



Economic Development Assessment

April 2017

Introduction

This Report provides an assessment of the market and land use conditions influencing the State Highway 7 (SH-7) Corridor as they relate to developing a bus rapid transit (BRT) system. It identifies opportunities for enhancing development and creating Transit Oriented Development (TOD) surrounding the BRT stations. It also identifies several other community and economic benefits of implementing transit on SH 7. The Report is organized as follows.

- Executive Summary
- Population and Employment Growth Patterns - The Report begins with a regional and corridor market overview which contains an analysis of the economic, demographic, and real estate market trends and conditions. These factors influence the demand for regional transit, as well as the land use and development conditions needed to support good transit service and TOD.
- Corridor Land Use Patterns – This section contains a summary of existing and forecasted land use densities. Transit is most feasible in areas with concentrated development.
- Development and Market Conditions - This section includes an evaluation of planned real estate development activity with a focus on the I-25/SH 7 Interchange.
- Transit Oriented Development and BRT – This section describes the transit investment and market conditions necessary to generate successful TOD. It also recommends strategies for leveraging the land use benefits of TOD on this Corridor.
- Community and Economic Benefits – This section discusses how the SH 7 BRT project supports economic and community development goals in each community. It also provides preliminary calculations of the economic value of safety and environmental benefits created by the project.

How to Use this Report

This Report identifies the opportunities and challenges for achieving BRT TOD on the SH-7 corridor segments and stations from a real estate market perspective. The accompanying Land Use Analysis then addresses with more detail the land use best practices that need to be implemented in order to promote transit-supportive land use along the SH-7 corridor and at the proposed stations.

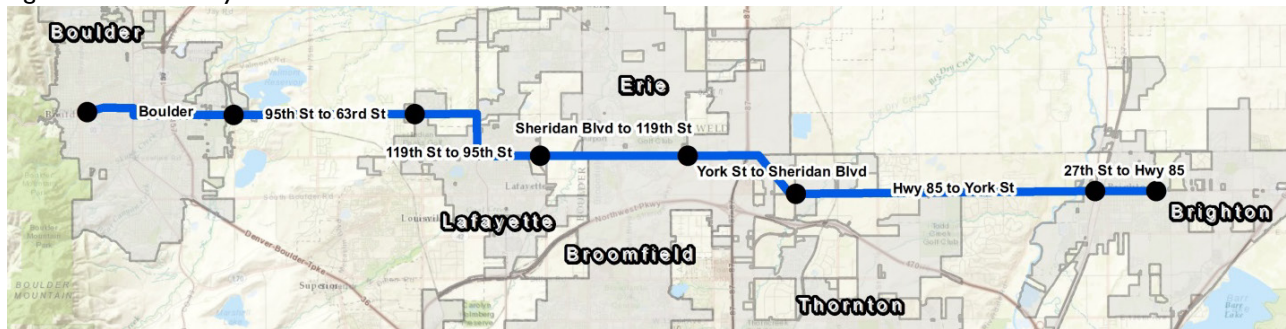
This Report provides a rationale for investing in high quality transit aside from the potential land use (TOD) benefits. These other benefits include supporting community and economic development objectives, improving access to jobs (for the workforce) and labor (for employers), as well as safety and environmental benefits.

Study Area

SH 7 is a State Highway which runs from the eastern edge of Brighton at I-76 west into the City of Boulder. The corridor includes, from west to east, the cities of Brighton (pop. 38,000), Thornton (pop. 133,000), the City and County of Broomfield (pop. 65,000), Erie (pop 21,500), Lafayette (pop. 27,500), and Boulder (pop. 107,300).

East of I-25 the corridor lies in Adams County, while west of I-25 the corridor lies in Boulder County except for the area around the I-25/SH 7 interchange, which is in the City and County of Broomfield (NE, NW, and SW corners). Land use and development densities vary widely from suburban and exurban to urban in the City of Boulder.

Figure 1: SH 7 Study Area



Executive Summary

Population and Employment Growth Patterns

- At the regional scale the locations of population growth and job growth are separated, highlighting the important role of regional transit in connecting people with job centers. Nearly 80 percent of the job growth from 2010 through 2015 occurred in urban areas with large existing concentrations of jobs. This is in contrast to the two thirds of the region's population growth that occurred in more suburban areas. While there has been a large increase in the share of population growth that has occurred in urban and central city areas (Denver, Aurora, Boulder, Southeast I-25 Corridor), the suburbs continue to accommodate a large portion of Metro Denver's growth putting more pressure on the region's highways and commuter transit lines.
- Broomfield, Erie, Thornton, and Brighton are some of the fastest growing communities in Metro Denver with growth rates of roughly 3.5 percent per year (8.5%/yr. in Erie). The growth of northern Broomfield, Erie, and Lafayette is directly related to the strong job growth in Boulder and the lack of attainable and affordable housing in the City. Brighton and Thornton are also growing as the regional housing market shifts to the north due to limited land and water availability in Arapahoe, Douglas, and Jefferson Counties.
- The 2015 commuting patterns east and west of I-25 are notably different. In Brighton and Thornton, the dominant commuting directions are north and south to Denver, Aurora, and Greeley. West of I-25 the labor market is heavily oriented to Boulder and the US-36 employment corridor. In 2040, the east-west home-work trips will still be a large portion of travel demand, although more trips to new employment areas at I-25/SH 7 and in Brighton are predicted.

Development and Market Conditions

- Transit provides the best service and generates the most ridership in areas with concentrated development. There are existing nodes where densities (population plus employment) are sufficient for BRT including Downtown Brighton, Lafayette, and Boulder. The segment from Lafayette into Boulder currently has the greatest concentration of population and employment. A nodal development pattern is emerging on SH 7 corridor that will be well suited to long distance commuter transit. When development is concentrated in nodes rather than a dispersed linear pattern, the transit route can be served with fewer stations, making travel time more competitive with personal automobiles.
- There are plans for nearly 20 million square feet of office-type employment and mixed use development at the I-25/ SH 7 interchange in Broomfield and Thornton. The mix of future development on the Thornton side may be more weighted to light industrial and flex/R&D space often built at lower densities than office. This area has potential to emerge as a new office, health care, and R&D

employment center in the northern metro area but the timing is uncertain. This area has not established a track record or 'momentum' for attracting these types of employers. Once a catalytic project is successfully built and occupied it may help to attract more jobs to the area. Also, as the Boulder market becomes increasingly constrained, this area, along with other locations on the US-36 Corridor, will become more attractive to employers.

- The impact of the IKEA announced at I-25/SH 7 will need to be monitored. The IKEA business model is a self-contained shopping experience and may not result in a large amount of retail spin-off development.
- Planned development between the nodes (Brighton, I-25/SH 7, Lafayette, and Boulder) is largely single family detached housing. Single family housing can be transit supportive if built at densities of at least 5 units per acre (gross density). Traditional neighborhood design is a form of single family development that achieves this level of density (e.g. Stapleton).

