New System Design

Report of Findings

Prepared for

Metropolitan Tulsa Transit Authority

Prepared by

Perteet Engineering, Inc.

September 2003

Tulsa Transit
New System Design

Report of Findings

Prepared for

Metropolitan Tulsa Transit Authority

Prepared by

Perteet Engineering, Inc.

and

Carolyn Browne Associates

September 2003

This report was prepared and funded in cooperation with the U.S. Department of Transportation, Federal Transit Administration and the State of Oklahoma Department of Transportation

Acknowledgements

We wish to thank the following persons for their generous application of time and energy to ensure the successful completion of the Tulsa Transit New Service Design project.

Tulsa Transit Staff

Bill Cartwright, General Manager/CEO

Cynthia Staab, Director of Strategic Development

Howard Washington Manager of Planning

Doran Barnes, General Manager/CEO (2001-2003)

Steven Cox, Manager of Grants and Procurement

Becki Hefley, Senior Planner

Tulsa Transit Board of Directors

Brook D. Tarbel

Joe Fallin

Clay Bird

Sebastian Lantos

Phyllis Combs-Joseph

Gerald Rothlein

Wayne Bohannan (2001-2003)

Sharry White (2000-2002)

Stakeholders

Steve Sewell, Deputy Mayor

Susan Neal, Tulsa City Council

Sam Roop, Tulsa City Council

Joe Williams, Tulsa City Council

Richard Hedgecock, Congressman Sullivan's Office

Dr. James Hess, OSU Tulsa

Kevin Buck, University of Tulsa

Tom McKeon, Tulsa Community College

Dr. David Sawyer, Tulsa Public Schools

Jim Norton, Downtown Tulsa Unlimited

Tim Armer, INCOG

Jay Clemens, Tulsa Chamber of Commerce

Pete Patel, Hotel/Hospitality Association

Loy Calhoun, City of Sand Springs

Eric Wiles, City of Owasso

Dudley Thomas, Fixed Route Customer Advisory Committee

Table of Contents

Chapter 1: Overview 1

Project Overview 1

Background and Methodology 1

Chapter 2: Existing Conditions 4

Demographics 4
- Population Density 4
- Elderly 4
- Students/Youths 5
- The Disabled 6
- Low Income 7
- Automobile Ownership 8

Telephone Survey 8
- Definitions 9
- Major Findings 9
- Summary of Responses 10
  - Awareness of Transit Services 10
  - Experience with/Attitudes toward Tulsa Transit 10
  - Desired Tulsa Transit Improvements 10
  - Willingness to Try Transit 11
  - Willingness to Support Transit with Tax Dollars 11
  - Experience with Transit in other Cities 11
  - Demographics 12
- Detailed Survey Results and Supporting Tables 12
  - Awareness of Tulsa Transit Services 12
  - Desired Tulsa Transit Improvements 15
  - Experience with Transit Elsewhere 18
  - Demographics of Respondents 19

Significant Transit Sub-Markets 21
- Hotel/Motel Employees 21
- Hospital/Clinic Employees 22
- Employees of Other Major Employers 22

Chapter 3: Existing Transit Services 24

Service Provided 24

Ridership and Productivity 24

Chapter 4: Conceptual Design 26

Route Design Goals 26

Route Network Planning Guidelines 26

Route Design Priorities 28
- Grid Design 28
- Denver Avenue Station and Memorial Midtown Station 28
- Cost Parameters 29
- Regional Services and Governance 30
- Commuter vs. Baseline Services 30
- Major Employment Concentrations 30
- Design Priority 31

Table of Contents (continued)

Chapter 5: System Re-Design 32
Urban System (Tier 1) 32
Individual Fixed Routes 33
Route A: Suburban Acres 33
Route B: Yale Avenue / Apache Street 34
Route C: Peoria Avenue 35
Route D: Mingo Road 36
Route E: East 41st Street / Garnett Road 37
Route F: Admiral Place 38
Route G: Fast Track 39
Route H: 15th Street 40
Route I: Harvard Avenue 40
Route J: Memorial Drive 41
Route K: 31st Street 42
Route L: West Tulsa 43
Route M: Union Avenue / 71st Street 44
Route N: 11th Street 45
Route O: South Lewis Avenue / Jenks 46
Route P: Pine Street / Sheridan Road 47
Route Q: North Lewis Avenue 48
Route R: Gilcrease Museum / Newton Street 49
Route S: Charles Page Boulevard 49
Route T: West 41st Street 50
Route U: Eastland 51
Demand Response Service Zones 51
Service and Cost Summary 53
Suburban System (Tiers 2 and 3) 53
Individual Fixed Routes 54
Route AA: Catoosa (Tier 3) 54
Route BB: Owasso / Collinsville 55
Route CC: Skiatook (Tier 3) 57
Route DD: Broken Arrow / Coweta 58
Route EE: Sapulpa (Tier 3) 59
Service and Cost Summary 60
Additional Issues 61
System Governance 61
Local Transit Funding 62
Regional Planning Perspectives 62
Governance Models 62
Funding 63
Transit Market Priorities 64
Lower-Income Employees 64
Elderly and Disabled 64
College Students 64
High School and Middle School Students 65
Financial and Capital Plan 65
Service Hours Growth 66
Operating Costs 66
Fleet Expansion and Replacement 67
Ridership and Productivity 68

Table of Contents (continued)

Appendix A: Detailed Services and Costs A-1
Appendix B: Telephone Survey Questionnaire B-1

List of Figures

Figure 1: Tulsa Transit Fixed Route Ridership, 1992-2003 1
Figure 2: Tulsa Transit Network 2
Figure 3: Tulsa Transit Fixed Route Service Hours, 1992-2003 3
Figure 4: Population Density Distribution 5
Figure 5: Distribution of Elderly Residents 5
Figure 6: Distribution of Households with Children under Age 18 6
Figure 7: Disabled Resident Distribution 7
Figure 8: Distribution of Households with Incomes below the Poverty Line 7
Figure 9: Distribution of Households with No Automobiles 8
Figure 10: Distribution of Hotels/Motels in the Tulsa Metro Area 22
Figure 11: Distribution of Hospitals in the Tulsa Metro Area 23
Figure 12: Distribution of Major Employment Sites 23
Figure 13: Annual Tulsa Transit Fixed Route Productivity, 1992-2003 25
Figure 14: Recommended Tulsa Transit Urban System 32
Figure 15: Route A Alignment 34
Figure 16: Route B Alignment 35
Figure 17: Route C Alignment 36
Figure 18: Route D Alignment 37
Figure 19: Route E Alignment 38
Figure 20: Route F Alignment 39
Figure 21: Route G Alignment 39
Figure 22: Route H Alignment 40
Figure 23: Route I Alignment 41
Figure 24: Route J Alignment 42
Figure 25: Route K Alignment 43
Figure 26: Route L Alignment 44
Figure 27: Route M Alignment 45
Figure 28: Route N Alignment 45
Figure 29: Route O Alignment 46
Figure 30: Route P Alignment 47
Figure 31: Route Q Alignment 48
Figure 32: Route R Alignment 49
Figure 33: Route S Alignment 50
Figure 34: Route T Alignment 51
Figure 35: Route U Alignment 51
Figure 36: Recommended Demand Response Service Zones 52
Figure 37: Recommended Tulsa Transit Suburban Network 54
Figure 38: Catoosa Route Alignment 55
Figure 39: Owasso/Collinsville Route Alignment 56
Figure 40: Skiatook Route Alignment 57
Figure 41: Broken Arrow/Coweta Route Alignment 58
Figure 42: Sapulpa Route Alignment 60
Figure 43: Estimated Service Hours by Year, 2003 through 2024 66
Figure 44: Estimated Annual Operating Costs, Including Inflation, 2003 through 2024 66
Figure 45: Projected Fleet Requirements, 2003 through 2024 67
Figure 46: Estimated Ridership Growth, 2003 through 2024 68
Figure 47: Estimated Ridership Productivity, 2003 through 2024 68

List of Tables

Table 1: Awareness of Tulsa Transit 14
Table 2: Experience with and Attitudes Toward Tulsa Transit 15
Table 3: Most Desired Transit Improvements 16
Table 4: Most Desired Transit Improvements – Likely to Ride vs. Unlikely to Ride 16
Table 5: Attitudes toward Tulsa Transit Improvements 17
Table 6: Ratings of Ten Potential Improvements(Arranged in order of highest excellence ratings) ... 18
Table 7: Experience with Transit in other Cities 18
Table 8: Demographics of Respondents 20
Table 9: Demographics of Respondents (continued) 21
Table 10: Tulsa Transit Peer Group 29
Table 11: Route A Summary 34
Table 12: Route B Summary 35
Table 13: Route C Summary 36
Table 14: Route D Summary 37
Table 15: Route E Summary 38
Table 16: Route F Summary 38
Table 17: Route G Summary 39
Table 18: Route H Summary 40
Table 19: Route I Summary 41
Table 20: Route J Summary 42
Table 21: Route K Summary 43
Table 22: Route L Summary 43
Table 23: Route M Summary 44
Table 24: Route N Summary 46
Table 25: Route O Summary 47
Table 26: Route P Summary 48
Table 27: Route Q Summary 49
Table 28: Route R Summary 49
Table 29: Route S Summary 50
Table 30: Route T Summary 50
Table 31: Route U Summary 51
Table 32: Estimated Demand Response Zone Characteristics 52
Table 33: Urban Network Summary 53
Table 34: Catoosa Route Summary 55
Table 35: Owasso Route Summary 55
Table 36: Collinsville Extension Summary 57
Table 37: Skiatook Route Summary 58
Table 38: Broken Arrow Route Summary 58
Table 39: Coweta Route Extension Summary 59
Table 40: Sapulpa Route Summary 59
Table 41: Suburban Network Summary 61
Table 42: Estimated Fixed Route Fleet Replacement and Expansion Schedule, 2003-2024 67

Chapter 1: Overview

Project Overview

The New System Design project is intended to identify a modified design for Tulsa Transit's public transit service network in the Tulsa, Oklahoma region. That design is meant to serve as the basis for a revitalization of public transportation in the Tulsa region and to constitute an element of the City of Tulsa's larger plans to re-invigorate downtown Tulsa.

To that end, a preliminary system operation target budget was established at approximately $22 million annually for the fixed route (bus) urban system and an additional $6 million for the demand response system designed to meet the transportation needs of the disabled within the Tulsa Transit service area (see "Cost Parameters" on page 29.) This report documents the methodology and findings of the system redesign effort.

Background and Methodology

The project got underway in October 2002 as an attempt to modify the then-existing service network (see *Figure 2A*), which had evolved over a number of years in response to short-term service needs. The resulting network had become unnecessarily circuitous and difficult to understand, given the Tulsa region's straightforward grid street network.

Tulsa Transit ridership had fallen over the past few years after a period of moderate growth (*Figure 1*.) The national and regional economic downturn, which had been apparent since mid-2000, significantly reduced tax revenues, from which the City of Tulsa drew to provide a wide range of programs and services. As the economic recession deepened, City finances were particularly hard-hit, resulting in the need to significantly curtail a number of City programs. The public transportation system, competing with other City programs for funds, was faced with a significant revenue shortfall and the need to pare back services.

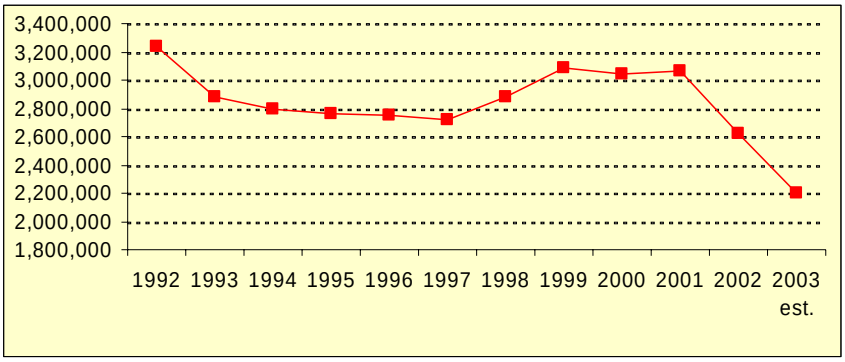
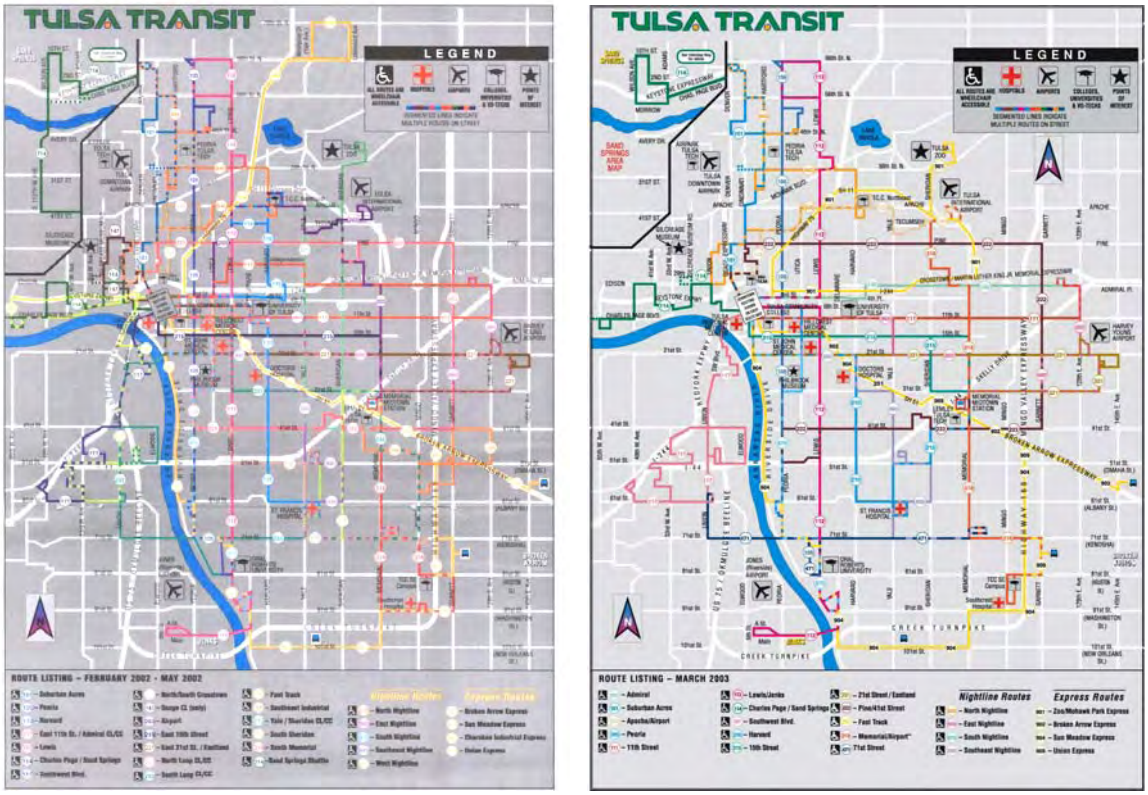


Figure 1: Tulsa Transit Fixed Route Ridership, 1992-2003

In 2002, the City of Tulsa embarked upon a visioning program, designed, in part, to redefine and redevelop Tulsa's downtown area. As part of this program, Tulsa Transit was looking to conduct a major restructuring and redesign of its service network. As originally conceived, the purpose of the New System Design project was to develop a new structure for the Tulsa Transit service network which could initially be operated with existing resources and which would accomplish the following objectives:

- To improve transit travel times to major transit destinations,
- To improve ridership and ridership productivity when compared to the then-existing Tulsa Transit network,
- To improve operating cost efficiency when compared to the then-existing Tulsa Transit network,
- To support and promote the urban initiatives included in the City of Tulsa's visioning process and
- To serve as the basis upon which to build an improved service network as available funding resources expanded in the future.



February 2002 August 2003

Figure 2: Tulsa Transit Network

As the project proceeded, continuing revenue shortfalls precipitated a series of service reductions in the Tulsa Transit system (see *Figure 3*) to the point at which a new service design was needed immediately to serve as the basis of a reduced Tulsa Transit service network. The consultant and Tulsa Transit staff met in December 2002 to analyze a number of approaches to reducing levels of service provided by Tulsa Transit while minimizing negative impacts to existing riders.

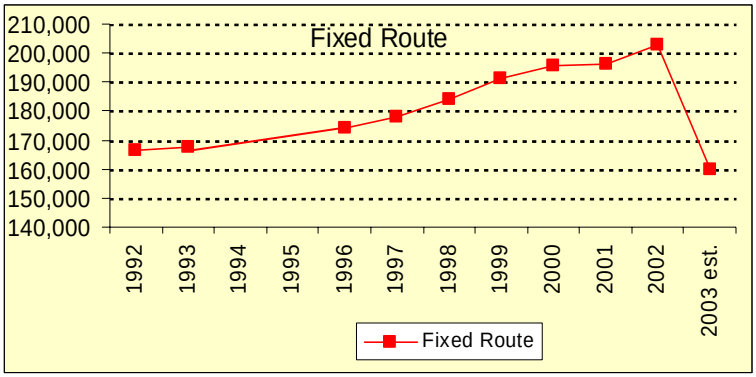


Figure 3: Tulsa Transit Fixed Route Service Hours, 1992-2003

A simplified Tulsa Transit network resulted from that analysis, (see Figure 2B) which retained services to important transit destinations, minimized the loss of services to significant geographic areas and simplified operations. The scaled-back network was then used as the starting point for the redesign of a more full-featured Tulsa Transit network for the future.

Chapter 2: Existing Conditions

A number of analyses of existing conditions were carried out to assist in the identification of important transit corridors in the Tulsa area. A number of those analyses are described in the following subsections.

Demographics

The demographics of the Tulsa urban area were derived from the outputs of the 2000 Census of Population. The initial publication of data from the 2000 Census was posted to the U.S. Census web page on the internet in early March 2003. From that information, a geographic database was created which identified regions of the Tulsa metropolitan area with high concentrations of a number of demographic sub-groups that have been identified as significant sources of transit riders. These regions included the following:

- Areas having a high proportion of households having no access to a private car or truck for personal transportation,
- Areas having a high proportion of households with incomes below the defined poverty level,
- Areas having a high proportion of elderly citizens,
- Areas having a high proportion of youthful (less than 16 years old) citizens,
- Areas having a high proportion of non-English-speaking individuals or households and
- Areas having a higher-than-average population density.

From this information were identified areas within the Tulsa metropolitan region having one or more of these characteristics. This information was plotted on maps of the region and then overlaid with maps of existing and proposed bus route alignments to make sure that transit dependent neighborhoods and groups were well-represented in the modified service network.

Population Density

Areas having the highest population densities represent the areas most efficiently served by fixed route transit services. With higher densities, transit riders can be efficiently served with larger buses operating along fixed route alignments and schedules. Population density distributions in the Tulsa region are shown in *Figure 4*.

Population densities in the Tulsa region tend to be rather low, making the provision of transit services more difficult. In addition, as the figure shows, areas having higher densities tend to be geographically dispersed and remote, often separated by other regions of significantly lower developmental densities.

Elderly

Elderly citizens are often included in the population groups having the highest propensity to use transit. This is due to a number of characteristics of this group. Many of the elderly are also included in the lower-income groups and follow the transit propensities of other members of low-income populations. In other cases, the driving abilities of many persons may deteriorate with advancing age, causing many elderly to drive less, or not at all.

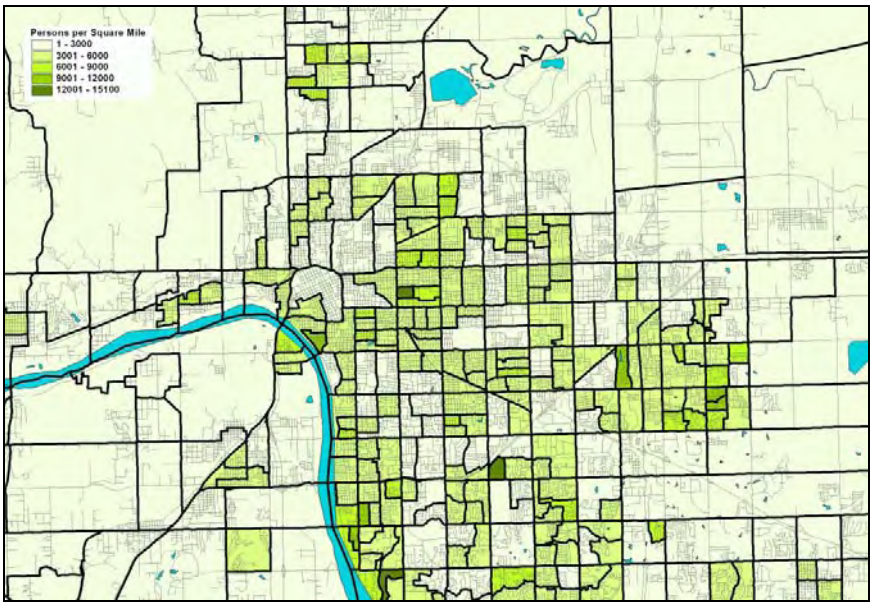


Figure 4: Population Density Distribution
Source: 2000 Census of Population

As *Figure 5* indicates, the elderly in the Tulsa region tend to live in areas that ring the downtown area but are geographically remote from the downtown. This geographic dispersion makes the provision of transit services to the elderly less efficient than would a more concentrated distribution of elderly residences.

