Quality of Life PROGRAM

RTD FASTTRACKS

Quality of Life Study

Baseline Report - 2006

February 2008

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EXECUTIVE SUMMARY

Purpose of the Study

The FasTracks Plan was adopted by the RTD Board in April 2004, and approved by the voters in November 2004. The RTD Board adopted three core goals for the FasTracks Plan:

- Establish a proactive plan that balances transit needs with future regional growth
- Increase transit mode share during peak travel times
- Provide improved transportation choices and options to the citizens of the [Regional Transportation] District

The Quality of Life Study (QoL) was initiated to identify, track and measure how the FasTracks Plan is achieving the adopted goals. Additionally, the study is intended to identify and quantify FasTracks' effects on the region. That is to say, the study measures how the region changes as the transit corridors are planned, constructed and opened for service. The QoL Study is also designed to collect "Before and After" information required by the Federal Transit Administration (FTA) for those rapid transit corridors receiving federal New Starts funds.

Study Scope

The QoL Study is a multi-year effort that began with the establishment of a "baseline" dataset, (pre-FasTracks) and will continue after the FasTracks Plan has been constructed. The QoL Study will provide the RTD Board and other stakeholders with regular (annual) updates on selected measures, with a report of all measures every three years. These updates will serve three purposes: (1) demonstrate early impacts of the program in the years before and during construction, (2) provide a high-level summary of the program's impacts following project openings, and (3) develop trend lines for key measures that will allow FasTracks' benefits and impacts to be more easily identified over time.

The QoL Study is focused on areas that are most affected by transit improvements:

- Mobility
- Environment
- Economic Activity
- Development and Land Use

Quantitative data will be collected for the QoL Study at three levels:

- Region
- Rapid transit corridor (existing and future)
- Rapid transit station areas (existing and future)

RTD made an effort to conduct the QoL Study using data collected from existing sources, either from on-going efforts of the RTD and other agencies, or, in the case of the FTA Before and After Studies, have resources dedicated to the collection and analysis of specific information.

Some measures can fluctuate substantially from year to year due to external factors, so a relatively large number of data points are needed to identify long-term trends that may otherwise be obscured by year-to-year variations. Thus, data will continue to be collected on all measures throughout the life of the FasTracks program. However, to account for the fact that many measures will not change appreciably on an annual basis, the QoL annual report will consist of the results of key measures which are a subset of the larger set of measures, and a more detailed report will be prepared every three years.

2006 Baseline Report

This is the first report for the QoL Study and the information in this report summarizes the information against which future data will be compared. The data presented in this report were collected prior to the opening of the Southeast Corridor light rail.

To better define and organize the data collection effort, objectives were established for each of the RTD Board adopted goals. Measures were then established for each of these objectives. The goals and objectives and samples of the measures and baseline data contained in the full report are summarized below.

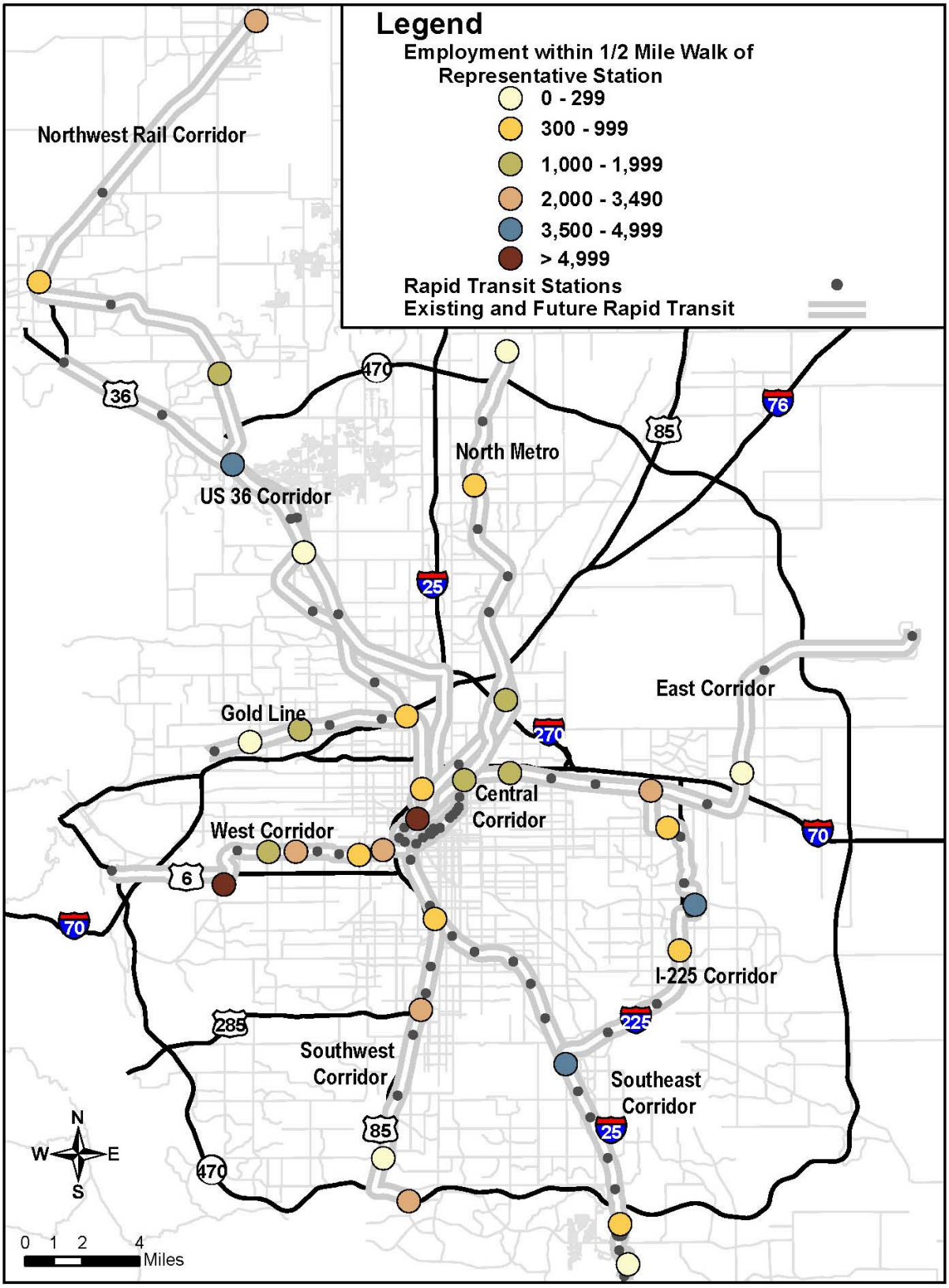
***Goal 1**: Establish a Proactive Plan that Balances Transit Needs with Future Regional Growth*

- Objective 1: Meet Future Transportation Needs
    - o Sample Measure: Comparison of the population and employment growth in the rapid transit corridors and in station areas to the growth in the region overall.
- Objective 2: Provide opportunity for Development Near Transit
    - o Sample Measure: Quantify and track the residential, commercial and institutional development in station areas.
- Objective 3: Environmental Sustainability
    - o Sample Measure: Energy consumption and air quality

2006 Baseline Report Example, Goal 1: Station Area Employment

Approximately 116,100 jobs were found in representative rapid transit station areas, according to 2005 DRCOG socioeconomic data. Figure ES 1 illustrates employment at each of these station locations. Station area data were collected in the area within a one-half mile radius around representative stations. The stations were selected to represent the different types of areas around stations: urban centers, community centers, or neighborhood centers

ES 1: Station Area Employment



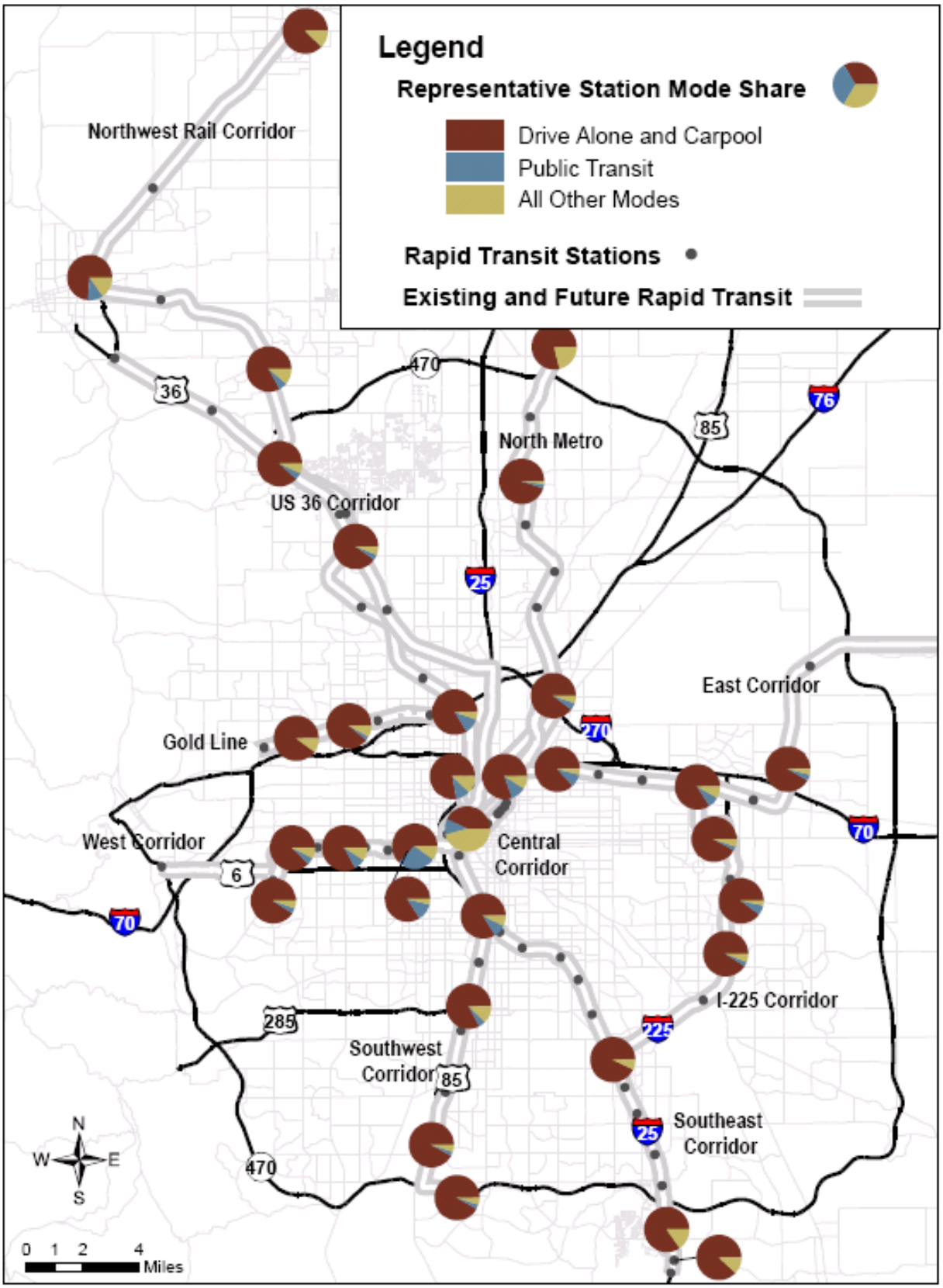
***Goal 2**: Increase Transit Mode Share at Peak Times*

- Objective 1: Transit Usage
    - o Sample Measure: Peak transit modes share and ridership
- Objective 2: Travel Safety and Security
    - o Sample Measure: Crime on RTD property
- Objective 3: Customer Satisfaction
    - o Sample Measure: Results of RTD customer satisfaction surveys on convenience, travel time, security, comfort and other factors

2006 Baseline Report Example, Goal 2: Station Area Transit Mode Share

The transit share of commute trips for those living in station areas may increase if development is such that residential/mixed use and higher density development is constructed. Using 2000 Census data, mode share was determined for residents within one-half mile of existing and future rapid transit representative station areas. As shown in Figure ES 2, drive alone and carpool are currently the predominant commuting mode for residents. Some station areas do show significant transit mode share, including station areas in and close to downtown Denver and the future Boulder Transit Village. This higher transit mode share is likely correlated with a higher level of bus service in these areas. For example, the West Corridor's Federal-Decatur station area, which is the site of a current RTD transfer center, has the highest share of transit use at 27 percent.

ES 2: Representative Station Area Mode Share



Goal 3: *Provide improved transportation choices and options to the citizens of the District*

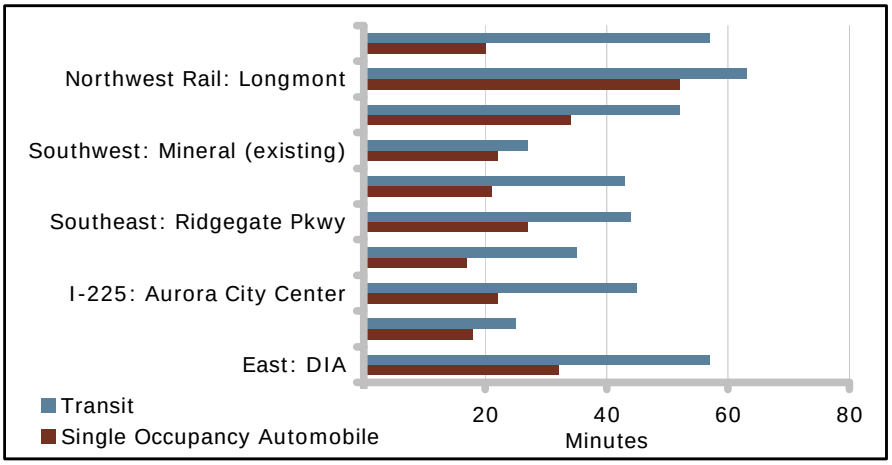
- Objective 1: System Mobility
    - o Sample Measure: Corridor travel times on transit and roadways
- Objective 2: Travel Choices and Accessibility
    - o Sample Measure: Number of households and jobs with access to high frequency transit service

2006 Baseline Report Example, Goal 3: Corridor Travel Time

Transit's ability to provide a competitive travel time compared to the auto is essential to make transit a viable transportation option. Over time, congestion in the Denver region is expected to worsen, which will increase auto travel times and decrease the reliability for auto commuters.

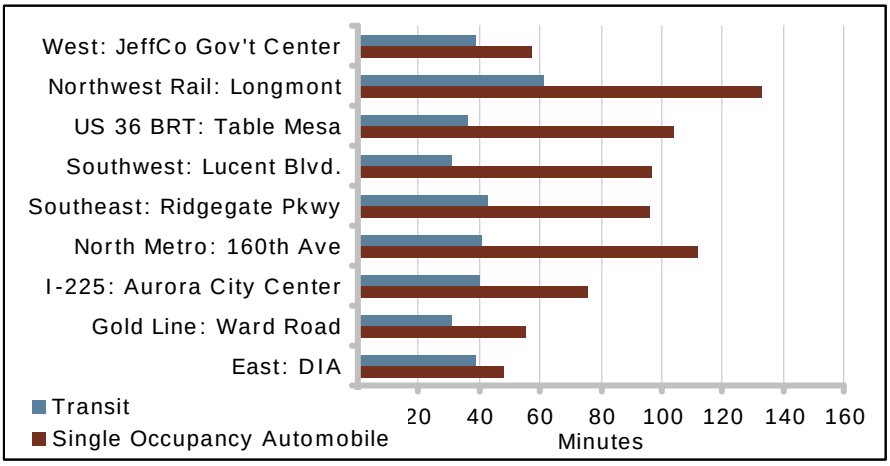
Automobile travel times were measured by timing the drive from key origins and destinations during the AM peak period in October 2006. Result for travel time analysis for auto and transit to downtown Denver are shown in Figure ES 3. Travel time data for 2006 show that auto travel times are currently shorter than the transit travel times from key stations on each of the existing and future rapid transit corridors. This is because the majority of transit in the Denver region is bus transit operating in traffic and not in its own right-of-way. Thus, buses are typically caught in the same congestion as autos. With the implementation of rapid transit, RTD will provide higher speed and more reliable transit times that are much more competitive with the auto on the region's increasingly congested roadways.

ES 3: AM Peak Period Travel Times to Downtown Denver (16th & California), Fall 2006



After FasTracks is implemented, transit will provide higher speed and more reliable transit times that will be much more competitive with the auto on the region's increasingly congested roadways. Figure ES 4 shows the auto and transit projected corridor travel times for 2025.

ES 4: AM Peak Period Travel Times to Downtown Denver (16th & California), Projected 2025



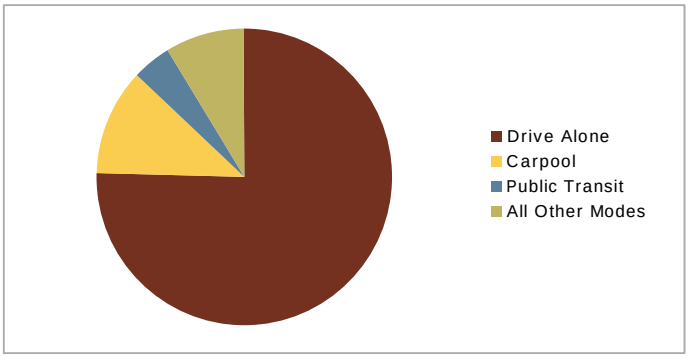
Conclusion

The baseline data presented in this 2006 QoL report provide a foundation against which to compare to future data. These comparisons will eventually tell a story about how the region (and more specifically the rapid transit corridors and station areas) is changing in terms of mobility, economic development and the environment. Although this report provides a snapshot of the region, existing and future rapid transit corridors and station areas for broad range of measures, several key observations are notable.