TOD Land Use Strategies

- TOD is real estate development integrated with nearby transit. The increased access to jobs and services provided by good transit creates a location premium that supports higher property values and rents that result in increased densities. The economic benefits of TOD include higher public revenues per acre (taxes), reduced parking and roadway costs, reduced sprawl, and enhanced neighborhood revitalization. TOD is usually associated with rail transit, a permanent investment in access and mobility that creates real estate value premiums. Premium BRT service with fixed high quality station improvements can create a similar level of real estate and land use enhancement.
- There are several examples of successful BRT implementation in North America, and these lines have helped attract substantial private real estate investment. Many of these BRT corridors however are distinctly different from the SH 7 Corridor. They are located in densely populated urban areas and are considerably shorter than the 28-mile SH 7 corridor.
- With longer travel distances and greater station spacing on SH 7, BRT will be most effective in connecting concentrations of housing with concentrations of jobs. Development will be enhanced at key nodes rather than along an entire corridor. With implementation of land use and zoning policies and cooperation from land owners and developers, a pattern of housing and jobs concentrated at key BRT stations can be created. This type of land use pattern is necessary to generate the ridership needed to support a high quality BRT project.
- The land within one-eighth to one-quarter of a mile of the BRT stations should be reserved for the highest development densities. Land outside of the station area can be developed sooner, but should anticipate transit access and integration with higher density development. This will require patience on the part of the corridor communities and land owners as the market conditions on the corridor do not currently favor high density TOD.
- The SH 7 BRT will create many opportunities to locate medium to high density single and multifamily development at BRT stations. Traditional Neighborhood Design (TND) can easily be designed to supply single family homes in a transit supportive manner.
- Office, healthcare, education, and some R&D facilities can be built at transit supportive densities (1.5 Floor Area Ratio (FAR) or greater). While these densities would require costly structured parking, there is sufficient surplus land on which surface parking could be built in the interim. Structured parking could be built at a later date when adequate transit service is in place to reduce parking demand.
- Transit ridership is enhanced by making station access as convenient and safe as possible through "first and last mile connection" strategies. Development plans should include intentional plans for pedestrian

and bicycle access to stations. Good station access also extends the distance from a station in which the increased real estate values and densities can be leveraged from transit.

- The SH 7 Corridor jurisdictions, in partnership with landowners, should consider creating and adopting station area plans for key BRT stations. These plans, in conjunction with adopted zoning, will set development expectations and ensure that future development is supportive of the transit investment.

Community Benefits

Implementing BRT on the SH 7 Corridor supports several community and economic development benefits.

- Brighton – Supports downtown revitalization planned mixed use development, and enhancements to the Bridge Street corridor. Provides an opportunity to construct streetscape improvements with BRT enhancements, resulting in potential cost savings. Helps attract younger residents who value transit accessible locations.
- Thornton – Creates stronger linkages to Boulder area skilled labor and firms. Provides an additional amenity for recruiting major employers to the I-25/SH 7 interchange area.
- Broomfield – Provides a stronger link to the Boulder area labor force and firms and additional commuting options for residents. May enhance business recruitment efforts at I-25/SH 7.
- Lafayette – Complements a citywide strategy to promote transportation other than the personal automobile. Supports the downtown civic cluster if the Downtown Lafayette PNR is included.
- Boulder – Supports revitalization of the East Arapahoe Corridor. With approximately 75 percent of the workforce commuting into Boulder, BRT provides a much needed additional transit link to the surrounding workforce. RTD and the City have made a substantial investment in Boulder Junction, the new intermodal center. Adding more regional transit service to this facility further supports this investment.

Safety and Environmental Benefits

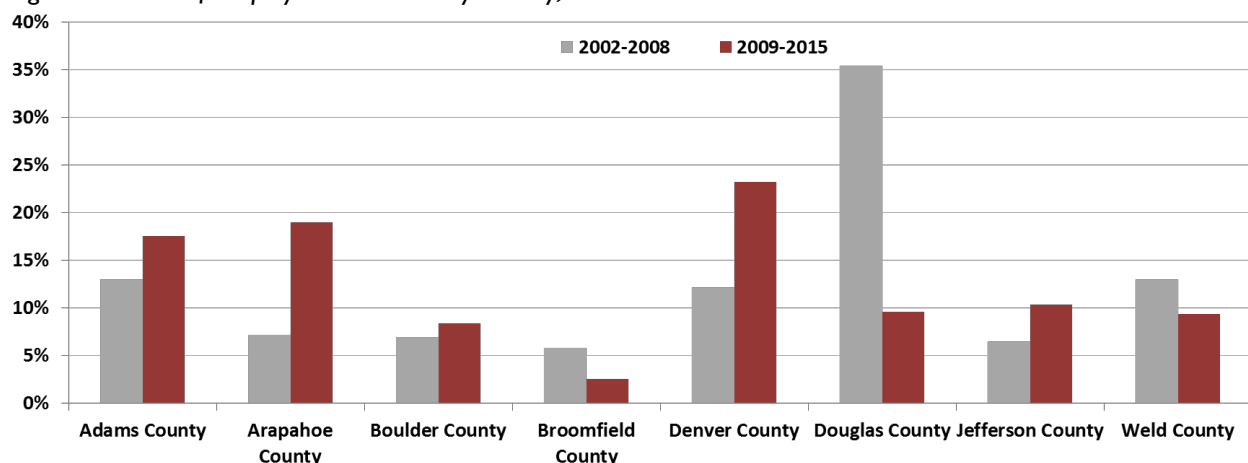
- Transit has a much better safety record than driving. Driving results in 72 times more fatalities per mile driven than bus transit. The 2040 modeling results estimate that the BRT system would shift 42,000 vehicle miles travelled (VMT) per day (10.9 million/year) to transit. This results in 2.55 fewer fatalities over 30 years with an estimated value to society of \$23.5 million.
- The reduction in automobile emissions from the shift of VMT to transit results in a reduction of about 3,900 metric tons of CO₂ per year with an economic benefit of \$5.7 million over 30 years.

Population and Employment Growth Patterns

Metro Area Growth Patterns

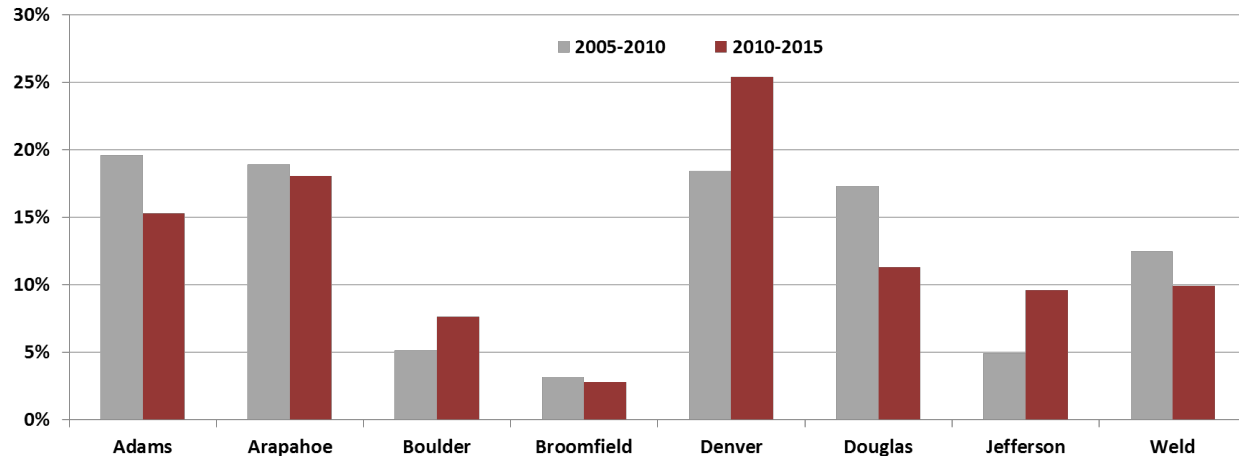
Population and employment growth patterns in Metro Denver show two important trends that have implications for transportation planning. Similar to many urban areas, employment and population growths at the metro scale are occurring in different locations, resulting in an increasing need to connect residents and jobs. Nearly 80 percent of the job growth from 2009 (post recession) through 2015 occurred in 'urban counties' or in the urban areas of larger suburban counties that already have relatively large concentrations of jobs. Denver captured 23 percent of the region's employment growth (55,000 jobs) (Figure 1). Arapahoe County which includes the Southeast I-25 Corridor Captured 19 percent of the employment growth (45,000 jobs). Adams County captured 18 percent mostly around the Anschutz Medical Campus which grew by 15,000 jobs, and the areas surrounding DIA and along the North I-25 corridor. Jefferson County comprised just over 10 percent market share. Boulder County added 19,800 jobs which was 8 percent of the region's job growth and over half of which were in the City of Boulder.

