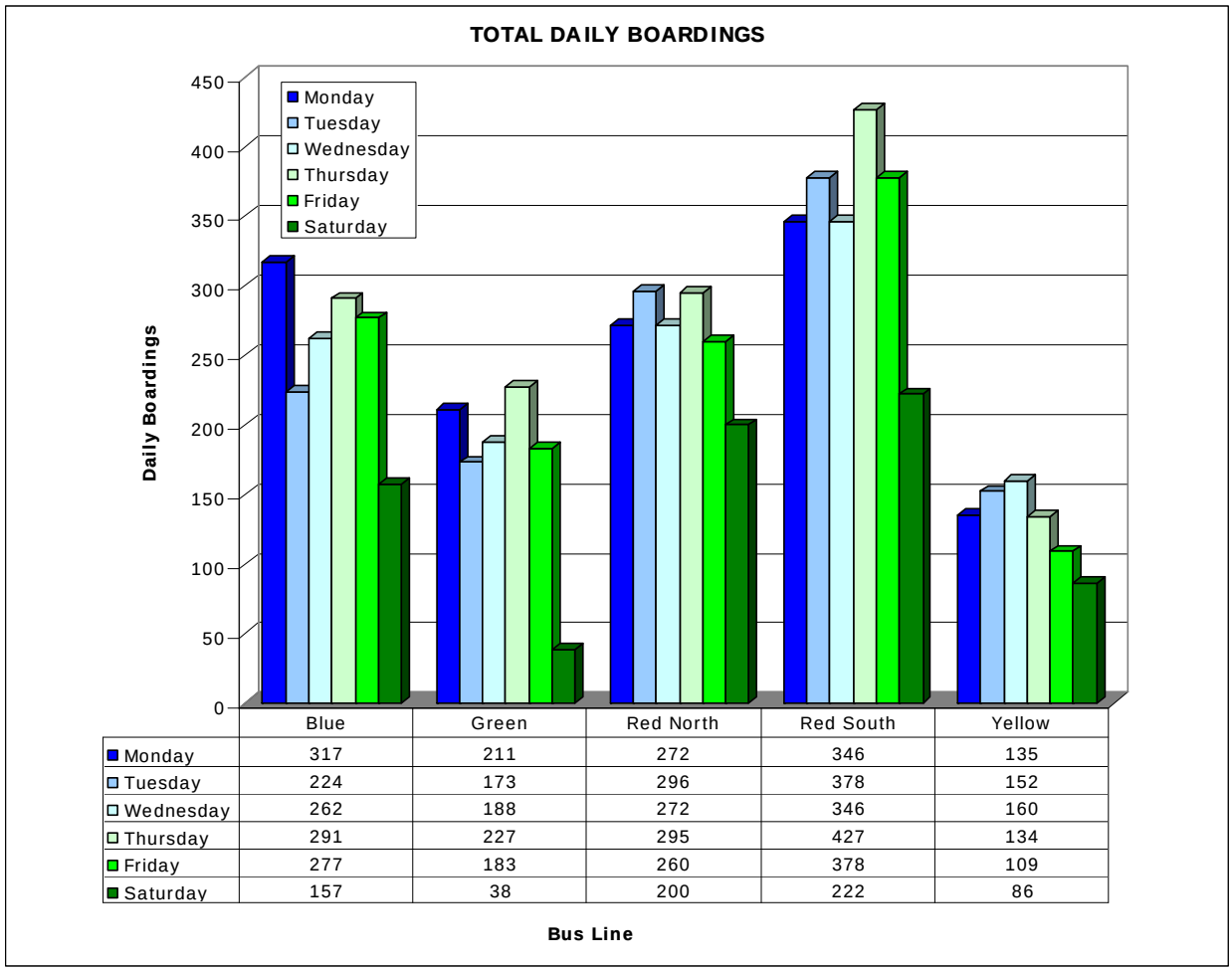
3.4 BOARDINGS BY ROUTE

3.4.1 One Week Observation

As mentioned in Chapter 1, boardings and alightings at each bus stop location was recorded from Monday to Saturday on April 5-10, 2010. This was accomplished to determine what the current usage of each route was. Before making any recommended changes, we wanted to know which parts of the routes were being utilized and which parts where not. The bus drivers were utilized to collect the data as they picked up and dropped off passengers throughout the day. **Figure 3-3** presents a summary of total daily ridership levels on each bus lines. Maps of daily boardings at each bus stop are shown on **Figures 3-4** and **3-5**. It is important to note that the weekday daily boardings shown on **Figure 3-4** represent the observed maximum boardings at each bus line during the weekday boarding count survey.

Figure 3-3 highlights the average boarding activity by line. The numbers of daily boardings on all lines vary. For all lines, Saturday boarding activity is significantly lower than on weekdays. The Saturday ridership along the Green Line has only about a fifth of weekday ridership. The Red Line (South) has the highest daily ridership with over 420 observed on Thursday and a week total of 2,097 boardings. The Yellow Line has the lowest daily boardings with a week total of 776. A total of 7,016 boardings were recorded for all lines during the entire week of survey.

The highest boarding levels occur where more frequent service is provided and moderate to high population and/or employment densities exist. High levels of boarding activity also occur at locations where convenient transfers between routes (are possible). Not surprisingly, the Bergfeld Center has the highest boarding activity.



	Blue	Green	Red North	Red South	Yellow
Monday	317	211	272	346	135
Tuesday	224	173	296	378	152
Wednesday	262	188	272	346	160
Thursday	291	227	295	427	134
Friday	277	183	260	378	109
Saturday	157	38	200	222	86