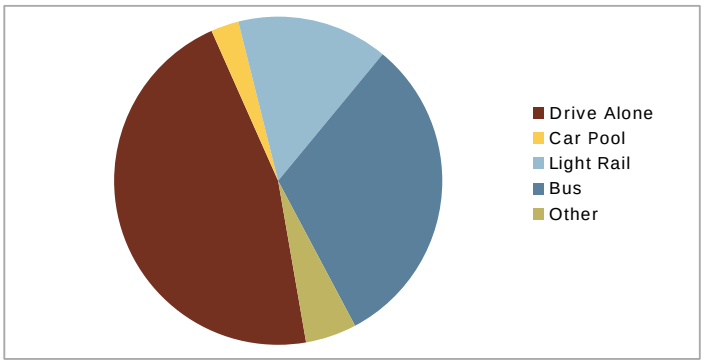
Reliable, high-frequency transit service that is competitive with auto travel times results in higher transit ridership. Between 2000 and 2006 (before the opening of the Southeast Corridor light rail) bus boardings grew by six percent but light rail boardings increased 69 percent.

Areas with a high level of transit service are correlated with a higher transit mode share. In 2005, regional transit mode share for commute trips was at four percent but a 2003 Downtown Denver Partnership survey of those commuting to downtown Denver indicated a transit mode share of 46 percent. These data are show in Figures ES 5 and ES 6.

ES 5: Denver Region Commute Trip Mode Share 2005



ES 6: Downtown Denver Commute Trip Mode Share 2003



It is important to note that the FasTracks transit investment is but one variable in the equation that may yield improved mobility, economic development opportunities, and environmental benefits. Local governments and private entities, that will be primarily responsible for developing the areas adjacent to the transit stations, will need to implement appropriate land use regulations and thoughtful development plans.

The QoL Study will continue to collect data throughout the life of the FasTracks program. Future reports will demonstrate early impacts of the program in the years before and during construction, provide a high-level summary of the program's impacts following project openings, and develop trend lines for key measures that will allow FasTracks' effects to be more easily identified in the long term.

I. INTRODUCTION

Purpose of the Study

The Regional Transportation District (RTD) Quality of Life (QoL) Study is a multiyear, monitoring program intended to objectively measure the effects of the FasTracks program at three geographic scales: regionally; within existing and future rapid transit corridors; and at transit station areas. This study focuses on "quality of life" in the context of those areas most affected by transit improvements: mobility, environment, economic activity, and development/land use. The three key objectives of the QoL Study are as follows:

- to identify FasTracks' effects on the region;
- to collect data for and to track, and observe trends for measures of economic activity, changes in land use, and the value placed on transit investments; and
- to provide required Before and After (BA) Study information to the Federal Transit Administration (FTA).

Specific measures, discussed below, were developed from the FasTracks Plan Core Goals in order to determine how the region changes throughout the life of the FasTracks program.

This is the first report for the QoL Study. It provides a baseline against which future data will be compared. It is important to note that the data presented in this report were collected prior to the opening of the Southeast Corridor light rail. Generally, data collection is for the years 2004-October 2006. When possible, data collection extended as far back as 2000 in order to establish trends for specific measures. The QoL Study will report annually on a subset of the complete measures, referred to as "high-level measures". Approximately every three years, the QoL Study will report on the entire list of measures. These reports will be produced throughout the life of the FasTracks program and continue for at least two years after the project is complete.

Measuring FasTracks' Effects

The FasTracks Plan identifies a series of anticipated effects to the region as a result of implementation of transit improvements. In order to identify the possible benefits and impacts of FasTracks on the region, this study aims to gauge how the region is changing as transit corridors are planned, built, and opened for customer service. The measures by which the QoL Study determines benefits and impacts grew from, and were shaped by, the FasTracks Plan core goals established by the RTD Board of Directors. Those goals are:

- Establish a proactive plan that balances transit needs with future regional growth;
- Increase transit mode share during peak travel times; and
- Provide improved transportation choices and options to the citizens of the [Regional Transportation] District.

Data Collection and Reporting

An additional purpose of the QoL Study is to provide the RTD Board and other stakeholders with regular (annual) updates. These updates will serve three purposes: (1) to demonstrate

early impacts of the program in the years before and during construction, (2) to provide a high-level summary of the program's impacts following project openings, and (3) to develop trend lines for key measures that will allow FasTracks' benefits and impacts to be more easily identified in the long term.

The study endeavored to refrain from collecting new data and use existing data already collected by RTD, the Denver Regional Council of Governments (DRCOG), local governments or generally available from federal government agencies. The exception to this general rule is the collection of data required for FTA Before and After studies. The purpose of using existing data was to make the data collection as efficient and cost effective as possible.

The Measures

The measures in this report are not intended to track the FasTracks Team planning, design and construction performance during the course of FasTracks project delivery. The FasTracks Program Management Team has other systems in place to measure and report project activities. The QoL Study will track project outcomes. The QoL measures are meant to show the changes in the region, transit corridors, and transit station areas. While there may be a correlation between the results of the measures and the presence of transit, the project will most likely have the greatest measurable impact at the smaller scales of transit corridors and station areas. Therefore, the QoL Study will gather data at the regional, transit corridor, and transit station levels, but the study's focus will be on corridors and station areas.

The outline below provides an overview of the structure of the QoL Study as well as this report. As previously mentioned all measures for the QoL Study grew from and were shaped by the FasTracks Plan core goals. *The outline below highlights the FasTracks Plan Core Goals and the objectives under which the measures are allocated.*

FasTracks Plan Core Goal 1:

Establish a Proactive Plan that Balances Transit Needs with Future Regional Growth

- Objective 1: Meet Future Transportation Needs
    - Population growth
    - Job growth/employment
    - Housing growth
- Objective 2: Provide Opportunities for Development Near Transit
    - Economic activity
    - Property value
- Objective 3: Environmental Sustainability
    - Sustainable project features and actions
    - Air quality
    - Energy consumption

FasTracks Plan Core Goal 2:

Increase Transit Mode Share at Peak Times

- Objective 1: Transit Usage
    - Peak transit mode share and ridership
- Objective 2: Travel Safety and Security
    - Passenger perceptions
    - Crime on RTD property
- Objective 3: Customer Satisfaction
    - Overall transit passenger satisfaction

FasTracks Plan Core Goal 3:

Improve Transportation Choices and Options

- Objective 1: System Mobility
    - Roadway system vehicle miles traveled (VMT)
    - Corridor travel times and variability
    - Traffic volumes
    - Extent of congestion
    - User cost savings
- Objective 2: Travel Choices and Accessibility
    - Access to transit (pedestrian/bicycle/bus/auto)
    - Household and job access to high frequency transit service
    - Regional destination access to high frequency transit service

High Level Measures

Some measures can fluctuate substantially from year to year due to external factors, so a relatively large number of data points are needed to identify long-term trends that may otherwise be obscured by year-to-year variations. Thus, the QoL annual report will typically report changes in eleven key measures which are a subset of the larger set of measures, namely those identified as High Level Measures (see Table 1). These measures have been selected on the basis of being measures that can be directly impacted by FasTracks activities and being measures that are easy to evaluate and present.

Table 1: QoL High Level Measures

Goal	Objective	Measure
Establish a proactive plan that balances transit needs with future regional growth	Meet Future Transportation Needs	**Direct Job Creation**
	Provide Opportunities for Development Near Transit	**Taxable Retail Sales**
	Environmental Sustainability	**Environmentally Friendly Designs and Actions**
Increase Transit Mode Share at Peak Times	Transit Usage	**Transit Boardings Per Capita**
	Travel Safety and Security	**Crime on RTD Property**
	Customer Satisfaction	**Overall Service Rating**
Improve Transportation Choices and Options	System Mobility	**Travel Time Variability**
		Transit and Auto Travel Times Through Corridors
	Travel Choices and Accessibility	**park-n-Ride Capacity and Utilization**
		Regional Destination Access to Quality Transit Service
		Area Zoned at Transit-Supportive Densities

Required FTA Information

The QoL Study will also collect data required for FTA Before and After (BA) studies for corridors receiving federal New Starts funding. The goal of the FTA BA Study is to determine how well these corridors met their forecasts for five key project characteristics: project scope, transit service levels, capital costs, operating and maintenance costs, and ridership and fare revenue. Planning data are collected just before the project opens, and then compared to data collected approximately two years after opening. The BA studies are designed to provide the FTA and the transit industry in general, with better information about project costs, impacts, and planning/forecasting methods.

Description of the FasTracks Program

To provide some background information on the program on which the QoL Study focuses, this section gives an overview of the general program as well as a brief corridor description.

FasTracks is a 12-year comprehensive plan for implementation of high quality transit service and facilities in the Denver region. FasTracks is a proactive plan that responds to the growing transportation needs of the Denver metropolitan region by providing an enhanced region-wide, reliable and safe transit system. The plan includes building and operating commuter and light rail lines, as well as expanding and improving bus service, including bus rapid transit (BRT), and park-n-Rides throughout the region. There will be:

- 122 Miles of new light rail and commuter rail.
- 18 miles of bus rapid transit service.
- 21,000 new parking spaces at rail and bus stations.
- Expanded bus service in all areas.

These improvements are subject to the environmental process. Corridors identified for improvement are identified in Figure 1 and include:

West Corridor

This project is a proposed 12.1-mile light rail transit corridor between Denver Union Station and the Jefferson County Government Center in Golden. The project is in Final Design with construction scheduled to begin in 2008 and to be completed in 2012.

East Corridor

This proposed 23.6-mile commuter rail transit corridor connects Denver Union Station and the Denver International Airport (DIA). A draft EIS is expected to be ready for public comment by fall of 2009. Final Design and construction is scheduled to begin in 2010 and be completed in 2014.

Central Corridor

This 5.3-mile light rail line originally opened in 1994 and is Denver's first light rail line running from I-25/Broadway, through downtown Denver, and along Welton Street to 30th/Downing. The light rail extension, as part of FasTracks, takes the line north on Downing Street less than a mile to the 40th/40th Station, a transfer station with the East and North Metro Corridors. This project is expected to be locally funded. Construction is scheduled to be completed in 2015.

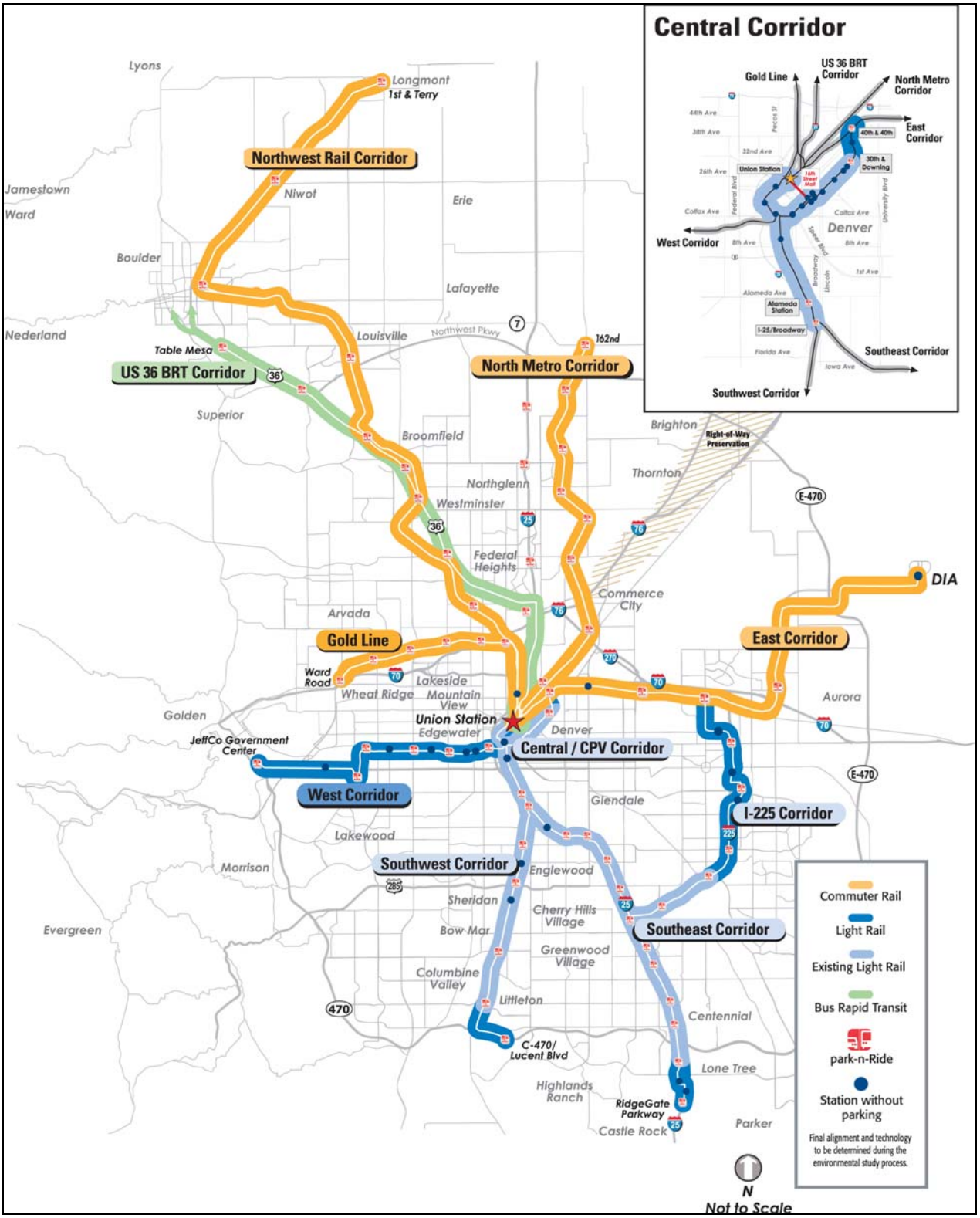
Gold Line

This proposed 11.2-mile commuter rail transit corridor goes from Denver Union Station to the vicinity of Ward Road, passing through northwest Denver, unincorporated Adams County, Arvada and Wheat Ridge. The Gold Line EIS began in summer 2006 and is expected to be completed in early 2009. Final Design and Construction is scheduled to begin in 2009/2010 and completed in 2015.

I-225 Corridor

This proposed 10.5-mile light rail line connects the Southeast Corridor Nine Mile light rail station at Parker Road and I-225, and the East Corridor at Smith Road and Peoria. At Smith Road and Peoria, a cross-platform transfer to the East Corridor rail line to DIA and downtown Denver will be provided. The I-225 Corridor Environmental Evaluation (EE) began in summer 2007 and is expected to be completed in the fall of 2009. Construction is scheduled to begin in 2012 and be completed in 2015.

Figure 1: FasTracks Program Map



North Metro Corridor

This proposed 18-mile commuter rail transit corridor extends from Denver Union Station to 162nd Avenue, passing through Denver, Commerce City, Thornton, Northglenn and unincorporated Adams County. The North Metro Corridor EIS began in 2006 and is expected to be completed in late 2009. Construction is scheduled to begin in 2011 and be completed in 2015.

Northwest Rail Corridor

This proposed 41-mile commuter rail corridor connects Denver Union Station to Longmont via Boulder, passing through Adams County, Westminster, Broomfield, Louisville, Boulder, Niwot, and Longmont. The Northwest Rail Corridor EE began in 2007 and is expected to be completed in 2009. Construction is scheduled to begin in 2010 and be completed in 2014.

The Southeast Corridor Extension

This 2.3 mile light rail project extends the existing Southeast Corridor LRT line to Lone Tree. The Southeast Corridor opened in 2006 and is a 19.1-mile light rail line from I-25/ Broadway to Lincoln Avenue in Douglas County with an additional connection from I-25 to Parker Road along I-225. The EA is expected to begin in early 2008 and construction is scheduled to be completed in 2015.

The Southwest Corridor Extension

The Southwest Corridor light rail line opened in July 2000 as an 8.7-mile extension from I-25/Broadway to Mineral Avenue in Littleton. Plans to extend the line 2.5 miles south from Mineral Avenue to Lucent Boulevard in Highlands Ranch include a new station at C-470/Lucent Boulevard. A new station will also be added in Englewood at Bates Avenue when a new planned development is constructed. The EA is expected to begin in early 2008 and construction is scheduled to be completed in 2015.

US 36 Corridor

This 18-mile Bus Rapid Transit (BRT) Corridor connects downtown Denver and Boulder. The FasTracks program includes funding for Phase I BRT, slip ramps and access improvements to park-n-Rides along the corridor. These components will be completed in 2009. In addition, FasTracks will fund stations, platforms and a proportional share of HOV lanes as part of future Colorado Department of Transportation (CDOT) improvements to US 36. The EIS for US 36 began in 2003. The Draft Environmental Impact Statement (DEIS) was released for public review on August 3, 2007. RTD, CDOT and the US 36 communities are working to identify a highway/BRT alternative on this corridor and complete the Final Environmental Impact Statement (FEIS).