Figure 1: Share of Employment Growth by County, 2002-2008 and 2009-2015



Approximately sixty percent of the population growth from 2010 through 2015, roughly the same time period, occurred in more suburban areas including Adams, Arapahoe, Broomfield, Douglas, Jefferson, and Weld Counties. During the prior five year period 2005 through 2010, the market share for these same areas was 76 percent. A boom in apartment construction and increased demand for residential locations close to jobs, services, and entertainment caused Denver and Jefferson County, and to a lesser extent Boulder County, to increase their share of growth. The differences in the location of population and employment growth highlights the need to improve the connections and provide transportation options such as good commuter transit between job centers and residential growth areas. The SH 7 BRT project would be part of this important strategy.

Figure 2: Share of Population Growth by County, Metro Denver, 2005-2010 and 2010-2015



Existing job centers tend to continue to attract jobs due to the urban geography principle of agglomeration and access to a broad labor force. Agglomeration is the benefit that firms realize by location near each other. The classical example is law firms locating near the county court house. Denver and Boulder have agglomerations of professional services, technology, and energy firms that value being close to each other for in-person communications. Communications technology is facilitating the dispersion of some employment, but even remote workers are seeking places to congregate resulting in the rise of co-worker/shared office space. A central city also has the benefit of being able to draw from a larger pool of labor. This is part of the reason that job growth has not been as strong in outlying suburbs despite their strong population growth.

Corridor Growth Patterns

The northern Metro Denver communities are some of the fastest growing cities in Metro Denver. These include the SH 7 communities of Brighton, Thornton, and Broomfield. The relative sizes of the SH 7 communities are shown in Figures 5 and 6 which show population and employment trends respectively.

- **Brighton** – Brighton’s population grew from 21,000 in 2000 to 34,400 in 2015, adding 900 people per year (3.4%/yr.). As population grew, the number of jobs grew from 8,900 in 2002 to 14,900 in 2014 (500/yr.; 4.3%/yr.).
- **Thornton** – Thornton is the largest city on the Corridor with 133,000 people, up from 82,000 in 2000 although most of the population lives south of the SH 7 Corridor. Thornton has added 3,400 people per year (3.2%/yr.). Despite the large population, Thornton only has 21,000 jobs and has only added 184/yr. since 2002.
- **Broomfield** – Broomfield has a population of 65,000, up from 38,300 in 2000 (1,800/yr.; 3.6%/yr.). With 32,000 jobs, it is the second largest employment area on the Corridor. Job growth occurred at 482/yr. (1.7%/yr.) from 2002-2014.
- **Erie** – Erie is the smallest community with 21,500 people, up from 6,300 in 2000 (1,000/yr.; 8.5%/yr.). Erie has an employment base of approximately 2,300 jobs.
- **Lafayette** – Lafayette’s population is 27,500, up from 23,200 in 2000 (290/yr.; 1.2%/yr.). Lafayette has 10,200 jobs, up from 5,700 in 2002 (379/yr.; 5.0%/yr.).
- **Boulder** – Boulder has 107,300 people and grew from 95,000 in 2000 (841/yr.; 0.8%/yr.). With 89,000 jobs, it is the largest employment center in northern Metro Denver. Boulder added 10,000 jobs (840/yr.; 1.0%/yr.) since 2000. Note that these figures do not include the self-employed and therefore underestimate total job numbers.

Figure 5: SH 7 Community Population Trends, 2000-2015

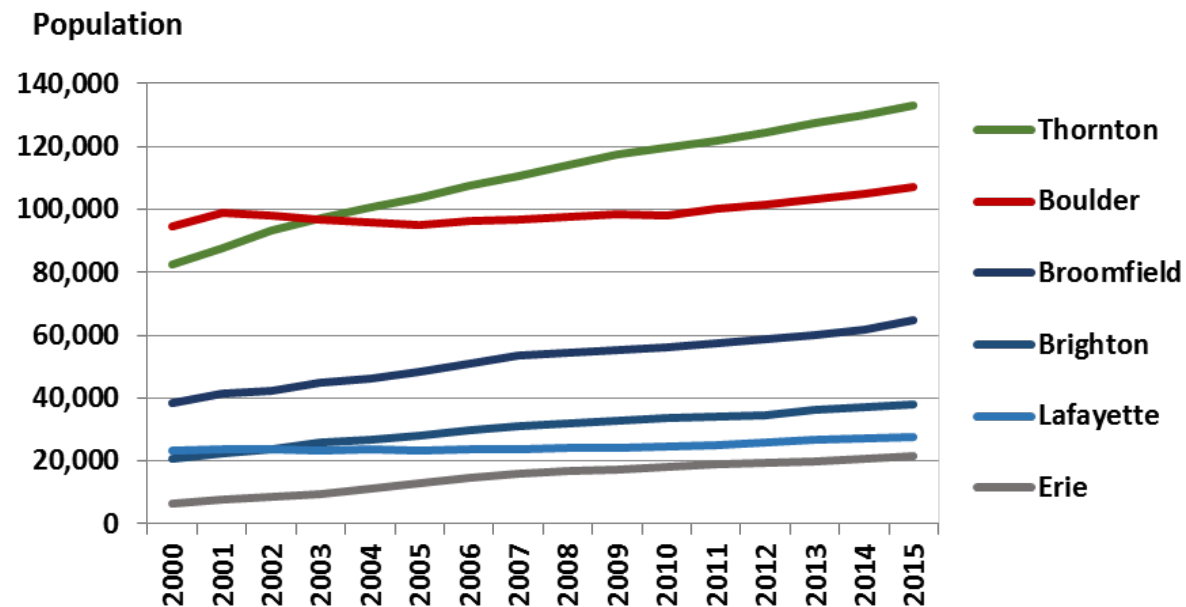
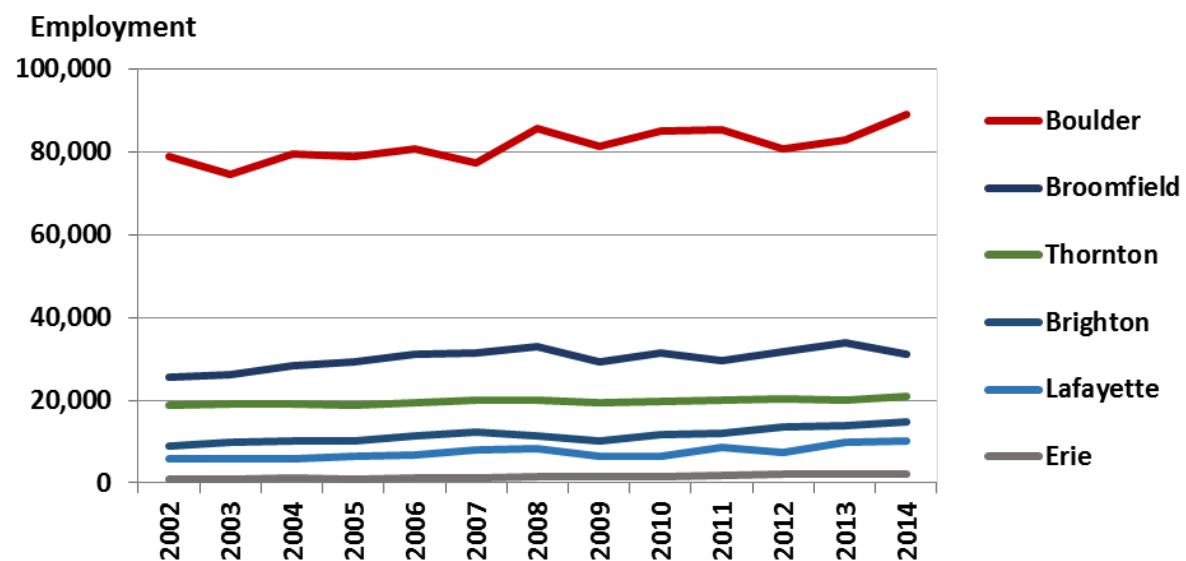


Figure 6: SH 7 Community Employment Trends, 2000-2015



Commuting Trends

The origin-destination (O/D) analysis for this corridor found that the 2015 home-work commuting patterns along the corridor are distinct east and west of I-25 and closer to Boulder. A more detailed evaluation of these trends is found in the Corridor Conditions Report.