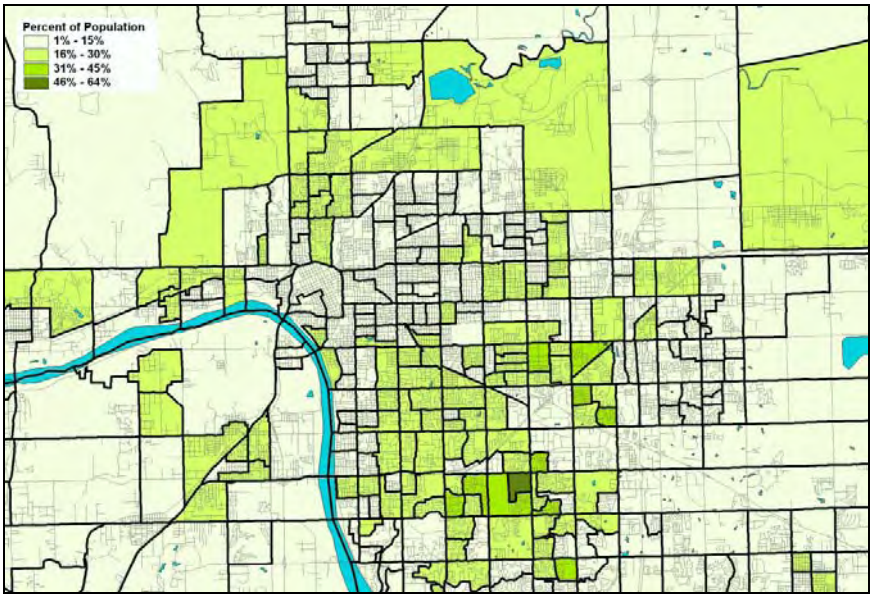


Figure 5: Distribution of Elderly Residents
Source: 2000 Census of Population

Students/Youths

In an automobile-dependent region such as Tulsa, the propensity to ride transit diminishes as the access to private automobiles increases. For youthful citizens who have not yet reached legal driving age, public transit constitutes the major alternative to walking or parent-provided

transportation. For this reason, areas with a high proportion of young residents offers a larger potential market for transit services.

To the extent that these persons are unable to access transportation from friends or relatives, they can make up a significant market for transit services. However, as age surpasses the minimum legal driving age, transit usage typically decreases significantly. The distribution of younger citizens is depicted in *Figure 6*.

Areas with the highest proportion of households with children tend to be located at the periphery of the Tulsa Transit service area, although most areas exhibit a relatively high proportion of such households.

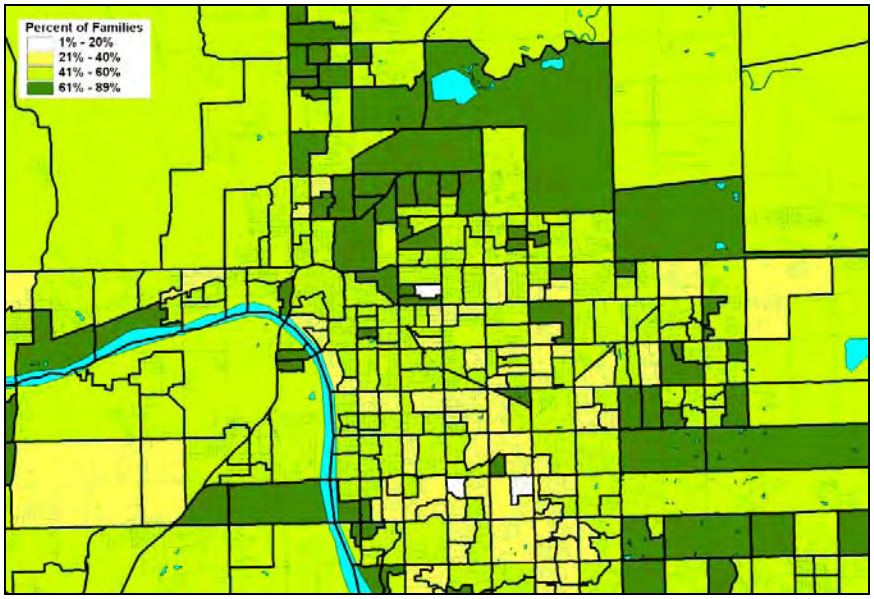


Figure 6: Distribution of Households with Children under Age 18
Source: 2000 Census of Population

The Disabled

Disabled persons constitute a major market for public transportation services. A significant proportion of disabled persons cannot, or do not, drive their own private vehicles. To the extent that reported disabilities are not too debilitating, many of these persons are riders of fixed route (bus) transit. The more severely disabled are generally confined to use of paratransit services.

As *Figure 7* indicates, those reporting having disabilities are clustered primarily in the downtown area and the regions immediately to the north and northeast of downtown. The region between downtown and Sand Springs also exhibits a higher-than-average incidence of disabled residents.

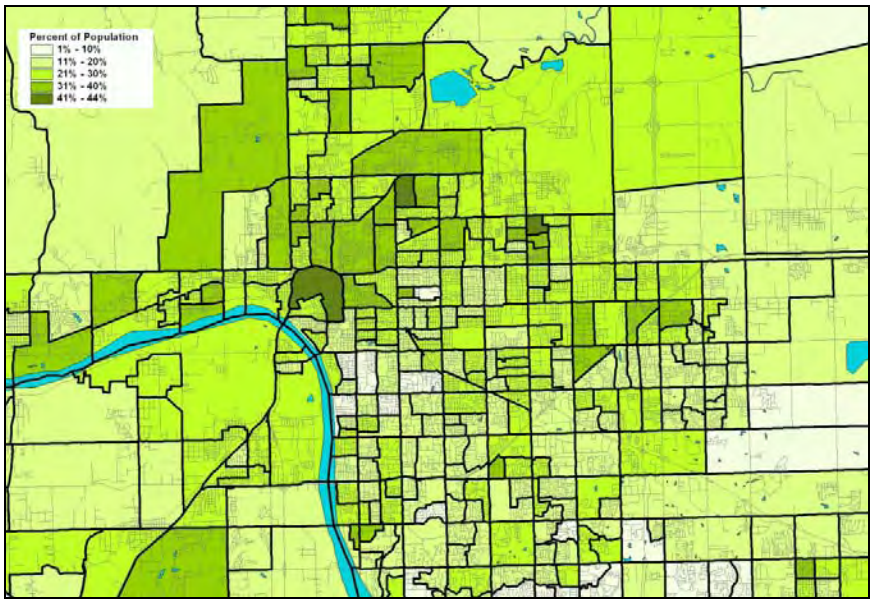


Figure 7: Disabled Resident Distribution
Source: 2000 Census of Population

Low Income

The ownership and operation of a private automobile represents a significant commitment of financial resources. For many households, this commitment represents an unsustainable demand on personal financial resources.

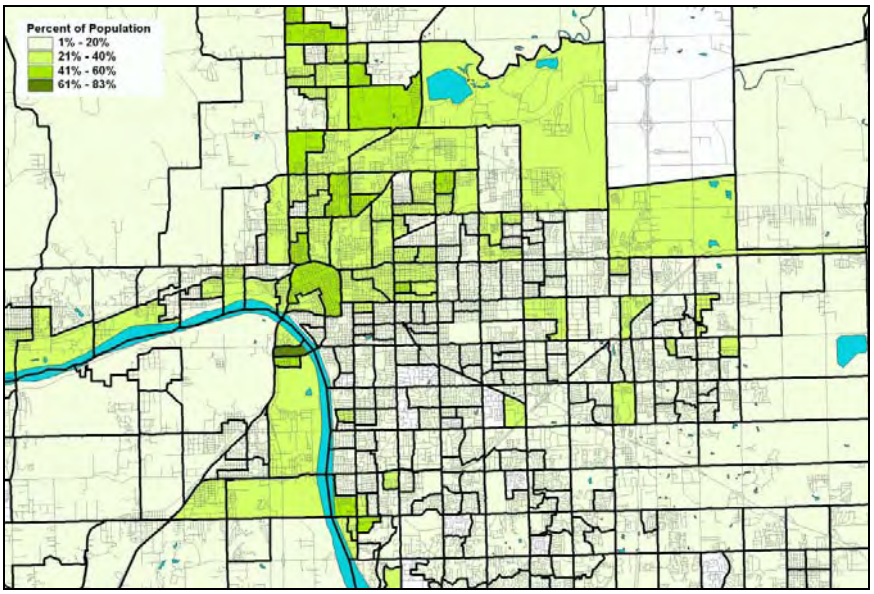


Figure 8: Distribution of Households with Incomes below the Poverty Line
Source: 2000 Census of Population

A significant proportion of members of households with incomes below the poverty line do not own, or have access to, an automobile. For these persons, public transit represents one of the few available transportation options.

Figure 8 depicts the distribution of households with incomes below the poverty level. These areas constitute major markets for transit services in the Tulsa region. As the figure shows, the lower-income regions of the Tulsa metropolitan area are concentrated in the region to the north and northeast of downtown Tulsa. A significant concentration also occurs in west Tulsa, across the Arkansas River to the south of the central business district.

Automobile Ownership

Individuals having no access to a private automobile, for whatever reason, are the largest component of transit dependent riders. In many municipal systems, such persons often make up 70% or more of all transit riders. Although the Tulsa region has developed with a high dependency on the private automobile, there is a significant population of persons who do not have access to one for much of their tripmaking.

In general, the areas with the lowest incidence of automobile ownership occurred in the area surrounding the Tulsa downtown core and isolated areas to the north and east of the downtown area as well as in West Tulsa, just across the Arkansas River from downtown.

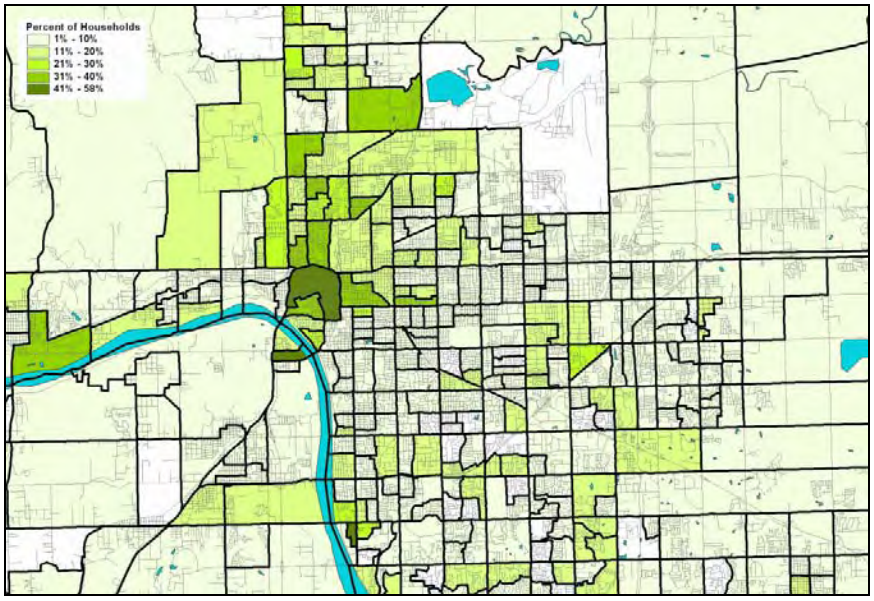


Figure 9: Distribution of Households with No Automobiles
Source: 2000 Census of Population

In addition, such demographic conditions were also found in scattered areas corresponding to the location of a number on senior citizen and low-income housing developments. The distribution of areas exhibiting a low incidence of automobile ownership is shown in *Figure 9*.

Telephone Survey

As part of the analysis of the existing transit network, a survey identifying the perceptions and attitudes about transit among residents of Tulsa was undertaken in December 2002. Telephone interviews were conducted with 201 randomly selected male and female heads of household residing within the city limits of Tulsa. Interviewers were instructed to speak with a head of household and to target about the same proportion of men and women. The 8 to 10-minute interview included questions about travel patterns, attitudes toward public transportation in

general and toward Tulsa Transit. Demographic data for the respondent and his or her household was also collected.

The sample of Tulsa residents was obtained by randomly selecting names from the current local phone directory for the area. The random sample of 201 households provides data that may be projected to the total population from which it is drawn with an error range of +/- 7% and a 95% confidence level.

Definitions

Tables include the total sample of Tulsa residents completing the survey, ("Total Sample"). In addition, there were significant differences in the responses of those who said they would be very or somewhat likely to ride Tulsa Transit, or to use the system more if improvements were made (for simplicity called "Likely to Ride"), compared with those who were somewhat or very unlikely to ride the bus ("Unlikely to Ride").

For purposes of clarity, the following terms, shown in boldface, are used in this report:

Total sample/total residents – all of the Tulsa residents who qualified and were interviewed for this survey.

Likely to ride – respondents who said they would be very or somewhat likely to use the bus system, or to use it more, if some specific improvements were made.

Unlikely to ride – respondents who said they would be somewhat unlikely or very unlikely to use the bus system, even if improvements were made.

Detailed Survey Results include tables that document the information contained in each section. Detailed Survey Tabulations, which include cross-tabulations of the survey questions, are in a separate, bound volume at the Tulsa Transit offices in Tulsa. A copy of the survey questionnaire is found in Appendix B.

Major Findings

A significant majority (88%) of those surveyed believe that "a good public transportation system is important to the economic vitality of the area." Over one-half (52%) of those surveyed said they would be somewhat or very likely to vote for funding to provide transit improvements.

Two-thirds (65%) of those surveyed can correctly name the Tulsa Transit system, but only 10% have someone in the household who has used Tulsa Transit within the last six months.

The greatest single reason Tulsa residents believe that someone uses transit is because they have no choice (64% of the respondents).

Just over one-third (34%) have experience using transit in other cities in the previous five years; and 41% say they have ridden light rail in another city.

Nearly one-half (46%) have no opinion about rating the Tulsa Transit system. Of those with an opinion, people are generally split into thirds: about a third each give the system top (5 or 4); average (3); or poor (2 or 1) ratings.

Respondents supported many suggested improvements for Tulsa Transit, but they were most enthusiastic about the following:

- More bus shelters and benches
- Express service to major employers
- Service to outlying areas
- Better route and schedule information
- Light rail transit where feasible
- More frequent bus service

Summary of Responses

Awareness of Transit Services

Nearly two-thirds (65%) could provide the correct name for the local bus system. Most people (64%) say they are four or more blocks from a bus stop, have no bus available, or simply do not know where a bus stop is in relation to where they live.

Asked to rank Tulsa Transit on a 5-point scale where 5 is "excellent" and 1 is "very poor," nearly half (46%) of those interviewed have no opinion. Of those who have an opinion, the responses were fairly evenly divided: one-third give the system top (5 or 4) ratings; one-third give it an average (3) rating; and the remaining third give it low (2 or 1) ratings.

Nearly everyone (88%) agrees that a good public transportation system is important for the economic vitality of the area.

Experience with/Attitudes toward Tulsa Transit

Just 10% of the Tulsa residents surveyed have someone in their household who has ridden Tulsa Transit in the past six months, and all of these people are included in the ***Likely to Ride*** respondents.

More than half (58%) have no opinion about whether bus service is better or worse today compared with five years ago. Of those who do have an opinion, twice as many respondents believe service is better, rather than worse (17% vs. 8%), with the remainder (17%) saying service is about the same.

Most of the respondents (64%) believe that those who use transit have no choice. Other major reasons given for transit usage include: saves money (29%); and it is convenient for those who use it (19%).

Desired Tulsa Transit Improvements

Respondents were given a list of 12 possible transit system improvements and asked to rank them on the 5-point scale. Seven of the 12 were given top rankings (5 or 4) by a majority of the respondents:

More bus shelters and benches	69%
Express service to major employers	67
Service to outlying areas	63
Better route and schedule information	56
Make the bus system easier to understand	55
Light rail transit where feasible	54
More frequent bus service	53

The items having the least support included:

- Sunday service 49%
- Weekday bus service after 7PM 48
- Saturday bus service after 6 PM 44
- A route closer to your home 41
- A route closer to your job or school 40

Those ***Likely to Ride***, compared with those ***Unlikely to Ride*** Tulsa Transit have somewhat different priorities for transit improvements. Overall, those Likely to Ride are far more supportive of all of the suggested improvements.

A majority of both the Likely and Unlikely to Ride are in agreement that the three most important improvements to encourage more ridership are: 1) more bus shelters and benches, 2) express service to major employers, and 3) service to outlying areas.

Improvement	Likely to Ride	Unlikely to Ride
More bus shelters and benches	80%	59%
Express service to major employers	70	63
Service to outlying areas	68	58
Make the bus system easier to understand	44	44
Better route and schedule information	66	46
More frequent bus service	66	41
Light rail transit where feasible	60	48
A route closer to your job or school	56	25
Sunday service	55	43
Weekday bus service after 7PM	55	41
Saturday bus service after 6 PM	53	35
A route closer to your home	50	32

Willingness to Try Transit

Nearly one-half (48%) of those surveyed say they are very (15%) or somewhat likely (33%) to begin riding Tulsa Transit if the improvements they believe are important are made; an additional 12% say they are somewhat unlikely; and 40% say they are very unlikely to use transit.

Willingness to Support Transit with Tax Dollars

Just over half (52%) say they are very (16%) or somewhat likely (36%) to vote for some increase in taxes to fund the transit improvements they believe are important. Those who are Likely, compared with those Unlikely to Ride are nearly twice as likely to be willing to fund transit improvements (69% vs. 37% respectively).

Experience with Transit in other Cities

About one-third (34%) of the Tulsa residents surveyed have used public transit in other cities, and 41% have had experience with light rail transit in another city.

Demographics

Employment

Of the total respondents, 42% are employed at full-time jobs and 6% have part-time jobs; 4% are full-time students; and the remaining 48% are retired, homemakers, or not employed. Most Tulsa residents who commute (78%) spend 20 minutes or less each way traveling to work or school; and 40% spend 10 minutes or less. The great majority (83%) of commuters travel alone in their vehicle. Most (86%) do not pay for parking.

Age

Of the total respondents, 16% are under 35 years of age; 36% are 35 to 54; and 48% are 55 and over. Those most Likely to Ride tend to be under 55 years of age (65% vs. 40% of those Unlikely to Ride.

Children in the household

Forty-four percent (28%) have at least one child under 18 in the household.

Gender of respondent

Fifty-eight percent (58%) of the respondents are female and 42% are male.

Vehicle ownership

The great majority (94%) of Tulsa residents have at least one working car or truck; and 65% have two or more working vehicles.

Difficulties with mobility or transit access

Twelve percent (12%) have a member of the household with a health condition that makes it difficult for them to travel in the local area. Nine percent (9%) had someone in the household who had experienced difficulty seeking employment because there was no transportation available.

Eighteen percent (18%) reported that someone in their household had been stranded because no transportation was available. Those who experienced more difficulties with transit access are more likely to say they are willing to ride Tulsa Transit if improvements are made:

Lack of available transportation for a job: 16% vs. 2%
Problem being stranded: 26% vs. 11%

Detailed Survey Results and Supporting Tables

Awareness of Tulsa Transit Services

Two-thirds (65%) of the Tulsa residents surveyed correctly identified the name of the local transit system. Those who are Likely to Ride have a somewhat higher awareness level than those who are Unlikely to Ride (74% vs. 57%).

A majority of those surveyed (64%) believe they do not have easy access (three blocks or less) to a bus stop. Just over one-third (36%) say they live three blocks or less from a Tulsa Transit

bus stop. Those who are Likely to Ride, compared with those Unlikely to Ride, have greater access to service (45% vs. 28% say they live three blocks or less from a bus stop).

Nearly half of the respondents (46%) have no opinion when it comes to rating the Tulsa Transit system. Some 18% gave it a high (5 or 4) rating on the 5-point scale; 20% gave it an average (3) rating, and 16% gave it low ratings (2 or 1). Twice as many of those who are Likely to Ride, compared with those Unlikely to Ride, have an opinion about the system (70% compared with just 39%). The Likely riders give somewhat higher ratings (23% rate the system a 5 or 4 compared with 14% of the Unlikely riders), but also express greater levels of dissatisfaction with the service (22% compared with 10% of the Unlikely Riders give the system a 2 or 1 rating).

Nearly nine out of 10 (88%) Tulsa residents surveyed say they agree that a good public transportation system is important to the economic vitality of the area. Among those Likely vs. Unlikely to Ride, the belief is even stronger (95% vs. 82%, respectively).

Of those surveyed, only 10% said that someone in their household used Tulsa Transit within the past six months. All of those who had a rider in the household in the previous six months are Likely to Ride respondents. The majority (58%) of those who had ridden Tulsa Transit had done so in the previous month.

Most people surveyed (58%) had no opinion about the bus services provided by Tulsa Transit; this was especially true for those who are Unlikely to Ride (73% vs. 42% of those who are Likely to Ride). Of those with an opinion, twice as many rated the bus service better rather than worse (17% vs. 8%), and the rest believe that service is about the same (17%). When the “Don’t know” responses are removed, the numbers become very small for drawing statistically sound conclusions, but they tend to indicate that those who are Likely to Ride, compared with those Unlikely to Ride, have a somewhat less favorable impression of the transit system today, compared with five years ago.

By far, the greatest single reason given for why people in Tulsa are using transit is because they have no choice (64%). Other reasons suggested: saves money and is cheaper than driving a car (29%); the bus is convenient for them to use (19%); avoids traffic hassles (9%); benefits the environment (8%); and people don’t like to drive a car (7%).

