City Of Boulder

Transportation Master Plan Update: Renewed Vision For Transit

Final

State Of The System Report

September 2013


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ecoliner
Zero Emissions Electric Vehicle
Foothill Transit

TABLE OF CONTENTS

TABLE OF FIGURES

EXECUTIVE SUMMARY

IN THIS CHAPTER

- **Why transit, why now?**
- **What's included in the State of the System Report**
- **How is the community involved?**
- **What are the key findings?**

EXECUTIVE SUMMARY

Why Transit, Why Now?

Boulder's first Transportation Master Plan (TMP) was adopted in 1989, setting a new course for a community that relies less on the single-occupant vehicle (SOV). Over time, this vision, built on specific policies and goals to reduce SOV travel and manage congestion and mobile source emissions, has been implemented through a strategic program of capital projects and programs designed to change the way Boulder residents, employees, and visitors travel. The result has been the evolution of a complete transportation system that provides safe and healthy travel choices for the community. The TMP remains a strong and valid policy foundation. Over the years, the city continues to make good progress in achieving TMP goals.

However, the city is not on course to meet its TMP transportation goals. Declining transportation revenue, decreased transit service hours, and a growing number of workers commuting[1] to Boulder have heightened the need for a renewed TMP. While Boulder has made remarkable progress encouraging residents to walk, bike, and ride transit, there is still work to be done to meet the City's transportation goals:

- Continued progress toward no growth in long-term vehicle traffic
- Reduce single-occupant-vehicle travel to 25 percent of trips
- Continued reduction in mobile source emissions of air pollutants
- No more than 20 percent of roadways congested at Level of Service F
- Expand fiscally viable transportation alternatives for all Boulder residents and employees, including the elderly and those with disabilities
- Increase transportation alternatives commensurate with the rate of employee growth
- Improve safety
- Enhance neighborhood accessibility
- Reduce vehicle miles traveled (VMT) per capita for residents and in-commuters

The City's work to achieve these transportation and sustainability goals is met with numerous challenges and opportunities. Key among those identified through outreach to the Boulder community and stakeholders are:

- **Changing Demographics:** People are living longer and the Baby Boomers want to age in place; Gen Xers and Millennials tend to want to live in connected urban environments, yet in Boulder the high cost of housing causes many to choose to live outside of the city. The TMP must address the transportation and housing demands of these diverse generations and of Boulder's most vulnerable populations.
- **Emerging Technology and the New Live-Work City:** Technology such as smart phones and high speed mobile wireless internet are enabling people to work anywhere anytime at coffee shops and en route on transit. Providing a transit system that responds to the need for frequent travel (frequency), connectedness (on-board wi-fi), spontaneity (real-time information), and creativity and communication (bus and facility design) are improvements desired by Boulder's younger, working-age residents.
- **The Housing Challenge:** Boulder's high quality of life and natural beauty have affected housing prices. Some people who work or attend school in Boulder are living outside the city.

Why a Renewed Vision for Transit?

- The City is not on course to meet City TMP mode share goals.
- Transit ridership is stagnant.
- Transportation revenue and funding for local transit service in Boulder is declining.
- 80% of Boulder in-commuters drive alone to work; serving this market is essential.
- Over the last decade, RTD has cut service hours in Boulder by 20,500 service hours – the equivalent of the DASH route.
- Boulder continues to see redevelopment; this is anticipated to continue in areas east of 28th Street. Designing transit service to meet the impending needs of East Boulder and improving access and connections to transit is essential to meet community sustainability, climate, and mode share goals.

The HOP bus – the first Community Transit Network (CTN) route – is a community-focused bus with large windows, unique branding, and perimeter seating to encourage social interaction. A Renewed Vision for Transit will build upon the success of the CTN.
Image from the City of Boulder

1 City of Boulder.

The Importance of Place

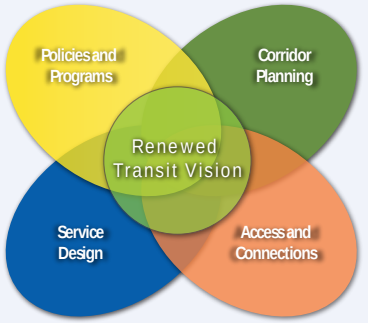
In our attempts to quantify relationships between land use, transportation, and urban design we too often lose the simple message – it's all about the places we create. Improved transportation infrastructure and service increase access to land, which in turn increases travel demand. Since some amount of infill may be desired and important to the economic health of the city and region, the TMP Update must focus on a finer-grained integration of land use with sustainable transport. This integration will help reduce per capita travel demand while improving access to jobs and services, supporting housing affordability, and advancing environmental goals.

- **Emissions:** With transportation contributing over 20% of Boulder's greenhouse gas emissions, success in achieving the goals of the TMP are essential to keeping this contribution from growing. Given the large portion of vehicle fuel-related emissions, the TMP is intimately tied to broader sustainability initiatives, such as the Climate Commitment.
- **Declining Transportation Revenues and Purchasing Power:** Due to increasing costs, stagnating revenue, and decreased purchasing power, the City's ability to operate, maintain, and improve the community's transportation system is eroding. Since 2002, the City has seen a 40% decline in purchasing power, largely due to increasing costs of materials and labor.
- **Growing Public Health Concern:** Obesity and other sedentary-related diseases are plaguing generations – young and old. The research is clear: land use environments and roadway design impact health. People who live in neighborhoods with a mixture of uses within comfortable walking distance are 7% less likely to be obese, lowering their relative risk of obesity by 35%.[2] On the other hand, every additional 30 minutes spent daily in a car correlates to a 3% greater chance of obesity.[3]

The Renewed Vision for Transit will focus on developing a complete transit system – a network of high-quality, frequent transit routes that connect local destinations and neighborhoods to regional destinations. More than just a service plan, the Renewed Vision for Transit will focus on transit supportive programs and policies, corridor planning, service design, and improved access and connections that make transit a first choice of travel for more Boulder residents, workers, and visitors.

The Renewed Vision for Transit will be integrated with the overall TMP Update, community sustainability goals, and the Climate Commitment. The final Renewed Vision for Transit report will provide a strategic action plan for wise investment in transit over time within financial constraints. Consistent with broader TMP goals and regional climate and sustainability objectives, the goal of the Renewed Vision for Transit is to:

- **Put the passenger first:** make transit easy and comfortable to use for people of all ages and all abilities
- **Make transit a convenient choice of travel:** focus on service quality by connecting local and regional destinations and improving bicycle and pedestrian access to transit
- **Use transit to build community:** improve access and connectivity to transit and build transit facilities to support central community gathering places
- **Improve transit service and ridership through regional partnerships:** work with neighboring jurisdictions to improve access to transit and increase regional transit ridership
- **Reduce the environmental impacts of travel:** use transit to support the Sustainability Framework and Climate Commitment goals



A renewed transit vision will help Boulder meet the Transportation Master Plan (TMP) mode share goal of 75% non-SOV travel by 2025.
Image from Nelson\Nygaard

The Renewed Vision for Transit is just one element of the five TMP Update focus areas:

- **Complete Streets:** Renewed vision for transit and bicycle and pedestrian innovations
- **Regional Travel:** Regional corridors, including bus rapid transit on US 36
- **Funding:** Sustainable and local funding sources, including a Transportation Maintenance Fee
- **Transportation Demand Management:** Community-wide Eco Pass and parking policy
- **Integration with Sustainability Initiatives:** Integrate TMP outcomes with the Climate Commitment , economic vitality, Sustainable Streets and Centers, parking management, Parks Master Plan and Boulder Civic Area Plan

2 "Driving, Walking, and Where You Live: Links to Obesity." McCann Consulting. (accessed June 15, 2013).

3 Ibid.

What's Included in The State of The System Report?

The State of the System report communicates key transportation issues and trends, while also serving as a foundational report to guide the Renewed Vision for Transit. While this Executive Summary provides key findings from the report, the complete report includes the following chapters:

- **Chapter 1 Renewed Vision for Transit –** an overview of the TMP Update and its focus on a Renewed Vision for Transit.
- **Chapter 2 Our Challenge, Our Chance –** a summary of community feedback and direction on the issues and driving forces that will shape Boulder's transit future.
- **Chapter 3 Land Use and Travel Demand –** a brief summary of land use patterns in Boulder, an assessment of Boulder's transit-oriented land use patterns, and an overview of current and future travel demand.
- **Chapter 4 Transit Service –** an overview of existing transit service providers, funding, and performance in Boulder.
- **Chapter 5 Peer Review –** an assessment of transit performance in Boulder compared to a number of peer communities in the U.S.
- **Chapter 6 Transit Innovations and Leading Practices –** an overview of leading transit innovations in the U.S. and internationally.
- **Appendix A: Detailed Route Profiles –** detailed route profiles for Boulder's existing local and regional routes.
- **Appendix B: Community Outreach Summary –** a detailed community outreach summary.[4]

4 The Community Outreach Summary includes outreach completed to date. The final version of the Outreach Summary will be completed at the end of the planning process.

How is the Community Involved?

The Renewed Vision for Transit is guided by a robust community outreach process, including a Technical Advisory Committee, a Community Feedback Panel, online and social media tools, open houses, and storefront workshops.

- **Transit Technical Advisory Committee (TAC):** The TAC is comprised primarily of technical staff from local and regional policy, agency, and key community stakeholders, such as transportation staff from City of Boulder and Boulder County, Regional Transportation District, the Director of the Chamber of Commerce, University of Colorado representatives, and local Transportation Management Organizations.
- **Stakeholder Interviews:** Interviews are being held with key stakeholders throughout Boulder County, including the University of Colorado, the Center for People with Disabilities, the Regional Transit District, among others.
- **Community Storefront Workshops:** Storefront workshops provide feedback on transit and other mobility issues, especially from transit users. The workshops are held in different geographic locations to ensure participation from a range of people, and on the principle that it is important to bring outreach feedback opportunities to people as they go about their daily lives.
- **Design Your Transit System Online Tool and Questionnaire:** The project team developed a "Design Your Transit System" online decision-making simulation tool. This new outreach strategy walks participants through a series of visually oriented exercises to better understand which elements of system design are most likely to attract new riders and improve the quality of experience for existing and new users. View the online tool at www.bouldertransitdesign.com.
- **Inspire Boulder:** Questions are posted to Inspire Boulder, the City's online community forum, to get feedback on key transit service issues and opportunities.Visit Inspire Boulder at www.inspireboulder.com.

The Design Your Transit System online tool allows the community to prioritize transit investments.
Image from Nelson\Nygaard

- **Community Feedback Panel:** The Community Feedback Panel is a group of interested members of the public who have volunteered to be queried on TMP-related issues. Approximately 400 people signed up for the Panel. The panel is called upon throughout the process to provide input on the Design Your Transit System Tool and the long-term transit scenarios.
- **Transportation Advisory Board (TAB):** The TAB is the host of the Transportation Master Plan Update and has been engaged throughout the process with monthly updates.

Key findings from the community outreach process, in addition to the technical analysis of the State of the System Report, are summarized below.

What's our challenge?

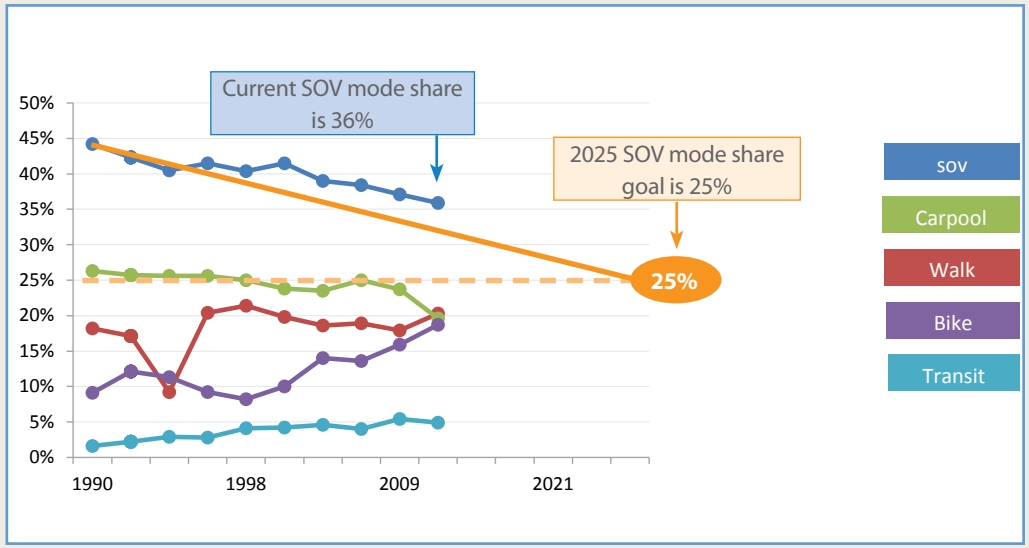
The City has aggressive mode share goals

The 2008 TMP includes a goal of 25% single-occupancy vehicle (SOV) use by the year 2025 for all trips. As shown in Figure ES-1, Boulder is not on course to meet this goal. Since 1990, the SOV rate has declined from 44.2% to 35.9% in 2012 for all trips. Bicycle use has more than doubled during this time from 9.1% to 18.7% in 2012. While transit use has more than tripled in the 12-year period, growing from 1.6% in 1990 to 4.9% in 2012, transit has the lowest share of all modes and has stagnated in recent years. To meet the SOV goal by 2025, SOV trips between 2013 and 2025 would have to be reduced at an average rate of 2.5% per year.

Average daily weekday transit ridership peaked in Boulder in 2008 at 33,919 rides (local and regional routes) (Figure ES-2). Between 2008 and 2010, ridership declined, dropping to 30,428 total rides in 2010. Since 2010, bus ridership is driving back toward the City's 10-year high at 32,636 rides in 2012. One of the key outcomes of the renewed vision for transit will be to:

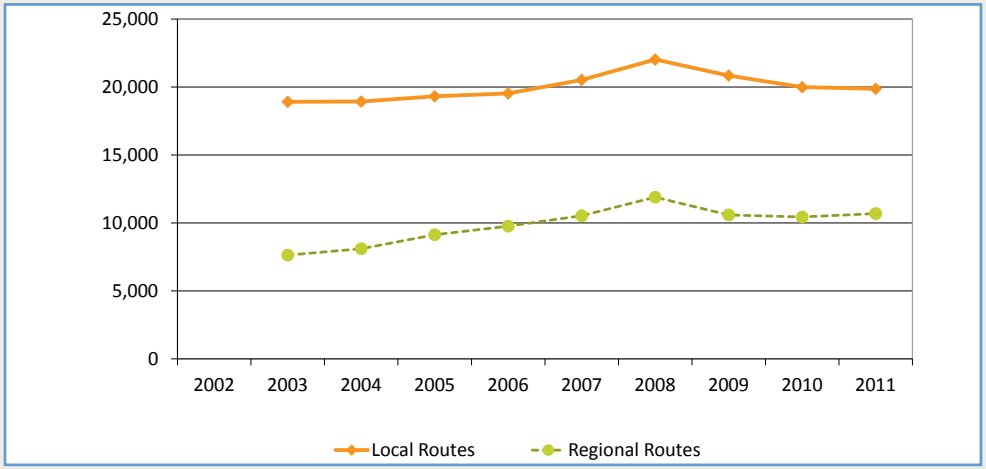
- Increase transit ridership for both local and regional trips (particularly commute trips)
- Continue to build a convenient, attractive and effective transit network that enhances the multimodal transportation syystem

Figure ES-1 City of Boulder Mode Split for All Trips, 1990–2012



Source: City of Boulder Modal Shift in the Boulder Valley, 1990 – 2012

Figure ES-2 City of Boulder Average Weekday Daily Transit Ridership, 2003–2012



Source: Data is from 2012 RTD Annual Ridership Data; HOP data was provided by the City of Boulder; Climb data was provided by Via; YL data was provided by Boulder County

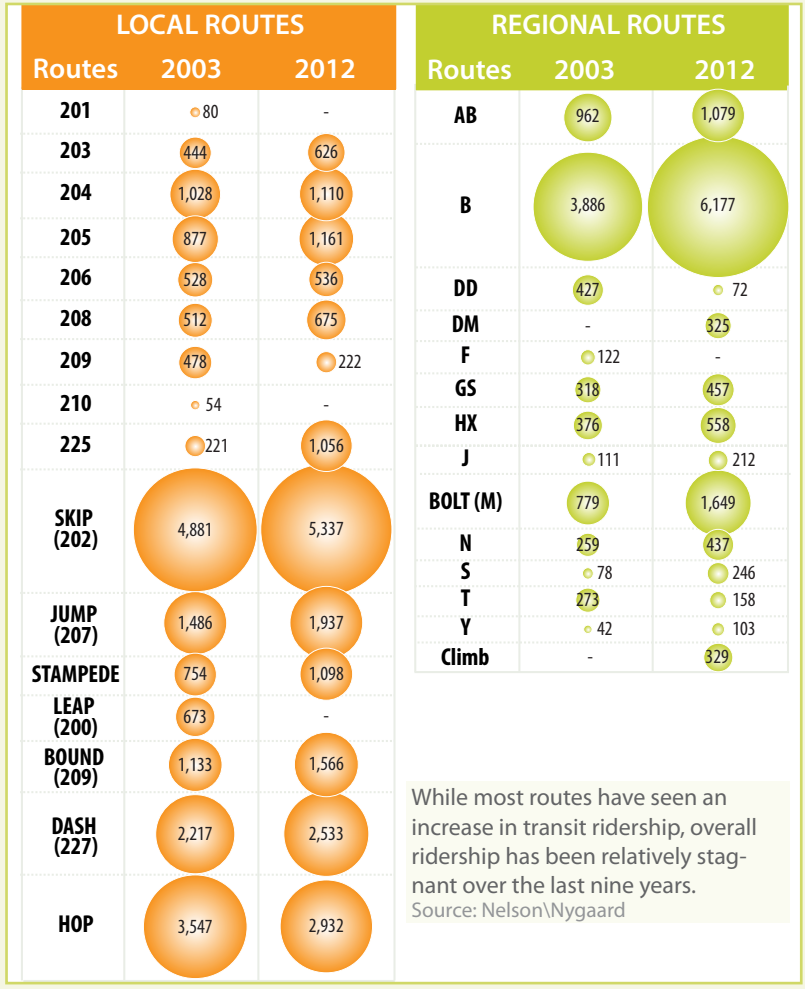
What's working well?

The CTN model works

The Community Transit Network (CTN) routes, particularly those operating largely in Boulder, are both the most cost-effective and productive routes in the transit system serving Boulder County. On Boulder local routes, ridership is highest on the SKIP, HOP, and DASH, while the B to Denver has the highest regional boardings (Figure ES-3).

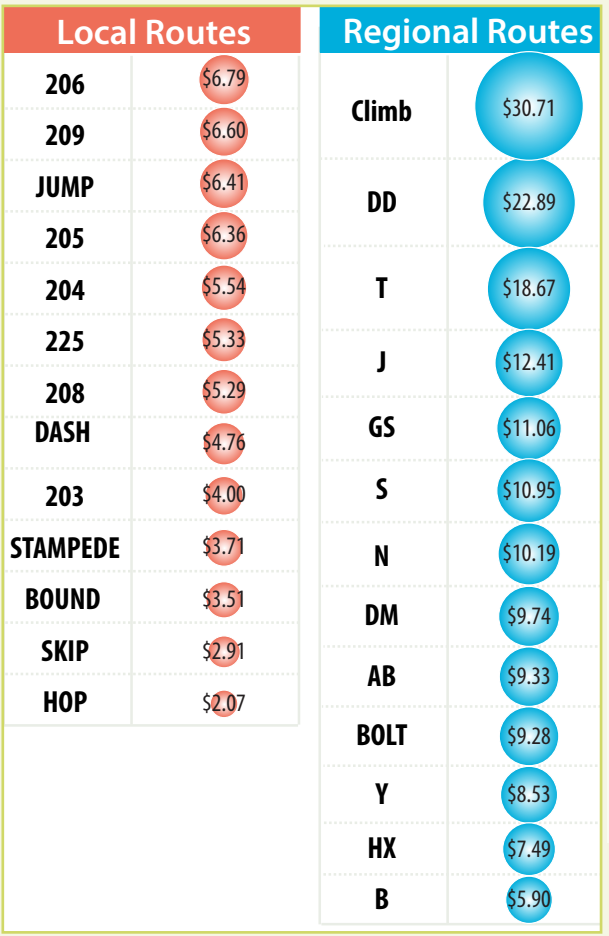
The HOP is the most cost-effective local Boulder route at only $2.07 per passenger trip carried, followed by the SKIP and BOUND (Figure ES-4). The B is the most cost-effective regional Boulder route at $5.90. By comparison, the systemwide RTD average cost per boarding for local routes not including Boulder is $4.81; the systemwide RTD average for regional routes not including Boulder is $12.25.

Figure ES-3 Average Weekday Ridership by Route, 2003 and 2012



While most routes have seen an increase in transit ridership, overall ridership has been relatively stagnant over the last nine years.
Source: Nelson\Nygaard

Figure ES-4 Cost Effectiveness (Cost per Boarding) of Boulder Local and Boulder Regional Routes



Note: RTD systemwide average is $4.43 per boarding.

Cost per boarding is a common metric used to measure the efficiency of transit service. The local CTN routes (namely the HOP, BOUND, SKIP) provide the most cost-effective service (cost per boarding).
Source: Nelson\Nygaard

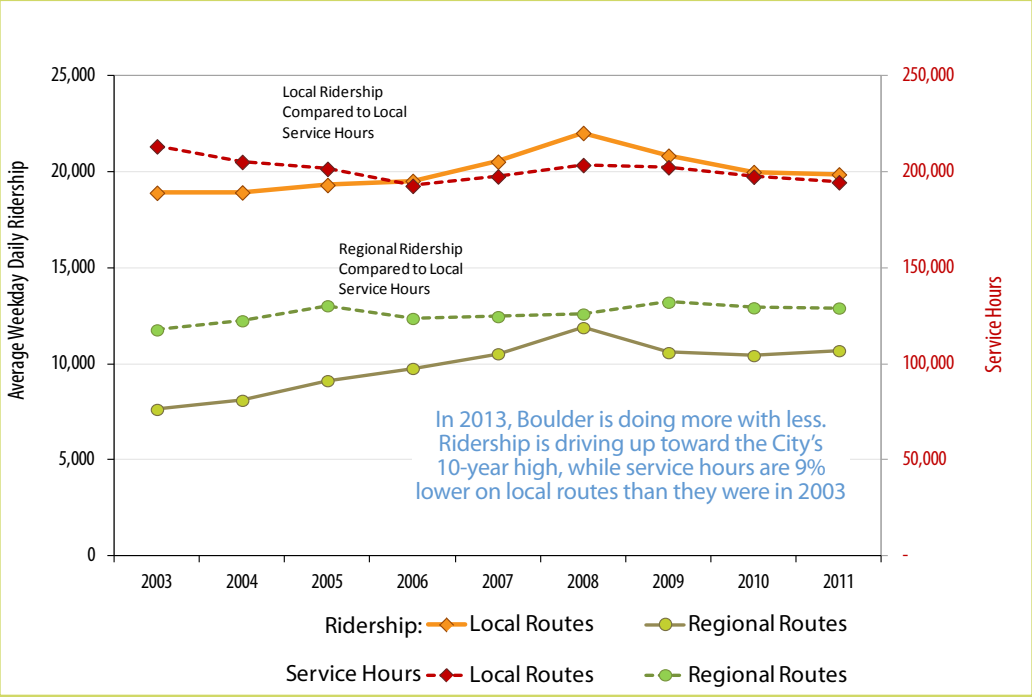
What's working well?

Boulder is doing more with less

Although ridership has experienced a slight decline since 2008, the productivity of the transit system has improved. In 2012, Boulder is doing more with less. ***Ridership is driving back toward a 10-year high, while service hours are 9% lower on local routes than they were in 2003.*** While these trends indicate a more efficient transit system, in some cases, higher ridership with lower service hours results in very crowded buses.

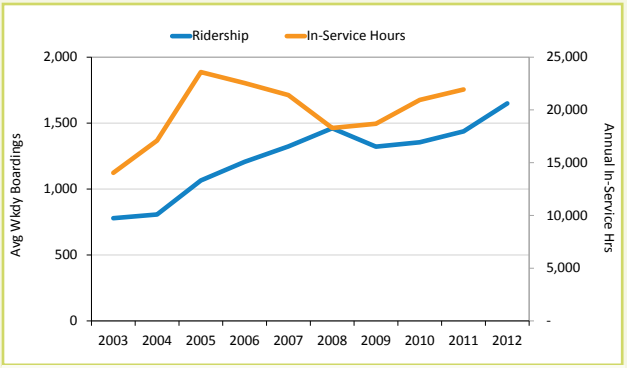
Some regional routes that only have Boulder and one other community as end points, such as the BOLT (Figure ES-6), have shown great resiliency to the recession and have a promising ridership projection.

Figure ES-5 Average Weekday Ridership Compared to In-Service Hours, 2003–2012



Source: Data is from 2012 RTD Annual Ridership Data; HOP data was provided by the City of Boulder; Climb data was provided by Via.

Figure ES-6 BOLT Ridership History, 2003–2012



The BOLT provides service between the Boulder Transit Center and Longmont. Regional routes that only have Boulder and one other community as end points have shown great resiliency to the recession and better ridership history than other regional routes.

Source: Nelson\Nygaard

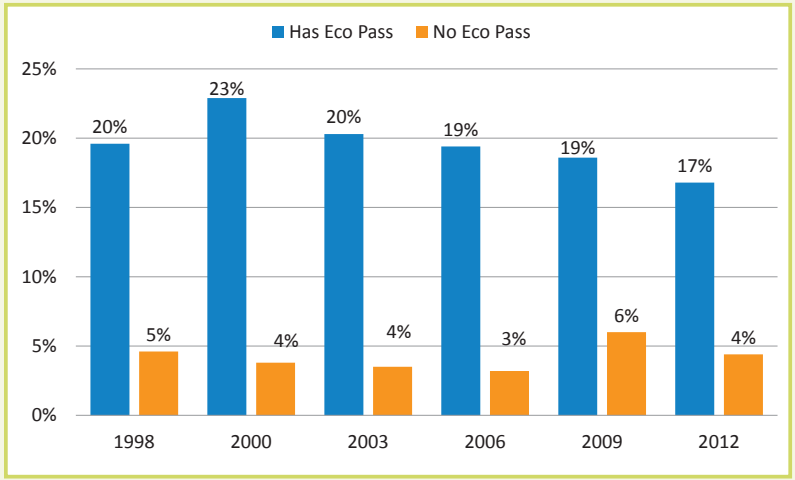
What's working well?

The City's transportation demand management programs work

The City of Boulder has a long and successful history of managing parking and transportation in downtown Boulder, the University of Colorado, and surrounding neighborhoods. In 2012, $773,750 in downtown parking revenue was used to fund Eco Passes for 6,190 downtown employees. ***Surveys show that people with an Eco Pass are 4 to 7 times more likely to ride transit*** (Figure ES-7). Areas with paid parking districts – downtown and the University – have also proven to have higher transit ridership than other areas of the city (due to paid parking, among other reasons) (Figure ES-8).

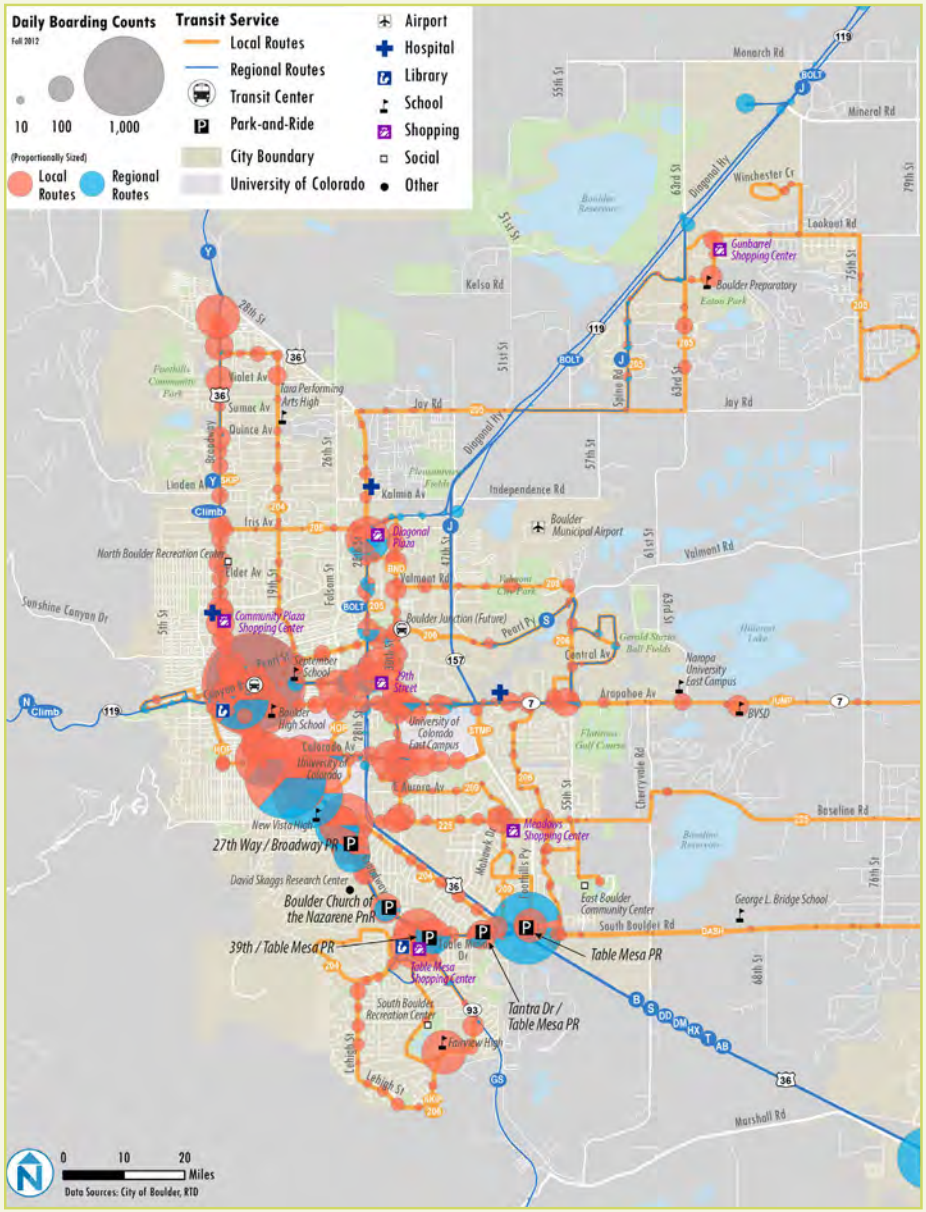
Community-wide parking management strategies and expanded parking districts will be examined to help the City meet TMP mode split goals and reduce single occupant commuting to new job centers in East Boulder. An expanded Eco Pass program is also being examined to meet mode split goals, particularly in areas of opportunity (e.g. East Boulder).