FIGURE 3-3 OBSERVED DAILY BOARDINGS

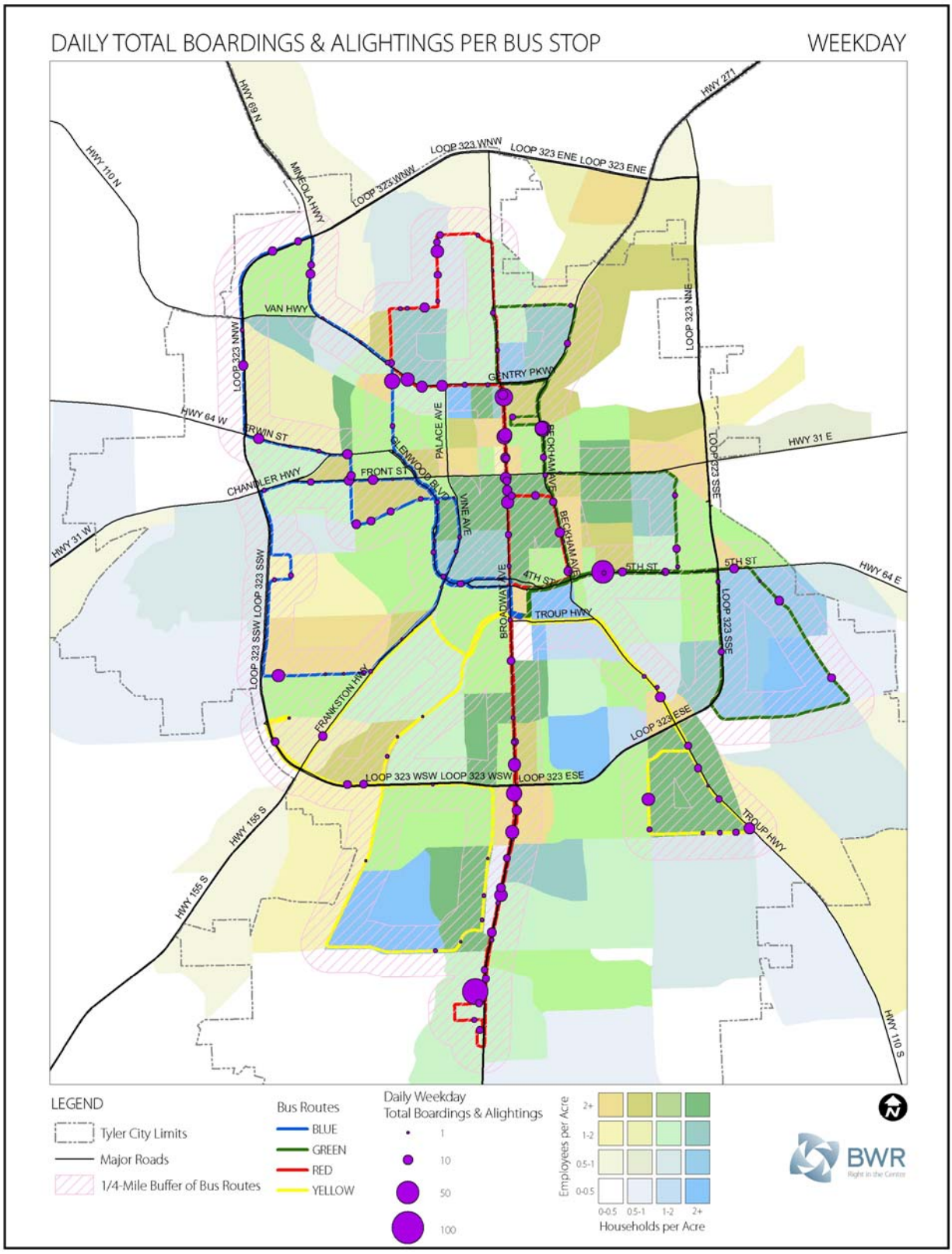


FIGURE 3-4 WEEKDAY DAILY BOARDINGS PER STOP

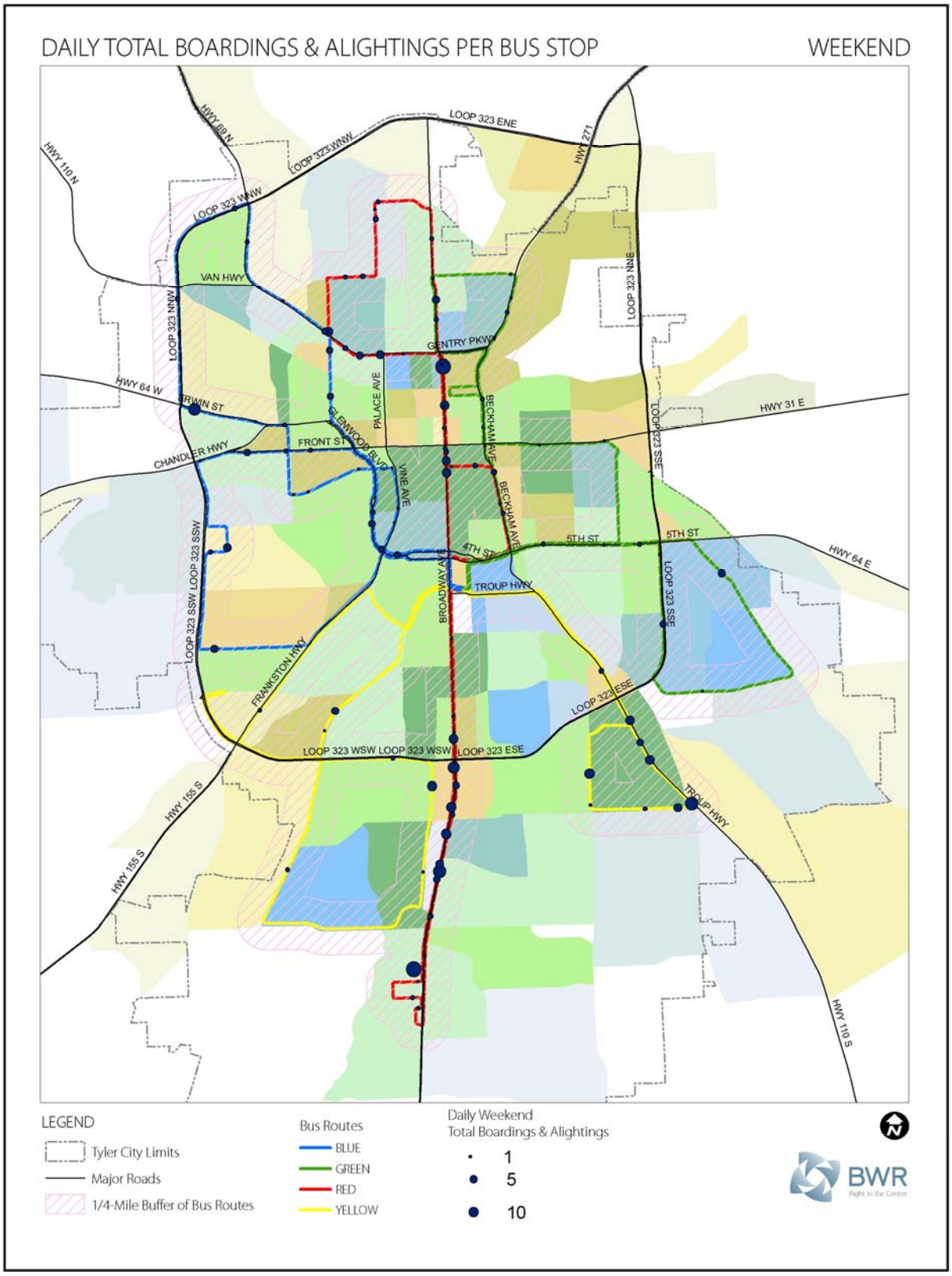


FIGURE 3-5 WEEKEND DAILY BOARDINGS PER STOP

3.4.2 Annual Ridership Per Route

Tyler transit staff provided data on annual ridership for each bus route for the last two financial years. As shown in **Figure 3-6**, ridership has increased in 2009 with the exception of the Blue Line where there was a significant dropped (about -7.3%) in ridership.

