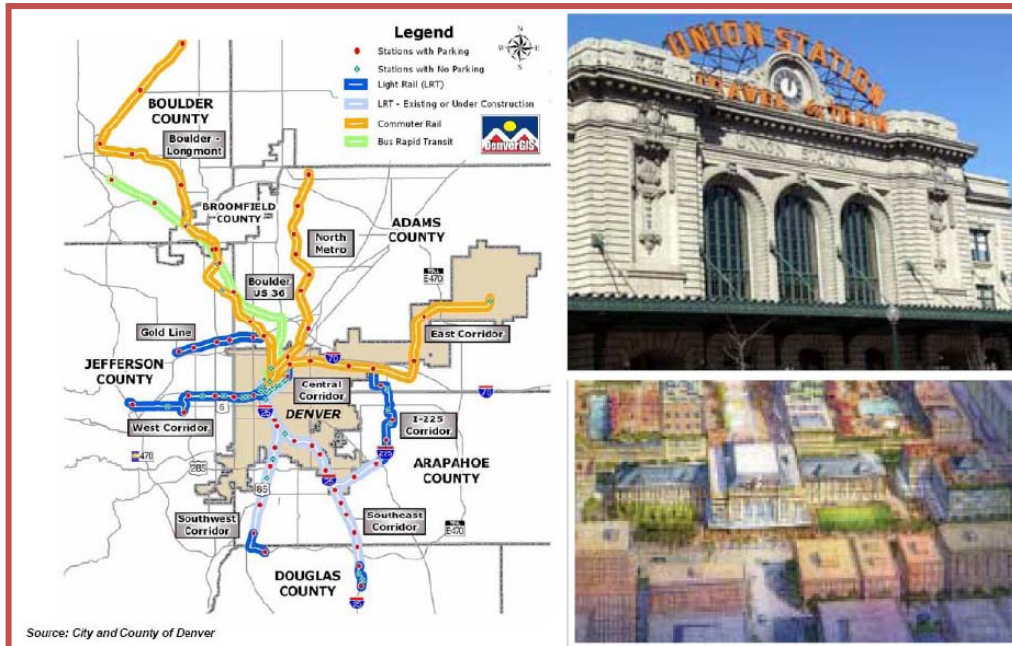


# Transit Oriented Development Economic Analysis and Market Study

## Task 2: Regional Demand Analysis & TOD Market Analysis



PREPARED FOR  
**City and County of Denver**  
Community Planning and Development



**DENVER**  
THE MILE HIGH CITY

PREPARED BY

**bbpc** Basile Baumann Prost Cole & Associates, Inc.  
ASSOCIATES 177 Defense Highway, Suite 10  
Annapolis, MD 21401

*In association with*  
Arland Land Use Economics

**ARLAND**  
Land Use Economics

January 2008

# Table of Contents

- Introduction ..... 1**
  - 1.1 Study Purpose ..... 1
  - 1.2 Work Completed..... 1
  - 1.3 Report Organization ..... 4
  - 1.4 Participating Stakeholders ..... 4
- Regional Demand..... 5**
  - 2.1 Study Area Overview..... 5
  - 2.2 Baseline Household & Employment Estimates ..... 6
  - 2.3 Transit’s Potential to Induce Regional Growth ..... 11
  - 2.4 Induced Regional Growth Potential..... 15
- System-Wide & Corridor TOD Market Demand ..... 18**
  - 3.1 Baseline Corridor Estimates..... 18
  - 3.2 Research on TOD Capture Rates ..... 27
  - 3.3 TOD Capture ..... 33
  - 3.4 Adjusted Household and Employment Estimates ..... 37
  - 3.5 Adjusted System-Wide & Corridor Demand (2015, 2030) ..... 39
- Employment Forecasting Tool..... 41**
  - 4.1 Overview ..... 41
  - 4.2 Methodology..... 41
  - 4.3 Key Features ..... 43
- Appendix ..... 48**

# Introduction

# 1.0

## 1.1 Study Purpose

The Denver FasTracks transit initiative, a \$4.7 billion regional infrastructure investment that will add 119 miles of new rail lines and 70 new stations, brings the Denver region an unprecedented opportunity to promote and facilitate transit-oriented higher density, mixed-use residential and commercial development. Recognizing this opportunity, the City and County of Denver has taken a proactive approach toward refocusing growth into neighborhoods and districts near existing and future transit stations.

To identify, leverage, and maximize these opportunities, the City retained a project team led by Basile Baumann Prost Cole & Associates in cooperation with ArLand Land Use Economics to conduct a *TOD Economic Analysis and Market Study*. The primary goal of the *TOD Economic Analysis and Market Study* is to provide the City with an assessment of TOD potential at the regional, corridor, and station area levels through analysis of short- and long-term demand (e.g. demand in 2015 and 2030). Conducted in coordination with station area planning efforts, the market study is meant to better align station area plans with market realities and dynamics. The overall objectives of the *TOD Economic Analysis and Market Study* include forging a better understanding of the economic context in which the City may plan for TOD, and developing specific recommendations regarding the amount, type, mix, and intensity of uses appropriate for selected station areas.

Task 2 *Regional Demand Analysis and TOD Market Analysis* is presented in this report. The purpose of the regional demand analysis and TOD analysis task is to assess short- and long-term demand for new residential, office, and retail space at the regional level and understand potential market demand for TOD at the system-wide and corridor levels. For the purposes of this analysis, “system-wide” refers to the nine (9) existing and future fixed guideway transit corridors within the FasTracks system.

## 1.2 Work Completed

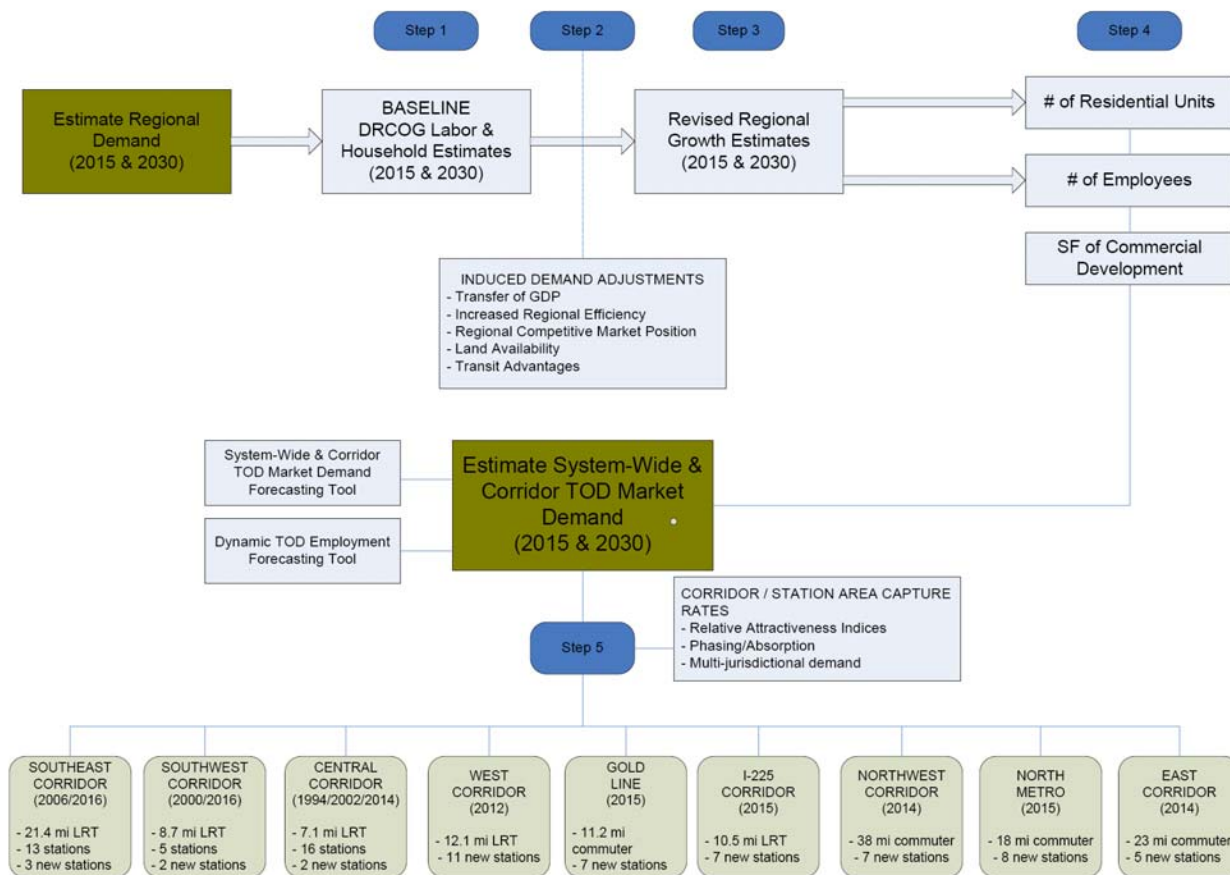
As part of the *Task 2 Regional Demand Analysis & TOD Market Analysis*, the Project Team completed the following tasks:

- 1) ***Estimated regional demand*** for new residential, office, and retail space. This estimation involved adjustment of baseline household and employment growth projections to account for the potential enhanced growth premium associated with transit investment. To estimate potential enhanced or induced growth (e.g. growth that would not have occurred without the transit system’s presence), the Project Team researched national case studies and reports, and conducted a survey to solicit input from national and regional experts in this area.

- 2) **Estimated system-wide and corridor TOD market demand** for residential, office, and retail space based on estimated capture rates (e.g. proportion of regional growth redistributed to areas within ½ mile of transit stations). To establish a range of credible capture rates, the Project Team utilized: national case studies, academic reports, and expert opinion; baseline regional housing and employment projections; field surveys; national and regional industry market data and trends; existing and proposed development plans and projects; and the insight of local stakeholders.
- 3) **Created an employment forecasting tool** that allows users to estimate direct and spin-off employment growth induced by the FasTracks transit expansion at the system, corridor, and station area levels, and provides estimation of the number of jobs in the region created as a result of FasTracks. Organized by year, the tool permits tracking of employment growth trends over time.

Exhibit 1-1 summarizes the five-step process used to estimate regional demand and TOD market demand at the system-wide and corridor levels.

**Exhibit 1-1: Regional Demand Analysis and TOD Market Analysis Approach**



Source: BBPC

To estimate regional demand and TOD market demand, the Project Team undertook the following steps:

- 1) Established baseline 2005, 2015 and 2030 regional household and employment growth using Denver Regional Council of Governments (DRCOG) estimates and projections by Transportation Analysis Zone (TAZ).
- 2) Undertook a qualitative survey and literature/ case study review that examined the ability of transit to induce regional growth. Based on the survey and literature review, estimated credible, quantifiable assumptions for transit induced growth.
- 3) Adjusted baseline 2015 and 2030 regional household and employment projections to include growth projection induced by transit, if any.
- 4) Translated adjusted regional household and employment projections into estimated regional demand in terms of number of residential units and square footage of space.
- 5) Estimated system-wide and corridor TOD market demand in terms of residential units and square feet of space (2015 and 2030 time periods) based on the following steps:
  - Established baseline 2015 and 2030 system-wide and corridor household and employment growth using Denver Regional Council of Governments (DRCOG) estimates and projections by Transportation Analysis Zone (TAZ).
  - Reviewed national/regional case studies and academic research to identify potential growth premium associated with TOD, and reviewed national and regional industry market trends (ascertained through existing and proposed development plans as well as stakeholder input) to examine the potential redistribution of growth around transit station areas (e.g. within ½ mile walksheds) within region.
  - Based on national research, market trends, relative attractiveness indices, phasing/absorption, and multi-jurisdictional demand, estimated market capture rates for household and employment growth at the system-wide and corridor levels.
  - Adjusted baseline 2015 and 2030 household and employment projections to include growth captured from the region (including induced growth) to transit station areas.
  - Translated adjusted system-wide and corridor household and employment projections into estimated demand in terms of residential units and square footage of space (office and retail).

### 1.3 Report Organization

The *Task 2 Regional Demand Analysis & TOD Market Analysis* includes the following sections:

1. Introduction
2. Regional Demand Analysis
3. System-Wide & Corridor TOD Market Demand Analysis
4. Employment Forecasting Tool
5. Appendix

### 1.4 Participating Stakeholders

The *Task 2 Regional Demand Analysis & TOD Market Analysis* was informed by the insight of a variety of stakeholders. Individuals that lent their time and expertise to the Project Team include representatives of the following organizations and companies:

- City & County of Denver Community Planning & Development (CPD)
- City & County of Denver Office of Economic Development (OED)
- City & County of Denver Public Works Department
- Regional Transportation District (RTD)
- Denver Regional Council of Governments (DRCOG)
- Denver Urban Renewal Agency (DURA)
- Enterprise Community Partners, Inc.
- Metro Denver Economic Development Corporation (EDC)
- CB Richard Ellis
- Continuum Partners LLC
- Urban Frontier
- Citiventure
- Mile High Development
- Trammell Crow
- Cherokee Denver LLC
- Urban Ventures
- Littleton Capital Partners
- East West Partners
- Cypress Real Estate Advisors
- Cohens Development Team
- Starboard Realty Group
- Mercy Housing
- Frederick Ross & Company

# Regional Demand

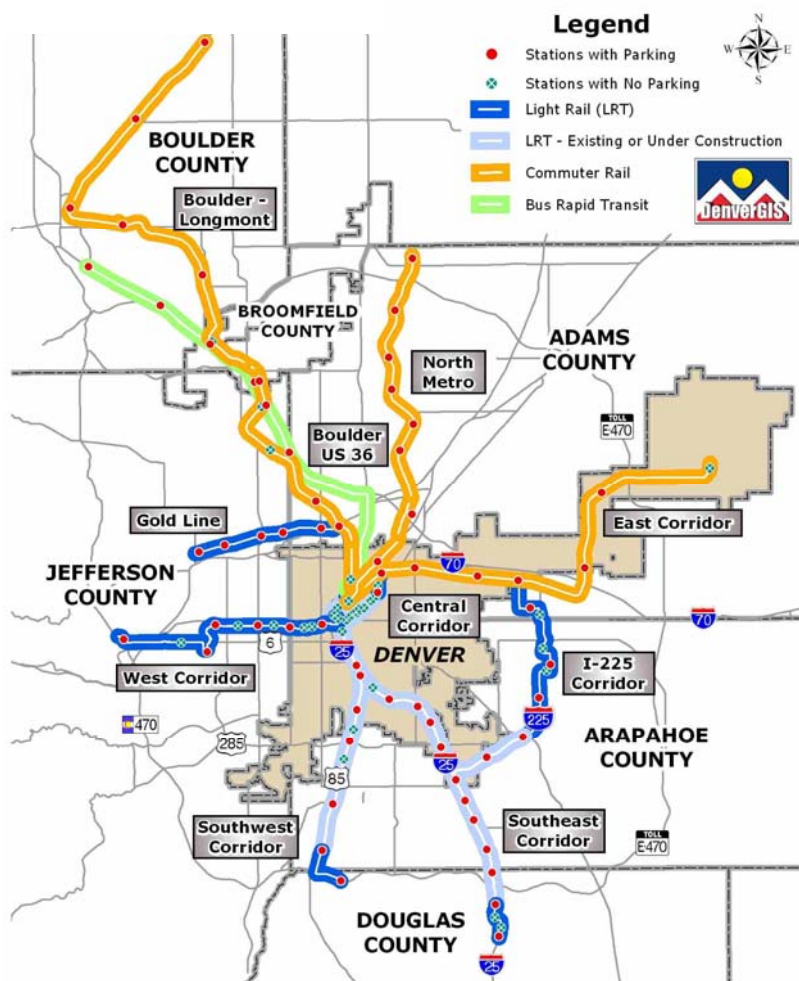
# 2.0

## 2.1 Study Area Overview

The Denver Regional Transportation District (RTD) transit system currently offers 36 existing light rail transit stations within the Denver region. Upon completion in 2016, the development of FasTracks will add six new rapid transit corridors, extensions of three existing corridors and will add 57 new stations, bringing the total number of stations to approximately 93. Comparably sized regional transit systems include those in Portland (110 existing stations), Los Angeles (124 existing stations), and San Diego (69 existing stations).