II. BASELINE REPORT

This is the first report for the QoL Study. It provides a baseline, or an inventory of existing conditions, against which future results will be compared. It is important to note that the results presented in this report are prior to the opening of the Southeast Corridor light rail. Generally, data collection is for the years 2004 - October 2006. Where possible, data were collected as far back as the year 2000 in order to establish an existing trend for that measure. The QoL Study will report annually on a subset of the complete measures, referred to as "high-level measures". These reports will occur throughout the life of the FasTracks program and continue for at least two years after the final project opens. Approximately every three years, the QoL Study will report on the entire list of measures.

Geographic Scales of Data Collection

Data for this report were aggregated at three different geographic scales: regional, rapid transit corridor, and rapid transit station area. FasTracks build out has yet to occur, and thus, all results represent existing conditions. No forecasts are provided.

Regional Scale

With the exception of transit-specific measures, measures at the regional scale will be only marginally affected by implementation of the FasTracks program. Measures at the regional scale provide the basis for assessing measures at the corridor and station areas scales. The effects of transit improvements on demographic and economic characteristics, and land use and development tend to be narrowly focused in corridors and around stations. Therefore, it is necessary to know the status of the region in order to put the status of the corridors and station areas in perspective and illustrate the effects of transit improvements.

In order to provide a frame of reference for the Denver region results, several peer cities/regions were selected for comparison. The peer cities were selected based on the following criteria: being located in the Midwestern or Western part of the country, being of comparable size, and the presence of rail systems. The selected peer cities are: Portland, Seattle, Salt Lake City, Dallas, Sacramento, San Jose, and Minneapolis. These peer city comparisons for select measures are presented in Section IV of this report.

Different providers of data used in the QoL Study use different definitions for the Denver region. The RTD boundary currently includes all of Boulder, Broomfield, Denver, and Jefferson counties; western Adams, western Arapahoe, and northern Douglas counties; and a small portion of southwest Weld County. Federal data providers generally use Metropolitan Statistical Areas (MSA) to define regions; the RTD boundary includes all of the Boulder MSA and portions of the Denver-Aurora MSA. The Denver-Aurora MSA was significantly expanded in 2005, based on 2000 Census results, to include four counties located well outside of the RTD boundary: Clear Creek, Elbert, Gilpin, and Park. The Texas Transportation Institute (TTI) Mobility Study provides congestion measures for the urban area (the portion of the region with population densities exceeding 1,000 per square mile); the urban area boundary typically expands each year.

Corridor Scale

Similar to the differences in the definition of the region, depending on the measure, what constitutes corridor geography varies by measure. In general, analysis of most measures looked at a one mile buffer of the transit alignments (one mile on each side of the alignment). The study areas used for corridor Environmental Impact Statements (EIS) were not used due to the different methodologies employed to determine each study area. The sizes and shapes of each EIS corridor study area varied so widely that comparisons between corridors were difficult to make.

Station Area Scale

Station area data were collected in the area within a one-half mile radius around representative stations. For the majority of station area measures, a select subset of 32 representative stations is analyzed. Measures, for which data were readily available for all existing and future rapid transit stations, are included in this report.

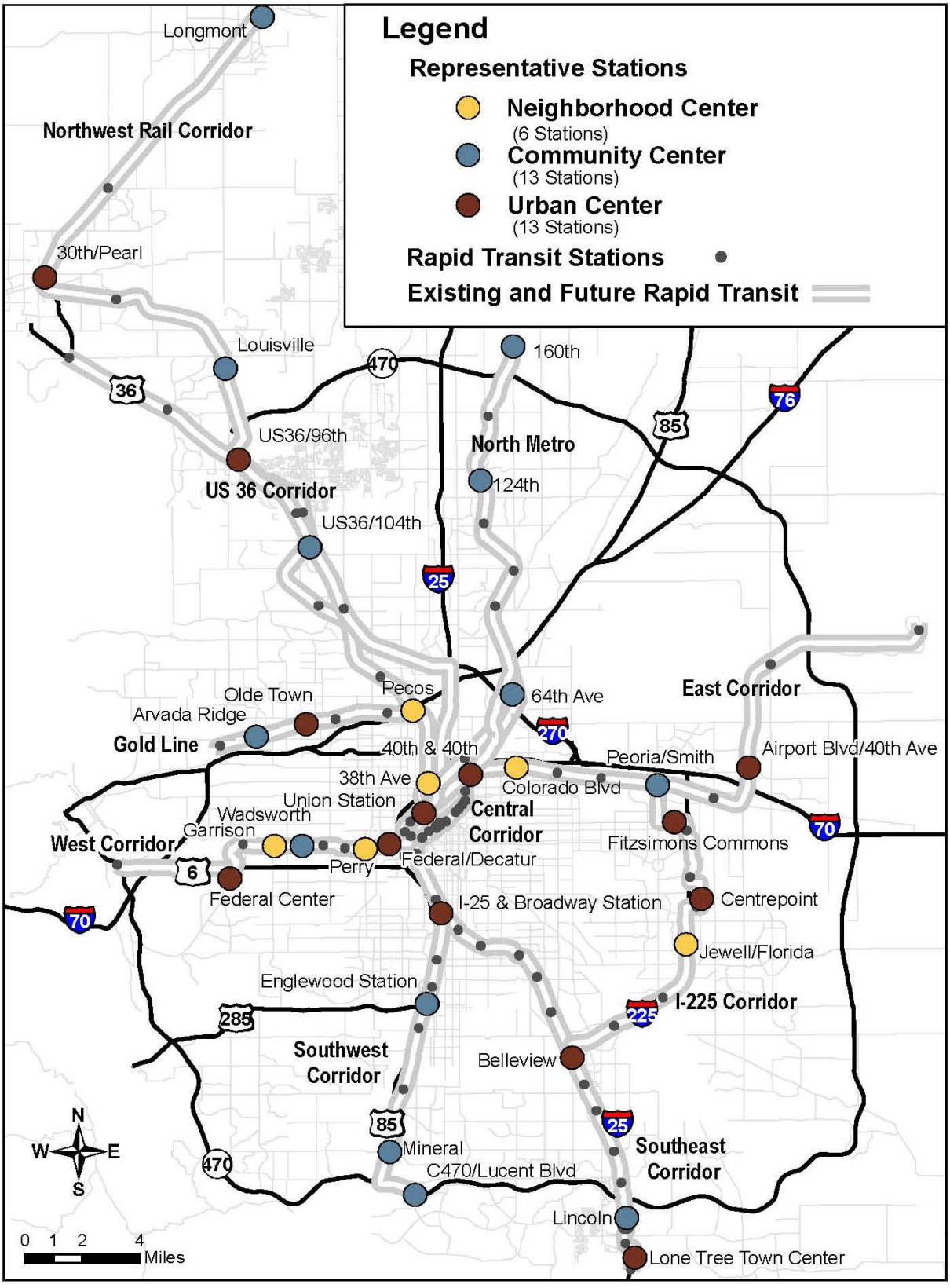
The representative station approach was chosen due to the size of the overall study and the need for efficiency; examining every station, both now and in the future, for every measure, is not feasible. Representative stations are shown in Figure 2 (only representative stations are labeled). The stations were selected to represent the different types of areas around stations: urban centers, community centers, or neighborhood centers.

Station areas were selected based on urban centers identified in the DRCOG *MetroVision* regional plan as well as local government classifications, such as the City and County of Denver's transit-oriented development (TOD) station typology system. Station areas were further evaluated based on street design, intersection frequency, transit service, pedestrian and bicycle facilities, parking supply, land use, vehicle speeds, and regulatory tools (see Appendix A for a complete description of the methodology).

In general, urban centers are mixed-use destinations with a high level of pedestrian connectivity and transit service. Community centers are mixed-use areas of less development intensity and less frequent transit service. Neighborhood centers are areas with lower development intensity that are not necessarily mixed-use and may be more auto-oriented. The QoL Study tried to balance representative station selection by status (existing or future), corridor, and typology.

It is important to note that as corridor EISs and project development progresses, some station locations may change slightly. In general, the analysis for this baseline document used station locations from the original 2004 FasTracks Plan.

Figure 2: QoL Representative Stations



QoL Measures and Results

The goal of this section is to provide a rationale for the selection of measures and describe how they relate to the FasTracks transit investment. Some general results will be presented in Section II, but all measures and their analysis are provided in Section IV of this report. It is important to note that these data are for *existing conditions* as of 2006 only and that this report does not provide forecast data. The measures are discussed and presented in order of the FasTracks Plan goal with which they are associated.

Although key measures were developed based on the FasTracks Plan Core Goals, it is important to note that not all of the measures being tracked for the QoL Study are at a geographic scale that FasTracks will influence. It is necessary to track measures at the regional level since they provide a context for the areas that will be most affected, transit corridors and station areas. For example, fluctuations in regional population will not be measurably impacted by the FasTracks program, but the regional population number, and change in that number, provides a basis for understanding changes in corridor and station area population.

Given the dichotomy that exists within the QoL measures, the baseline data reporting in this document is presented in two sections. First, the presentation of baseline data for those measures most affected by the FasTracks program is in Section II. Second, the presentation of baseline data for all measures, including those that likely will not be as measurably affected by FasTracks implementation is in Section IV of this report.

Goal 1: Establish a Proactive Plan that Balances Transit Needs with Future Regional Growth

The Denver metropolitan region is expected to grow from 2.46 million (2001) people to 3.39 million in 2025. This growth requires an enhanced transit system to help meet the future transportation needs of the region. FasTracks responds to this need and provides opportunities to focus development near transit to take advantage of the increased capacity and convenience of the enhanced system.

Future population and employment projections are an important basis for all metropolitan planning and impact everything from transportation to economic conditions at all scales of activity. The measures related to this goal focus on population and economic growth as well as environmental sustainability aspects of the FasTracks program.

Objective 1: Meet Future Transportation Needs

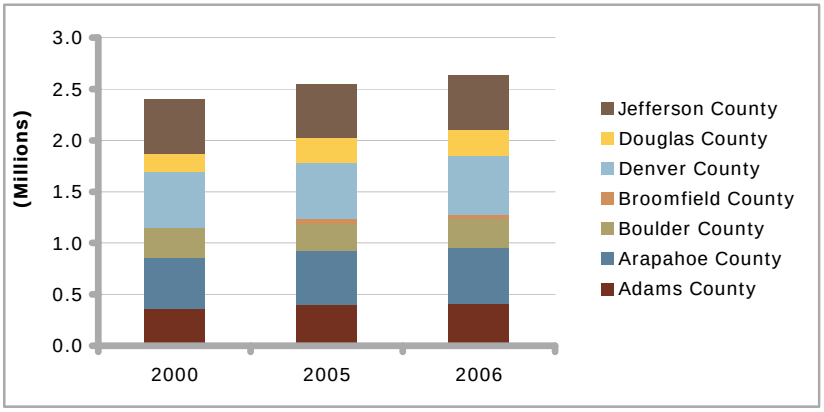
Population

Regional Population

Measuring population at the regional scale over time is one of the key elements of baseline data that the QoL Study collects, as it provides context for nearly every other measure in the report.

As indicated by Figure 3, according to the US Census Bureau, the seven-county Denver region had a population of 2.4 million in 2000, but by 2005 that figure had already grown by 148,300, a six percent increase. Growth during that period (2000-2005) in the individual counties varied widely, from a 50 percent increase in Douglas County to a drop of two percent in Denver County. The decline in population in Boulder and Jefferson Counties between 2000 and 2005 was due to the creation of Broomfield County from land formerly inside Boulder and Jefferson Counties. From 2005 to 2006, the region's population had grown by another 87,700, or three percent. All metro counties had an estimated growth rate of two to six percent between 2005 and 2006.

Figure 3: Regional Population by Denver Region County



Source: U.S. Census Bureau: 2000 decennial census, 2005 American Community Survey, 2006 estimates.

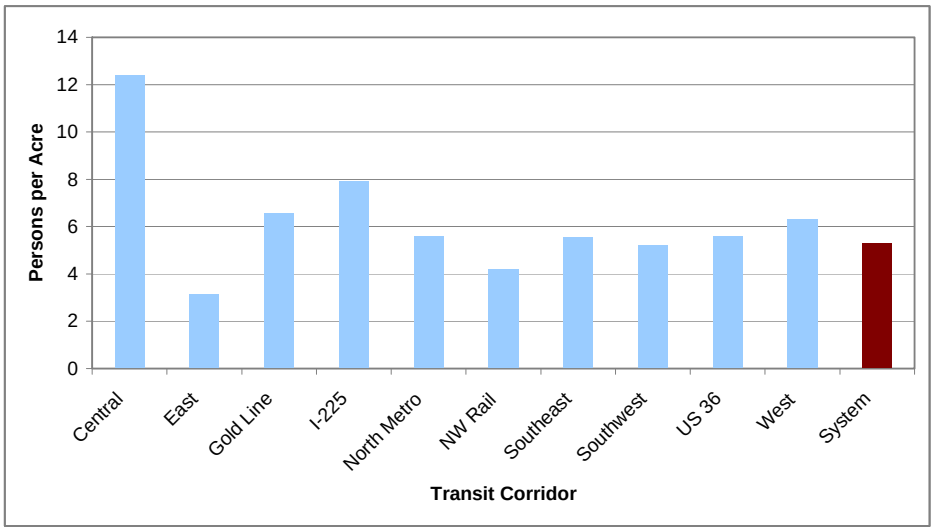
Corridor Population

Measuring population at the corridor level over time will help to gauge how many, and what share, of the region's residents live within proximity to transit. Examining this information at the corridor level will give a sense of how each corridor's individual share of population changes with time.

Combined corridor population within a one mile radius of current and future rapid transit lines is approximately 815,000. This illustrates that 31 percent of the region's population lived within one mile of the future FasTracks corridors as of 2005. Measuring the population within a mile of each corridor may provide a skewed perspective as some corridors are longer than others. A comparison of corridor population density provides a relative basis for comparison over time. Figure 4 below shows corridor population densities (persons per acre).

As could be expected, the Central Corridor, which serves downtown Denver, the region's Central Business District, has the highest densities, more than 12 persons per acre. Conversely, the East Corridor, which includes large areas of undeveloped land near DIA, has the lowest population density, about three persons per acre. The population density of other corridors currently falls between about four and eight persons per acre. It is possible that these densities will increase over time, which the QoL Study will measure.

Figure 4: Corridor Population Density



Source: DRCOG 2005 Land Use/Socioeconomic Data

Station Area Population

According to 2005 DRCOG socioeconomic data aggregated by Transportation Analysis Zone (TAZ), approximately 70,500 people live within a half-mile of the representative stations included in the study. As with corridor population density, it is possible that these values will increase over time, which the QoL Study will track.

Urban Land Consumption

Urban land consumption is the average number of square miles of undeveloped land annually used for development. This measure helps analysts to understand the extent that new growth is consuming undeveloped land, which is a way of quantifying sprawl. It is possible that FasTracks will result in more efficient regional land use patterns, which would reflect a decline in urban land consumption over time.

According to DRCOG, the average square miles of land urbanized increased annually from 2000-2002 by approximately 11 square miles, and from 2002-2004, seven square miles. Development around transit stations may be denser than other regional development and may encourage infill development as opposed to urbanization of undeveloped areas. The total land area in FasTracks station areas (1/2 mile radius), however, is a small percentage of the region and may only minimally effect urban land consumption without supportive land use policies by local governments.

Urban Residential Density

This measure of average household density within the urban area (households per square mile) is the ratio of households in the region compared to the total square miles of urban area in the region.

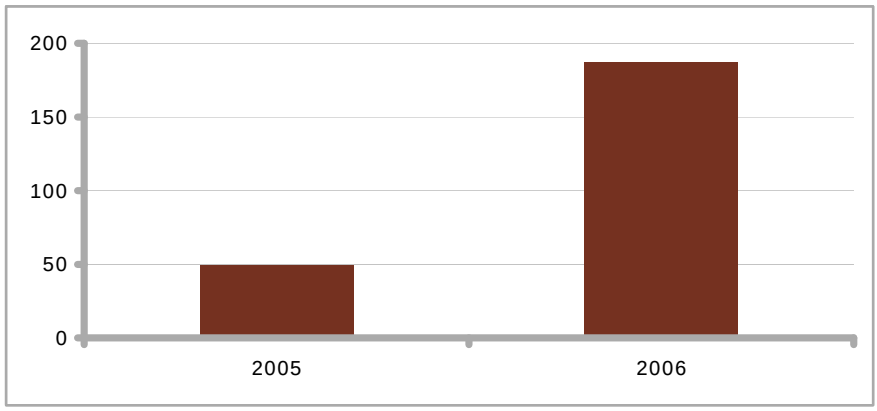
In 2004, the average household density was 1,810 households per square mile in the urban area. By controlling the expansion of the urbanized area, the region promotes efficient land use and transportation options. Increased density combined with mixed use development is an integral element to the success of the "T" in transit-oriented development (TOD). Densification may help to slow the growth of the urbanized area while still allowing growth in population and employment.