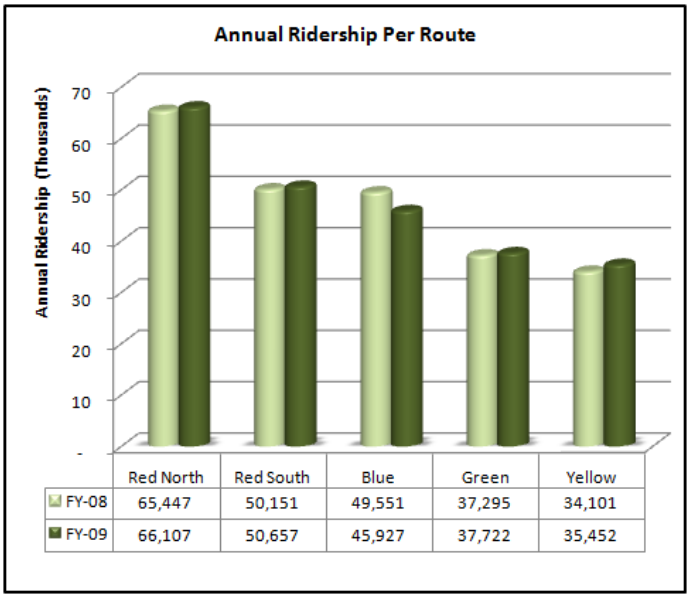


FIGURE 3-6 TOTAL ANNUAL RIDERSHIP PER ROUTE

3.4.3 Annual Total Ridership by Type of Transit Service

Figure 3-7 presents a comparison of total annual ridership for the fixed bus route and the trippers (para-transit) services for 2008 and 2009 financial years. Both transit services indicate a drop in 2009 total ridership compared to the previous financial year.

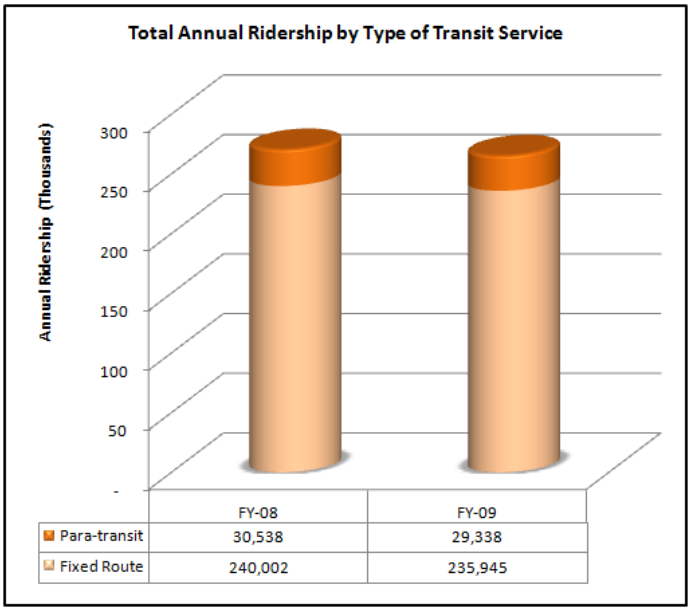


FIGURE 3-7 TOTAL ANNUAL RIDERSHIP BY TYPE OF TRANSIT SERVICE

4 Outreach

This chapter presents a summary of outreach efforts to gather input from major stakeholders and residents in the City of Tyler.

4.1 TRANSIT STAKEHOLDER INTERVIEWS

Project team staff spoke with major employers, politicians, business owners, and community representatives in the City of Tyler to gather their feedback on major transit issues, needs and gaps in service. All stakeholders interviewed felt that transit improvements were critical to meeting future transportation demand and accommodating growth in a sustainable manner. Stakeholders identified a number of deficiencies in the transit services offered in Tyler.

Critical needed improvements cited were:

- Improved shelters, add more benches and trashcans at stop locations.
- Better sidewalk connectivity near bus stops
- Add security lighting at bus stops for better safety
- Install emergency push button at shelter locations for better safety
- Add covered shelter to transfer point
- Need shorter headways (30 to 45 minutes)
  - Suggested adding multiple buses to one line
  - Shorten existing routes and eliminating underused stops
- Improve the reliability of the buses. Many people depend on them to get to work and doctor appointments. Right now the buses always run late.
- Look at extending the hours of operation during the weekdays and possibly starting a Sunday service. The existing hours do not meet the needs of all riders – especially the hospital staff or extended hour commercial industries. Suggested hours are 5 AM to midnight.
- Bus fares are very reasonable and do not require adjustments
- Improve marketing efforts to better inform the public about route availability.
- Investigate extending services outside the city limits to include routes to University of Texas Health Center, Target Distribution Center, Lindale and Whitehouse.
- Consider adding 'green' alternatives to the transit system, i.e., greener buses and trees at bus stops.

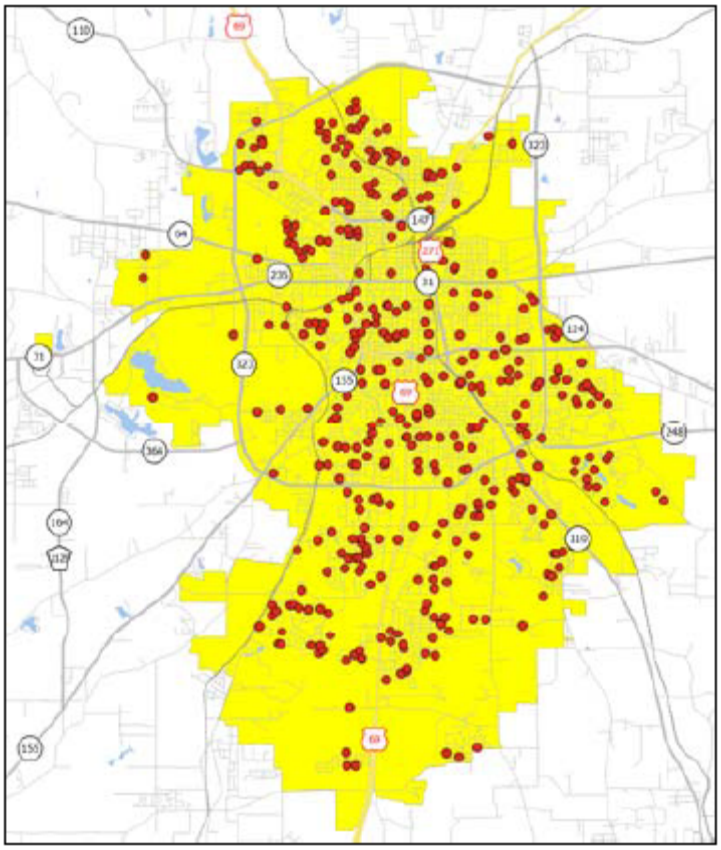
4.2 HOUSEHOLD COMMUNITY SURVEY

A transit survey to gather input from Tyler residents regarding issues and opportunities relating to transit use and planning for Tyler was conducted during the Spring of 2010. A copy of the survey instrument is included in Appendix A. A full report that details the responses to each survey question is available from Tyler Transit. Topics addressed in the resident survey included:

- Current use of Tyler Transit.
- Acceptable frequency of service and distance to bus stops.
- Reasons for not currently using transit in Tyler.
- Barriers that would encourage use of the bus.
- Importance of serving segments of the Tyler population.
- Household demographics.

Methodology

The survey was mailed to a random sample of 2,000 residents during March and April of 2010, with 413 completed responses received (see scatter map at right). The overall results for the 413 surveys that were collected have a precision of at least +/- 5% at the 95% level of confidence.



The following are key findings from the resident survey:

- **Sufficiency of Service and Current Use**. Those surveyed were asked to rate the sufficiency of transit service in Tyler; 4% rated it as excellent, 13% as good, 13% as average, and 9% as poor. Sixty-one percent (61%) didn't know. A total of 11% of residents surveyed reported using the service.

- **Expectations of Frequency and Distance to Stops**. Those surveyed were asked about acceptable wait time in minutes to take the bus instead of a car; 7% said 5 or less minutes, 10% said 6-10 minutes, 26% said 11-20 minutes, 26% said 21-30 minutes, 12% said 31-60 minutes, and 18% did not provide and answer.