Exhibit 2-1 illustrates the current and future rapid transit corridors, including bus rapid transit, within the RTD FasTracks system.

**Exhibit 2-1: FasTracks System (Existing and Future Corridors)**



Source: City and County of Denver

The FasTracks expansion will result in a comprehensive system of nine (9) transit corridors linking major employment and transportation hubs throughout the region.

The nine existing and planned corridors include the:

- Central Corridor/Central Platte Valley Spur (CPV)
- Southwest Corridor
- Southeast Corridor
- East Corridor
- West Corridor
- Gold Line Corridor
- Northwest Corridor (and associated US 36 Bus Rapid Transit Corridor)
- North Metro Corridor
- I-225 Corridor

Exhibit 2-2 details existing and future stations within the FasTracks system by corridor and impacted jurisdiction (e.g. jurisdiction through which transit lines will pass).

Exhibit 2-2: Fastracks Overview					
Corridor	County	# of Stations			Completion
		Existing (2007)	Future	Total	
Central CPV	Denver	18	2	20	1994, 2015
Southwest	Denver, Arapahoe, Douglas	5	2	7	2000, 2016
Southeast	Adams, Denver, Arapahoe, Douglas	13	3	16	2006, 2016
East	Adams, Denver, Arapahoe, Douglas	0	8	8	2014
West	Denver, Jefferson	0	11	11	2012
Gold Line	Jefferson, Adams, Denver	0	7	7	2015
Northwest	Boulder, Denver, Broomfield	0	9	9	2014
North Metro	Adams, Denver	0	8	8	2015
I-225	Adams, Arapahoe	0	7	7	2015
<b>TOTAL</b>		<b>36</b>	<b>57</b>	<b>93</b>	

*Source: BBPC*

The Central CPV corridor, which passes through downtown Denver, will have the most stations at build out with 20 stations followed by the Southeast Corridor with 16 stations, the West Corridor with 11 stations and the Northwest Corridor with 9 stations.

## 2.2 Baseline Household & Employment Estimates

The Denver Regional Council of Governments (DRCOG), the regional planning agency for the Denver metropolitan area, has generated estimates and projections of regional



households and employment in the region for the years 2005, 2015, and 2030. These estimates are useful to understand general patterns of growth at the regional and city/county levels, and represent a level of baseline growth that the planning agency projects to occur. Currently, these projections do not take into consideration, in some instances, transit's ability to influence land use patterns with the location of new housing and employment.

To generate employment estimates, DRCOG utilizes data from the Quarterly Census of Employment and Wages (ES202), which includes all employment except contract and self-employment, which DRCOG estimates separately. Household estimates are based on applying the estimated vacancy rate in areas to the total number of housing units, which are estimated based on data from utility companies and housing market researchers. Future projections of employment and households incorporate these factors and data as well as local land use development information reported by jurisdictions. Summary DRCOG estimates for the years 2005, 2015 and 2030 are provided below. Additional data is provided in the appendix.

### Households

Current projections indicate that households will be added in the Denver region at an average annual increase of 1.8 percent from 2005 to 2030. The most household growth during this period is projected to occur in suburban counties south, east, and north of Denver (e.g. Douglas, Arapahoe, Adams). Less growth is projected to the north and west (e.g. Jefferson and Boulder) where lack of available land for new development has been identified as a constraint to growth. Exhibit 2-3 summarizes these baseline household estimates and forecasts from 2005 to 2030.

**Exhibit 2-3: Household Forecast 2005 - 2030<sup>1</sup>**

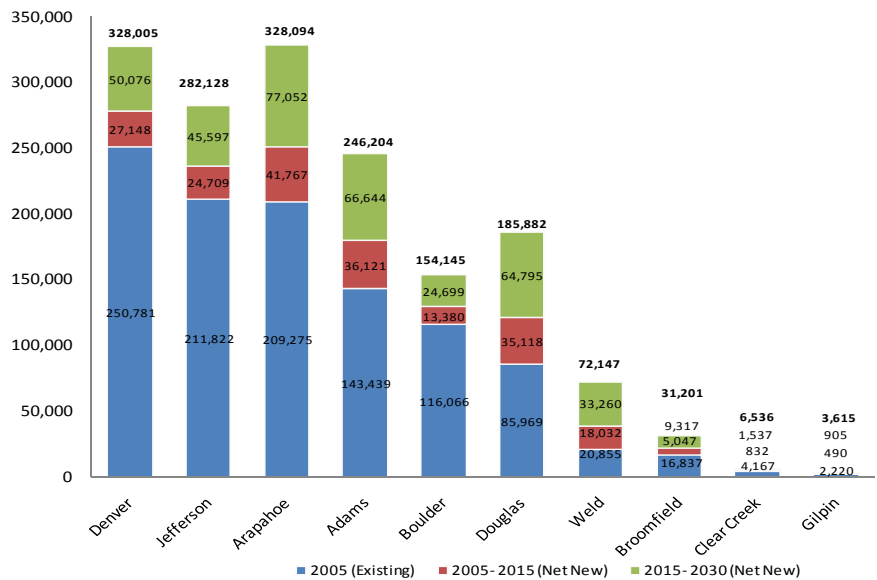
County	Forecast			% Annual Growth (2005-2015)	% Annual Growth (2015-2030)	Net Change (2005-2030)	% Annual Growth (2005-2030)
	2005	2015	2030				
Denver	250,781	277,929	328,005	1.0%	1.1%	77,224	1.1%
Jefferson	211,822	236,531	282,128	1.1%	1.2%	70,306	1.2%
Arapahoe	209,275	251,042	328,005	1.8%	1.8%	118,819	1.8%
Adams	143,439	179,560	246,204	2.3%	2.1%	102,765	2.2%
Boulder	116,066	129,446	154,145	1.1%	1.2%	38,079	1.1%
Douglas	85,969	121,087	185,882	3.5%	2.9%	99,913	3.1%
Weld	20,855	38,887	72,147	6.4%	4.2%	51,292	5.1%
Broomfield	16,837	21,884	31,201	2.7%	2.4%	14,364	2.5%
Clear Creek	4,167	4,999	6,536	1.8%	1.8%	2,369	1.8%
Gilpin	2,220	2,710	3,615	2.0%	1.9%	1,395	2.0%
<b>TOTAL</b>	<b>1,061,431</b>	<b>1,264,075</b>	<b>1,637,957</b>	<b>1.8%</b>	<b>1.7%</b>	<b>576,526</b>	<b>1.8%</b>

<sup>1/</sup> % Annual growth = compound annual growth rate, used to reflect population compounding over time

Source: Denver Regional Council of Governments (DRCOG), BBPC

Baseline projections show that all counties in the Denver region are projected to experience household growth from 2005 to 2030, as summarized in Exhibit 2-4. Arapahoe County is projected to see the greatest growth in terms of new households during the period 2005 to 2030, adding approximately 119,000 new households during this period for a projected total of 328,000 households by 2030 (an increase of 1.8 percent per year).

**Exhibit 2-4: Household Forecast by County (2005-2030)**



Source: Denver Regional Council of Governments (DRCOG), BBPC

Adams and Douglas Counties are also projected to experience higher household growth relative to the rest of the region, growing at respective rates of 2.2 and 3.1 percent annually, and are each projected to add approximately 100,000 new households during this period for a total of 250,000 (Adams) and 186,000 (Douglas) households by 2030.

### Office Employment

DRCOG also provides employment forecasts broken out by production, retail, service, military, contractor, and self employment. Based on an analysis of the office related jobs in the region, the Project Team assumed that office-based employment includes 65 percent of service employment (encompassing such fields as professional services, finance, insurance, real estate, and information) and 10 percent of production employment (to capture industrial companies that occupy office space in addition to traditional industrial spaces).<sup>1</sup> These are the jobs that would be located in a typical office building environment.

The region is projected to add office-based employment from 2005 to 2030 at nearly the same rate as it adds households, at an average annual rate of 1.7 percent compared to

<sup>1</sup> Based on CoStar data regarding office space users by industry in Denver.

1.8 percent, respectively. Much of the office employment growth could be concentrated in the central, southeast, and northern areas in the region, building on existing clusters of office development in such areas as the Central Business District, Tech Center and along the US 36 corridor. Exhibit 2-5 summarizes the baseline office employment estimates and projections for the years 2005, 2015 and 2030.

**Exhibit 2-5: Office Employment Forecast (2005 – 2030)<sup>1</sup>**

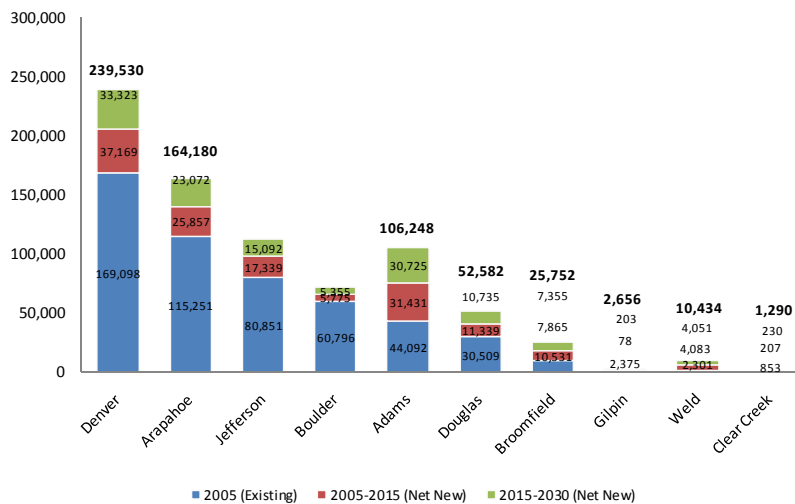
County	Forecast			% Annual Change (2005-2015)	% Annual Change (2015-2030)	Net Change (2005-2030)	% Annual Change (2005-2030)
	2005	2015	2030				
Denver	169,098	206,267	239,590	2.0%	1.0%	70,492	1.4%
Arapahoe	115,251	141,109	164,180	2.0%	1.0%	48,929	1.4%
Jefferson	80,851	98,190	113,282	2.0%	1.0%	32,431	1.4%
Boulder	60,796	66,571	71,927	0.9%	0.5%	11,131	0.7%
Adams	44,092	75,523	106,248	5.5%	2.3%	62,156	3.6%
Douglas	30,509	41,848	52,582	3.2%	1.5%	22,074	2.2%
Broomfield	10,531	18,396	25,752	5.7%	2.3%	15,220	3.6%
Gilpin	2,375	2,453	2,656	0.3%	0.5%	281	0.4%
Weld	2,301	6,384	10,434	10.7%	3.3%	8,134	6.2%
Clear Creek	853	1,060	1,290	2.2%	1.3%	436	1.7%
<b>TOTAL</b>	<b>516,657</b>	<b>657,801</b>	<b>787,942</b>	<b>2.4%</b>	<b>1.2%</b>	<b>271,284</b>	<b>1.7%</b>

<sup>1/</sup> % Annual growth = compound annual growth rate, used to reflect employment compounding over time

Source: Denver Regional Council of Governments (DRCOG), BBPC

With much of the regional office growth estimated to occur in the central, southeast, and northern areas of the region, the counties of Denver, Adams, and Arapahoe are projected to receive the majority of office-based employment growth. Exhibit 2-6 illustrates baseline office employment projections for periods 2005-2015 and 2015-2030 along with the total projected office jobs by 2030.

**Exhibit 2-6: Office Employment Forecast by County (2005-2030)**



Source: Denver Regional Council of Governments (DRCOG), BBPC

The City and County of Denver, as the employment center in the region, is projected to add over 70,000 office jobs from 2005 to 2030, followed by Adams County (62,156 jobs) and Arapahoe County (48,829 jobs).

### Retail Employment

Based on analysis of retail service jobs in the Denver region, the Project Team assumed that retail employment includes 100 percent of DRCOG projected employment classified as retail and 5 percent of service employment, which includes food service and other service-based retail jobs.

Exhibit 2-7 summarizes baseline retail employment estimates and projections for the period 2005 to 2030.