Figure ES-7 Bus Ridership by Eco Pass Status: Percent of Respondents Who Made at Least One Trip per Week on the Bus, 1998–2012



Source: City of Boulder Modal Shift in the Boulder Valley, 1990 – 2012

Figure ES-8 Average Daily Ridership in Boulder and Boulder County



What are the barriers?

The in-commute is growing

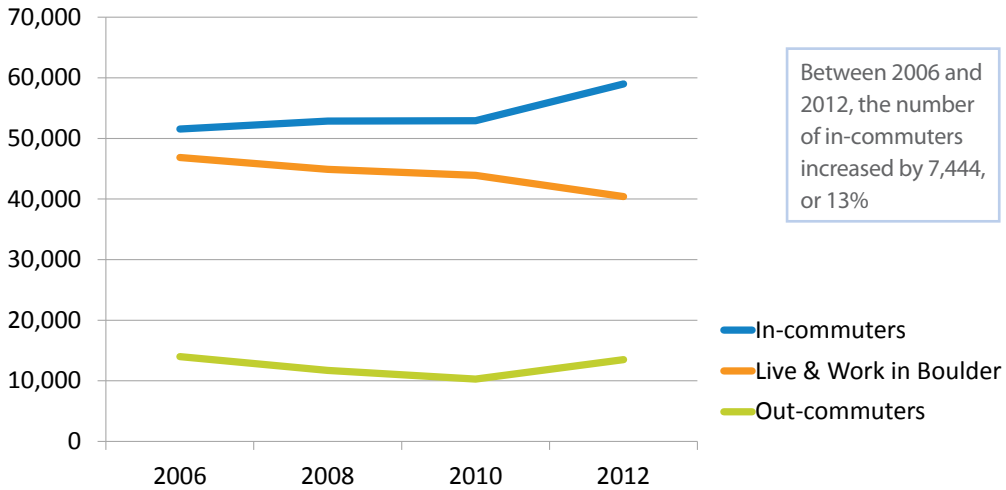
High housing costs and limited availability of housing in Boulder combined with a strong and growing job base have increased the level of in-commuting in recent years. Although still only a small percentage of overall travel in Boulder, the in-commute is growing. Approximately 59% of Boulder workers are estimated to travel into Boulder for work. While Boulder has achieved a remarkably low SOV mode share for local travel (48.5% for commute trips), in-commute travel remains primarily SOV at nearly 80% (Figure ES-10). Between 2006 and 2012 the number of Boulder workers commuting from outside of Boulder increased by 7,444 commuters, or 13%. This trend is expected to increase (Figure ES-9).

As Boulder adds more jobs, an increasing percentage of the population is expected to live in east Boulder County, Weld County, and along the US 36 Corridor. In addition to making sure that more existing and future workers have the housing options to live and work in Boulder, success in reducing SOV travel among "in-commuters" will require key partnerships between Boulder, Boulder County, RTD, CDOT, and neighboring communities *(see the Regional Partnerships are Key section on page ES-15)*.

Addressing the needs of long-distance commuters in the Boulder Valley will also be expensive compared to addressing local travel needs. The TMP Update will explore the most appropriate balance of investments in local and regional service enhancements.

Commute traffic on US 36 is already an issue. With projected increases in population and employment along the US 36 corridor between Boulder and Denver, traffic volumes are projected to increase dramatically over the next two decades (see page ES-14 for more details).
Image from Nelson\Nygaard

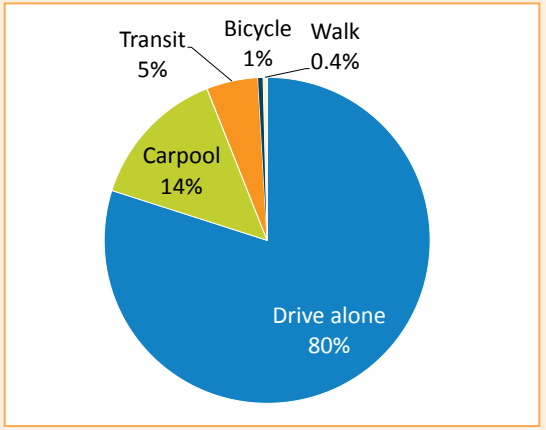
Figure ES-9 Growth in Boulder In-Commute, 2006 – 2012



Between 2006 and 2012, the number of in-commuters increased by 7,444, or 13%

Between 2006 and 2012, the percent of Boulder workers living outside of Boulder increased from 52% to 59% of total workers. It should be noted that this data includes commute trips only; it does not account for students traveling to school. Between 1993 and 2009, the percent of University of Colorado students living outside of Boulder also increased from 15% of undergraduates in 1993 to 41% in 2009 (not including students living on campus.
Source: City of Boulder

Figure ES-10 Boulder In-Commute Mode Share



Source: Census Transportation Planning Products (CTPP). 2006 – 2008 American Community Survey "Journey to Work," University of Colorado.

Note: In-commute data is not available for communities with fewer than 20,000 residents. For example, employees from the following communities in Boulder County traveling to Boulder for work were not counted: Jamestown, Louisville, Lyons, Nederland, Ward, Superior, and Erie.

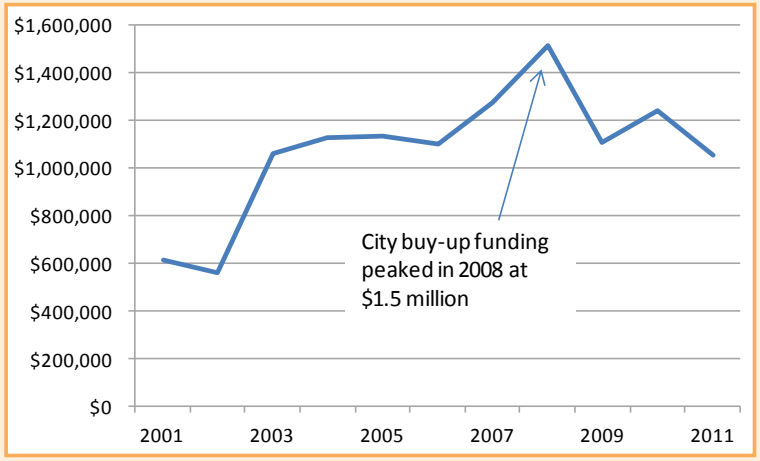
What are the barriers?

Transportation revenue and purchase power are declining

Like many jurisdictions nationwide, Boulder is faced with the challenge of stagnant revenue, cost escalation, and decreasing purchase power to invest in its transportation system. The City has identified a 40% decline in purchase power since 2002 coupled with stagnant sales tax revenue that has resulted in a growing funding gap (Figure ES-13). In 2013, the City identified a total annual funding gap range of $3.2 million to $5.6 million for three key areas of transportation operations and maintenance: (1) pavement maintenance, (2) routine maintenance, and (3) transit/Eco Pass service support. Transit service and Eco Pass support are estimated to experience a funding gap of $700,000 annually.

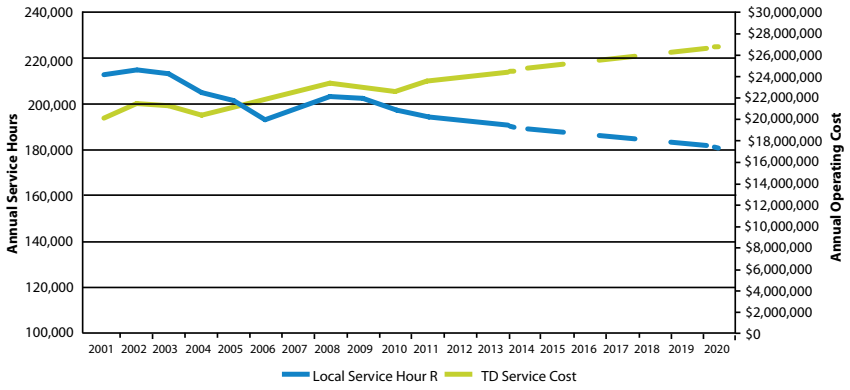
In addition to the City's funding gap, RTD has not provided 10-minute frequencies on all Community Transit Network routes; its capacity to do so continues to diminish as RTD service costs increase (Figure ES-12). While the City has historically funded the HOP route (together with RTD and CU) and buy-up service on the JUMP and BOUND, its capacity to continue to buy-up service is also diminishing (Figure ES-11). City buy-ups in transit service peaked in 2008 at $1.5 million; in 2011, the City's investment had declined to $1.1 million. This decline is expected to continue given the funding gap noted above. To meet TMP mode split goals, increased and sustainable funding sources are needed.

Figure ES-11 City Transit Buy-Up History, 2001–2011



Source: City of Boulder

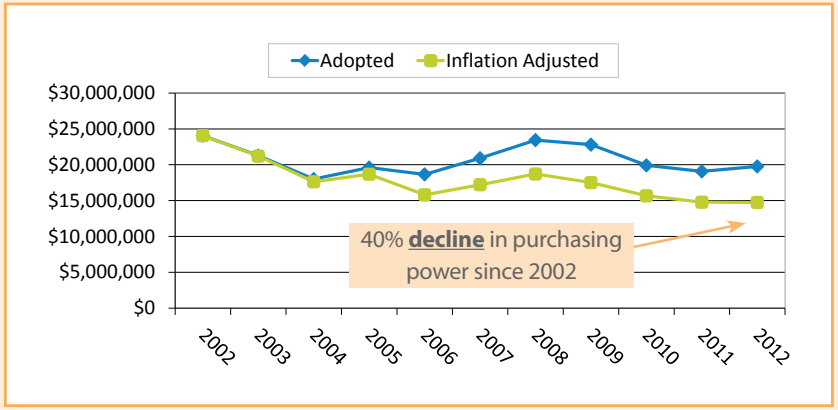
Figure ES-12 Projected RTD Service Costs vs. Hours (2001–2020)



RTD service hours are declining, while costs to maintain or increase service are increasing. This trend is expected to worsen.

Source: City of Boulder

Figure ES-13 City of Boulder Adopted Transportation Budget



The City of Boulder estimates a 40% decline in purchasing power from 2002 forward.

Source: City of Boulder

What are the opportunities?

Focus on areas of opportunity

Given that west Boulder is largely built out, most planned development will occur in Boulder Junction, Boulder Community Hospital Foothills Campus, the University of Colorado East Campus, and in Gunbarrel. By 2035, population is estimated to increase by only 2,000 residents west of 28th Street while it is estimated to increase by more than 8,000 residents east of 28th Street. Similarly, only 1,000 dwelling units are anticipated west of 28th Street by 2035, while over 4,000 new units are anticipated to the east. Employment is also projected to increase more east of 28th Street (7,500 employees will be added west of 28th Street compared to 8,700 employees east of 28th Street).[6]

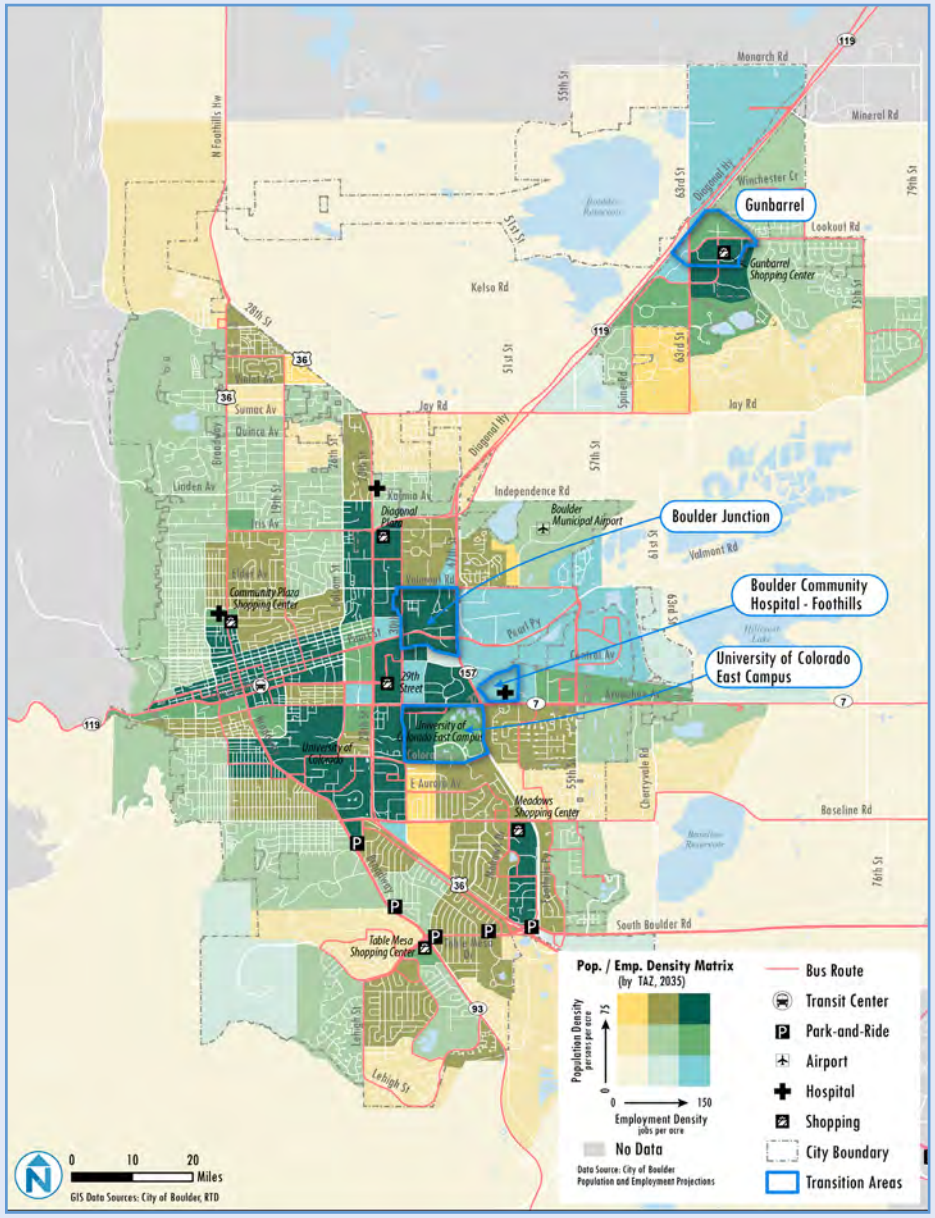
The TMP Update, is focused on these transitioning areas as primary opportunities to create great places that are walkable, sustainable, and economically vital. Focus will also be given to areas where transit investment can be maximized by supporting efficient land use.

The Renewed Vision for Transit will also explore opportunities to make cost effective transit enhancements to the entire existing system, including downtown, at the University of Colorado, and in other areas.

The Boulder Community Hospital is in the process of consolidating the majority of its inpatient acute care services at the Foothills campus on the corner of Foothills Parkway and Arapahoe Avenue. This new development will add a significant number of employee and visitor trips to the area.

Population and employment growth is expected to be concentrated around the University, in East Boulder, and in Gunbarrel.
Source: Nelson\Nygaard

Figure ES-14 Future Land Use and Key Development Areas in 2035



6 City of Boulder Population and Employment Projections.

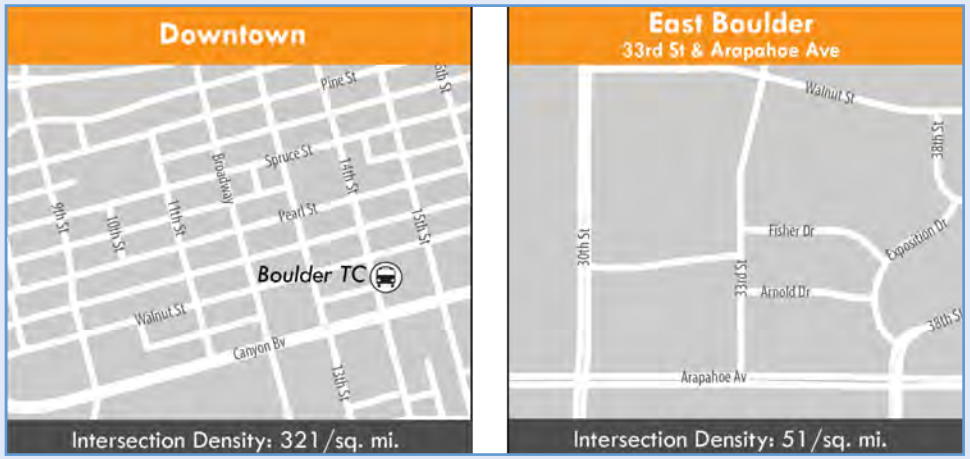
What are the opportunities?

Boulder is a 'Tale of Two Cities'

Boulder's evolution is often described as a "tale of two cities." The west side of Boulder developed in a more traditional highly connected grid and development pattern of smaller, walkable blocks. East Boulder is characterized more by its "super blocks," with an orientation towards the automobile, large blocks, and a less walkable grid development pattern.

For all modes to succeed in East Boulder, significant investments will be needed to develop an interconnected street network with bicycle and pedestrian access to key transit corridors, mix of land uses, and strong anchors with all-day transit demand. As shown in Figure ES-15, street connectivity is much lower in East Boulder. While downtown has a connected street system with high intersection density (number of intersections per square mile), blocks are long and scattered in East Boulder making walking, biking, and accessing transit more difficult.

Figure ES-15 Intersection Density in West vs. East Boulder



Intersection density is a good measure for street connectivity and walkability. In downtown, there are 321 intersections per square mile, whereas east Arapahoe between 30th Street and Foothills Parkway only has 51 intersections per square mile.
Image from Nelson\Nygaard

On Arapahoe Avenue in East Boulder, the sidewalk ends abruptly in a commercial shopping area.
Image from Nelson\Nygaard

Pearl Street Mall in downtown Boulder provides a mixed-use walkable environment.
Image from Flickr beautifulcataya

What are the opportunities?

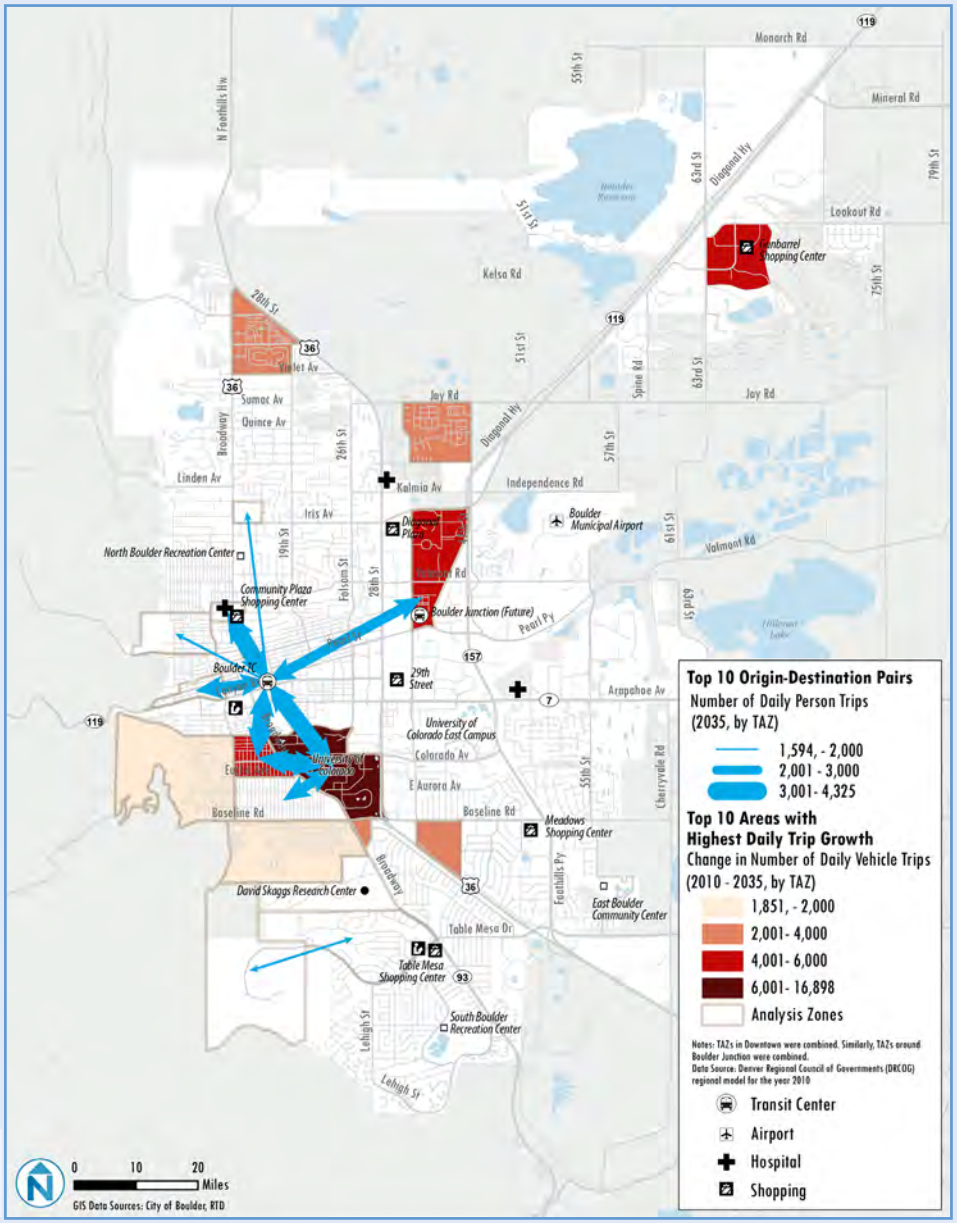
Boulder Junction and East Boulder redevelopment will affect demand

Boulder Junction will be a new complete neighborhood and destination in Boulder and provide important regional and local transit connections. A new regional transit center will be located underground on the site, allowing a broad pedestrian plaza to be developed. Figure ES-16 shows the top ten projected origin-destination pairs in the city. Trip projections from the regional model estimate that the connection between Boulder Junction and downtown and the University of Colorado and downtown will be significant. Many of these projected trips will move through Boulder Junction en route to other areas via regional transit transfers. As a regional hub and the end of the future US 36 bus rapid transit (BRT) line scheduled to open in 2016, Boulder Junction and additional development in East Boulder will create significant new demand for transit. These changes in demand will need to be considered when early action items for transit service changes are developed, and also incorporated into the Renewed Vision for Transit. Completing missing bicycle network connections will be key to connecting this area to the rest of the city.

Boulder Junction will be a new transit center.
Image from Nelson\Nygaard

Trips between the University of Colorado and downtown are projected to be among the highest in the city in 2035.
Source: Nelson\Nygaard

Figure ES-16 Top 10 Origin-Destination Pairs and Areas of Trip Growth, 2035



What are the opportunities?

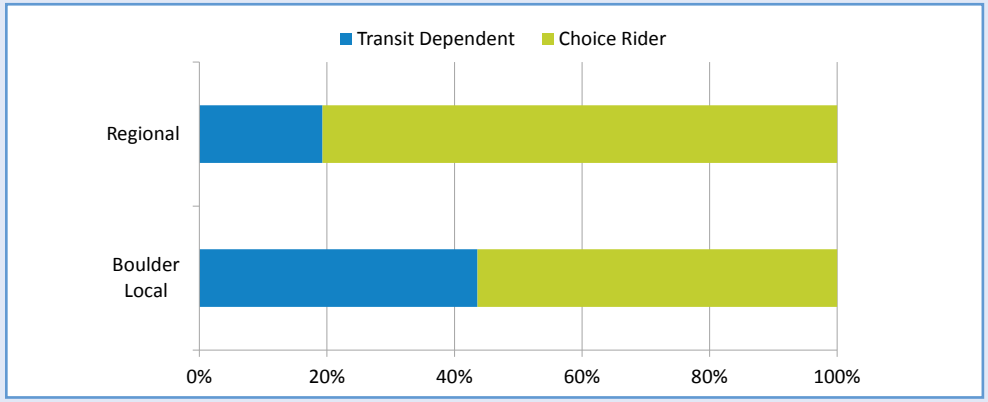
Changing demographics are shaping transit needs

Three generations will be most influential in shaping Boulder's future transit demand. These include Baby Boomers (born 1946-1964), Generation X (1961-1984), and Millennials (1977-2003). Together, these generations represent over three-quarters of Boulder's total population.[7] There is also a continued need to design transit for people with disabilities who are living with significant mobility challenges and are unable to use fixed route transit. As Boulder develops its Renewed Vision for Transit, it will be critical to consider the following trends:

- Nationally, it is estimated that one out of five people aged 65 and older do not drive.[8] In Boulder, this translates to over 1,700 seniors who do not drive. Transitioning older adults to fixed route transit can reduce expensive paratransit costs.
- RTD estimates that over 40% of bus riders in Boulder are "transit dependent," meaning they do not have access to a vehicle, have a disability or impairment that prevents vehicle operation, or do not possess a valid driver's license (see Figure ES-17).[9]
- As the older population grows, the need for paratransit service will also grow. The number of paratransit trips provided in Boulder in 2012 represents a 16% increase over 2011. According to the 2010 Census, the population of older adults and people with disabilities in Via's service area is expected to grow 95% between 2010 and 2025, from 12,463 to 24,365.[10]

An older woman crosses Arapahoe Avenue in east Boulder in front of the Boulder Community Hospital Foothills Campus.
Image from Nelson\Nygaard

Figure ES-17 Transit Dependent Riders and Choice Riders for Local and Regional Riders



Source: 2011 RTD Customer Satisfaction Survey

Via Mobility Services provides accessible transportation for seniors and people with disabilities residing in Boulder County.
Image from Nelson\Nygaard

7 U.S. Census 2010.
8 Bailey, Linda. 2004. Aging Americans: stranded without options. Washington, DC: *Surface Transportation Policy Project.*
9 RTD. 2011. RTD Customer Satisfaction Survey.
10 Getting There Collaborative. 2005. Analysis of Colorado's Human Service and Public Transportation Needs.

What are the opportunities?

US 36 BRT is an opportunity to improve regional mobility

According to regional forecasts, the population along US 36 is expected to increase 28%, employment will expand 53%, and traffic volumes are projected to increase substantially over the next 15 years. Between 2010 and 2012, traffic along the corridor has increased 1.4%.[11]

As part of FasTracks – the region's multi-billion dollar transit expansion plan – 18 miles of bus rapid transit (BRT) service will be launched between downtown Denver and Boulder Junction along US 36 to help respond to this growing population and the increasing numbers of employees commuting into Boulder for work.

As seen in numerous case study examples, new BRT service typically leads to significant ridership increases due to improved amenities and faster service. To be effective, US 36 BRT will need to provide efficient, reliable, and comfortable service for travelers. For the service to work well for those traveling to and from Boulder, local routes will need to be restructured to get people to and from BRT stations. The introduction of "fully-featured" BRT service on US 36 will also be an opportunity to generate momentum for extending BRT and transit lane enhancements into the city (e.g. on Broadway) and along other important regional corridors.

11 US 36 Mobility Report.

Figure ES-17 US 36 BRT Corridor

US 36 BRT and commuter bikeway will provide 18 miles of service between downtown Denver and Boulder Junction along US 36.
Source: RTD

US 36 BRT could generate momentum for extending BRT and transit lane enhancements within the city.
Image from Nelson\Nygaard

What are the opportunities?

Regional partnerships are key

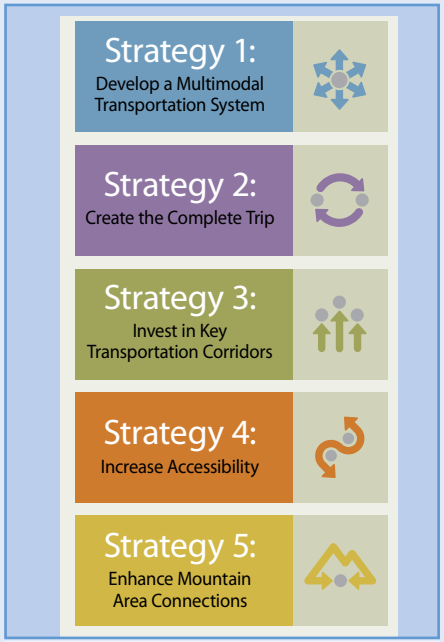
Boulder County and the City of Boulder have aligned their transportation and land use goals. The recent Boulder County Transportation Master Plan directs the region to focus access and mobility policies on non-single occupancy vehicle (SOV) modes of travel, with transit being a backbone to creating sustainable land use and transportation patterns countywide. Neighboring communities like Fort Collins are leading the way in transit innovations with the implementation of a bus rapid transit system (BRT) – the first BRT system in the Front Range. The US 36 First and Final Mile Study sponsored by US 36 Commuting Solutions also highlights opportunities to integrate regional bikeways and trails, transit routes, and open space to address first and final mile connectivity.

Regional partnerships will be critical to address the growing regional in-commute issues as a top priority for the TMP Update. Success in reducing SOV travel for in-commute trips will require an active stance from Boulder, new fare tools, strong partnerships with RTD and others, and new funding sources to grow service offerings.

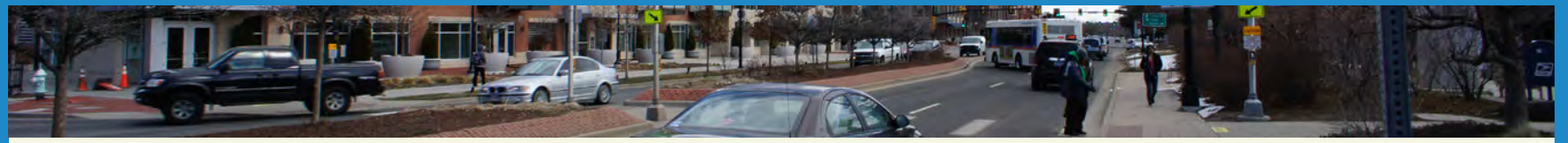
Setting a mode share target for in-commuters could be an important step for the Colorado Department of Transportation, the City of Boulder, and Boulder County, but will need to be set in concert with regional partners and a regional mode share goal.