The acceptable distance for transit stops to be located for residents to take the bus instead of a car range from 1 block or less (22%), 2-5 blocks (44%), 6 or more blocks (4%), and 30 % did not provide and answer.

- **Barriers for Resident Use of Public Transit**. Residents were offered a list of possible reasons for not using public transit - multiple selections could be made. The top three reasons were; 1) I just prefer to drive, 2) it takes too long compared to travel by car, and 3) I don't have enough information about it.
- **Factors that Would Encourage use of Public Transit**. Those surveyed were asked about various factors that would encourage them to use public transit. The three issues that were most likely to encourage them to use public transit were 1) transit stops being closer to their home, 2) the cost of gasoline exceeds $3 per gallon, and 3) buses scheduled to arrive more often. They were less influenced by parking issues and a slightly longer commute time.
- **The Target Purpose for Transit Service**. Although all purposes were supported by those surveyed, the top two purposes indicated were; 1) to help people to get to and from work, and 2) to provide transportation to low income persons.

4.3 ON-BOARD TRANSIT PASSENGER SURVEY

The on-board transit passenger survey was also conducted during the Spring of 2010. The survey was administered on-board by Tyler Transit drivers. The purpose of the survey was to gather input from residents regarding issues and opportunities relating to transit use and planning for Tyler.

Topics addressed in the on-board survey included:

- Current use of Tyler Transit.
- Method of getting to bus stops.
- Satisfaction with existing service and personnel.
- Barriers to more frequent use of the bus.
- How information about bus routes and service is currently obtained.
- Overall satisfaction with transit service.

Methodology

The survey was administered by giving the survey to passengers as they boarded Tyler Transit busses on the Red North Line, the Red South Line, the Blue Line, the Green Line, and the Yellow Line and having it completed while they were on the bus and returned as they exited the bus. The survey was administered in both English and Spanish versions. The on-board transit survey was administered to a random sample of 162 riders in March and April of 2010. The overall results for the 162 surveys that were administered have a precision of at least +/- 7.5% at the 95% level of confidence

The following are major findings from the on-board transit survey:

- **Current Users of Tyler Transit**. Fifty-four percent (54%) of those who currently use public transit indicated that they use it at least four days a week. Fifty-eight percent (58%) had used public transit at least once a week for over a year. Eighty-two percent (82%) of those surveyed indicated that they did not have a car to use for their trip. Nearly half (49%) indicated "work" as the purpose of their trip.

- **Method of Getting to Bus Stop**. The majority (65%) of riders walked to the bus stop for the bus they were riding. Twenty-four percent (24%) said they transferred to the bus they were riding.
- **Satisfaction with Existing Service and Personnel**. Riders were asked about their satisfaction with various issues of bus service. Their highest satisfaction (with a combination of very satisfied and satisfied) were how safe they felt riding the bus (90%), how knowledgeable bus drivers were (89%), how safely bus drivers operate vehicles (88%), and how courteous the drivers were (88%). The least satisfaction was indicated with the hours that bus service is offered (52%), and the availability of bus shelters at stops (50%).
- **Barriers to More Frequent Use of the Bus**. Riders said that more weekend service (64%), more evening service (56%), more covered shelters available (55%), and more frequent service (54%) would encourage them to use the bus more.
- **How Information About Bus Routes and Service is Currently Obtained**. Drivers were the source of information for 54% of riders, a call to the City was the source for 38%, friends and family for 25%, and signs posted on the bus were a source of information for 25% of riders.
- **Overall Satisfaction with Transit Service**. Those riders surveyed found that public transit service in Tyler was excellent (22%), good (34%), average (25%), or poor (7%). Twelve percent (12%) did not know.

5 Transit Recommendations

This section of the report presents the alternatives identified by the study through input received from the surveys, public meeting, advisory committee, and city staff.

5.1 OVERVIEW OF ALTERNATIVES

Through the alternate route development process, two main routes came to the top as the best options for consideration. Of the two options both have a minimum, operation with the current five buses, and an optimum number of buses that could operate the system. Each of the alternatives considered projected employment and population statistics to ensure future growth demands were also met. The alternatives also considered the transit need index which is compilation of the elderly, minority, and low income demographics. The following will discuss each of the two alternatives and the recommended Alternative.

5.1.1 Alternative 1

The objective with the first alternative was to provide a similar coverage area as the existing system while eliminating under utilized areas for better efficiency. Like the existing system, bus lines were color coded into four groups – Red, Blue, Green and Yellow. The Red line will primarily serve Broadway Avenue. The Blue line will cover the west and northwest portions of the City; while the Green line serves the east and north sections of town. Finally the Yellow line will service the southwest and southeast areas of Tyler.

Alternative 1 has two options. The first option, Alternative 1A, is a scenario where five buses are used to operate the system. Five buses is the minimum number of buses recommended for the system. Each bus line would receive one bus with the exception of Red line. The Red line would operate with two buses. The second scenario, Alternative 1B is considered the optimum condition. It consists of seven buses. Each line would receive two buses with the exception of the Yellow line, which would have one bus.

Both scenarios of Alternative 1 utilize the train depot on Oakland Street as a transfer point. The train depot currently houses the Tyler Transit Department. It is a location owned by the City and has the potential for long range development. The depot offers riders an indoor location with restroom facilities. It is ideally located near downtown Tyler, an area with higher existing ridership. Future improvements to the site should consider including more destination orientated attractions, such as a satellite post office service or movie rental vending machines. Three of the bus lines – Red, Green, and Blue – will serve the depot. The Yellow line will not access the depot since its route does not travel close enough to make it feasible. Instead it will connect to the other lines through overlaps in the system.

Alternative 1 will serve eight of the City's 19 major employers. Employers include the City of Tyler, Smith County, Trinity Mother Francis Hospital, ETMC, Southside Bank, Tyler Junior College, University of Texas at Tyler, and Tyler Independent School District.

Route Description by Bus Line

The Red line will mainly service the Broadway Avenue corridor, the City's main north-south roadway. The proposed route is very similar to the existing service area with one significant change. This alternative trims a portion of the line's route north of Gentry Parkway and assigns it to the proposed Green line. The change allows the Red line's main focus to become meeting headway along Broadway Avenue. The Red line will also provide service to the East Texas Lighthouse for the Blind in the downtown area. The East Texas Lighthouse for the Blind is an organization dedicated to serving the blind. Currently, the City provides transportation to the group though the City's paratransit service. Transit Department staff has expressed interest in adding a stop here and reducing the demand on the paratransit system.

The proposed Red line is approximately 13 miles in length. It is recommended the route has no more than 24 bus stops to maintain an overall travel time of 90 minutes. Two buses will also be used to help keep headways reasonable; however, both buses will travel the complete route. Ideally the buses will remain equally spaced from one another through scheduling and two-way radio communication. By eliminating this segment of the line, Red line moves closer to an achievable acceptable headway. The average rider will experience a headway of 45 minutes at any bus stop.