Job Growth/Employment

Regional Directly Supported Jobs

Throughout the life of the FasTracks program, jobs will be generated to plan, design, construct and operate the project. These data include RTD internal staff, contracted employees working directly on corridor studies, design, construction suppliers, public involvement and/or quality oversight staff. As the FasTracks program ramped up between 2005 and 2006, the number of jobs directly supported by the program grew from approximately 50 to almost 200 (see Figure 5). Since many of the people working on the FasTracks project do not work on the project full-time, year-round, results are represented in numbers of Full Time Equivalents (FTE). Once construction begins on multiple corridors, FasTracks is expected to become a considerable source of jobs in the region.

Figure 5: FasTracks Directly Supported Jobs



Source: RTD

Regional Indirectly Supported Jobs

Some job growth is also created indirectly by FasTracks. A tool developed by FasTracks consultant staff estimates the number of indirect jobs created in a given timeframe. The key factor in this estimation is completed development in transit station areas. This factor is measured in the number of residential units, hotel rooms, and square feet of office, retail and institutional space built within one-half mile of planned or existing transit stations. The indirect employment tool estimated 5,062 new jobs within station areas were created by new transit-zone commercial development in 2006.

In the discipline of economic development estimation, the rationale for basing job growth on real estate development is based on the observation that construction of new residential units equals new residents to live in those units (a portion of whom are employed), which in turn increases demand for goods and services, which in turn creates new jobs in other sectors of the economy. This relationship has been confirmed in metropolitan regions experiencing overall population growth. If the resident of a new dwelling unit moved from within the region, somewhere along the chain of housing transactions created by this resident's move, a new household enters the region. This relationship does not hold true in metropolitan regions with stable or declining overall populations that suffer from housing abandonment.

Station Area Employment

In addition to the number of people working on the FasTracks program and jobs created by new investment near transit stations, the number of jobs within representative station areas is also an important measure to track over time because of its ramifications for transit usage and mode share. FasTracks will improve transit service to and from some key employment areas, which may widen the draw area for employers and provide them with a more diverse pool of job candidates. Several employment sectors, such as professional services, have a demonstrated affinity for employees whose demographic profile correlates with transit use. They often choose to locate near stations when feasible. FasTracks implementation will have more effect on station area employment, than at the regional and corridor scales.

Approximately 116,100 jobs were located in representative station areas, according to 2005 DRCOG socioeconomic data aggregated by TAZ. It is possible that these totals will become greater over time as development occurs in station areas.

Other Employment Measures

FasTracks is expected to increase the overall future livability of the Denver region relative to other major employment regions across the US which may increase its relative attractiveness for businesses and employees wishing to relocate. The QoL Study will also track general regional indicators related to employment such as changes in regional employment and regional unemployment rates (see Section IV).

Objective 2: Provide Opportunity for Development Near Transit

Part of balancing transit needs with future growth is the potential for the transit investment to attract future growth. When new development occurs near stations, it increases the likelihood that residents and workers will choose transit as their transportation mode, which reduces the growth in vehicle miles traveled and auto trips on a constrained roadway system while, at the same time, accommodating new growth. The QoL Study will measure this type of data to gauge these potential effects.

Economic Activity

New Development in Station Areas

The opportunity to attract reinvestment and plan for new growth around station areas was a major reason many voters and interest groups supported FasTracks in the 2004 ballot initiative. TOD is a major development trend throughout the nation's metropolitan regions with transit systems, as noted by industry research groups such as the Urban Land Institute.

RTD tracks all new development within one-half mile of station areas in a TOD database. The database includes approved, pending, and completed projects by year of completion. All developments completed during the study year were summed to determine the number of new residential units and square feet of commercial development in the station areas. It is possible that some development, such as small infill projects, would not be included in the database.

For all existing and future rapid transit stations, the following quantities of residential, commercial and institutional development were completed in 2006:

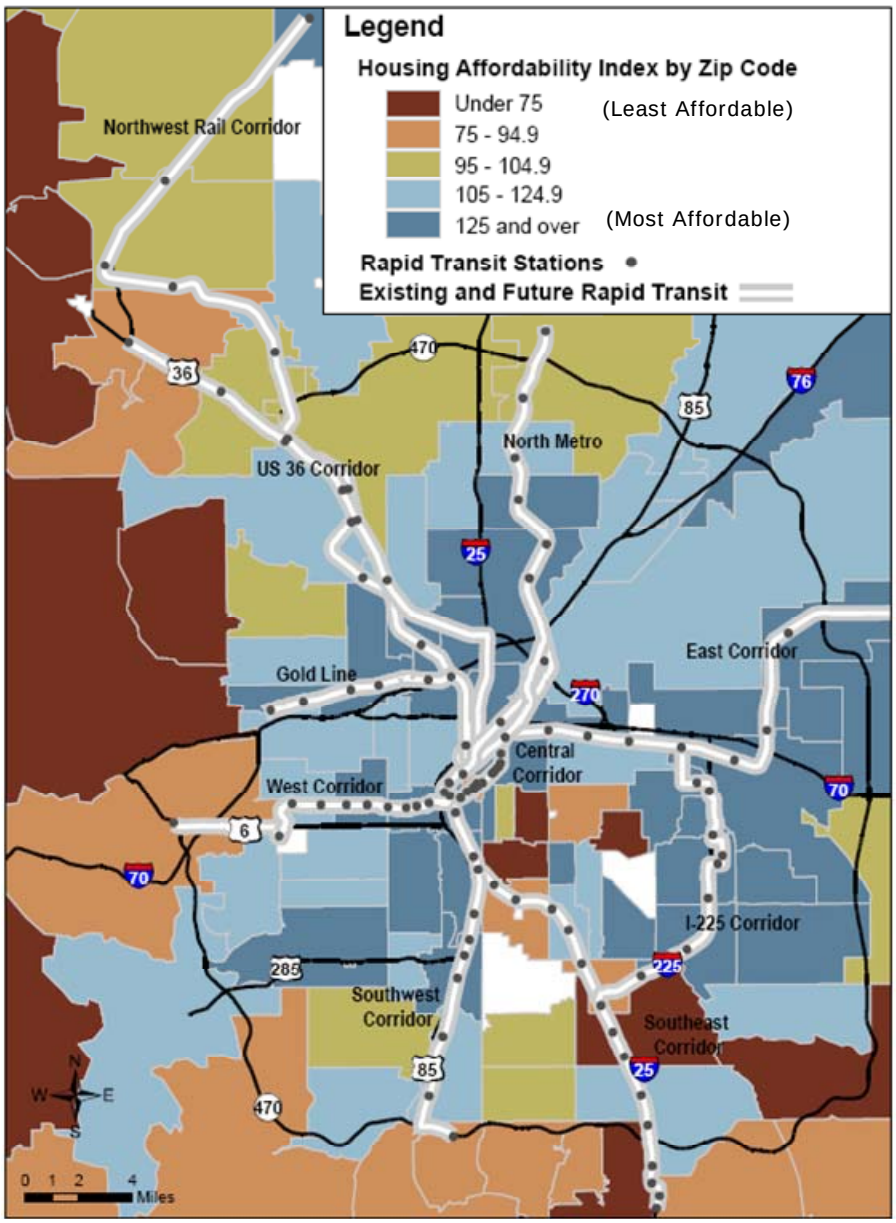
- 2,236 residential units
- 1.85 million square feet of retail
- 545,000 square feet of office space
- 343,000 square feet of institutional space (government, medical, cultural or convention/sports)

Property Values/Rental Prices and Affordability

Household Affordability

Housing affordability is an issue of regional concern. A study by the Center for Transit Oriented Development found that 19 percent of the average US household's income is spent on transportation costs. When added to the 30 percent average spent on housing, nearly half of household income in the US is spent on housing and transportation. To the extent that FasTracks can help households lower their transportation spending by increasing the availability of mass transit, it can also help offset housing costs. While this will likely be the case at the station area or corridor scales, the FasTracks program is not likely to affect regional housing affordability.

Figure 6: Regional Housing Affordability Index Results, 2006



The Housing Affordability Index (HAI) is calculated from Federal Housing Finance Board, Census Bureau, National Association of Realtors, and DQNews.com data. The index does not factor transportation costs into the equation. A value of 100 indicates that a household earning the median income for the Denver region has 100 percent of the income needed to buy a median-priced home. Higher values indicate that more households have sufficient income to buy a house, while lower values indicate that fewer households have sufficient income. Year-to-year changes in the index are influenced by changes in mortgage rates and changes in home prices relative to change in household incomes.

The 2006 Denver regional HAI value is 112, which indicates that a household earning the median income for the Denver region has 112 percent of the income needed to buy a median-priced home in the region. More specifically, a family earning the Denver region median income of $71,800 has 112 percent of the income needed to qualify to purchase the median priced home of $255,000. Although regional housing affordability dropped six percent from 2005 to 2006, more than 50 percent of Denver region households have sufficient income to purchase a median-priced house. Figure 6 illustrates the HAI regional results by zip code.

The FasTracks transit corridors generally serve areas with above-average housing affordability. Nine of the ten corridors (all except Southeast) have HAI values over 100, indicating that more than 50 percent of Denver-region households have sufficient income to purchase a median-priced home in that corridor. Eight of the ten corridors (all except Southeast and US 36) have HAI values that exceed the regional value of 112, indicating that housing in those corridors is currently more affordable than in the region as a whole.

HAI values were also tracked at representative station areas. Only 6 of the 32 representative stations had an HAI of less than 100, meaning that a majority of Denver region households can afford to purchase a median-priced home at the other 26 station areas. Some 21 station areas have HAIs of greater than 112, indicating that housing at those areas is more affordable than in the region as a whole. These data represent just a snapshot since 2006, the study will be tracking affordability changes over time. The discussion of property value data below suggests that housing affordability in station areas may be stressed in the future. Since only local governments control the policies that can influence affordability, it will be up to them to address this issue. For example, Denver, Boulder and Longmont already have inclusionary zoning rules that require a proportion of units for all new developments to be affordable to prospective buyers at various area median income (AMI) levels.

Property Values

Numerous studies in other US cities with fixed guideway transit have found statistically significant residential property value appreciations in transit station areas compared to their broader sub-areas. There is, however, no way to quantify precisely the effect FasTracks would have in terms of property values, because of the wide array of factors that affect these values. The QoL Study will track property values in representative station areas compared to their sub-areas over time to gauge these changes.

As a baseline condition, this study found that the median difference in property value for representative station areas, compared to the larger sub-areas in which they exist, was 45 percent higher for station areas. Of the 32 representative station areas, only 11 had lower

property values than their sub-areas. This suggests that the FasTracks stations are generally being planned for higher value development than elsewhere in the region.

Residential Rents

Residential rents are another metric that can be used to gauge housing affordability. This is especially important around stations since an analysis of US Census data by the Center for Transit Oriented Development found that nationally, nearly two-thirds of households living within a half-mile of stations are renters, which is the inverse of the rest of their metropolitan areas.

A recent downturn in the housing market has resulted in a drop in median apartment rental prices in the Denver region for the years 2004-2006. In the Denver Primary Metropolitan Statistical Area (PMSA), the most significant change in rent was for two-bedroom apartments, which fell eight percent (see Figure 7). Median apartment rental prices in Boulder, however, have increased for all apartment types for the years 2004-2006. Median apartment rental prices in Boulder are consistently higher than equivalent apartment types in Denver due to a constrained market and the high proportion of students seeking rental options.

Figure 7: Median Apartment Rent for the Denver PMSA

Source: U.S. Department of Housing and Urban Development

In 2006, baseline data were collected for residential rents where the representative station areas currently have rental markets, which is 15 of the representative station areas. The average gross rent for the 8,653 units surveyed was $896, which equaled $1.04 per square feet. The study will track the trends in residential rents.

Commercial Lease Rates

In addition to residential renters, the QoL Study tracks rates for the three major types of commercially-leased property (retail, office, and industrial) within one-half mile of representative station areas compared to their sub-markets to assess trends over time. As with residential property, studies in other transit regions have found statistically significant appreciations for commercial property values in station areas compared to their broader sub-areas.

Among representative station areas with retail lease data, the median difference between current retail lease rates in station areas and sub-areas was nine percent higher for station areas. This means that as a baseline condition, station areas have slightly higher retail rents than their sub-areas.

The difference for station area office lease rates and their sub-areas was more diverse. For the 20 station areas with office lease data available, 8 had lower rates than their sub-areas and 11 had higher rates. The study will track these rates over time to determine if trends emerge. The study will also track industrial lease rates, although other studies have not found correlations between industrial uses and transit ridership.

Other Regional Economic Indicators

A number of other regional economic health indicators are being tracked by the QoL Study. These will be compiled only for reference purposes since they do not relate directly to the FasTracks program, but could be used for future comparisons. The results of the baseline data collection for these measures is in Section IV of this report. These measures include:

- Housing starts
- Change in regional employment
- Regional unemployment rate
- Taxable retail sales
- Sales tax revenue

Objective 3: Environmental Sustainability

FasTracks will provide environmental benefits to the region in a number of areas. RTD will contribute to the region's environmental sustainability as both an employer and as the regional transit provider. As an employer, RTD will strive to set high standards for its employees and its facilities to recycle, be energy efficient, and apply "green" standards for construction and operations. As a regional transit provider, RTD is part of regional efforts to reduce resource use (i.e. fossil fuels) and minimize air pollution.

FasTracks Sustainable Design Features and Actions

In each phase of the FasTracks program, from planning to construction to implementation, RTD will incorporate environmentally friendly designs and actions. RTD's Sustainability Committee will track these efforts and provide the information for this measure in future QoL reports.

In October 2006, the RTD Board of Directors adopted Sustainability Guidelines for the District, as well as for the FasTracks program. Since FasTracks is still largely in the planning phase, creating and approving the Sustainability Guidelines were the focus of the environmentally friendly activities related to the FasTracks program in 2005 and 2006.

The guidelines establish the following overarching goals:

- Improve and increase energy efficiency and vehicle fuel efficiency
- Institute best management practices for planning, design and construction

- Institute sustainable business practices
- Train and educate staff
- Manage resources

A second important achievement was the identification of RTD's sustainability goals and objectives for each FasTracks project. These goals will be incorporated into each project's planning and design documents as they are developed. Additionally, each individual FasTracks project will create sustainability goals annually. Goals will include a budget analysis of costs and benefits.

Other Environmental Measures

Regional air quality and energy consumption measures are being tracked but largely will not be affected by FasTracks implementation because the benefits from FasTracks will be more specific to the corridor-level geography, which are difficult to track. The results of these measures will provide a snapshot of the region's environmental health related to transportation emissions and fuel used for transportation. Air quality data will be reported for annual tons of emissions of nitrogen oxide (NOx), volatile organic compounds (VOC), and particulate matter. Additionally, the Denver region's compliance with national air quality standards will be documented. See Section IV for baseline data on these measures.

Goal 2: Increase Transit Mode Share at Peak Times

Existing congestion during peak travel times of the day is frustrating for many drivers and is only expected to get worse as the region continues to grow. Providing viable transit options during the peak travel times will help provide relief for frustrated drivers. FasTracks is projected to increase the percentage of people taking transit during the peak hours from 11 to 22 percent in the region's major transportation corridors where congestion is worst.

RTD's business practices are designed to be customer-service oriented. To increase the transit mode share at peak times, RTD will continue to observe how transit customers use the transit system and what they report via regular customer surveys, to keep what is working well, and to improve wherever possible. Measures related to this goal include the following: transit usage and mode share; travel safety and security; and transit customer satisfaction.

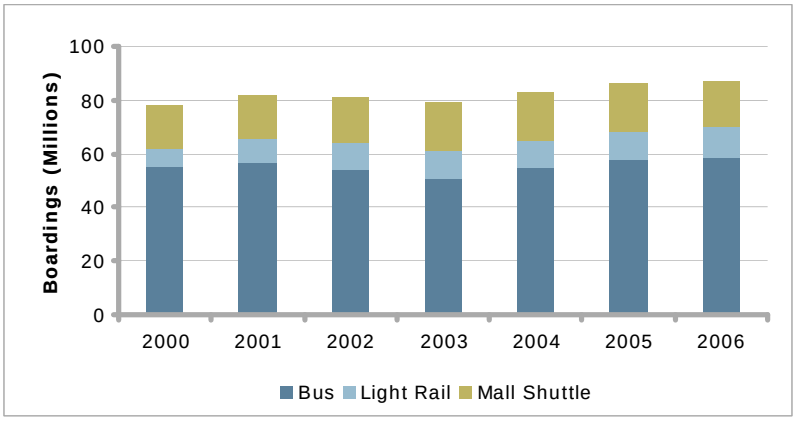
Objective 1: Transit Usage

Ridership

Regional Ridership

Ridership, or transit boardings, is a key measure in charting the success of transit in the region. This measure is tracked annually for three major transit service classes: bus, light rail, and the mall shuttle. As shown in Figure 8, the existing regional trend shows a steady growth in boardings; between 2000 and 2006, overall RTD boardings grew by 12 percent. Light rail experienced the largest increase, with 69 percent growth in the same timeframe, bus boardings grew by six percent.

Figure 8: RTD Annual Boardings



Transit boardings per capita also grew slightly; each person in the metro area *averaged* 32.3 transit boardings per year in 2000 versus 32.9 transit boardings in 2006. While this increase is relatively modest, it sets a benchmark against which to measure future per-capita transit boardings. Section IV provides additional data on this measure including a boardings per capita comparison to several peer cities in the US.