Boulder County's Bus then Bike program is installing covered secure bike parking at key transit stops in Boulder County.
Image from 303 cycling

Fort Collins will launch the Front Range's first BRT system in Spring 2014.
Image from City of Fort Collins



The Boulder County Transportation Master Plan prioritizes five key strategies to improve transportation in the region.
Source: Boulder County Transportation Master Plan (2012)



Report Summary

This section provides a brief overview of the conclusions and next steps from each chapter in the State of the System report.

Chapter 2 provides an overview of Boulder's challenge to develop a Renewed Vision for Transit, including key issues and opportunities identified by the community outreach process and trends that influence transit design. Based on the findings in Chapter 2, the Transit Plan will focus on the following:

- **Mode split:** Identify strategies to continue improvement in transit mode share, helping Boulder reach its TMP mode share target.
- **Build on the CTN model:** Explore opportunities to expand the Community Transit Network (CTN), increase the number of regional transit connections, and integrate Bus Rapid Transit (BRT) on key corridors.
- **Information and education:** Explore opportunities to improve customer information, travel training, and peer-to-peer transit use mentoring.
- **Respond to changing demographics:** Design transit for changing demographics, including the elderly, the disabled, families, young professionals, and students.
- **Focus on the in-commute:** Explore opportunities to decrease the drive-alone rate of in-commuters.
- **Focus on potential redevelopment and infill areas:** Identify strategies to serve areas with transit, manage parking, and ensure development is pedestrian, bicycle, and transit friendly.
- **Focus on funding opportunities:** Explore opportunities to increase local funding for transit.
- **Integrate with climate work:** Integrate the Renewed Vision for Transit with Climate Commitment and Sustainability Framework.
- **Work with Partners:** Identify opportunities for Boulder to work with regional partners to enhance transit service levels and quality.

Chapter 3 provides an overview of land use and travel demand in Boulder – key factors that will influence the future of transit use in the city and region. Based on the findings in Chapter 3, the Renewed Vision for Transit will focus on the following:

- **Transit Supportive Land Use:** Identify opportunities to create well connected, compact urban form on blocks closest to the community core or transit network to support high frequency transit service.
- **Increase Transit Mode Share:** Although Boulder has been successful increasing walk and bicycle mode share, while transit has remained stagnant. A key desired outcome of this plan is to increase transit mode share in the short-term and over the plan period.
- **Regional Partnerships:** Explore opportunities to continue to build effective regional partnerships to address the growing in-commute.
- **Focus on Areas of Opportunity:** Identify integrated transportation and land use strategies to accommodate the growing population and employment that is projected at Boulder Junction, CU east campus, around the Boulder Community Hospital on Arapahoe, and in Gunbarrel.
- **Anticipate Projected Demand:** Population and employment are projected to grow considerably over the next 20+ years (12% and 19% respectively). When developing transit alternatives consider projected trip patterns resulting from growth, and transit needs – both fixed route and demand responsive – resulting from areas with increased concentrations of youth, elderly populations, low-income residents, and carless households.
- **Housing Affordability:** In partnership with the Comprehensive Housing Strategy, explore opportunities for transit to improve overall affordability for Boulder residents and workers.

Chapter 4 provides an overview of transit service in Boulder. As the update to the TMP moves ahead, there are areas of need that should be considered further during the development of the Renewed Vision for Transit and short-term service recommendations:

- **Focus on land use:** Land use activity in east Boulder is reaching a point that justifies attention in how the CTN is structured and how it embraces that activity. Some of the issues related to this are a factor of the route network, while others address the need for access to new or growing destinations.
- **Fill in missing connections:** In the northwest part of Boulder, there is a lack of east/ west connectivity. For example, to get from a location on north Broadway to a grocery store on 28th Street, passengers have to travel downtown first, then back north. In the northeast part of Boulder, the IBM plant and the employment in Gunbarrel is underserved. Buses may be only part of the solution for such campus settings, as employees likely travel from many parts of Boulder County.
- **Transit System Branding:** The named routes and service buy-up has been a successful model for Boulder. But the local network includes some numbered routes and some routes that are "officially" part of the CTN, based on being named (and meeting CTN service levels). The mix and match nature of the network, how residents perceive the various routes, and how that impacts ridership response needs further investigation.
- **Focus on Boulder County:** Factors for success in increasing transit ridership between adjacent communities should be investigated further, assessing how the same root motivators used to increase transit ridership in Boulder can apply to regional routes. This assessment should evaluate the need to provide expanded or new park-and-ride facilities in some of these communities. While these facilities currently exist, the long-term potential is greater than current park-and-ride capacity in several locations.
- **Regional Service is Key:** A robust regional BRT service is a great opportunity for increased transit market share in the corridor. Presently, there are a number of regional services that target people departing Boulder in the morning. Some are well utilized, others, are not. The TMP update should evaluate the possibility for routes to operate two-way service, encouraging both "in" and "out" transit commuting in Boulder. An increasing number of commuters to Boulder come from areas outside of RTD's boundaries – Fort Collins, for example. These markets should be examined for the possibility of developing intercity commuter services. Other non-single occupant options such as carpooling or vanpooling should be explored where the market for a transit route does not yet exist.

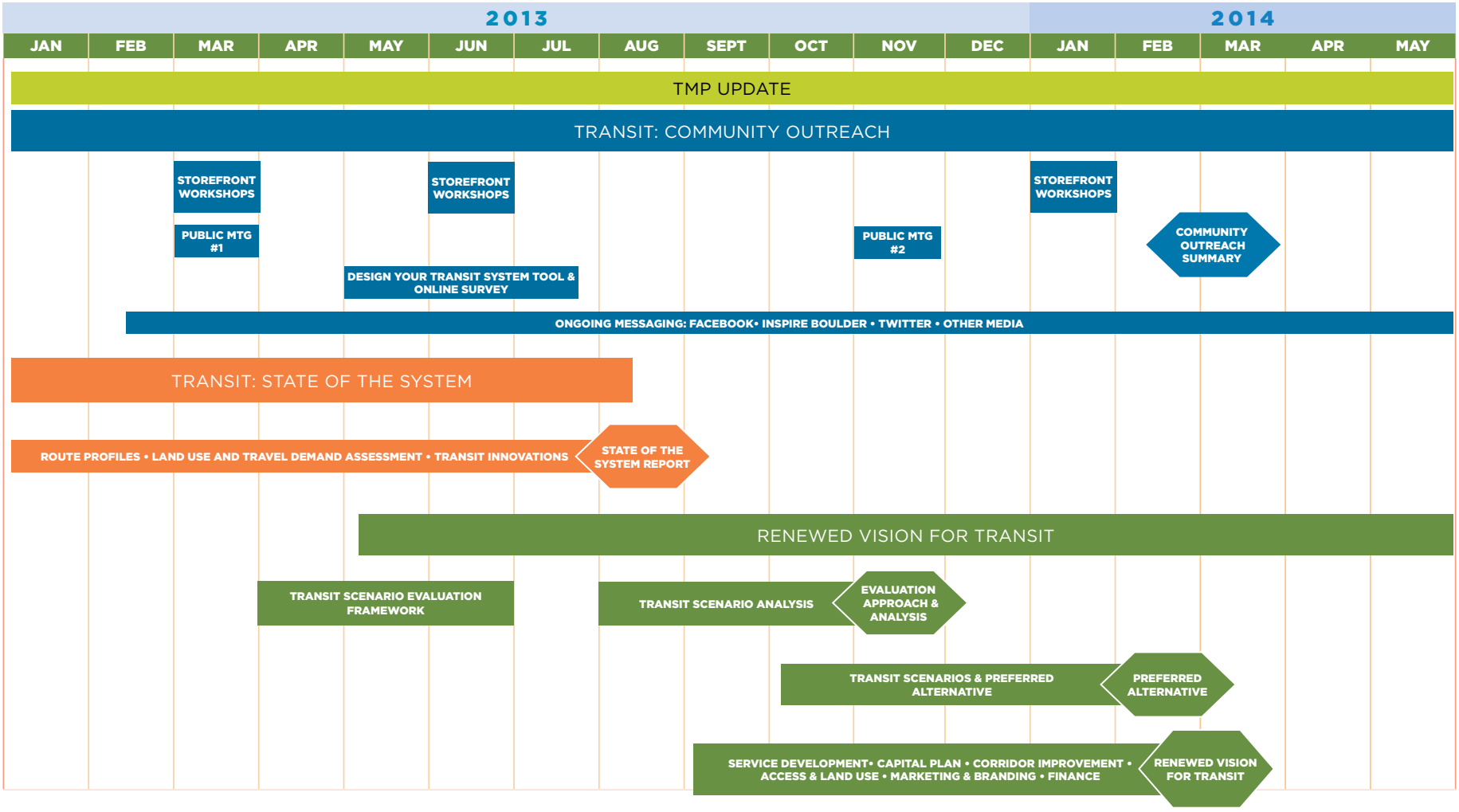
Chapter 5 provides a peer evaluation of seven peer transit systems. Key findings include:

- **Focus on investments that have led to peer ridership growth:** Peer cities and agencies show the greatest bump in transit ridership where significant investments in speed and reliability (i.e., BRT services) have been made. This is an important consideration for Boulder moving forward.
- **Efficiency:** Boulder's efficiency metrics (i.e., cost per passenger, cost per revenue hour) don't compare well to peer cities that are not part of broader regional transit systems. While this is expected, it does present a key tradeoff question for Boulder in defining a renewed vision for transit. Focus on transit improvements and coordinated land use improvements inside City boundaries or broaden the City's preview to deal with regional travel patterns?
- **Integrate university transit services:** Many peers have intercampus transportation services integrated with local/regional transit, simplifying system offerings and creating a more cohesive, transparent transit product. There could be substantial cost tradeoffs associated with integration; this is worth exploring in the next phase of the project.
- **Build on fare program successes:** Eco Pass programs combined with strong ridership help Boulder transit routes to operate with less subsidy than peer systems. The transit plan will look at opportunities to further reduce public subsidies for transit. Coordination with the Boulder County's Eco Pass study will be critical.

Renewed Vision For Transit Schedule

Based on the findings in the State of the System Report and feedback from the community, a Renewed Vision for Transit will be developed—a vision that responds to changing needs; capitalizes on unique local opportunities; supports housing, climate, and placemaking initiatives; strengthens regional partnerships; and stays true to Boulder's strong local values.

Figure ES-18 Renewed Vision for Transit Schedule



CHAPTER 1

RENEWED VISION FOR TRANSIT

IN THIS CHAPTER

- The Transportation Master Plan Update
- Boulder's Renewed Vision for transit
- Why focus on transit?
- Overview of the State of the System Report
- Renewed vision for transit schedule

CHAPTER ONE
RENEWED VISION FOR TRANSIT

The Transportation Master Plan Update

Boulder's first Transportation Master Plan (TMP) was adopted in 1989, setting a new course for a community that relies more on walking, biking, and taking transit to support a more convenient and sustainable transportation system. This vision, built on specific policies and goals, has been implemented through a progressive program of capital projects and programs designed to offer more choices for Boulder residents, employees, and visitors. The result has been the evolution of a complete transportation system that provides safe, healthy, and fun choices for travel in the community.

The 2013 TMP Update includes five focus areas (see the next page). Transit is a key component of the Complete Streets focus area.

Image from Nelson\Nygaard

WHERE WE'VE BEEN . . .

1989 **The original TMP** called for shifting away from single-occupant vehicle (SOV) trips and recognized the need to reconcile two sometimes conflicting goals: "to provide mobility and access in the Boulder Valley in a way that is safe and convenient" and "to preserve what makes Boulder a good place to live by minimizing auto congestion, air pollution, and noise."

1996 update **Set an objective of "no long-term growth in vehicle traffic"** to limit the environmental and community impacts of auto travel. Began to pioneer concept of Complete Streets.

2003 update **Identified four policy focus areas:**

- Enhancing regional connections
- Expanding transportation demand management (TDM) efforts, especially via public-private partnerships
- Completing the multimodal corridors with 28th Street as the top priority
- Identifying the funding necessary to achieve the goals of the plan

FasTracks **FasTracks Local Optimization (FLO)** is an effort by the City of Boulder and other local organizations to optimize the benefits of regional transit improvements that will be provided by FasTracks.* The FLO effort worked with the community to understand how regional services would be integrated into the community.

2008 update **Developed the Complete Streets Investment Program** that identified the highest priority investments for the community through 2025.

Now **Develop a renewed transit vision** under the Complete Streets focus area to meet community ridership goals, climate commitment, and sustainability framework goals. Added focus area to integrate with sustainability initiatives. Added new objectives for safety, neighborhood accessibility, and vehicle miles traveled per capita.

* *The RTD FasTracks Program is a multi-billion dollar comprehensive transit expansion plan to build 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit, 21,000 new parking spaces at light rail and bus stations, and enhance bus service for easy, convenient bus/rail connections across the eight-county district.*

2013 TMP Update Focus Areas

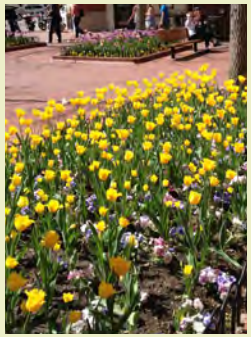
Complete Streets

A renewed vision for transit and bicycle and pedestrian innovations are needed to reach mode share objectives and ensure residents, in-commuters, and transition areas such as East Boulder* will have the same excellent transportation choices as those in other parts of the community.

Projects: *Renewed Vision | Bike & pedestrian innovations*

** In this report, "East Boulder" refers to the area of Boulder east of Folsom Street.*

Integrate with Sustainability Initiatives



Transportation planning and funding support many other city initiatives. The TMP is fully integrated with City-wide planning initiatives to support a broad range of community values and sustainability goals.

Projects: *Climate Commitment | Civic Area Plan | Access Management & Parking Strategies | Parks & Recreation Master Plan | Sustainable Streets & Centers | Comprehensive Housing Strategy| East Arapahoe Corridor*

Regional Travel

Significant growth in the number of employees working in Boulder but living elsewhere highlights the need for improved regional connections. Such improvements will only occur where corridor plans, funding, and collaboration with other communities and agencies are established.

Projects: *Regional multi-modal Corridors | BRT and regional bikeway on US 36 Corridor | Boulder Junction TOD | RTD North West Area Mobility Study*

Transportation Demand Management (TDM)

Improved management of the transportation system – such as parking policy and programs to encourage use of travel options – is the most cost-effective strategy to maintain the function of the transportation system.

Projects: *Community-wide Eco Pass | Access Management and Parking Management Strategies | Sustainable Streets and Development Review Toolkit*

Funding

Since 2003, stagnating city sales tax revenue and an unprecedented increase in the cost of construction materials have increased the cost of operating and maintaining the transportation system. Maintaining our current transportation system while improving infrastructure and programs to meet TMP goals will be a significant challenge.

Projects: *New Transportation Funding for O&M and Capital Improvements*

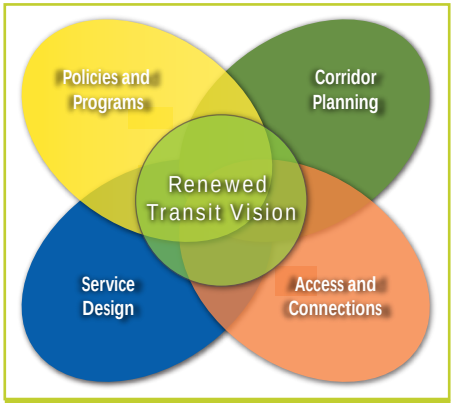
MEASURABLE OBJECTIVES FOR ALL AREAS

Existing Objectives

- Continued progress toward no growth in long-term vehicle traffic
- Reduce single occupant vehicle travel to 25 percent of trips
- Continued reduction in mobile source emissions of air pollutants
- No more than 20% of roadways congested at Level of Service (LOS) F
- Expand fiscally viable transportation alternatives for all Boulder residents and employees, including the elderly and those with disabilities
- Increase transportation alternatives commensurate with the rate of employee growth

New Objectives (2013)

- Safety
- Neighborhood accessibility
- Vehicle miles traveled per capita for residents and in-commuters



A renewed transit vision will help Boulder meet the Transportation Master Plan mode share goal of 75% non-SOV travel by 2025.
Image from Nelson\Nygaard

Boulder's Renewed Vision for Transit

The Renewed Vision for Transit will focus on continuing to develop and enhance a complete transit system – a network of high-quality, frequent and convenient transit routes that connect local destinations and neighborhoods and regional destinations. More than just a transit operating service plan, the Renewed Vision for Transit will focus on transit supportive programs and policies, the cost effectiveness of transit, corridor planning, service design, and improved access and connections to increase the use of transit in the community and make transit a first choice of travel.

The Renewed Vision for Transit will be fully integrated with the overall TMP Update, community sustainability goals, and the climate commitment, and will provide a strategic action plan for wise investment in transit over time. Consistent with broader TMP goals and the City's climate and sustainability objectives, the Renewed Vision for Transit will:

- **Put the passenger first:** make transit easy and comfortable to use for people of all ages and all abilities
- **Make transit a convenient choice of travel:** focus on service quality by connecting local and regional destinations and improving bicycle and pedestrian access to transit
- **Use transit to build community:** improve access and connectivity to transit and build transit facilities to support central community gathering places and neighborhoods
- **Improve transit service and ridership through regional partnerships:** work with neighboring jurisdictions, RTD, Denver Regional Council of Governments, North Front Range Metropolitan Planning Organization, and Colorado Department of Transportation to improve access to transit and increase regional transit ridership
- **Reduce the environmental impacts of travel:** use transit to support the Sustainability Framework and Climate Commitment goals

The HOP bus – the first Community Transit Network route – is a community-scaled bus with large windows, unique branding, and perimeter seating to encourage community interaction.
Image from the City of Boulder

Why Focus on Transit?

The Renewed Vision for Transit is a key element of the Complete Streets focus area of the TMP Update and supports the other focus areas as well. The City of Boulder has one of the most extensive public bus systems of any city of its size in the nation and has a long and successful history of investing in community transit.

Over the last two decades Boulder has made unprecedented improvements to its transit system. In the early 1990s, the City of Boulder embarked on an effort to increase the use of transit within its city limits. At that time, all local transit service was operated by RTD using vehicles standardized across the regional system and an operational model that focused on serving regional travelers. Seeking to transform the system to one that appealed to more local residents and offered a viable travel choice for many types of local trips, City staff undertook customer-focused market research. At a community roundtable, local residents were asked to describe transit system features that would make a community access shuttle successful in Boulder. The result of these conversations was the genesis of the HOP bus in Boulder.

When the City commenced service on the HOP route and subsequently expanded the Community Transit Network (CTN), several key design principles taken directly from the community roundtables were implemented:

- Service levels so frequent no schedule is needed (every 10 minutes)
- Community-scaled vehicles that are smaller, lower to the ground, and have large windows allowing passengers to connect to the street environment
- Perimeter seating in vehicles to engender conversation and community on the bus

- Branding to give the local system a unique look and feel
- Direct routing to make service more transparent, making riders more confident
- A pass program that eliminates the need to have correct change when boarding

The Community Transit Network constructed around these principles has been an unqualified success. The system is highly productive and has become a highly-valued element of Boulder's transportation system and the subject of considerable national interest as an example of "best practices in transit." A recent poll showed that residents valued the maintenance of the CTN (71%) as one of the highest priorities. Continuing the success of the CTN will be a core strategy to meet the city's mode share objectives. However, in the face of RTD service cuts, stagnant local, regional, state, and federal revenue and ridership trends, a growing market of in-commuters, and pending transformative land use changes in east Boulder, continued and expanded investment in transit is essential to meet the City's mode share, environmental, and housing affordability goals.

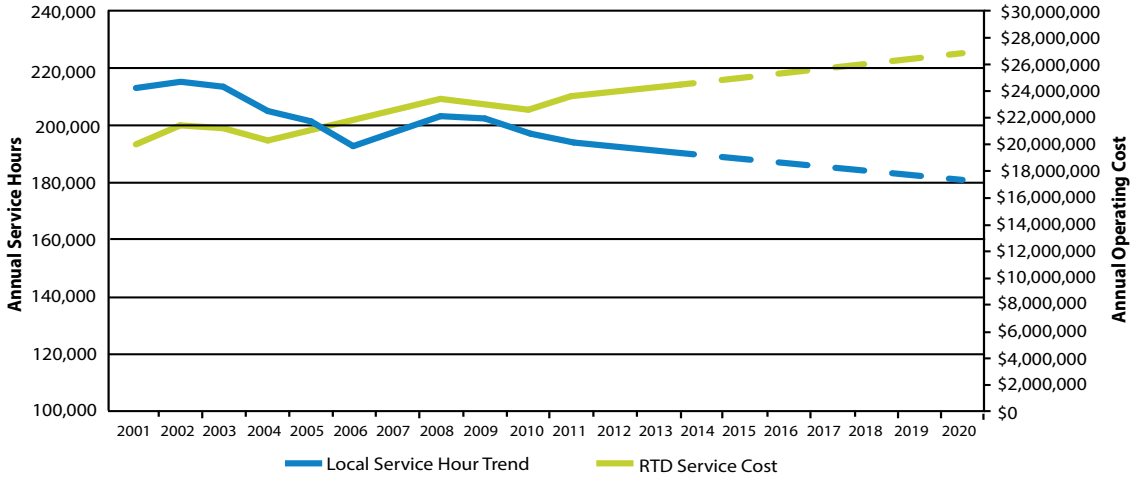
Why a Renewed Vision for Transit?

The City is not on course to meet the City's 2008 TMP mode share goals.

- Transit ridership is stagnant.
- Transportation revenue and funding for local transit service in Boulder is declining.
- 80% of Boulder in-commuters drive alone to work; serving this market is essential.
- Over the last decade, RTD has cut service hours in Boulder by 20,500 service hours – the equivalent of the DASH route.
- Boulder continues to see redevelopment; this is anticipated to continue in areas east of Folsom Street. Designing transit service to meet the impending needs of east Boulder and improving access and connections to transit is essential to meet community sustainability, climate, and mode share goals.

- Transition from hub and spoke system to high frequency grid

Figure 1-1 Projected Local Service Hours vs. RTD Service Cost, 2001-2020



Overview: State of the System Report

This State of the System Report sets the stage for Boulder and its partners to renew a local and regional vision for transit – one that responds to changing needs; capitalizes on unique local opportunities; supports housing, climate, and placemaking initiatives; creates better regional partnerships; and stays true to Boulder's strong local values.

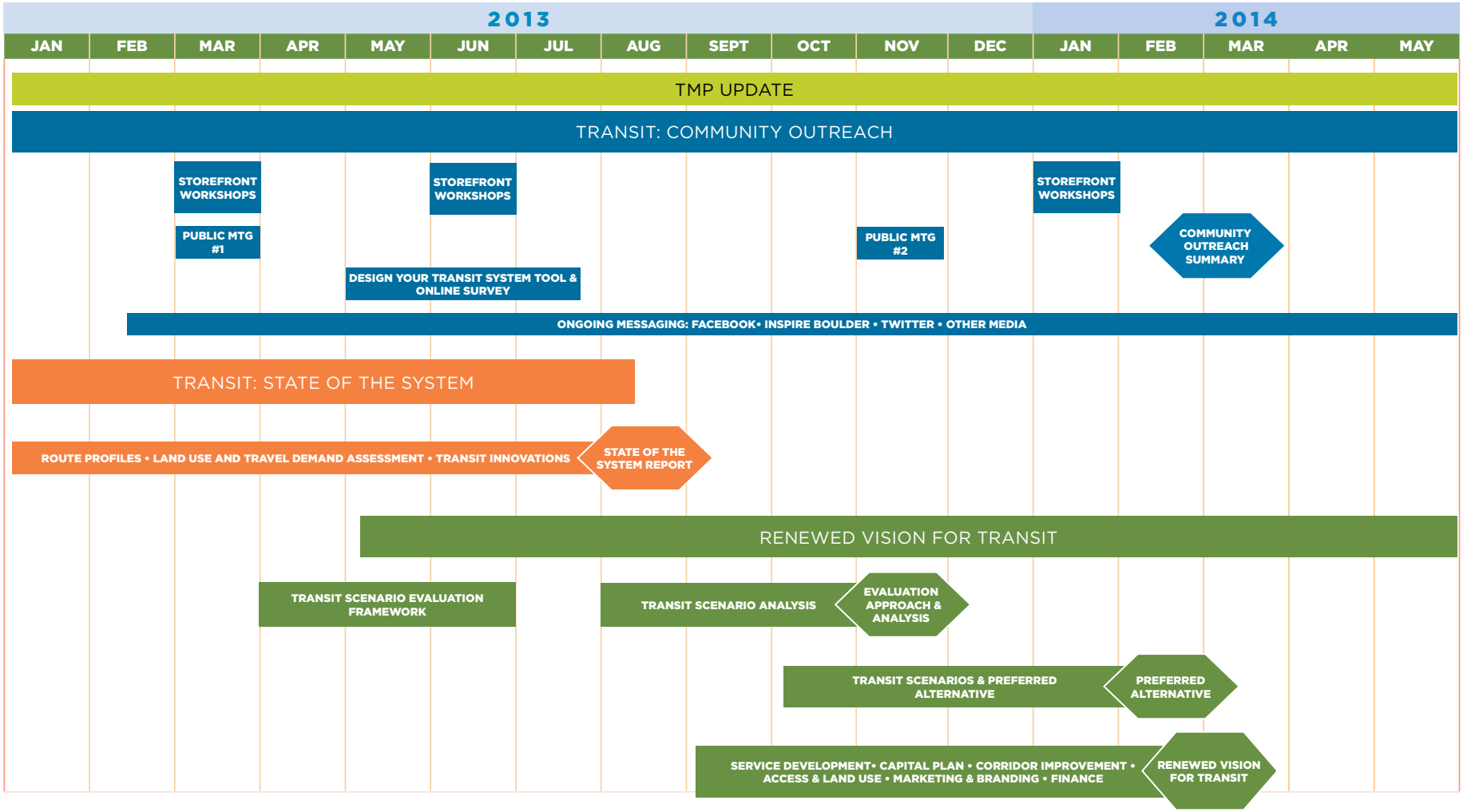
The State of the System report includes:

- **Chapter 1 Renewed Vision for Transit -** an overview of the Transportation Master Plan Update and its focus on a Renewed Vision for Transit.
- **Chapter 2 Our Challenge, Our Chance – a high-**level summary of community feedback and direction on the issues and driving forces that will shape Boulder's transit future.
- **Chapter 3 Land Use and Travel Demand – an assessment of Boulder's transit-**oriented land use patterns and an overview of current and future travel demand.
- **Chapter 4 Transit Service – an overview of transit service providers, funding, and performance in Boulder.**
- **Chapter 5 Peer Review –** an assessment of transit performance in Boulder compared to a number of peer communities in the U.S.
- **Chapter 6 Transit Innovations and Leading Practices –** an overview of leading transit innovations in the U.S. and abroad and suggestions for Boulder.
- **Appendix A Detailed Route Profiles –** detailed profiles for Boulder's local and regional routes.
- **Appendix B Community Outreach Summary** – a detailed summary of community outreach conducted throughout the project.

Renewed Vision for Transit Schedule

The Renewed Vision for Transit is one aspect of the city's long-term vision to build a high-quality transportation system. Figure 1-2 provides a high-level schedule for the City of Boulder's Renewed Vision for Transit and how it fits into the broader TMP update.

Figure 1-2 Renewed Vision for Transit Schedule



CHAPTER 2

OUR CHALLENGE, OUR CHANCE

IN THIS CHAPTER

- Community outreach process
- Key issues and opportunities
- Trends that influence transit design
- Shared vision with Boulder County neighbors
- Key issues to be explored in the Renewed Vision for Transit

CHAPTER TWO
OUR CHALLENGE, OUR CHANCE

Boulder's land use and transportation policy decisions have helped to make it one of the most livable cities in the United States. Success has not come by accident. It is a result of strong leadership, careful outreach that listens and responds to resident input, and clear and deliberate policy based on input and solid technical information. The TMP Update and the Renewed Vision for Transit presents **a challenge** – to advance the community toward its transportation goals – and **a chance** to create a vision for transportation and transit that will be effective, enduring, and financially sustainable; moving the City toward a more environmentally and economically sustainable transportation system. To do so, the vision must be clear, measurable, and responsive to the community's unique and changing needs.

The success of Boulder's Community Transit Network (CTN) routes, dramatic results from the Eco Pass program, and the unquestioned success of walking and biking network investments prove that *careful listening, holistic system design, thinking outside the box, partnerships, and focus on quality* are keys to success. These principles guide our approach. This chapter focuses on careful listening, describing our community engagement process, and what we've heard to date.

Community Outreach Process

The Renewed Vision for Transit is guided by the City's Transportation Advisory Board (TAB) and City Council, and a robust community outreach process, including a Technical Advisory Committee, a Community Feedback Panel, online and social media tools, open houses, and storefront workshops. A more complete community outreach summary is provided in Appendix B.

At a workshop in March 2013, the TAC defines the issues that drive the Renewed Vision for Transit in Boulder.
Image from Nelson\Nygaard

Transit Technical Advisory Committee

The Transit Technical Advisory Committee (TAC) provides technical support and input throughout the TMP process. The TAC convened in January 2013 and is comprised primarily of technical staff from local and regional policy, agency, and key community stakeholders such as transportation staff from Boulder County, Regional Transit District, Chamber of Commerce, University of Colorado representatives, and Transportation Management Organizations such as Boulder Transit Connections and 36 Community Solutions. The TAC is intended to be advisory and to provide input on the technical work and public outreach for the transit element of the TMP update. The TAC will provide critical input at every stage of the transit plan process.

Community Outreach Events and Activities

Activities and input opportunities conducted to date include:

- **Stakeholder Interviews:** Interviews were held with key stakeholders at the County, the City, the

Success by the Numbers

- Thirty local and regional bus routes provide over 32,000 bus rides on average every day
- 159 centerline miles of bike facilities carry thousands of cyclists every day
- More than 9% of commuters walk safely to work
- A combined 30% of Boulder commuters bike, bus, and walk to work, compared to only 9% in the Denver region and 10% nationally.*

*2007-2011 American Community Survey Five-Year Average

The Design Your Transit System tool is an online tool that allows the community to prioritize transit investments.
Image from Nelson\Nygaard

University of Colorado, the Boulder Chamber of Commerce, the Center for People with Disabilities, Regional Transit District, among others.