The proposed Blue line is similar to the existing Blue line however minor changes allow the proposed route to run more efficiently. First, the deletion of a central transfer point at Bergfeld Center saves time for the Blue line. No longer will the Blue line be required travel to Bergfield Center. Instead the proposed transfer point is positioned closer to Blue line's intended route at the train depot. Here riders will have the option to transfer to the Red or Green lines. Second, service along Front Street and Glenwood Boulevard was reduced. The reduction did not eliminate any high use bus stops, with the exception of the Total Healthcare Center near the intersection of Glenwood Boulevard and Gentry Parkway. Adjustments to the Green line were made to maintain service at this location without significant impact to the system. Lastly, the existing segment that travels around Hollywood Theatres was removed. Although this piece of Blue line is not long in length, it does add notable travel time without any significant ridership. The Tyler Junior College – West Campus does generate some ridership in the area. Its current bus stop is located along Roberson Road. To maintain this bus stop, the shelter should be relocated to Loop 323.

Overall, the Blue line is roughly 16 miles in length. It is recommended the route has no more than 21 bus stops to maintain an estimated headway of 90 minutes. In Alternative 1A, the Blue line will operate with one bus. However when the system expands to a seven bus system in Alternative 1B, a second bus will be added to the line. Like the Red line, the two buses on Blue line will be staggered along the route. Ideally the buses will remain equally spaced from one another through scheduling and two-way radio communication. With two buses on Blue line, the average rider will experience a headway of 45 minutes at any bus stop.

The proposed Green line consists of several major destinations. First, all three of Tyler's colleges are located along the Green line. The connectivity allows students attending classes at multiple campuses to move between locations without bus transfers. The Green line also provides service to the City's hospital district. Trinity Mother Frances and ETMC are major employers located along Beckham Avenue. The Green line provides double coverage to these areas by traveling along Fleishel and Beckham Avenues. The hospitals will have bus stops along both roadways

The Green line also expanded to cover a section of Tyler currently being serviced by Red Line (north). This expansion allows the Green and Blue lines to provide overlapping service along Gentry Parkway from Glenwood Boulevard to North Broadway Avenue. According to existing ridership data, this segment of Gentry Parkway generates the highest density of riders system wide. The double coverage will give riders more frequent service as well as the bi-directional option.

Overall, the Green line is 18 miles in length. It is one of the longest routes in Alternative 1, but it is also the route with the most access to the transfer point (train depot). It is recommended the Green line has no more than 36 bus stops to maintain an estimated headway of 120 minutes. In Alternative 1A, the Green line will operate with one bus. However when the system expands to a seven bus system in Alternative 1B, a second bus will be added to the line. Like the other multi-bus line, the two buses on Green line will be staggered along the route. Ideally the buses will remain equally spaced from one another through scheduling and two-way radio communication. With two buses on Green line, the average rider will experience a headway of 60 minutes at any bus stop. Because of its length and higher headway, the Green line should receive an additional bus before the Blue line.

The Yellow line received several major adjustments in Alternative 1 when compared to the existing system. Like the Blue line, the deletion of a central transfer point at Bergfeld Center saves time for the Yellow line. No longer will it be required travel to Bergfield Center. Instead the Yellow line will connect directly to the Red and Green lines with overlapping bus stops. Direct access to the Blue line will not be provided. The line's service area was also reduced along Old Jacksonville Road, Grande Boulevard, and Loop 323 because of low existing ridership. The reduction allowed service to be expanded to the University of Texas at Tyler in the east and Lake Placid Drive in the west.

The Yellow line mainly covers the area east and west of Broadway Avenue. Its southern boundary is Shiloh / Rice Road. On the west side of Broadway, the Yellow line major bus stops include Goodwill Retail Store, St Louis Church, and Broadway Square Mall. The bus stops on the east side of Broadway Avenue include more residential stops at multiple apartment complexes and Shiloh Road Mobile Home Park. Overall the Yellow line is 18 miles in length and should have no more than 24 bus stops to maintain an estimated headway of 90 minutes. Unlike the other lines, the Yellow line will never receive an additional bus. The line is one of the longest routes of the system; however the projected ridership is lower than the other lines.