Question	Total Sample (Base=201)	LikelyTo Ride (Base=98)	UnlikelyTo Ride (Base=103)
Q1. What is the name of the local bus service in the Tulsa area?			
Tulsa Transit/ Metropolitan Tulsa Transit Authority/MTTA	65%	74%	57%
Other suggestions	2	1	3
Don't know	33	25	40
Q2. How many blocks do you live from the nearest bus stop?			
Less than 1 block	8%	10%	6%
1 block	8	11	5
2 blocks	12	16	10
3 blocks	8	8	7
4 to 7 blocks	14	13	14
No bus available	29	30	29
Don't know	21	12	29
Q3. On a 5-point scale, where 5 is excellent and 1 is poor, how would you characterize the existing Tulsa Transit System?			
5	6%	7%	5%
4	12	16	9
3	20	25	15
2	7	10	5
1	9	12	5
Don't know	46	30	61
Q11. Is a good public transportation system important for the economic vitality of the area?			
Yes	88%	95%	82%

Table 1: Awareness of Tulsa Transit

Question	Total Sample (Base=201)	LikelyTo Ride (Base=98)	UnlikelyTo Ride (Base=103)
Q4a. Have you, or anyone in your household, used the Tulsa Transit System within the last six months?			
Yes	10%	21%	*
Q4b. How recently was the Tulsa Transit system used? (Base = 21)			
Within the last week	29%	*	*
One week to one month ago	29	*	*
Two to three months ago	29	*	*
More than three months ago	14	*	*
Q5. Compared with the bus service provided by Tulsa Transit five years ago, would you say that the bus service today is better, worse, or about the same?			
Better	17%	19%	14%
Worse	8	13	4
About the same	17	26	9
Don't know	58	42	73
Q12. What do you believe are the reasons that people in Tulsa are using the bus system? (Multiple, open-end responses; does not add to 100%)			
No choice (no vehicle)	64%	58%	70%
Saves money; cheaper than a car	29	35	24
Convenient for them to use	19	25	15
Avoids traffic hassles	9	12	6
Benefits the environment	8	7	8
Don't like to drive a car	7	7	7
Don't know	5	2	8

Table 2: Experience with and Attitudes Toward Tulsa Transit

Desired Tulsa Transit Improvements

Respondents were asked to rate 12 potential transit improvements for Tulsa Transit on a 5-point scale, where 5 is "very important" and 1 is "not at all important." Seven of the 12 received top (5 or 4) ratings:

Improvement	Percent
More bus shelters and benches	69%
Express service to major employers	67
Service to outlying areas	63
Better route and schedule information	56
Make the bus system easier to understand	55
Light rail transit where feasible	54
More frequent bus service	53

Table 3: Most Desired Transit Improvements

When the responses of those who are Likely to Ride are compared with those Unlikely to Ride, every item mentioned is considered of high importance to those who are likely, while for those who are unlikely, only the first three items are ranked high by a majority.

Improvement	Likely to Ride	Unlikely to Ride
More bus shelters and benches	80%	59%
Express service to major employers	70	63
Service to outlying areas	68	58
Better route and schedule information	66	46
Make the bus system easier to understand	67	44
Light rail transit where feasible	60	48
More frequent bus service	66	41
Sunday service	55	43
Weekday bus service after 7PM	55	41
Saturday bus service after 6 PM	53	35
A route closer to your home	50	32
A route closer to your job or school	56	25

Table 4: Most Desired Transit Improvements – Likely to Ride vs. Unlikely to Ride

When respondents were asked how likely it would be for them to ride Tulsa Transit or to use the bus system more often, 15% said they would be "very likely" and 33% said they would be "somewhat likely." In other words, nearly one-half of those surveyed (48%) feel positive about using the bus system if certain improvements are made.

Just over half (52%) of the Tulsa residents surveyed appear willing to provide financial support for improvements to the transit system. When asked about how likely they would be to vote for some increase in taxes to cover the cost of the improvements they feel are most important, 16% said they would be "very likely" and 36% said they would be "somewhat likely" to do so. Support is considerably higher for the Likely, compared with those who are Unlikely to Ride (69% vs. 37% are very or somewhat likely to vote for some increases in taxes to pay for improvements).

Question	Total Sample	LikelyTo Ride	UnlikelyTo Ride
Q6. Proportion giving a 5 or 4 rating on the 5-point scale, where 5 is very important and 1 is not at all important, for each suggested improvement? (Arranged in order of highest ratings)			
More bus shelters and benches	69%	80%	59%
Express service to major employers	67	70	63
Service to outlying areas	63	68	58
Better route and schedule information	56	66	46
Make the bus system easier to understand	55	67	44
Light rail transit where feasible	54	60	48
More frequent bus service	53	66	41
Sunday service	49	55	43
Weekday bus service after 7PM	48	55	41
Saturday bus service after 6 PM	44	53	35
A route closer to your home	41	50	32
A route closer to your job or school	40	56	25
Q8. If some of the improvements that are most important to you were made, how likely would you be to begin riding Tulsa Transit or to ride it more often?			
Very likely	15%	32%	--
Somewhat likely	33	68	--
Somewhat unlikely	12	--	22%
Very unlikely	40	--	78
Q9. How likely would you be to vote for some increase in taxes to fund the improvements most important to you?			
Very likely	16%	21%	12%
Somewhat likely	36	48	25
Somewhat unlikely	15	13	17
Very unlikely	28	14	41
Don't know	5	4	5

Table 5: Attitudes toward Tulsa Transit Improvements

Potential Bus Improvements	Very important----------Not important					
	5	4	3	2	1	Don't Know
More bus shelters and benches	45%	24%	13%	3%	10%	5%
Express service to major employers	44	23	15	7	5	6
Service to outlying areas	40	23	17	5	6	9
Better route and schedule information	31	25	20	5	8	11
Make the system easier to understand	35	20	17	6	9	13
Light rail transit where feasible	35	19	16	9	16	5
More frequent bus service	33	20	18	8	9	12
Sunday service	29	20	25	5	15	6
Weekday bus service after 7PM	25	23	20	13	13	6
Saturday bus service after 6 PM	26	18	17	15	16	8
A route closer to your home	27	14	11	14	30	4
A route closer to your job or school	26	14	10	14	27	9

Table 6: Ratings of Ten Potential Improvements(Arranged in order of highest excellence ratings)

Experience with Transit Elsewhere

Just one-third (34%) of the Tulsa residents surveyed say they have used public transit in another city in the last five years. Likely, compared with Unlikely to Ride respondents, are somewhat more inclined to have had transit experience elsewhere (39% vs. 29%).

Question	Total Sample (Base=201)	LikelyTo Ride (Base=98)	UnlikelyTo Ride (Base=103)
Q10a. Have you used public transit in any other city in the last five years?			
Yes	34%	39%	29%
Q10b. On average, about how many times a year have you ridden on public transportation in another city in the last five years?			
	(Base = 68)	**(Base = 38)**	**(Base=30)**
Once or twice a year	71%	61%	83%
One to four times a year	16	24	7
Five times a year or more	13	15	10
Q10c. Have you ridden light rail transit in another city?			
Yes	41%	40%	42%

Table 7: Experience with Transit in other Cities

Of those who ride transit in other cities, most (71%) do so just once or twice a year, on average. Those Likely to Ride, compared with those Unlikely to Ride, have ridden on other

public transit systems (24% vs. 7%) one to four times per year. Four out of 10 respondents (41%) say they have had experience riding a light rail system at some time in the past.

Demographics of Respondents

Employment

Forty-two percent (42%) of those surveyed are employed full time; an additional 6% work part time; 4% are full-time students; 6% are unemployed; 37% are retired; and 5% are homemakers. Those who are Unlikely, compared with those who are Likely to Ride have a much higher incidence of people who are retired (47% vs. 28%, respectively).

Commute patterns

Most of those who are employed have relatively short commute times. Over three-fourths (78%) travel 20 minutes or less each way to work or school, and 40% have a commute time of 10 minutes or less. Those who are Likely to Ride have longer commute times than those who are Unlikely to Ride (32% vs. 9% have commute times of 20 minutes or more.

Most of those who commute drive alone to work or school (83%); 7% work at home; 6% drive or ride with someone else; 3% take a bus; and 1% walk. Only 16% of those who drive have to pay for parking.

Age of respondent

Of those surveyed, 16% are under 35; 36% are 35 to 54; and 48% are 55 and over. Those most likely to ride tend to be under 55 years of age (65% vs. 40% of those Unlikely to Ride).

Children in the household

Forty-four percent (28%) of those surveyed have children under 18 in the household.

Gender of respondent

Fifty-eight percent (58%) of the respondents are female and 42% are male.

Cars/Trucks in the household

Most (94%) Tulsa residents surveyed have at least one working car or truck in the household, and 65% have two or more working vehicles.

Difficulties finding transportation

Asked if anyone 5 years of age or older in the household has a health condition that makes it difficult for them to travel in the local area, 12% said “yes.”

Nearly one in 10 (9%) said that someone in the household had experienced difficulty seeking employment because there was no transportation available. This was true for 16% of those Likely to Ride, but for only 2% of those who are Unlikely to Ride.

Eighteen percent (18%) said that someone in the household had been stranded because no transportation was available. Of those Likely to Ride, 26% had experienced this problem compared with only 11% of those Unlikely to Ride.

Question	Total Sample (Base=201)	Likely to Ride (Base=98)	Unlikely to Ride (Base=103)
Q13a. Employment status			
Employed full	42%	47%	40%
Employed	6	5	6
Full-time	4	7	--
Unemployed	6	7	4
Retired	37	28	47
Homemaker	5	6	3
Q13b. How long does it take you to travel one way to work or school? Of those employed or students)			
	(Base = 103)	(Base = 57)	(Base = 46)
10 minutes or	40%	26%	58%
11 to 20	38	42	33
More than 20	22	32	9
Q13c. How do you usually travel to work or school?			
Drive alone	83%	82%	85%
Work at	7	4	11
Drive with	6	9	2
Bus	3	5	--
Walk	1	--	2
Q13d. Do you pay for parking at or near your work or school?			
	(Base = 89)	(Base = 51)	(Base = 38)
Yes	16%	18%	13%
Q14. Age			
Under 35	16%	20%	13%
35 – 44	14	19	9
45 – 54	22	26	18
55 – 64	16	10	21
65 and older	32	25	39
Q15. Children			
Yes	28%	39%	18%

Table 8: Demographics of Respondents

Question	Total Sample (Base=201)	Likely to Ride (Base=98)	Unlikely to Ride (Base=103)
Gender of respondent			
Female	58%	53%	62%
Male	42	47	38
Q19. How many cars or trucks are in working condition in your household?			
None	6%	8%	4%
One	29	24	32
Two	41	39	44
Three or more	24	29	20
Q16. Is there any member of your household 5 years of age or older who has a health condition that makes it difficult for them to travel in and around the local area.			
Yes	12%	14%	10%
Q17. Is there any member of your household that has ever had difficulty seeking employment because there was no transportation available?			
Yes	9%	16%	2%
Q18. Has anyone in your household ever been stranded because there was no transportation available?			
Yes	18%	26%	11%

Table 9: Demographics of Respondents (continued)

Significant Transit Sub-Markets

One of the keys to minimizing the impacts of system operating changes on existing riders is to make sure that existing transit rider groups continue to have their needs met by the modified transit network. Currently, a number of lower-income commuter groups make up a significant proportion of Tulsa Transit riders.

Hotel/Motel Employees

Many existing employees of the hospitality industry are current Tulsa Transit riders. These riders regularly commute to entry-level jobs in the hotels and motels in the greater Tulsa area. Typically, these riders are included in the housekeeping staffs of these employers and a large proportion of them are not fluent in the English language.

Figure 10 depicts the locations of major hotels and motels in the metro Tulsa area. It is important, in the development of a modified network design, to maintain access to these employment sites.

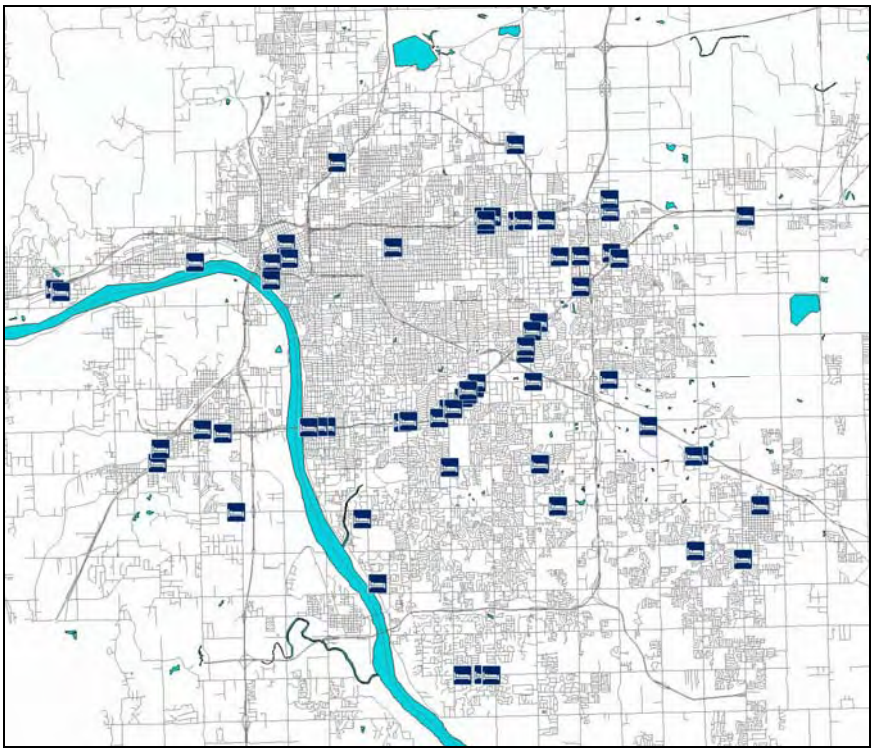


Figure 10: Distribution of Hotels/Motels in the Tulsa Metro Area
Source: INCOG

Hospital/Clinic Employees

A second major commuter group represented among Tulsa Transit riders is the healthcare industry. As with hospitality industry employees, many of these commuters are employed in lower-income entry-level jobs that pay wages that restrict the ability to own and/or operate a private automobile.

These commuters come from similar population groups to the hospitality industry workers and tend to live in similar areas of the region. The distribution of hospitals in the Tulsa metro area is depicted in *Figure 11*.

Employees of Other Major Employers

In addition to the hotels and hospitals in the region, there are a number of other major employers whose employees represent a significant proportion of Tulsa Transit riders. It is important that transit access to these major employment locations be maintained for the convenience of existing Tulsa Transit commuters. The distribution of these major employers (100 or more employees) is depicted in *Figure 12*.

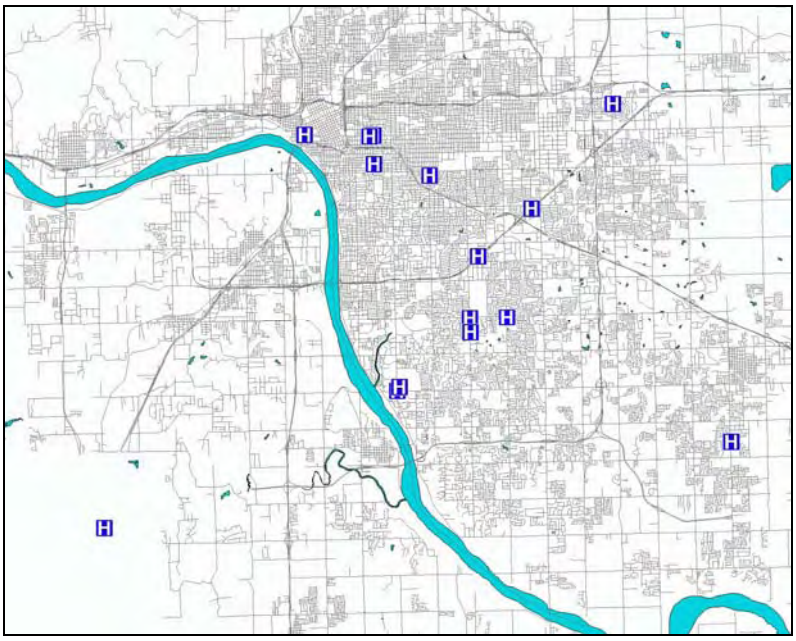


Figure 11: Distribution of Hospitals in the Tulsa Metro Area
Source: INCOG

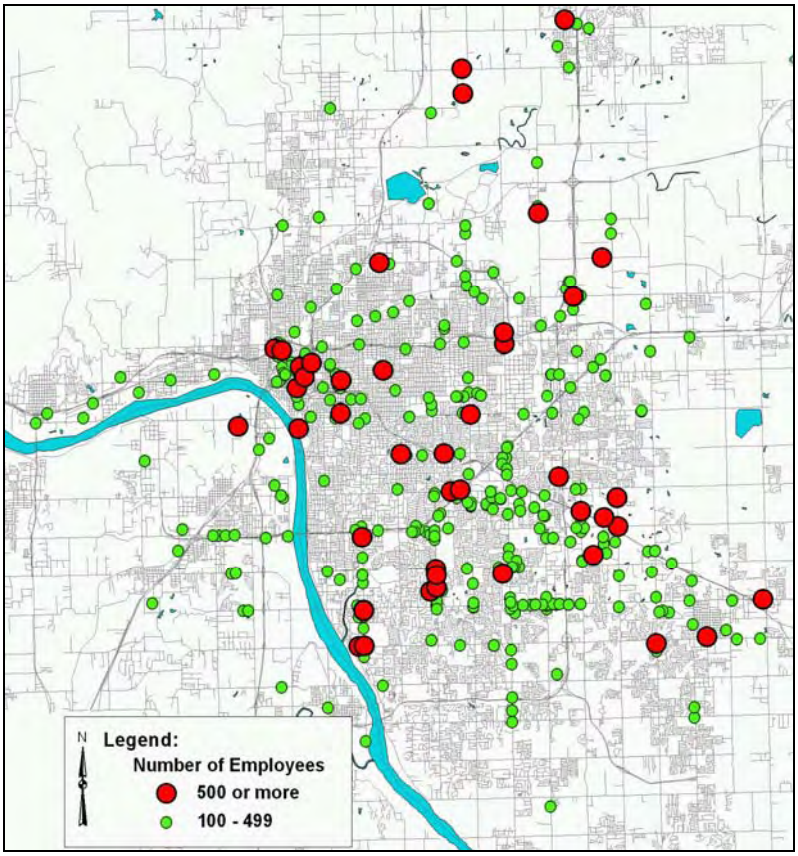


Figure 12: Distribution of Major Employment Sites
Source: INCOG

Chapter 3: Existing Transit Services

Service Provided

Over the past several years, service provided by Tulsa Transit grew at a modest rate, from approximately 175,000 annual service hours in 1996 to about 200,000 service hours in 2002. *Figure 3* on page 3 shows the trend in service hours provided between 1992 and 2003.

The nation-wide economic downturn that began in mid- to late-2000 resulted in the collection of significantly reduced tax revenues by the City of Tulsa beginning in late 2001. By 2002, a series of service cutbacks was mandated by the diminishing tax revenue collections.

Those service cutbacks necessitated a re-evaluation of the service network in order to avoid service reductions which would impact any individual rider subgroup disproportionately or which would undermine the integrity of the service network as a whole. To that end, a modified service network was developed by Tulsa Transit staff, with input from Perteet Engineering, which avoided the most egregious impacts that would have resulted from across-the-board service reductions.

The modified network was designed to maintain frequent service headways on the remaining routes in the network and to continue to provide a variety of inter-route transfer connections at the two transfer centers, Denver Avenue Station and Memorial Mid-town Station. While a significant number of service hours were pared from the Tulsa Transit network, the remaining service was much simplified and offered, in many cases, service frequencies superior to those in effect before the service reductions.

The service network put into effect in Spring 2003 represented a significant simplification of the network that had been in effect prior to that time (see *Figure 2* on page 2.) This simplified network became the foundation upon which the expanded service design was constructed. *Figure 3* estimates the total of fixed route service hours for 2003, given service levels in effect in August 2003, a significant reduction in service from previous years.

Prior to 2003, the Tulsa Transit network had become difficult to understand for both existing and potential riders. A large proportion of routes had become unnecessarily circuitous and transit travel times were often not competitive with other modes of travel in the Tulsa region.

With the need to significantly reduce the transit budget, Tulsa Transit staff was determined to re-design the system to improve directness of service and reduce travel times. While significant service reductions were made, the downsized network featured a much-improved directness of service. While overall service levels were diminished, the resulting system has become much easier to understand and average travel times have been reduced.

Ridership and Productivity

During the period 1997 through 2001, ridership on the fixed route (bus) network of Tulsa Transit was modestly increasing, after several years of decline in the early 1990s, as depicted in *Figure 1* on page 1. However, revenue shortfalls resulting from a faltering economy necessitated a significant cutback in Tulsa Transit services.

This reduction in service, implemented in Fall 2002 and Spring 2003, came shortly after the opening of the Memorial Midtown Transfer Station in July 2001. That opening was accompanied by a significant increase in transit service. Just as ridership began to rebound, a sizable reduction in services was implemented just months later, resulted in the rather precipitous declines in ridership depicted in *Figure 1*.