Station Area Ridership

Transit boardings at future rapid transit station areas were determined by collecting data from existing park-n-Rides in locations proximate to future stations. These data create a baseline against which to compare station boardings at future rapid transit stations when they are built. For existing rapid transit stations, boardings data were collected based on actual 2006 information. See Section IV for results on this measure.

Mode Share

An increase in public transportation's share of commute trips is evidence that transit options are sufficiently appealing to shift behavior from taking a private auto. With the FasTracks transit expansion, regional mode share for public transportation is expected to increase as rapid transit options expand geographically to serve a larger area. At a corridor level, a mode shift to transit may occur with the implementation of rapid transit in a fixed guideway, which will be more competitive with the auto in terms of travel time and reliability. The transit share of commute trips for those living in station areas may go up if development is such that residential/mixed use and higher density development is constructed. The following is the current public transit share of commute trips at each of these three geographic scales.

Regional Mode Share

Residents of the Denver region show a tendency towards driving alone for commute trips. According to the US Census Bureau's American Community Survey, in 2005, 77 percent of commute trips in the region were made by driving alone and about four percent were made via public transportation (Figure 9). However, a 2003 commuter survey conducted by the Downtown Denver Partnership found that 46 percent of people commuting to downtown Denver take public transit (Figure 10).

Figure 9: Denver Region Commute Trip Mode Share, 2005

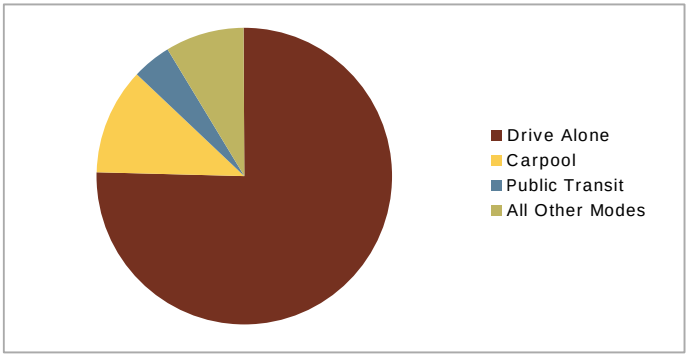
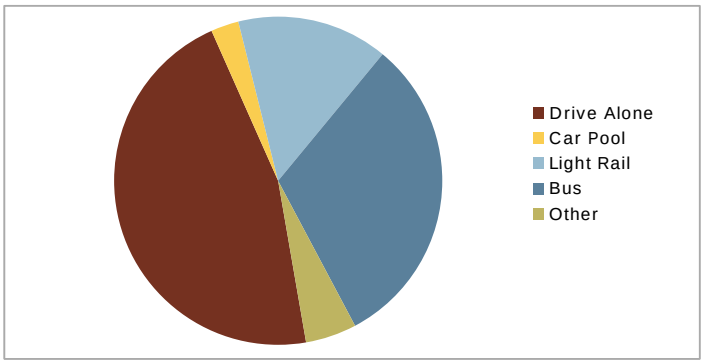


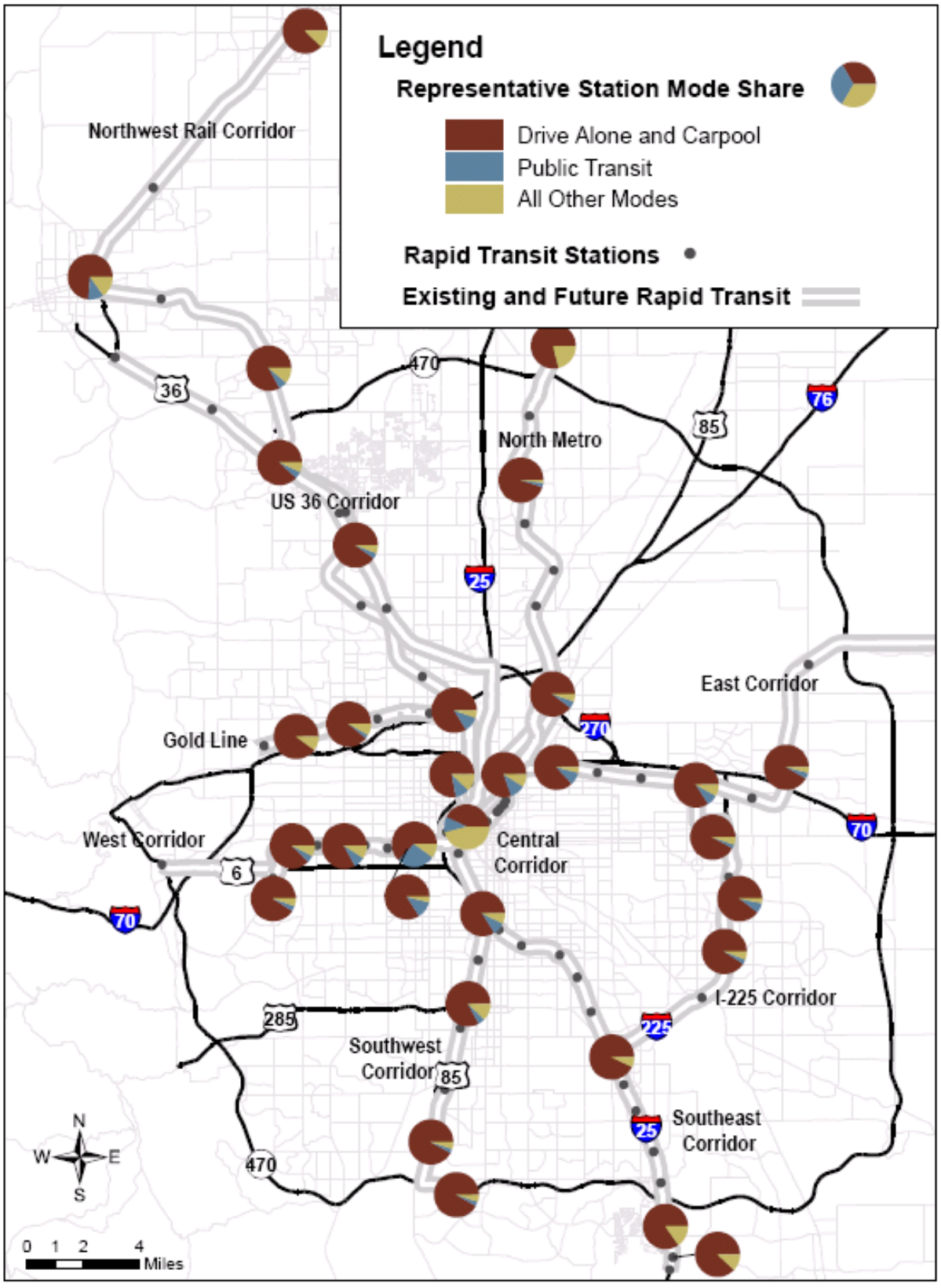
Figure 10: Downtown Denver Commute Trip Mode Share, 2003



Station Area Mode Share

Using 2000 Census data, mode share was determined for residents within one-half mile of existing and future rapid transit representative station areas. As shown in Figure 11, drive alone and carpool are currently the predominant commuting modes for residents. Some station areas do show significant transit mode share, including station areas in and close to downtown Denver and the planned Boulder Transit Village. This higher transit mode share is likely correlated with a higher level of bus service in these areas. For example, the West Corridor's Federal-Decatur station area, which is the site of a current RTD transfer center, has the highest share of transit use at 27 percent.

Figure 11: Representative Station Area Mode Share



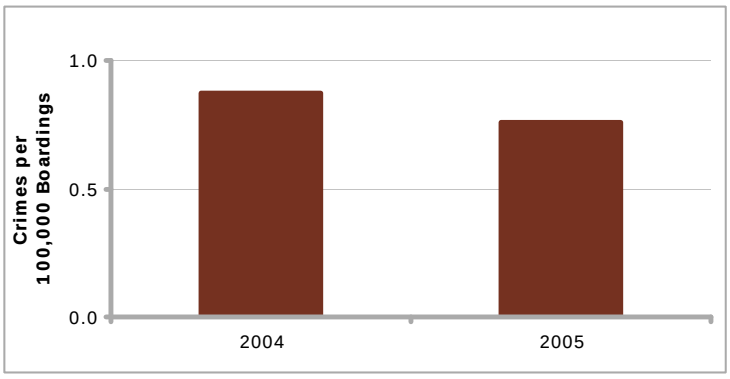
Objective 2: Travel Safety and Security

In order to increase its mode share, transit needs to be as safe a transportation option as possible. A safe system allows for use by all people at all times and may encourage use at off-peak evening hours that otherwise would not occur. Although there is no way to completely deter crime, RTD can reduce the probability of crime on its property by building a transit system with good security elements. Most of all, passengers must be aware of these elements and feel safe riding transit. Community perception that transit is unsafe can deter people from using transit.

Safety and Security

Safety and security is a significant objective for transit systems. Crime is one key safety and security measure and lowers customer satisfaction as well as deters new users. Crime for the entire RTD transit system remains overall very low, at just under one reported crime per 100,000 boardings in 2004 and 2005 (see Figure 12).

Figure 12: Crime Rate on RTD Property



RTD employs various techniques and technologies to ensure the safety of its users. RTD's Security Command Center monitors and manages RTD's light rail stations and some park-n-Rides 24-hours a day. The center answers emergency assistance calls, dispatches security staff and monitors video surveillance systems. RTD also has a Transit Watch program and hotline encouraging riders to be aware of suspicious activity, to know what to do in the event of an emergency, and report security-related issues by calling the Transit Watch hotline, which is available 24-hours a day, 7-days a week. Table 2 shows the kinds and quantities of security elements in place currently.

Table 2: RTD Security Resource Inventory

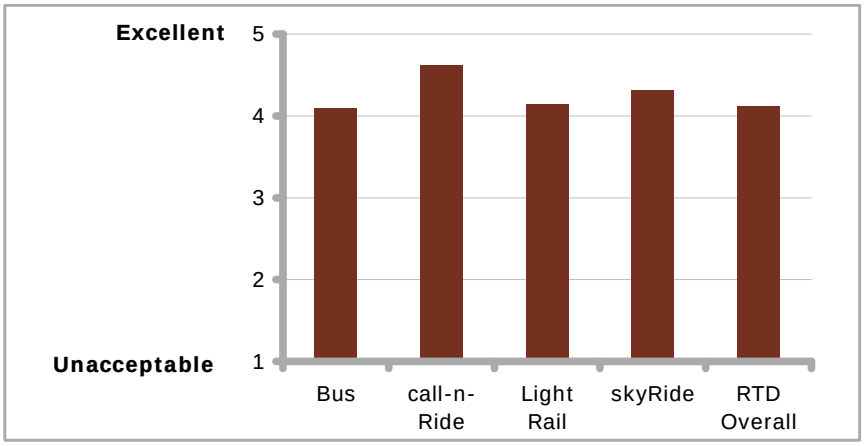
Video Surveillance Systems	**Totals**
park-n-Rides	22%
Buses	69%
Light rail stations	44%
Light rail vehicles	100%
Emergency Assistance Telephones	
Light rail stations	100%
park-n-Rides	4%
Security Staff	
RTD internal and administrative staff	6 full-time
Uniformed contract security	90 full-time
Off-duty Denver Police	2 full-time

According to RTD's 2005 and 2006 customer satisfaction surveys, a relatively low number of riders, about six percent, identified security as the most important area in which RTD could make improvements. Out of 10 possible options on the survey, security was the fifth highest area for improvement, behind cost, convenience, no improvement, and travel time. In general, these data indicate that transit users perceive transit in the Denver region to be safe and secure.

Objective 3: Customer Satisfaction

Similar to customer perception of security, overall customer satisfaction is vital to the use of public transportation; if customer satisfaction is low, ridership will be negatively impacted. RTD's customer satisfaction survey asks transit users about their satisfaction with public transportation in terms of convenience, travel time, security, comfort and other factors. As of 2005 (bus) and 2006 (light rail), overall customer satisfaction with all RTD transit services was high with a rating of 4.11 (Figure 13).

Figure 13: RTD Overall Customer Satisfaction



Source: RTD Customer Satisfaction Surveys: Bus Fall 2005, Light Rail Spring 2006

Goal 3: Improve Transportation Choices and Options

> *Additional transportation choices add to the region's quality of life. Reduced reliance on a single mode of transportation by providing additional, convenient transit options gives individuals choices on how to travel and where to live, work and play. FasTracks provides over 119 miles of new rail transit, contributes to the construction of 18 miles of bus rapid transit and greatly enhances the bus network to support investments in rail, serve suburb-to-suburb trips, and provide local and regional service.*

With the region's population of senior citizens rapidly increasing, transit will provide additional transportation choices for those who become unable or unwilling to drive. Additionally, increasing numbers of people been expressed greater interest in reliance on transit as a lifestyle choice. It is possible that, as the program expands, the number of vehicles per household in the station areas may be lower than the region's average due to the presence of additional transportation choices in those areas.

Measures related to this goal include congestion tracking, travel times between various origins and destinations, and transit accessibility.

Objective 1: System Mobility

Congestion

FasTracks is not expected to reduce region-wide measures of congestion; however, it is anticipated that FasTracks will slow the rate of growth of congestion and daily vehicle miles traveled (VMT). The extent of the potential improvement is unknown, and dependent on a variety of factors including, but not limited to, willingness to ride transit, fuel prices, and regional growth compared to transit capacity. Additionally, while it is anticipated that FasTracks may initially reduce the number of vehicles on the region's major transportation corridors, those corridors may again fill with vehicles that may formerly have been traveling on local streets. That may divert

The QoL Study tracks several indicators of regional congestion to provide a backdrop for regional mobility. Baseline data on the measures listed below are in Section IV of this report.

- Regional congestion
- Regional congestion costs
- Regional VMT
- Excess fuel used due to congestion
- Corridor duration of congestion
- Corridor traffic volumes

Travel Time and Variability

Corridor Travel Time

Transit's ability to provide a competitive travel time compared to the auto is essential to transit being a viable transportation option. The degree to which both transit and auto travel times will

change is affected by a host of regional trends. Population and employment may grow slower or faster than expected. Housing and apartment construction trends may make homes more or less affordable than expected. Additionally, CDOT and local jurisdiction funding availability to maintain and expand highways is uncertain.

Over time, congestion in the Denver region is expected to worsen, which will increase automobile travel times and decrease the reliability for auto commuters. The FasTracks rapid transit projects will maintain or decrease current transit corridor travel times while automobile travel times increase. As roadway congestion increases and new rapid transit lines are built, the transit travel times will become more competitive with auto travel times.

Automobile travel times were measured by timing the drive from the origins to the destinations during the AM peak period in October 2006 (origins and destinations are shown in Figures 14 - 16). The FasTracks program has paid particular attention to three key destinations: Downtown Denver, the Denver Technological Center (DTC), and Denver International Airport (DIA). During the same timeframe, transit travel times were calculated based on the actual bus and/or rail service (as it existed in October 2006) that one would need to take to reach the same destinations from the same origins as auto.

For each FasTracks corridor, automobile and transit travel times were determined using similar travel paths. It is important to note that the paths are not identical for transit and auto because there is often a more direct path from origin to destination for automobiles. Transit travel times were determined by using only existing transit routes as of October 2006. Additionally, there were data limitations for the actual transit travel time data available for the desired time period; in a few instances, the most direct transit route was not used. Therefore, the auto has a slight advantage in some scenarios.