Alternative 1 is illustrated in **Figure 5-1**

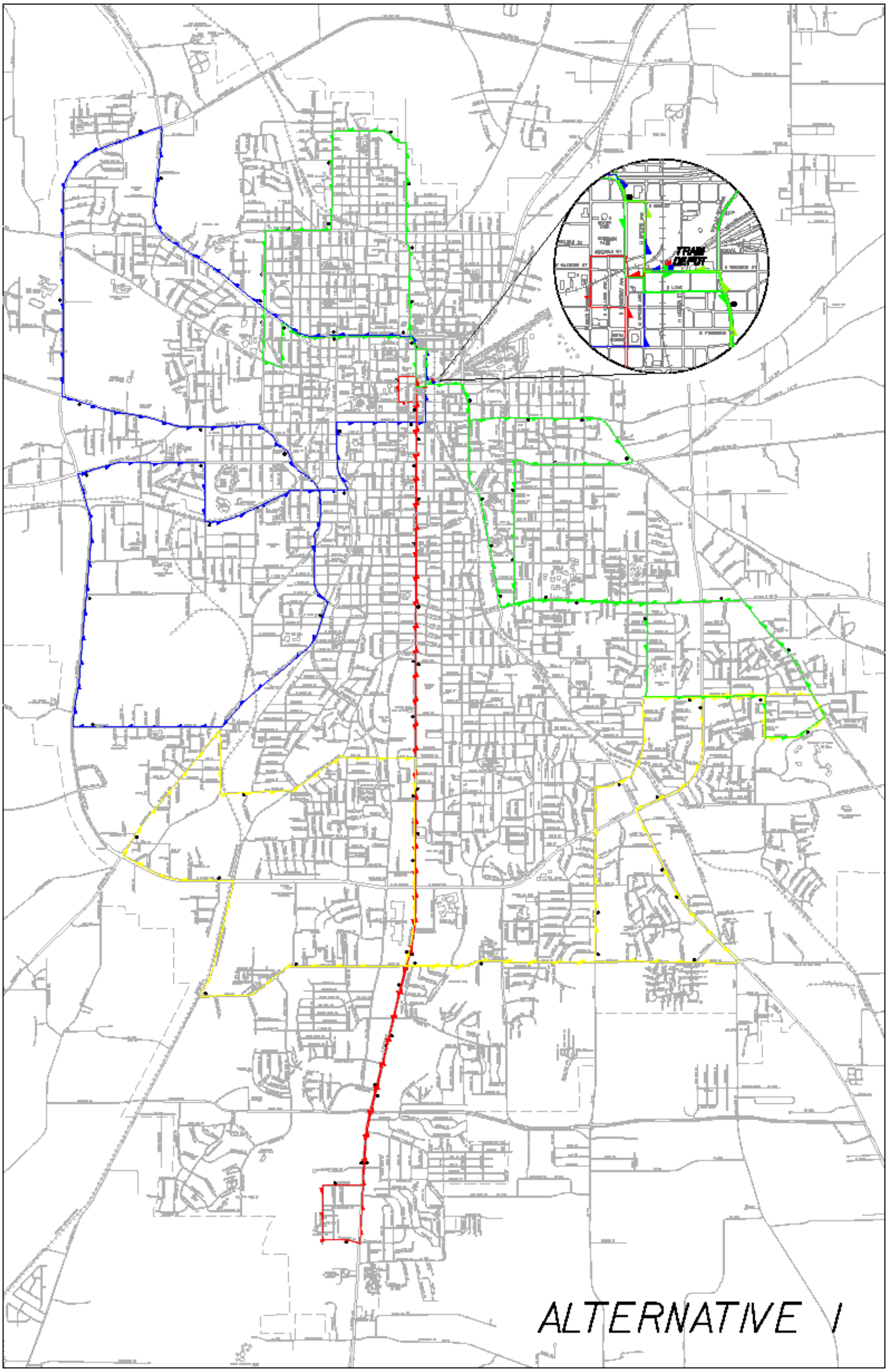


FIGURE 5-1 ALTERNATIVE 1

5.1.2 Alternative 2

The objective with the second alternative was to minimize the need to transfer between buses by providing more direct routes City wide. Two major movements were identified. The first was a direct route from north to south Tyler. The second route was from the east side to south Tyler. Like the existing system and Alternative 1, bus lines were color coded into four groups – Red, Blue, Green and Yellow. The Red line is the north-south route running the length of the service area. The Blue line covers the west portion of the City; while the Green line serves the east and southeast sections of town. Finally the Yellow line will service the northwest area of Tyler.

Alternative 2 has two options. The first option, Alternative 2A, is a scenario where five buses are used to operate the system. Five buses is the minimum number of buses recommended for the system. Each bus line would receive one bus with the exception of the Red line. It would operate with two buses. In the second scenario, Alternative 2B, each line would receive two buses, for a total of eight buses.

In Alternative 2, the train depot will not be used as a transfer point as in Alternative 1. Instead buses will have overlapping stops where riders can transfer between bus lines. A bus stop will be located at the depot; however, it will only be a common bus stop between the Yellow and Red lines. The overlapping (common) bus stops where transfers will occur should be larger bus shelters capable of housing several riders. Additional consideration should be given to the construction of restroom facilities along key routes if this alternative is selected.

Alternative 2 will serve eight of the City's 19 major employers. Employers include the City of Tyler, Smith County, Trinity Mother Francis Hospital, ETMC, Southside Bank, Tyler Junior College, University of Texas at Tyler, and Tyler Independent School District.

Route Description by Bus Line

Similar to the existing system, the proposed Red line in Alternative 2 will run the entire length of the transit's service area. Two buses will be used along the route to help combat the effect of traffic congestion and provide users a reasonable headway. Both buses will travel the complete route. Ideally the buses will remain equally spaced from one another through scheduling and two-way radio communication.

The Red line is approximately 23.5 miles in length. A significant change in the Red Line from Alternative 1 is in south Tyler, the bus line will use Old Bullard Road, East Rieck Road, New Copeland Road, and Grande Boulevard to crisscross South Broadway Avenue. The idea is to eliminate some of the delay associated with traveling on Broadway Avenue during peak periods. The crisscross effect will also create new service areas east of Broadway Avenue. Like Alternative 1, the Red line's most southern bus stop is along Heritage Drive at Carmike Theatre. On its return north, the Red line travels back along Broadway Avenue, passes back through the hospital district via Flieshel Avenue, and returns to the depot. It is recommended the route has no more than 45 bus stops to maintain an estimated headway of 150 minutes. Since two buses will service the Red line, the average rider will experience a headway of 75 minutes at any bus stop.

The proposed Blue line is similar to the existing Blue (SW) line. It starts at the intersection of Houston Street and Broadway Avenue. Like Alternative 1, the existing segment of Blue line that travels around Hollywood Theatres was removed. In Alternative 2 the Blue line travels through the hospital district. Not only does this provide another travel option for riders in the hospital district, it also acts as the overlapping transfer area for the Blue and Red lines. The Red line is the only route the proposed Blue line interacts directly with.

Overall, the Blue line is roughly 11 miles in length. It is recommended the route has no more than 25 bus stops to maintain an estimated headway of 75 minutes. In Alternative 2A, the Blue line will operate with one bus. However when the system expands to an eight bus system in Alternative 2B, a second bus would be added to the line. Like the Red line, the two buses on Blue line will be staggered along the route. Ideally the buses will remain equally spaced from one another through scheduling and two-way radio communication. With two buses on Blue line, the average rider will experience a headway of roughly 40 minutes at any bus stop.

The proposed Green line takes a different approach than the other bus lines. The other routes form a closed loop pathway, where the buses end at the same point they began their route without overlapping themselves. The Green line forms a bi-directional path, where it travels its route, turns around, and travels the same roadways in the opposite direction. The line consists of two of Tyler's three colleges – Tyler Junior College and University of Texas at Tyler – as well as several apartment complexes. It offers connectivity to the Red line along Flieshal Avenue and at the intersection of Shiloh Road and South Broadway Avenue. The Green line does not connect directly to any other bus line.

Overall, the Green line is 11 miles in one directional and 22 miles total length. It is recommended the Green line has no more than 36 bus stops to maintain an estimated headway of 105 minutes. In Alternative 2A, the Green line will operate with one bus. However when the system expands to a seven bus system in Alternative 2B, a second bus will be added to the line. Like the other multi-bus line, the two buses on Green line will be staggered along the route. Ideally the buses will remain equally spaced from one another through scheduling and two-way radio communication. With two buses on Green line, the average rider will experience a headway of roughly 50 minutes.

The proposed Yellow line is similar to the existing Blue (NW) line. It begins at the train depot and travels northwest along Gentry Parkway. Once it reaches Loop 323, the Yellow bus turns south and serves John Tyler High School. At the intersection of Loop 323 and Erwin, the route turns to the east. Using Lyons Road, the Yellow line jogs to Front Street where it continues east to Spring Avenue. Finally at Spring Avenue the bus turns north and turns to the train depot. The Yellow line will connect directly to the Red line at the train depot with an overlapping bus stop; however, direct access to the Blue and Green lines will not be provided.

Overall the Yellow line is 9 miles in length. It should have no more than 20 bus stops to maintain an estimated headway of 75 minutes. In Alternative 2A, the Yellow line will operate with one bus. However when the system expands to an eight bus system in Alternative 2B, a second bus will be added to the line. Like the other lines, the two buses on Yellow line will be staggered along the route. Ideally the buses will remain equally spaced from one another through scheduling and two-way radio communication. With two buses on Yellow line, the average rider will experience a headway of roughly 40 minutes at any bus stop.