During the past several years, ridership productivity on the fixed route system has remained relatively constant, at about 15½ riders per hour. The significant increase in service implemented in 2002 temporarily depressed the system productivity, as expected. That productivity is estimated to have rebounded somewhat as the service cuts implemented in Spring 2003 generally targeted the more unproductive services for the greatest reductions. (See *Figure 13*.)

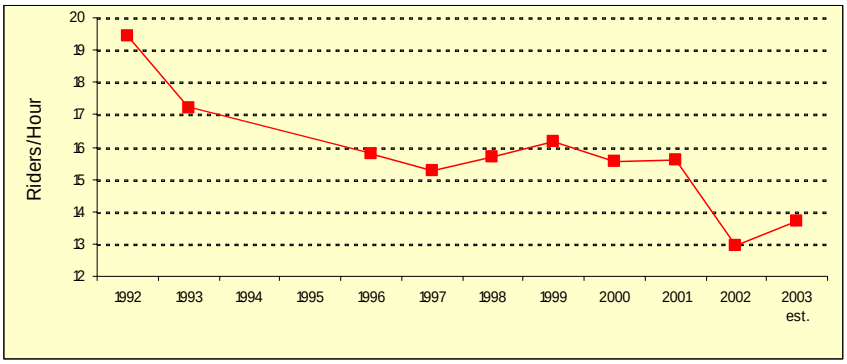


Figure 13: Annual Tulsa Transit Fixed Route Productivity, 1992-2003

The service cuts implemented in 2003 have reduced the utilization of Tulsa Transit's revenue fleet. At the same time, twenty-eight (28) buses have been retired from the Tulsa Transit bus fleet due to age. Consequently, the cost of any future system expansion in the short term will need to be accompanied by a significant program of fleet replacement and expansion. The issue of fleet replacement and expansion is discussed in more detail in Chapter 5.

Chapter 4: Conceptual Design

The modified Tulsa Transit route network put into effect in Spring 2003 was intended to be a temporary response to transit funding shortfalls resulting from the weakened United States and regional economy. The New System Design project was re-designed at that time to take a more long-range look at transit needs and services in the Tulsa region and to plan for improved services once the transit funding outlook improved. The modified Tulsa Transit network implemented in Spring 2003 was used as the foundation of that future expanded transit network.

Route Design Goals

The success of any transit network is influenced by a great many variables, among them: location and size of major activity centers, the number of people and jobs per square mile, and local roadway system performance. The goals for Tulsa Transit's fixed route bus network system were defined as follows:

- To provide public transportation within the service area that is safe, convenient, comfortable, accessible, and reliable
- To adopt fiscal policies which are both effective and efficient in the acquisition and utilization of public transportation funds
- To adopt operational policies that are both effective and efficient in providing quality public transportation services to all segments of the community
- To promote the continued development of public transportation services and facilities that are responsive to the needs of the public and community
- To assure a properly hired, trained and deployed work force and a supporting work environment that promotes confidence, the achievement of individual goals, and the delivery of service which is sensitive to the needs of the customer
- To promote and participate in the community to achieve community mobility, energy conservation, air quality improvements, and promotion of additional development in the City of Tulsa and its urban service area

Route Network Planning Guidelines

If the route network appears too complicated, many potential riders may never use transit. However, some complications are often necessary to provide cost-efficient operations that offer coverage to as many service area residents as possible. Generally, the overall industry urban service coverage guideline is to have a route within a quarter mile of at least 95 percent of the service area population. However, the popular "service coverage" guideline becomes counter productive if the routes on a transit system map represent bus services provided only a few time a day. It is also important to avoid meandering alignments that take riders on a circuitous tour rather than directly to their desired destination.

The following are route design guidelines that were used in the modified design of Tulsa Transit's fixed route system:

Loops	are included only at the ends of a route and only under the following conditions: they should be anchored by a time point at the beginning of the loop, and the total elapsed time to complete the loop should not exceed five minutes.
Branches	may be included at the ends of a route. Branches should be anchored by a time point at the common juncture of the two branches. Only one branch should be served on each trip, typically resulting in branch service headways significantly greater than trunk headways.
Turnbacks	may be used when possible to increase service frequency on trunk portions of route where the majority of the route's boardings occur. Turnbacks typically occur at or before the midpoint of a route, but may be utilized anywhere along the trunk portion of the route. The location of the turnback should also be a time point.
Route Alignments	are designed such that the coefficient of directness (one-way route mileage divided by the most direct roadway distance between the two terminal points) should never exceed 1.2 and more properly should remain below 1.1.
Route Deviations	are only to be provided if the number of average daily boardings exceed ten, the deviation does not exceed five minutes and the average number of on-board passengers being inconvenienced by the deviation does not exceed the number of boardings served by the deviation, and the deviation serves at least 10% of the total number of boardings on the route.
Route Branches	should each be given a unique route name and number to avoid confusion.
Round Trip Cycle Times	are in 15 minute increments including recovery time to allow for interlining and pulse scheduling at transit centers.
Headways	are generally no more than 60 minutes for regularly scheduled weekday base service. The minimum peak period policy headway for regularly scheduled weekday service should be 30 minutes. The minimum evening, Saturday or Sunday policy headway should be no more than 60 minutes.
Interlining	is designed to better serve trip desires and to reduce transfer volumes and operating costs.
Bus Stops	should be provided on the average every 600 to 900 feet in contiguous urban development areas. Spacing will be more frequent in high density areas and less frequent in outlying areas.
Shelters	should be provided at all locations having 25 or more boardings per day. Tulsa Transit should participate with any neighborhood request for a passenger shelter when private or other public funds are contributed regardless of passenger boarding activity. The degree of support should be discretionary based upon the level of commitment from the neighborhood or commercial enterprise.

Bus service becomes even less attractive when the route is adjusted without adequately notifying passengers, when service is unreliable, when buses arrive late or early, or becomes inconvenient because it is not offered when customers need to travel. The industry "service coverage" guideline is meant to be applied in combination with other service design guidelines.

Consistent route planning techniques should be used by Tulsa Transit to maintain optimum service coverage while providing the most efficient transit operation possible. In some cases, the service design of an individual route may be made primarily to optimize the utilization of limited equipment and personnel. However, this may not represent the most efficient use of resources to maximize ridership. Nor will it necessarily serve the best long-range interests of the system.

When routes and services are assembled into a complete network, they should convey a public transportation service that operates effectively *as a system*. Different route design techniques should not be used in different corridors.

Route Design Priorities

In addition to the route design guidelines and goals described above, a number of additional planning priorities were observed in the development of the recommended system design for Tulsa Transit.

Grid Design

When the project began, it was desired to evaluate a number of preliminary system designs based on a grid service network. Several preliminary designs had been developed in a conceptual form before the consultant selection was completed.

Because of the grid network of streets in the Tulsa region, it was felt that the grid network possessed a number of distinct advantages over the service network then in place:

- The grid concept is much easier to understand for both existing and potential future users;
- The grid concept is compatible with the street and highway network in the Tulsa region;
- Any location in the service area is generally reachable from any other location requiring, at most, one transfer and
- Travel time is decreased by eliminating meandering route alignments.

Balancing those advantages, the application of a pure grid network in the Tulsa region also has a number of drawbacks, including:

- Major regional travel destinations have no greater levels of service than other, less frequently-accessed destinations;
- Transfer locations are dispersed throughout the service area rather than being concentrated at a few locations, each having a high level of transit service and
- Dispersed transfer locations require a higher level of service on all routes to minimize transfer delays.

Denver Avenue Station and Memorial Midtown Station

Over the past several years, Tulsa Transit has developed two major transfer facilities, at which a majority of all transfers between Tulsa Transit fixed routes are concentrated. These two

locations are Denver Avenue Station, located at 4th Street and Denver Avenue in downtown Tulsa and Memorial Midtown Station just west of Memorial Drive and 33rd Street in southeast Tulsa.

These two transfer centers would be underutilized under a pure grid service network, making it difficult to justify the cost expended on them. In addition, a grid network would increase transfer delays for a large number of Tulsa Transit riders. For those reasons, a pure grid design was rejected in favor of a hybrid service design that would maintain operation along the major grid arterials, but continue to focus transfers at the two transfer centers.

Cost Parameters

Before the design work on the modified Tulsa Transit system was undertaken, it was determined to set cost parameters for the future Tulsa Transit system. This system operating cost goal was based upon the operations of other transit agencies serving similar-sized areas.

Twelve American cities of similar size were identified for comparison, based upon year 1999 estimates of city population. These ranged from Toledo, Ohio (population 308,000) to Oklahoma City, Oklahoma (population 475,000.) The estimated 1999 population of Tulsa (382,000) was located at the approximate middle of this range.

A number of transit service characteristics were recorded for each system, comparing the service area size and population, fixed route transit service hours provided, transit revenue fleet size and per capita service production and consumption. From this data, additional summary ratios were calculated for each agency as well as for the peer group as a whole: annual revenue hours per capita ("Hours/Capita" in *Table 10*) and vehicles per capita (multiplied by 100,000 and shown as "Bus Index" in the table.)

City	1999 Population	Service Area (sq.mi.)	Peak Buses	Annual Hours	Weekday Riders	Hours/ Capita	Bus Index
Oklahoma City, OK	475,000	1,265	98	194,165	21,494	0.41	20.63
Tucson, AZ	467,000	242	159	515,505	54,217	1.10	34.05
Kansas City, KS-MO	438,000	173	235	581,978	51,254	1.33	53.65
Long Beach, CA	435,000	96	161	640,707	79,660	1.47	37.01
Albuquerque, NM	421,000	124	116	300,461	28,007	0.71	27.55
Sacramento, CA	407,000	295	184	584,849	66,424	1.44	45.21
Fresno, CA	404,000	133	84	300,949	42,532	0.74	20.79
Omaha, NE	387,000	193	114	272,411	13,207	0.70	29.46
Tulsa, OK	**382,000**	**184**	**74**	**196,447**	**10,853**	**0.51**	**19.37**
Colorado Springs, CO	350,000	644	48	148,062	10,913	0.42	13.71
Wichita, KS	336,000	120	47	107,538	9,085	0.32	13.99
Cincinnati, OH	331,000	262	360	874,376	82,416	2.64	108.76
Toledo, OH	308,000	149	146	251,338	15,627	0.82	47.40
Average	**395,462**	**298**	**140**	**382,214**	**37,361**	**0.97**	**35.52**

Table 10: Tulsa Transit Peer Group

Source: FTA National Transit Database and U.S. Department of Commerce

From the summary averages for the peer group, targets for the system redesign were calculated using Tulsa Transit's hourly operating cost of $58.34 and service area population. The target parameters for the fixed route portion of the completed system design were calculated as:

- Annual Revenue Hours: 370,000
- Peak Buses: 140
- Annual Fixed Route Operating Cost: $22,000,000

The operating characteristics exhibited by these peer cities are summarized in *Table 10*.

Regional Services and Governance

Tulsa Transit is owned and operated by the City of Tulsa. Under this funding arrangement, service is confined to the City of Tulsa unless another jurisdiction contracts with the City for the provision of services. The initial system designs assumed no change in the funding and operating governance of the system, and therefore, that the targeted operating cost ceilings would apply to services within the City of Tulsa only.

While some services included in the new system design serve other jurisdictions, as some existing services do, they represent a small proportion of total system services. It was assumed that additional services to outlying jurisdictions could be layered on top of the basic system design since those services would be subject to additional funding from the jurisdictions they would serve.

The issue of regional services did raise fundamental questions concerning the long-term funding and operation of public transportation in the Tulsa region. In this project, no assumption of an alternate mode of system governance has been made. It is recognized that a change in governance to a more regional authority would significantly change the regional component of the longer-term system design and would significantly increase the total amount of service to be provided, based upon a much larger service area size and population.

Commuter vs. Baseline Services

Major urban transit networks are designed to reflect the underlying rider priorities of their service area. In many cities included in the peer group, the transit network is designed to optimize commuter travel, with a high proportion of the revenue fleet active only during commuter travel hours. In other communities, the network is designed primarily as a safety net for transit dependent riders and tends to have service levels relatively equal during most operating periods.

The peer group agencies tend to be slightly more commuter-oriented, as a group, than is Tulsa Transit, which is reflected in the larger fleet sizes maintained by many, as shown in *Table 10*. Of the 13 peer agencies, six have fleet sizes in excess of 140, which, given the total service provided, reflects a high commitment to commuter services. In some cases more than half the fleet is out of service during off-peak hours. At the same time, five of those agencies have fleets with fewer than 100 buses, reflecting a more balanced level of service across all operating periods.

Tulsa currently falls into the latter category. It has been assumed, for the purposes of the system re-design, that this general focus on all-day services would continue.

Major Employment Concentrations

The issue of major transit sub-markets has been discussed earlier in this document. In order to retain many employees at major employment sites as transit riders, an effort was made to maintain direct transit service to these major sites to the greatest extent possible from both

major transfer stations. This ensures that riders will continue to be able to access these employment sites from nearly any point in the service area with at most one transfer.

Maintenance of this direct access adds some small additional travel time to a few route alignments but, it was reasoned that the maintenance of direct service to these sites was more important than the minor inconvenience to a minority of other riders.

Design Priority

It was concluded that a pure grid network was not the most feasible design for the Tulsa Transit expanded service network. The inability to provide sufficient service frequencies on every route to minimize transfer waits, the difficulty in focusing service on major transit trip attractors and the potential for underutilization of the two existing transfer centers all weighed heavily in that decision.

The Tulsa Transit network should take advantage of the grid street network in the Tulsa region while focusing on major employment and retail centers and the transit center facilities. This conclusion was the basis for the design of the hybrid system of routes included in the modified route network.

Chapter 5: System Re-Design

The modified system design is comprised of some purely grid-designed routes, some straight-line routes operating to and from the Tulsa CBD and other L-shaped routes connecting important destinations and neighborhoods with the Denver Avenue and Memorial Midtown stations. The overall design is shown in *Figure 14* and in *Figure 37* on page 54.

Urban System (Tier 1)

The urban system is made up of twenty-two routes serving the City of Tulsa, Jenks and Sand Springs. The network is designed to operate between 5:30 AM and midnight on weekdays, between 7:00 AM and midnight on Saturdays and between 8:00 AM and 11:00 PM on Sundays and holidays. Within these general guidelines, individual routes may operate a more restricted span of service as conditions warrant.

Services are generally designed to operate at frequencies of 2 trips per hour during daytime and early evening hours, seven days per week with hourly service in effect during other periods. A few routes operate more frequently during weekday morning and afternoon commuter hours as noted in the individual route descriptions.

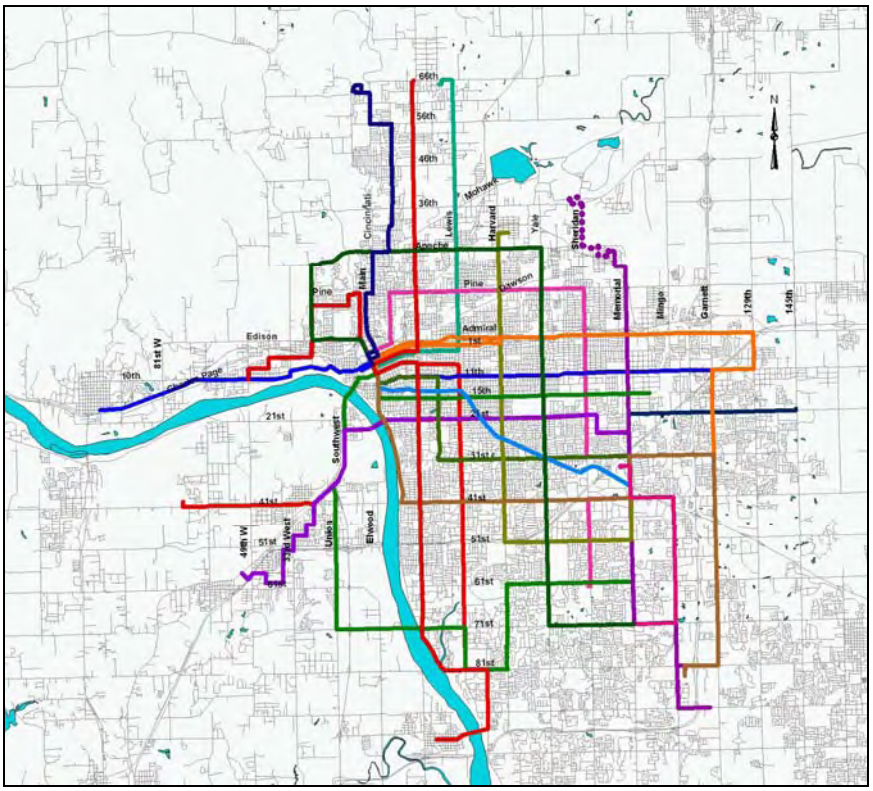


Figure 14: Recommended Tulsa Transit Urban System

In general, the fixed route urban services have been assumed to operate at an average speed of 15 miles per hour with the exception of the fast track service operating via the Broken Arrow Expressway. This route is assumed to operate at an average speed of 25 miles per hour over its entire alignment. Demand response services in the demand response service zones (see

Figure 36 on page 52) are assumed to operate at an average speed of approximately 10 miles per hour.

Most routes serve the Denver Avenue Station (16 routes) and Memorial Midtown Station (10 routes). Five routes serve both facilities. Only one of the twenty-two urban routes does not serve either transfer station.

Figure 14 shows the general alignment of the twenty-two routes making up the urban transit network. The new system design also designates three regions in south and east Tulsa that are proposed to be served by demand response services, connecting individual origins within each region to the nearest transfer station or major transfer point.

Annual variable operating costs for the urban network are estimated at $17.6 million in constant 2003 dollars. Another $4.3 million represents the system fixed costs, a total annual operating cost of $21.9 million for the urban network, in 2003 dollars. The urban system provides approximately 485,000 annual platform hours of service, using 95 buses in service during peak periods and 75 buses during weekday off-peak periods.

Individual Fixed Routes

The following sections discuss each of the twenty-two routes making up the recommended urban system in more detail. In the summary tables accompanying each route, the average operating speeds and running times are shown for the midday base period. Average operating speeds and headways often change from one period to another, a fact reflected in the varying vehicle requirements shown in the route summary tables. Costs are in constant 2003 dollars.

Route A: Suburban Acres

Route A replaces the existing Route 101 Suburban Acres service. The Route A alignment is essentially unchanged from the existing Route 101 alignment in most locations. The route is designed to operate in local (all stops) service throughout its 7.5-mile long alignment between Denver Avenue Station and 66th Street North and Denver Avenue. Route A serves the University Center at Tulsa along its route alignment.

Service is designed to operate every 20 minutes during weekday peak periods, every 30 minutes during midday and early evening periods and every 60 minutes at night. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route A requires five buses during peak commuter hours and three during other daytime hours of operation, providing approximately 19,500 annual revenue hours of service at an estimated annual variable operating cost of $710,000. The proposed Route A alignment is shown in *Figure 15*.

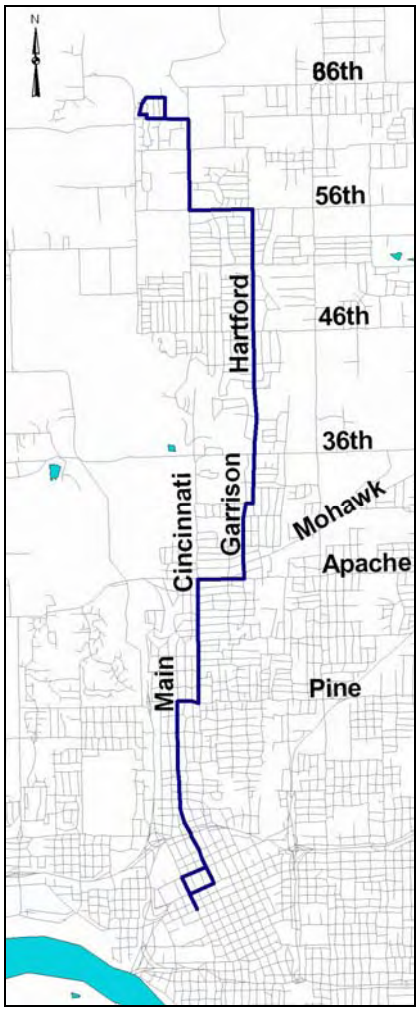


Figure 15: Route A Alignment

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
7.5 mi.	30 min.	15 mph	20	30	30	5	3	2	19,500	$ 710,000

Table 11: Route A Summary

Route B: Yale Avenue / Apache Street

Route B operates west from downtown Tulsa to the Gilcrease Museum, then east across Apache Street, south on Yale Avenue and east on 71st Street to the Woodland Hills Mall. In addition to the Gilcrease Museum and the Woodland Hills Mall, Route B also serves the North Campus of Tulsa Community College, the Tulsa Promenade Mall, Children's Medical Center, St. Francis Hospital and Laureate Psychiatric Hospital.

Service is designed to operate in local service mode along the 14.2 miles of the route alignment. Route B is operates every 30 minutes during daytime periods of operation and every 60 minutes during early morning and late night operation. The span of service is from

5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route B requires 4 buses during all daytime hours of operation and two buses during nighttime operations, providing 23,500 annual revenue hours of service at an annual estimated variable operating cost of approximately $850,000. The proposed Route B alignment is depicted in *Figure 16*.