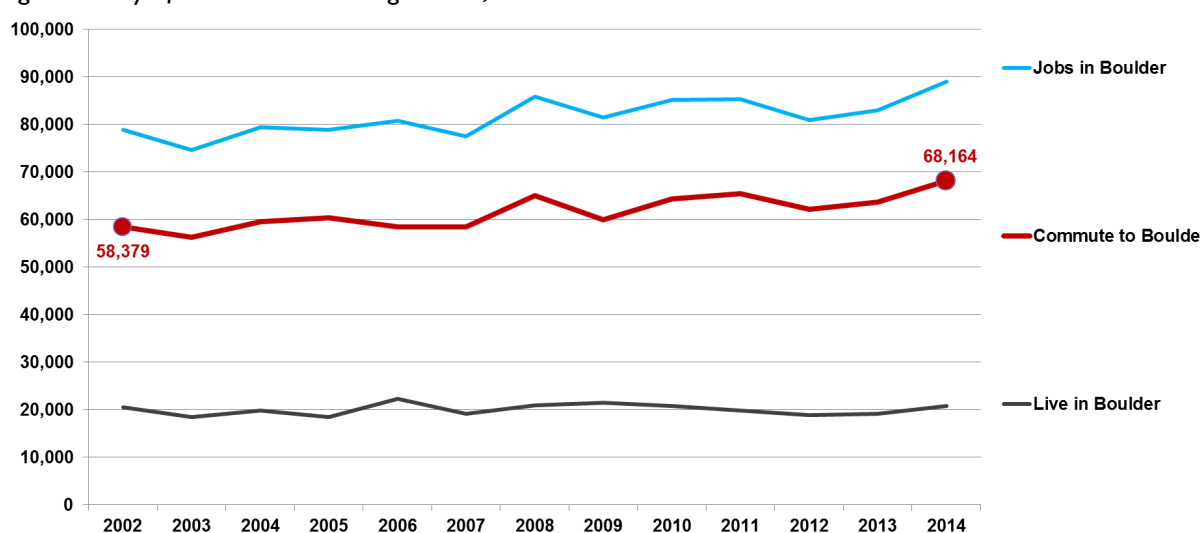
Less than five percent of Brighton's workforce travels the full length of the corridor to Boulder (230 average daily trips). Commuting from Brighton is much more heavily oriented to Aurora, Commerce City, and Denver. Thornton residents have commuting patterns similar to Brighton with only 345 trips to Boulder. East of I-25 commuting patterns are more heavily oriented to Boulder and the US-36 corridor. In Lafayette nearly 30 percent of commuters (3,800 average daily trips) commute into Boulder.

The 2040 commuting patterns are expected to shift as development occurs around the I-25/SH 7 interchange. Some of the increase in trips is due to the opening of the North Metro commuter rail line into Downtown Denver. Thornton to Brighton trips grow nearly 3 times and Thornton to Broomfield trips grow by 1.6 times. Broomfield to Thornton trips increase by nearly 7 times current levels. The O/D analysis shows increases in west to east home to work trips as well as growth in the dominant east to west home to work trips. This results in more diversity of trips and economic activity along the corridor in 2040.

An important trend to highlight is the trend in commuting to and from Boulder, the largest job center along the Corridor. Commuting to Boulder has grown by more than 10,000 employees over the past 10 to 12 years (Figure 7). About 75 percent of the jobs in Boulder are filled by people who live outside of Boulder. These figures likely underestimate total commuting as they only include wage and salary employment. Self-employed and contract workers are not included in the available data.

- Every cycle of job growth in Boulder brings more in-commuting. Residential development in Boulder has not been able to keep up with demand, especially in affordable/workforce housing.
- The number of people who live *and* work in Boulder have stayed about the same over the past 10-12 years as shown below.
- Additional transit options will help provide more labor access to the City and ease congestion.
- Affordability conditions in Boulder County continue to worsen, reinforcing the need for more transit options to serve communities further from Boulder and even outside Boulder County.

Figure 7: City of Boulder Commuting Trends, 2002-2014

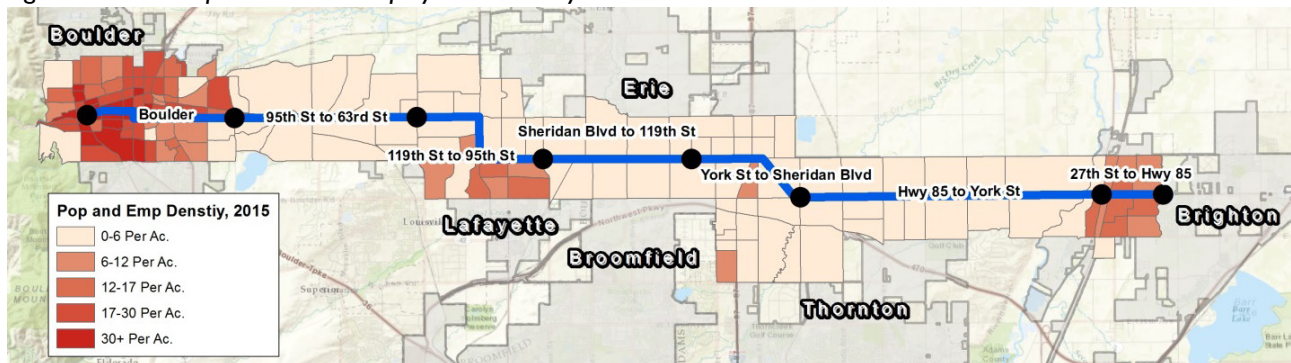


Corridor Land Use Patterns

2015 Population and Employment Density

RTD's minimum density standard for initiating limited peak service is 3 to 12 residents plus employees per acre. Average BRT systems with a capital cost of \$10 million per mile have population plus employment densities of at least 17 per acre and have strong ridership (Cervero and Guerra). There are currently three segments or nodes along the SH 7 Corridor that meet this threshold today: Downtown Brighton, much of Lafayette, and most of Boulder (Figure 8). The main drivers for transit demand will be in these nodes and in the areas where densities are forecasted to increase, such as at I-25.

Figure 8: 2015 Population Plus Employment Density



2040 Corridor Forecasts

DRCOG prepares forecasts of population and employment at the sub-municipal level for transportation planning. The HDR team evaluated these forecasts and local land use and development plans to update the forecasts with the most current information as well as existing and future land use. The focus was on a roughly one mile distance north and south of the SH 7 Corridor as development closest to the corridor will have the greatest impacts on transit ridership.

The land use forecasts indicate that a nodal development pattern could emerge along the SH 7 corridor. This type of development pattern is well suited to long distance commuter transit because there are more opportunities to concentrate development, and therefore ridership, at stations rather than dispersed along a corridor. The route can be then served with fewer stations, making travel time more competitive with personal automobiles. Most of the development planned between these nodes is lower-density single family residential. Depending on the densities at which it is ultimately developed, the residential development may not be as transit-supportive.