County	Forecast			% Change (2005-2015)	% Change (2015-2030)	Net Change (2005- 2030)	% Change (2005-2030)
	2005	2015	2030				
Denver	76,604	97,865	116,970	2.5%	1.2%	40,366	1.7%
Arapahoe	58,250	71,324	82,518	2.0%	1.0%	24,268	1.4%
Jefferson	55,015	64,815	75,586	1.7%	1.0%	20,571	1.3%
Boulder	33,296	37,835	41,229	1.3%	0.6%	7,934	0.9%
Adams	29,340	46,719	63,582	4.8%	2.1%	34,242	3.1%
Douglas	26,505	32,002	39,119	1.9%	1.3%	12,615	1.6%
Broomfield	8,422	11,113	13,961	2.8%	1.5%	5,539	2.0%
Weld	1,886	6,703	11,475	13.5%	3.6%	9,589	7.5%
Gilpin	1,281	1,340	1,449	0.5%	0.5%	169	0.5%
Clear Creek	805	980	1,115	2.0%	0.9%	310	1.3%
<b>TOTAL</b>	<b>291,403</b>	<b>370,697</b>	<b>447,005</b>	<b>2.4%</b>	<b>1.3%</b>	<b>155,602</b>	<b>1.7%</b>

<sup>1/</sup> % Annual growth = compound annual growth rate, used to reflect employment compounding over time

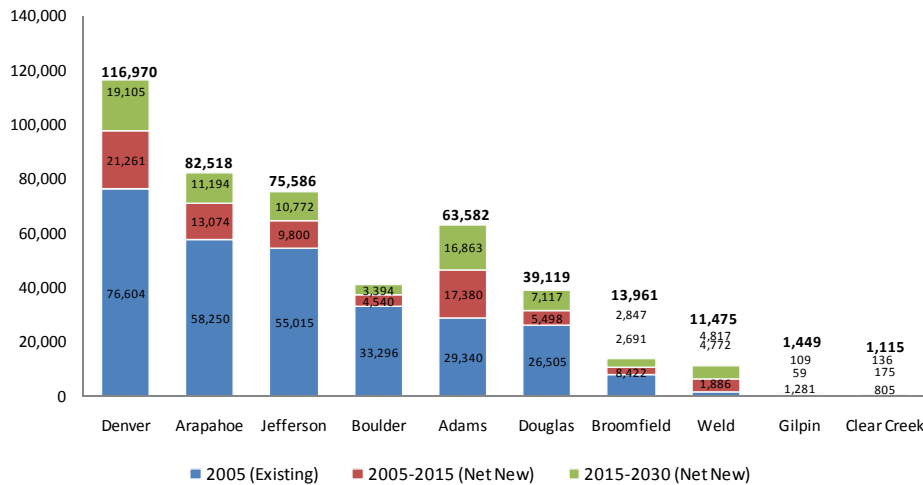
Source: Denver Regional Council of Governments (DRCOG), BBPC

Baseline retail employment projections suggest that the Denver region could add retail employees at an average rate of 1.7 percent per year from 2005 to 2030, the same rate as it could add office employees.

Retail employment growth is projected to be strongest in the south, east, and northern areas of the region, where new retail services may cater to growing residential populations.

Significant growth could also occur in the central part of the region, which has traditionally served as a hub for entertainment and retail services. Exhibit 2-8 depicts retail employment by county from 2005 to 2030.

Exhibit 2-8: Retail Employment Forecast by County (2005-2030)



Source: Denver Regional Council of Governments (DRCOG). BBPC

The City and County of Denver is projected to build on its existing concentration of retail and entertainment offerings with the addition of over 40,000 new retail employees from 2005 to 2030, for a total of 117,000 retail employees by 2030. This is followed by Adams and Arapahoe Counties in the southeast and northern areas of the region, which is projected to see growth of 34,000 and 24,000 retail employees, respectively.

### 2.3 Transit’s Potential to Induce Regional Growth

One of the most challenging, and under-explored, research topics in the transit field is the question of whether the presence of a transit system can stimulate or “induce” regional growth that would not have otherwise occurred if the transit system was not present.

In an attempt to address this question as part of the Denver *Regional Demand Analysis*, the Project Team undertook a qualitative survey of other regions with established transit systems and key economic development, transit, and business site selection professionals from across the nation that are experts in the field. The survey method and key findings are outlined below.

#### Qualitative Survey Method

In early 2007, the Project Team distributed a written survey to over 50 experts in the fields of economic development/business site selection, transit and local and regional land use planning in order to solicit their input on transit’s ability to induce growth. Survey recipients were chosen based on their expertise regarding transit oriented development and business site selection, and/or their location within regions with established rail systems. With 25 responses, the survey received a 50 percent response rate.

Recipients included transit, economic/business development and land use planning representatives from the following regions with established rail transit systems:

- San Francisco Bay Area
- Washington, DC
- Portland, OR
- Dallas, TX
- San Diego, CA
- Salt Lake City, UT
- Minneapolis/St. Paul, MN

The Project Team also solicited input from representatives from national/policy organizations, consulting firms, universities and others who are experts in the fields of TOD, business site selection, transit, and economic development. Appendix A contains a complete listing of who this was sent out to and who we received responses from.

The central question posed through this survey was if investment in transit:

- a) induces new growth to a region that otherwise would not have occurred without transit;
- b) contributes to redistribution of growth around transit; or
- c) some combination of induced growth and redistribution.

### **Key Survey Findings**

In general, respondents noted that the issue of transit induced growth as an important topic, yet one that has received little research to date. Most respondents indicated that transit investment can redistribute growth to station areas, and that, though not empirically tested, transit investment offers potential to induce new growth. Respondents suggested that this induced new growth may occur when the transit investment is comprehensive (e.g. fully developed), when land use policies support transit oriented development, and when residents and companies value the accessibility advantages transit can provide. However, some respondents cautioned that the level of new growth induced by transit may be minor, since transit is but one of many factors influencing the location decisions of households and firms.

Survey respondents offered a range of estimates when asked to estimate the level of new growth that could, under the right conditions, be attributed to transit; respondents estimated transit could induce from 2 to 50 percent of the net new growth that occurs in a region. Estimates were similarly wide ranging in response to the question of what level of induced new growth station areas could potentially capture; respondents estimated station areas could capture from 5 to 80 percent of net new growth.

Key findings, summarized by question, are as follows:

- *Do you think the investment in transit (in your region or elsewhere) induces new growth (e.g. business location, new jobs, new residents) to the region that otherwise would not have occurred in the region without transit or does transit investment represent a redistribution of growth within the region, or some combination of both?*

**Summary Results:**

- Transit investment both redistributes and induces new growth under certain conditions
- New growth occurs with the introduction of a truly comprehensive transit system
- New growth due to transit is a minor consideration in overall growth patterns
- Data is limited on this issue

- *If transit induces new growth to the region, what is the percent of this growth that you think is transit induced (e.g. 5% of new growth is transit induced)?*

**Summary Results:**

- Hard quantitative data is lacking on this issue
- Anecdotally, growth induced by transit ranges from 2 to 50 percent
- The percent of growth induced by transit depends on the regional growth rate (e.g. fast or slow)

- *If transit induces new growth to the region, why do you think this growth was induced from the transit system? In other words, what about the transit system prompted this net new growth to occur?*

**Summary Results:**

- Transit improved accessibility, quality of life, and commuting times
- Transit investment indicates that the region is progressive - a positive factor for some businesses searching for new locations for their companies
- Transit offers new locational opportunities for jobs

- *If transit induces new growth to the region, how much of this net new growth do you think occurs around the transit stations (e.g. within ½ mile of the station)?*

**Summary Results:**

- Difficult factor to determine
- Respondents identified a range of proportions (from less than 5 to 80 percent)
- Respondents noted the proportion depends on:
  - The link between transit and land use
  - Whether or not stations are located in growth areas
  - The degree to which TOD provides benefits that are unavailable elsewhere in the region

- *How important do you think the presence of a transit system (in your region or elsewhere) is as a criteria that businesses look at when deciding to move to a region and/or expand within the region?*

**Summary Results:**

- Respondents offered a range of opinions, from those that thought transit is not a significant factor in business site selection to those that indicated it is a factor of paramount importance. These opinions included the following:
  - Transit may be a factor in site selection under certain circumstances
  - Transit is a more important factor to businesses that employ the demographic more likely to use transit (e.g. young professionals)
  - Transit is an important factor if the system is comprehensive and well-used
  - Transit is not on many CEO's radar screens when making corporate site selection decisions



- *Do you know of any anecdotal information from developers, businesses, or others indicating why the transit system prompted them to locate in and/or expand within the region? Please be specific if possible.*

**Summary Results:**

- Anecdotal information is limited, but there are examples (Bellsouth in Atlanta, Boeing in Chicago)
- Limited amount of hard data available, mostly related to rent and/or land value premiums associated with TOD
- Selected developers are looking at TOD sites

- *Do you know of any research (academic or otherwise) that has documented the issue of transit-induced growth? Please list if so.*

**Summary Results:**

- There is limited research on this issue, and none that specifically addresses the issue of net new growth
- No research has addressed the issue of redistribution versus new growth
- Analogous studies have focused on highway impacts, not transit

## 2.4 Induced Regional Growth Potential

Based on these survey results, the Project Team’s experience with transit induced growth, and the Denver region’s potential to induce growth with FasTracks, we estimate that there could be a modest level of growth induced by transit **from the time period 2015 to 2030**. It is during this time period that the FasTracks system will be a truly comprehensive system serving the Denver region, and will place the region in a better competitive position to attract new growth (firms and households) compared to other regions without full transit systems. In contrast, we estimate the level of induced growth to be nominal from 2005 to 2015, since the entire system will not be fully operational.

Within the range held by the most conservative of survey respondents, the Project Team assumes that in addition to baseline new growth that occurs in the Denver region after FasTracks’ completion, 2 percent induced new growth, attributable to transit, could be added. We also estimate that 40 percent of this growth could be captured within the ½ mile walksheds surrounding transit stations. Forty percent is near the midpoint of survey respondents estimates regarding how much induced new growth could be captured in station areas. Our assumption that growth may be captured within station areas is further

supported by academic research and case studies that have documented redistribution of households and firms in station areas. This research, which is more fully described in section 3.2, has suggested that transit station areas may capture relatively more regional growth when located in regions that: are fast-growing, are experiencing growth of households likely to be interested in living near transit (e.g. empty nester, singles, non-family, and immigrant households), have experienced demand for higher-intensity development, and benefit from public policies that support transit oriented development.

Our assumption that transit may induce regional growth in the Denver region is based on the following assumptions:

- Denver is a relatively fast-growing region
- FasTracks will improve accessibility, quality of life, and commuting times
- FasTracks will be a symbol of the Denver region's progressiveness
- A portion of companies considering sites within the Denver region employ young professionals more likely than others to use transit
- FasTracks will be a well-used system (based on current ridership)

To calculate estimated induced growth, the Project Team assumed that a conservative 2 percent of future growth may be induced by the transit system, as based on the findings of national case study research, review of academic reports, and feedback from national experts. Since our research did not reveal empirical evidence suggesting a different capture rate in station areas of population versus employment, we have assumed a 2 percent capture rate of both households and firms. Estimated net new induced growth was calculated by:

- Adjusting baseline regional growth projections upward to account for potential induced growth (e.g. dividing baseline regional growth projections by 0.98 such that adjusted growth projections would include 2 percent induced by transit), and;
- Subtracting baseline regional growth projections from adjusted regional growth projections.

This method resulted in the following estimates of potential induced growth:

- 7,630 new households
- 2,656 new office employees
- 1,557 new retail employees

Exhibit 2-9 illustrates the adjusted regional forecast based on estimated induced growth potential.

<b>Exhibit 2-9: Adjusted Forecast based on Induced Growth (2030)</b>			
	<b>Households</b>	<b>Office Employment</b>	<b>Retail Employment</b>
Baseline Regional Growth Projections 2030	373,882	130,141	76,308
Adjusted Regional Induced Growth:2030 (Basekine/0.98) 1/	381,512	132,797	77,865
<b>Net Induced Regional Growth: 2005-2030 (Adjusted Baseline or Adjusted*2 percent)</b>	<b>7,630</b>	<b>2,656</b>	<b>1,557</b>
<i>1/ Adjusted Regional Growth is estimated to include 2 percent of Induced Growth</i>			
<i>Source: DRCOG, BBPC</i>			

Of the regional induced growth, we estimate that approximately 40 percent could be redistributed to the station areas along the FasTracks system. This 40 percent capture rate is approximately the midpoint of the range of capture rates provided by survey respondents (e.g. 5 to 80 percent), and translates to:<sup>2</sup>

- 3,052 new station area households
- 1,062 new station area office employees
- 623 new station area retail employees

<b>Exhibit 2-10: Redistribution of Induced Growth to Transit System (2015-2030)</b>			
	<b>Households</b>	<b>Office Employment</b>	<b>Retail Employment</b>
Regional Induced Growth (2015-2030)	7,630	2,656	1,557
% Redistributed to Station Areas	40%	40%	40%
<b>Station Area Induced Growth</b>	<b>3,052</b>	<b>1,062</b>	<b>623</b>
<i>Source: DRCOG, BBPC</i>			

These new induced households and employees within the station areas are in addition to those that are forecasted based on 1) DRCOG baseline estimates and 2) estimated redistribution of baseline regional growth. Total households and employment at the system and corridor levels, including induced growth, DRCOG baseline growth, and redistributed regional baseline growth (TOD capture), is detailed in Section 3.0.

<sup>2</sup> Given the lack of empirical evidence on transit induced growth and how it is redistributed within a region, we feel that the midpoint of survey respondents answers provides our best estimate of how much induced new growth could be refocused in station areas.