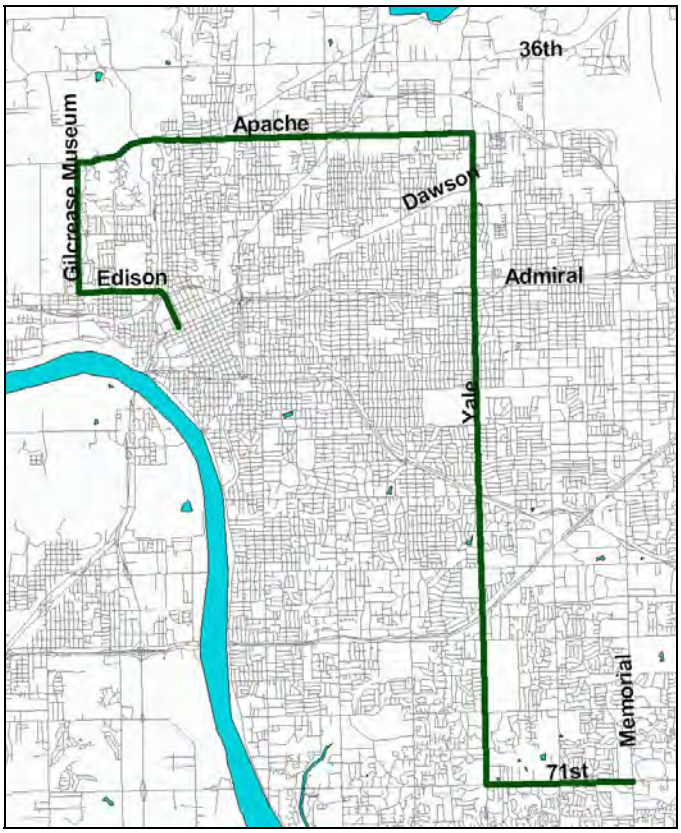


Figure 16: Route B Alignment

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
14.2 mi.	57 min.	15 mph	30	30	30	5	4	4	26,500	$ 960,000

Table 12: Route B Summary

Route C: Peoria Avenue

Route C serves the Peoria Avenue corridor from 66th Street North via the Tulsa CDB and Denver Avenue Station enroute to its southern terminus near Oral Roberts University, covering much of the alignment of existing Route 105.

Service is designed to operate in local service mode along the 13.6 miles of its route alignment, operating every 20 minutes during weekday peak commuter periods, every 30 minutes during other daytime and early evening hours and every 60 minutes during early morning and late night periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route C requires 8 buses during weekday peak commuter hours, 4 buses during all other daytime and evening hours of operation and two buses during nighttime operations, providing nearly 32,300 annual revenue hours of service at an annual estimated variable operating cost of about $1.18 million. The proposed Route C alignment is depicted in *Figure 17*.

Route	Run	Average	Headway (min.)			Required Buses			Annual	
Length	Time	Speed	Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
13.6 mi.	54 min.	15 mph	20	30	30	8	4	4	32,300	$ 1,180,000

Table 13: Route C Summary

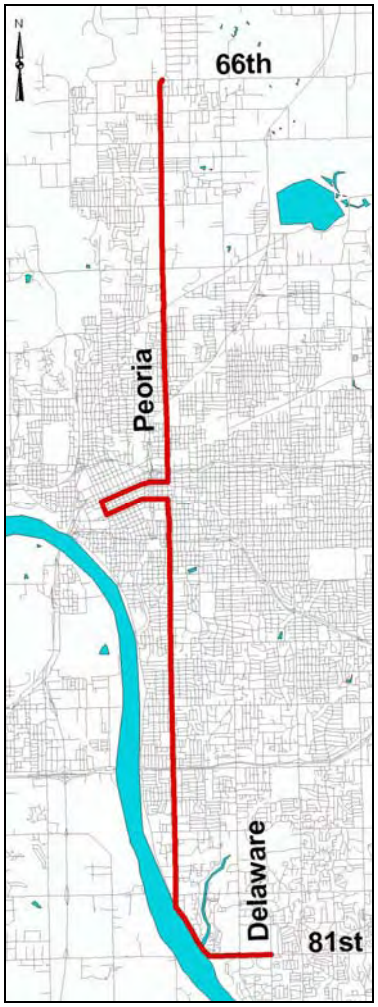


Figure 17: Route C Alignment

Route D: Mingo Road

Route D operates between Memorial Midtown Station and the Woodland Hills Mall via Memorial Drive, East 41st Street, Mingo Road and East 71st Street. Service is designed to operate in local service mode along its entire 5.7-mile alignment.

Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route D requires two buses during weekday and weekend daytime and evening hours of operation and one bus during nighttime operations, providing nearly 12,000 annual hours of service at an annual estimated variable operating cost of about $450,000. The proposed Route D alignment is depicted in *Figure 18*.

Route	Run	Average	Headway (min.)			Required Buses			Annual	
Length	Time	Speed	Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
5.7 mi.	23 min.	15 mph	30	30	30	2	2	2	12,000	$ 450,000

Table 14: Route D Summary

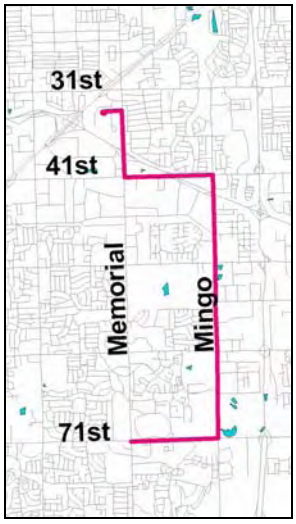


Figure 18: Route D Alignment

Route E: East 41st Street / Garnett Road

Route E operates south from Denver Avenue Station via Denver Avenue, Riverside Drive and East 41st Street to Memorial Midtown Station, serving the Tulsa Promenade Mall enroute, and then eastbound via East 31st Street, Garnett Road and 81st Street to Tulsa Community College's southeast campus.

Service operates in local service mode along the entire 16.9 miles of the Route E alignment. Route E operates every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route E requires six buses during weekday peak and five buses during daytime and evening hours of operation, with two buses during nighttime operations, providing more than 32,000 annual hours of service at an annual estimated variable operating cost of just over $1.17 million. The proposed Route E alignment is depicted in *Figure 19*.

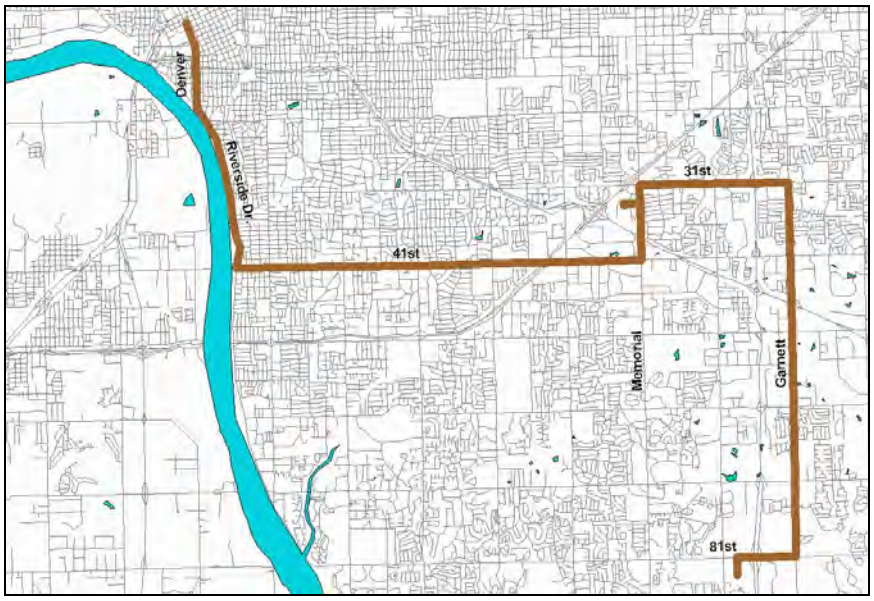


Figure 19: Route E Alignment

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
16.9 mi.	68 min.	15 mph	30	30	30	6	5	5	32,000	$ 1,170,000

Table 15: Route E Summary

Route F: Admiral Place

Route F operates east from Denver Avenue Station via Admiral Way to 129th Avenue, and then southbound to East 11th Street to Garnett Road to 31st Street.

Service is designed to operate in local mode along the entire 12.5 miles of the Route F alignment. Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route F requires five buses during weekday peak, four buses during daytime and evening hours of operation and two buses during nighttime operations, providing more than 26,500 annual hours of service at an annual estimated variable operating cost of just over $960,000. The proposed Route F alignment is depicted in *Figure 20*.

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
12.5 mi.	50 min.	15 mph	30	30	30	5	4	4	26,500	$ 960,000

Table 16: Route F Summary

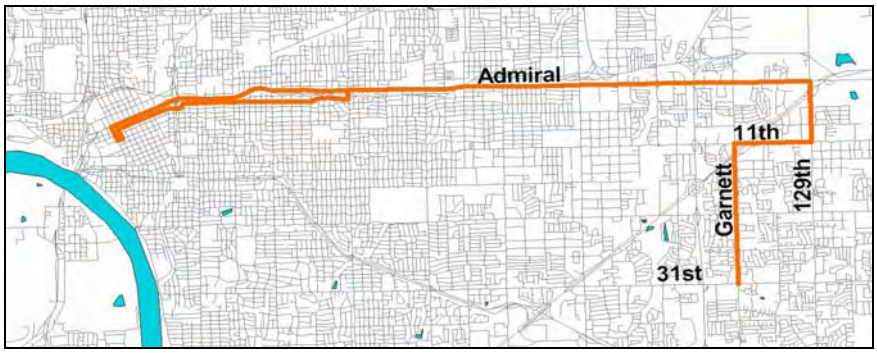


Figure 20: Route F Alignment

Route G: Fast Track

Route G duplicates the existing Fast Track route, connecting the Denver Avenue and Memorial Midtown Stations via the Broken Arrow Expressway along a 7.8-mile route alignment. Route G is designed to operate in non-stop express mode between Denver Avenue/Interstate-444 and East 41st Street/Broken Arrow Expressway.

Service operates every 15 minutes during weekday daytime hours, every 30 minutes early evening hours and weekend daytime hours and every 60 minutes during all other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route G requires three buses during weekday peak hours, 2 buses during Weekday and Saturday midday hours one bus during early evening, nighttime and Sunday operations, providing more than 14,000 annual hours of service at an annual estimated variable cost of just over $500,000. The proposed Route G alignment is depicted in *Figure 21*.

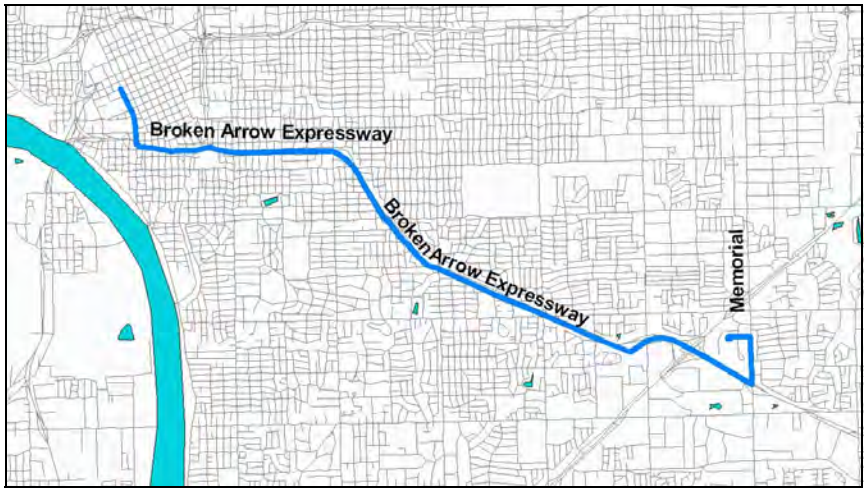


Figure 21: Route G Alignment

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
7.8 mi.	15 min.	25 mph	15	30	30	3	2	1	14,000	$ 500,000

Table 17: Route G Summary

Route H: 15th Street

Route H operates south from Denver Avenue Station and east via 15th (Cherry) Street to Memorial Drive. Service is designed to operate in local service mode along the entire 6.9 miles of the Route H alignment, serving the Cherry Street entertainment district and the Hillcrest and St. John Medical Centers. Service is designed to operate every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation.

The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route H requires three buses during weekday peak hours, two buses during midday and evening hours of operation and one bus during nighttime operations, providing just over 14,000 annual hours of service at an annual estimated variable operating cost of approximately $520,000. The Route H alignment is depicted in *Figure 22*.

Figure 22: Route H Alignment

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
6.9 mi.	28 min.	15 mph	30	30	30	3	2	2	14,000	$ 500,000

Table 18: Route H Summary

Route I: Harvard Avenue

Route I operates via an L-shaped alignment southbound along Harvard Avenue from Tulsa Community College's North Campus to 51st Street, turning east to Memorial Drive and north to Memorial Midtown Station. Route I serves both Tulsa Community College and Tulsa University in local service mode along its 11.3-mile alignment, as well as Doctors' Hospital and the Children's Medical Center.

Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during all other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route I requires four buses during daytime hours, three buses during evening hours of operation and two buses during nighttime operations, providing just under 22,500 annual hours of service at an annual estimated variable operating cost of nearly $810,000. The proposed Route I alignment is depicted in *Figure 23*.

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
11.3 mi.	45 min.	15 mph	30	30	30	4	4	3	22,500	$ 810,000

Table 19: Route I Summary

Figure 23: Route I Alignment

Route J: Memorial Drive

Route J operates south from Tulsa International Airport via Memorial Drive serving Memorial Midtown Station enroute to the Woodland Hills Mall and to Tulsa Community College's Southeast Campus.

On weekends and holidays only, Route J is extended from the airport to serve the Tulsa Zoo via Sheridan Road (dashed alignment in *Figure 24.*) Service is designed to operate in local service mode along the entire 13.4 miles (16.6 miles on weekends) of the Route J alignment. Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route J requires five buses during daytime hours and weekend evening hours of operation, four buses during weekday midday and evening hours and two buses during nighttime operations, providing nearly 28,000 annual hours of service at an annual estimated variable operating cost of just over $1,020,000. The proposed Route J alignment is depicted in *Figure 24*.

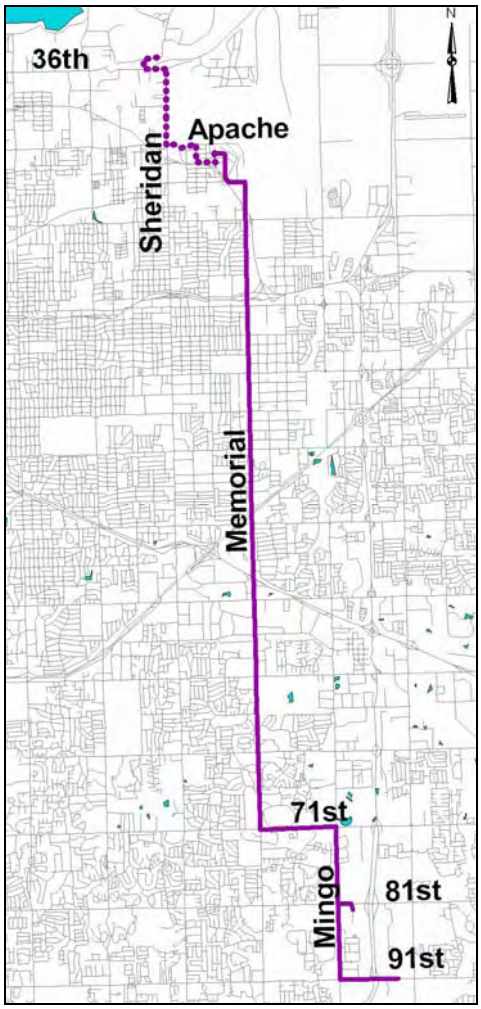


Figure 24: Route J Alignment

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
13.4 mi.	54 min.	15 mph	30	30	30	5	4	4	28,000	$ 1,020,000

Table 20: Route J Summary

Route K: 31st Street

Route K operates east from downtown Tulsa via 11th Street, Utica Avenue and 31st Street serving the Hillcrest and St. John Medical Centers, Utica Square and Doctors' Hospital enroute to Memorial Midtown Station.

Service is designed to operate in local service mode along the entire 8.8 miles of the Route K alignment. Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to

midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

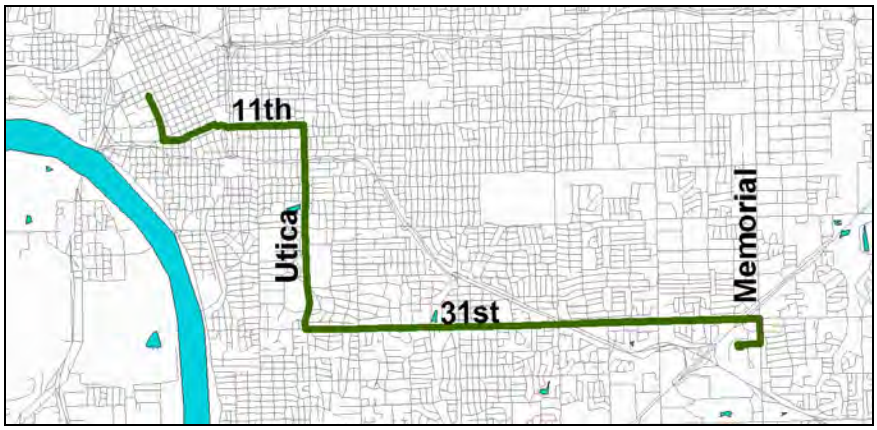


Figure 25: Route K Alignment

Route K requires four buses during weekday peak hours, three buses during midday and evening hours of operation and two buses during nighttime operations, providing nearly 20,000 annual hours of service at an annual estimated variable operating cost of just over $720,000. The proposed Route K alignment is depicted in *Figure 25*.

Route	Run	Average	Headway (min.)			Required Buses			Annual	
Length	Time	Speed	Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
8.8 mi.	35 min.	15 mph	30	30	30	4	3	3	20,000	$ 720,000

Table 21: Route K Summary

Route L: West Tulsa

Route L operates south and east from downtown Tulsa via Southwest Boulevard through West Tulsa to the Town West Shopping Center.

Service is designed to operate in local service mode along the entire 7.3 miles of the Route L alignment. Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route L requires three buses during daytime hours and two buses during evening and weekend hours of operation, providing nearly 15,500 annual hours of service at an annual estimated variable operating cost of just over $560,000. The Route L alignment is depicted in *Figure 26*.

Route	Run	Average	Headway (min.)			Required Buses			Annual	
Length	Time	Speed	Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
7.3 mi.	29 min.	15 mph	30	30	30	3	3	2	15,500	$ 560,000

Table 22: Route L Summary

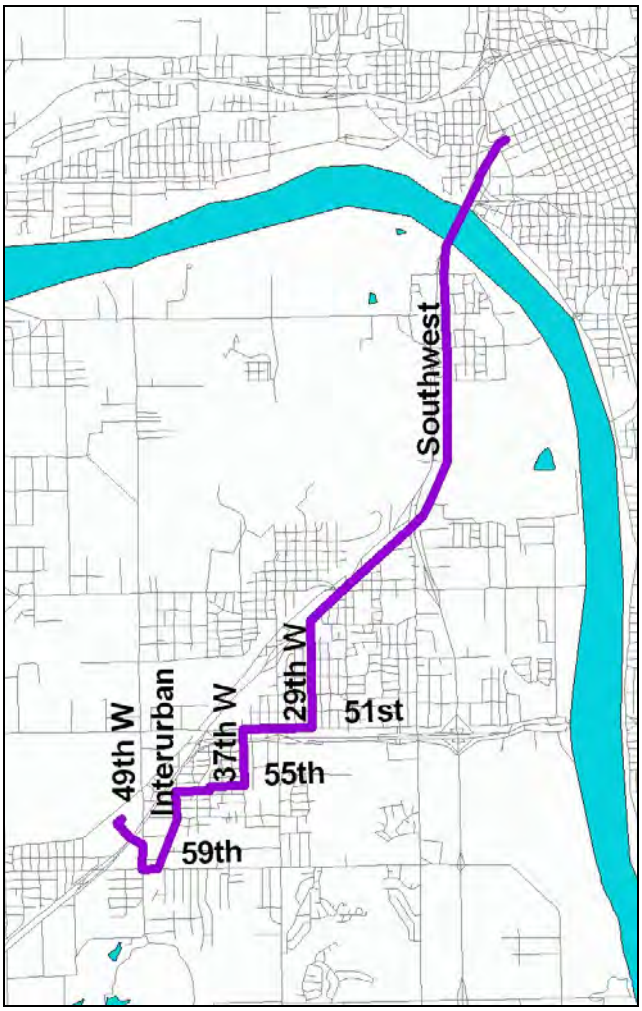


Figure 26: Route L Alignment

Route M: Union Avenue / 71st Street

Route M operates south and east from downtown Tulsa via Southwest Boulevard, Union Avenue, 71st Street, Lewis Avenue, 81st Street, Harvard Avenue, 61st Street and Memorial Blvd. to Woodland Hills Mall, serving West Tulsa, Oral Roberts University, Columbia Specialty Hospital and St. Francis Hospital enroute.

Service is designed to operate in local service mode along the entire 17.7 miles of the Route M alignment. Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route	Run	Average	Headway (min.)			Required Buses			Annual	
Length	Time	Speed	Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
17.7 mi.	71 min.	15 mph	30	30	30	5	5	3	32,000	$ 1,200,000

Table 23: Route M Summary

Route M requires six buses during peak hours, five during midday and evening hours of operation and two buses during nighttime operations, providing more than 32,000 annual hours of service at an annual estimated variable operating cost of just under $1.2 million. The proposed Route M alignment is depicted in *Figure 27*.