- **Community Storefront Workshops:** Storefront workshops gather feedback on transit and other mobility issues, especially from transit users. To ensure participation from a range of people, the workshops were held in different geographic locations, such as the Boulder Community Hospital Foothills Campus, the Cup on Pearl Street, and the University of Colorado's main campus. It is important to bring workshops to the community, instead of asking people to "come to us."
- **Design Your Transit System Online Tool and Questionnaire:** The project team developed a "Design Your Transit System" online decision-making simulation tool. This new outreach strategy walked participants through a series of visually oriented exercises to better understand which elements of system design are most likely to attract new riders and improve the quality of experience for existing users. Visit www.boulder-transitdesign.com.
- **Social Media Outreach:** Social media outreach strategies such as utilizing Inspire Boulder, Twitter, Facebook, and Tumblr have been deployed to assist public outreach efforts and to expand outreach to a larger audience. Questions are posted to Inspire Boulder, the City's online community forum, to get feedback on key transit service issues and opportunities. Visit Inspire Boulder at www.inspireboulder.com.
- **Community Feedback Panel:** The Community Feedback Panel is a new social outreach strategy for the TMP update and is comprised of a group of interested members of the public who have volunteered to be queried on TMP-related issues. As of mid April, nearly 400 people have signed up for the panel. The panel was called upon throughout the process to provide input on the Design Your Transit System Tool and the long-term transit scenarios.
- **Open Houses:** The TMP update Kick off Open House was held on March 4 at the Hotel Boulderado Conference Center in conjunction with the Smart Growth America Cool Planning Presentation and Workshop. A second open house was held on March 13 at the CU East Campus in conjunction with CU East Campus Projects Open House.
- **Transportation Advisory Board (TAB):** The TAB is the host of the Transportation Master Plan Update and has been engaged throughout the process with monthly updates.

Key Issues & Opportunities from the Public

Based on the community outreach process and the technical analysis of transit in the subsequent chapters, several key issues and opportunities have emerged. These key issues and opportunities are shown in the table on the following page.

Storefront community workshops brought public outreach to the community. We asked the community for their vision for transit at popular locations, such as the University Memorial Center (UMC), The Cup, and the Boulder Community Hospital.
Image from Nelson\Nygaard

Figure 2-1 Key Issues and Opportunities

	Key Issues & Opportunities
Transit Service & Amenities	**Mode Split is Stagnant – Get it Moving in the Right Direction** The TMP has an objective of reducing the number of trips made by one person driving alone in a car (called "single occupant vehicle" mode share or SOV) to 25% of all trips by Boulder residents by 2025. While Boulder has made significant progress, it is not currently on track to reach its 2025 goal.
	Expand Community Transit Network (CTN) Service Community and stakeholder outreach conducted for the transit element of the TMP suggests that maintaining and expanding the CTN is fundamental to reaching local mode share targets. Route performance enhancements along arterial roadways giving priority for transit, and transit service expansion along key local and regional corridors is important to advancing the CTN.
	Need for Enhanced Regional Transit Connections The community expressed a desire for new connections, improved frequency, and expanded service span at the regional level.
	Introduction of Bus Rapid Transit (BRT) Service The introduction of "fully-featured" US 36 BRT service will be an opportunity to generate momentum for extending BRT and transit lane enhancements into the city (e.g. on Broadway) and along other important regional corridors.
	Need for Better Customer Information The community has expressed a desire for real-time arrival information to make traveling by transit more convenient and efficient.
Demographics	**Changing Demographics** Boulder needs to deliver a "golden menu" of options to meet the complex housing and transportation demands of its residents and workers, including the elderly, the disabled, young professionals, students, and families.
Land Use	**Increase in Workers Commuting to Boulder** High housing costs in Boulder combined with a strong and growing job base have continued to increase the level of in-commuting in recent years. While Boulder has achieved a remarkably high non-SOV mode share for local travel, in-commute travel remains primarily SOV (approx 80%). As Boulder adds more jobs, an increasing percentage is expected to live in east Boulder County, Weld County, and along the US 36 Corridor, likely causing an increase in the "in-commute." The number of commuters from Larimer and southwest Weld Counties is also expected to increase (Fort Collins and the tri-city area including Frederick, Firestone, and Dacono).
	Land Use and Transportation Connection Providing cost-effective, fast, efficient transit for regional commuters is part of the solution. However, working to ensure that more existing and future workers can live and work in compact, walkable neighborhoods and mixed-use districts is an equally essential outcome. This theme is particularly relevant to the concurrent work efforts at the City on the Comprehensive Housing Strategy, Sustainable Streets and Centers, and the Neighborhood Accessibility analysis.
	Making East Boulder Pedestrian, Bicycle and Transit Friendly Most planned land use changes will occur in East Boulder and in Gunbarrel. The TMP and parallel city efforts focus on these areas of opportunity to create great places that are walkable, sustainable, and economically vital.
Parking	**Parking Management is Key** Community-wide parking management strategies and expanded parking districts will help the City meet TMP mode split goals and reduce the increasing impacts of in-commuter travel. Parking management must be a key focus of the TMP to meet mode split goals, particularly in areas of opportunity (e.g. East Boulder).
Funding	**Stagnant Funding and Declining Purchasing Power** The primary source of transportation funding in Boulder is a $.006 sales tax on every $1.00 of local purchases. Sales taxes are volatile and are likely to decrease in the future as Boulder's population ages and moves into more careful spending habits. Recent polling shows strong community support for new funding focused on basic operations and maintenance needs. There is also strong community support for transit and other multimodal transportation system improvements; additional funding is needed to meet TMP mode share goals and other objectives.
Climate	**Climate Commitment & Sustainability Framework Drive TMP Outcomes** TMP outcomes need to align with the developing Climate Commitment goal to reach carbon neutrality through all sectors (energy, transportation, etc.) to achieve Sustainability Framework goals. At the same time, the Climate Commitment and TMP Update activities are being integrated to help shape effective and mutually supportive outcomes. New approaches to data gathering are needed to capture information needed to support low-carbon transportation options.
Partnerships	**Need for Regional Partnerships** Success in reducing SOV travel among "in-commuters" will require an assertive stance from Boulder and Boulder County, strong partnerships, new fare tools, continued partnerships with RTD and surrounding communities, and new funding sources to grow service offerings.

Trends That Influence Transit Design

Too often, transportation planning responds to current events rather than future needs and goals. Since the decisions people make are based on the choices that are currently in place, this approach misses an opportunity to ask the important questions: How would people travel if conditions and options were different? What forces will be at play in the future that will cause people to make decisions differently? What local or global trends will influence mobility and access to jobs, goods, and services in 5, 10, or 20 years?

In March of 2013, the Transit Advisory Committee (TAC) met to look ahead at trends and driving forces that already are, or may in the future, reshape how, where, and why we travel. This section highlights these factors in terms of their influence on transit design, in addition to their broader implications for transportation and community development.

Changing Demographics

Three generations will be most influential in shaping Boulder's future transit demand. These include Baby Boomers (born 1946-1964), Generation X (1961-1984), and Millennials (1977-2003). Together, these generations represent over three-quarters of Boulder's total population.[1] There is also a continued need to design transit for people with disabilities who are living with significant mobility challenges and are unable to use fixed route transit. As Boulder develops its Renewed Vision for Transit, it will be critical to consider the following trends:

- Nationally, it is estimated that one out of five people aged 65 and older do not drive.[2] In Boulder, this translates to over 1,700 seniors who do not drive. Transitioning older adults to fixed route transit while they are able to ride can reduce expensive paratransit costs.
- RTD estimates that over 40% of bus riders in Boulder are "transit dependent," meaning they do not have access to a vehicle, have a disability or impairment that prevents vehicle operation, or do not possess a valid driver's license.[3]
- Senior growth is projected to increase considerably in the Denver-Boulder region. In 2000, there were approximately 100,000 people in the region aged 75 and older; by 2030, that number is expected to increase 150% to 250,000.[4]
- As the older population grows, the need for ADA paratransit service will also grow. Although there are disabled people of all ages who cannot use fixed route transit due to a disability, the largest concentration of ADA-eligible people is in the 80 to 89 age group. Just based on population growth, the size of the ADA-eligible population is expected to grow by 94% by 2030 in the Denver-Boulder region.[5]

As the Baby Boomers age, there will be a need for transportation options for older adults who are not able to walk or who are unable to use regular fixed route transit. There will also be a need to design transit for people with disabilities who are living with significant mobility challenges.

Gen Xers are maturing, with the majority of them now married with children. These households have the most disposable incomes but their spending is now focused on household needs. In Boulder, increasing housing prices are making it more difficult for middle-income households to live in Boulder. An increasing number of these households are seeking housing opportunities in more affordable communities

An older woman crosses Arapahoe Avenue in east Boulder in front of the Boulder Community Hospital Foothills Campus.
Image from Nelson\Nygaard

Transportation Master Plan 2008 Policy Framework

While Boulder has made good progress providing travel choices for people, there is still tremendous work to be done to meet the City's aggressive transportation objectives for 2025:*

- Continued progress toward no growth in long-term vehicle traffic
- Reduce single occupant vehicle travel to 25 percent of trips
- Continued reduction in mobile source emissions of air pollutants
- No more than 20 percent of roadways congested (at Level of Service F)
- Expand fiscally viable transportation alternatives for all Boulder residents and employees, including the elderly and those with disabilities
- Increase transportation alternatives commensurate with the rate of employee growth

**City of Boulder (2008) Transportation Master Plan*

1 U.S. Census 2010.

2 Bailey, Linda. 2004. *Aging Americans: stranded without options*. Washington, DC: Surface Transportation Policy Project.

3 RTD. 2011. RTD Customer Satisfaction Survey.

4 Getting There Collaborative. 2005. Analysis of Colorado's Human Service and Public Transportation Needs.

5 Getting There Collaborative. 2005. Analysis of Colorado's Human Service and Public Transportation Needs.

outside of Boulder, causing a growing population of in-commuters.[6]

Nationwide, the Millennials outnumber the Boomers and brim with optimism and a strong sense of social activism. Connected to technology from the crib, Millennials are true multi-taskers and drivers of technological innovations that include social communications and smart phones. With a large university and many lifestyle attractions, Boulder is an attractive place for people of this generation. However, with less opportunity for jobs than larger urban areas and a high local cost of living, keeping Millenials and families around will require efficient, affordable transportation and housing to balance lifestyle and other income requirements. The Millenial generation may be the first in a long time to fully embrace Amory Lovin's quote: "The best form of transit is simply being there."

The Importance of Place

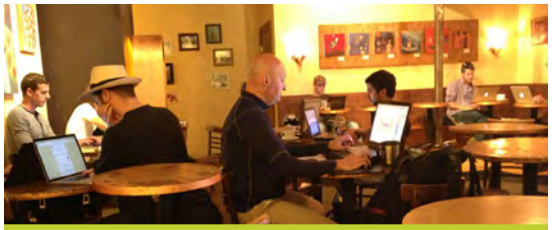
In our attempts to quantify relationships between land use, transportation, and urban design we too often lose the simple message – it's all about the places we create. Improved transportation infrastructure and service increase access to land, which in turn increases travel demand. Since some amount of infill may be desired and important to the economic health of the city and region, the TMP Update must focus on a finer-grained integration of land use with sustainable transport. This integration will help reduce per capita travel demand while improving access to jobs and services, supporting housing affordability, and advancing environmental goals.

While these relationships are important, Boulder TAC members and stakeholders stress that achieving transportation outcomes is reliant on building quality, vibrant communities where people want to be and move about on foot. The success of the Pearl Street Mall is testament to the power of place. This street is at once a gathering place, an enjoyable pedestrian way, one of the highest grossing retail streets in the city, and a symbol of civic life. Boulder Junction is the city's next opportunity to craft place with this attention to quality. The development of the Pearl Parkway multi-way boulevard is indicative of attention to detail that can translate the successes of old Boulder to the new. While transit operations are only one small detail of this street project, the role of transit in making Boulder Junction Boulder's next great place is substantial. As a new regional transit hub, many people will be able to travel to and from the area without the impact of parking, street congestion, or unnecessary bus transfers.

In the end, the TMP Update must ensure that Boulder's transportation system is designed to support the great places that will be created at Boulder Junction, CU East Campus, and other areas. Transit's role in helping to "shape" placemaking outcomes will be addressed in the Renewed Vision for Transit.

6 City of Boulder. 2013. Boulder City Council Study Session "Developing a New Comprehensive Housing Strategy for Boulder, May 14, 2013."

Pearl Street Mall is testament to the power of place, providing a central gather place and enjoyable pedestrian way.
Image from Nelson\Nygaard



The Laughing Goat Coffeehouse on Pearl Street in Boulder is busy on a weekday afternoon with people working or going about their daily business.
Image from Nelson\Nygaard

Emerging Technology and How it Drives Our Lives

Technology such as smart phones and high speed mobile wireless internet are enabling people to more fluidly mix work, pleasure, and civic life. Instant access to information and increased use of social networks is changing how we work and communicate. Mobile devices are expected to continue to diminish the importance of static office locations, allowing for connections anywhere, anytime.

In Boulder, coffee shops buzz with people working and flexible work spaces have become popular, providing a "landing zone" for sole proprietors and small start-ups. Census data illustrating the most recent commute patterns suggest that many people employed in Boulder don't commute to a brick and mortar office. To attract young skilled employees, employers will increasingly look to provide dynamic work environments close to amenities and civic life.

Along with changes following the Great Recession, technology is assisting a shift in consumerism. Consumers are increasingly shopping and comparing products online prior to making purchasing decisions. The convergence of social media and pricing promotion through media such as Groupon is significant for downtowns and transit agencies by connecting e-commerce with place.

Providing a transit system that responds to the need for frequent travel (frequency), connectedness (on-board wi-fi), spontaneity (real-time information), and spontaneous creativity and communication (bus and facility design) are challenges to be addressed in Boulder's Renewed Transit Vision.

The Housing Challenge

Advances in technology and the global marketplace are creating a generation more rooted to general urban living than one particular place. Walking, cycling, and transit are the preferred mode of transportation. This growing trend is reflected in people's choice of housing type and location. For example, nationwide, only 20% of Millennials, the emerging market of potential homebuyers, say that owning a home is one of their priorities in life.[7] On the other hand, for those that highly prioritize home ownership the majority (59%) would choose a smaller house if it meant a commute time of 20 minutes or less.[8]

Despite these trends, more and more people who work or attend school in Boulder are living outside the city.[9] Boulder's high quality of life and natural beauty attracts new residents on a national and even international scale, a trend that has pushed housing prices outside the realm of affordability for many. Today middle-income people who work in Boulder and desire to own a detached home are unlikely to find that opportunity in the city. Increasingly, lower-income renters who work or attend school in Boulder are challenged to find affordable rental opportunities. Some Boulder workers also simply want to live outside of Boulder for a different type of lifestyle.

7 Taylor, Paul, and Scott Keeter. 2010. *Millennials a portrait of generation next : confident, connected, open to change*. Washington, D.C.: Pew Research Center.

8 "The 2011 Community Preference Survey." National Association of Realtors (accessed February 1, 2012).

9 Longitudinal-Employer Household Dynamics (LEHD) Data, U.S. Census (2010).

Boulder is undertaking concurrent work to evaluate opportunities for creating low- and middle-income housing opportunities. Transportation can play an important role in lowering household costs. Quality transit options that allow a family to live with one less car can save about $10,000 a year, effectively increasing spending power for housing and other life needs.[10]

Emissions and the Cost of Energy

The City of Boulder is a national leader in addressing local contributions to climate change. Boulder's Climate Commitment and the TMP update are being coordinated to establish a long-term strategy to reach carbon neutrality. The TMP will help to frame actions and measurable targets for climate action.

With transportation contributing more than 20% of Boulder's greenhouse gas emissions, success in achieving the goals of the TMP are essential to keeping this contribution from growing. Between 1990 and 2012, vehicle fuel emissions have increased 49%.[11] Given the large portion of vehicle fuel-related emissions, the TMP is intimately tied to broader sustainability initiatives.

Aside from walking and cycling, transit is the best choice for reducing transportation related emissions. Transit technology innovation combined with clean energy sources can further enhance the climate protection value of transit. There are three options to reduce fossil fuel based transportation: increase use of biking and walking; increase energy efficiency; and reduce carbon intensity of transport energy (electric vehicles, biofuels, etc.).

10 AAA. 2013. "Your Driving Costs: How much are you really paying to drive?"

11 City of Boulder. 2012. Greenhouse Gas Inventory.

Boulder's Climate Commitment

In 2002, the Boulder City Council passed the Kyoto Resolution which set the goal of reducing community greenhouse gas emissions to 7% below 1990 levels by 2012, representing a 24% decrease n emissions between 2005 and 2012. Currently, the City is exploring a new approach to its climate commitment.

The combination of sustainable local energy and transit can also help to protect Boulder residents and workers from potential future increases in energy costs. While hydraulic fracturing and shale oil extraction are leading many to predict that fossil fuel cost spikes may be delayed, energy futures are unpredictable and affect the most vulnerable when fuel prices rise quickly.

Growing Public Health Concern

Obesity and other sedentary-related diseases are plaguing generations young and old. The research is clear: land use environments and roadway design impact health. People who live in neighborhoods with a mixture of uses within comfortable walking distance are 7% less likely to be obese, lowering their relative risk of obesity by 35%.[12] On the other hand, every additional 30 minutes spent daily in a car correlates to a 3% greater chance of obesity.[13]

Although Boulder County is significantly less sedentary, obese and, therefore, healthier than the rest of the United States (15% of the Boulder County population is obese compared to 25% nationally), the rate of obesity has increased over the last decade from 11% of the population in 2004 to 15% in 2013.[14] In particular, the rate of childhood obesity is increasing in Colorado. Between 2003 and 2007, childhood obesity in Colorado increased 23% – the second fastest rate of increase in

12 "Driving, Walking, and Where You Live: Links to Obesity." McCann Consulting (accessed June 15, 2013).

13 Ibid.

14 County Health Rankings and Roadmaps. www.countyhealthrankings.org Data compiled from the National Diabetes Surveillance System, CDC Behavior Risk Factor Surveillance System, and the U.S. Census Bureau's Population Estimates Program.

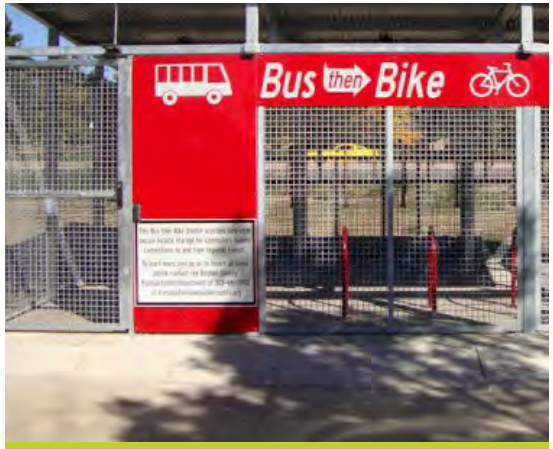
the nation behind Nevada.[15] In 2012, 14.2% of Colorado children were obese (23rd highest in the nation).[16] To curb this trend and continue to have one of the lowest obesity rates in the U.S., Boulder must continue to prioritize pedestrian- and bicycle-supportive design to encourage active transportation.

Stagnant Transportation Revenues and Declining Purchasing Power

While trends point to a heightened demand for transit service, bicycle facilities, and a safe walking environment for all ages, transportation funding is declining and costs are increasing. Boulder is falling behind industry standards for maintenance and operations – similar to the shortfalls at federal and state levels. Due to increasing costs, stagnating revenue, and decreased purchasing power, the City's ability to operate the community's transportation system is eroding. Since 2002, the City's Transportation Division has seen a 40% decline in purchasing power, largely due to increasing costs of materials and labor (see).

15 Healthy Policy Solutions. 2011. "Colorado No. 2 in increased rate of childhood obesity" (accessed July 2, 2013).

16 Colorado Health Foundation. 2012. The Colorado Health Report Card.



Boulder County's "Bus then Bike" program improves access to transit throughout the region.

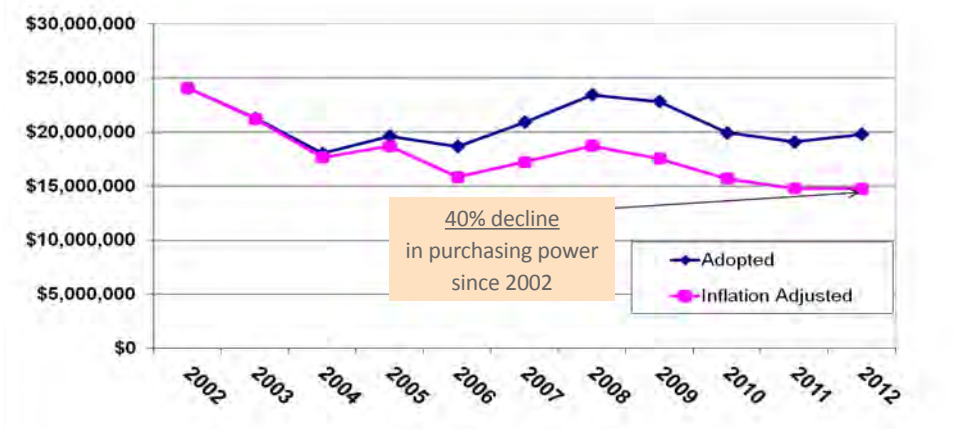
Image from 303 cycling

Shared Vision with Boulder County Neighbors

Partnerships have been integral to the success of the nation's most lauded transit systems. Given Boulder's growing commute shed, multi-provider system, and countywide land use and open space preservation controls, TMP success involves partnerships with many public and private entities.

Boulder County, the various cities of which it is comprised, and major institutions in those communities have aligned their transportation and land use goals. The recent Boulder County Transportation Master Plan directs the region to focus access and mobility policies on non-SOV modes of travel, with transit being the backbone to creating sustainable land use and transportation patterns countywide. Fostering regional partnerships will be critical to address the increasing number of people traveling in and out of Boulder for work, school, and services.

Figure 2-2 Transportation Revenue and Decline in Purchasing Power



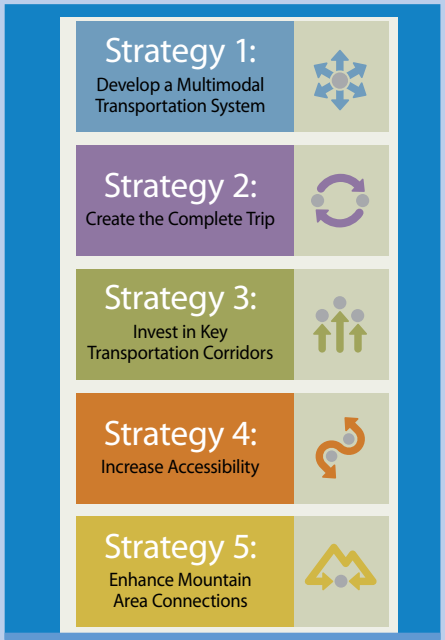
The City's purchasing power has declined 40% since 2002.

Source: City of Boulder

Boulder County Transportation Master Plan

In 2011, the County spent nearly $1 million to improve transit service and access to transit. In 2012, the County updated its Transportation Master Plan with a focus on improving regional multi-modal connections. Strategies specific to improving transit include:

- **Increase bike capacity at transit stops:** The County is installing "Bus then Bike" shelters throughout the County to support the "last mile."
- **Increase the bicycle capacity** on transit vehicles.
- **Improve intersections** for safe and convenient access to transit stops and bike and pedestrian facilities.
- **Collaborate with communities** to establish a community-wide Eco Pass program: In 2013, the County began a study to document the feasibility of a community-wide Eco Pass.
- **Invest in new transit service** to expand the system.
- **Promote regional bus rapid transit** and/or commuter rail in regional corridors.
- **Enhance bus stop facilities** (benches, concrete pads, shelters, bike racks, and bike shelters).



The Boulder County Transportation Master Plan prioritizes five key strategies to improve transportation in the region.
Source: Boulder County Transportation Master Plan (2012)

Key Issues to be Explored in the Renewed Vision for Transit

Chapter 2 provides an overview of Boulder's challenge to develop a Renewed Vision for Transit, including key issues and opportunities identified by the community outreach process and trends that influence transit design. Based on the findings in this chapter, the Transit Plan will focus on the following:

- **Mode split:** Identify strategies to continue improvement in transit mode share, helping Boulder reach its TMP mode share target.
- **Build on the CTN model:** Explore opportunities to expand the Community Transit Network (CTN), increase the number of regional transit connections, and integrate Bus Rapid Transit on key corridors.
- **Information and education:** Explore opportunities to improve customer information, travel training, and peer-to-peer transit use mentoring.
- **Respond to changing demographics:** Design transit for changing demographics, including the elderly, the disabled, families, young professionals, and students.
- **Focus on the in-commute:** Explore opportunities to decrease the drive-alone rate of in-commuters.
- **Focus on potential redevelopment and infill areas:** Identify strategies to serve areas with transit, manage parking, and ensure development is pedestrian, bicycle, and transit friendly.
- **Focus on funding opportunities:** Explore opportunities to increase local funding for transit.
- **Integrate with climate work:** Integrate the Renewed Vision for Transit with Climate Commitment and Sustainability Framework.
- **Work with Partners:** Identify opportunities for Boulder to work with regional partners to enhance transit service levels and quality.

CHAPTER 3

LAND USE & TRAVEL DEMAND

IN THIS CHAPTER

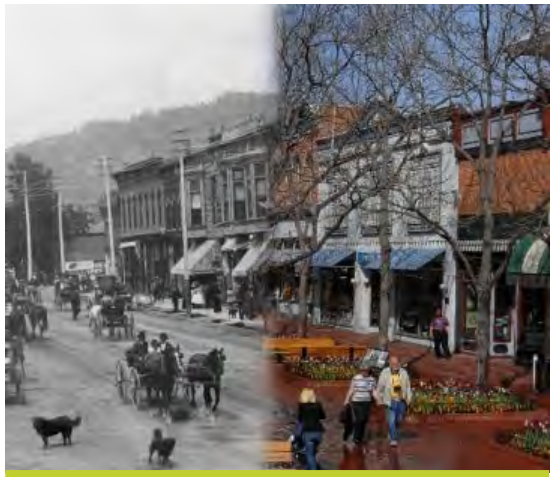
- The relationship between land use and transit demand
- Travel demand in Boulder
- Future development in Boulder
- Future local and regional growth
- Housing affordability
- Key issues to be explored in the Renewed Vision for Transit

CHAPTER THREE
LAND USE AND TRAVEL DEMAND

History of Land Use in Boulder

Boulder has a rich history of environmental protection, growth management, and efforts to preserve its historic past. Long before many cities in the western United States recognized the importance of compact urban form, Boulder had established important urban form principles and policies that would help guide development in the region for decades to come. Boulder's national reputation for proactive and creative growth management has been prompted, in part, by the following policies, ordinances, and actions:

- 1959: Blue Line adoption - Restricts extension of City water service above a defined elevation to protect the mountain backdrop.
- 1967: City passed a tax to purchase thousands of acres of open space. Today, the City owns and manages over 45,000 acres of public open space.
- 1972: Building height restriction ordinance was passed which limited building heights to 55 feet to ensure that all residents could enjoy the views of the mountains and open space.
- 1977: City and County adopted the Boulder Valley Comprehensive Plan, setting the vision for growth, development, and preservation in the Boulder Valley, including a defined urban growth boundary managed in cooperation with Boulder County. Boulder's approach to urban growth boundaries, called the service area concept, offers important lessons for controlling sprawl, preserving rural land uses outside the city, and extending urban services in a rational manner.



The Historic Pearl Street mall was developed between 1976 and 1977, bringing many businesses back to downtown and revitalizing one of Boulder's key historic commercial areas.

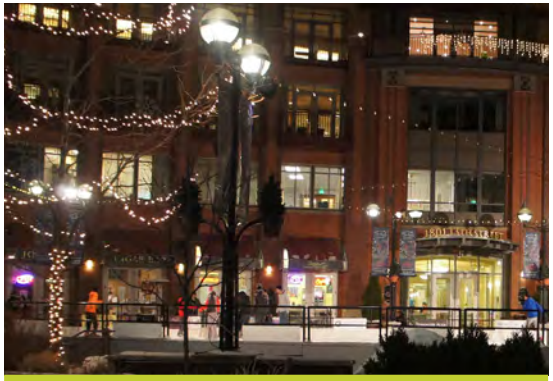
Photo montage from Silvia Pettem's book Positively Pearl Street. Historic photo from the Carnegie Branch Library for Local History. Current day photo taken by Casey A. Cass.

The Relationship Between Land Use and Transit Demand

Density, land use diversity, design, regional destinations, demand management, and distance to quality transit (often called the six "Ds" or "6Ds") are key factors commonly cited as influencing trip making, transit use, and the length of driving trips.[1,2] Extensive research shows that the built environment – including neighborhood form, land use patterns, transportation networks, and urban design – significantly affects travel behavior. Demand management (pricing and incentives) and demographics (income, household size, age, etc.) are also considered important factors. This section provides an assessment of the 6Ds in Boulder, recognizing that the urban form in east and west Boulder is very different (see "A Tale of Two Cities").

1 Cervero, Robert and Kara Kockelman (1997), "Travel Demand and the 3Ds: Density, Diversity, and Design," Transportation Research Part D, Vol. 2, pp 199-219.

2 Ewing, Reid and Robert Cervero (2001), "Travel and the Built Environment: A Synthesis," Transportation Research Record 1780, Washington DC: Transportation Research Board, pp 87-114.



Today, Boulder's downtown core is vibrant, compact, and walkable. The ice rink at One Boulder Plaza just south of the Pearl Street Mall is a favorite hangout spot for people of all ages and just a block away from high frequency transit in all directions.
Image from Nelson\Nygaard

A Tale of Two Cities: East and West Boulder

Boulder's evolution is often described as a "tale of two cities" – east and west. The west side of Boulder developed in a more traditional highly connected grid and development pattern of smaller, walkable blocks. East Boulder is characterized more by its "super blocks", with an orientation towards the automobile, large blocks, and a less walkable grid development pattern.

For all modes to succeed in East Boulder, significant investments will be needed to develop an interconnected street network with bicycle and pedestrian access to key transit corridors, mix of uses, and strong anchors with all-day transit demand. Street connectivity is much lower in East Boulder. While downtown has a connected street system with high intersection density (number of intersections per square mile), blocks are long and scattered in East Boulder making walking, biking, and accessing transit more difficult.