## System-Wide & Corridor TOD Market Demand

# 3.0

After estimating regional growth - both baseline and growth induced by transit - the Project Team assessed potential redistribution of regional growth captured within station areas at the system and corridor levels. In analyzing station area growth, the Project Team:

- Established baseline DRCOG household and employment estimates
- Reviewed national case studies and academic research, national and regional industry market trends, and stakeholder input to assess potential redistribution
- Established capture rates for regional household and employment growth (e.g. proportion that would be redistributed to transit corridors) based on market attractiveness, multi-jurisdictional demand, phasing, absorption and other key factors
- Adjusted baseline household and employment projections to include redistributed regional growth
- Converted adjusted projections to TOD demand (residential units and square feet of development)

### 3.1 Baseline Corridor Estimates

#### Methodology

The Project Team utilized DRCOG household and employment estimates and projections, available at the Transportation Analysis Zone (TAZ) level, to estimate baseline growth that could occur in station areas (e.g. ½ mile walksheds of stations).<sup>3</sup>

Since TAZ boundaries did not always correspond to station area (e.g. ½ mile) boundaries, the Project Team assigned TAZs to each station area based on the percentage of the TAZ within the station area and the overall coverage of the station area (to insure that each station area was adequately represented). Because many TAZs were larger than the station areas within which they are located, the Project Team assigned only TAZs that had more than 50 percent of their total area within the station area.

This method of allocation raises potential for instances of both over- and under-counting of station area households and employment, as some TAZs that include households and employment outside station areas were included, and some TAZs that include households and employment within station areas were excluded.

---

<sup>3</sup> The TAZ projections currently capture the plans of local jurisdictions regarding growth within transit station areas; however, we believe the total potential growth within station areas is underestimated at the system and corridor levels.

Selected instances of over- or under-estimated households and employment were assumed to cancel each other out at the system level, providing fairly accurate system-wide estimates and projections.

### Households

Baseline estimates project households will grow at a faster annual rate in station areas compared to the region, at an average rate of 2.5 percent from 2005 to 2030 compared to 1.8 percent. The proportion of regional households located in station areas is projected to increase over time, from 8.5 percent in 2005 to 10.1 percent in 2030.

Exhibit 3-1 summarizes baseline household projections within station areas by corridor from 2005 to 2030. More detailed information is provided in the appendix.

Corridor	Forecast (Non-Adjusted For TOD)			Net Change (2005 to 2030)	% Annual Change (2005- 2015)	% Annual Change (2015- 2030)	% Annual Change (2005- 2030)
	2005 <sup>2</sup>	2015	2030				
Central CPV	17,272	23,486	34,952	17,680	3.1%	2.7%	2.9%
Southwest	6,847	8,729	12,201	5,354	2.5%	2.3%	2.3%
Southeast	16,500	22,794	34,410	17,910	3.3%	2.8%	3.0%
East	1,546	4,358	9,546	8,000	10.9%	5.4%	7.6%
West	17,016	21,313	29,242	12,226	2.3%	2.1%	2.2%
Gold Line	8,238	9,114	10,733	2,495	1.0%	1.1%	1.1%
Northwest	5,515	6,100	7,178	1,663	1.0%	1.1%	1.1%
North Metro	9,557	11,260	14,401	4,844	1.7%	1.7%	1.7%
I-225	7,356	9,155	12,473	5,117	2.2%	2.1%	2.1%
<b>Total</b>	<b>89,847</b>	<b>116,309</b>	<b>165,136</b>	<b>75,289</b>	<b>2.6%</b>	<b>2.4%</b>	<b>2.5%</b>
DRGOG region	1,061,431	1,264,075	1,637,957	576,526	1.8%	1.7%	1.8%
<b>Station area % capture</b>	<b>8.5%</b>	<b>9.2%</b>	<b>10.1%</b>				

Note: 3.8 percent of the households in the region in 2005 were within existing (open) station areas.

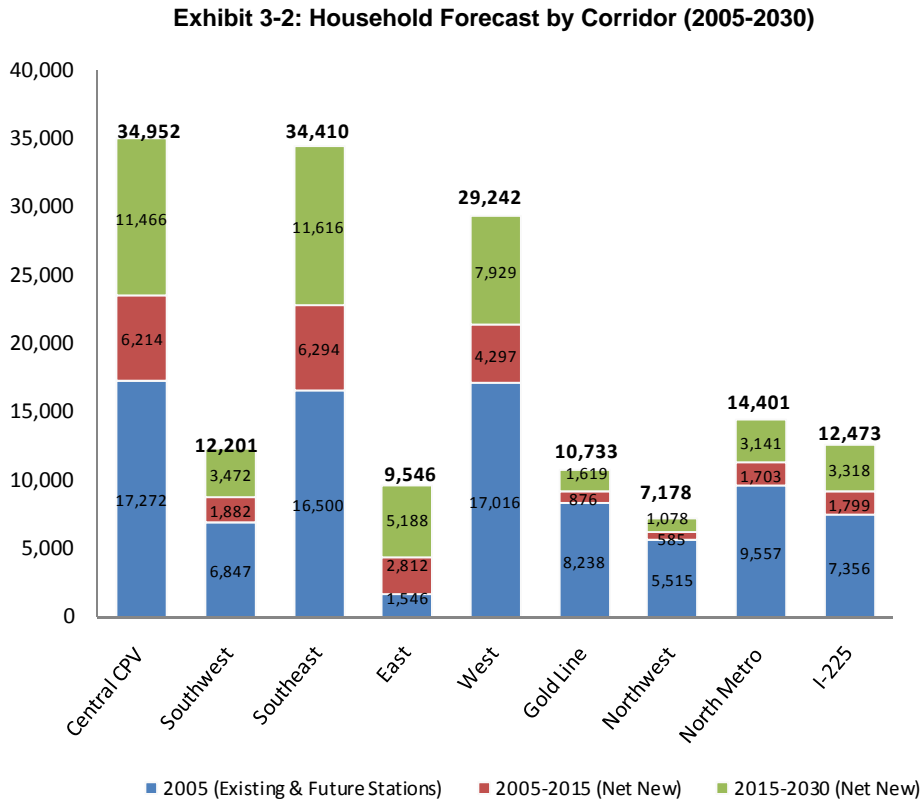
1/ % Annual growth = compound annual growth rate, used to reflect population compounding over time

2/ Includes existing and future stations.

Source: Denver Regional Council of Governments (DRCOG)

The most rapid household growth is projected to occur along the East, Southeast, and Central/CPV corridors. Growth in the East and Southeast corridors mirrors household growth occurring in counties through which these corridors pass (e.g. Arapahoe, Douglas), and along the Central/CPV corridor may be attributed to increasing interest in downtown living.

Exhibit 3-2 illustrates baseline household projections by corridor from 2005 to 2030.



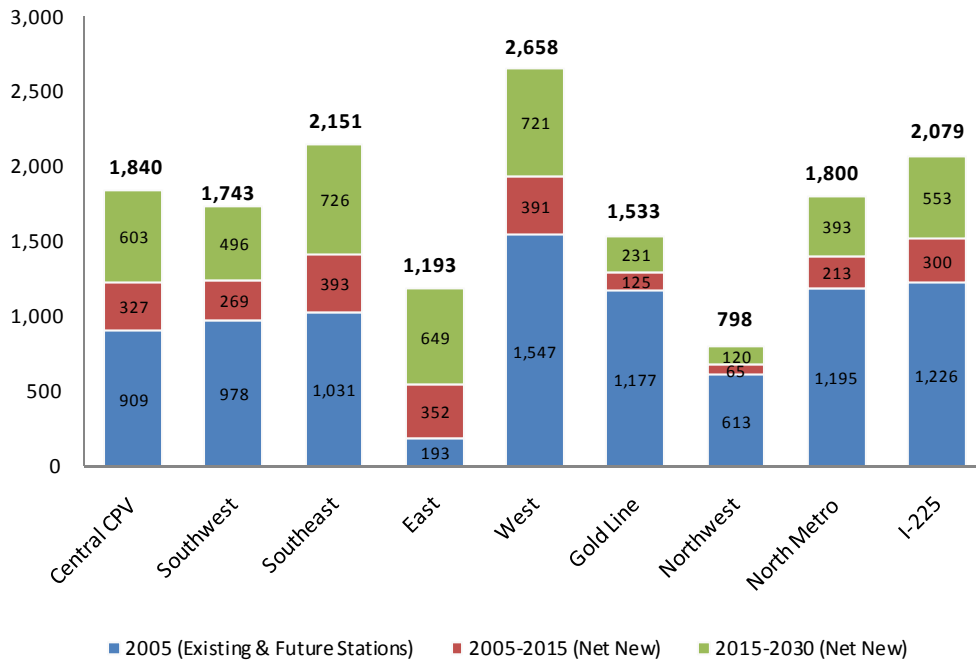
Source: Denver Regional Council of Governments (DRCOG)

Currently, the Central/CPV, Southeast, and West corridors have the highest number of households; established transit lines already serve residents living in station areas in the former two corridors.

While all corridors could experience household growth that would provide opportunities for transit oriented development, the Central/CPV and Southeast corridors, growing at annual rates of 3 percent, are projected to each add the most new households (approximately 18,000 new households from 2005 to 2030), bringing total households along each of these corridors to nearly 35,000 in 2030. Other corridors are projected to add from 1,500 (Northwest) to 12,000 households (West) during this same time period.

With relatively high household growth projected per station, the West (2,658 households per station), Southeast (2,151), and I-225 (2,079) corridors could have significant concentrations of households by station in 2030, as summarized in Exhibit 3-3.

**Exhibit 3-3: Household Forecast per Station by Corridor (2005-2030)**



Source: Denver Regional Council of Governments (DRCOG)

### Office Employment

According to baseline estimates and projections, corridor station areas are projected to add office employees at a faster rate (2.1 percent per year) than the region (1.7 percent) from 2005 to 2030. This higher growth is estimated to raise the share of regional office employment located in station areas. The proportion of office employees in station areas is projected to increase from 23.2 percent in 2005 to 25.6 percent in 2030.

Station area office employment estimates and projections are summarized in Exhibit 3-4.

Corridor	Forecast			Net Change (2005-2030)	% Annual Change (2005-2015)	% Annual Change (2015-2030)	% Annual Change (2005-2030)
	2005 <sup>2</sup>	2015	2030				
Central CPV	41,416	54,307	67,093	25,677	2.7%	1.4%	1.9%
Southwest	7,386	9,010	10,622	3,236	2.0%	1.1%	1.5%
Southeast	28,531	38,046	47,486	18,954	2.9%	1.5%	2.1%
East	9,237	15,619	21,951	12,714	5.4%	2.3%	3.5%
West	12,143	14,884	17,601	5,458	2.1%	1.1%	1.5%
Gold Line	6,265	7,398	8,522	2,257	1.7%	0.9%	1.2%
Northwest	7,066	7,847	8,622	1,556	1.1%	0.6%	0.8%
North Metro	2,206	2,745	3,281	1,075	2.2%	1.2%	1.6%
I-225	5,530	11,225	16,875	11,345	7.3%	2.8%	4.6%
<b>Total</b>	<b>119,782</b>	<b>161,082</b>	<b>202,052</b>	<b>82,271</b>	<b>3.0%</b>	<b>1.5%</b>	<b>2.1%</b>
DRGOG region	516,657	657,801	787,942	271,284	2.4%	1.2%	1.7%
<b>Station area % capture</b>	23.2%	24.5%	25.6%				

Note: 14.7 percent of the office employment in the region within existing station areas, open in 2007.

1/% Annual growth = compound annual growth rate, used to reflect employment compounding over time

2/Includes existing and future stations.

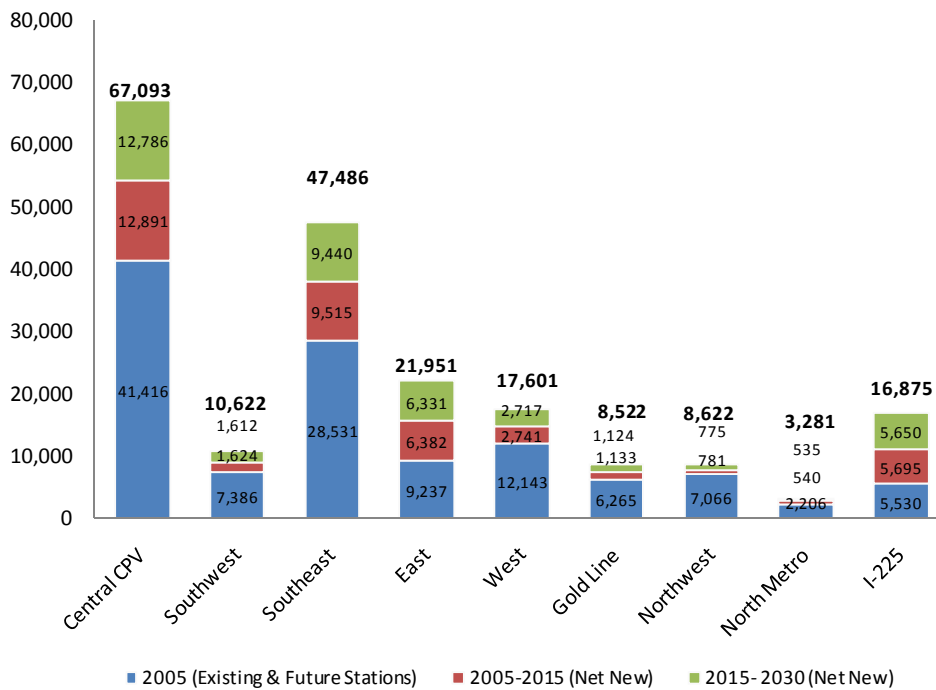
Source: Denver Regional Council of Governments (DRCOG)

All transit corridors are projected to experience office-based employment growth that could support transit oriented development. The most rapid office employment growth is projected along corridors passing through the southeast and central parts of the region (e.g. I-225, East, Southeast, and Central/CPV corridors), the locations of existing employment clusters. This office based employment growth mirrors recent office building development trends in southeast and central area clusters such as Tech Center and the Central Business District.

Exhibit 3-5 summarizes office employment projections for period 2005 to 2030.