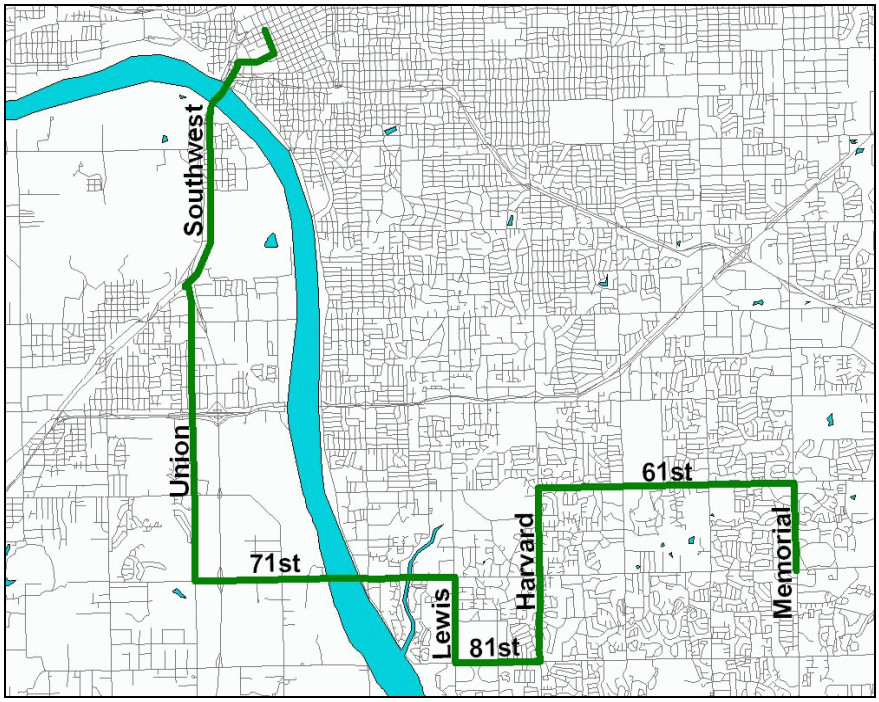


Figure 27: Route M Alignment

Route N: 11th Street

Route N operates east from downtown Tulsa via 11th Street to Memorial Drive, serving the Tulsa University main campus along the way. Service is designed to operate in local service mode along the entire 8.1 miles of the Route N alignment. Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route N requires three buses during daytime and evening hours of operation and one bus during nighttime operations, providing more than 18,000 annual hours of service at an annual estimated variable operating cost of just over $650,000. The Route N alignment is depicted in *Figure 28*.

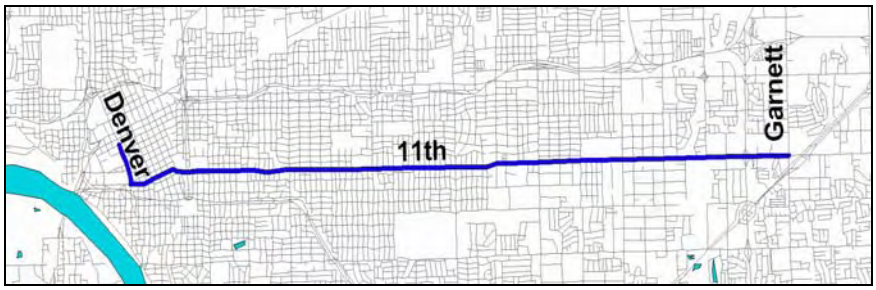


Figure 28: Route N Alignment

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
8.1 mi.	32 min.	15 mph	30	30	30	3	3	3	18,000	$ 650,000

Table 24: Route N Summary

Route O: South Lewis Avenue / Jenks

Route O operates east and south from downtown Tulsa via 11th Street, Lewis Avenue, 81st Street, Delaware Avenue and the Jenks Bridge to the community of Jenks, serving Oral Roberts University and the Columbia Specialty Hospital enroute. This alignment replaces the southern portion of the existing Route 112.

Service is designed to operate in local service mode along the entire 12.1 miles of the Route O alignment. Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route O requires five buses during peak hours, four during midday and evening hours of operation and two buses during nighttime operations, providing nearly 26,500 annual hours of service at an annual estimated variable operating cost of just over $960,000. The Route O alignment is depicted in *Figure 29*.

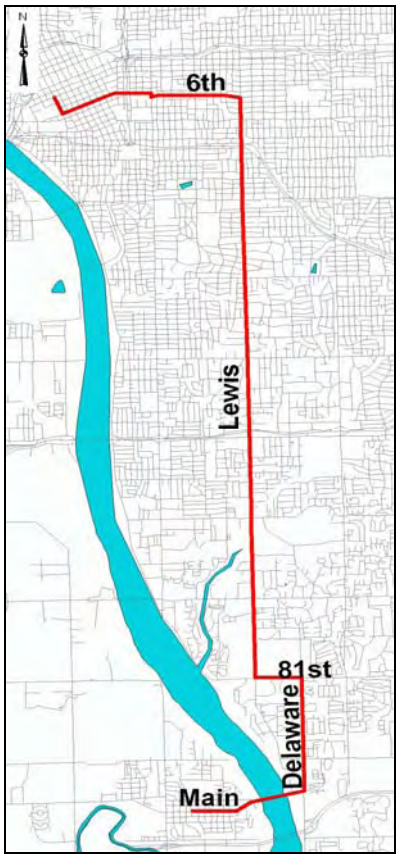


Figure 29: Route O Alignment

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
12.1 mi.	48 min.	15 mph	30	30	30	5	4	4	26,500	$ 960,000

Table 25: Route O Summary

Route P: Pine Street / Sheridan Road

Route P operates east and south from downtown Tulsa via Greenwood Avenue, Pine Street, and Sheridan Road to the Memorial Midtown Station, then continuing south on Sheridan to 61st Street near the Shadow Mountain Hospital.

Service is designed to operate in local service mode along the entire 15.7 miles of the Route P alignment. Service operates every 30 minutes during daytime and evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

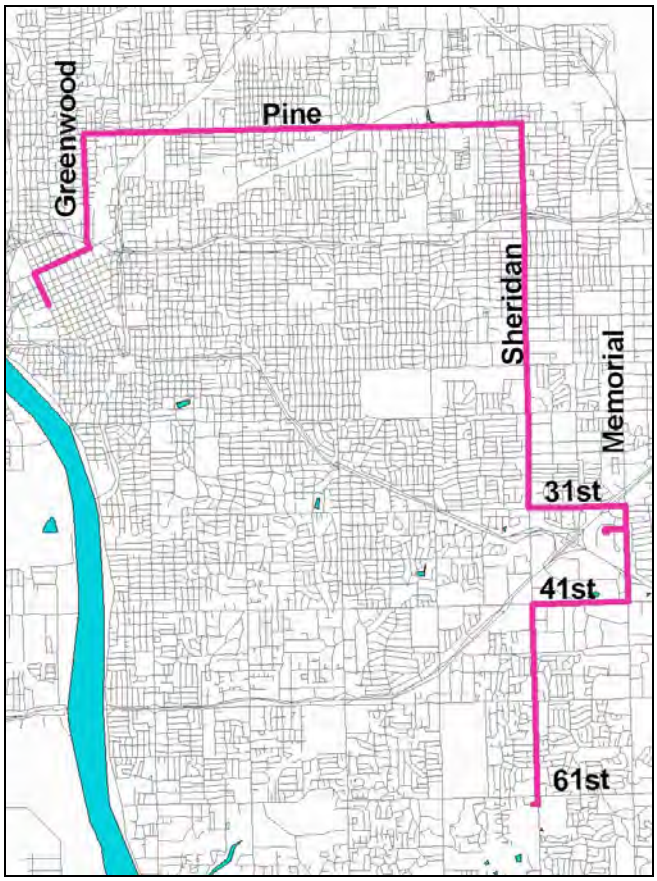


Figure 30: Route P Alignment

Route P requires six buses during peak hours, five during midday hours, four during evening hours of operation and two buses during nighttime operations, providing more than 30,000 annual hours of service at an annual estimated variable operating cost of slightly more than $1,100,000. The Route P alignment is depicted in *Figure 30*.

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
15.7 mi.	63 min.	15 mph	30	30	30	6	5	4	30,000	$1,100,000

Table 26: Route P Summary

Route Q: North Lewis Avenue

Route Q operates east and north from downtown Tulsa via 4th Street, and North Lewis Avenue to 66th Street, replacing the northern portion of the existing Route 112.

Service is designed to operate in local service mode along the entire 8.2 miles of the Route Q alignment. Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route Q requires three buses during daytime and evening hours of operation and one bus during nighttime operations, providing 18,000 annual hours of service at an annual estimated variable operating cost of just more than $ 650,000. The Route Q alignment is depicted in *Figure 31*.

Figure 31: Route Q Alignment

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
8.2 mi.	33 min	15 mph	30	30	30	3	3	3	18,000	$ 650,000

Table 27: Route Q Summary

Route R: Gilcrease Museum / Newton Street

Route R operates west and north from downtown Tulsa via Denver Avenue, Pine Street, Osage Drive, Newton Street and Gilcrease Museum Road and west to its terminus at Charles Page Boulevard and 49th West Avenue.

Service is designed to operate in local service mode along the entire 6.0 miles of the Route R alignment. Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route R requires three buses during peak hours, two during midday and evening hours of operation and one bus during nighttime operations, providing 14,000 annual hours of service at an annual estimated variable operating cost of just under $ 520,000. The Route R alignment is depicted in *Figure 32*.

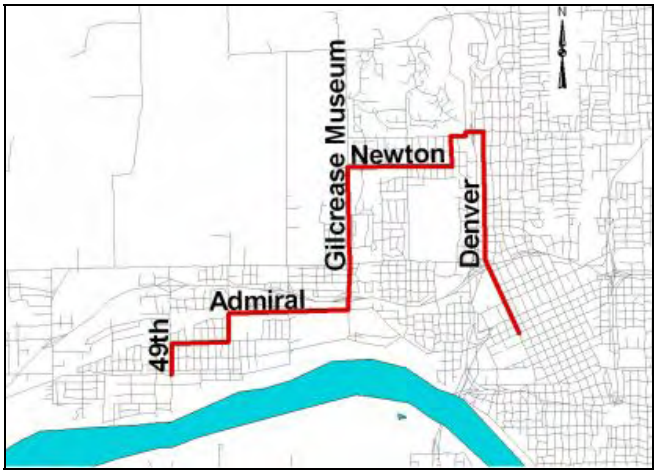


Figure 32: Route R Alignment

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
4.5 mi.	24 min.	15 mph	30	30	30	3	2	2	14,000	$ 520,000

Table 28: Route R Summary

Route S: Charles Page Boulevard

Route S operates west from downtown Tulsa via West 3rd Street and Charles Page Boulevard to downtown Sand Springs. Service is designed to operate in local service mode along the entire 7.8 miles of the Route S alignment. Service operates every 30 minutes during daytime and

early evening hours and every 60 minutes during all other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route S requires three buses during daytime and evening hours of operation and two buses during nighttime operations, providing 16,000 annual hours of service at an annual estimated variable operating cost of just under $ 590,000. The Route S alignment is depicted in *Figure 33*.

Route	Run	Average	Headway (min.)			Required Buses			Annual	
Length	Time	Speed	Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
7.8 mi.	31 min.	15 mph	30	30	30	3	3	3	16,000	$ 590,000

Table 29: Route S Summary

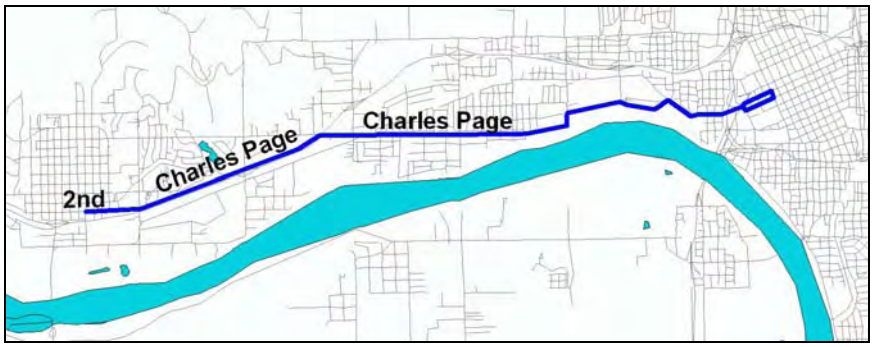


Figure 33: Route S Alignment

Route T: West 41st Street

Route T operates eastward from the west campus of Tulsa Community College via West 41st Street, Southwest Boulevard and 21st Street, serving St. John Medical Center and Utica Square enroute to Memorial Midtown Station.

Service is designed to operate in local service mode along the entire 12.4 miles of the Route T alignment. Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during all other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Route T requires five buses during peak hours, four during midday and evening hours of operation and two buses during nighttime operations, providing 26,500 annual hours of service at an annual estimated variable operating cost of $ 960,000. The Route T alignment is depicted in *Figure 34*.

Route	Run	Average	Headway (min.)			Required Buses			Annual	
Length	Time	Speed	Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
12.4 mi.	50 min.	15 mph	30	30	30	5	4	4	26,500	$ 960,000

Table 30: Route T Summary

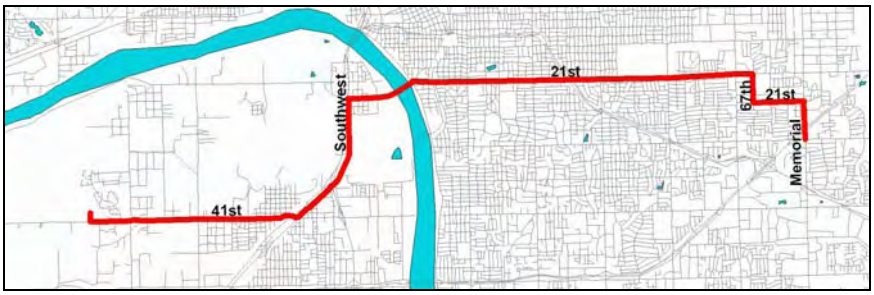


Figure 34: Route T Alignment

Route U: Eastland

Route U operates east from Memorial Midtown Station to Eastland Mall via Memorial Drive and 21st Street. Service is designed to operate in local service mode along the entire 5.1 miles of the Route U alignment. Service operates every 30 minutes during daytime and early evening hours and every 60 minutes during other periods of operation. The span of service is from 5:30 AM to midnight on weekdays, from 7:00 AM to midnight on Saturdays and from 8:00 AM to 11:00 PM on Sundays and holidays.

Figure 35: Route U Alignment

Route U requires two buses during daytime and evening hours of operation and one bus during nighttime operations, providing 12,000 annual hours of service at an annual estimated variable operating cost of $ 450,000. The Route U alignment is depicted in *Figure 35*.

Route	Run	Average	Headway (min.)			Required Buses			Annual	
Length	Time	Speed	Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
5.1 mi.	20 min.	15 mph	30	30	30	2	2	2	12,000	$ 450,000

Table 31: Route U Summary

Demand Response Service Zones

The twenty-two fixed routes included in the service design do not provide service to all parts of the Tulsa Transit service area. Some areas to the south and east of the fixed route network appear to have insufficient transit demand potential for scheduled fixed route services.

However, these areas do require some sort of transit service for those in need of such transportation services.

It is proposed to define three separate sub-regions of the Tulsa Transit service area as demand response service zones. Service would be provided within each of three areas by demand response vehicles, providing transportation by advance request of intending riders within the three zones.

For trips entirely within the same demand response zone, service would be provided curb-to-curb between point of origin and intended destination. Trips destined out of or into a demand response zone are provided on an advance reservation basis between the origin or destination within the zone and the nearest transit center or designated transfer point. At this point riders transfer to or from the regular fixed route network to complete their trip.

Each zone is designed to be served by one vehicle providing transfer connections with the fixed route network at least hourly, with connections every 30-minutes as a stated goal. The size of the demand response vehicle will depend on the expected service demand from each zone. Service could be provided via 12-passenger vans or by 40-foot transit buses or a vehicle of intermediate size.

Figure 36: Recommended Demand Response Service Zones

Route Length	Average Speed	Headway (min.)			Required Buses			Annual	
		Peak	Base	Night	Peak	Base	Night	Hours	Cost
N/A	10 mph	N/A	N/A	N/A	3	3	3	19,000	$ 700,000

Table 32: Estimated Demand Response Zone Characteristics

Service would operate during the same hours of operations as the fixed route network, requiring three additional vehicles at an annual cost of $700,000 for more than 19,000 hours of

service. Although the costs for these services have been calculated at the fixed route rate, service could probably be provided under contract for considerably less.

Service and Cost Summary

The proposed modified urban network falls within the cost parameters set earlier in the project see "Cost Parameters", page 29.) Urban system operating characteristics are summarized in *Table 33*. A more detailed summary of operations and costs appears in Appendix A.

Service Span	Weekday	5:30 AM to midnight
	Saturday	7 AM to midnight
	Sunday	8 AM to 11 PM
One Way Route Miles		249.1
Revenue Hours	Weekday	1,345
	Saturday	1,101
	Sunday	965
Maximum Vehicles	Weekday	95
	Saturday	72
	Sunday	69
Variable Operating Cost	Weekday	$ 13,300,000
	Saturday	$ 2,200,000
	Sunday	$2,100,000
Fixed Costs		$ 4,300,000
Total Cost		$ 21,900,000

Table 33: Urban Network Summary

Suburban System (Tiers 2 and 3)

Overlaid on the urban transit network is a secondary network of routes designed to serve a number of communities surrounding the City of Tulsa. It is intended that the routes included in the suburban network be funded by the individual communities that they are designed to serve. This secondary, suburban network consists of routes serving seven additional suburban corridors:

- Catoosa (I-44/Highway 167)
- Owasso* / Collinsville (I-44/Highway 169)
- Skiatook (Red Fork Expressway/Highway 11)
- Sapulpa (I-244/Alt. 75)
- Jenks* / Glenpool (Highway 75)
- Bixby* (South Memorial Drive/Highway 64)
- Broken Arrow* / Coweta (Broken Arrow Expressway/Highway 51)

In general, these routes are designed to operate every 30 minutes during peak commuter hours and hourly at other times. Operating periods are somewhat reduced from those of the urban (Tier 1) services. For the Tier 2 services, denoted in the above list by an asterisk (*), these operating periods are generally from 6 AM to 8 PM weekdays, from 7 AM to 7 PM Saturdays and from 8 AM to 6 PM Sundays.

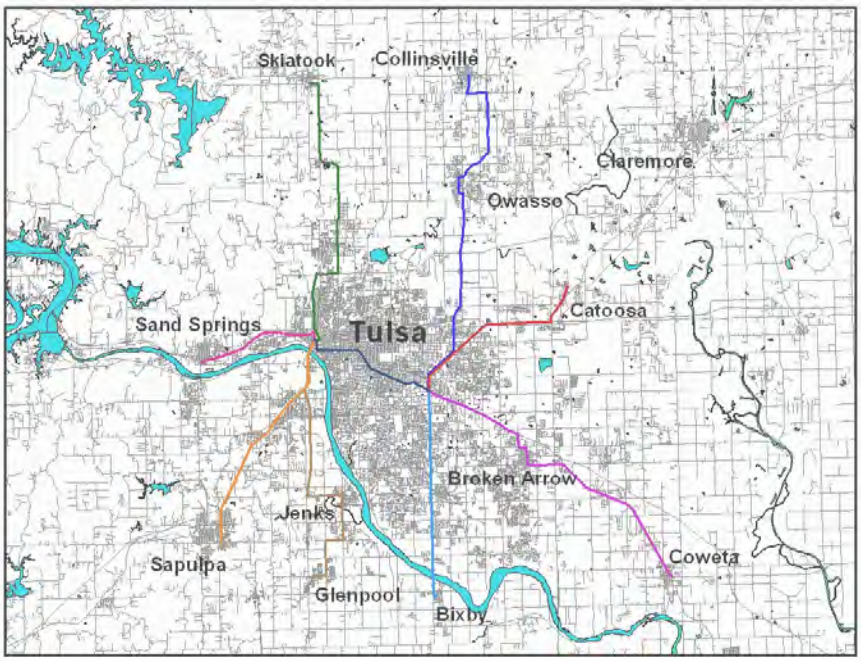


Figure 37: Recommended Tulsa Transit Suburban Network

The Tier 3 routes generally serve communities farther removed geographically from the City of Tulsa. These routes offer reduced service hours compared to the Tier 2 routes, generally from 5:30 AM to 7:30 PM weekdays, from 7 AM to 6 PM Saturdays and from 9 AM to 5 PM Sundays and holidays. The suburban network is depicted in *Figure 37*.

Individual Fixed Routes

This section discusses each of the ten routes serving the 7 corridors making up the suburban system in more detail.

Route AA: Catoosa (Tier 3)

The Catoosa route operates from downtown Tulsa via the Broken Arrow Expressway to Memorial Midtown Station, then on Memorial Drive to Interstate 44 and eastward to Highway 167 and via Cherokee Street to Catoosa. Service is designed to operate in express service mode along the BA Expressway and I-44 portions of the route alignment and in local mode along Memorial Drive, Highway 167 and Cherokee Street. Service operates every 30 minutes during weekday peak hours and every 60 minutes during midday and evening periods. The span of service is from 5:30 AM to 7:30 PM weekdays, from 7 AM to 6 PM Saturdays and from 9 AM to 5 PM Sundays and holidays.