Figure 14: AM Peak Period Travel Times to Downtown Denver (16th & California), Fall 2006

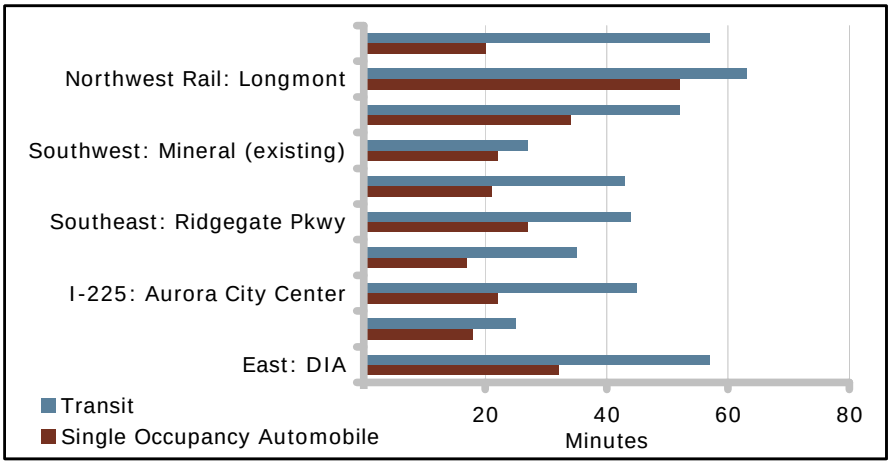


Figure 15: AM Peak Period Travel Times to DTC, Fall 2006

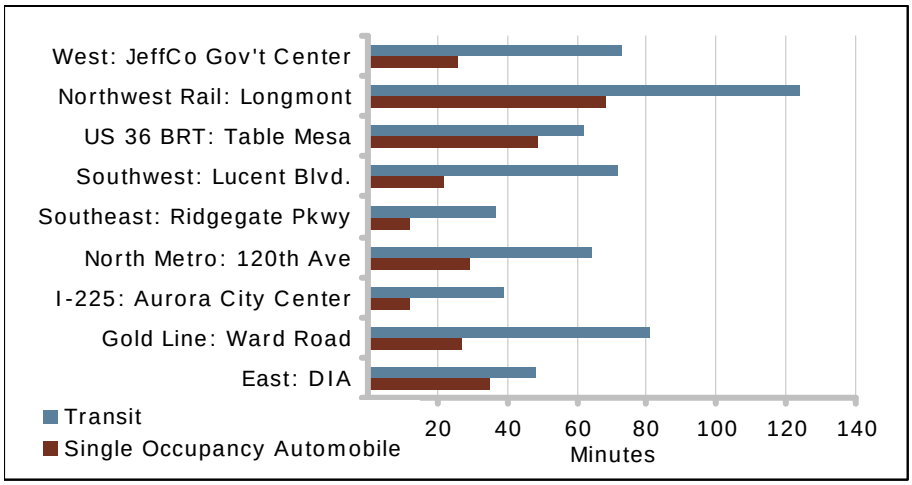
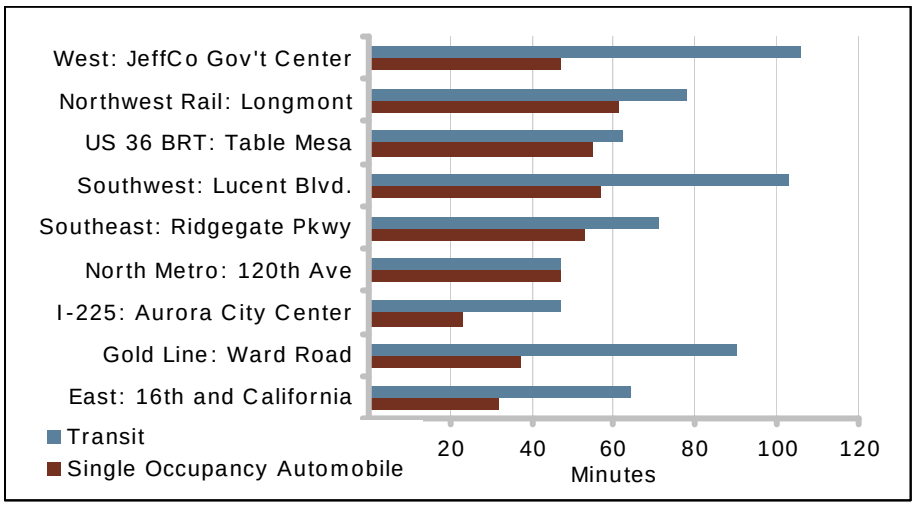


Figure 16: AM Peak Period Travel Times to DIA, Fall 2006



Note that the North Metro corridor northern terminus is not the same as FasTracks terminus because there is currently no transit service from which to determine the transit portion of the travel time comparison. Thus, the current terminus of 120th Avenue was used for both auto and transit travel time data collection.

Travel time data for 2006 show that the Denver freeway system currently provides a relatively reasonable amount of mobility during the AM peak period. In nearly all cases, auto travel times are currently shorter than the transit travel times. This is because the majority of transit service in the Denver region is bus transit operating in traffic and not in its own right-of-way. Thus, buses are typically caught in the same congestion as autos and have to stop to pick up and drop off passengers. With the implementation of fixed guideway transit, RTD will provide higher speed and more reliable transit times that will be much more competitive with the auto on the region's increasingly congested roadways.

Corridor Travel Time Variability

Travel time variability describes the reliability of a trip. That is to say, it measures whether traveling from "A" to "B" can be done consistently in the same amount of time. Travel time variability charts for automobile and transit trips to downtown Denver (16th & California) are shown, respectively in Figures 17 and 18.

The automobile travel times only take into account the variability of travel on freeways. Therefore, these are conservative variability estimates, and automobile drivers may need to allocate additional time to arrive downtown based on the conditions of the surface streets. In 2006, auto trips typically had five to ten minutes of variability. The transit travel time variability takes into account the entire trip. Therefore, the variability calculations provide an accurate representation of the time a transit passenger would need to allocate to be sure of arriving downtown at a certain time. In 2006, transit trips currently have 10 to 15 minutes of variability, slightly longer than auto. The exception to this is the Southwest light rail corridor, which has the lowest transit travel time variability of all transit corridors.

It is important to note that auto travel time variability for both the Southwest corridor and NW rail between Boulder and Longmont was not calculated due to a lack of data. CDOT has no speed sensors on Santa Fe or north of 104th Avenue on I-25.

Figure 17: AM Peak Automobile Travel Time Variability, Fall 2006

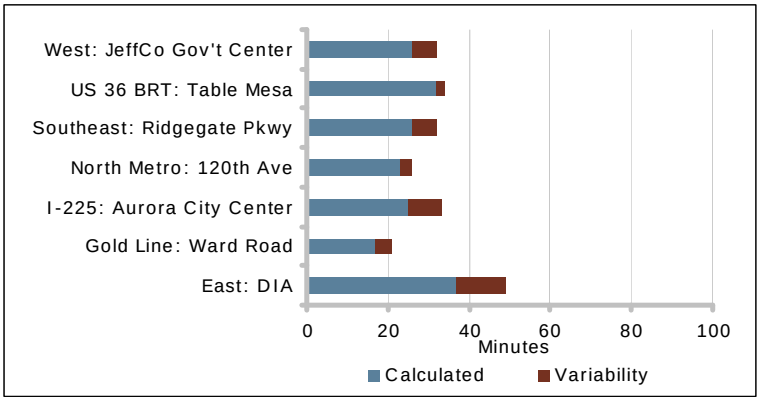
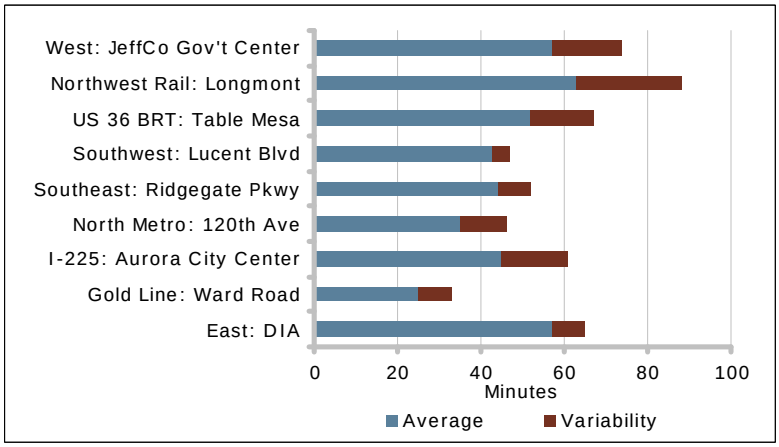


Figure 18: AM Peak Transit Travel Time Variability, Fall 2006



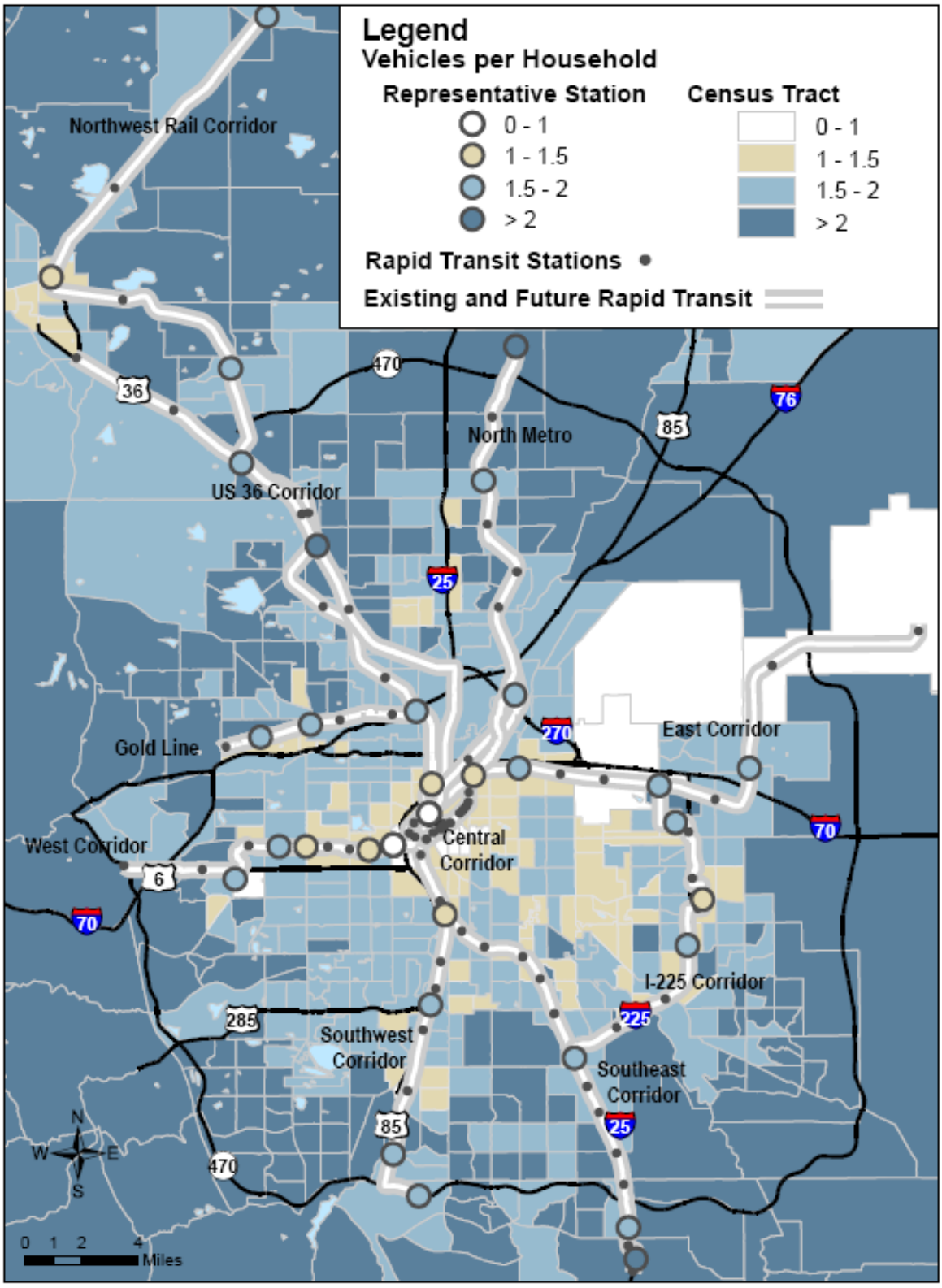
Vehicle Ownership

The FasTracks transit expansion will provide increased transit options for Denver region residents in the future and particularly for those living and/or working in transit station areas or corridors. With increased transit options, there will be an opportunity for households at corridor and station area scales to own fewer vehicles than currently and maintain or improve their mobility. The transit expansion will likely have little effect on regional vehicle ownership trends.

Regional and Station Area Vehicle Ownership

Figure 19 illustrates both regional patterns of vehicle ownership and vehicle ownership in representative station areas as of the 2000 Census. Regionally and at representative station areas, the patterns are somewhat predictable in that closer to downtown Denver and Boulder, vehicle ownership is low and in areas farther away from those urban centers, vehicle ownership is generally higher. This pattern is somewhat reflective of the availability of transit service. Where transit service is extensive, it is possible for households to own fewer vehicles.

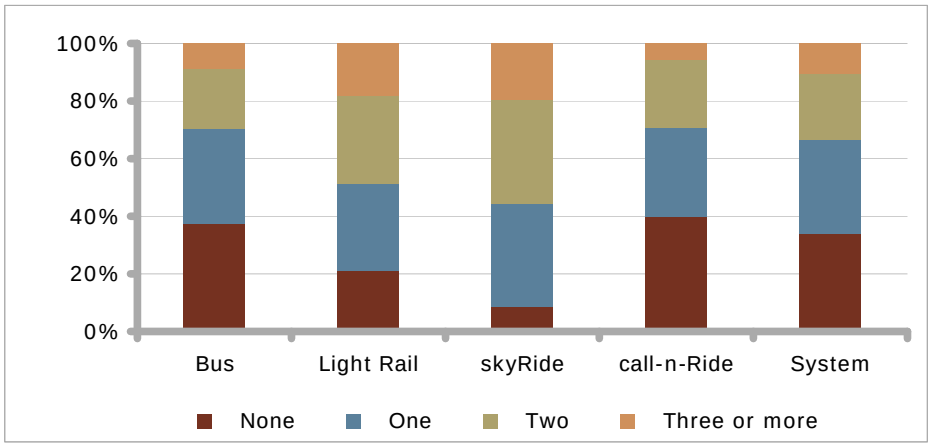
Figure 19: Denver Region and Rapid Transit Station Area Vehicle Ownership



Source: U.S. Census Bureau 2000

From 2005 and 2006 RTD surveys, there are data available that are specific to vehicle ownership for transit users. As illustrated in Figure 20, light rail and skyRide (regional bus) users are more likely to live in households with two or more vehicles as opposed to passengers of other bus services or call-n-Ride services. Thus, more "choice" riders use light rail and skyRide. Zero-auto households are often considered "transit dependent." Transit riders from households with one or more autos may be considered "choice riders."

Figure 20: RTD Transit User Vehicle Ownership



Source: RTD Customer Satisfaction Survey: Bus 2005, Light Rail 2006

Corridor Vehicle Ownership

In 2000, households within a one mile radius of existing and future rapid transit corridors already showed vehicle ownership at slightly lower levels than the region overall. With the implementation of the FasTracks program, households within the corridor, but outside of a station area, may be able to rely less on driving. This change in vehicle ownership will only occur if connectivity to and from the transit station area and surrounding communities is provided for pedestrians, bicyclists and transit users.

Objective 2: Travel Choices and Accessibility

Access Data

Mode of Access to Transit

Part of determining how accessibility to transit is changing is knowing the modes by which users access transit. The findings below were obtained from RTD's 2005 (bus) and 2006 (light rail) customer satisfaction surveys and are also illustrated in Figure 21 (note that Mall shuttle and call-n-Ride are not shown in the chart because their access share was less than one percent).

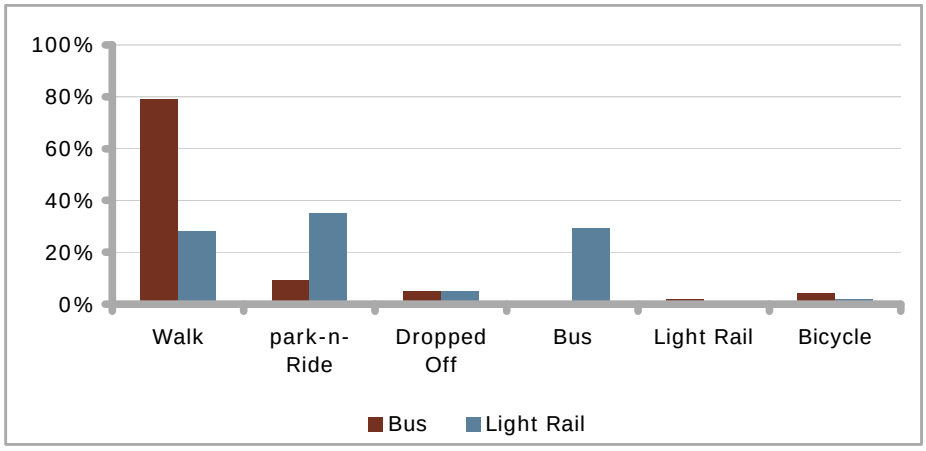
Walk is by far the dominant access mode to bus, at nearly 80 percent. Access to bus differs significantly by type of service. The vast majority of bus riders using local service buses walked to their first bus stop, while only 46 percent of the express and 41 percent of the regional bus

riders walked. Large percentages of express (38 percent) and regional (41 percent) riders drove and parked.

There are three primary ways in which light rail passengers traveled to light rail stations for their trips: drove and parked/park-n-Ride (35 percent), bus (29 percent) and walked (28 percent). Only five percent of the passengers were dropped off and two percent traveled by bicycle.

Data will be collected on the mode used to access transit in the future and will be compared to 2005/2006 regional survey data.

Figure 21: Mode of Access to Bus and Light Rail



Source: RTD Customer Satisfaction Survey: Bus 2005, Light Rail 2006

Auto Access - park-n-Ride Capacity and Utilization

RTD's park-n-Ride lots provide a useful system for many users that:

- prefer to drive to transit,
- do not live within walking or cycling distance of a transit facility, and/or
- live too far from transit (bus or light rail) to feasibly take transit for the entire trip or to a park-n-Ride.

As of October 2006 (prior to the opening of the Southeast light rail corridor), RTD provided 66 park-n-Ride lots throughout the District with a total auto capacity of about 21,300 parking spaces. The FasTracks program is expected to add 21,000 new parking spaces by the time of completion.