Exhibit 3-5: Office Employment Forecast by Corridor (2005-2030)

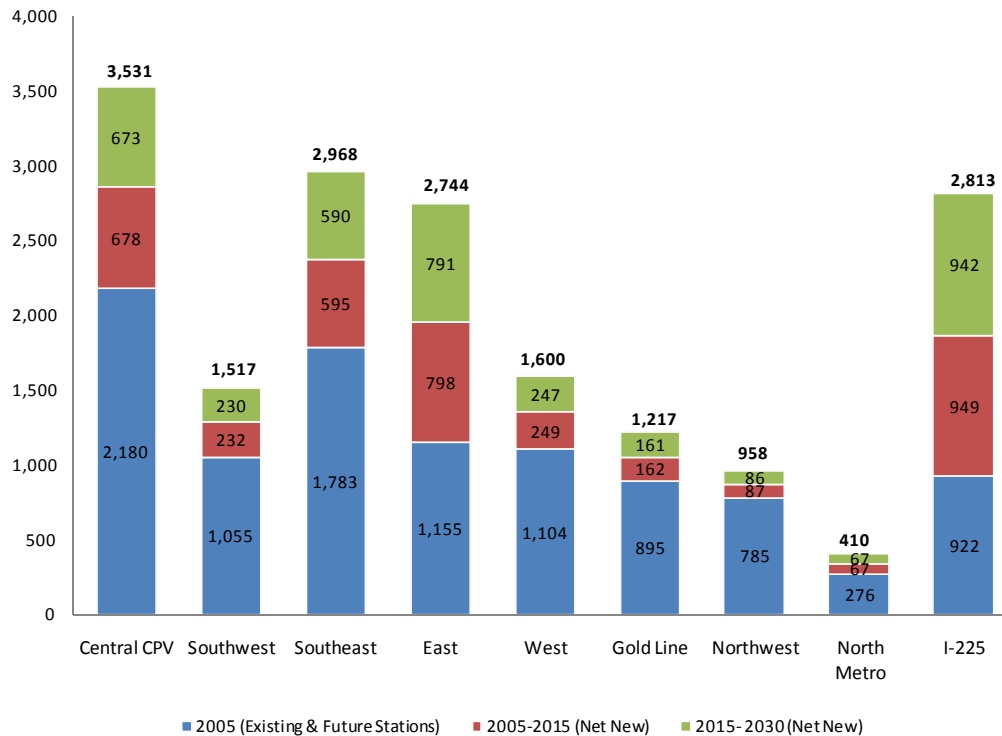


Source: Denver Regional Council of Governments (DRCOG)

Growing at an annual rate of 1.9 percent from 2005 to 2030, the most new office based employment is projected to occur along the Central/CPV Corridor, with the addition of approximately 26,000 new office employees which would raise the corridor’s total office employment to over 67,000 by 2030. Much of the Central/CPV Corridor growth is estimated to be clustered within the Central Business District, the region’s historic hub for employment.

The Southeast Corridor, which passes through the Tech Center office employment cluster, is projected to add 19,000 office employees from 2005 to 2030 at an average annual rate of 2.1 percent, bringing the corridor’s total employment to over 47,000 office employees. Other corridors are projected to add office employment from 1,000 (North Metro) to 12,000 office employees (East); the most rapid office employment growth is projected to occur along the I-225 corridor (growing at an annual rate of 4.6 percent) and the East corridor (growing at an annual rate of 3.5 percent).

Exhibit 3-6: Office Forecast per Station by Corridor (2005-2030)



Source: Denver Regional Council of Governments (DRCOG)

As illustrated in Exhibit 3-6, the highest concentrations of office employment per station are projected along the Central corridor (3,531 office employees per station), Southeast corridor (2,968), I-225 (2,813) and East (2,744).

### Retail Employment

According to baseline retail employment estimates and projections, retail employees located within corridor station areas are projected to grow at a faster rate (2.2 percent per year) than the region (1.7 percent), and at a faster rate than office employees are added in these areas (2.1 percent). Over time, station areas are projected to capture a larger share of regional retail employment; the proportion of retail employees in station areas within the region is projected to rise from 18.8 percent in 2005 to 21.2 percent in 2030.

Exhibit 3-7 summarizes baseline retail employment projections from 2005 to 2030.

Exhibit 3-7: Station Area Retail Employment (2005-2030) <sup>1</sup>						
Corridor	Forecast			% Annual Change (2005-2015)	% Annual Change (2015-2030)	% Annual Change (2005-2030)
	2005 <sup>2</sup>	2015	2030			
Central CPV	16,335	23,941	30,154	3.9%	1.6%	2.5%
Southwest	3,198	4,221	4,789	2.8%	0.8%	1.6%
Southeast	13,095	18,349	22,778	3.4%	1.5%	2.2%
East	4,733	7,641	10,694	4.9%	2.3%	3.3%
West	4,227	5,454	6,450	2.6%	1.1%	1.7%
Gold Line	3,242	3,789	4,478	1.6%	1.1%	1.3%
Northwest	4,654	5,096	5,494	0.9%	0.5%	0.7%
North Metro	216	596	764	10.7%	1.7%	5.2%
I-225	5,096	7,065	9,228	3.3%	1.8%	2.4%
<b>Total</b>	<b>54,796</b>	<b>76,152</b>	<b>94,829</b>	<b>3.3%</b>	<b>1.5%</b>	<b>2.2%</b>
DRGOG region	291,403	370,697	447,005	2.4%	1.3%	1.7%
Station area share	18.8%	20.5%	21.2%			

Note: 11 percent of the retail employment in the region within existing station areas, open in 2007.

1/% Annual growth = compound annual growth rate, used to reflect employment compounding over time

2/Includes existing and future stations.

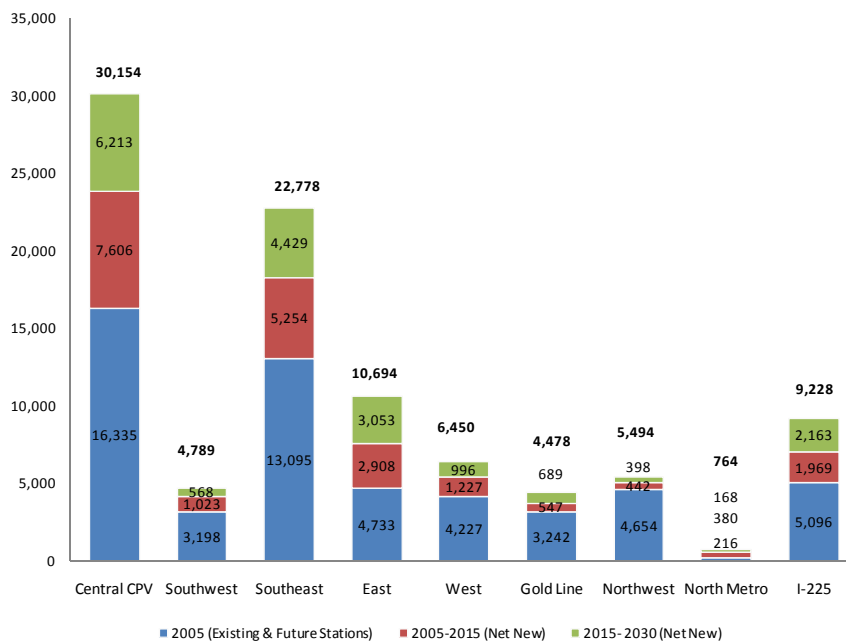
Source: Denver Regional Council of Governments (DRCOG)

Though all corridors are projected to add new retail employees, more rapid retail employment growth is projected along corridors in which rapid household growth is also occurring. Significant household growth along the East, Southeast, and Central/CPV corridors is projected to support retail employment growth, as businesses open or relocate to operate near new households.

With the majority of new station area households projected to locate along the Central/CPV and Southeast Corridors, the majority of station area retail employees are also projected along these corridors. The Central/CPV Corridor, is projected to add 14,000 retail employees from 2005 to 2030 (annual rate of 2.5 percent), bringing total corridor retail employment to 30,000. Growing at an annual rate of 2.2 percent, the Southeast Corridor is estimated to add nearly 10,000 retail employees from 2005 to 2030 for a total of 23,000 retail employees in 2030. Other corridors are projected to add from 500 (North Metro) to 6,000 retail employees (East); the I-225 corridor is projected to add 4,000 new retail employees.

Exhibit 3-8 illustrates station area retail employment estimates and projections.

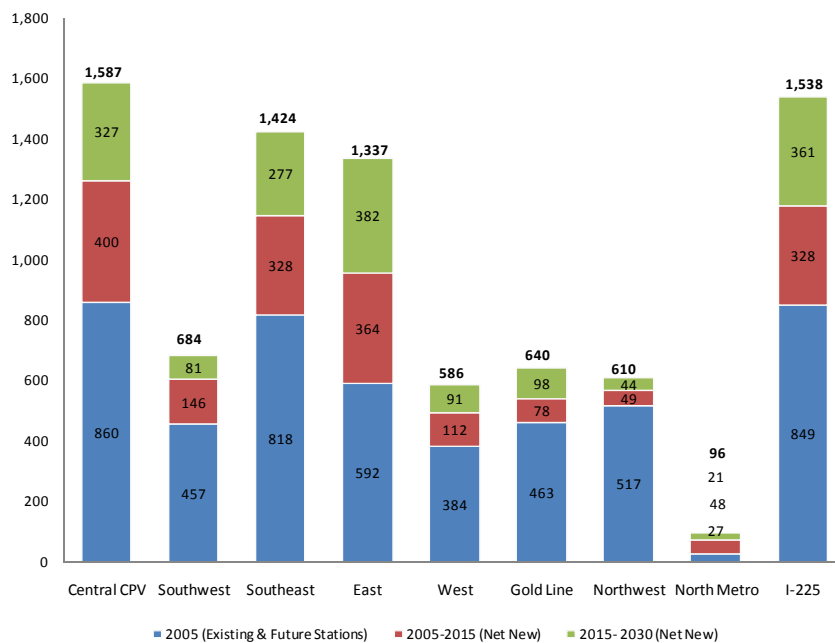
**Exhibit 3-8: Retail Employment Forecast by Corridor (2005-2030)**



Source: Denver Regional Council of Governments (DRCOG)

The highest concentrations of retail employment per station are projected to occur along the Central corridor (1,587 employees per station), the I-225 corridor (1,538), the Southeast corridor (1,424), and the East corridor (1,337), as shown in Exhibit 3-9.

**Exhibit 3-9: Retail Forecast per Station by Corridor (2005-2030)**



Source: Denver Regional Council of Governments (DRCOG)

## 3.2 Research on TOD Capture Rates

In addition to baseline station area growth, the Project Team estimates that a portion of new regional growth, whether baseline or induced by transit, could be redistributed, or 'captured', within station areas (1-1/2 mile walkshed) because of the introduction of the FasTracks system and transit oriented development potential. This refocusing of demand is predicated on local policy support, and may occur if households and companies desire to be located near transit to take advantage of:

- Enhanced access to employment, services, and the regional workforce
- Reduced travel costs
- Reduced travel times
- Enhanced quality of life

To estimate the level of this redistribution, the Project Team has established a range of capture rates at the system and corridor level. These capture rates are rooted in findings from national academic research, regional industry market trends, and development activity by corridor.

### National Academic Research

While a relatively narrow body of academic research has explored the issue of transit induced growth, numerous studies have analyzed the potential redistribution of growth around transit. Scholars have identified a variety of factors likely to impact the proportion of growth that is redistributed.<sup>4</sup>

These factors include:

- *Growth rate of the region.* Faster regional growth rates are assumed to enable relatively more redistribution of growth around transit
- *Growth of certain household types.* Relatively faster growth of households likely to be interested in living near transit (e.g. empty nester, singles, non-family, and immigrant households) is assumed to prompt more redistribution
- *Demand for higher intensity development.* Regions with relatively more interest in higher-density housing are more likely to achieve high rates of redistribution
- *Supportive public policies.* Public sector involvement and incentives (e.g. land assembly, high-density zoning allowances, parking restrictions, direct financial incentives) have been found to encourage refocusing of growth around transit station areas

Transit systems are estimated to capture relatively higher proportions of regional growth when these conditions are met; it follows that individual corridors could also capture relatively higher proportions of growth based on their adherence to these factors. Studies

---

<sup>4</sup> Susan Handy, "Smart Growth and the Transportation-Land Use Connection," *International Regional Science Review*

have suggested that transit station areas may capture between 15 to 50 percent of regional growth over a long-term timeframe (e.g. over 20 years) depending on how closely they meet these conditions.<sup>5</sup>

### Demographic, Market, and Policy Trends in the Denver Region

To estimate the proportion of regional growth that could be redistributed within station areas, the Project Team reviewed household and employment growth rates, density patterns, and public policies in the Denver region.

Key findings of this review of demographic, market, and policy trends include:

- *Relatively high rates of household and employment growth.* Baseline projections from DRCOG indicate regional households are projected to grow at an average annual rate of 1.8 percent from 2005 to 2030. Office and retail employment is projected to grow at an average rate of 1.7 percent over the same time period.
- *Growth of household types likely to reside near transit.* The proportion of empty nesters (age 55+) in the Denver region is projected to grow over time, from 17 percent in 2000 to 22 percent in 2012. The Denver region could also become more diverse, with the Hispanic population estimated to grow from 18 percent in 2000 to 22 percent in 2012.<sup>6</sup> Young professionals (age 25-34) are projected to comprise approximately 13 percent of the regional population in 2012.
- *Demonstrated interest in higher-intensity development.* Denver residents in the greater Downtown area have demonstrated a growing interest in higher density development and living next to transit, as evidenced by such projects as One Lincoln Park (372 units per net acre), Uptown Square (63 units per net acre), and Campus Village Apartments (51 units per net acre).<sup>7</sup> These developments are well above the minimum threshold density of 12 units per net acre recommended to support heavy rail transit.<sup>8</sup>
- *Supportive public policies.* Municipalities in the Denver region have taken a proactive role in planning for transit oriented development. The City and County of Denver has developed a station area typology system that identifies a range of density patterns appropriate for different neighborhoods and contexts that includes provisions for higher density development at Downtown, Major Urban Center, or Urban Center stations. The City has also utilized incentives such as tax increment financing to facilitate TOD, has demonstrated interest in land assembly techniques to reserve land for such development.

<sup>5</sup> Center for Transit Oriented Development, *Hidden in Plain Sight*

<sup>6</sup> ESRI Business Information Solutions, 2007

<sup>7</sup> RTD, *TOD Status Report, 2007*

<sup>8</sup> Urban Land Institute, *Developing Around Transit, 2004*. Densities presented in net terms (e.g. number of residences divided by number of acres dedicated to residential use). Gross density assumed to be 10 to 15 percent higher to account for acres devoted to non-residential required infrastructure, so the minimum residential density threshold would be 13.2 to 13.8 dwelling units per gross acre.