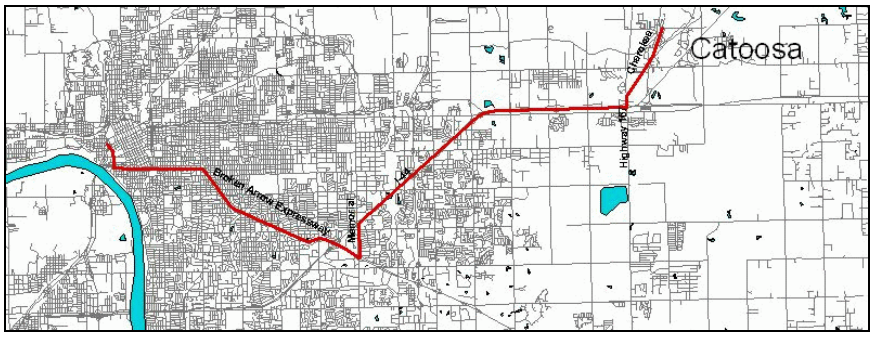


Figure 38: Catoosa Route Alignment

The Catoosa route requires four buses during peak hours and 2 during midday and evening hours, providing 13,600 annual hours of service at an annual estimated variable operating cost of $ 500,000. The Catoosa route alignment is depicted in *Figure 38*.

Route	Run	Average	Headway (min.)			Required Buses			Annual	
Length	Time	Speed	Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
19.0 mi.	36 min.	32 mph	30	60	60	4	2	2	13,600	$ 500,000

Table 34: Catoosa Route Summary

Route BB: Owasso / Collinsville

Route BB serves the I-44 / State Highway 167 Corridors, including the communities of Owasso and Collinsville. This service is designed for implementation in two separate phases, as described below.

Owasso (Tier 2)

The Owasso route operates east from Denver Avenue Station via the Broken Arrow Expressway to Memorial Midtown Station, then on Memorial Drive to Interstate 44, eastward to the Mingo Valley Expressway, north to 76th Street, east to Main, north to 86th Street and east to the Three Lakes Shopping Center in Owasso. Service is designed to operate in express service mode along the BA Expressway, I-44 and Mingo Valley Expressway portions of the route alignment and in local mode on local streets and highways. Service is designed to operate every 30 minutes during weekday peak hours and every 60 minutes during midday and evening periods. The span of service is from 6 AM to 8 PM weekdays, from 7 AM to 7 PM Saturdays and from 8 AM to 6 PM Sundays.

The Owasso route requires four buses during peak hours and 2 during midday and evening hours, providing 14,000 annual hours of service at an annual estimated variable operating cost of $ 510,000. The Owasso route alignment is depicted in *Figure 39*.

Route	Run	Average	Headway (min.)			Required Buses			Annual	
Length	Time	Speed	Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
20.0 mi.	38 min.	32 mph	30	60	60	4	2	2	14,000	$ 510,000

Table 35: Owasso Route Summary

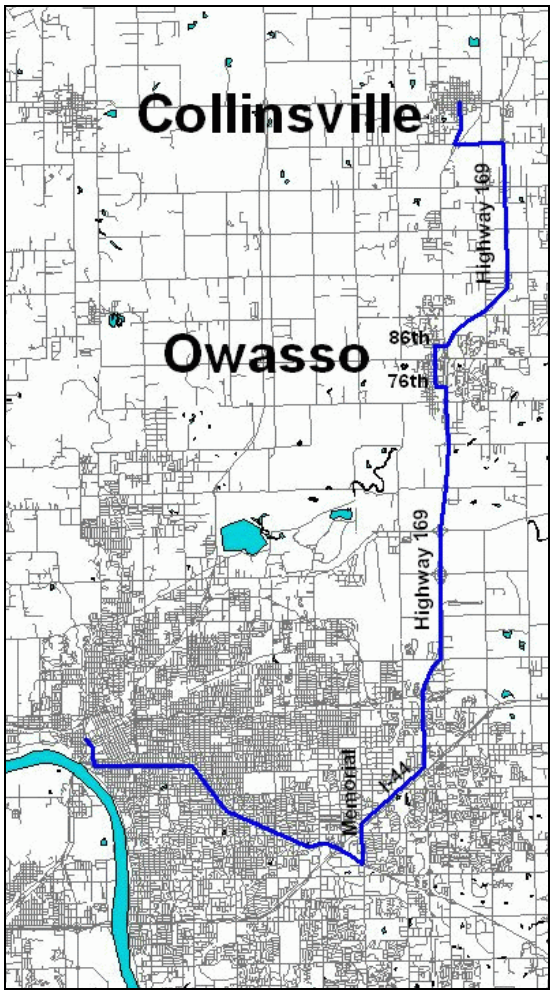


Figure 39: Owasso/Collinsville Route Alignment

Collinsville Extension (Tier 3)

The Collinsville route is an 8.5-mile extension of the Owasso route operating north from Owasso via the Mingo Valley Expressway to Collinsville. It is intended that this service be implemented only after the Owasso service has demonstrated success.

Service is designed to operate in express mode along the Mingo Valley Expressway portion of the route alignment, although a possible alternate route might operate in local mode along Garnett Road between Owasso and Collinsville. Service operates every 30 minutes during weekday peak hours and every 60 minutes during midday and evening periods. The span of service is from 5:30 AM to 7:30 PM weekdays, from 7 AM to 6 PM Saturdays and from 9 AM to 5 PM Sundays and holidays.

The Collinsville route extension requires three additional buses during peak hours and 1 additional during midday and evening hours, adding 8,800 annual hours of service at an additional annual estimated variable operating cost of $ 320,000. The proposed Collinsville extension alignment is included in *Figure 39*.

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
8.5 mi.	26 min.	20 mph	30	60	60	3	1	1	8,800	$ 320,000

Table 36: Collinsville Extension Summary

Route CC: Skiatook (Tier 3)

The Skiatook route operates north from Denver Avenue Station via the Red Fork Expressway, N. 36th Street, and Peoria Avenue/SR 11 to Skiatook, serving the community of Sperry enroute. Service is designed to operate in express service mode along the Red Fork Expressway, 36th Street and Peoria Avenue alignment to the northern terminus of urban route C (Peoria Avenue) at 66th Street North. Local mode is operated between 66th Street North and Skiatook. Service operates every 30 minutes during weekday peak hours and every 60 minutes during midday and evening periods. The span of service is from 5:30 AM to 7:30 PM weekdays, from 7 AM to 6 PM Saturdays and from 9 AM to 5 PM Sundays and holidays.

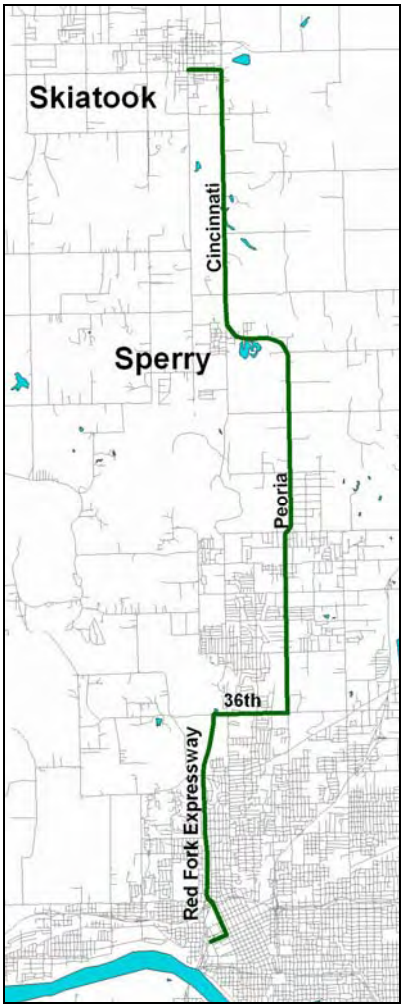


Figure 40: Skiatook Route Alignment

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Evening	Peak	Base	Evening	Hours	Cost
22.6 mi.	75 min.	18 mph	30	60	60	7	3	3	22,500	$ 815,000

Table 37: Skiatook Route Summary

The Skiatook route requires seven buses during peak hours and three during midday and evening hours, providing 22,500 annual hours of service at an annual estimated variable operating cost of $ 815,000. The Skiatook route alignment is depicted in *Figure 40*.

Route DD: Broken Arrow / Coweta

The Broken Arrow Expressway corridor is designed for implementation in two separate phases. The Tier 2 implementation of the Broken Arrow Express is intended to supplant and complement the existing Broken Arrow express service, to be followed, at a later date, by the Tier 3 Coweta extension.

Broken Arrow (Tier 2)

The Broken Arrow route operates east from downtown Tulsa via the Broken Arrow Expressway and Memorial Drive to Memorial Midtown Station, then via Memorial Drive and the Broken Arrow Expressway to 145th Street and the Broken Arrow Park and Ride, then south on 145th to Kenosha, 161st Street and Houston. Service is designed to operate in express service mode along the Broken Arrow Expressway portion of the route alignment and in local mode on local streets and highways. Service operates every 30 minutes during weekday peak hours and every 60 minutes during midday and evening periods. The span of service is from 6 AM to 8 PM weekdays, from 7 AM to 7 PM Saturdays and from 8 AM to 6 PM Sundays.

Route Length	Run Time	Average Speed	Headway (min.)			Required Buses			Annual	
			Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
15.8 mi.	30 min.	32 mph	30	60	60	3	1	1	9,000	$ 330,000

Table 38: Broken Arrow Route Summary

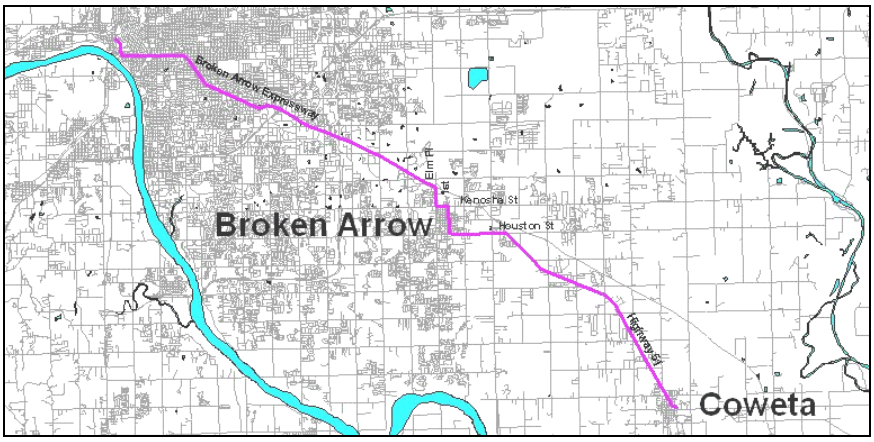


Figure 41: Broken Arrow/Coweta Route Alignment

The Broken Arrow route requires three buses during peak hours and 1 during midday and evening hours, providing 9,000 annual hours of service at an annual estimated variable operating cost of $ 330,000. The Broken Arrow route alignment is depicted in *Figure 41*.

Coweta Extension (Tier 3)

The Coweta route is a 19.0-mile extension of the Broken Arrow route that continues east from Broken Arrow via Houston Street and southeast via Highway 51 to Coweta. It is intended that this service be implemented only after the Broken Arrow service has demonstrated success.

Service is designed to operate in local mode along the entire route alignment between Broken Arrow and Coweta. Service operates every 30 minutes during weekday peak hours and every 60 minutes during midday and evening periods. The span of service is from 5:30 AM to 7:30 PM weekdays, from 7 AM to 6 PM Saturdays and from 9 AM to 5 PM Sundays and holidays.

The Coweta extension would require five additional buses during peak hours and 2 additional during midday and evening hours, adding 15,600 annual hours of service at an additional annual estimated variable operating cost of $ 570,000. The proposed Coweta route extension alignment is included in *Figure 41*.

Route	Run	Average	Headway (min.)			Required Buses			Annual	
Length	Time	Speed	Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
19.0 mi.	57 minutes	20 mph	30	60	60	3	2	2	15,600	$ 570,000

Table 39: Coweta Route Extension Summary

Route EE: Sapulpa (Tier 3)

The Sapulpa route operates south from downtown Tulsa via I-244 to the Creek County Line, then via Alternate Highway 75 to Dewey Avenue in Sapulpa. Service is designed to operate in express service mode along the I-244 portion of the route alignment and in local mode on Highway 75 and Dewey Avenue. Service operates every 30 minutes during weekday peak hours and every 60 minutes during midday and evening periods. The span of service is from 5:30 AM to 7:30 PM weekdays, from 7 AM to 6 PM Saturdays and from 9 AM to 5 PM Sundays and holidays.

The Sapulpa route requires four buses during peak hours and 2 during midday and evening hours, providing 13,600 annual hours of service at an annual estimated variable operating cost of $ 500,000. The Sapulpa route alignment is depicted in *Figure 42*.

Route	Run	Average	Headway (min.)			Required Buses			Annual	
Length	Time	Speed	Peak	Base	Eve.	Peak	Base	Eve.	Hours	Cost
13.9 mi.	42 min.	20 mph	30	60	60	4	2	2	13,600	$ 500,000

Table 40: Sapulpa Route Summary

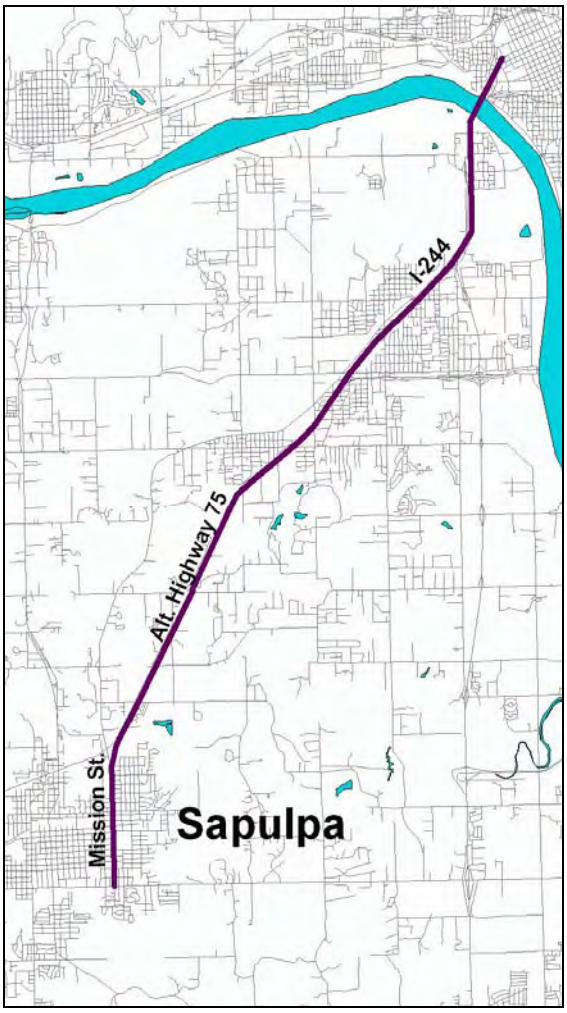


Figure 42: Sapulpa Route Alignment

Service and Cost Summary

The proposed modified suburban network is not included in the cost parameters set at the beginning of the project. System operating characteristics are summarized in *Table 41*, representing services that are intended to be funded by the municipalities they are designed to serve. A more detailed summary of operations and costs in constant 2003 dollars appears in Appendix A.

Service Span	Weekday	5:30 AM to 8 PM
	Saturday	7 AM to 7 PM
	Sunday	8 AM to 6 PM
One Way Route Miles		161.9
Revenue Hours	Weekday	410
	Saturday	217
	Sunday	168
Maximum Vehicles	Weekday	43
	Saturday	19
	Sunday	19
Variable Operating Cost	Weekday	$ 4,300,000
	Saturday	$ 433,000
	Sunday	$380,000
Fixed Costs	Included in urban system costs	
Total Additional Cost		$ 5,126,000

Table 41: Suburban Network Summary

Additional Issues

A number of issues have been raised in the development of the new system design. The overlaying of a suburban transit network over the urban network adds a degree of complexity to the governance, service priorities and funding of transit operations for the new system design. These issues are discussed briefly in the following sections.

System Governance

The Tulsa Transit system, which serves the Tulsa Urban Area, is owned and operated by the City of Tulsa. The majority of existing services operate primarily within the city boundaries, but significant areas outside of the City receive services from Tulsa Transit. In addition, anticipated growth in the Tulsa area seems to be directed into areas outside of the City's current corporate boundaries, primarily to the south and southeast.

Currently, the local share of Tulsa Transit's operating subsidy (the difference between operating costs and fare collections) is funded by the City of Tulsa, with negotiated payments contributed by other jurisdictions in the Tulsa vicinity, based upon the amount of service they receive. As demand for transit services continues to grow, the operating subsidies of Tulsa Transit will likewise grow, bringing into question the will and/or ability of the City of Tulsa to continue significant financial support of an increasingly regional public transportation system.

System governance, that is, the governmental framework under which Tulsa Transit will continue to operate, could become an increasingly important issue in the greater Tulsa area. The potential for an expanded political base and for regional control of the transit network,

offers the potential for an expanded funding base and a more regional perspective in the decisions that affect the operations of public transportation in the Tulsa region.

The issue in the Tulsa area, as elsewhere, essentially revolves around two separate issues: who will control the direction of public transportation development and how will public transportation operations be funded.

Local Transit Funding

The City of Tulsa's ability to secure additional local funding for transit operations, given existing funding sources, is limited. While existing agreements reimburse the City, at least in part, for services provided primarily for the use of non-City residents, there are no provisions for sharing the burden of maintaining the infrastructure for keeping that service operating.

It seems clear that for Tulsa Transit to meet the demand for transit services by adding new and improved services, particularly to and from origins and destinations outside the City, a dedicated and predictable source of funding for transit operations and infrastructure needs to be identified.

Regional Planning Perspectives

The regional network design calls for a network of direct services connecting outlying communities with major destinations in the Tulsa Urban Area, which will ultimately need to be supported by capital programs including park-and-ride lots and transit centers. While these longer-term perspectives are better suited for analysis in a long-range Transit Development Plan, these expectations have spilled over into the parameters for service design in this New System Design project.

Regional transportation needs must be included in transportation planning efforts in the Tulsa region. While these needs can be met in the short term by improved ridesharing and vanpool programs, changes in the land uses and developmental densities along regional corridors can change this outlook rapidly.

Governance Models

Many governance models in use elsewhere in the United States and Canada have application to the conditions in the Tulsa region.

Municipal Systems

Tulsa Transit is a municipal system, owned and operated by the City of Tulsa and funded by locally generated taxes, supplemented by payments from other jurisdictions for services provided. While the long term-continuation of this governance model is possible in the Tulsa region, it does not address the regional perspectives described above.

County-Wide or Multi-County Systems

The ownership and operation of the transit system could be focused with a consortium of one or more of the counties in the Tulsa Metro Area: Tulsa, Osage, Creek, Wagoner and Rogers Counties. This would broaden the tax base and permit the inclusion of more regional transportation issues in the development of long-term public transportation planning region-wide. Adoption of this model would require the sale of Tulsa Transit to the counties, reimbursement to the City of Tulsa for transferred assets. If expanded countywide operations

require additional funding beyond the current resources provided by the local tax base, a public vote would be required to authorize additional tax revenues to support a multi-county system.

City-County Hybrid

Another alternative is the joint ownership of Tulsa Transit by the City of Tulsa and by one or more counties in the region, accompanied by a formula-funding package to insure funding continuity and the resources necessary to expand Tulsa Transit to a more regional system. Funding would need to include provisions for not only the direct cost of service, but also the development and maintenance of the service infrastructure, including maintenance, operations, park-and-ride lots, transit centers, shelters, benches and signs.

Under this model, services provided to or within other municipalities within the counties would need to be reimbursed by those communities in some manner.

Transit District

Many states create special-purpose districts for the provision and funding of many public services, including water treatment, electric power and public transportation. The authorization for such special districts resides with the state legislature. The authorization for operating funds must be approved by a vote of the public.

Such districts can include multiple counties or just a portion of a single county. Usually, smaller municipalities can “opt in” to such a district by a majority vote of the registered voters in the affected area. The advantage of this model is that the tax burden associated with operations can be limited to the areas actually benefiting from those operations.

Governance Summary

Under the existing conditions in the Tulsa region, the continuation of the municipal operation can continue to provide direction and funding for the system. Either the Multi-County or City-County Hybrid model would be relatively easy to create from a legal perspective, and would meet the requirements for a more regional decision-making process as the transit system becomes more regional in the provision of its services. While the transportation district model is often the most difficult to create, from a legal and political perspective, it does the best job of keeping a regional perspective in the planning and implementation of public transportation services.

The management and operation of public transportation services in the Tulsa region is fundamental to the design of expanded transit services. In the short term, the network described in this document is based on the assumption that the transit system will continue to be owned and operated by the City of Tulsa.

Funding

Tulsa Transit currently lacks a dedicated funding source. Under existing funding policies, Tulsa Transit is acutely susceptible to changes in economic conditions, as experience over the past couple of years has demonstrated. Tulsa Transit currently competes with a host of other programs and services for City funding. During periods of revenue shortfall, the Tulsa Transit operating budget is subject to significant fluctuation as the City struggles to match expenditures with revenues.