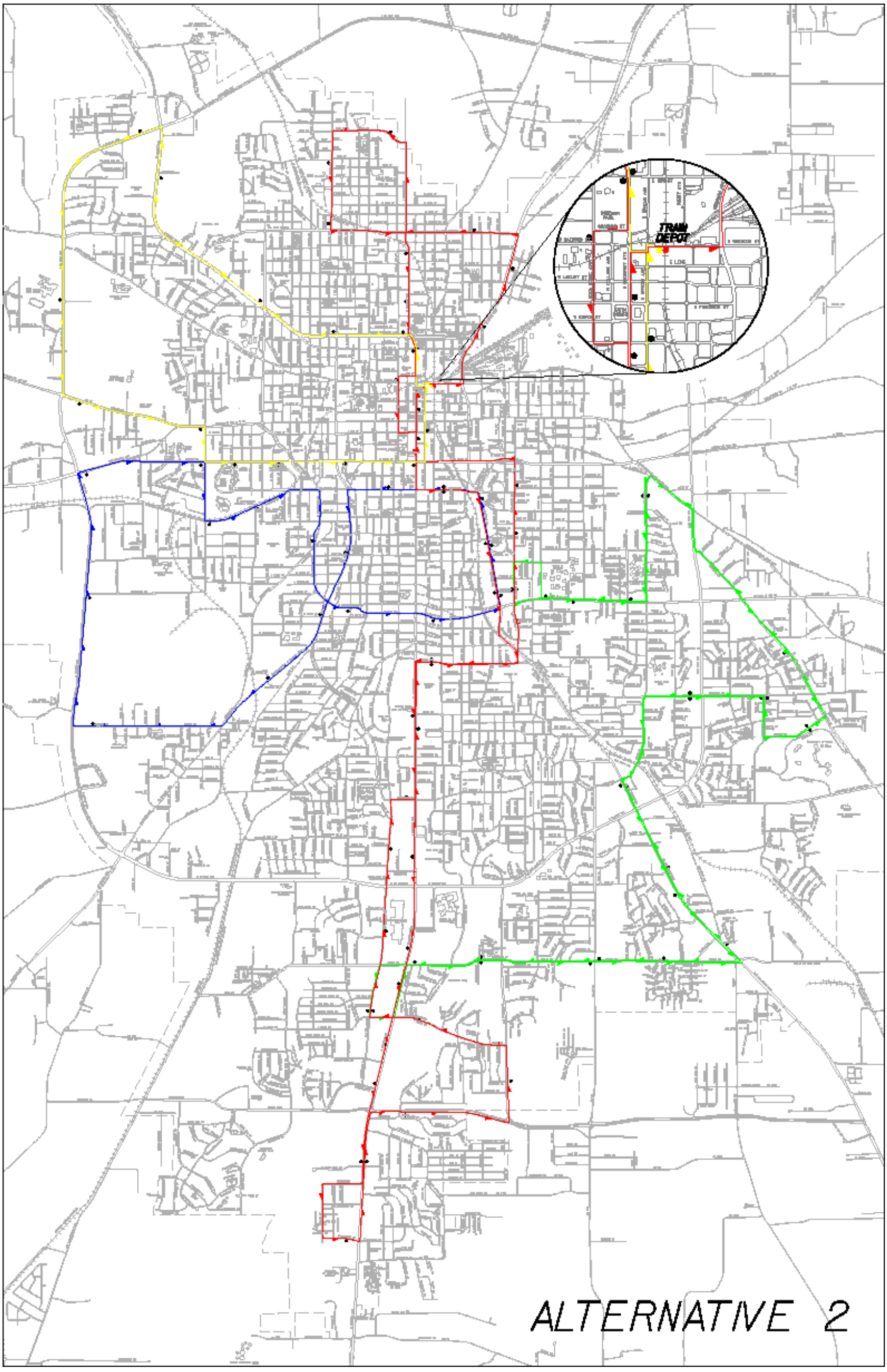


FIGURE 5-2 ALTERNATIVE 2

5.2 COMPARISON OF TRAVEL TIMES

Maintainable headways on individual lines are not enough to ensure a well functioning system overall. Many times riders require travel on multiple lines to reach their intended destination; therefore the different lines must work together in a way that overall travel time is kept to a minimum.

To measure the performance in getting riders to their destination via multiple bus lines, four different origins and destinations were identified. Their locations were selected by key city staff and are based on areas of high ridership within the City. The four routes there were analyzed are as follows.

- **UT Tyler to Carmike Theater.** The first trip involved a rider originating at the University of Texas at Tyler wanting to reach Carmike Theatre in South Tyler. A desired departure time of 2:00 PM was selected for analysis. This is one of two scenarios created to measure travel time for a leisure trip. Both alternatives offer better connectivity between the city's colleges/university and commercial developments. It is the desire of key staff members this better connectivity will encourage future ridership for more recreational purposes.
- **Glenwood Boulevard / Gentry Parkway to Hospital District.** The second trip involved a rider originating at the intersection of Glenwood Boulevard and Gentry Parkway. The intersection was identified because of its high existing ridership. The trip's destination was set in the hospital district along Beckham Avenue. Again, the existing boarding / alighting data showed high ridership in the area. This trip was clearly defined as a morning commute; therefore the departure time was set at 7:00 AM.
- **Tyler Junior College to Broadway Square Mall.** The third trip involved a rider originating at Tyler Junior College and wanting to reach the Broadway Square Mall in South Tyler. This is the second scenario designed to measure travel time for a leisure trip. The rider's desired departure time was set at 10:00 AM.
- **Downtown Tyler to Front Street / Lyons Drive.** The final trip involved a rider wishing to depart from downtown Tyler at 5:30 PM and travel to the intersection of Front Street and Lyons Drive. The trip is meant to capture the travel time of a typical evening commute. Both the origin and destination locations experience high existing ridership. Staff does not expect the ridership to change significantly at either location.

Preliminary timing plans were used to measure and analyze the travel time it took between each origin and destination. A comparison of travel times for each trip is shown in **Table 5-1**.

TABLE 5-1 COMPARISON OF TRAVEL TIMES

Trip	Alternative 1 (mins)	Alternative 2 (mins)
1 UT Tyler to Carmike Theater	60	60
2. Glenwood Boulevard and Gentry Parkway to Hospital District	45	105
3. Tyler Junior College to Broadway Square Mail	75	45
4. Downtown Tyler to Front Street and Lyons Drive	60	45

5.3 ALTERNATIVE DECISION MATRIX

After the two alternatives were developed a tool to compare and ultimately select a preferred alternative was needed. This study relied on a decision matrix as that tool. The decision matrix offered a way to systematically identify, analyze, and rate the strengths of each alternative. The completed matrix can be seen in **Table 5-2**.

Eleven performance measures were included in the final matrix. They are as follows:

- **Overall Average Headway.** Headway is a measurement of the distance/time between vehicles in a transit system. For a rider, it is the amount of time one must wait if he/she just misses the bus at a particular stop before the bus returns to that bus stop. Since actual headways can only be measured in the field after implementation, study evaluators derived a way to calculate the headway of each alternative for comparison purposes. For each alternative, the proposed routes were driven by bus and the total travel time was recorded. Next, time was allotted on each route for the anticipated stops (ie. delay) at future bus stops. An average time of two minutes was assigned to each proposed stop. To illustrate, in Alternative 1 it is recommended the Blue line has no more than 21 bus stops. Therefore the time associated with stopping at each of these proposed stops is 21 stops times 2 minutes or a total of 42 minutes. The calculation was carried out for each route in the two alternatives. Finally, an average of alternative headways was taken and recorded in the matrix.
- **Number of Buses to Operate.** This measure accounts for the number of buses needed to operate the proposed alternative. The city's current system runs using five buses. Both alternatives offers a five bus operating scenarios, but also have optimum plans using more buses. The expansion allows the city to increase its fleet numbers when additional funds are available.
- **Overall Bus Miles.** This measure lists the total distance traveled during one service cycle.
- **Mileage Cost.** According to city's staff, in 2009 the Transit department averaged a rate of $1.24 per mile for maintenance and expenses on its fix route system. Note the rate does not include driver salaries or fuel costs. This measure shows the maintenance costs and expenses associated with one service cycle through an alternative. For example, the mileage cost for Alternative 1 is roughly $100 per service cycle. If Alterative 1 is able to complete 10 service cycles within its hours of operation, the total daily cost the Transit department will accrue is $1,000 for Alternative 1.
- **Required Bus Drivers.** This measure shows the number of drivers needed to operate the system. The Transit department currently has two shifts of drivers – a morning and evening shift. The department plans to maintain two drivers per route in the future. No adjustments were made for substitute or part-time drivers.