In addition, as of early 2007, nearly 40 station area planning efforts were underway to identify station area (re)development opportunities in 12 jurisdictions (i.e. Denver, Aurora, Arvada, Adams County, Wheat Ridge, Aurora, Thornton, Greenwood Village, Littleton, Boulder, Louisville, and Lakewood) - a strong testament to the high level of policy support for transit oriented development in the Denver region.

The Denver region's household and employment growth rates, demonstrated interest in higher-intensity development, and supportive public policies position it to distribute a relatively stronger share of regional growth within transit station areas.

### Pipeline Development Activity

To determine potential TOD capture rates at the system and corridor levels, the Project Team referred to baseline growth rates and pipeline development activity (as tracked by RTD), with the assumption that recent development activity would provide a "reality check" of baseline projections' accuracy. Baseline household and employment growth was converted to dwelling units and square feet to provide an "apples to apples" comparison to pipeline development projects.

RTD tracks real estate development projects within an approximate ½ mile radius of its existing and planned transit stations in a TOD database, and provides summary reports on TOD project status. All development within ½ mile of stations are included, regardless of project design, orientation, or access, to avoid subjectively excluded projects. Project data for the TOD database is collected from published or broadcast news reports, meetings and interviews with individual real estate developers, meetings and interviews with planning and development staff from local government jurisdictions, and other published reports, studies, and plans.

RTD has designated four status levels for development projects. These include:

- Completed: projects that have been built;
- Under construction: projects currently being built;
- Proposed: projects that have entered some phase in the development process of a local jurisdiction, or have detailed development programs identifying each type of proposed use; and
- Expected: projects that have been announced by a developer or jurisdiction but have not entered the development review process (e.g. project has not been submitted for review) or do not yet have detailed development programs.

The Project Team assumed that pipeline development projects are those either *under construction* or *proposed*. In general, the comparison of baseline projections to pipeline development suggested that, in some instances, baseline projections appear to underestimate household and employment growth that is occurring based on recent development activity.

Since projects underway in 2007 were assumed to represent a five-year development pipeline, these projects should account for one half (approximately 50 percent) of the projected growth for the period 2005 to 2015. Instead, pipeline residential projects represented 63 percent of projected growth. Pipeline office and retail projects represented 42 and 35 percent of projected growth.

**Exhibit 3-10: Baseline Projections and RTD Reported Pipeline Station Area Development Activity**

FasTracks Station Areas	Projected Estimated Net Change (2005-2015) <sup>1</sup>	RTD Project Pipeline (Under Construction/ Proposed) Dwelling Units <sup>2</sup>	RTD Pipeline % of 2005-2015 Growth
Dwelling Units	26,462	16,762	63%
Office Square Feet	13,039,188	15,072,021	42%
Retail Square Feet	8,371,050	2,893,300	35%

*1/ Projected net change based on estimated household growth projected by DRCOG. 1 household assumed to = 1 dwelling unit, 1 office employee= 250 square feet, and 1 retail employee= 333.33 square feet.*

*2/ Includes projects under construction or proposed according to RTD methodology as of February 2007.*

This comparison indicates that at the system level, baseline projections appear to underestimate household growth. The baseline retail projections are lower than 50 percent, consistent with typical retail development patterns in which retail follows residential; therefore, the retail projections appear to be nearly on target. Office projections also appear to be on target, since pipeline development projects account for nearly half (42 percent) of projected growth. Household projections could be adjusted to account for developer interest in station areas.

In many corridors, the baseline projections appear to be underestimated given recent development activity. Residential development activity was most prevalent in the Central, Northwest, and I-225 corridors. Examples of major developments in these corridors include Uptown Square (a nearly 700 unit residential project along the Central/CPV Corridor in Downtown Denver), Arista II (a 625 unit residential project in Broomfield along the Northwest Corridor), and the Avenues (a 65-acre mixed use development along I-225 in Aurora featuring 1,000 residential units), all of which are completed or underway.

For example, pipeline residential development was 99 percent of projected growth along the Central/CPV Corridor, 355 percent along the Northwest Corridor, and 93 percent along the I-225 Corridor, as illustrated in Exhibit 3-11.



**Exhibit 3-11: Station Area Dwelling Units  
Baseline Projected and RTD Reported Pipeline**

Corridor	Projected Estimated Net Change (2005-2015) <sup>1</sup>	RTD Project Pipeline (Under Construction/ Proposed) Dwelling Units <sup>2</sup>	RTD Pipeline % of 2005-2015 Growth
Central CPV	6,214	6,126	99%
Southwest	1,882	976	52%
Southeast	6,294	4,453	71%
East	2,812	24	1%
West	4,297	10	0%
Gold Line	876	665	76%
Northwest	585	2,075	355%
North Metro	1,703	753	44%
I-225	1,799	1,680	93%
<b>Total</b>	<b>26,462</b>	<b>16,762</b>	<b>63%</b>

1/ Projected net change based on estimated household growth projected by DRCOG. 1 household assumed to = 1 dwelling unit.

2/ Includes projects under construction or proposed (e.g. all net new) according to RTD methodology as of February 2007.

Given the significant amount of residential development activity in excess of baseline projections in the Central, Northwest, and I-225 corridors, the Project Team has assumed proportionately more redistribution of households could occur in these corridors' station areas.

Office development activity is relatively high along the Central and Southeast corridors. Major office developments along these rail lines include an 860,000 office building at 1551 Wewatta Street (next to Union Station along the Central/CPV Corridor) and the Belleview Station development (planned to feature 600,000 square feet of office space in its first phase, and located along the Southeast Corridor).

With the exception of the Central corridor, baseline projections for office employment along these corridors do not appear to underestimate growth. In fact, in some corridors, pipeline projects are well below the 50 percent of projected growth that would be expected. For example, current pipeline office activity represents 2 percent of growth along the Southwest Corridor, 9 percent of the Gold Line, and 0 percent of the North Metro Corridor.

A comparison of baseline office employment projections and pipeline office development activity is provided in Exhibit 3-12.

<b>Exhibit 3-12: Station Area Office Development Activity Baseline Projections and RTD Reported Pipeline</b>			
<b>Corridor</b>	<b>Projected Estimated Net Change (2005- 2015)<sup>1</sup></b>	<b>RTD Project Pipeline (Under Construction/ Proposed) Office SF<sup>2</sup></b>	<b>RTD Pipeline % of 2005-2015 Growth</b>
Central CPV	4,460,575	3,020,242	68%
Southwest	527,200	10,000	2%
Southeast	3,520,950	1,292,300	37%
East	821,963	175,155	21%
West	1,061,963	250,000	24%
Gold Line	206,875	19,372	9%
Northwest	348,738	172,800	50%
North Metro	40,475	0	0
I-225	2,050,450	586,152	29%
<b>Total</b>	<b>13,039,188</b>	<b>5,526,021</b>	<b>42%</b>

*1/ Projected net change based on estimated office employment growth (based on selected service and production growth) projected by DRCOG. Assumes 1 employee = 250 SF. Excludes institutional employment growth.*

*2/ Includes office projects under construction or proposed according to RTD methodology as of March 2007. Does not include recently completed projects nor expected projects identified by RTD. Excludes institutional space.*

Baseline retail employment projections appear to underestimate retail growth along the Central, I-225, and Northwest corridors. Major retail projects either recently completed or underway in these corridors include Metropolitan Gardens (800,000 square feet of proposed retail space along the Central/CPV Corridor at I-25/Broadway), the Avenues (435,000 planned retail square feet within a mixed use development along I-225 at Aurora), and an 800,000 square-foot retail development at 29<sup>th</sup> Street in Boulder (along the Northwest Corridor).

For example, current pipeline retail activity represents 72 percent of growth along the Central/CPV Corridor, 86 percent along the I-225 Corridor, and 180 percent along the Northwest Corridor.

Exhibit 3-13 summarizes station area retail development activity compared to projected growth.

**Exhibit 3-13: Station Area Retail Development Activity  
Baseline Projections and RTD Reported Pipeline**

Corridor	Projected Estimated Net Change (2005-2015) <sup>1</sup>	RTD Project Pipeline (Under Construction/ Proposed) Dwelling Units <sup>2</sup>	RTD Pipeline % of 2005-2015 Growth
Central CPV	2,971,600	2,143,315	72%
Southwest	392,933	0	0%
Southeast	2,100,833	618,250	29%
East	1,020,650	274,200	27%
West	516,383	16,000	3%
Gold Line	198,900	18,924	10%
Northwest	181,783	327,670	180%
North Metro	128,900	0	0%
I-225	859,067	734,941	86%
<b>Total</b>	<b>8,371,050</b>	<b>2,893,300</b>	<b>35%</b>

*1/ Projected net change based on estimated retail (and selected service, e.g. lodging) employment growth projected by DRCOG. Assumes 3 retail employees per 1,000 SF. Assumes 500 SF per hotel room.*

*2/ Includes retail and lodging projects under construction or proposed according to RTD methodology as of March 2007. Does not include recently completed projects or expected projects identified by RTD.*

Given the relatively high levels of retail development activity along these corridors, the Project Team has assumed these corridors could capture relatively higher proportions of regional retail employment growth.

### 3.3 TOD Capture

#### Capture Rates

Based on national academic research, regional market trends, and recent and planned development activity within the region and corridor station areas, the Project Team conservatively projects that the transit system could capture between **13 and 28 percent** of the regional growth projected to occur from 2005 to 2030. Station areas are assumed to capture a larger share of growth (e.g. 15 to 28 percent) during the 2015 to 2030 time period, when the transit system becomes fully operational, compared to 13 to 15 percent during the 2005 to 2015 time period when FasTracks is under construction.

#### Methodology

Given the potential of the development of the FasTracks transit system to redistribute regional growth, projected 2015 and 2030 station area household and employment projections have been adjusted to include growth redistributed from the region.

To determine the level of redistributed growth, the Project Team first estimated redistribution of baseline regional growth to corridors. Rather than estimate each corridor's capture rate of total regional growth, capture rates of impacted jurisdictional growth (e.g. growth within counties through which corridors pass) by corridor were

established. These capture rates were informed by the results of national research and comparison of corridor pipeline development activity to growth projections, and for most corridors are higher during the period 2015 to 2030 than 2005 to 2030.

Since some corridors pass through multiple jurisdictions, care was taken to ensure the capture rates selected would be conservative to minimize the potential for double-counting. The total levels of redistribution of households and firms was also assessed to ensure estimates were reasonable given national case studies (e.g. the total regional redistribution of households and firms such that by 2030, 15 percent of households and 26 to 33 percent of firms is considered reasonable compared to national evidence).

### Households

FasTracks station areas together are estimated to capture over 74,000 new households from baseline growth in other parts of the region. All corridors could capture significant levels of households from other parts of surrounding jurisdictions, providing strong opportunities over the long-term for residentially-based transit oriented development. Exhibit 3-14 summarizes redistribution of baseline jurisdictional household growth by corridor from 2005 to 2030.

**Exhibit 3-14: Station Area Household Capture (2005-2030)**

Corridor	Projected Households (2005- 2015) <sup>1</sup>	Capture Rate (2005-2015)	Redistributed Households (2005-2015)	Projected Households (2015-2030) <sup>1</sup>	Capture Rate (2015-2030)	Redistributed Households (2015-2030)	Total Capture
Central CPV	27,148	15%	4,072	50,076	18%	9,014	13,086
Southwest	104,033	2%	2,081	191,923	3%	5,758	7,838
Southeast	140,154	6%	8,409	258,567	6%	15,514	23,923
East	63,269	1%	633	116,720	2%	2,334	2,967
West	51,857	1%	519	95,673	2%	1,913	2,432
Gold Line	87,978	1%	880	162,317	2%	3,246	4,126
Northwest	54,548	6%	3,273	100,660	6%	6,040	9,312
North Metro	63,269	2%	1,265	116,720	3%	3,502	4,767
I-225	36,121	5%	1,806	66,644	6%	3,999	5,805
<b>Total</b>			<b>22,937</b>			<b>51,319</b>	<b>74,257</b>

<sup>1/</sup> Projected households within impacted jurisdictions.

Source: Denver Regional Council of Governments, BBPC

By corridor, the most redistribution of baseline jurisdictional household growth is projected to occur along the Southeast Corridor. For example, with an estimated household capture rate of 6 percent from 2005 to 2030, the Southeast Corridor is estimated to capture 24,000 new households among the 400,000 new households added in Adams, Arapahoe, Denver, and Douglas counties over this time period. Other corridors could add from approximately 2,500 new households (West Corridor) up to 13,000 new households (Central/CPV Corridor).

## Office

Transit station areas could capture over 56,000 new office employees from baseline growth in other parts of the region. All corridors within the FasTracks system are projected to offer strong potential to capture office employees within station areas, supporting a variety of possible mixed use commercial developments oriented towards transit. Exhibit 3-15 summarizes office employment redistribution by corridor.

**Exhibit 3-15: Station Area Office Employment Capture (2005-2030)**

Corridor	Projected Employment (2005-2015) <sup>1</sup>	Capture Rate (2005-2015)	Redistributed Office Employment (2005-2015)	Projected Employment (2015-2030) <sup>1</sup>	Capture Rate (2015-2030)	Redistributed Office Employment (2015-2030)	Total Capture
Central CPV	37,169	15%	5,575	33,323	18%	5,998	11,573
Southwest	74,365	1%	744	67,130	3%	2,014	2,758
Southeast	105,796	1%	1,058	97,855	6%	5,871	6,929
East	68,600	1%	686	64,048	2%	1,281	1,967
West	54,508	1%	545	48,415	2%	968	1,513
Gold Line	85,939	1%	859	79,140	2%	1,583	2,442
Northwest	45,071	2%	901	36,081	8%	2,886	3,788
North Metro	68,600	2%	1,372	64,048	6%	3,843	5,215
I-225	31,431	30%	9,429	30,725	35%	10,754	20,183
<b>Total</b>			<b>21,170</b>			<b>35,199</b>	<b>56,369</b>

<sup>1/</sup> Projected employment within impacted jurisdictions.