- 27th St. to SH 85 (Brighton) – Population in this segment is forecasted to remain constant while employment is forecasted to grow by approximately 1,800 jobs.
- SH 85 to York – This area is planned mainly for single family residential development. Densities are not expected to increase above 6 population plus employment per acre.
- I-25 Interchange Area (York to Sheridan in Thornton and Broomfield) – Thornton and Broomfield are targeting this area for substantial amounts of development and view it as a key location for employment development with nearly 16.0 million square feet proposed in Broomfield and at least 2.6 million in Thornton. Population is forecasted to grow by 13,000 and employment by over 9,000 jobs.
- Sheridan to 119th (Erie and Lafayette) – This area is proposed mainly for single family residential development. Population is forecasted to grow by 8,700 and employment by 1,700 although densities are not predicted to go above 6 to 12 population plus employment per acre.

- 119th St. to 95th St (Lafayette) – An increase of 9,300 residents, based on available land for development, and 2,800 employees is forecasted. This area already has sufficient densities in Lafayette’s core to support BRT.
- Boulder – The largest amount of population and job growth is forecasted in the City of Boulder with an increase of 5,500 residents and nearly 18,000 jobs.

Population Change by Segment, 2015-2040

Hwy 7 Segment	2015	2040	Change
27th St to Hwy 85	14,953	14,950	-3
Hwy 85 to York St	10,635	28,610	17,975
York St to Sheridan Blvd	5,480	18,549	13,069
Sheridan Blvd to 119th St	9,847	18,511	8,664
119th St to 95th St	21,712	31,060	9,348
95th St to 63rd St	4,161	5,749	1,588
Boulder	<u>56,454</u>	<u>62,010</u>	<u>5,556</u>
Total Population	123,242	179,439	56,197

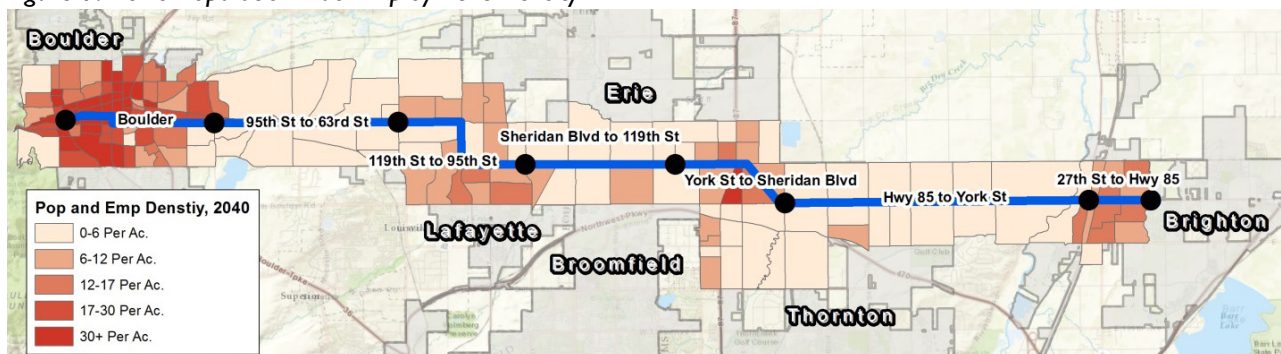
Source: DRCOG; Economic & Planning Systems

Employment Change by Segment, 2015-2040

Hwy 7 Segment	2015	2040	Change
27th St to Hwy 85	6,033	7,789	1,756
Hwy 85 to York St	1,070	2,785	1,715
York St to Sheridan Blvd	4,078	13,207	9,129
Sheridan Blvd to 119th St	1,273	2,966	1,693
119th St to 95th St	6,719	9,511	2,792
95th St to 63rd St	1,996	5,073	3,077
Boulder	<u>69,218</u>	<u>86,815</u>	<u>17,597</u>
Total Jobs	90,387	128,146	37,759

Source: DRCOG; Economic & Planning Systems

Figure 9: 2040 Population Plus Employment Density



It is important to recognize that these land use forecasts, originated from the DRCOG 2040 forecasts, are prepared for long range transportation planning. There are therefore numerous policy assumptions that go into the forecasts such as where density and economic growth is desired by local communities. These policy forecasts do not always align with the private sector real estate market expectations, although transportation and infrastructure investment policies can play a role in the location and form of development. The next section provides an overview of the real estate and development conditions along the corridor for context and comparison.

Development and Market Conditions

As noted above, between the existing population and density centers most planned development along the corridor is single family residential with modest amounts of supporting retail and commercial development. If built at densities of 5 dwelling units per acre or higher, there may be areas between the existing nodes of population and employment that could support additional stations and generate ridership. The key is to ensure that development is planned for pedestrian and bicycle circulation and station access.

The best opportunities for TOD or other development enhancement by transit is in downtown Brighton, the future North Metro terminus at Colorado Blvd. and SH 7, the I-25 Interchange Area, Lafayette, and Boulder.

I-25 Interchange Planned Development

Broomfield and Thornton are both seeking to attract employment and commercial tax base to the I-25/SH 7 interchange area. In Broomfield, there are 13,000 housing units planned and nearly 16.0 million square feet of employment development (Table 3, Figs. 10 and 11). At a conservative 500 to 750 square feet per job, this implies 20,000 to 30,000 jobs.

While there is momentum building on attracting employers, it will take some time for the market in this area to mature and grow into a major employment center. Employers are hesitant to locate in new areas without established track records for attracting and retaining workers. The office submarket that includes this interchange runs along North I-25 from about I-76 to SH 7. This submarket currently accounts for less than 3.0 percent of the Metro Denver office market and has experienced minimal growth. This area has traditionally been stronger in industrial and more recently in retail development, although the retail market may be oversupplied at this time.

One of the largest land holdings, North Park in Broomfield, was planned as a science, technology, and education campus with supporting residential and retail development. The project is currently being re-planned and re-positioned due to a current lack of demand for commercial development. The timing of development on these large land holdings is highly uncertain.

IKEA has announced a new store on the northwest corner of the interchange in Broomfield. This could catalyze some additional restaurant development in the area. However, IKEA's business model as a self-contained shopping experience has not generated a lot of spin-off development in its other U.S. locations.

Thornton also has ambitious economic development objectives in this area but is targeting a different market segment that may show quicker success. Thornton is recruiting for light industrial, flex industrial, and R&D facilities as well as office if opportunities arise. Both Broomfield and Thornton are hoping to recruit firms who have outgrown Boulder and need more and lower cost space. Light industrial and flex/R&D development is less likely to be built at high enough densities to be served efficiently with transit.

Table 3: I-25/SH 7 Planned Development

Name	Type	Residential Units	Commercial Sq. Ft.	Estimated Timing	Notes
Broomfield					
257 Land	Employment/Mixed Use	2,700	2,850,000	TBD	Requires water and sewer extension across I-25
Highlands	Mixed Use	1,000	350,000	Res: 5 yrs.; Comm: TBD	
JF Beyer	Employment/Mixed Use	780	1,500,000	TBD	Requires sanitary sewer lift station
North Broomfield East of I-25	Residential	1,300	TBD	TBD	Long term
North Park	Employment/Mixed Use	6,200	8,600,000	TBD	Re-visioning due to lack of demand for employment development.
Northlands	Employment/Mixed Use	825	2,600,000	TBD	IKEA site with significant excess acreage.
Seven25 (Palisades)	Residential	200	TBD	5-10 Years	
Total		13,005	15,900,000		
Thornton					
Cundall Farms	SF Residential	363	---	5 years	
Front Range Crossings	Mixed Use	300	500,000	5 years	
Front Range Crossings-Wilcox	Commercial	---	500,000	5 years	
Heritage at Todd Creek	SF Residential	1,290	---	10 years	90% within 5 years
Larkridge	Commercial	---	1,250,000	5-10 Years	
Larkridge Apartments	SF Residential	338	---	1-2 years	
Morrison	SF Residential	432	---	Under construction	
North End Station	Mixed Use	3,500	375,000	TBD	Pending funding of North Metro commuter rail extension
Parterre	SF Residential	4,144	---	TBD	
Talon Pointe	SF Residential	362	---	10 years	90% within 5 years
Talon View	SF Residential	296	---	5 years	
Westwood	SF Residential	156	---	5 years	
Total		11,181	2,625,000		