Between 2004 and 2006, the system-wide total percent of utilization has remained at about 60 percent. Light rail park-n-Rides are highly utilized at approximately 90 percent and bus park-n-Rides are utilized about 55 percent. The extent to which these parking facilities are used indicates that transit riders in the Denver region are embracing the park-n-Ride concept as a way to avoid driving longer distances which can reduce traffic congestion on roadways and reduce vehicle emissions.

Bicycle Access

RTD's bike-n-Ride program offers transit customers the option to take their bicycle with them on the bus or the light rail or, alternatively, they can park their bicycle at many transit facilities throughout the District. Usage of RTD's bicycle facilities is an indicator of viable connectivity to transit stations from surrounding communities.

Bicycles are allowed on light rail vehicles with no time restrictions but subject to space availability. Four bicycles are allowed per car except for the first car, where the train operator door is located (only two bikes are allowed in this car). At this time there is not a system in place to capture bike-on-Light Rail ridership. However, RTD is committed to provide at least the same accommodations for bicycles on future rapid transit vehicles.

All of RTD's buses are equipped with front-mounted bicycle racks that can hold up to two bicycles. Additionally, regional buses can carry bicycles on a space-available basis in luggage bins. RTD surveys conducted in 2000 and 2004 indicate a 70 percent increase in bike boardings, with 3,260 daily summer weekday boardings reported in 2004 (up from 1,920 in 2000).

RTD provides and maintains bicycle racks and leaseable bicycle lockers for its users. System-wide in June 2006, there were 532 bicycle lockers and a bicycle rack capacity of 332 bicycles at transit facilities around the region. At that time, 68 percent of lockers were leased.

Accessibility

FasTracks will provide alternative transportation options at almost 60 stations across the region. Residents and employees need access both to and from transit through pedestrian and bicycle connections. Local jurisdictions have begun to address the circulation needs at each station. It is the responsibility of these jurisdictions to connect the stations into surrounding neighborhoods and activity centers. Through this connectivity between transit and pedestrian/bicycle facilities, a multi-modal system will be created that allows less reliance on the automobile.

A transit patron's ability to access rapid transit is a function of a combination of factors:

- Direct route distance to the station (most studies indicate that people are willing to walk ¼ to ½ of a mile to transit, about 5 to 10 minutes)
- Quality of the route (how safe, convenient and attractive the journey is)
- Frequency of transit service (how long a patron needs to wait)
- Trip origin and destination (studies indicate that people are more willing to walk further to and from home than to and from employment, and are willing to walk the least distance to and from shopping)

Zoning

Studies indicate that certain population density thresholds support transit usage. The minimum density needed to support rail transit is about 16 dwelling units per acre. When densities reach about 50 units per acre, transit usage becomes competitive with auto mode share. Land use regulations that establish density are under the control of local governments, through other

ordinances and policies. It is up to local governments to use zoning and other land use controls to increase the accessibility in station areas, since RTD does not have these powers.

After the passage of FasTracks but prior to 2007, local governments rezoned land in three station areas to increase allowed densities and encourage a mix of uses (see Table 3). All three station areas are in the City of Denver. Two mixed use zoning districts, Transit Mixed Use (T-MU) or Residential Mixed Use (R-MU), were applied. In addition to allowing a mix of uses and higher densities, the T-MU district also allows reductions in parking requirements and requires buildings to have a pedestrian orientation to the street. In 2006, many municipalities adopted station area plans for future FasTracks station locations as a preliminary step to zoning those areas to accommodate TOD.

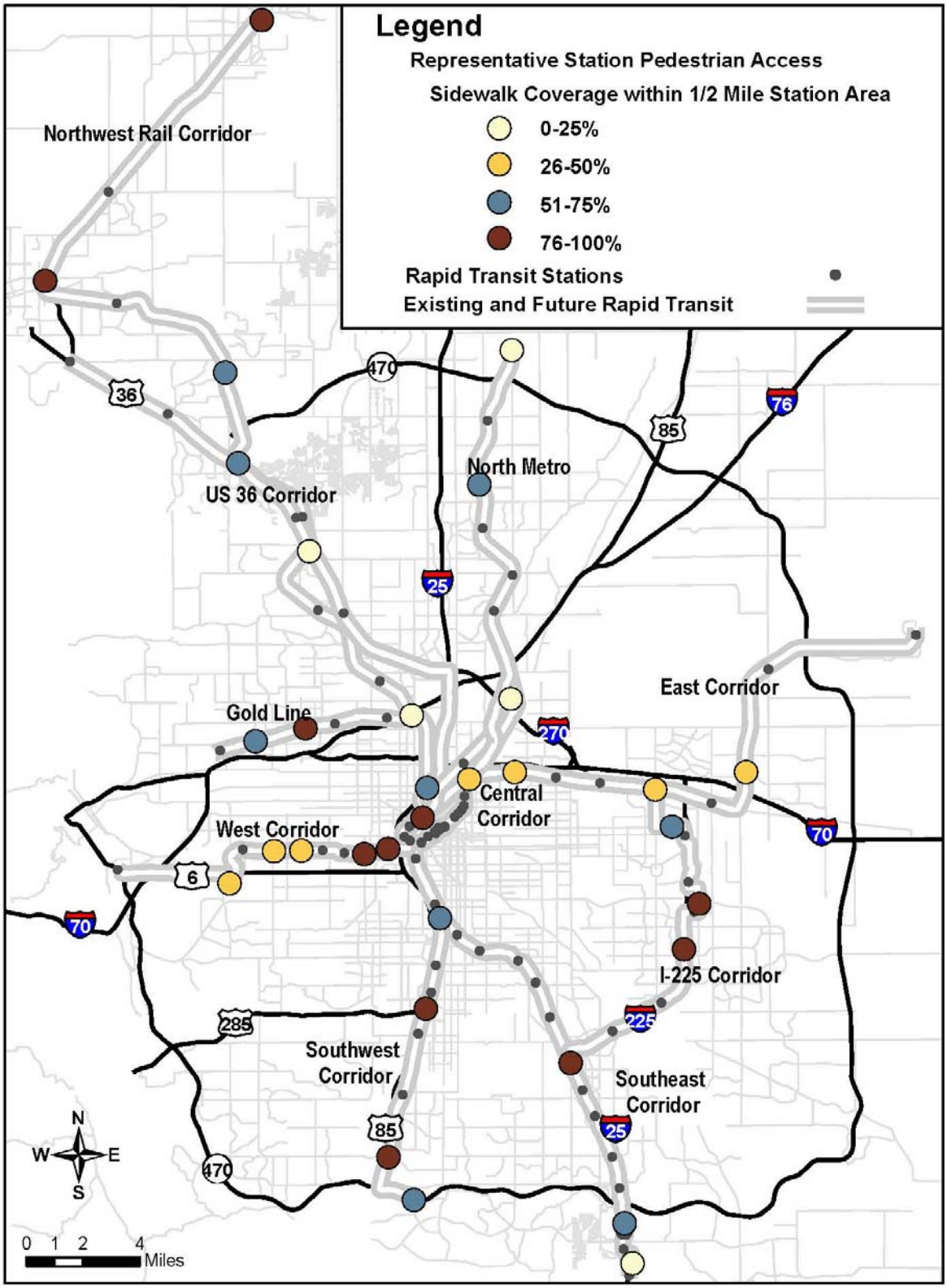
Table 3: Station Area Rezonings

Station	Zoning	Area (acres)	Percent of 1/2 Mile Station Area
Denver Union Station	T-MU-30	19.5	3.8%
I-25/Broadway Station	T-MU-30	*68.0*	*13.1%*
	R-MU-30	*30.0*	*5.9%*
	Total	98.0	19.0%
Belleview	T-MU-30	48.0	9.5%

Pedestrian Access to Stations

In order to quantify the level of pedestrian accessibility at representative station areas, an analysis was done based on the percentage of roadways with sidewalks within one-half mile of each station. As shown in Figure 22, station areas with the highest scores for pedestrian access (at least 80 percent sidewalk coverage) included Federal-Decatur, Belleview, Mineral, Union Station, Olde Town and Perry station areas. Some of the lowest scoring station areas are currently in largely undeveloped locations. As these areas develop, it is expected that station area plans will include and place a high priority on walkability. Good pedestrian access to and from stations will continue to be a key component of transit ridership.

Figure 22: Pedestrian Access to Stations



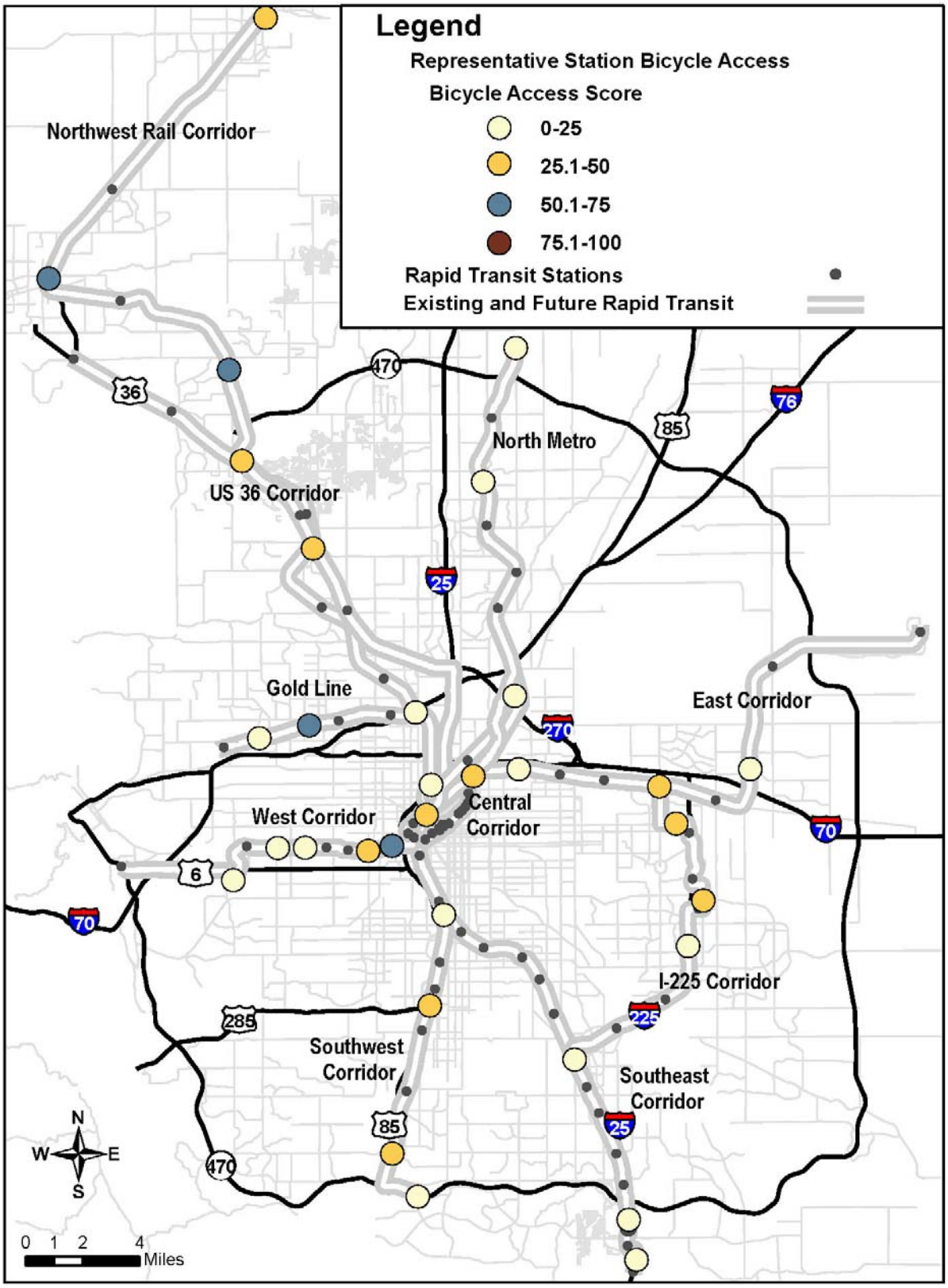
Bicycle Access to Stations

Bicycle access can increase the catchment area for a station compared to walking. People will generally walk about one-half mile, but will bicycle three to five miles to transit. Providing bicycle connections and accessibility helps the transportation system in many ways. It can help reduce traffic impacts around station areas. More bicycle access can reduce or defer the need to build more parking at stations or take parking pressure off of neighborhood parking overflow. From an air quality standpoint, biking to stations at the home (origin) end of a trip eliminates "cold-start" vehicle emissions associated with driving to a park-n-Ride lot. A large proportion of air pollution is generated in the first few miles of an auto trip when the engine is cold.

Bicycle access in representative station areas was determined by scoring each area based on two criteria. The first component of the score indicates the percentage of arterial and collector streets within two miles of a station that have bike lanes. Local streets are not included in the analysis because most are suitable for bicycle riding without dedicated lanes. The second component of the score incorporates the presence of, distance to, and availability of a bike trail.

As illustrated in Figure 23, station areas with the highest scores for bicycle access include Federal/Decatur, Olde Town Arvada, Downtown Louisville, and the Boulder Transit Village.

Figure 23: Bicycle Access to Stations



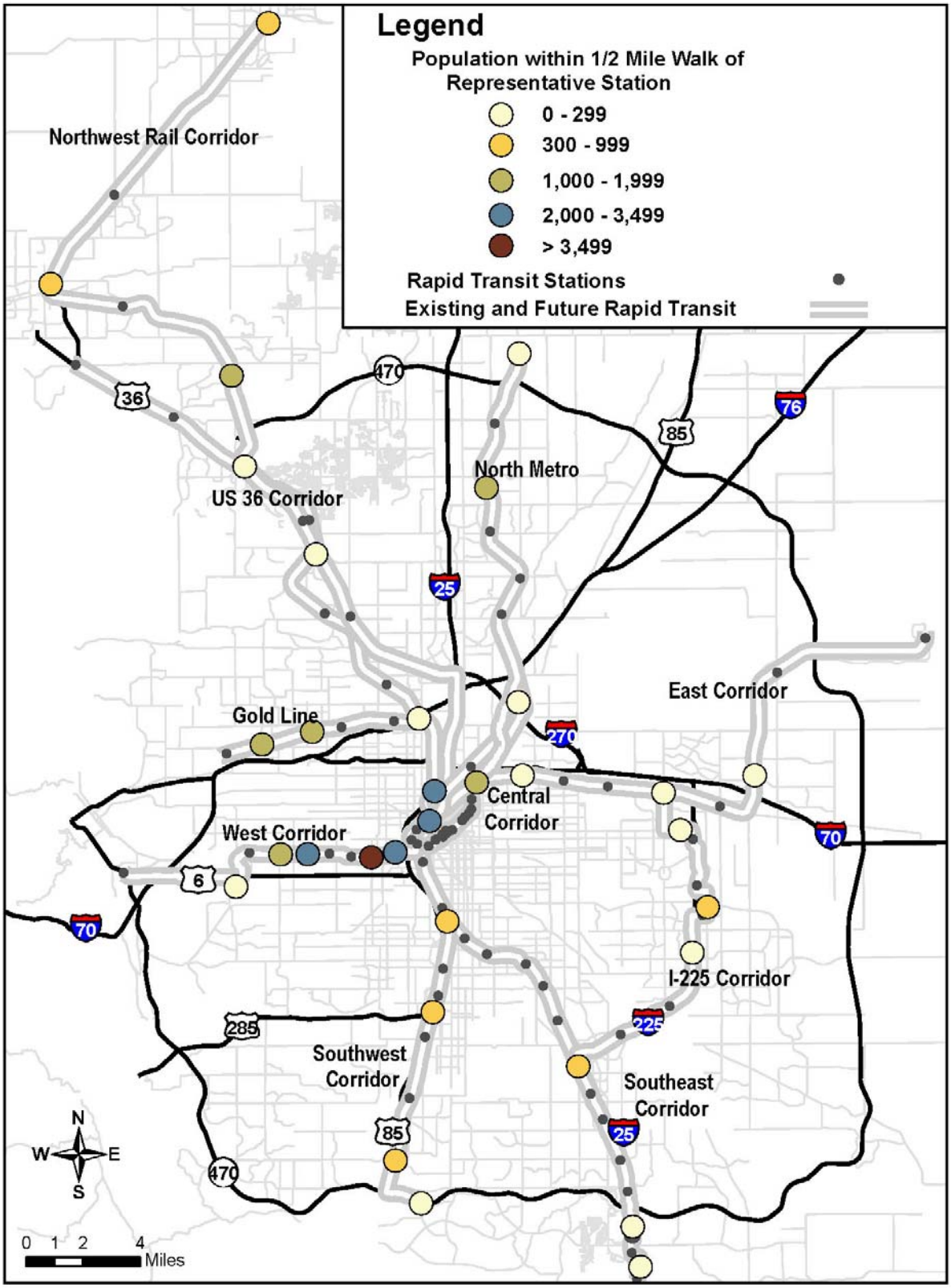
Population within Walking Distance to Stations

Based on trends across the nation, as well as in the region, there is expected to be an increasing demand for residential development near transit stations. Pedestrian accessibility to transit facilities is the key component of a TOD; those that combine a variety of housing alternatives with diverse employment and living options are most successful. Increasingly important is the aging of the population regionally and nationally as the baby-boomer generation moving towards retirement. TODs can provide more people in their later years with higher-quality transit service than traditional senior shuttles, and, consequently, enable them to continue leading active lifestyles. Senior-focused TOD may also help alleviate the future demand for paratransit service.