Source: Denver Regional Council of Governments, BBPC

Redistribution of office employment is projected to be highest along the I-225 Corridor. The I-225 Corridor is projected to capture 30 percent of the office employment growth that is projected to occur in Adams and Arapahoe Counties from 2005 to 2030, and 35 percent from 2015 to 2030, for a net capture of over 20,000 new office employees. Office employment redistribution in other corridors could range from 1,500 new office employees (West Corridor) to 11,600 (Central/CPV Corridor).

## Retail

An estimated 23,000 retail employees could be redistributed from baseline growth in other areas in the region to station areas by 2030. Each corridor within the FasTracks system is projected to offer potential for capturing baseline growth from other areas, providing opportunities for introduction of ground floor retail spaces as part of mixed use developments. New retail businesses could cater to households and employees refocused from other parts of the region into station areas. Exhibit 3-16 illustrates redistribution of retail employment by corridor.

**Exhibit 3-16: Station Area Retail Employment Capture (2005-2030)**

Corridor	Projected Employment (2005- 2015) <sup>1</sup>	Capture Rate (2005-2015)	Redistributed Retail Employment (2005-2015)	Projected Employment (2015-2030) <sup>1</sup>	Capture Rate (2015-2030)	Redistributed Retail Employment (2015-2030)	Total Capture
Central CPV	21,261	15%	3,189	19,105	18%	3,439	6,628
Southwest	39,833	1%	398	37,416	2%	748	1,147
Southeast	57,212	4%	2,288	54,279	6%	3,257	5,545
East	38,641	1%	386	35,968	2%	719	1,106
West	31,061	1%	311	29,877	2%	598	908
Gold Line	48,440	1%	484	46,739	2%	935	1,419
Northwest	24,611	2%	492	25,346	3%	760	1,253
North Metro	38,641	2%	773	35,968	3%	1,079	1,852
I-225	17,380	8%	1,390	16,863	10%	1,686	3,077
<b>Total</b>			<b>9,713</b>			<b>13,221</b>	<b>22,934</b>

<sup>1/</sup> Projected employment within impacted jurisdictions.

Source: Denver Regional Council of Governments, BBPC

With significant residential growth occurring in Downtown Denver and the Central Platte Valley, and relatively high retail development activity in the pipeline, the Central Corridor is poised to capture relatively high proportions of retail employment. The Corridor is projected to capture 15 percent of the retail employment growth that occurs in Denver from 2005 to 2015, and 18 percent from 2015 to 2030, for a net capture of nearly 7,000 retail employees. Other corridors could capture from 900 retail employees (West Corridor) to 5,500 retail employees (Southeast Corridor).

### Induced Growth Capture

In addition to capturing a redistributed proportion of baseline regional growth, station areas within the FasTracks system could capture an estimated 40 percent of induced regional household and employment growth, which is approximately the midpoint of the range of capture rates (e.g. 5 to 80 percent) provided by respondents to the transit induced growth survey. The estimated 40 percent capture translates to a net increase of over 3,000 households, 1,000 office employees, and 600 retail employees. Exhibit 3-17 summarizes the adjusted station area forecast based on redistribution of baseline and transit induced regional growth.

**Exhibit 3-17: Adjusted Station Area Forecast (2030)  
Based on Redistribution of Baseline and Induced Regional Growth**

	Households	Office Employment	Retail Employment
DRCOG Baseline Station Area Projections (2030)	165,136	202,052	94,829
Baseline Regional Growth Redistribution (2005-2030)	74,257	56,369	22,934
Station Area Induced Growth	3,052	1,062	623
<b>DRCOG Adjusted Station Area Projections (2030)</b>	<b>242,445</b>	<b>259,483</b>	<b>118,386</b>

Source: Denver Regional Council of Governments, BBPC

Added to redistributed baseline growth, station area capture of induced growth is projected to result in approximately 77,000 new households, 57,000 new office employees, and 23,000 new retail employees in station areas above baseline projections.

### 3.4 Adjusted Household and Employment Estimates

#### Households

In 2030, over 240,000 households are projected to live within ½ mile walk of FasTracks transit stations, representing 15 percent of all households in the region. All corridors could capture both baseline growth from other parts of the region and a proportion of potential induced growth.

Though all corridors could capture significant levels of household growth from other parts of the region, the most household redistribution could occur along the Southeast and Central/CPV corridors, where significant levels of recent residential development activity have occurred. With high numbers of office jobs estimated to be added in these corridors, household growth could remain strong as employees seek homes near work. Exhibit 3-18 summarizes projected station area households by corridor.

**Exhibit 3-18: Corridor Station Area Household 2005-2030<sup>1</sup>**

Corridor	Baseline 2005-2030		Redistribution & Inducement	Adjusted 2030		
	DRCOG Baseline HH 2005	DRCOG Baseline Corridor HH Growth 2005-2030	Net New HH Redistributed to Corridor <sup>2</sup>	Adjusted HH Growth 2005-2030	% Annual Change (2005-2030)	Total Adjusted HH 2030
Central CPV	17,272	17,680	13,803	31,483	4.2%	48,755
Southwest	6,847	5,354	8,055	13,409	4.4%	20,256
Southeast	16,500	17,910	24,649	42,559	5.2%	59,059
East	1,546	8,000	3,291	11,291	8.8%	12,837
West	17,016	12,226	2,928	15,154	2.6%	32,170
Gold Line	8,238	2,495	4,227	6,722	2.4%	14,960
Northwest	5,515	1,663	9,380	11,043	4.5%	16,558
North Metro	9,557	4,844	4,963	9,807	2.9%	19,364
I-225	7,356	5,117	6,012	11,129	3.8%	18,485
<b>Total</b>	<b>89,847</b>	<b>75,289</b>	<b>77,309</b>	<b>152,598</b>	<b>4.1%</b>	<b>242,445</b>

<sup>1/</sup> % Annual growth = compound annual growth rate, used to reflect population compounding over time

<sup>2/</sup> Includes redistribution of baseline household growth from impacted jurisdictions to corridors and redistribution of induced growth to station areas. The proportion of induced growth captured by corridor based on proportion of baseline regional growth captured.

Source: Denver Regional Council of Governments, BBPC

#### Office Employment

An estimated 33 percent of regional office employment, or 260,000 employees, could be located in station areas in 2030. With all FasTracks corridors exhibiting strong potential for office employment growth, station areas throughout the region offer opportunities for a variety of mixed-use commercial projects.

The redistribution of office employment could be most pronounced along the I-225, Central/CPV, and Southeast corridors. Each of these areas has exhibited high levels of developer interest in office development, and benefit from existing or planned clusters of employment (e.g. the Central Business District, Tech Center, and Fitzsimmons). Exhibit 3-19 illustrates projected office employment growth by corridor.

**Exhibit 3-19: Corridor Station Area Office Employment 2005-2030<sup>1</sup>**

Corridor	Baseline 2005-2030		Redistribution & Inducement	Adjusted 2030		
	DRCOG Baseline Employment 2005	DRCOG Projected Corridor Employment Growth 2005-2030	Net New Employment Redistributed to Corridor 2005-2030 <sup>2</sup>	Adjusted Employment Growth 2005-2030	% Annual Change 2005-2030	Total Adjusted Employment 2030
Central CPV	41,416	25,677	11,905	37,582	2.6%	78,998
Southwest	7,386	3,236	2,799	6,035	2.4%	13,421
Southeast	28,531	18,954	7,174	26,128	2.6%	54,660
East	9,237	12,714	2,131	14,845	3.9%	24,082
West	12,143	5,458	1,584	7,042	1.8%	19,185
Gold Line	6,265	2,257	2,471	4,728	2.3%	10,994
Northwest	7,066	1,556	3,808	5,364	2.3%	12,430
North Metro	2,206	1,075	5,229	6,304	5.5%	8,510
I-225	5,530	11,345	20,330	31,674	7.9%	37,205
<b>Total</b>	<b>119,782</b>	<b>82,271</b>	<b>57,431</b>	<b>139,702</b>	<b>3.1%</b>	<b>259,483</b>

<sup>1/</sup> % Annual growth = compound annual growth rate, used to reflect employment compounding over time

<sup>2/</sup> Includes redistribution of baseline office employment growth from impacted jurisdictions to corridors and redistribution of induced growth to station areas. The proportion of induced growth captured by corridor based on proportion of baseline regional growth captured.

Source: Denver Regional Council of Governments, BBPC

The Central Corridor offers potential to capture the most new office employees, with 20,000 estimated to be refocused from other parts of the region. Added to projected office employment growth, this corridor could add approximately 38,000 new office employees by 2030. Other corridors could add from approximately 5,000 employees (Gold Line) to 32,000 (I-225).

### Retail Employment

Over 118,000 retail employees could work in station areas by 2030, representing 26 percent of projected regional retail employment. With all corridors exhibiting prospects for retail employment growth, many forms of transit oriented retail developments could be added at station areas throughout the region.

Since retail growth generally follows residential and office employment growth, it is not surprising that the Central/CPV and Southeast corridors are estimated to attract the most new retail employees from 2005 to 2030; both of these corridors exhibit significant levels



of new households and office employees projected by 2030. Retail employment by corridor over this time period is summarized in Exhibit 3-20.

**Exhibit 3-20: Corridor Station Area Retail Employment 2005-2030<sup>1</sup>**

Corridor	Baseline 2005-2030		Redistribution & Inducement	Adjusted 2030		
	DRCOG Baseline Employment 2005	DRCOG Projected Corridor Employment Growth 2005-2030	Net New Employment Redistributed to Corridor 2005-2030 <sup>2</sup>	Adjusted Employment Growth 2005-2030	% Annual Change	Total Adjusted Employment 2030
Central CPV	16,335	13,819	6,835	20,654	3.3%	36,989
Southwest	3,198	1,591	1,166	2,757	2.5%	5,955
Southeast	13,095	9,683	5,693	15,376	3.2%	28,471
East	4,733	5,961	1,208	7,169	3.8%	11,902
West	4,227	2,223	941	3,164	2.3%	7,391
Gold Line	3,242	1,236	1,442	2,678	2.4%	5,920
Northwest	4,654	840	1,266	2,106	1.5%	6,760
North Metro	216	548	1,857	2,405	10.5%	2,621
I-225	5,096	4,132	3,149	7,281	3.6%	12,377
<b>Total</b>	<b>54,796</b>	<b>40,033</b>	<b>23,557</b>	<b>63,590</b>	<b>3.1%</b>	<b>118,386</b>

<sup>1/</sup> % Annual growth = compound annual growth rate, used to reflect employment compounding over time

<sup>2/</sup> Includes redistribution of baseline retail employment growth from impacted jurisdictions to corridors and redistribution of induced growth to station areas. The proportion of induced growth captured by corridor based on proportion of baseline regional growth captured.

Source: Denver Regional Council of Governments, BBPC

### 3.5 Adjusted System-Wide & Corridor Demand (2015, 2030)

The potential ability of the transit system to capture regional growth, coupled with baseline household and employment growth, is projected to fuel demand for transit oriented development. By 2030, growth of station area households and employees is estimated to provide demand for an estimated 150,000 new residential units, 35 million square feet of new office space, and 21 million square feet of new retail space focused in station areas. This demand may be accommodated through higher density mixed use, transit oriented and pedestrian friendly development located within a ½ mile walk of stations. Exhibit 3-21 summarizes projected demand in residential units and office and retail square feet at the system level.

<b>Exhibit3-21: Station Area Demand Forecast (2005-2030)</b>			
	<b>Residential Units</b>	<b>Office Employment</b>	<b>Retail Employment</b>
Adjusted HH/Employee Growth SF/Employee (1/)	152,598	139,700	63,600
		250	333
<b>Estimated Demand in Units/SF</b>	<b>152,598</b>	<b>34,925,000</b>	<b>21,197,000</b>

Source: BBPC

All corridors exhibit strong potential for growth of households, office employment, and retail employment, offering strong potential opportunities for mixed-use residential and commercial development oriented towards transit. This development could take a variety of forms, from relatively high-intensity urban condominiums and high-rise mixed-use office buildings in Downtown Denver to pedestrian friendly “Main Streets” human scale ground floor retail and upper floor lofts and small office spaces. Exhibit 3-22 summarizes projected demand by use and corridor from 2005 to 2030.

<b>Exhibit 3-22: Net New Demand based on Total Growth 2005-2030</b>			
<b>Corridor</b>	<b>Dwelling Units</b>	<b>Office SF</b>	<b>Retail SF</b>
Central CPV	31,483	9,395,425	6,884,766
Southwest	13,409	1,508,780	918,863
Southeast	42,559	6,532,090	5,125,309
East	11,291	3,711,215	2,389,529
West	15,154	1,760,500	1,054,786
Gold Line	6,722	1,182,035	892,723
Northwest	11,043	1,340,887	701,958
North Metro	9,807	1,575,963	801,817
I-225	11,129	7,918,597	2,426,926
<b>TOTAL</b>	<b>152,598</b>	<b>34,925,493</b>	<b>21,196,678</b>

Source: BBPC

While all corridors offer potential for growth, the Central/CPV and Southeast Corridors could experience relatively high growth of dwelling units, office, and retail square feet. These corridors benefit from their location within office nodes; the Central Business District and Southeast office markets are the largest office development areas in the region, with 30 and 41 million square feet of space, respectively. This office development activity has supported, and is estimated to continue to support, development of dwelling units, as employees have been attracted to residences near work; in turn, the residential development is projected to support growth of retail services catering to residents.

Projected demand along the Central/CPV and Southeast corridors is estimated to support the construction of: 30,000 and 40,000 new dwelling units, respectively; 9 and 6.5 million square feet of new office space; and 7 and 5 million square feet of new retail space. Other corridors could add from approximately 7,000 (Gold) to 15,000 (West) new dwelling units; 1.2 million (Gold) to 8 million (I-225) square feet of office space; and 800,000 (North Metro) to 2.4 million square feet of retail space (I-225).

# Employment Forecasting Tool

# 4.0

## 4.1 Overview

As part of the analysis of regional demand, the Project Team was charged with creating a system-wide employment forecasting tool that may be used by RTD, DRCOG and its member county and municipal governments to track changing conditions and TOD outcomes.

The purpose of this tool is to allow these stakeholders to estimate direct and spin-off employment growth directly induced by the FasTracks transit expansion plan at the system, corridor, and station area levels. The estimation of employment does not include direct and indirect employment related to the construction of the FasTracks system.