Source: Economic & Planning Systems

Figure 10: Broomfield Development Projects- I-25 & Hwy 7

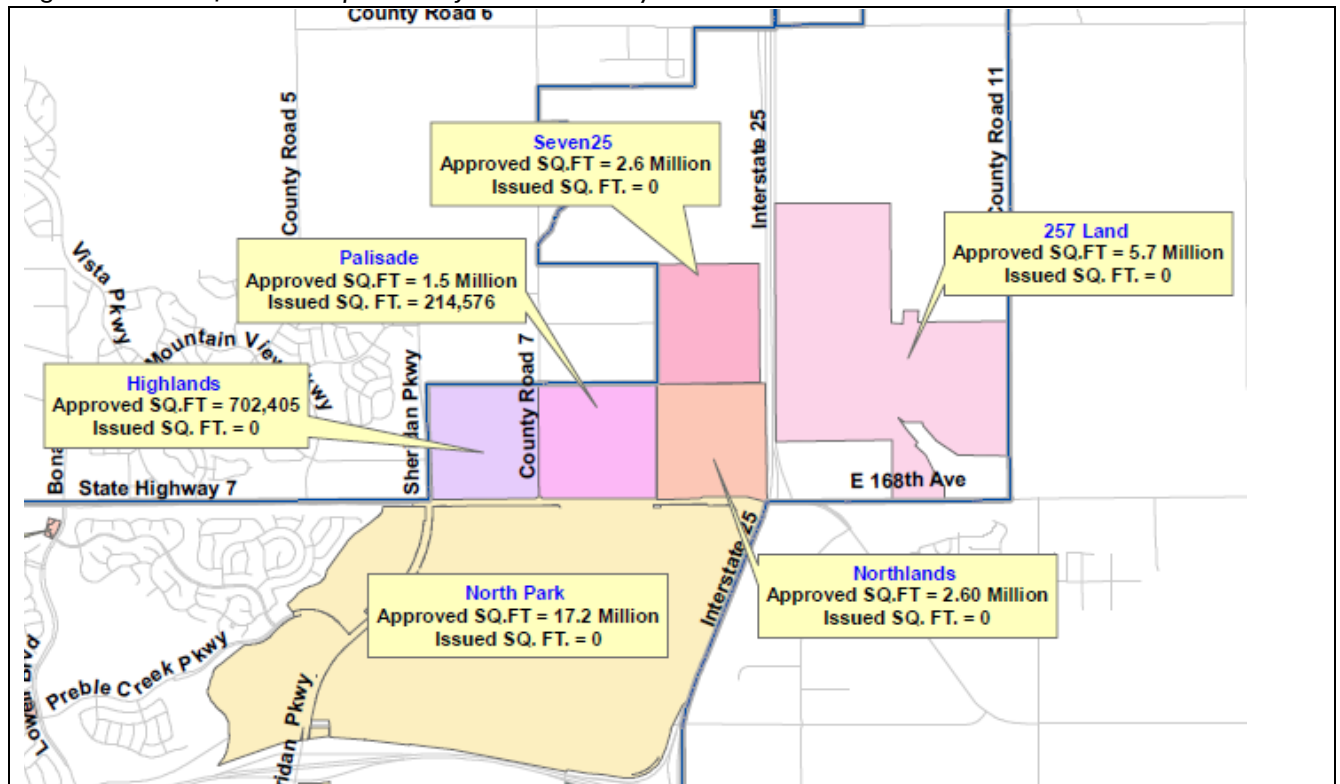
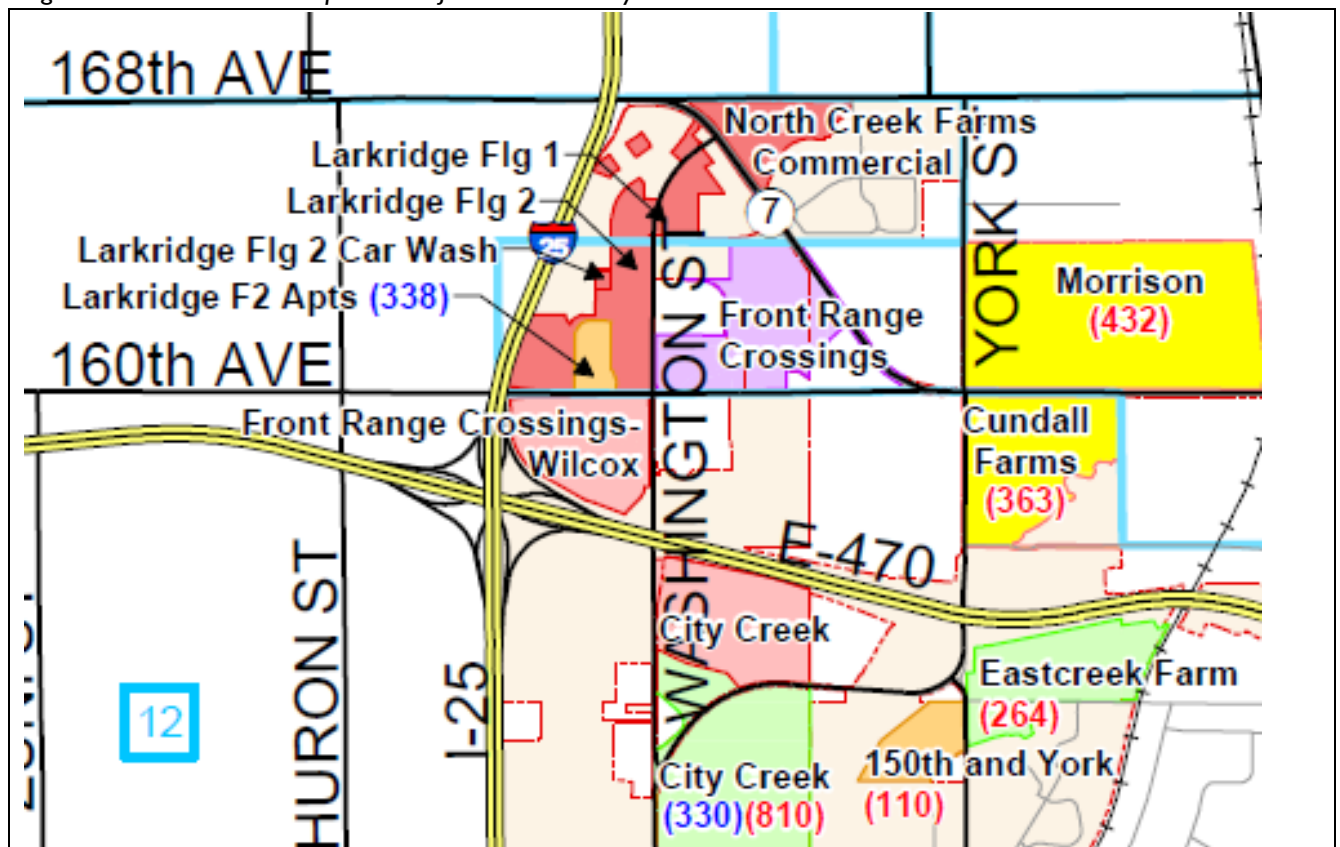


Figure 11: Thornton Development Projects- I-25 & Hwy 7



North I-25 and SH 7 Office Market

The major land use types that typically benefit the most from increased transit service are residential, retail, and office. Transit increases the access to and from a property for residents, workers, and customers. Office and retail development has much higher employment densities (jobs per acre) than industrial development, making it more efficient to serve with transit and connect it to stations.