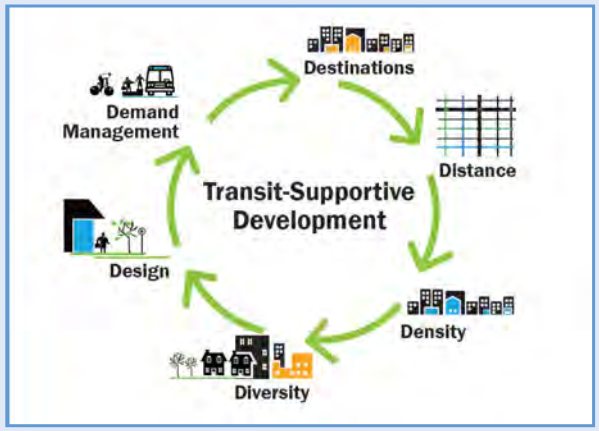
Pearl Street Mall in downtown Boulder provides a mixed-use walkable environment.
Image from Flickr beautifulcataya

On Arapahoe Avenue in East Boulder, the sidewalk ends abruptly in a commercial shopping area.
Image from Nelson\Nygaard

To understand the connection between land use and transportation in Boulder, the 6D principles were used. The 6Ds are most effective when applied in concert, although various principles apply differently at varying scales of geography (see Figure 3-1). For example, density and diversity must be considered at the neighborhood scale, while design principles can apply to a specific station, stop, or site.

The following sections provide a high-level assessment of key local challenges and opportunities related to the 6D factors. Key opportunities and challenges for Boulder are summarized in Figure 3-2.

Figure 3-1 6Ds of Transit-Supportive Development



Source: Nelson\Nygaard

Figure 3-2 Summary of 6D Factors

6D Factor	Principles	Challenge	Opportunities for Potential Exploration
1. Destinations	Align major destinations along a reasonably direct corridor so that they can be efficiently served by frequent transit.	It will be difficult to cost-effectively deliver high-quality, high-frequency (CTN level) service to areas with emerging destinations.	Prioritize transit investment in areas slated for change; incentivize infill and redevelopment along and across key transit corridors.
2. Distance	Provide an interconnected system of pedestrian routes so that people of all ages and abilities can walk to transit service quickly and conveniently from the places they live, work, shop, and play.	Lack of street connectivity and large surface parking lots in East Boulder increases the distance between destinations.	Build upon the success of Boulder Junction planning and community design efforts and the City's new neighborhood accessibility tool as part of the current TMP Update.
3. Density	Concentrate higher densities as close to frequent transit stops and stations and multimodal nodes as possible to minimize walking distances to more destinations for more people.	Existing height limits may limit the amount of change that can occur near transit, which reduces land consumption and supports use of efficient, cost-effective transportation modes.	High demand for housing and urban lifestyles could support increased density if housing is appropriately scaled and affordable. Future compact neighborhoods could deliver many placemaking and public amenity benefits that are needed in East Boulder and throughout the city.
4. Diversity	Provide a rich mix of pedestrian-friendly uses to facilitate street-level activity throughout the day and night, increase affordability, and enliven the public realm.	Although there is some opportunity to develop in East Boulder, opportunity is limited in many areas because it is largely built out under the low density and single use limits of current zoning.	The prioritization of mixed-use infill and new development will be important where possible. Since more jobs are coming to this area, it will be important to ensure that employees have opportunities to live, play, and shop nearby and also have access to regional connections (bike and bus).
5. Design	Design high-quality, pedestrian-friendly spaces that invite walking and bicycling and connect people to transit.	Limited connectivity and a focus on the car in East Boulder force people to walk and bike along busy arterials with limited buffers. Transit stops also lack a sense of place.	Improve buffers between pedestrians along major arterials, particularly when there is no logical parallel route. Transform high-demand transit stops into community gathering places. Provide direct ped/bike connections to building entrances and destinations.
6. Demand Management	Provide attractive transportation options to driving.	Paid parking districts only exist in downtown, at the University, and in the developing Boulder Junction. Balancing economic vitality with sustainability and demand management.	Build upon the City's successful framework for managing travel demand and providing options by expanding paid parking districts and broadening the reach of the Eco Pass program and bike share and car share programs.

Destinations

People are more likely to choose transit if it quickly and directly brings them to their destinations. Maximizing transit access to the city's major destinations is key. Today, high-frequency transit (7-10 minute service) at peak hours and throughout the day connects downtown, the university's east and west campuses, and other major destinations such as the Twenty Ninth Street Shopping Center. As Boulder develops a vision for its transit system, it will be important to prioritize direct frequent service that connects to regional destinations and safe and inviting access to/from transit stops to encourage those traveling in to Boulder to use transit.

A key challenge for Boulder will be to deliver high-quality, high-frequency (CTN level) service to areas with emerging land uses. Although compact, diverse, walkable destinations are required to support frequent service, sometimes the quality transit investment is needed to help developers justify those land uses as well as to accept lower parking standards, paid parking, and other key demand measures that make the CTN service level effective.

High frequent transit service connects key destinations like the Twenty Ninth Street Shopping Center to downtown and the University.
Image from Nelson\Nygaard

Density

The City of Boulder estimates that employment will increase by 19% between 2012 and 2035; dwelling units and population are also expected to grow by 12%, adding nearly 6,000 dwelling units and over 14,000 new residents to the community by 2035.[3] While Boulder is already seeing more infill and mixed-use development, a key challenge for the city will be to provide walkable urban form and affordable housing options for low- and middle-income workers so that people can continue to live and work in Boulder. An efficient transit system will be needed to accommodate land use and residential and employment growth while meeting the city's transportation and Climate Commitment goals.

Vehicle miles travelled decrease as density and a mix of uses increase. Decreasing the number of vehicle miles traveled will play an important role in meeting the community's Climate Commitment goals. The transportation sector currently accounts for 21.8% of the city's greenhouse gas emissions.[4] Concentrating and intensify activities and development near high frequency transit service can help support the community's climate goals. Continuing to invest in transit and bicycle infrastructure will not be enough to meet aggressive climate goals for transportation unless land use and housing affordability issues are addressed simultaneously. The VMT reduction benefits derived from increased land use density are eroded if average commute distances continue to climb.

3 City of Boulder Department of Community Planning and Sustainability.

4 City of Boulder. (2004). Climate Action Plan.

Mixed-use development is in the heart of downtown Boulder.
Image from Nelson\Nygaard

The Boulder Valley Comprehensive Plan Supports the 6D Framework:

Policy 2.09: Neighborhoods as building blocks

Policy 2.10: Preservation and support for residential neighborhoods

Policy 2.14: Mix of complementary uses

Policy 2.16: Mixed-use and higher density development

Policy 2.17: Variety of activity centers

Policy 2.18: Role of the central area

Policy 2.21: Commitment to a walkable and accessible city

Policy 2.22: Improve mobility grid

Policy 2.23: Trail corridors/linkages

Policy 2.36: Design excellence for public projects

Policy 6.09: Integration with land use

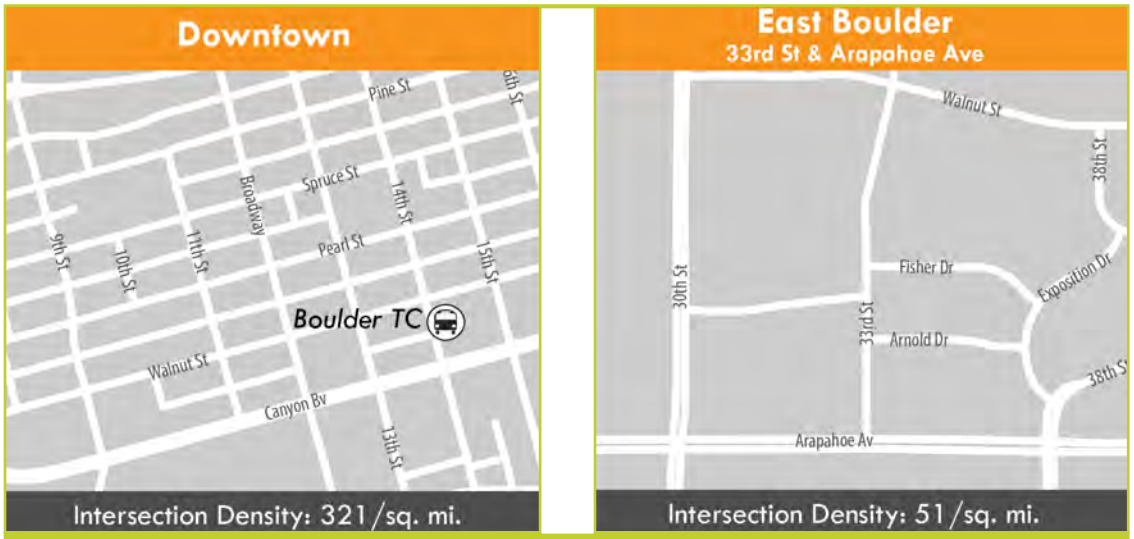
Policy 6.10: Managing parking supply

Policy 6.12: Neighborhood streets connectivity

Distance

A key to making transit, bicycling, and walking more attractive is minimizing the distance between destinations by providing direct connections at the neighborhood scale. Distance does not just refer to the actual distance from point A to B, but also the perceived distance based on quality of environment. In Boulder west of Folsom Street, the blocks are designed in a grid-like pattern and are short, providing multiple options for people to travel between destinations. Conversely, the post-World War II development pattern of East Boulder is made up of a windy street pattern with very large blocks. Along 30th Street between Arapahoe and Colorado avenues, there is no interconnected street network for nearly half a mile. This pattern makes it very difficult to cross 30th Street or walk efficiently between the CU East Campus and neighborhoods west of 30th Street.

Although some population and employment growth is projected to occur in areas with high street connectivity (downtown and the CU main and east campuses), much of the projected development is expected to occur in areas with lower street connectivity (see graphic at right). The area around Boulder Junction is projected to be one of the high-growth population and employment areas, while areas east of 47th Street and south of Valmont Road are expected to absorb much of the projected employment growth. As these areas in Boulder are redeveloped in the coming years, a fully built-out street network should be prioritized to facilitate safe and efficient access to transit. Boulder is a national leader in this arena and has already prioritized valuable new street connections in the Boulder Junction area.



Intersection density is a good measure for street connectivity and walkability. In downtown, there are 321 intersections per square mile, whereas east Arapahoe between 30th Street and Foothills Parkway only has 51 intersections per square mile.

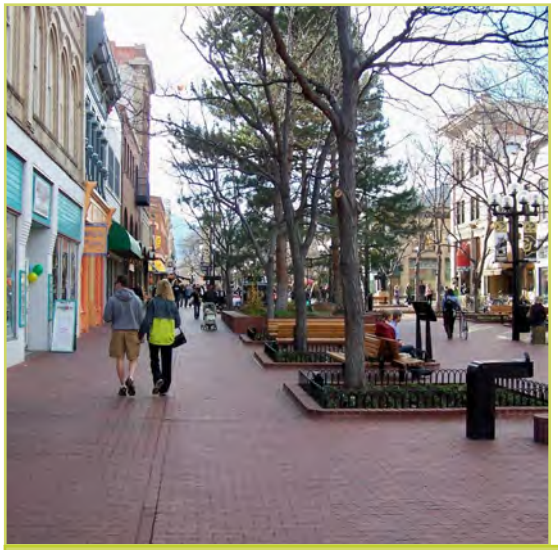
Image from Nelson\Nygaard

Diversity

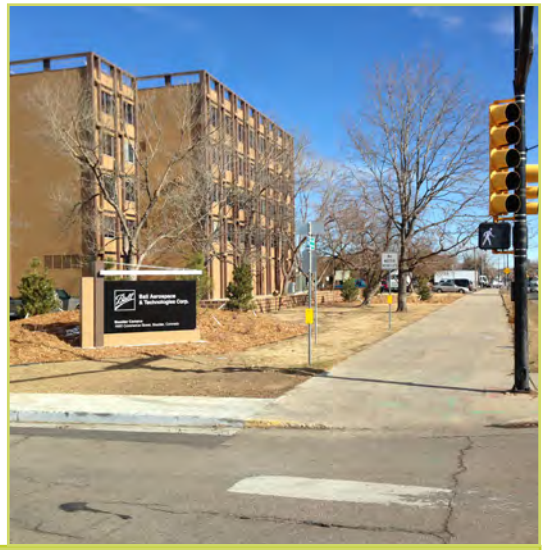
The most lively and attractive communities are those with a rich mix of pedestrian-friendly uses that facilitate street-level activity around the clock. Historic Pearl Street in downtown Boulder is spotted with cafes and shops on the street level and office space above. Pedestrians swarm the streets even in the coldest winter months. Pedestrian-scale buildings with lively facades adjoin the street, engaging pedestrians as they walk by. This diverse environment encourages walking and supports access to the high-frequency transit stops close by. As change occurs in areas outside of downtown, a mix of uses and diverse building facades along transit routes and major corridors will be critical to support easy access to transit and a rich urban environment.

There will never be enough retail market demand for all street-fronting buildings to have Pearl Street style ground floor retail. However, ensuring buildings front the sidewalk and have an inviting "face" to the street is essential. Street fronting townhouse entries, office, or civic uses housed in future retail space, or set back to provide small publicly accessible plazas are important to create a diverse pedestrian environment that supports transit use.

> "Almost nobody travels willingly from sameness to sameness and repetition to repetition, even if the physical effort required is trivial."
>
> -Jane Jacobs, *The Death and Life of Great American Cities*



A range of destinations – including retail, services, work, and eateries – make downtown Boulder an appealing place to walk.
Image from Flickr j stephen conn



Although there are wide sidewalks on this section of Arapahoe Avenue at Commerce Street in East Boulder, a lack of diversity in uses makes for a less appealing walking environment.
Image from Nelson\Nygaard

Design

High-quality pedestrian and bicycle facilities and transit waiting areas are critical to a complete transportation system. Boulder already has a robust bicycle network with 58 miles of paved multiuse pathways, 78 underpasses, 34 miles of roads with bike lanes on both sides, four miles of roadway with a climbing bike lane and downhill bike route, 10 miles of road with paved shoulders, 43 miles of roads designated as bike routes, and 10 miles of soft surface trails.[5] The Missing Sidewalk Links Program fills in missing sidewalks and the City's Sidewalk Repair Program repairs and installs missing curb ramps in the highest priority pedestrian zones. However, there are opportunities to improve the City's program to make the streets more pedestrian friendly, particularly in East Boulder. Landscaped buffers between the sidewalk and traffic lanes and improved pedestrian lighting, particularly on high volume arterials like Arapahoe, 30th and Colorado avenues, will be important to improve the walking environment and comfortably connect people to transit stops and street crossings, destinations, multi-use paths and bike network, etc.

In addition to the bicycle and pedestrian network, transit stops are important community gathering places that should be designed to attract people. Although high-boarding RTD transit stops typically include seating, a trash can, bike parking, and an enclosed shelter, the physical design of the space could be improved. Moreover, many stops in Boulder only include an RTD sign. As Boulder continues to refine the street network and build out transit service in new areas, transit stop design should be considered to attract more transit riders and contribute to the urban fabric. *See the "Placemaking" section in Chapter 6: Transportation and Land Use for more details on best practices in transit station design (page 6-11).*

The Broadway (Euclid to 18th) Transportation Improvement Project provides a safe underpass connection for students and residents between the CU main campus and the CU Transit Station, one of the busiest transit stops in the RTD system with more 1,280 buses stopping every day -- more than twice the number of buses that stop at Market Street Station in downtown Denver.
Image from Nelson\Nygaard

While the standard RTD transit stop provides all the right amenities (seating, trash receptacle, bike parking, and cover from inclement weather), the design could be improved to foster community gathering places.
Image from Nelson\Nygaard:

5 City of Boulder. (2012) "Report on Progress."

Demand Management

Boulder has an innovative approach to managing transportation demand. From subsidized transit passes to managed parking in the downtown core and at the University, Boulder has taken a bold step to manage employee and visitor access.

Parking in Boulder

Parking plays a central role in our transportation and planning decisions. Boulder Parking Districts are guided by the following principles: shared, unbundled, managed, and paid. Too much parking communicates that driving is easy and can be a first travel choice, while too little parking can deter access to a site or neighborhood and harm economic vitality.

The City of Boulder currently manages two, paid parking districts: downtown and University Hill. The downtown district is a 35-block district between Pine Street and Arapahoe (north to south) and 9th Street and 18th Street (east to west). The University Hill District is a five-block district in the commercial area adjacent to the University of Colorado. The Boulder Junction Access General Improvement District has been established as a third district in anticipation of the Boulder Junction development. This district includes both a Parking and a TDM District to help manage access to the area and meet the area's vehicle trip generation allowance.

The Central Area General Improvement District is a 35-block, paid parking district in downtown Boulder.
Source: City of Boulder

The mixed-use parking garage on the corner of 15th Street and Pearl Street won an award from the Congress for the New Urbanism for its approach to mixing parking spaces with retail and office space.
Image from flickr payton chung

Boulder is a national leader in the development of well-designed parking structures. Urban design criteria have been codified into the local zoning code and building standards, such as the requirement for incorporating street-level retail in all parking structures. There are seven parking structures downtown, all of which are aesthetically integrated into the urban fabric because they are wrapped with a mix of uses.

The Boulder land use code also manages the availability of parking starting at the development review process. In Boulder Junction, for example, the land use code includes a parking maximum of one space per dwelling unit for mixed-use development and high density residential (RH-7). Bicycle parking is required throughout the city (at least four spaces or at least one space for every 10 dwelling units, whichever is greater, for mixed-use development and high density residential (RH-7 and RH-3).[6]

Expansion of Downtown Boulder parking management policies and regulations to East Boulder neighborhoods (in a context-sensitive fashion) will be critical to meeting TMP goals.

6 City of Boulder. Chapter 9-9: Development Standards. Section 9-9-6 Parking Standards.

Eco Pass Program

The Eco Pass Program is an annual RTD transit pass for unlimited regional, express, local bus, and light rail service throughout the Denver and Boulder regions. More than 76,000 residents in Boulder County have access to an Eco Pass *(see page 4-2 for more details)*. Surveys show that residents who hold an Eco Pass are five to nine times more likely to ride transit. In 2012, $773,750 in downtown parking revenue was used to fund Eco Passes for 6,190 downtown employees.

The City is partnering with Boulder County to evaluate expansion of the Eco Pass program, which could well be among the most cost-effective means to meet TMP mode share goals. Other transit agencies with similar programs have found that ridership increases 50 – 100% upon implementing a similar "ecopass" style pre-paid fare program *(see Chapter 6 "Fares and Funding" on page 6-47)*.

Transportation Management Organizations

Transportation Management Organizations (TMOs) are membership-based organizations that work with local businesses, residents, and city leaders to enhance travel options in Boulder. TMOs in Boulder are located in two important and growing areas: Boulder Transportation Connections serves the city of Boulder with a focus on employer outreach and Business Eco Pass expansion; US 36 Commuting Solutions serves the residents and businesses along the US 36 corridor.

Boulder County Eco Pass Feasibility Study

In 2013, Boulder County, in partnership with the City of Boulder, launched a study to determine the feasibility of instituting a countywide Eco Pass. The study will identify options for how the program could be structured, paid for, and priced.

US 36 First and Last Mile Study

In 2013, US 36 Commuting Solutions sponsored a First and Last Mile Study to identify opportunities to connect RTD riders to and from the US 36 Bus Rapid Transit stations and surrounding areas. Opportunities that were identified included electric bikes, shuttle circulators, station cars, scooters or golf carts, and improved signage.

This study identified suitable options to better connect RTD riders to/from the US 36 Bus Rapid Transit (BRT) stations and the surrounding activity centers utilizing such transportation demand management tactics as bike share, shuttle circulators, station cars, scooters or golf carts, as well as bicycles.

View the full report here.

The First and Last Mile Study sponsored by US 36 Commuting Solutions identified opportunities, such as BCycle, to connect RTD riders to/from the US 36 BRT stations and surrounding areas.
Image from Nelson\Nygaard

Travel Demand in Boulder

Assessing the market for public transportation between Boulder neighborhoods and between Boulder and the region is a foundational component of the transit element of the TMP. A range of factors combine to affect the demand for transit in Boulder and the region. Some are quantifiable; others are more subtle. Extensive industry research shows that the built environment – including land use density and mix of uses, neighborhood form, and connectivity in the transportation network – significantly impacts travel behavior. Compact development is also linked to positive externalities such as reduced greenhouse gas emissions, community health, and improved livability. This section provides an overview of existing travel patterns in Boulder and how existing and future land use patterns and demographic trends may influence the demand for transit in Boulder and the region.

How the City of Boulder Compares to the Region

Compared to the Denver region and the nation, the city of Boulder has:

- The highest number of people who bike to work (10.5% compared to 0.8% in Denver and 0.5% in the nation)
- The highest number of people who walk to work (9.1% compared to 2.1% in Denver and 2.8% in the nation)
- Twice the Denver and national average for transit use

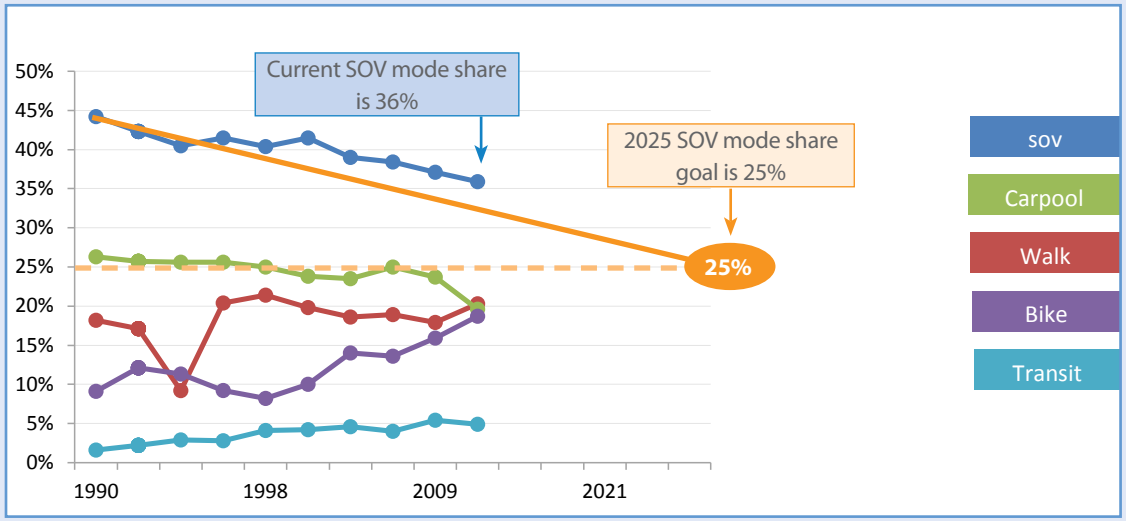
Source: City of Boulder. (2012) "Boulder Report on Progress"

How do people travel ***within*** Boulder?

The 2008 TMP includes an objective of 25% single-occupancy vehicle (SOV) use by the year 2025 for all trips by Boulder residents. As shown in Figure 3-3, the City of Boulder is not on course to meet this goal. In 2012, the SOV mode split for all trips was 35.9%. To meet the SOV goal by 2025, SOV trips between 2013 and 2025 would have to shift at an average rate of 2.5% per year.

Compared to "all trips", the SOV rate for commute trips in Boulder is higher at 48.5% in 2012 (*see Figure 3-4 on page 3-12*).

Figure 3-3 City of Boulder Mode Split for All Trips, 1990 – 2012

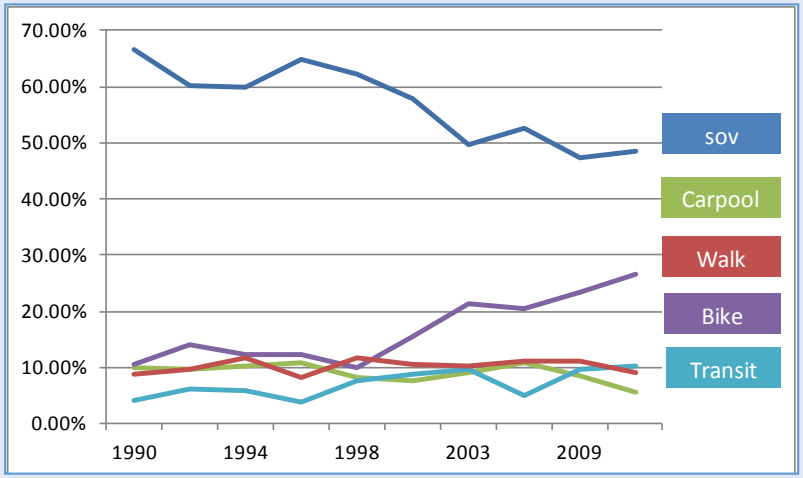


Source: Mode Shift in the Boulder Valley, 1990 – 2012

Compared to the Denver region and the nation, Boulder residents are twice as likely to take transit to work, walk more than three times as often, and are more than five times as likely to bike to work (see Figure 3-5). Boulder residents are also nearly three times as likely to work from home.

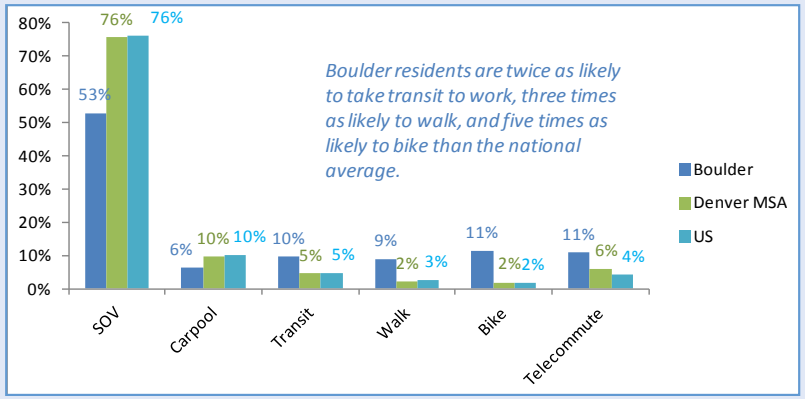
Looking at the types of trips in the region can help inform transit service planning and the marketing efforts that Boulder and its partners will use to encourage people to take transit more often and for more types of trips. In 2012, most of Boulder residents' trips were for the purpose of work (not including those identified as "home trips") followed by social/recreation trips. The goal of the Transportation Master Plan Update will be to shift all types of trips to transit, biking, and walking.

Figure 3-4 City of Boulder Mode Split for Commute Trips, 1990 – 2012



Source: Mode Shift in the Boulder Valley, 1990 – 2012

Figure 3-5 Comparison of Commute Mode Share in Boulder, Denver Metropolitan Statistical Area, and the U.S.



Source: American Community Survey Five-Year Estimates (2007 – 2011)

Note: The commute mode share in this figure is different than the mode share in Figure 3-3 due to different data sources (2012 Travel Diary compared to 2007-2011 American Community Survey)

How do people travel *to* Boulder?

In 2012, of the 99,400 employees in Boulder, approximately 59% (or 59,000) lived outside of Boulder (see Figure 3-6). By comparison, only 41% of employees (40,400) both live and work in Boulder.

The number of employees commuting into Boulder has grown (as a percent of total employees and as a total number employees) over the last six years, from 51,556 employees in 2006 (or 52%) to 59,000 employees in 2012 (59%).

It should be noted that this data includes commute trips only; it does not account for students traveling to school. Between 1993 and 2009, the percent of University of Colorado students living outside of Boulder also increased from 15% of undergraduates in 1993 to 41% in 2009 (not including students who live on campus).

The majority of Boulder in-commuters drive to work alone. Figure 3-8 shows the mode share for commuters traveling to Boulder for work from areas outside the city. Eighty percent drive alone, compared to 48.5% of Boulder residents who commute within Boulder for work.

7 University of Colorado.

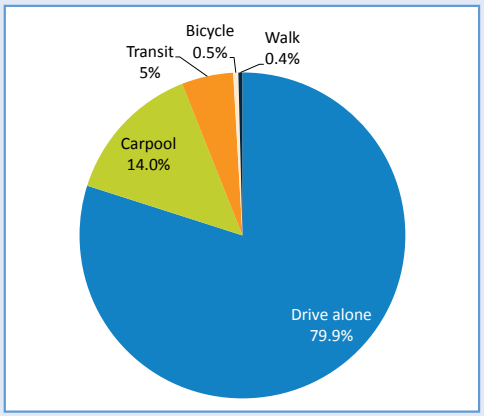
Figure 3-6 Boulder Employee Commute Patterns

	2006		2008		2010		2012	
	# of Jobs	% of Jobs	# of Jobs	% of Jobs	# of Jobs	% of Jobs	# of Jobs	% of Jobs
TOTAL JOBS	98,400	100%	97,753	100%	96,800	100%	99,400	100%
In-Commuters	51,556	52%	52,852	54%	52,907	55%	59,000	59%
Live Here/Work Here	46,844	48%	44,901	46%	43,893	45%	40,400	41%
Out-Commuters	13,992		11,733		10,296		13,500	

Source: City of Boulder

Notes: The City of Boulder commuting estimates are a labor force driven estimate, using a mixture of federal and local data sources, and a set of local and state assumptions and factors. The estimate begins with an estimated number of households (City and State estimate), and develops a resident labor force (the population of workers) using a factor of 1.3 workers per household (State Department of Labor). The total employment estimate is developed using US Bureau of Labor Statistics data, reviewed for accuracy at a local level by the University of Colorado at Boulder LEEDS School of Business – Business Research Division, and a self employed factor (10%) is applied to establish a total jobs estimate.

Figure 3-7 Boulder Employee In-Commute Mode Share



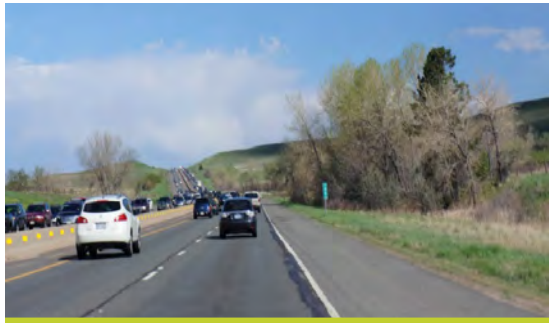
Source: Census Transportation Planning Products (CTPP). 2006 – 2008 American Community Survey "Journey to Work."

Note: In-commute data is not available for communities with fewer than 20,000 residents. For example, employees from the following communities in Boulder County traveling to Boulder for work were not counted: Jamestown, Louisville, Lyons, Nederland, Ward, Superior, or Erie.

What are the Existing Land Use Patterns?