- **Projected Ridership.** This was developed using the projected employment and population figures for the year 2020 for the City and the Transit Need Index for the route. Using the 2009 annual ridership numbers from Tyler Transit, a base ridership was determined that was proportional to the boarding and alighting observations that were made during the study. Next the base ridership numbers were reduced to compensate with the changes in the proposed alternatives versus the existing route. Depending on the route improvements and the increased headway for each line, the projections were increased proportionally. Additionally for each route had and increase in ridership based on the population, employment, and transit need index improvements. The increases were determined by calculating the amount of lane miles that crossed the different zones in each of the maps presented in Chapter 2. The ridership increases were proportional across the lines. If one line had a higher increase in population than another line, its ridership projection was increased more than the other.
- **Number of Bus Stops.** The total number of bus stops recommended for the system to maintain effective headways. Both alternatives offer significantly less bus stops than the existing system.
- **Service Area.** An area measurement that incorporates a quarter mile buffer on either side of the proposed routes. This area is defined as the walking distance a rider is likely to undertake to access transit services.
- **Major Employers within Service Area.** There are 19 major employers identified within the city limits. This measure shows the number of major employers able to access transit services.
- **Ease of Expansion.** The study's evaluators felt it was important a selected alternative had the ability to grow and expand with time. This measure shows if ease of expansion is available. Examples of expandable include the addition of bus stops, minor route changes, or minor schedule adjustments. To be considered positive, the changes must not require a complete system overhaul.
- **Transit Need Index.** Recently the Texas Transportation Institute (TTI) completed a report summarizing the findings of the East Texas Regional Coordination Transfer Study. In this report TTI identified block groups within Tyler's city limits and their need for transit. Many variables went into classifying the different areas. Classifications ranged from very low need for transit services and to areas with very high use of transit. For this study, TTI's colored block groups were superimposed onto both alternatives. Next, a weighted factor was applied to each color group. For example, areas classified by the dark green color indicated very low transit use and therefore received a weighted factor of 1. Areas classified by a dark red color indicated a very high need for transit services and therefore received a weighted factor of 10. Finally, the length of proposed route passing through each of these color blocks were measured and multiplied by the coordinating weighted factor. The end result is cumulative number that expresses the alternatives total transit need. A higher Transit Need Index number means more high need areas are being accessed in that alternative.

The identified measures are independent criteria intended to be evaluated on a line by line basis. However, the study's evaluators recognize certain overlap exist between the measures. For example, an alternative's mileage cost (Performance Measure 4) is directly related to its overall bus miles (Performance Measure 3). Note the relationship between measures was not a factor in the ultimate decision. Instead the alternatives ratings based on each criterion was compared to the existing system ratings.

TABLE 5-2 TRANSIT DECISION MATRIX

City of Tyler Transit Route Study
Alternative Evaluation

Criteria Number	Performance Measures	Existing Bus Routes (5-Bus System)	Alternative 1A (5-Bus System)	Alternative 1B (7-Bus System)	Alternative 2A (5-Bus System)	Alternative 2B (8-Bus System)
1	Overall Average Headway (minutes)	90	80	55	70	45
2	Number of Buses to Operate (each)	5	5	7	5	8
3	Overall Bus Miles (miles)	83	80	114	90	132
4	Mileage Cost ($ per service cycle, less driver salaries and fuel)	$102.92	$99.20	$141.36	$111.60	$163.68
5	Required Bus Drivers	10	10	14	10	16
6	Projected Ridership	245,141	263,890	270,800	248,800	261,350
7	Number of Bus Stops (each)	222	91	91	99	99
8	Service Area (sq miles)	41.6	25.7	25.7	23.8	23.8
9	Major Employers within Service Area (each)	8	8	8	8	8
10	Ease of Expansion	No	Yes	Yes	Yes	Yes
11	Transit Need Index	422	354	354	337	337

Legend
- Least Impact
- Greatest Impact

Prepared by: BWR Right in the Center

5.4 STUDY RECOMMENDATIONS

A considerable amount of effort was spent examining the current transit system and operations. Public surveys, key stakeholder meetings, and staff input exposed many of the system's strengths and weaknesses. The information gathered lead to the development of two route alternatives and several operational improvements. The following recommendations summarize the next steps the department should explore to better meet the community's needs and expectations.

- **Work Towards Adopting Alternative 1 Routes.** The decision matrix shows Alternative 1 provides several additional benefits over Alternative 2. The alternative is also similar to the existing transit system; meaning fewer changes are needed to implement Alternative 1 and therefore fewer inconveniences for the users. Although the service area is decreasing in Alternative 1 when compared to the existing system, the future ridership projections are actually higher. The reason for the increase ridership is because better efficiency. The proposed routes focus are areas with the most need resulting in a more attractive public transit system for those mostly likely to use the service. The routes are also designed to meet the proposed headways; creating a dependable system for its users.
- **Improve Amenities at Bus Stops.** This study inventoried all of the existing stops. It found the majority of the stops are comprised only of bus stop signs. Comments received from the stakeholders and public encouraged the City improve these stops and offer more amenities. Suggestions ranged from shelters at highly utilized locations to benches in lower ridership areas. Also, trashcans and transit route maps and schedules were suggested to make the stops more user-friendly. The Transit department is currently improving many of its bus stops. The department is focusing on the most utilized stops first and upgrading these stops with covered shelters, benches, and sidewalks. As funding is available they will continue to upgrade other bus stops.
- **Develop a Policy for the Establishment of Bus Stops.** Currently to establish a bus stop, transit staff evaluates the requests on a case by case basis and decides if a stop is warranted. This process has lead to a system with over 220 bus stops. The boarding observation study showed many of these stops are not longer utilized. When this study defined the proposed routes, it recognized the number of stops on each route has a significant impact on its achievable headway. To maintain the system's overall performance, the department should outline a set of criteria to establish a new bus stop. These requirements should define the spacing between stops and a threshold of ridership needed for a stop to be established. By managing its number of stops, the department should be able to maintain acceptable headways within its system.
- **Establish a Transit Advertisement Campaign.** Another public comment voiced by the key stakeholders and community was the need for a transit advertisement campaign. Many respondents did not know enough about the system to effectively use it. Some of the improvement strategies shared at the public meeting included:
  - Supplying a route map and bus schedule at each bus stop location and on the buses.
  - Color coded each bus stop sign by route so new patrons know what bus line they are about to board.
  - Develop a public awareness campaign to let residents know more about the City's transit transportation options.

- **Work Towards Establishing Broader Transit Service Beyond City Limits.** The City should work with the East Texas Council of Governments (ETCOG) to establish a broader transit network beyond the City limits of Tyler. Several individuals at the public meeting and stakeholder interviews expressed a desire to tie the City's transit system to other communities. While this study focuses on improving the system's current operations, thought should be given to how the system can become more interconnected. As the ETCOG strengths its regional bus system, the Transit department should work towards interfacing its system with a regional system to promote better service.