Current funding of Tulsa Transit services comes from the following sources:

- City of Tulsa (50%)
- Federal Transit Administration (33%)
- Fares (12%)
- State of Oklahoma (3%)
- Other sources (2%)

While a dedicated funding source would not completely insulate Tulsa Transit from economic cycles, it would dampen the severity of the financial impacts resulting from fluctuations in tax collections making up the local share of Tulsa Transit funding. A dedicated funding source would also allow more reliable long-term forecasting of revenues and expenses, and consequently, of services and programs.

Transit Market Priorities

A number of target service markets are inherent in the design of the modified service network. The relative priorities of those markets had a significant impact on the configuration of the final network design.

Lower-Income Employees

Given the restricted service area and the range of services provided by Tulsa Transit at present, it is concluded that the highest priority of service in the short term is the preservation and expansion of transit-based work trips for low- and middle-income residents. This policy concentrates the application of new service resources to the residential and employment areas most important to lower-income workers and students. Such services focus on the hospitality and healthcare industries, on the provision of transportation to other service jobs such as restaurants and retail and on service to local colleges and universities.

Often, these service jobs do not provide standard Monday-Friday, 9 to 5 employment. For transit-dependent employees, work trips are frequently made at non-traditional times: evenings, late night and weekend periods. For this reason, the provision of service during these periods is of primary importance in providing employment-based transportation.

Elderly and Disabled

The transportation needs of the elderly and, to a lesser extend, the disabled often complement those of the low-income employees. Primary transit destinations for these persons also include healthcare and retail businesses. The network design focused on satisfying the travel needs of the elderly and disabled as a primary transportation objective.

College Students

College students comprise one of the fastest-growing transit markets in the country. As colleges wrestle with the need to expand educational facilities within limited campus building space, the expansion of transit services to students often permits the reallocation of on-campus parking areas to other uses. For these reasons, the college campus locations in the Tulsa area were considered extremely important transit destinations.

To fully take advantage of the opportunities for college student transportation, Tulsa Transit needs to forge alliances with the major post-secondary educational institutions in the Tulsa area:

- Tulsa Community College – multiple campuses
- Tulsa University
- Oklahoma State University at Tulsa
- Oral Roberts University

While a concerted attempt was made to provide high-quality service to college campuses, both direct services to student-related destinations and to the two major transfer centers, the key to improving student transit ridership is the design of transit services directly related to the needs of students on a campus-by-campus basis. While this activity was outside the scope of this project, it remains a primary market for future Tulsa Transit services.

High School and Middle School Students

While not an immediate feature of the new network design, an opportunity for Tulsa Transit to work closely with the Tulsa School District to provide transportation to high school and middle school students has been identified. Because of the nature of most school-based transportation, schools were not included as primary destinations in the modified route network.

Yet, even with the focus on all-day transit services, the modified urban network has allocated 20 vehicles for service only during peak commuter hours, providing an opportunity to increase the utilization of those vehicles by assigning them to school-based services operating at the shoulder of commuter peak periods.

Financial and Capital Plan

The implementation of the programs and services included in the new service plan is recommended on an annual incremental basis. It is recommended that these services be implemented in three groups, corresponding to the three service tiers identified in the program. For purposes of this report, it is assumed that service improvements begin in FY 2005, given adequate funding. Within that framework, the service tier implementation is recommended according to the following schedule:

Tier	Service	Implementation
1	Weekday	2005 through 2013
	Saturday	2005 through 2013
	Sunday	2008 through 2015
2	Weekday	2008 through 2012
	Saturday	2010 through 2014
	Sunday	2012 through 2016
3	Weekday	2011 through 2015
	Saturday	2013 through 2017
	Sunday	2015 through 2019

Service Hours Growth

For about 2/3 of the urban network, improved services Monday through Saturday will have minimal effect on paratransit requirements except for later evening service. For the remaining third of the urban system, weekday and Saturday improvements represent a geographic expansion of service, requiring an expansion of mandated complementary paratransit services. Expansion of urban service to Sundays represents both a temporal and geographic expansion of services requiring significant investments in additional paratransit services.

Introduction of suburban fixed route service will also have a significant impact on the complementary paratransit services mandated by ADA. The additional paratransit services required by expanded fixed route services are reflected in the accompanying financial program. Assumed incremental system service implementation is shown in *Figure 43*. ***The future expansion of demand response services likely to result from the aging of the population are not included in this analysis, which focuses only on the impacts of implementing the modified fixed route network.***

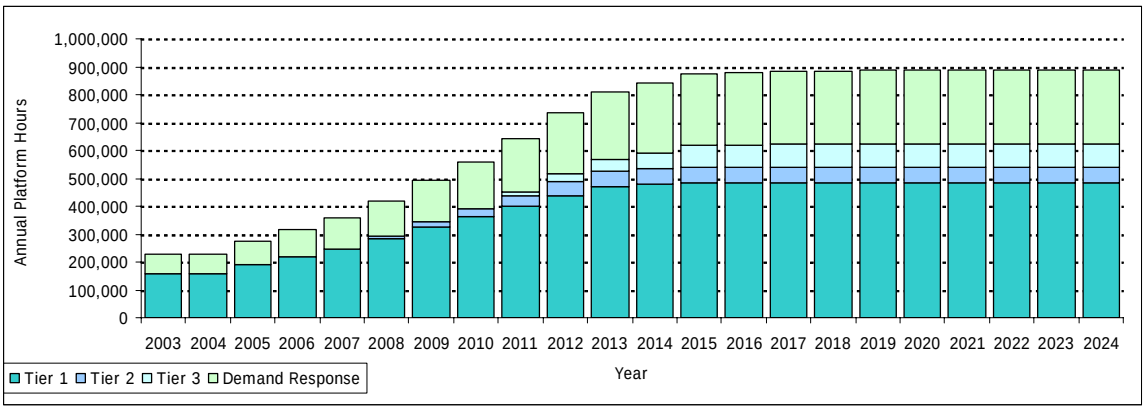


Figure 43: Estimated Service Hours by Year, 2003 through 2024

Operating Costs

The estimated growth in system operating costs, in 2003 dollars, is shown in *Figure 44*.

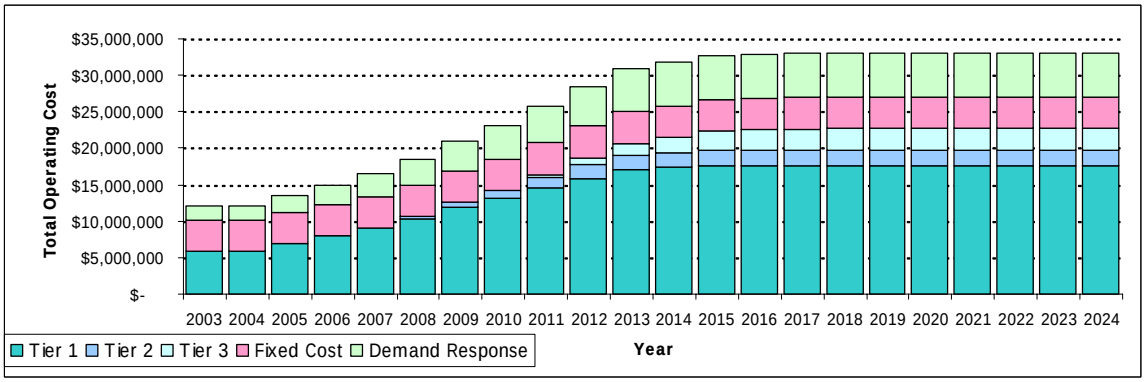


Figure 44: Estimated Annual Operating Costs, Including Inflation, 2003 through 2024

Fleet Expansion and Replacement

The service cuts implemented in 2002 and 2003 have reduced the utilization of Tulsa Transit's revenue fleet. At the same time, 28 vehicles have been retired from the fleet due to advancing age. As transit funding improves, expansion of fleet services will require the addition of fleet vehicles. The anticipated growth in the Tulsa Transit fixed route fleet is shown in *Figure 45*.

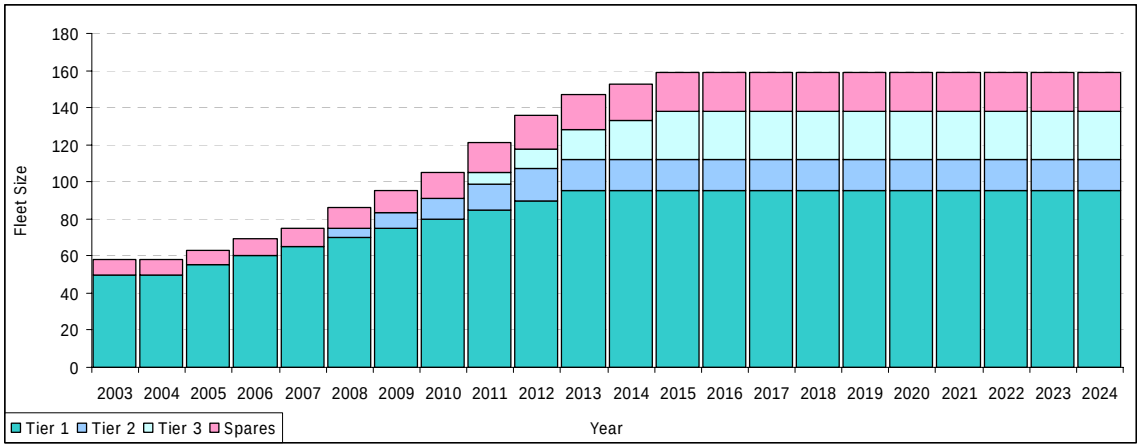


Figure 45: Projected Fleet Requirements, 2003 through 2024

An estimated fixed route fleet expansion, retirement and replacement program is summarized in *Table 42*, sufficient to operate the proposed modified urban and suburban networks. A fleet expansion and replacement capital program will need to be established in order to plan for, and fund, fleet purchases to support the service expansion program.

Model	Fiscal Year																					
Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1985	2																					
1986	6	6																				
1987	6	6																				
1990	12	12																				
1998	16	16	16	16	16	16	16															
2000	20	20	20	20	20	20	20	20	20													
2005			32	32	32	32	32	32	32	32	32	32	32	32								
2007					10	10	10	10	10	10	10	10	10	10	10	10						
2009							25	25	25	25	25	25	25	25	25	25	25	25				
2010								35	35	35	35	35	35	35	35	35	35	35	35			
2012										50	50	50	50	50	50	50	50	50	50	50	50	
2014												8	8	8	8	8	8	8	8	8	8	8
2017															32	32	32	32	32	32	32	32
2019																	10	10	10	10	10	10
2021																			25	25	25	25
2022																				35	35	35
2024																						50
Fleet	**62**	**60**	**68**	**68**	**78**	**78**	**103**	**122**	**122**	**152**	**152**	**160**	**160**	**160**	**160**	**160**	**160**	**160**	**160**	**160**	**160**	**160**
New			32		10		25	35		50					32		10		25	35		50
Retire		2	24					16		20					32		10		25	35		50

Table 42: Estimated Fixed Route Fleet Replacement and Expansion Schedule, 2003-2024

Ridership and Productivity

The new service design, based on the Tulsa Transit network in effect in September 2003 is recommended for implementation in relatively small incremental stages, beginning in 2005. Ridership projections are somewhat conservative, assuming average rider productivity on the urban system to increase to that of the existing peer group average by 2024, with Tier 2 and Tier 3 productivities reaching somewhat lower levels. In addition, demand response ridership reflects only the impacts of implementation of the modified fixed route urban and suburban networks and does not include future growth likely to result from the aging of the population as a whole. On that basis, anticipated ridership from 2004 through 2024 is depicted in Figure 46.

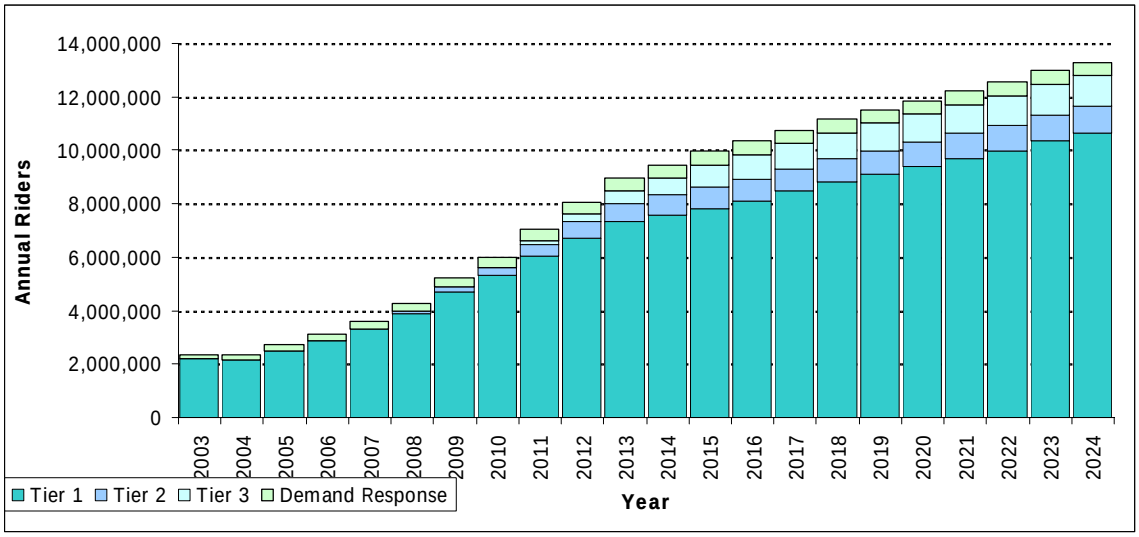


Figure 46: Estimated Ridership Growth, 2003 through 2024

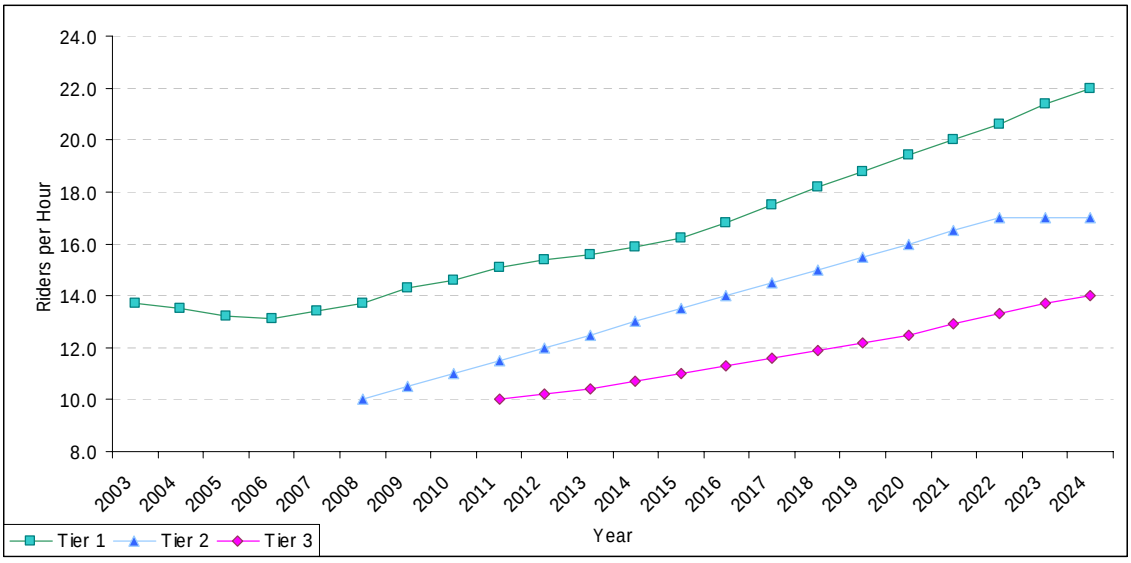


Figure 47: Estimated Ridership Productivity, 2003 through 2024

Appendix A: Detailed Services and Costs

Appendix B: Telephone Survey Questionnaire

Carolyn Browne Associates
16820 NE 11th Place
Bellevue, WA 98008
425-644-6820

INTERVIEWER _____
START _____
STOP _____
TOTAL _____

Person Called: _____

Phone: _____

Tulsa Transit

SURVEY OF CITY OF TULSA RESIDENTS

December, 2002

Hello, I'm _____ calling from Consumer Opinion Services, a marketing research firm in Seattle, Washington. We are conducting a short public opinion survey in the city of Tulsa concerning transportation services in the area. The information will be used to help the City make planning decisions. The survey will take about 8 minutes. I am not trying to sell you anything. Are you 18 years of age or older? (IF NOT, ASK TO SPEAK WITH SOMEONE IN THE HOUSEHOLD WHO IS THIS AGE, OR FIND AN APPROPRIATE TIME TO CALL BACK TO TALK WITH THAT PERSON).

1. What is the name of the local bus service in the Tulsa area? (DO NOT READ)

1 Tulsa Transit/Metropolitan Tulsa Transit Authority/MTTA

2 Other suggestions: _____

3 Don't know

.

2. How many blocks do you live from the nearest bus stop?

1 Less than 1 block

2 1 block

3 2 blocks

4 3 blocks

5 4 to 7 blocks

6 No bus stop available

7 Don't know

3. On a 5-point scale, where 5 is excellent and 1 is very poor, how would you characterize the existing Tulsa Transit System:

Excellent----------Very Poor

5 4 3 2 1 0 (DON'T KNOW)

4a. Have you, or anyone in your household, used the Tulsa Transit system within last six months?

1 Yes

2 No) Skip to Question 5

3 Not sure)

4b. How recently was the Tulsa Transit System used? (READ ONLY IF PERSON HESITATES)

1 Within the last week

2 One week to one month ago

3 Two to three months ago

4 More than three months ago

5 Can't recall

5. Compared with the bus service provided by Tulsa Transit five years ago, would you say that the bus service today is better, worse, or about the same?

1 Better

2 Worse

3 About the same

4 Don't know (DON'T READ)

6. I am going to read a list of potential improvements to the Tulsa Transit System. On the 5-point scale where 5 is very important and 1 is not at all important, will you please rate each suggested improvement? First, how about _____ (ROTATE LIST)

Potential Improvements	Very important---Not important					Don'tKnow
Weekday bus service after 7PM	5	4	3	2	1	0
Saturday bus service after 6 PM	5	4	3	2	1	0
Sunday service	5	4	3	2	1	0
A route closer to your home	5	4	3	2	1	0
A route closer to your job or school	5	4	3	2	1	0
More frequent bus service	5	4	3	2	1	0
More bus shelters and benches	5	4	3	2	1	0
Light rail transit where feasible	5	4	3	2	1	0
Better route and schedule information	5	4	3	2	1	0
Express service to major employers	5	4	3	2	1	0
Make the bus system easier to understand	5	4	3	2	1	0
Service to outlying areas	5	4	3	2	1	0

7. Is there a potential bus improvement I did not read that you believe is very important? What is that?

_____

09 Nothing else named

8. If some of the improvements were made that are most important to you, how likely would you be to begin riding Tulsa Transit or to ride it more often? Would you say you would be:

1 Very likely

2 Somewhat likely

3 Somewhat unlikely

4 Very unlikely

5 Don't know (DON'T READ)

9. How likely would you be to vote for some increase in taxes to fund some of the improvements that are most important to you? Would you say you would be:

1 Very likely

2 Somewhat likely

3 Somewhat unlikely

4 Very unlikely

5 Don't know (DON'T READ)

10a. Have you used public transit in any other city in the last 5 years?

1 Yes

2 No – SKIP TO QUESTION 11

10b. On average, about how many times a year have you ridden on public transportation in another city in the last 5 years? (READ, ONLY IF PERSON HESITATES)

1 Once or twice a year

2 One to four times a year

3 Five to 20 times a year

4 More than 20 times a year

5 Can't recall

10c. Have you ridden light rail transit in another city?

1 Yes

2 No

11. Do you think that a good public transportation system is important to the economic vitality of the area?

1 Yes

2 No

3 Not sure

12. What do you believe are major reasons that people in Tulsa ARE using the bus system?

_____

Now, I'd like to ask a few demographic questions for classification purposes. Your answers will in no way be identified with your name.

13a. What is your current employment status?

1 Employed full time
2 Employed part time
3 Full time student
4 Unemployed)
5 Retired) SKIP TO QUESTION 14
6 Homemaker)
7 Refused (DO NOT READ))

13b. On average, how long does it take you to travel one-way to work or school?

1 5 minutes or less
2 6 to 10 minutes
3 11 to 15 minutes
4 16 to 20 minutes
5 21 to 30 minutes
6 More than 30 minutes
7 No response

13c. How do you usually travel between home and work or school?

1 Drive alone
2 Drive with one or more other people
3 Bus)
4 Walk) SKIP TO QUESTION 14
5 Bike)
6 Work at home)
7 No response)

13d. Do you presently pay for parking at or near your place of employment or school?

1 Yes

2 No – SKIP TO QUESTION 14

13e. How much do you pay per month for your parking? _____

14. What is your age? _____

15. Are there any children, under 18 residing in your household?

1 Yes 2 No

16. Is there any member of your household, five years of age or older, who has a health condition that makes it difficult for them to travel in and around the local area?

1 Yes

2 No

17. Is there any member of your household that has ever had difficulty seeking or retaining employment because there was no transportation available?

1 Yes

2 No

3 Not sure

18. Has anyone in your household ever been stranded because there was no transportation available?

1 Yes

2 No

3 Not sure

19. Finally, how many cars or trucks are in working condition in your household? _____

Thank you very much for taking the time to help us with this survey.