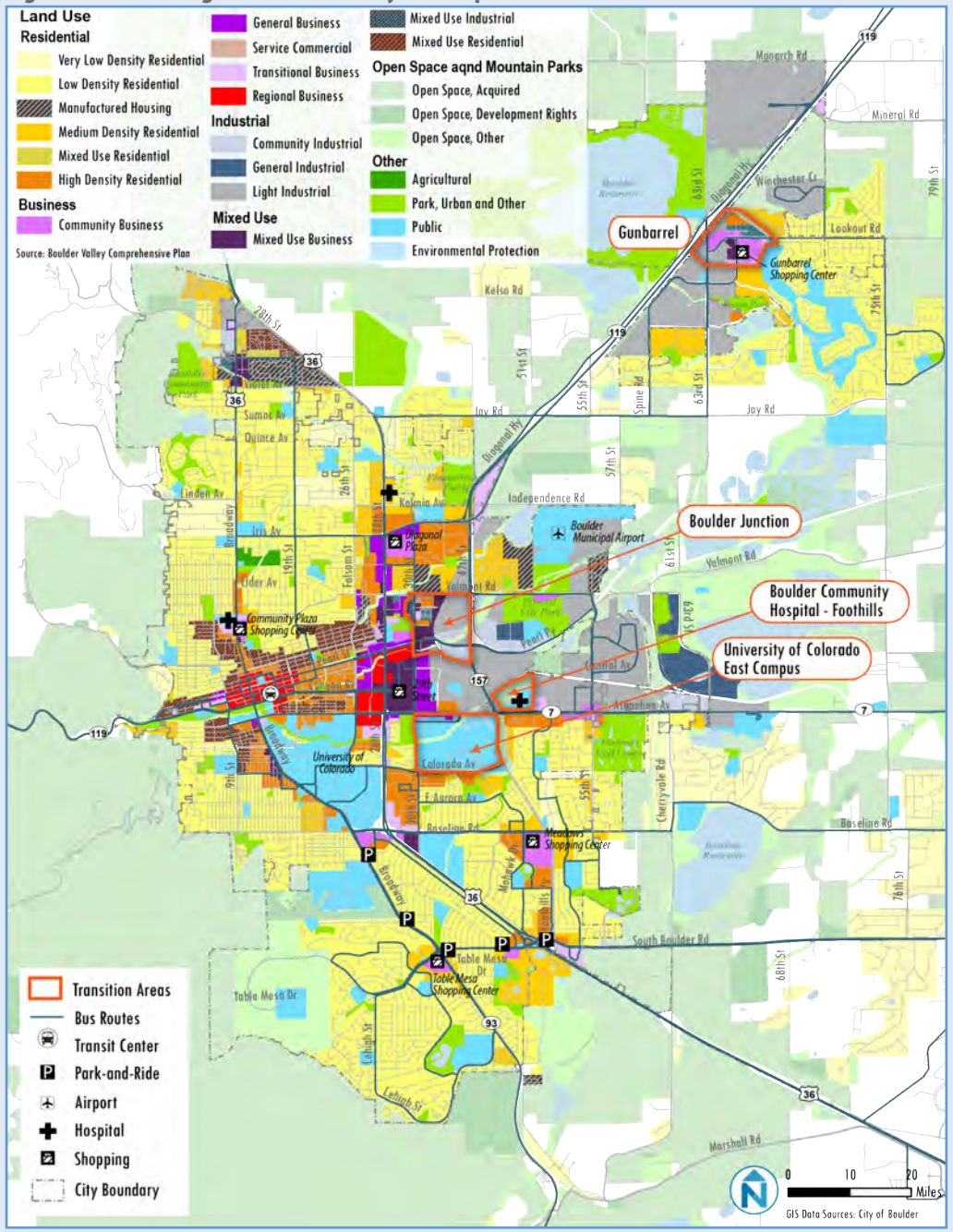
Figure 3-8 shows the existing land use designations and future development areas in Boulder.

- Boulder has a long history of transit-supportive land use practices and urban design principles that have primarily been realized in downtown Boulder.
- Mixed-use development is located primarily in the central core of the city.
- Higher density residential is primarily in downtown Boulder near the Transit Center and scattered throughout the city to the immediate east and west of the University and between 30th Street and 47th Street surrounding Diagonal Plaza.
- Boulder has significant areas of single-family residential developments to the north of downtown, south of the University of Colorado, and in Gunbarrel.
- Industrial, manufacturing, and warehousing is concentrated east of 30th Avenue, north of Arapahoe, and south of Independence Road.



Commute traffic on US 36 is already an issue. With projected increases in population and employment along the US 36 corridor between Boulder and Denver, traffic volumes are projected to increase dramatically over the next two decades.
Image from Nelson\Nygaard

Figure 3-8 Existing Land Use and Key Development Areas

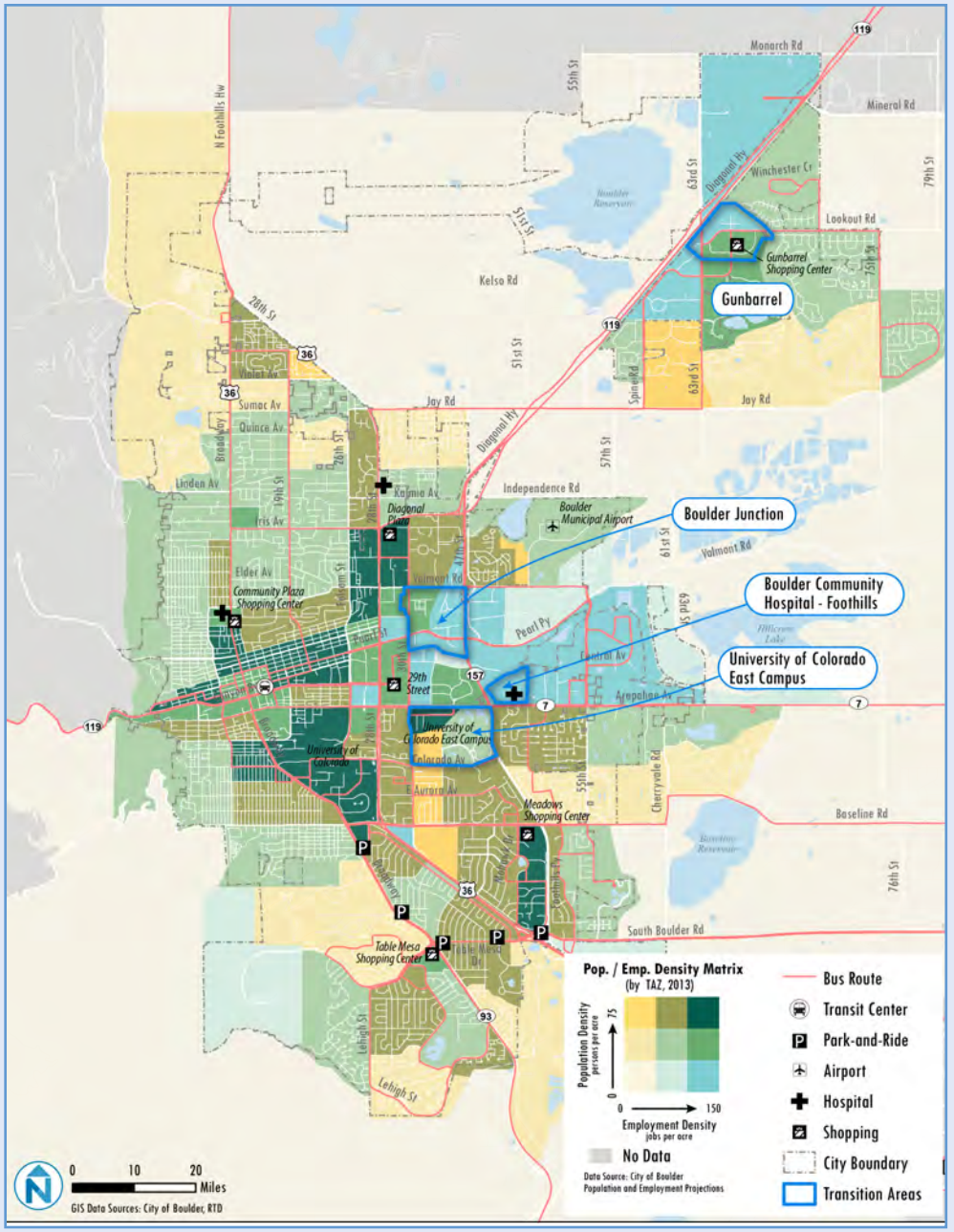


Where do People Live and Work in Boulder?

Figure 3-9 shows the population and employment density in Boulder in 2013.

Population and employment density have a significant impact on transit demand. As density increases, incentives to use transit (or disincentives to driving) such as traffic congestion, parking availability, and parking rates tend to increase. Areas of high employment and residential density (mixed-use areas) are primarily in downtown, at the University, and along 28th Street from downtown to Iris Avenue. Areas of high employment-only density in Boulder are found in East Boulder.

Figure 3-9 Population and Employment Density, 2013



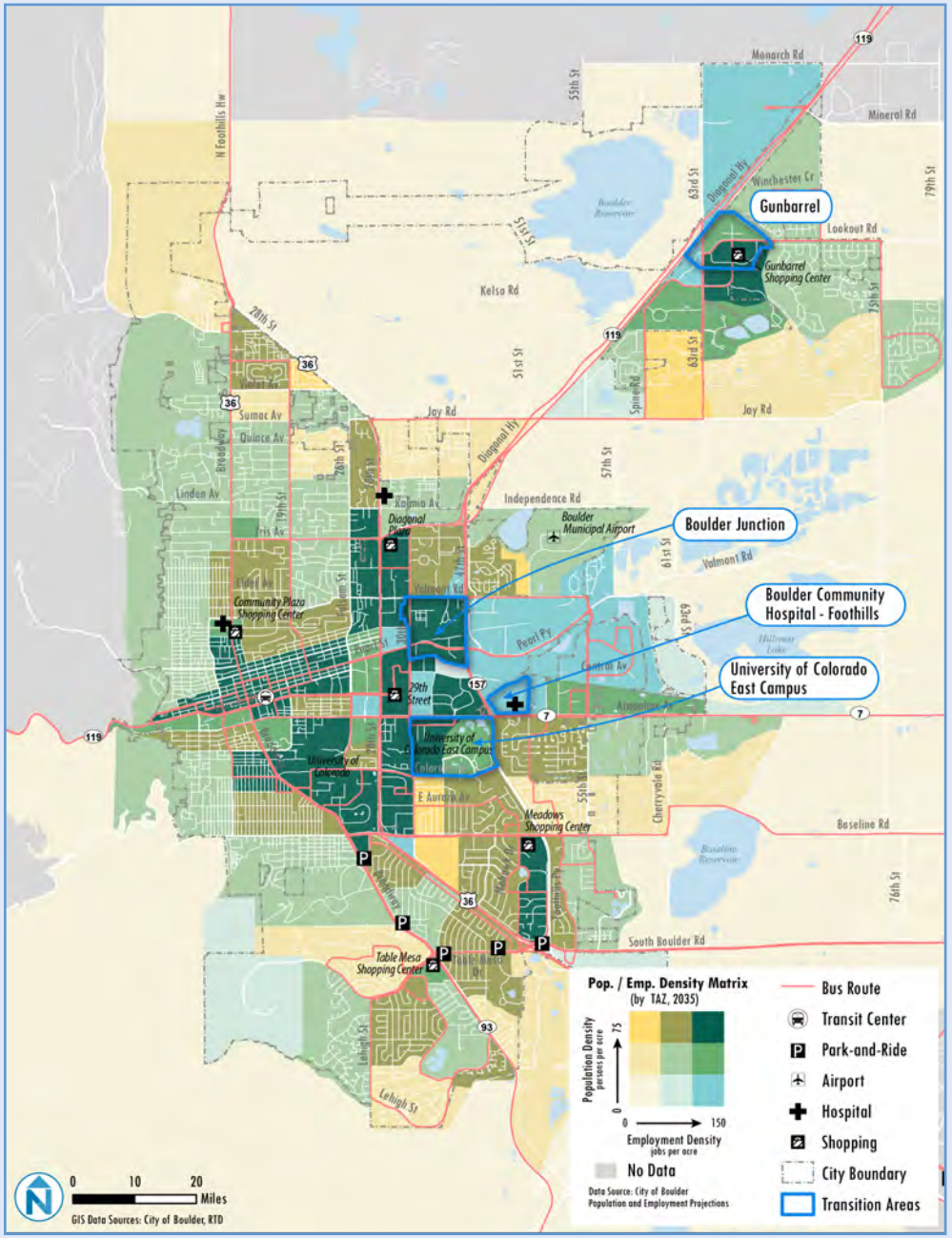
How will Population and Employment Density Change by 2035?

Figure 3-10 shows the projected change in employment and residential density in Boulder between 2013 and 2035. By 2035, high employment and residential density is expected to fill in around 30th Street and Pearl Parkway – the future home of Boulder Junction. Residential and employment density is also expected to increase between 28th Street and 30th Street to the west of the CU East Campus, east of the Boulder Community Hospital along Arapahoe Street, and in Gunbarrel south of Lookout Road between 63rd Street and Spine Road.

Population and employment is also expected to increase in Boulder County. Population and employment in Larimer, Weld, Jefferson, and Broomfield counties is expected to exceed growth in Boulder County.[8]

8 Boulder County. 2012. Transportation Master Plan.

Figure 3-10 Projected Population and Employment Growth, 2013-2035



Where are People most Likely to be Transit Dependent?

The transit use propensity (TUP) index combines the strongest indicators of transit demand. The TUP is based on population and employment densities, a transit dependency index (low-income households, persons with disabilities, and seniors aged 65+), and rates of access to automobiles.

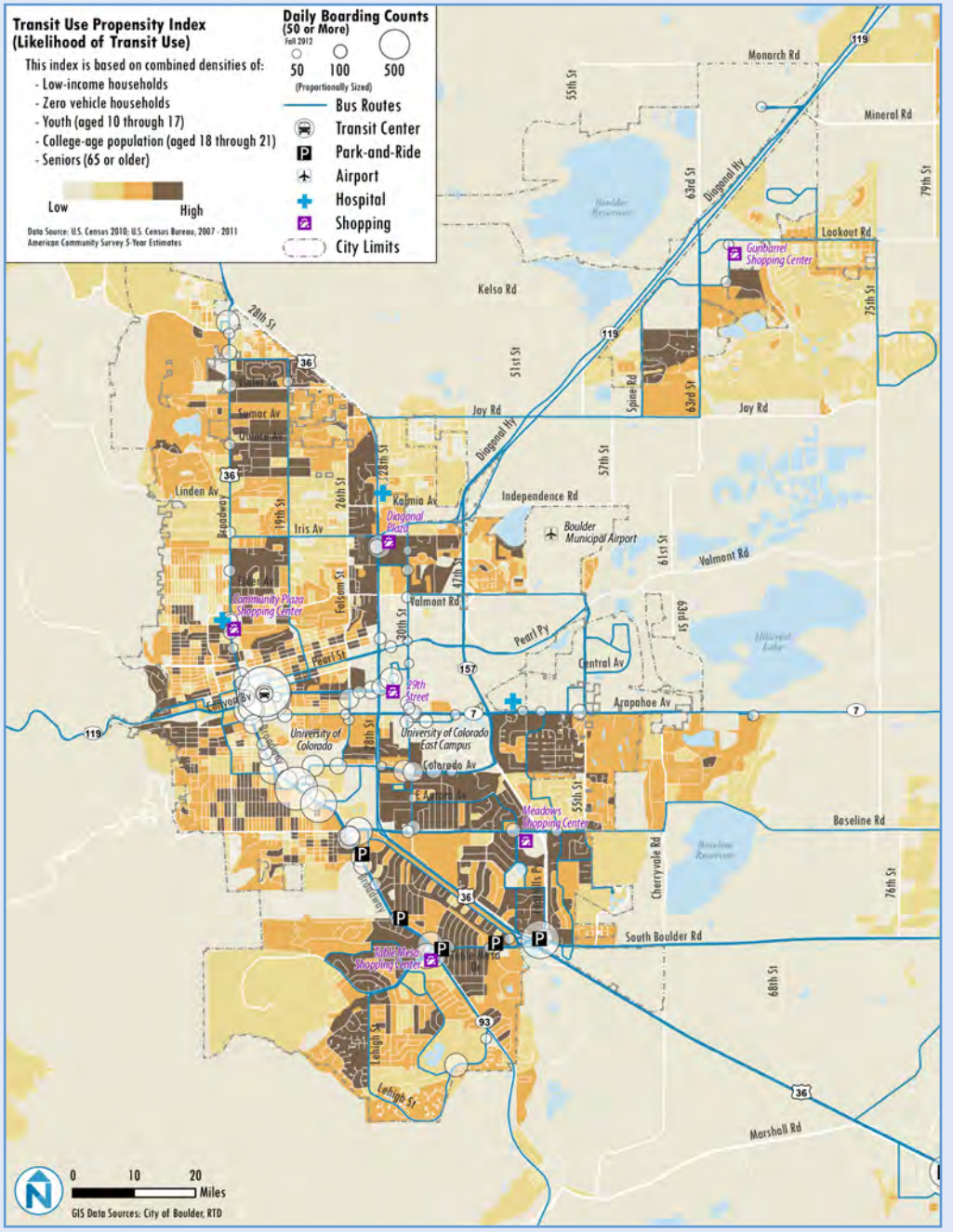
TUP scores are the highest in neighborhoods around the University of Colorado, in south Boulder, and along 28th Street in north Boulder (see Figure 3-12). Figure 3-11 provides a summary of demographic characteristics in Boulder that likely affect the demand for transit. Compared to Colorado, the proportion of seniors and youth is approximately the same, however the proportion of college age students in Boulder is nearly double that of the state. The percent of the population whose income is below the poverty level is also considerably higher in Boulder (21% compared to 13% in the state). This is likely influenced by the large number of university students in Boulder.

Figure 3-11 Summary of Demographic Characteristics in Boulder

Demographic Category	City of Boulder		Colorado	
	Number	%	Number	%
Total Population	97,385		5,029,196	
Senior (65+)	8,704	9%	533,046	11%
Youth (10-17)	5,705	6%	275,905	5%
College Age (18-21)	19,158	20%	549,625	11%
Population whose income is below the poverty level	19,170	21%	607,727	13%
No Vehicle Households	3,209	8%	111,148	6%

Source: Census 2010 and 2007-2011 ACS 5YR Estimates

Figure 3-12 Transit Use Propensity Index



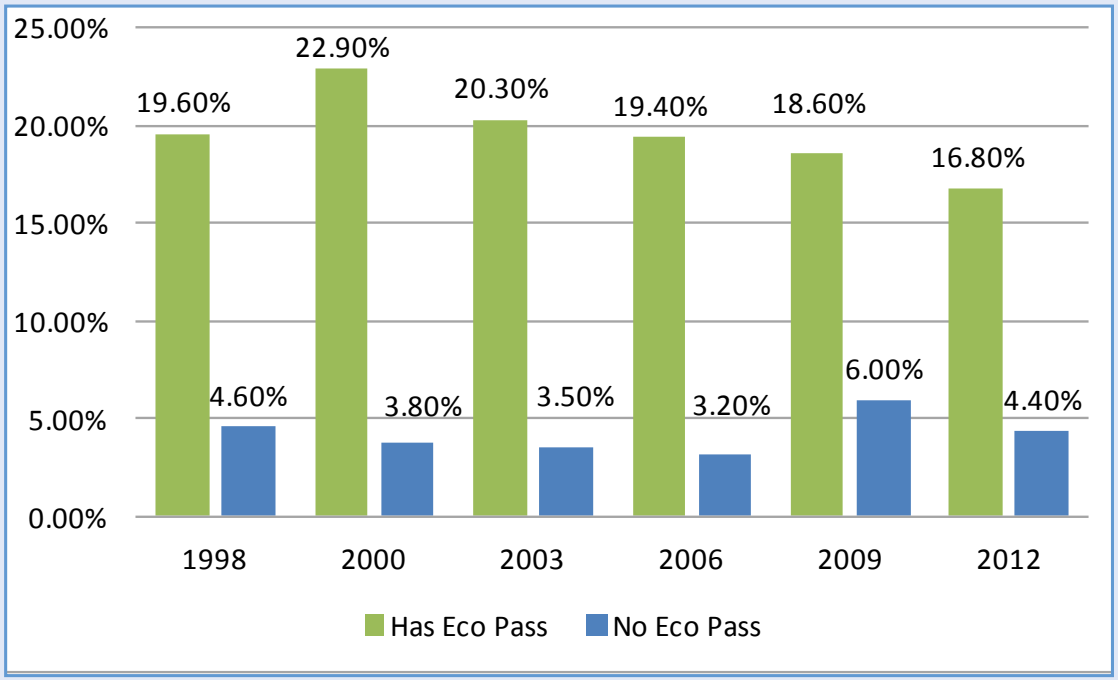
Where do People Access Transit?

Figure 3-14, Figure 3-15, and Figure 3-16 provide a summary of downtown Boulder, local/in-county, and regional ridership by stop. In Boulder, daily boardings are the highest in downtown, at the University of Colorado, Fairview High School, major shopping destinations such as the Twenty Ninth Street Mall and Diagonal Plaza, and at major park and ride facilities in south Boulder (the three park and rides on Table Mesa Road). Areas with managed (paid) parking in downtown (between 9th and 18th) and at the University show particularly high ridership.

In the communities surrounding Boulder, high-boarding stops are primarily located at park and ride stations. Strong ridership is already evident along the US 36 corridor (Figure 3-16).

Figure 3-17 and Figure 3-18 show the concentration of Business Eco Pass and Neighborhood Eco Pass holders (respectively) compared to average daily ridership. While ridership can be correlated to community Eco Pass holders in some cases, land use is the dominant predictor of ridership. However, ridership has been positively associated with having an Eco Pass. Since 1998, between 3% and 6% of non-Eco Pass holders made at least one trip by bus compared to between 17% and 23% of Eco Pass holders (see Figure 3-13 at right). Thus, Eco Pass holders have a greater propensity to use transit.

Figure 3-13 Bus Ridership by Eco Pass Status: Percent of Respondents Who Made at Least One Trip on the Bus