The current office market along the North I-25 corridor and along SH 7 is small and not established as the submarket that includes the I-25/SH 7 interchange comprises only 2.6 percent of the metro area office market. Both Broomfield and Thornton are seeking to attract more office employment (as well as R&D and flex-industrial jobs) to the I-25 interchange area.

For planning transit service, the implication here is that the timing of development of I-25/SH 7 is uncertain. For example, a catalytic major tenant could be recruited that could create momentum for the area and accelerate development, however, the timing of this can't be predicted. While the I-25 interchange area will not support any significant ridership until development of scale and sufficient density occurs, planning for BRT may influence development patterns.

Table 4: Metro Denver Office Market Inventory Trends, 2006-2016

Submarket	2006	2016	Change 2006-2016		Pct. of Metro Area
			Tot. #	Ann. #	
Central Denver and CBD	50,003,002	53,651,783	3,648,781	364,878	32.3%
Other Denver	3,403,711	5,489,092	2,085,381	208,538	3.3%
I-25 From I-76 to Hwy 7	3,217,601	4,365,466	1,147,865	114,787	2.6%
I-76 & DIA	1,264,789	1,850,231	585,442	58,544	1.1%
East I-70/Montbello	2,412,519	2,985,729	573,210	57,321	1.8%
West Denver	12,567,005	14,478,276	1,911,271	191,127	8.7%
Aurora	8,248,534	9,318,758	1,070,224	107,022	5.6%
Boulder	10,121,639	10,791,286	669,647	66,965	6.5%
Northwest and US-36	6,632,407	8,128,318	1,495,911	149,591	4.9%
Southeast and I-25 Corridor	32,353,946	33,935,108	1,581,162	158,116	20.5%
Southwest and C/E-470 Corridor	19,488,877	20,862,428	1,373,551	137,355	12.6%
Total Metro Area (Sq. Ft.)	149,714,030	165,856,475	16,142,445	1,614,245	100.0%

Source: CoStar; Economic & Planning Systems

Transit Oriented Development and BRT

TOD Definition

Transit Oriented Development (TOD) is defined as real estate development integrated with nearby transit. It is typically built at higher densities than traditional or surrounding development and has excellent access and circulation for pedestrians and bicycles which are prioritized over personal automobiles. The increased access to jobs and services provided by good transit creates a location premium that supports higher property values and rents that result in higher development densities. The economic benefits of TOD include higher public revenues per acre (taxes), reduced parking and roadway costs, reduced sprawl, and enhanced neighborhood revitalization.

Successful TOD

There are a number of key factors that influence the extent to which transit can positively impact surrounding property values that include the following:

- Overall system connectivity and frequency of service is the most important factor in increasing the value of properties around station areas. Frequent transit service throughout the day is needed, as is a dense transit network that connects multiple destinations to allow car-free or car-light living.
- A strong economy and real estate market allows transit to focus a portion of existing demand at a particular location in order to leverage accessibility. TOD is difficult to implement in areas with weak market conditions without significant incentives.
- Supportive land use policy is a key component of any successful TOD project and can leverage private investment through density bonuses, reduced parking requirements, and other incentives for TOD.
- Rail transit is a permanent investment in access and mobility that creates real estate value premiums. Premium BRT service with fixed high quality station improvements can create a similar level of location enhancement.

Commuter transit lines in the U.S. have tended not to leverage as much TOD as shorter intra-city lines as service usually has peak AM and PM service to serve suburb to central city commutes. With less frequent service during the day, the access to other destinations along a corridor is not as convenient as with a car or more frequent service. The demographics on commuter lines, especially near the outer termini, are often more family oriented. In the U.S. the prime demographics for TOD housing are young renters, aged 25 to 34, and empty nesters aged 55 plus. Families with children seek larger homes which are most often more affordable in suburban areas. Commuting family members are more likely to go straight from work to home and visa-versa resulting in less patronage of TOD retail and restaurants.

SH 7 TOD Opportunities and Strategies

There are several examples of successful BRT implementation in North America, and these lines have contributed to substantial private real estate investment. These lines include the following:

- Cleveland, OH- HealthLine
- Eugene, OR- EmX
- Los Angeles, CA- Orange Line
- Ottawa, ON- Transitway
- Pittsburgh, PA- MLK East

These corridors are distinctly different from the SH 7 Corridor, however. The above BRT lines are in densely populated areas and are considerably shorter than the 28 mile SH 7 corridor. The Cleveland HealthLine in particular has two major medical institutions (Cleveland Clinic and University Hospitals Cleveland Medical Center) and two universities (Case Western Reserve and Cleveland State) on the corridor.

With longer travel distances and larger station spacing on SH 7, the BRT will be most effective in connecting concentrations of housing with concentrations of jobs. Development will be enhanced at key nodes, rather than along an entire corridor. The following strategies and policies will be needed.

- **Development Phasing** – The land within one-eighth to one-quarter of a mile of the BRT stations should be reserved for the highest development densities. Land outside of the station area can be developed sooner, but should anticipate transit access and integration with higher density development. This will require patience on the part of the corridor communities and land owners as the market conditions on the corridor do not currently favor high density TOD.
- **Housing** – Commuter corridors are good locations to concentrate housing, especially near high cost city centers such as Boulder. The SH 7 BRT will create many opportunities to locate medium to high-density single and multifamily development at BRT stations. Traditional Neighborhood Design (TND) can easily be designed to supply single family homes in a transit supportive manner. The areas between the major nodes of density described above would be ideal for this. Multifamily development can be supplied in mixed-use developments, particularly in Downtown Brighton and Lafayette, as well as near the I-25/SH 7 interchange.
- **Employment** – Office, healthcare, education, and some R&D facilities can be built at transit supportive densities (1.5 FAR or greater). While these densities would require costly structured parking, there is sufficient surplus land on which surface parking could be built in the interim. Structured parking could be built at a later date when adequate transit service is in place to reduce parking demand.
- **First and Last Mile Connections** – Transit ridership is enhanced by making station access as convenient and safe as possible. Development plans should include intentional plans for pedestrian and bicycle access to stations. Good station access also extends the distance from a station in which the increased real estate values and densities can be leveraged from transit.
- **Station Area Plans** – The SH 7 Corridor jurisdictions, in partnership with landowners, should consider creating and adopting station area plans for key BRT stations. These plans, with adopted zoning, will set development expectations and ensure that future development is supportive of the transit investment.
- **Station Area Plans** – The SH 7 Corridor offers an opportunity for proactive mobility planning. With these strategies and policies, the identification of planned premium transit service on SH 7 can shape and inform development at the major nodes.

Community Benefits

Much of this report has focused on the potential for TOD or transit-enhanced development. There are numerous other benefits from transit that should be considered. Transit supports many community and economic development objectives in the SH 7 cities as described in this section and summarized in Table 5.

Brighton

One of Brighton's main economic and community development objectives is to revitalize its Downtown. Investment in a BRT project would be compatible with this goal and have some complementary benefits:

- **Park-n-Ride** – There may be an opportunity to better integrate the existing PNR with downtown by either relocating it or improving walkable connections between the PNR and Bridge (SH 7) and Main Streets.
- **Street Improvements** – With advanced planning in constructing the BRT system the City may be able to 'bundle' streetscape, bicycle and pedestrian improvements with the BRT construction. This would result in construction efficiencies and cost savings.