The QoL Study measured the population within one-half mile of light rail stations based on 2005 DRCOG estimates. Geographic information system (GIS) data was used to determine the half-and-quarter mile service areas using the walkable street network in representative station areas, as opposed to the standard circular buffer.

Currently, station areas with the highest population within walking distance are closer to downtown Denver (see Figure 24), where streets tend to be on a grid structure that offers more direct paths rather than the curvilinear streets and cul-de-sacs typical of suburban areas. These stations include DUS, 38th Avenue, Federal-Decatur, Perry, and Wadsworth.

Figure 24: Population within Walking Distance of Stations



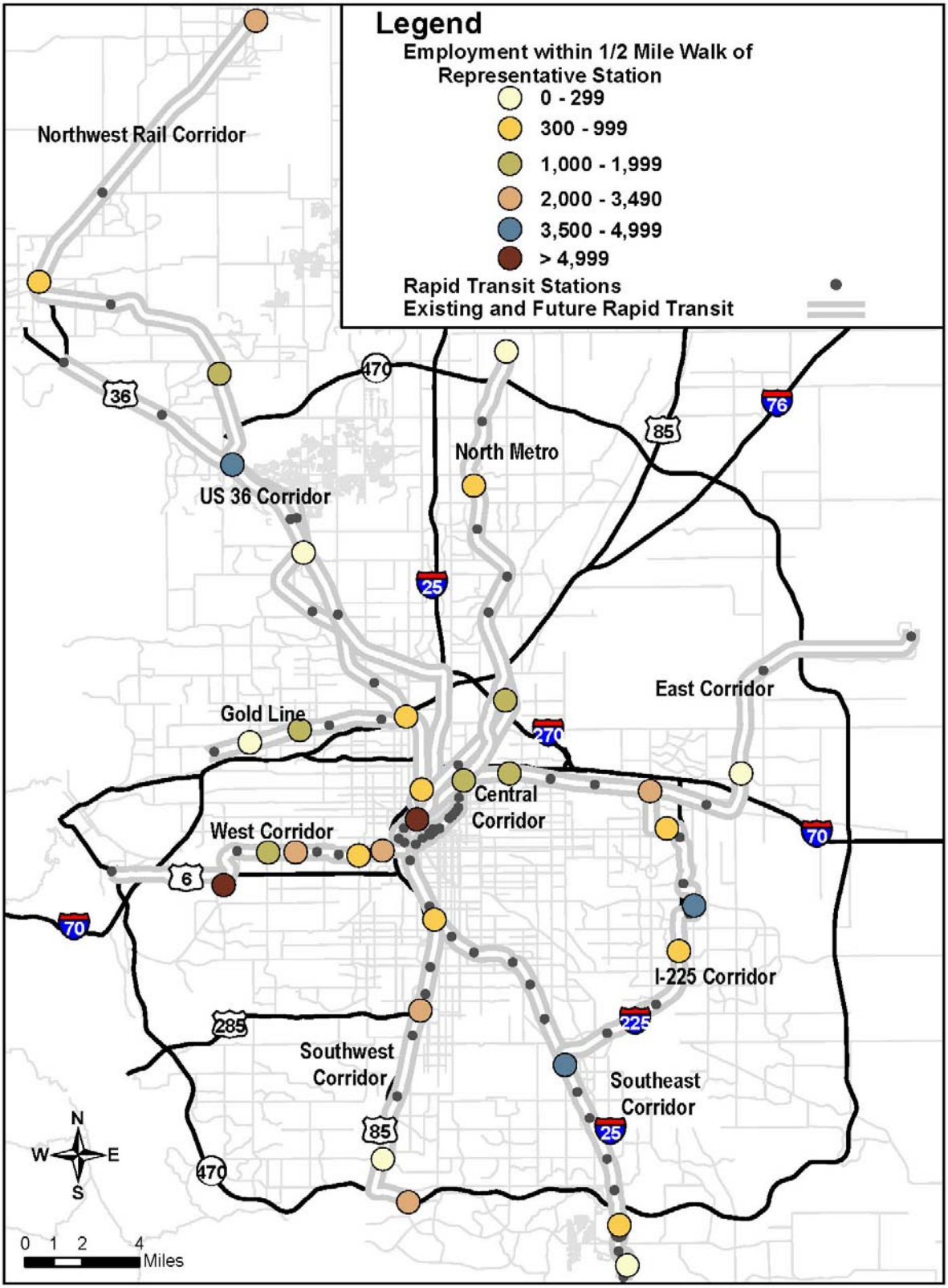
Employment within Walking Distance to Stations

Based on RTD passenger surveys, 56 percent of current light rail passengers use transit to get to work. An even higher percentage of bus passengers, 66 percent, use transit to get to work. The number of jobs in proximity to transit is an important indicator for both employers and employees alike. High quality transit provides commuter options for employees, which can provide a larger potential pool of works for employers.

The QoL Study team measured the number of jobs within one-half mile of light rail stations based on 2005 DRCOG estimates. As with the population analysis, GIS data was used to determine the half- and-quarter mile service areas using the walkable street network in representative station areas, as opposed to the standard circular buffer.

As illustrated in Figure 25, existing and future rapid transit stations with the highest number of jobs within walking distance include Union Station, Federal Center, CentrePoint, Belleview, and US 36/96th. It is likely that there will be additional stations with high employment within walking distance as the transit corridors are constructed and additional development occurs.

Figure 25: Employment within Walking Distance of Stations

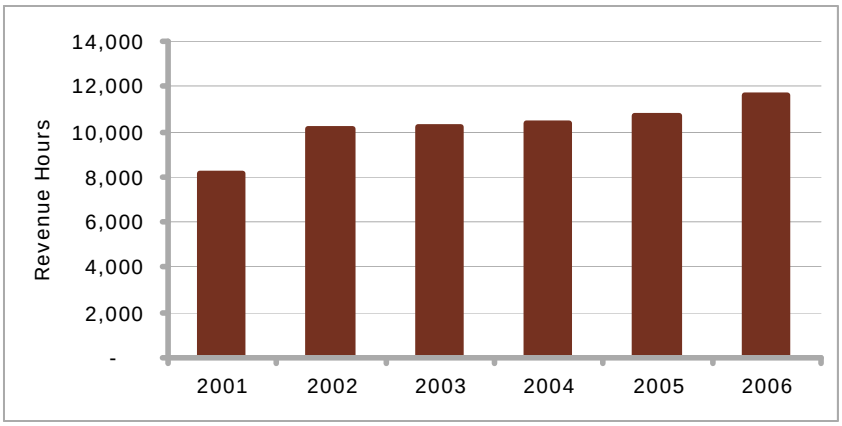


Transit Service

Another key to the success of the FasTracks program is quality transit service provided in a way that serves the locations where people want and/or need to be on a convenient schedule. As the region has grown, RTD's transit service area, service hours, and service types have all expanded to meet demand. In order to continue to provide viable transit options throughout the District, RTD's transit services are planned to keep pace with regional growth.

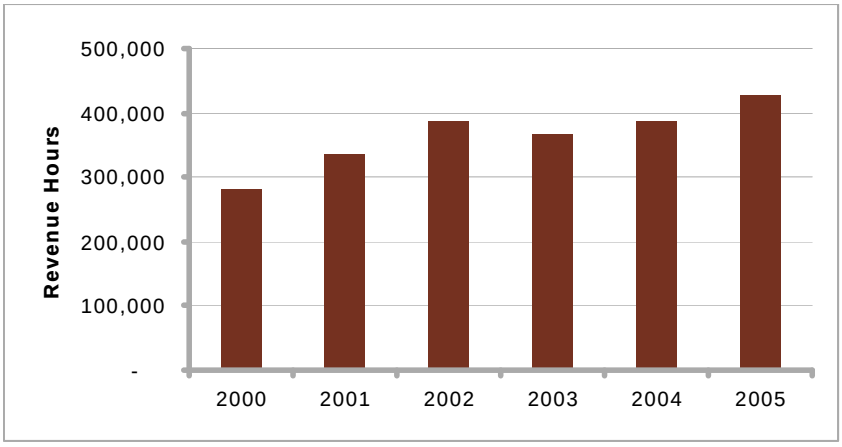
Over the period from 1980 to 2000, RTD averaged about 1.5 percent per year growth in service hours. Weekday service hours grew from just over 8,000 hours per day in 2001, to slightly under 12,000 hours in 2006. Figure 26 shows the growth in service hours between 2001 and 2006. Year-to-year changes can be heavily affected by the regional and national economy. For example, there was relatively rapid growth from 2001 to 2002, but little or no growth from 2002 to 2003 as the economy slowed after 9/11.

Figure 26: Weekday Transit Revenue Hours



RTD also provides a growing amount of transportation to passengers with disabilities who are unable to fixed route service. Between 2000 and 2005 the demand for access-a-Ride service grew by 54 percent (see Figure 27). The service hours for access-a-Ride also grew in that timeframe to accommodate demand.

Figure 27: Annual ADA Revenue Service



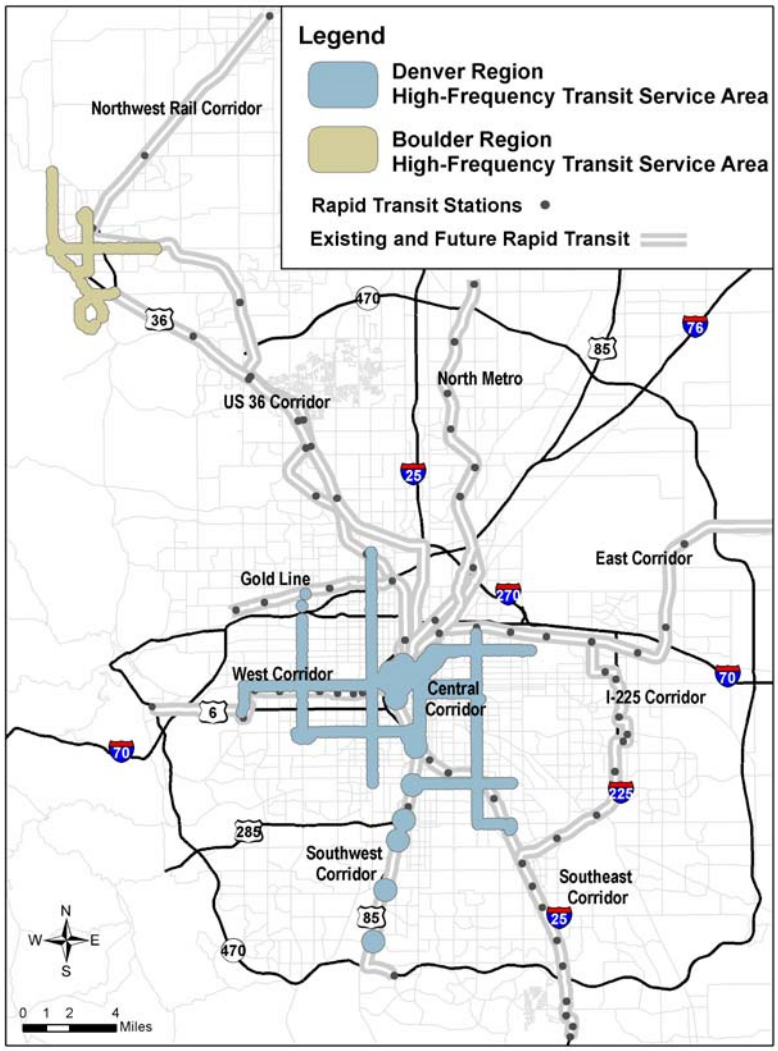
As congestion has grown on the region's roadways, RTD has invested in providing and expanding transit service that operates in its own right-of-way. Transit service that operates in its own right-of-way can operate faster and more reliably than transit sharing lanes with traffic. As of 2005, RTD operated approximately 60 directional miles of transit service (including both bus and light rail) in exclusive or controlled access right-of-way.

High-Frequency Transit Service

This study defines high-frequency transit service as transit routes (or segments of routes) that provide frequent, all-day bus service (15-minute, or better, peak and off-peak headways) on weekdays and that connects to the regional transit network. High-frequency transit is service that is so frequent and predictable that patrons do not have to consult schedules.

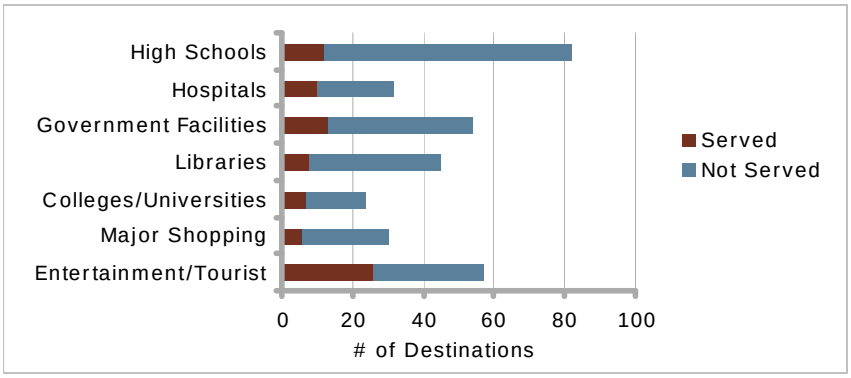
As of October 2006, the area served by this high-frequency service is shown in Figure 28. This area is the area contained within one-half mile of a rail station or one quarter mile of a high-frequency bus stop. A majority of the planned FasTracks rapid transit service will fall within this definition of high-frequency transit, thus, the area served is expected to expand.

Figure 28: Areas Served by High-Frequency Transit, October 2006



Access to high-frequency transit service increases the likelihood of someone using public transportation. Currently, about 10 percent of the region's population and 12 percent of the region's employment are within walking distance of high-frequency transit service. Additionally, of the region's destinations shown in the Figure 29, entertainment and tourist destinations are now the most accessible by high-frequency transit. Overall, 25 percent of regional destinations are served by high-frequency transit.

Figure 29: Regional Destinations Served by High-Frequency Transit



As new rapid transit corridors are opened for revenue service and bus routes are integrated with those lines, regional high-frequency transit service coverage will expand and will be tracked in future QoL reports. Future reports will also track the percentage of regional destinations that are served by high-frequency transit as the system is built out.

III. CONCLUSION AND NEXT STEPS

The baseline data presented in this 2006 QoL report provide a foundation against which to compare to future data. These comparisons will eventually tell a story about how the region (and more specifically the rapid transit corridors and station areas) is changing in terms of mobility, economic development and the environment. Although this report provides a snapshot of the region, existing and future rapid transit corridors and station areas for broad range of measures, several key observations are notable.

Reliable, high-frequency transit service that is competitive with auto travel times results in higher transit ridership. Between 2000 and 2006 (before the opening of the Southeast Corridor light rail) transit boardings increased by 12 percent. Individually, bus boardings grew by six percent but light rail boardings increased 69 percent. The opening of the Southwest Corridor light rail in June 2000 is largely responsible for this increase.

Areas with a high level of transit service are correlated with a higher transit mode share. In 2005, regional transit mode share for commute trips was at four percent but a 2003 Downtown Denver Partnership survey of those commuting to downtown Denver indicated a transit mode share of 46 percent. Additionally, from a mode share analysis of existing and future representative station areas, station areas with a higher level of transit service have a higher transit mode share. This is exemplified by the West Corridor's Federal-Decatur station area, which is the site of a current RTD transfer center; this station area had the highest share of transit mode share at 27 percent.

Where transit service is extensive and/or more frequent, it may be possible for households to own fewer vehicles. An analysis of 2000 Census data revealed that, generally, in areas closer to downtown Denver and Boulder, vehicle ownership is lower than more suburban areas. In these areas transit service is both denser and more frequent.

It is important to note that the FasTracks transit investment is but one variable in the equation that may yield improved mobility, economic development opportunities, and environmental benefits. Local governments and private entities, that will be primarily responsible for developing the areas adjacent to the transit stations, will need to implement appropriate land use regulations and thoughtful development plans.

Land use regulations that encourage higher densities, a mix of uses, and less auto-oriented uses may result in a higher density of residents and jobs in station areas. In turn, this may provide increased transit ridership, successful business investment and help maintain the region's urban growth boundary. Developments that accommodate pedestrian and bicycle circulation and connectivity to adjacent areas may result in less reliance on the automobile and fewer auto trips. Fewer auto trips could slow the growth of VMT and help maintain good air quality, at least at the rapid transit corridor and station area scales.

The QoL Study will continue to collect data throughout the life of the FasTracks program. At this point, the study is expected to end two years after the opening of the program (2018). The study team will publish an annual report on a subset of measures. At regular intervals (every 3 years), the QoL Study will report on all measures. Future reports will demonstrate early impacts of the program in the years before and during construction, provide a high-level summary of the program's impacts following project openings, and develop trend lines for key measures that will allow FasTracks' effects to be more easily identified in the long term.

For a copy of the full Quality of Life 2006 Baseline Report, please contact:

Genevieve Hutchison
RTD FasTracks Office
1560 Broadway, Ste 700
Denver, CO 80202

303-299-2054

Genevieve.Hutchison@RTD-FasTracks.com