Source: City of Boulder Modal Shift in the Boulder Valley, 1990 – 2012

Figure 3-14 Average Daily Ridership in Downtown Boulder

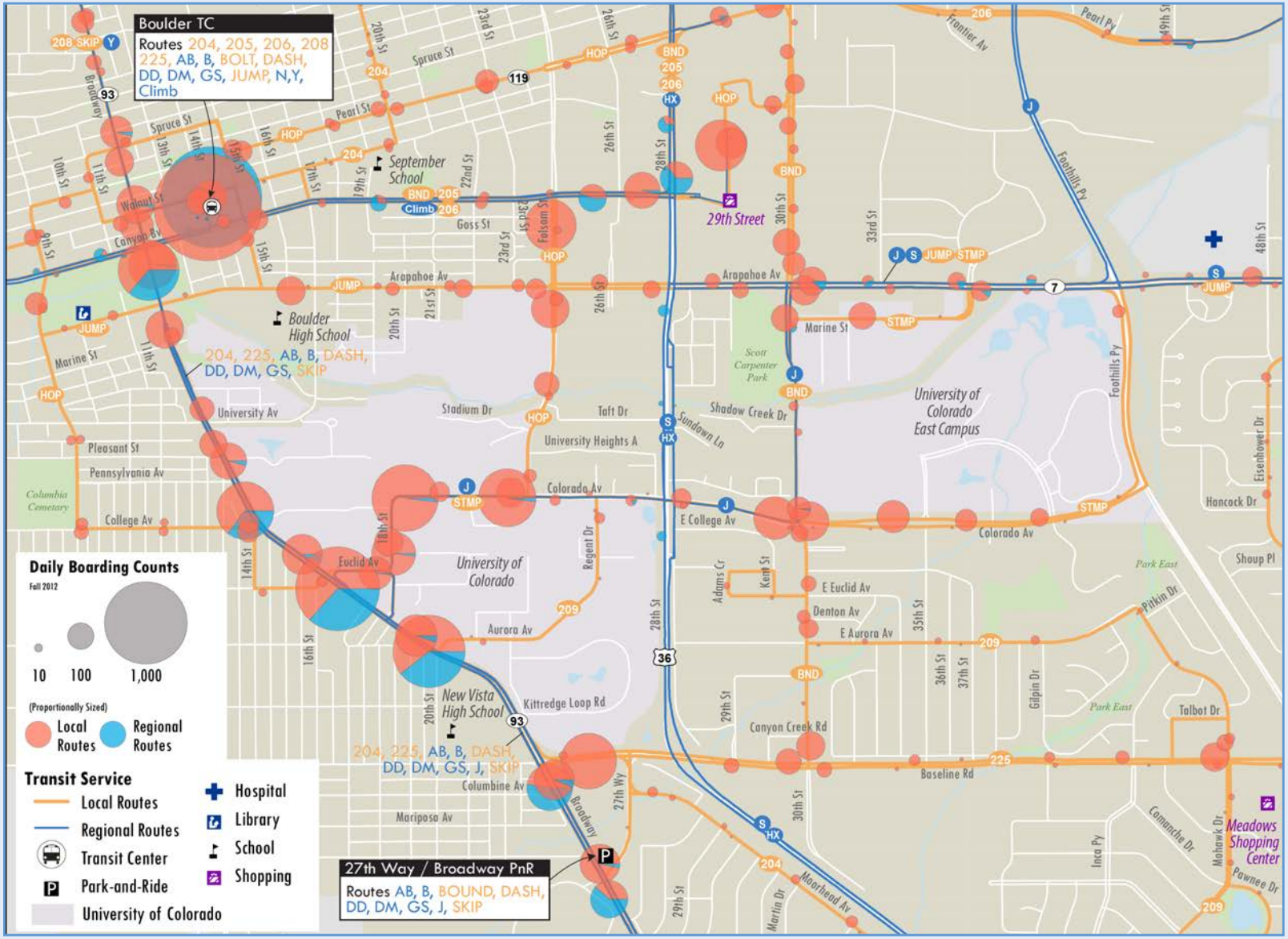


Figure 3-15 Average Daily Ridership in Boulder and Boulder County

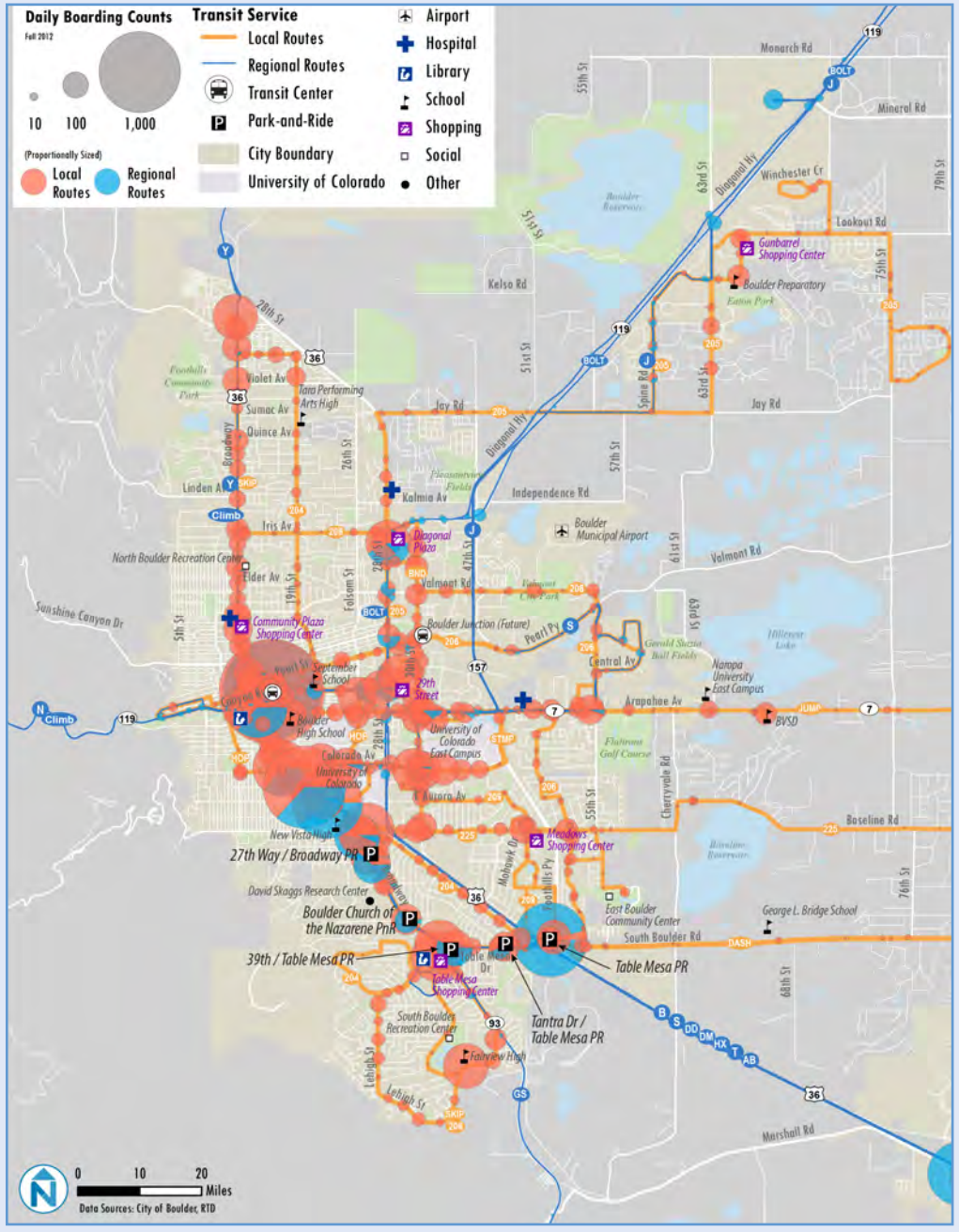


Figure 3-16 Average Daily Ridership in the Region

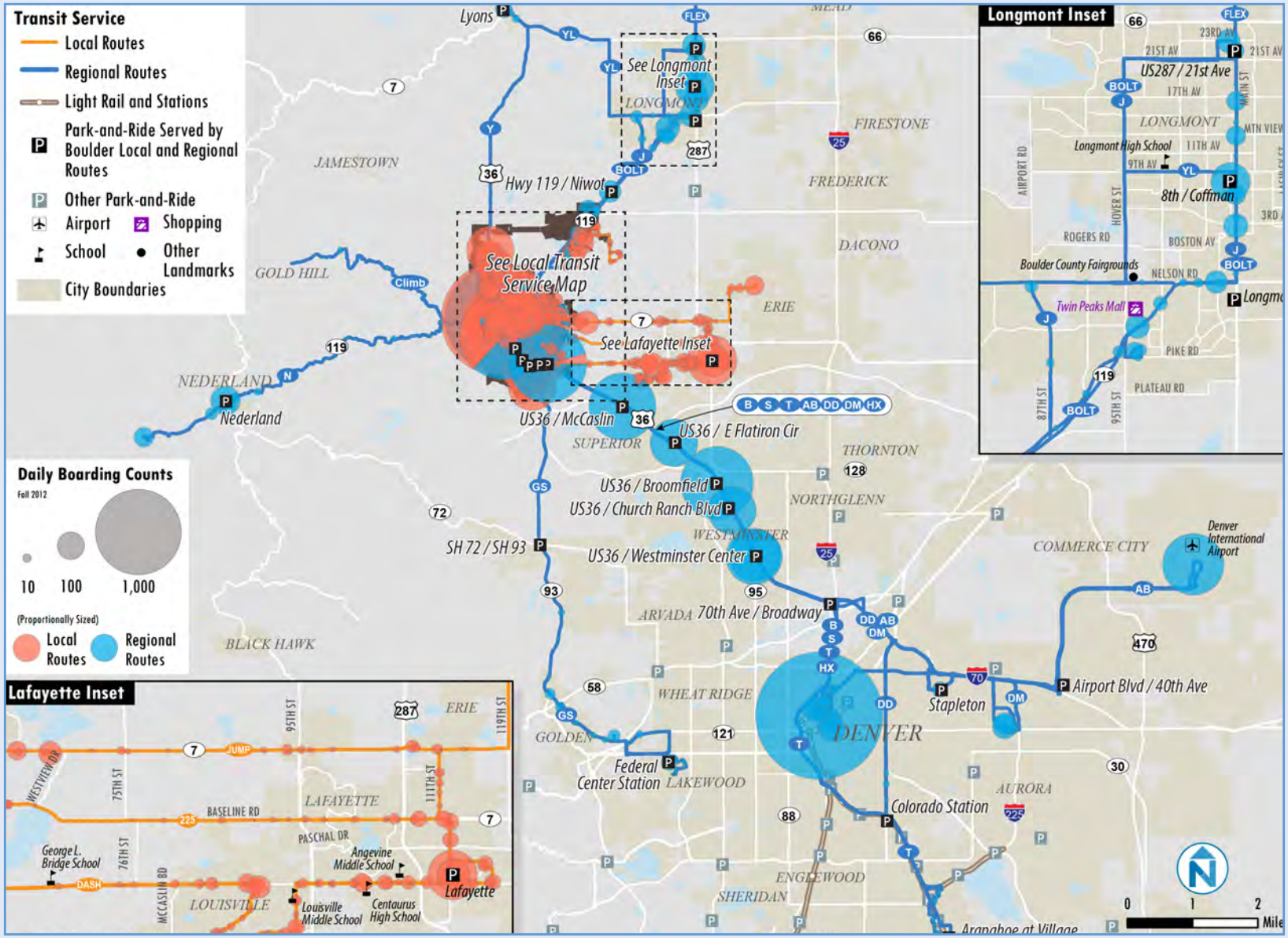


Figure 3-17 Ridership Compared to Business Eco Pass Holders

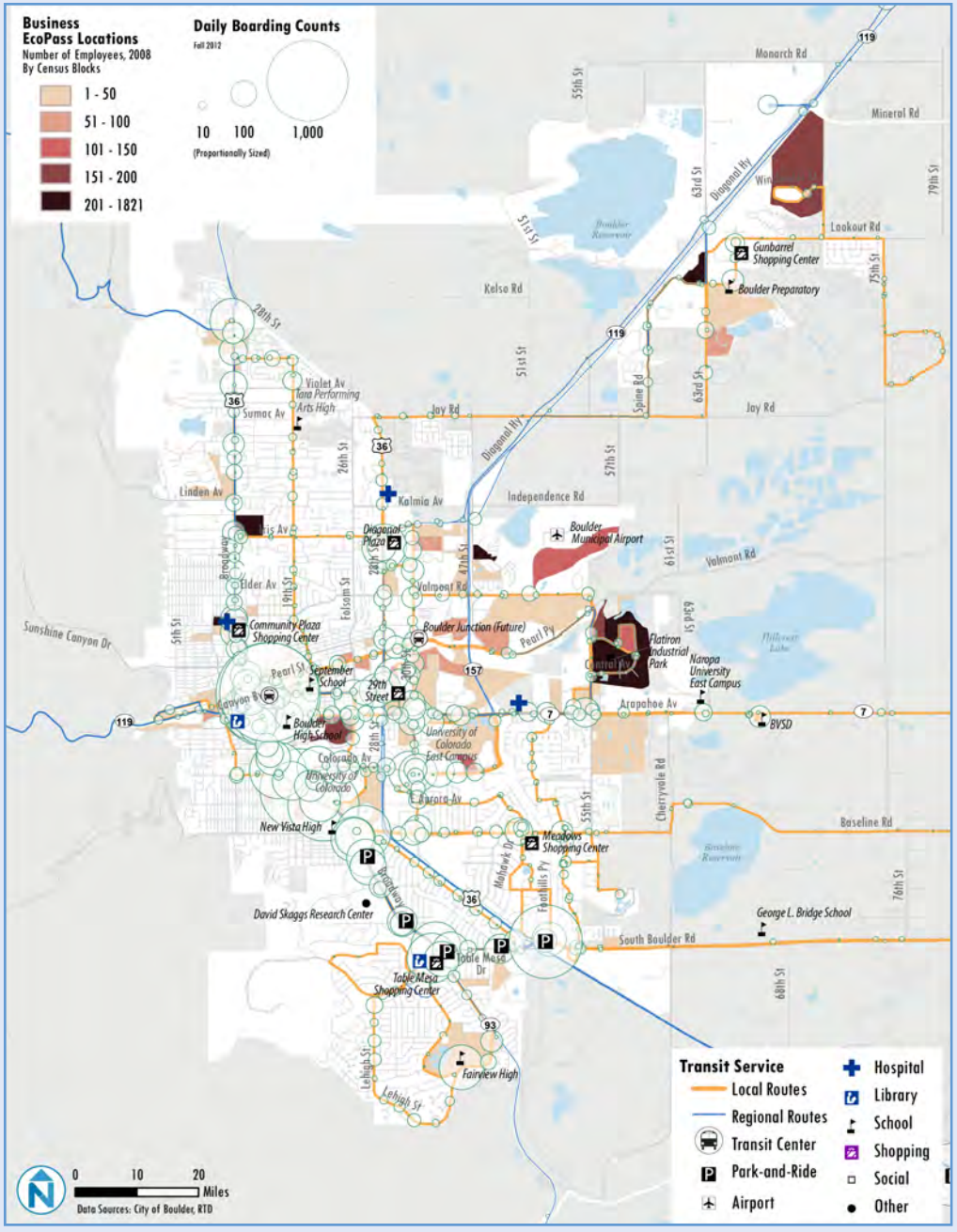
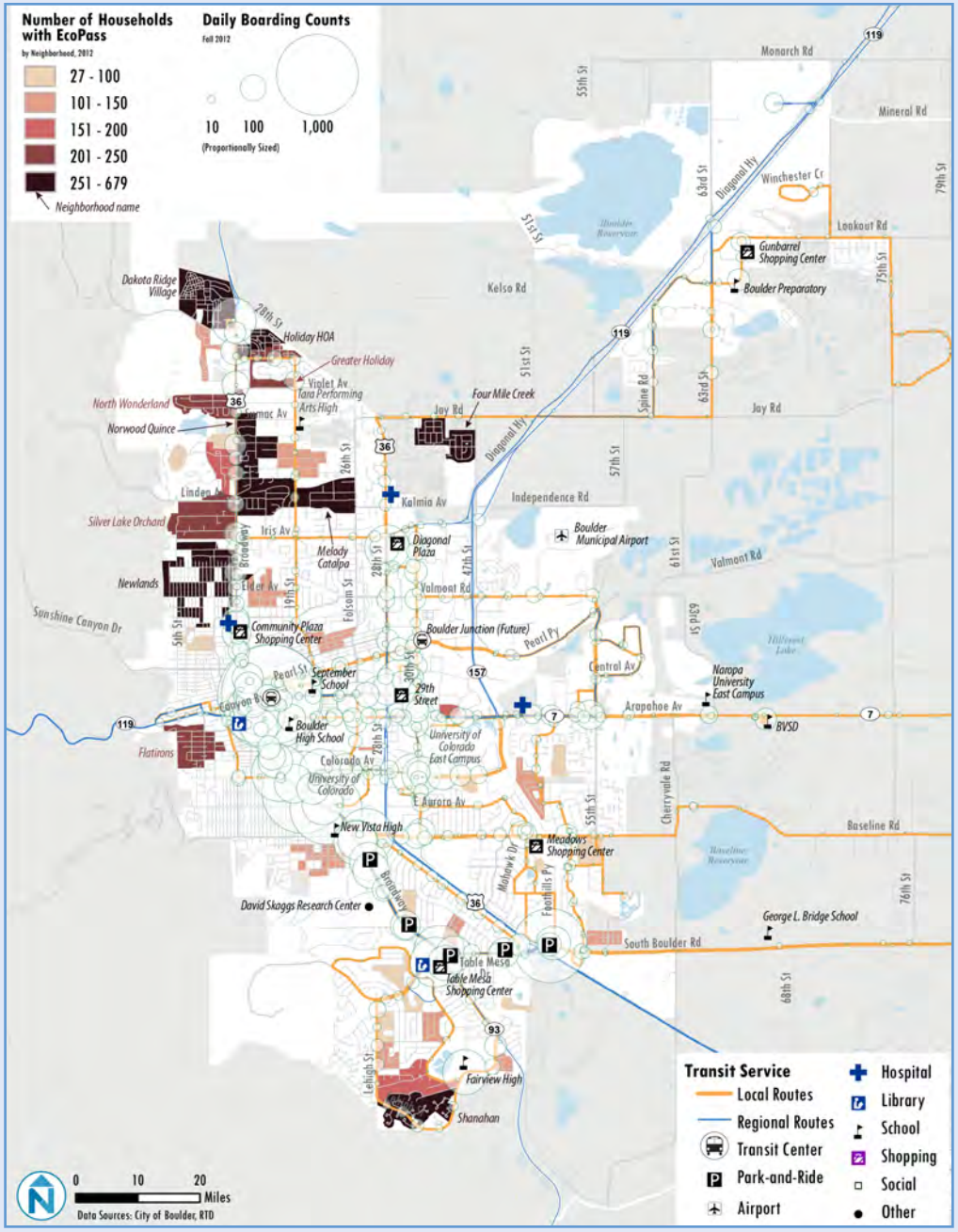


Figure 3-18 Ridership Compared to Neighborhood Eco Pass Holders



Where are People Traveling?

A key goal of the Boulder TMP is to capture more walking, biking, and transit trips. To plan effectively for these changes, it is important to know where trips start and end today and how trip making might change in the future. This analysis is based on the Denver Regional Council of Governments (DRCOG) regional model using origin-destination data for the year 2010 and a forecast of trips for the year 2035. In this section, this data is summarized and illustrated to describe travel demand between Boulder neighborhoods and between Boulder and the region. The maps in Figure 3-19 through Figure 3-22 illustrate major point-to-point travel patterns.

Since it is not possible to analyze every individual point of travel, this analysis uses two levels of geographic zones:

1. Local Market Analysis Areas: The DRCOG travel demand model in Boulder evaluates travel between 156 travel analysis zones (TAZs) in Boulder and Gunbarrel.
2. Regional Market Analysis Areas: These zones are organized to represent areas of the region that flow into Boulder on the relatively few major highway and transit corridors that enter the city.

In the following maps, it is important to consider the following:

- Data is from the 2010 regional travel demand model and is calibrated using actual travel counts where available; however, much of the data is simply a calculation of pre-sumed travel behavior based on model algorithms.
- Trips internal to the local and regional market analysis areas are not illustrated.
- The point-to-point analysis does not consider assignment of trips available to streets or transit routes. In viewing the data, it is helpful to think about how various point-to-point travel markets aggregate in actual travel corridors.
- Trips are not segregated by mode, trip purpose, or time of travel (i.e. peak vs. off-peak).

Figure 3-19 Origin-Destination Pairs in Boulder (2010)

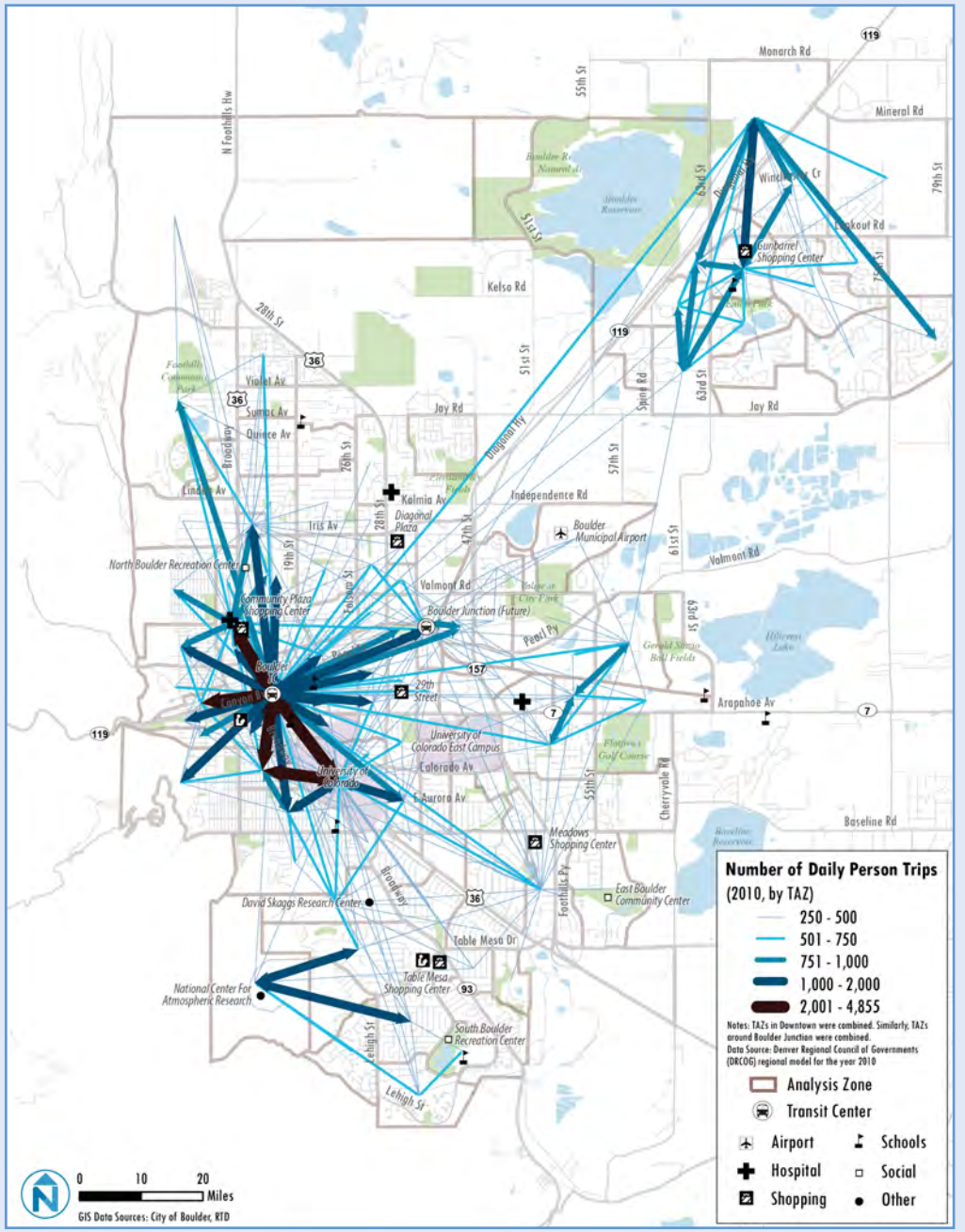


Figure 3-20 Origin-Destination Pairs in the Region (2010)

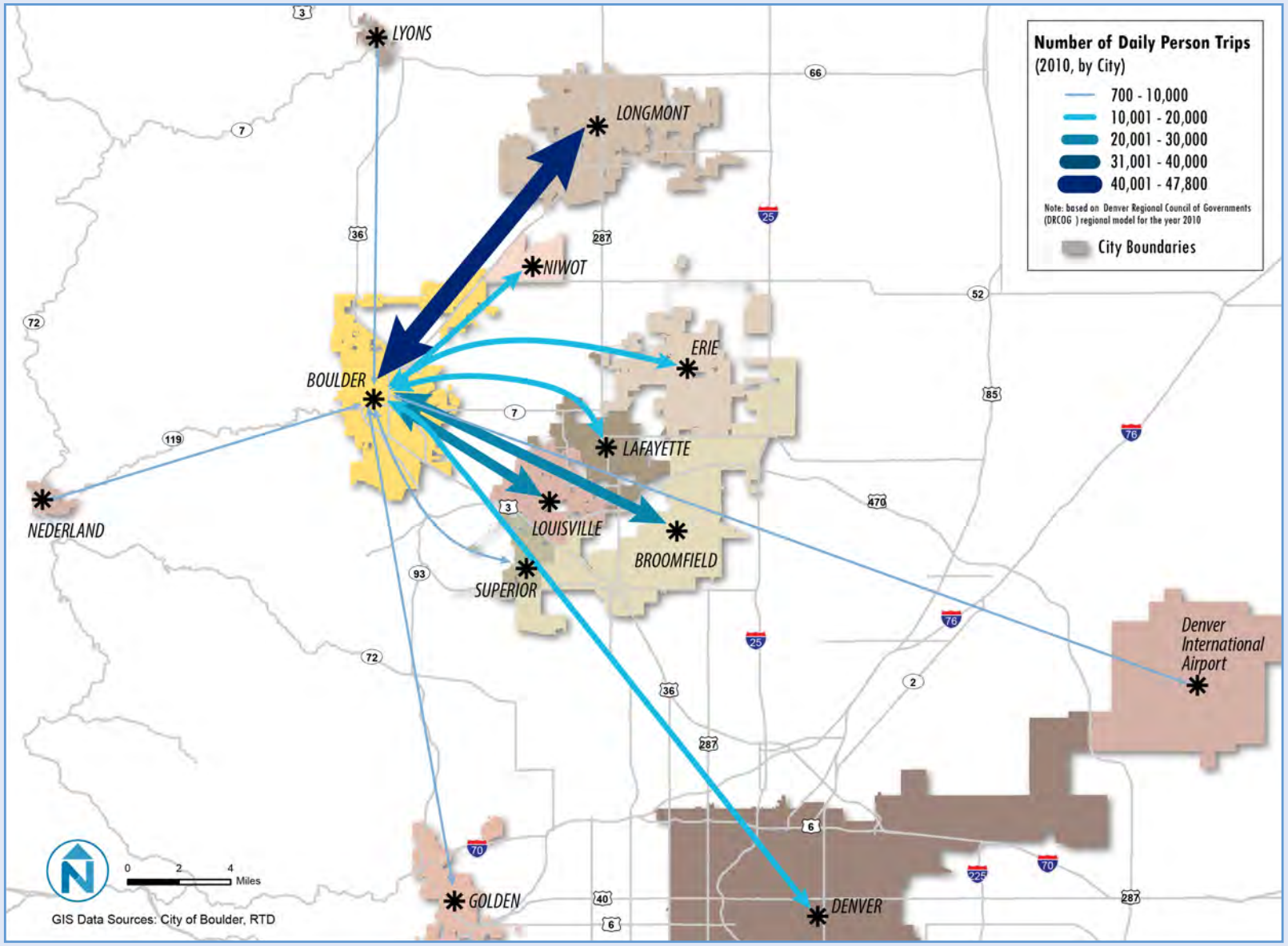


Figure 3-21 Top 10 Origin-Destination Pairs in Boulder (Projected Change 2010-2035)

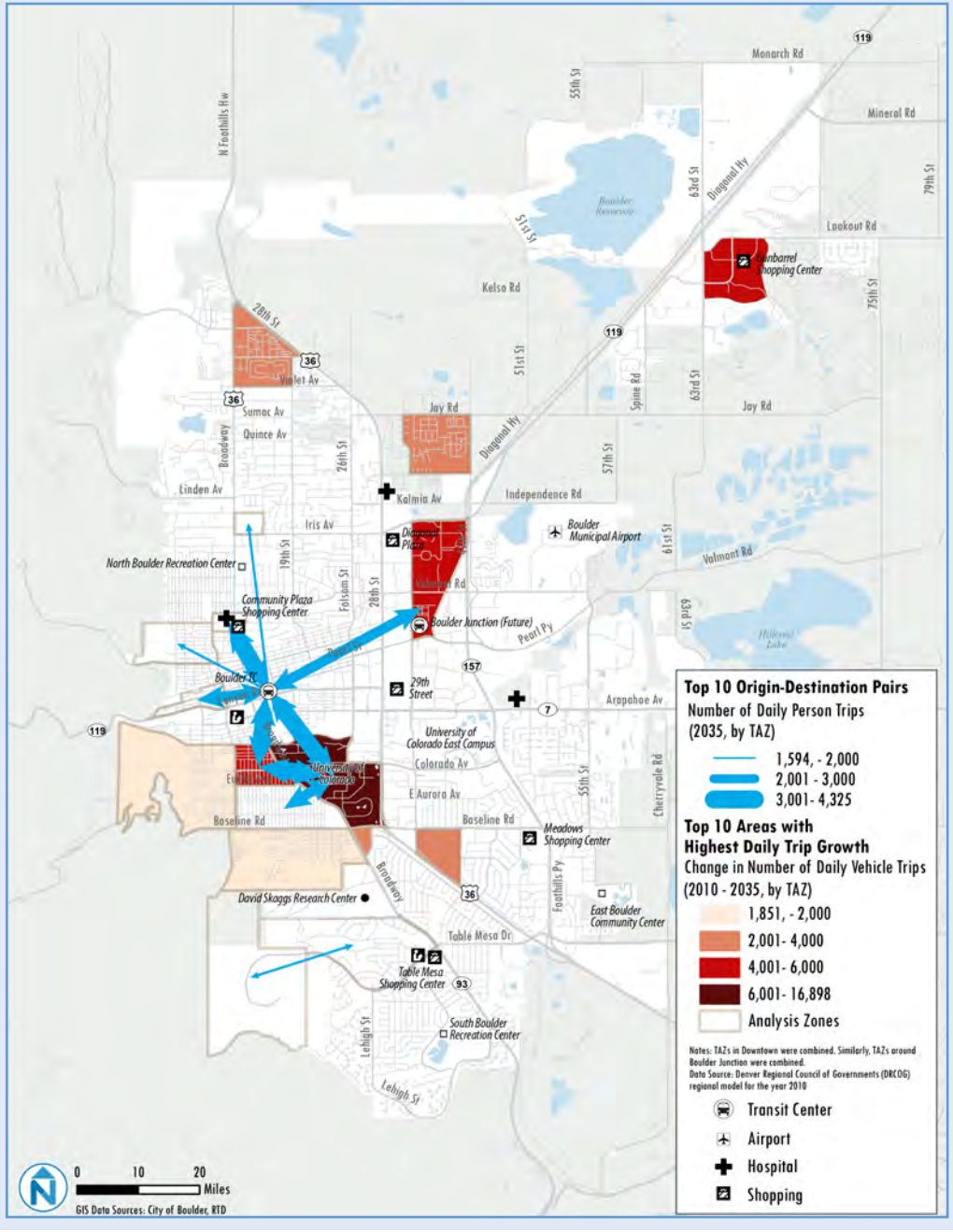
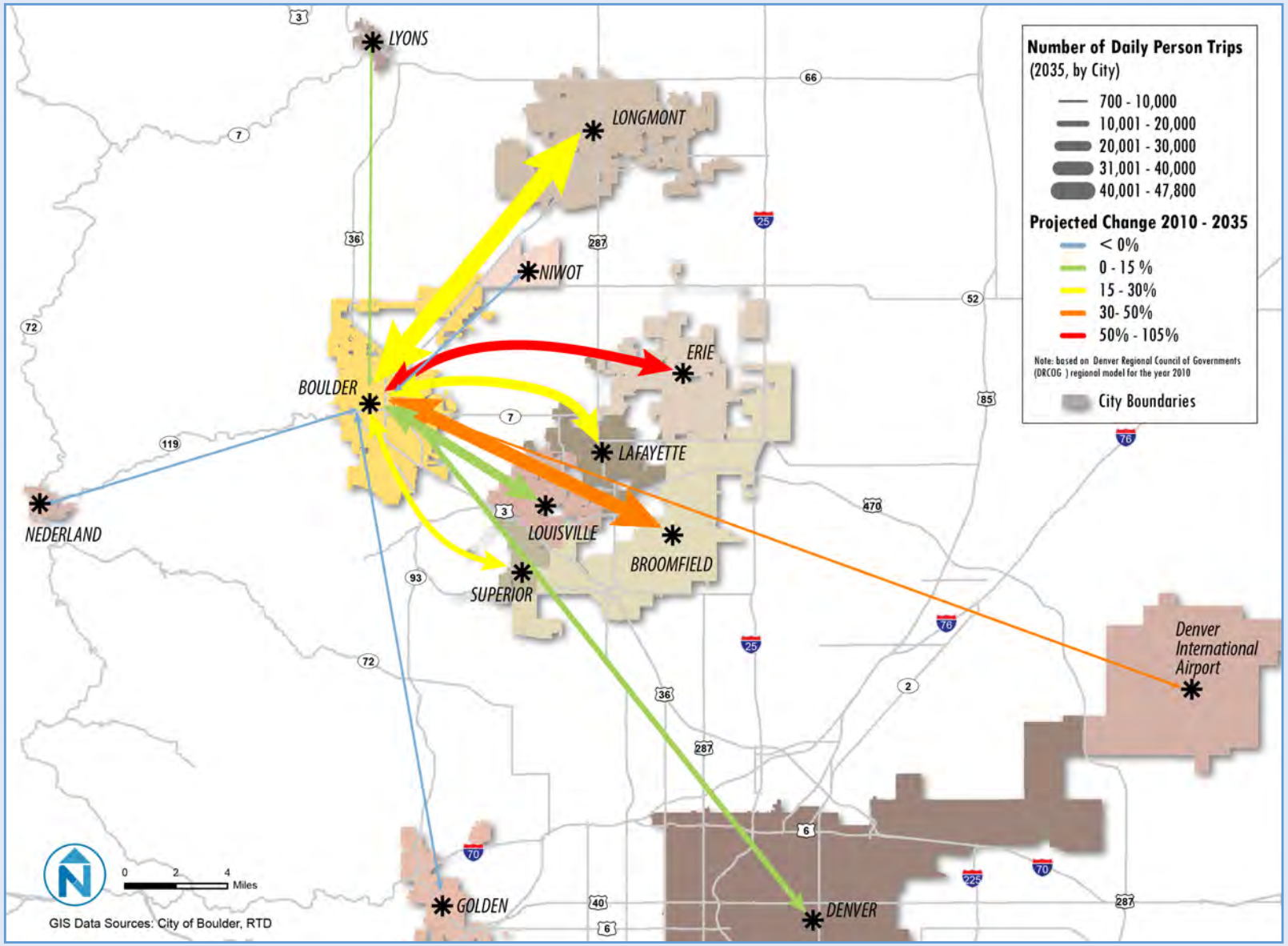


Figure 3-22 Origin-Destination Pairs in the Region (Projected Change 2010-2035)



Future Development in Boulder

According to population and employment growth projections and regional forecasting, future areas of land use change will be primarily focused in East Boulder and Gunbarrel. Other than opportunities for relatively small infill developments, downtown Boulder and the main University of Colorado campus are largely built out. East Boulder, however, provides opportunity for redevelopment. These provide an important opportunity for Boulder to continue the walkable and transit-supportive urban form of downtown in East Boulder.

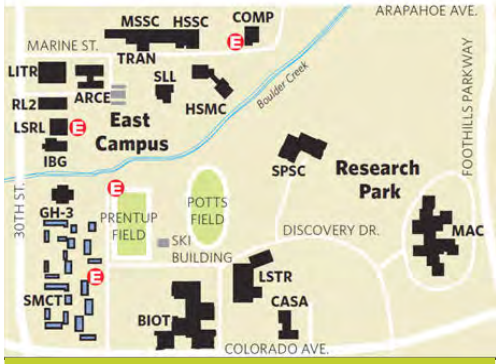
Boulder Junction will be a transit-oriented development located east of downtown in the geographic center of the community. The image above is a rendering of the Depot Square development, one of the projects currently under construction in the area.
Image from City of Boulder

Boulder Junction

Boulder Junction is a transit-oriented development located east of downtown Boulder, in the geographic center of the community across from the Whole Foods Market on Pearl Street and around the corner from the Twenty Ninth Street retail district, a major shopping and entertainment destination.

Guided by the Transit Village Area Plan, this 160-acre site will be transformed into a lively, mixed-use, pedestrian-oriented place where people will live, work, and shop. Boulder Junction will become a new neighborhood and an attractive destination for residents and visitors, with regional bus transit connections at Depot Square (see Chapter 4) and public spaces that will benefit the entire Boulder community. The Transit Village Area Plan envisions a community with buildings oriented to the street, usable open space, pedestrian-scale facades, and attractive parking structures that are integrated into the landscape. Between 1,400 – 2,400 new residential units will be built, added 2,800 to 5,000 residents.

Similar to downtown and the University of Colorado campus today, program incentives and managed, paid parking will encourage area residents, employees, and shoppers to choose transit, walking, bicycling, ride-sharing, and telecommuting over driving. The goal is to use parking management and design strategies for Boulder Junction to help inform and continue this type of development in other areas of East Boulder.



The CU East Campus includes 197 acres of developable land with the potential for over 4 million square feet of new building space.
Image from University of Colorado – Boulder

University of Colorado East Campus

The University of Colorado (CU) currently has 29,278 students enrolled, with a 2030 goal of 35,000 students. The main CU campus is almost entirely built out with classrooms already at capacity and facilities already outdated. CU east campus will be fully integrated with the main campus with frequent bus service, biking and walking facilities, housing, classrooms, and laboratory facilities. The CU East Campus is bound by 30th Street and Foothills Parkway (east to west) and Arapahoe Avenue and Colorado Avenue (north to south). The East Campus includes 197 acres of developable land, with the potential for over 4 million square feet of new building space.[9]

The CU East Campus Connections Project is a partnership between CU and the City to identify mutually agreed upon projects to "move the bar forward" on important sustainable transportation connections that will be needed in the east campus area. A primary goal of the transit element of the TMP will be seamless connections for students, faculty, and staff to walk, bike, and use the bus between Main and East Campuses as well as to major areas in Boulder such as downtown, Boulder Junction, Twenty Ninth Street retail, and Williams Village.