Table 5: BRT Support of Community and Economic Development Objectives

Community	Goal	BRT Role/Benefit
Brighton	<ul style="list-style-type: none"> Revitalize Downtown 	<ul style="list-style-type: none"> Opportunity to reconfigure existing park-n-ride to be better integrated with Downtown and Main Street. Brings more people to downtown to support businesses; increases street vibrancy. Potential to bundle streetscape, bicycle and pedestrian improvements on SH 7 with BRT transit investment for cost savings and construction efficiencies.
Thornton	<ul style="list-style-type: none"> Support economic development at I-25/SH 7 Improve access to jobs 	<ul style="list-style-type: none"> BRT can provide an additional amenity to employment and residential development. BRT will provide Thornton residents with more options to access job opportunities in new and different locations.
Broomfield	<ul style="list-style-type: none"> Support economic development at I-25/SH 7 Improve access to labor 	<ul style="list-style-type: none"> BRT can provide an additional amenity to employment and residential development. BRT will increase access to the skilled Boulder area workforce.
Lafayette	<ul style="list-style-type: none"> Support Downtown and Civic Area Ease congestion; provide commuting options to Boulder 	<ul style="list-style-type: none"> The BRT alternative to Downtown Lafayette best supports these goals. A route limited to SH 7 would provide additional transportation choice, but not in the Downtown.
Boulder	<ul style="list-style-type: none"> Ease congestion Improve access to jobs and labor Address environmental impacts of travel. 	<ul style="list-style-type: none"> Boulder has a long history of transportation policy favoring transit, bicycles, and pedestrians. Boulder also has goals to limit greenhouse gas emissions. Boulder also faces housing affordability and labor force shortage challenges. BRT supports all of these goal/policy areas.

- **Downtown Vibrancy** – A good transit connection will bring more people into Downtown Brighton creating more opportunities for local businesses to capture customers and increasing overall street vitality. Brighton is pursuing several mixed use development projects that will support transit ridership including a 7-story residential loft adaptive re-use project.
- **Labor Force** – As employment in Brighton grows, the City sees a need to expand east-west transit to provide better access to labor from Thornton and Broomfield. In addition, the City is working to attract a younger demographic as the millennial generation in particular seeks locations with good transit, bicycle, and pedestrian facilities.

Thornton and Broomfield

Thornton's primary objective along the SH 7 corridor is to attract jobs – real estate development with a significant jobs component. Less than 10 percent of the City's workforce works in a business located in Thornton. Improving the jobs-housing balance is a priority. Thornton is targeting the SH 7/I-25 area for flex-industrial and R&D development. A component of the recruiting strategy is to attract firms that have outgrown their location in or near Boulder and need more and lower cost space. BRT will provide an additional amenity that improves labor force access along the Corridor.

Broomfield has similar objectives at I-25/SH 7. The North Park development is envisioned as a science and technology park and village with a significant amount of housing. Accessing the Boulder area skilled labor force is important to attracting these types of employers and institutions. Broomfield envisions a broader mix of uses than Thornton, including residential development. BRT will provide better access for the Boulder area skilled labor force. It will also provide an amenity to future residents commuting west or east.

At this location, office and residential development can be concentrated at BRT stations to increase land values and create nodes of higher densities that can be better served with transit. Those uses can be built at higher densities than flex-industrial and R&D.

Lafayette and Erie

Lafayette and Erie are nearing build out and do not have large development opportunities along the SH 7 corridor. Their strategies for SH 7 and transit are therefore different from Broomfield, Thornton, and Brighton to the east.

- **Support Alternative Modes** – Both communities want to expand transportation options including public transit, bicycling, and walking. BRT directly supports the expansion of transportation choice and the environmental benefits of replacing single-occupant auto trips with transit trips.
- **Lafayette Downtown** – Lafayette has an existing park-n-ride on Public Road north of South Boulder Road. This is an important transit hub for the City. If the BRT alternative utilizes this station it would support greater commuting options from the population base in Downtown. This option would sacrifice some travel time through as it requires routing off SH 7 which is approximately one mile to the north. This alternative could support some redevelopment of low density land uses in Downtown Lafayette, possible for new TOD housing.

Boulder

In Boulder SH 7 is Arapahoe Avenue, an area of mixed light industrial, service commercial, office, and residential development. There are several major employers on this corridor including Boulder Community Health, Ball Aerospace, and the CU East Campus. The 29th Street retail area, a newer redevelopment, is at the intersection of Arapahoe and 29th Street. Finally, Boulder Junction is located about 0.6 miles to the north of Arapahoe at 30th and Pearl. Boulder Junction is the City's new (2015) intermodal and transit hub for regional bus and future commuter rail service. It is part of a larger 160 acre redevelopment underway. An alternative for the SH 7 BRT is to serve Boulder Junction.

With a large technology and R&D sector, Boulder is a desirable place to live and work because of the high wages and high quality of life the City has invested in. As a result, the City faces challenges in affordable/workforce housing and transportation to accommodate the influx of workers, as most do not live in the City. A BRT project on SH 7/Arapahoe would support the following City of Boulder initiatives:

- **East Arapahoe Corridor** – The City is currently preparing the East Arapahoe Transportation Plan. It will consider enhancements to bicycle, pedestrian, and transit service including BRT balanced with automobile travel. Part of the overall strategy is to revitalize the corridor and attract more mixed use and higher density development.
- **Labor Force Access** – With approximately 75 percent of the workforce commuting into Boulder, the City has major transportation challenges to manage. Transit, including this BRT project, is an important part of the City's long term economic health.
- **Boulder Junction** – RTD and the City have made a substantial investment in the new intermodal center and surrounding redevelopment. Adding additional regional transit service to this facility further supports the approximately \$18 million invested in the transit components of the Boulder Junction project in addition to expanding transit options in the City.

Safety and Environmental Benefits

Safety and environmental benefits are two major categories of benefits that transportation projects create. EPS made preliminary estimates of the safety and environmental benefits of the proposed BRT system on SH 7. First, transit has a much better safety record than driving. **Driving results in 72 times more fatalities per mile driven than bus transit (US average)**. Shifting 42,000 vehicle miles travelled (VMT) per day (10.9 million/year) to transit results in 2.55 fewer fatalities over 30 years. The Environmental Protection Agency (EPA) estimates the value of a human life at \$9.2 million, which results in **a benefit of \$23.5 million in averted fatalities over 30 years** (Table 6). Lesser injury and property-damage-only accidents have not been included in these figures.

Table 6: Annual Safety Benefits of BRT vs. Automobile Travel

Annual VMT Shifted to Transit	10,920,000 miles
Automobile Related Fatalities [1]	0.790 per hundred million miles
Bus Related Fatalities [2]	0.011 per hundred million miles
Difference	0.779 per hundred million miles
Averted Fatalities per Year	0.09
Averted Fatalities over 30 Years	2.55
Value of a Statistical Human Life	\$9,200,000
Estimated Safety Benefit	\$23,478,437

[1] DRCOG Region average

[2] U.S. average

Source: Economic & Planning Systems

The reduction in automobile emissions from the shift of VMT to transit is also a benefit. In the first year of service, 3,900 metric tons of CO₂ are reduced from cars (not including a small increase from the transit vehicles). The cost of carbon emissions has been valued at about \$50 per metric ton for impacts related to climate change. **The reduction in CO₂ emissions results in a benefit (cost savings) of \$5.7 million over 30 years** (Table 7). Note that the decline in CO₂ reductions over time is due to the average fuel efficiency of vehicles rising over time.

Table 7: Value of GHG Emissions Reduced due to BRT Service

Year	VMT Saved	Metric Tons of CO ₂ Reduced	Value per Metric Ton in 2016 \$ 2.0% Inflation	Benefit
1	10,920,000	3,899	\$47	\$184,735
2	10,920,000	3,813	\$48	184,280
3	10,920,000	3,731	\$49	183,915
4	10,920,000	3,652	\$50	183,637
5	10,920,000	3,577	\$51	183,440
10	10,920,000	3,242	\$57	183,571
15	10,920,000	2,964	\$63	185,327
29	10,920,000	2,461	\$82	203,042
30	<u>10,920,000</u>	<u>2,427</u>	\$84	<u>204,200</u>
30 Year Total	327,600,000	90,593		\$5,666,038

Source: Economic & Planning Systems