To structure the employment forecasting tool, the Project Team considered a variety of factors thought to influence employment growth. These factors include:

- Development (recently completed and pipeline projects, including those under construction, proposed, and expected)
- Amenities (e.g. open space, recreational facilities, enhanced streetscapes)
- Public/private investment dollars

The most appropriate factor for determining direct and indirect employment in the Denver region is development (expressed in dwelling units or square feet). Development projects are more readily quantified and tracked than amenity factors, which are often intangible, and public/private investment dollars, which are not always readily disclosed.

To create the employment forecasting tool, the Project Team utilized recent transit oriented development project data provided by RTD. The Project Team estimated direct and indirect employment generated during the operating phase of this development using Denver regional RIMS II employment multipliers from the Bureau of Economic Analysis.

## 4.2 Methodology

The Project Team utilized a two-step method for estimating employment that is woven into the forecasting tool. This method includes the following steps:

1. *Classification of TOD projects completed, under construction, proposed, and expected by station area and corridor.* The Project Team compiled data provided by RTD for development projects occurring within all station areas. The following sub-steps were completed:
  - a. Classified RTD reported TOD projects by station area and corridor by status (e.g. completed, under construction, proposed and expected)

- b. Calculated by station area and corridor total residential units, retail square feet, office square feet, hotel rooms, and institutional square feet completed (in this case, past 2005)
  - c. Calculated by station area and corridor total residential units, retail square feet, office square feet, hotel rooms, and institutional square feet as either under construction, proposed, or expected
2. *Estimated direct and indirect employment resulting from projects completed (in this case, past 2005).* The Project Team utilized standard industry employment assumptions as well as employment multipliers to estimate direct and spin-off employment generated by each new use. Sub-steps completed include:
- a. Translated residential units, retail square feet, office square feet, and institutional square feet completed past 2005 to employment by corridor using the following assumptions:
    - **Retail:** 3 employees per 1,000 square feet of space<sup>9</sup>
    - **Office:** 1 employee per 250 square feet of space<sup>10</sup>
    - **Hotel:** 0.618 employees per room<sup>11</sup>
    - **Institutional square feet:** 1 employee per 250 square feet of space
    - **Industrial:** 1 employee per 330 square feet of space
  - b. Estimated indirect employment resulting from direct employment and housing units by corridor using the following assumptions:
    - **Housing units:** estimated total income of households by corridor, then applied an earnings multiplier (12.8608) to estimate employment generated by household spending.
    - **Retail:** applied an employment multiplier (1.5946) to estimate employment generated by retail employment.
    - **Office:** applied an employment multiplier (3.0182) to estimate employment generated by office employment.
    - **Hotel:** applied an employment multiplier (1.6574) to estimate employment generated by hotel employment.
    - **Institutional:** applied an employment multiplier (1.6151) to estimate employment generated by institutional employment.
    - **Industrial:** applied employment multiplier (2.7974) to estimate employment generated by industrial employment
  - c. Calculated total employment impact by corridor by summing direct employment and indirect employment generated by corridor.<sup>12</sup>

<sup>9</sup> Urban Land Institute (assumed to reflect gross development)

<sup>10</sup> CoStar Denver Office Report, 2006 (assumed to reflect gross development)

<sup>11</sup> PricewaterhouseCooper's 2006 United States lodging report

<sup>12</sup> Indirect employment generated by housing units, retail employment, office employment, and hotel employment is not estimated on a geographic basis (e.g. location of indirect employees is not known).

### **4.3 Key Features**

The employment forecasting tool that resulted from this methodology is an excel workbook that includes a summary employment worksheet and individual worksheets with project data organized by station and corridor.

The following tables summarize the how users can utilize this tool to update with new projects once they become known, input them into the excel spreadsheet and generate the direct and indirect jobs that are generated as a result of this new development.

The following series of exhibits provide a graphic introduction to the forecasting tool for new users. Additional information is provided in the appendix.

Dynamic Employment multipliers, (RIMS II) - users may change over time.

Dynamic average HH income - users may change over time.

Station Area Employment (Existing & Future Stations) - Summary Post 2006 (2005 & Beyond)															
Employment Multipliers <sup>7</sup>														Average HH Income <sup>8</sup>	
															\$43,777
Post 2005 (New Projects) - Direct Jobs															
	Housing Units	Total Selected Employment <sup>1</sup>	Retail <sup>2</sup>	Office <sup>3</sup>	Hotel <sup>4</sup>	Institutional <sup>5</sup>	Industrial <sup>6</sup>	Post 2005 (New Projects) - Indirect Jobs							Post 2005 (New Projects) - Total Impact
								Employment	Housing Units	Retail	Office	Hotel	Institutional	Industrial	Employment
Systemwide	2,750	10,394	5,560	3,112	349	1,373	0	22,604	1,548	8,866	9,394	578	2,218	0	32,999
Corridor															
Central CPV	1,190	3,681	236	2,512	349	584	0	10,150	670	376	7,583	578	943	0	13,831
Southwest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Southeast	862	80	80	0	0	0	0	612	485	127	0	0	0	0	692
East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West	0	403	403	0	0	0	0	642	0	642	0	0	0	0	1,044
Gold Line	410	741	741	0	0	0	0	1,412	231	1,182	0	0	0	0	2,153
Northwest	12	5,490	4,101	600	0	789	0	9,632	7	6,539	1,811	0	1,275	0	15,123
North Metro	276	0	0	0	0	0	0	155	155	0	0	0	0	0	155
I-225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>2,750</b>	<b>10,394</b>	<b>5,560</b>	<b>3,112</b>	<b>349</b>	<b>1,373</b>	<b>0</b>	<b>22,604</b>	<b>1,548</b>	<b>8,866</b>	<b>9,394</b>	<b>578</b>	<b>2,218</b>	<b>0</b>	<b>32,999</b>

1/ Includes retail, office, hotel and institutional employment; does not include industrial and other employment  
 2/ Assumes 3 employees per 1,000 square feet of space  
 3/ Assumes each employee occupies 250 square feet  
 4/ Assumes each room equates to 0.618 employees (based on PricewaterhouseCooper's 2006 United States lodging report, which cited an average of 0.618 employees per room)  
 5/ Assumes each employee occupies 250 square feet (equivalent to average office space/employee)  
 6/ Assumes each employee occupies 330 square feet (based on CoStar report)  
 7/ 2004 employment multipliers, RIMS II Model  
 8/ Based on Census Bureau data

Updates automatically based on projects added within corridor tabs. Cells include calculations that users may change over time.

Updates automatically based on projects added within corridor tabs.

Microsoft Excel - RTD Forecasting Tool

File Edit View Insert Format Tools Data Window Help Adobe PDF

Type a question for help

Arial 10 B I U

H44

Station Area Employment (Existing & Future Stations) by Year (2006 & Beyond)																					
														Employment Multipliers <sup>7</sup>		Average HH Income					
														-	12.8608	1.5946	3.0182	1.6574	1.6151	2.7974	\$43,777
Post 2005 (New Projects) - Direct Jobs														Post 2005 (New Projects) - Indirect Jobs					Post 2005 (New Projects) - Total Impact		
	Housing Units	Total Selected Employment <sup>1</sup>	Retail <sup>2</sup>	Office <sup>3</sup>	Hotel <sup>4</sup>	Institutional <sup>5</sup>	Industrial <sup>6</sup>	Employment	Housing Units	Retail	Office	Hotel	Institutional	Industrial	Employment						
<b>Systemwide</b>	2,750	10,394	5,560	3,112	349	1,373	0	22,604	1,548	8,866	9,394	578	2,218	0	32,999						
<b>Corridor</b>																					
2006	676	2,431	194	1,512	141	584	0	6,431	381	309	4,565	234	943	0							
2007	514	1,250	42	1,000	208			3,719	289	67	3,018	344	0	0							
2008								0	0	0	0	0	0	0							
<b>Central CPV</b>	<b>1,190</b>	<b>3,681</b>	<b>236</b>	<b>2,512</b>	<b>349</b>	<b>584</b>	<b>0</b>	<b>10,150</b>	<b>670</b>	<b>376</b>	<b>7,583</b>	<b>578</b>	<b>943</b>	<b>0</b>	<b>13,831</b>						
2006		0						0	0	0	0	0	0	0							
2007		0						0	0	0	0	0	0	0							
2008								0	0	0	0	0	0	0							
<b>Southwest</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>						
2006	862	80	80					612	485	127	0	0	0	0							
2007		0						0	0	0	0	0	0	0							
2008								0	0	0	0	0	0	0							
<b>Southeast</b>	<b>862</b>	<b>80</b>	<b>80</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>612</b>	<b>485</b>	<b>127</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>692</b>						
2006								0	0	0	0	0	0	0							
2007								0	0	0	0	0	0	0							
2008								0	0	0	0	0	0	0							
<b>East</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>						
2006		403	403					642	0	642	0	0	0	0							
2007		0						0	0	0	0	0	0	0							
2008								0	0	0	0	0	0	0							
<b>West</b>	<b>0</b>	<b>403</b>	<b>403</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>642</b>	<b>0</b>	<b>642</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,044</b>						
2006	410	741	741					1,412	231	1,182	0	0	0	0							
2007		0						0	0	0	0	0	0	0							
2008								0	0	0	0	0	0	0							
<b>Gold Line</b>	<b>410</b>	<b>741</b>	<b>741</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,412</b>	<b>231</b>	<b>1,182</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,153</b>						
2006	12	5,490	4,101	600		789		9,632	7	6,539	1,811	0	1,275	0							

Summary Data- projects updated | Summary Data- corridor sheets | Central CPV Mar'07 | Southwest Mar'07 | Southe

Ready NUM

Allows tracking of employment over time (by corridor by year).

Microsoft Excel - RTD Forecasting Tool

File Edit View Insert Format Tools Data Window Help Adobe PDF

Type a question for help

Arial 10 B I U

J215

Project Name	Status	City	Use	Tenure	Units	Hotel Rooms	Retail SF	Office SF	Institutional SF	Date Complete
<b>10/Osage</b>										
Osage Lofts	Completed	Denver	Residential	Condo	32	0	0	0		2002
Nine 10 Arts	Completed	Denver	Residential	Condo	8	0	0	0		2006
La Villa de Barela	Completed	Denver	Mixed	Apartment	38	0	12000	0		2006
Maravilla	Proposed	Denver	Residential	Condo	75	0	0	0		
Antares Urban Townhomes	Proposed	Denver	Residential	Condo	8	0	0	0		
Lincoln Park redevelopment	Expected	Denver			0	0	0	0	0	
<b>Alameda</b>										
<b>I-25/Broadway</b>										
Manor Homes at Platt Park	Under construction	Denver	Residential	Single family	43	0	0	0		
Alexan Gates	Proposed	Denver	Mixed		350	0	16000	0		
Metropolitan Gardens	Proposed	Denver	Mixed		1500	0	900000	300000		
McStain at Platt Park II	Expected	Denver	Residential	Condo	200	0	0	0		
Gates Cherokee	Expected	Denver	Mixed		550	0	549000	254750		
Gates Lionstone	Expected	Denver	Mixed		1200	0	100000	200000		
Gates Joint Development	Expected	Denver	Mixed		0	0	145000	35250	0	
					12,818	5,251	2,861,915	8,015,675	3,973,850	
<b>Corridor</b>										
Central CPV	Completed	Under Construction	Proposed	Expected	Total					
Residential Units	4,742	1,442	4,684	1,950	12,818					
Office SF	2,555,433	370,000	2,650,242	2,440,000	8,015,675					
Retail SF	637,100	69,164	1,346,651	809,000	2,861,915					
Hotel Rooms	3,071	423	1,032	725	5,251					
Institutional SF	2,740,850	27,000	350,000	856,000	3,973,850					
Industrial SF										

User may enter new projects by station.

Summary corridor project data. Requires users to update calculations when new projects are added.

Summary Data- projects updated / Summary Data- corridor sheets / Central CPV Mar'07 / Southwest Mar'07 / Southe

Ready NUM



Microsoft Excel - RTD Forecasting Tool

File Edit View Insert Format Tools Data Window Help Adobe PDF

Type a question for help

B221 SUMMARY TABLE

Corridor	Residential Units		Retail SF		Office SF		Hotel Rooms		Institutional		Industrial	
Central CPV	Completed (Post 2005)	Under Const./Planned/Exp	Completed (Post 2005)	Under Const./Planned/Exp	Completed (Post 2005)	Under Const./Planned/Exp	Completed (Post 2005)	Under Const./Planned/Exp	Completed (Post 2005)	Under Const./Planned/Exp	Completed (Post 2005)	Under Const./Planned/Exp
Union Station	389	1,526	14,000	426,115	250,000	3,680,242		171				27,000
Pepsi Center/Elitch		0		0		0		0				0
Invesco Field		0		0		300,000		0				0
Auraria West	230	0		0		0		0				0
Colfax/Auraria	0	0		0		0		225				0
Convention Center	125	854		700		0	336	844				0
16th Street	333	0	21,650	0	14,700	0		138				0
18th Street		23		0		500,000	228	402				0
20/Welton		389		28,000		0		300				0
25/Welton		896		15,000		0		0				0
27/Welton	6	5		0		0		0				0
29/Welton		8		0		0		0				0
30/Downing		15		0		0		0				0
35/Downing		56		0		0		0				0
Civic Center	61	128	31,000	45,000	363,400	190,000		100	146,000		1,206,000	
10/Osage	46	83	12,000	0	0	0		0			0	
Alameda												
I-25/Broadway		3,843		1,710,000		790,000		0				0
<b>Total</b>	<b>1,190</b>	<b>7,826</b>	<b>78,650</b>	<b>2,224,815</b>	<b>628,100</b>	<b>5,460,242</b>	<b>564</b>	<b>2,180</b>	<b>146,000</b>		<b>1,233,000</b>	

Summary Project Data by station. Requires users to update calculations when new projects are added.

Summary Data- projects updated | Summary Data- corridor sheets | Central CPV Mar'07 | Southwest Mar'07 | Southe

Ready NUM

## Appendix

- A. Induced Growth Questionnaire Results
- B. Regional, Corridor and Station Area Growth Analysis and System-Wide Demand Forecasting Tool
- C. Employment Forecasting Tool