9 University of Colorado. "East Campus Vision."

Boulder Community Hospital – Foothills Campus

Boulder Community Hospital – Foothills Campus is located along Arapahoe Avenue and 48th Street in East Boulder. The hospital is in the process of consolidating the majority of its inpatient acute care services at Boulder Community Foothills Hospital to improve access to critical services for most residents of Boulder County. More than 100,000 square feet of clinical space is expected to be added to the current Foothills Hospital, along with additional medical office space. The expansion is expected to be completed by 2014.

Gunbarrel

The Gunbarrel area is located northeast of Boulder. Although currently a mix of light industrial and commercial uses, the Gunbarrel Community Center Plan envisions a denser, mixed-use retail core with improved pedestrian and bicycling facilities and improved access to transit.[10] Population and employment projections *(see Figure 3-11 on page 3-17)* show that the Gunbarrel area will experience significant population and employment growth by 2035. The Gunbarrel town center development is anticipated to begin construction in 2014.

10 Gunbarrel Community Center Plan.

Future Local and Regional Growth

The City of Boulder estimates that employment will increase by 19% between 2012 and 2035; dwelling units and population are also expected to grow by 12%, adding nearly 6,000 dwelling units and over 14,000 new residents to the community by 2035 (see Figure 3-23 below). The Boulder region is also expected to grow. According to regional forecasts, the population along US 36 is expected to rise 28%, employment will expand 53%, and traffic volumes are projected to increase dramatically over the next 15 years.[11] Boulder is expected to continue to be a strong employment base for the region, which will increase the number of people traveling to Boulder for all types of trips.

Figure 3-23 Boulder Projected Employment, Dwelling Unit, and Population Growth, 2012 and 2035

Growth Type	2012	2035	% Change
Employment	99,400	121,505	+22%
Dwelling Units	43,617	57,504	+32%
Population	99,069	130,248	+31%

Source: City of Boulder Department of Community Planning and Sustainability

11 US 36 Commuting Solutions.

Uptown Broadway apartments is located on the corner of Yarmouth Ave and 14th Street.
Image from Nelson\Nygaard

Housing Affordability

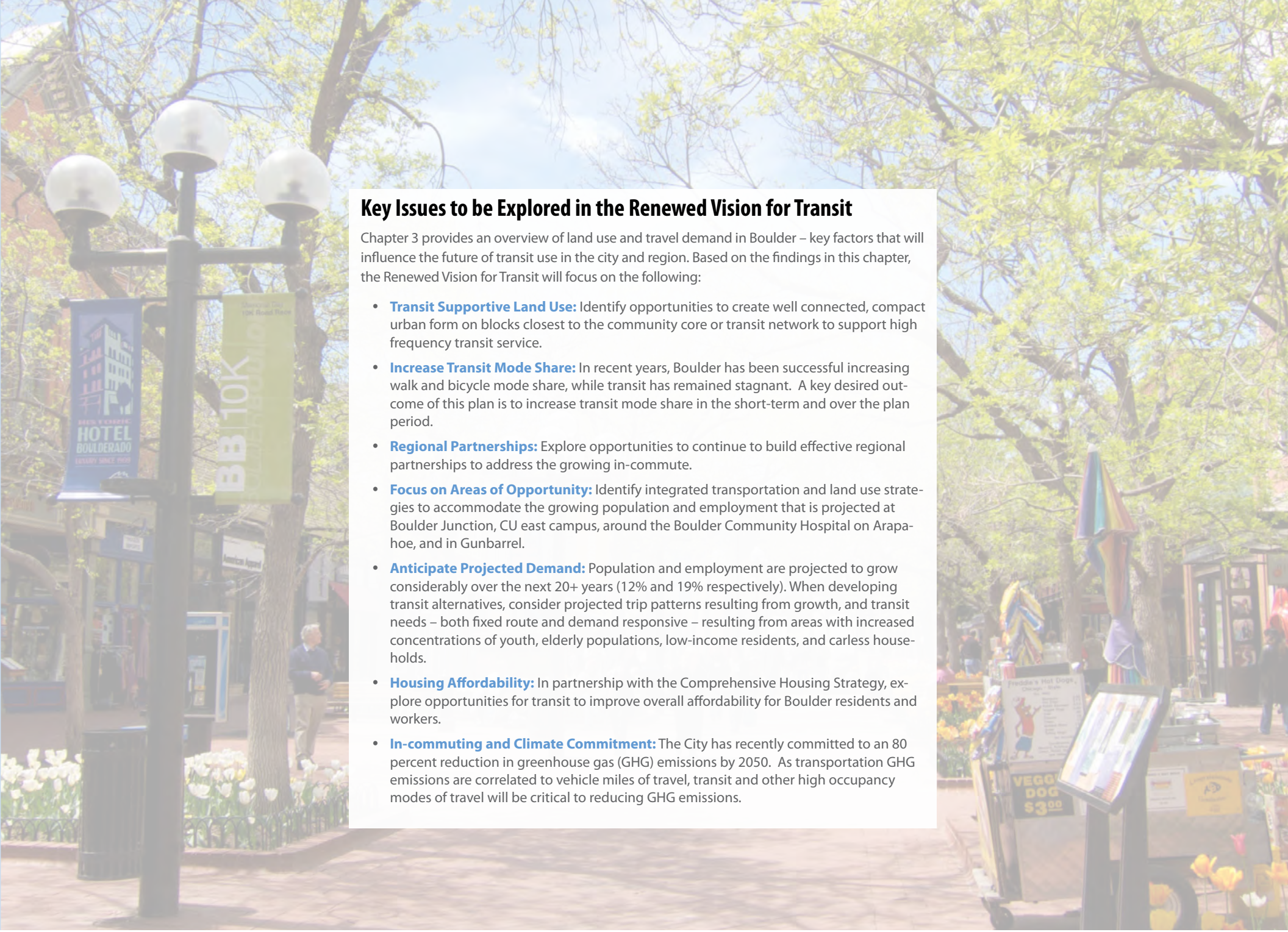
The ability for Boulder to address the regional commute issue will depend partly on the accessibility of affordable housing. The City is committed to preserving and promoting affordable housing and has a goal to supply 10% affordable housing. A Comprehensive Housing Strategy is currently underway to address housing affordability in Boulder.

In 1999, 43% of Boulder's households earned between $50,000 and $150,000 per year; by 2011, the proportion had dropped to 37%. Meanwhile, the percentage of city households earning over $200,000 per year increased from 7% to 9% during the same time period.[12] The median price for all housing units in 2011 was $501,800 compared to $344,600 in Boulder County.[13] In 2008, almost a third of households in Boulder with mortgages were spending more than 35% of their monthly income on housing costs, compared with 20% in 2000 and 17% in 1990.[13] Housing affordability will be a key factor in achieving the city's mode share goals.

12 City of Boulder. 2013. Boulder City Council Study Session "Developing a New Comprehensive Housing Strategy for Boulder" May 14, 2013.

13 City of Boulder. 2013. Boulder City Council Study Session "Developing a New Comprehensive Housing Strategy for Boulder" May 14, 2013.

14 City of Boulder. (2010) Summary of Key Trends: Boulder Valley Comprehensive Plan.



Key Issues to be Explored in the Renewed Vision for Transit

Chapter 3 provides an overview of land use and travel demand in Boulder – key factors that will influence the future of transit use in the city and region. Based on the findings in this chapter, the Renewed Vision for Transit will focus on the following:

- **Transit Supportive Land Use:** Identify opportunities to create well connected, compact urban form on blocks closest to the community core or transit network to support high frequency transit service.
- **Increase Transit Mode Share:** In recent years, Boulder has been successful increasing walk and bicycle mode share, while transit has remained stagnant. A key desired outcome of this plan is to increase transit mode share in the short-term and over the plan period.
- **Regional Partnerships:** Explore opportunities to continue to build effective regional partnerships to address the growing in-commute.
- **Focus on Areas of Opportunity:** Identify integrated transportation and land use strategies to accommodate the growing population and employment that is projected at Boulder Junction, CU east campus, around the Boulder Community Hospital on Arapahoe, and in Gunbarrel.
- **Anticipate Projected Demand:** Population and employment are projected to grow considerably over the next 20+ years (12% and 19% respectively). When developing transit alternatives, consider projected trip patterns resulting from growth, and transit needs – both fixed route and demand responsive – resulting from areas with increased concentrations of youth, elderly populations, low-income residents, and carless households.
- **Housing Affordability:** In partnership with the Comprehensive Housing Strategy, explore opportunities for transit to improve overall affordability for Boulder residents and workers.
- **In-commuting and Climate Commitment:** The City has recently committed to an 80 percent reduction in greenhouse gas (GHG) emissions by 2050. As transportation GHG emissions are correlated to vehicle miles of travel, transit and other high occupancy modes of travel will be critical to reducing GHG emissions.

CHAPTER 4

TRANSIT IN BOULDER

IN THIS CHAPTER

- Fixed route transit service
- Key transit facilities
- Who rides transit in Boulder?
- Fixed route system performance
- Summary of route performance
- Fixed route transit funding
- Other transportation service
- Key issues to be explored in the Renewed Vision for Transit

CHAPTER FOUR
TRANSIT IN BOULDER

Fixed Route Transit Service

Evolution of the Transit System in Boulder

A network of local and regional fixed route transit lines serves the city of Boulder and connects the city to the surrounding region. This section provides an overview of fixed route[1] transit service providers in the region, a summary of key facilities, an overview of the demographic profile of fixed route transit riders, a summary of transit line and system performance, and an overview of fixed route transit funding sources and trends. Note: detailed route profiles are provided in Appendix A.

Fixed Route Transit Service Providers

Fixed-route transit service in Boulder is operated by two primary service providers: Via Mobility, a private non profit transit provider in Boulder that also operates paratransit service *(see "Via Mobility Services Paratransit Service" for more details on page 4-27)*, and the Regional Transit District (RTD).

Local and regional transit maps are provided in Figure 4-1 and Figure 4-2. Figures 4-3 through 4-9 show fixed route transit frequency. *Note: in this section and throughout this report, "local" routes refer to routes within Boulder; "regional" routes refer to routes that have one terminus in Boulder and serve Boulder County, the US 36 corridor, and Denver.*

City of Boulder Service (Operated by Via Mobility Services)

The HOP bus was the first branded Community Transit Network route, providing frequent service to downtown, the University, and the Twenty Ninth Street Mall.

Community Transit Network

In the early 1990s, the City of Boulder decided it needed a new and more customer-responsive approach to transit delivery; the City went to the people to create a bus system that met their needs and overcame the obstacles that kept people off the bus. At the time, RTD provided service to downtown, the University, and the Crossroads Mall using its regionally standard bus fleet.

1 Fixed route transit service is service provided on a consistent schedule and route.

"The community wanted pedestrian-scale buses with big windows so that people on the street and on the bus could actually make eye contact. They wanted perimeter seating on the bus to encourage conversation so that we were actually creating community, not just serving the community."

– Tracy Winfree, Director of Public Works

Evolution of the Transit System in Boulder

In 1990, 15,100 customers rode the bus in Boulder each day. Transit service consisted of a hub and spoke system focused on the downtown, with buses arriving every half hour at best. Since then, transit has become a centerpiece of the transportation system, transformed through deliberate initiatives to attract new riders. Transit service now arrives every 10 minutes or less on many of the city's busiest transportation corridors. On average, more than 30,000 daily trips were made in 2012.

The HOP bus was the first branded Community Transit Network route, providing frequent service to downtown, the University,and the Twenty Ninth Street Mall.

Image from Nelson\Nygaard

The inspiration for the Community Transit Network (CTN) was driven by the following community desires:

- Quiet neighborhood-scale buses
- Low-floor pedestrian scale buses with large windows
- Buses so frequent you didn't need a schedule
- Perimeter seating on the bus to encourage community interaction

Based on the community's input, the City launched the HOP service in 1994 to connect major destinations throughout the community. HOP service is operated by Via Mobility Services. HOP buses arrive every 10 minutes or less from 7 a.m. to 7 p.m. The vehicles have big windows, seating that promotes conversation, on-board music, and are branded on the exterior with bold and distinctive graphics. The HOP's ridership exceeded projections within the first six weeks of service. The success of the HOP launched the Community Transit Network – which today includes seven high-frequency branded bus routes including the SKIP, JUMP, BOUND, STAMPEDE, DASH, and BOLT. The City contracts with Via Mobility Services to operate the HOP route. The City of Boulder has a long-standing partnership with RTD and the University of Colorado who also contribute funding to help pay for HOP service. The City also provides funding for additional service on the JUMP and BOUND *(see more information in the Funding section on page 4-25)*. The Regional Transportation District (RTD) operates the other CTN routes.

HOP 2 Chautauqua

Also operated by Via, the City partners with the Colorado Chautauqua Association (CCA) and the Colorado Music Festival (CMF)to operate the HOP 2 Chautauqua route during the summer, providing transit service to Chautauqua Park every fifteen minutes at the following intersections on CCA and CMF concert nights:

- 11th and Pearl Street
- 13th and Pearl Street
- Spruce and Broadway Street
- Chautauqua Park
- 27th Way Park-and-Ride
- 9th Street between downtown and Chautauqua

Regional Transportation District

The Regional Transportation District is the local mass transit operator providing service to 8 counties with 40 municipalities in the Denver region, including Boulder. RTD operates the bus and light rail system for the greater Denver region – a service area of 2,337 square miles with 2.8 million residents. RTD provides regular service on six light rail lines and 127 bus routes with over 100 million annual boardings. Boulder service makes up approximately 10% of RTD's total service hours (323,728 Boulder service hours in 2011 compared to 3,069,882 district-wide).[2]

Aside from the HOP and CLIMB, fixed route transit service operating within the City of Boulder or between Boulder and other Boulder County communities is operated by RTD. RTD operates 12 local and 12 regional routes in Boulder.

RTD also operates 12 regional routes into Boulder from Denver and the Denver International Airport, Longmont, Golden, Nederland, and Lyons with funding assistance from the City of Boulder (JUMP, BOUND) and CU (STAMPEDE).

Boulder County

The CLIMB route is funded by Boulder County and operated by Via Mobility Services. The CLIMB, recently implemented by Boulder County, provides limited service between Boulder and Gold Hill.

2 City of Boulder. "System and Trends."

City of Boulder and Boulder County Eco Pass Program

In 1994, the City launched its Eco Pass program, a discounted annual transit pass purchased by employers, universities and neighborhoods. City surveys have found that **people with an Eco Pass are four to seven times more likely to use transit than those without a pass.** The changes in travel behavior associated with access to an Eco Pass translate into significant reductions in vehicle trips and mobile emissions, with an estimated 40% lower emissions. **For work trips, Boulder employees with an Eco Pass travel less than half the annual vehicle commute miles compared to employees without a pass.** The Eco Pass program was extended to the Boulder Valley School District in 2009 and to East Boulder businesses in 2011. In 2012, 69,425 people who live, work, or study in Boulder have access to Eco Passes. The City and County are currently conducting a study to assess the feasibility of a countywide Eco Pass program.

Boulder County launched its Community Eco Pass program in 2011. As of 2013, over 1,500 Eco Passes are distributed in Lyons and over 1,300 in Nederland, and the County is working to increase distribution. The County also sponsors a Business and Neighborhood Program, which currently distributes over 800 passes. The University BuffOne Card allows faculty and staff to ride the Buff Bus and all RTD buses fare free. Nederland saw a 40% increase in ridership on the N route after the Nederland Eco Pass program began.

The Eco Pass Extra program allows Eco Pass holders to save with discounts at restaurants and stores at participating local businesses. More information about the Eco Pass program is available at: http://www.boulderecopass.com/pricing.html.

US 36 Bus Rapid Transit

FasTracks is RTD's multi-billion dollar comprehensive transit expansion plan to build 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit, and 21,000 new parking spaces at light rail and bus stations across the eight-county RTD service district. FastTracks is funded, in part, by a voter-approved 0.40% sales tax increase in 2004. For Boulder, FasTracks is projected to bring 18 miles of bus rapid transit (BRT) service between downtown Boulder and Denver along US 36. Phase I of the project was completed in 2010 – system improvements including the opening of the US 36 and Broomfield park-and-ride. Phase I was estimated to cost $23.3 million. Phase 2 of the project – a more than $200 million effort – will implement the high frequency BRT service along the corridor and is schedule to be complete in 2015.

NW Area Mobility Study

The original FasTracks plan approved by voters in 2004 called for commuter rail along the U.S. 36 corridor to East Boulder and along the Burlington Northern Santa Fe tracks to Longmont by 2014. However, diminished sales-tax revenue and higher prices triggered by an economic downturn caused RTD to scale back the plan. RTD's NW Area Mobility Study will develop consensus among RTD, Colorado Department of Transportation, and corridor stakeholders, on cost-effective mobility improvements to serve the northwest area.

The RTD study will analyze several corridor options under the FasTracks plan, including alignments of the Northwest Rail Line from Westminster to Longmont, the extension of the North Metro commuter-rail line to Longmont, several potential Boulder County BRT corridors, and the design and operating element to implement a complete BRT system on US 36 (beyond what is scoped for January 2016 opening).

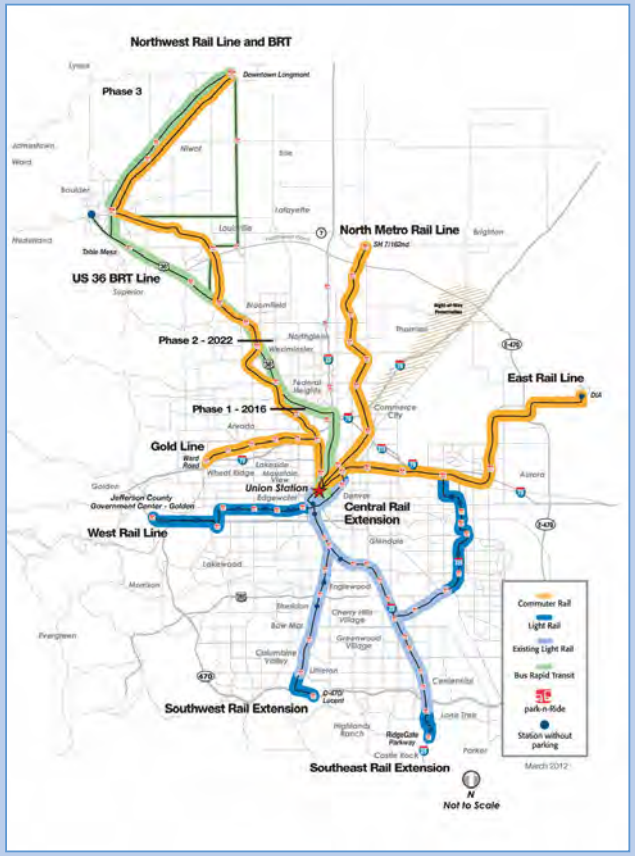


Figure 4-1 Boulder Local Transit Service

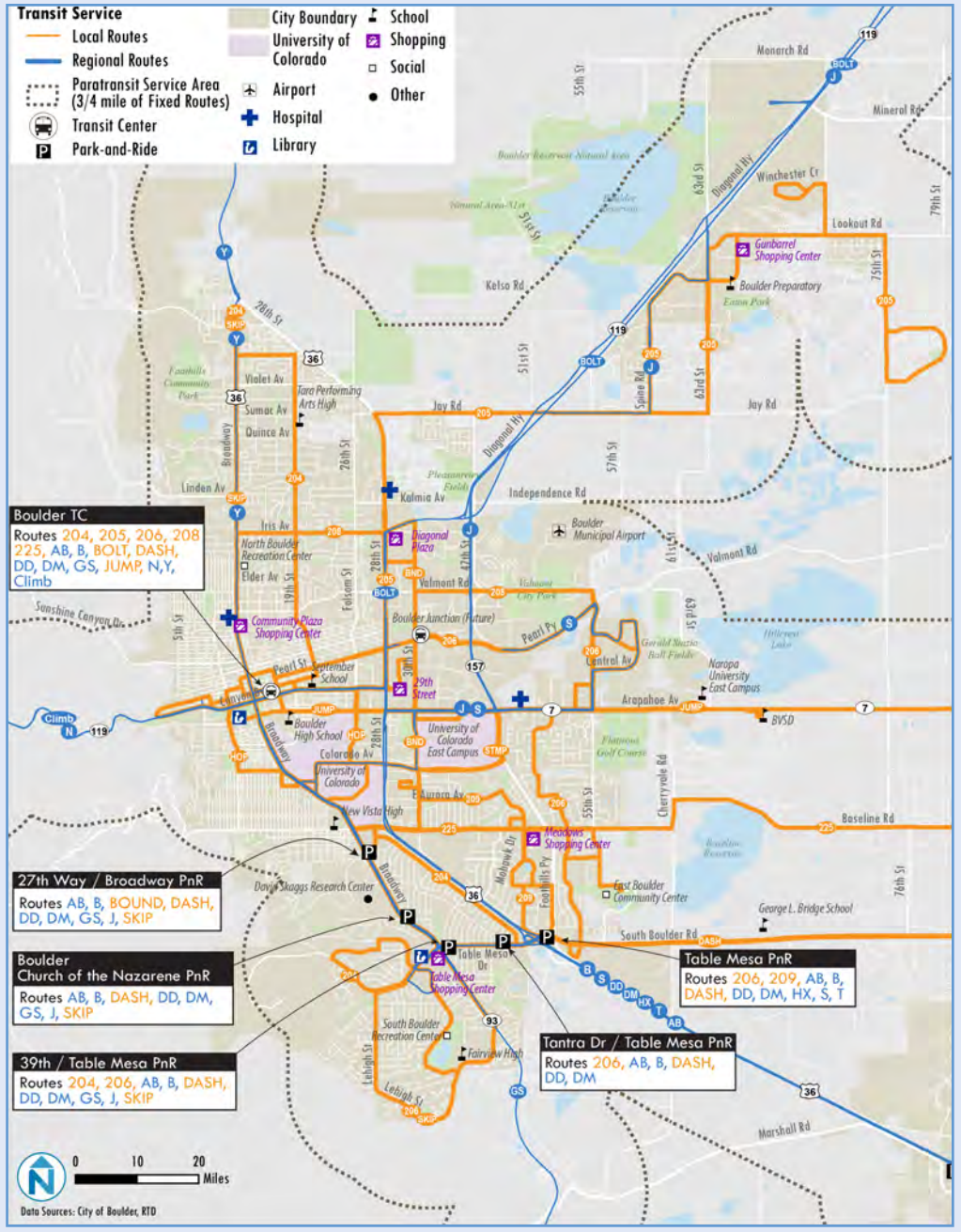


Figure 4-2 Boulder Regional Transit Service

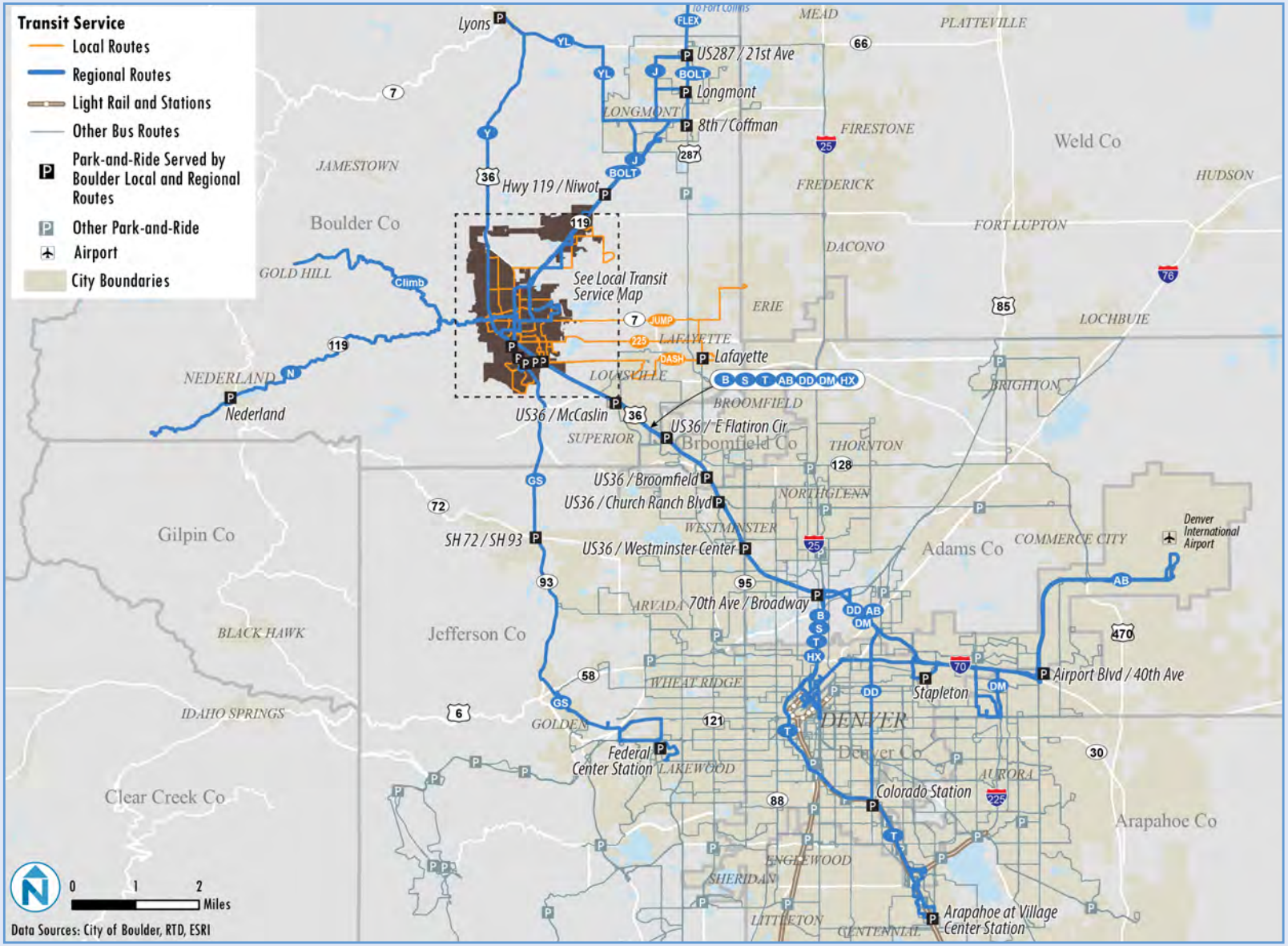


Figure 4-3 Local Midday Transit Frequency

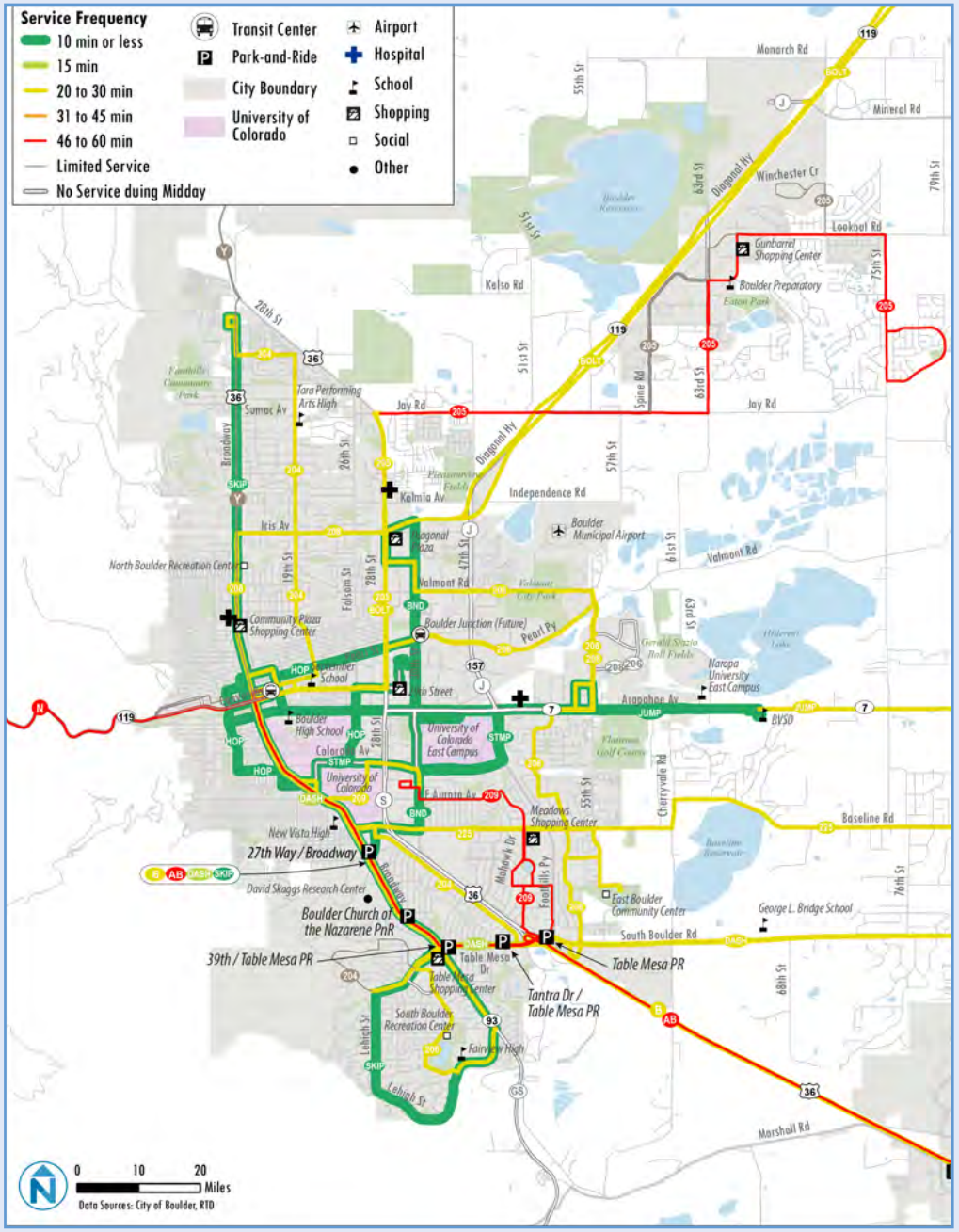


Figure 4-4 Local Peak Hour Transit Frequency

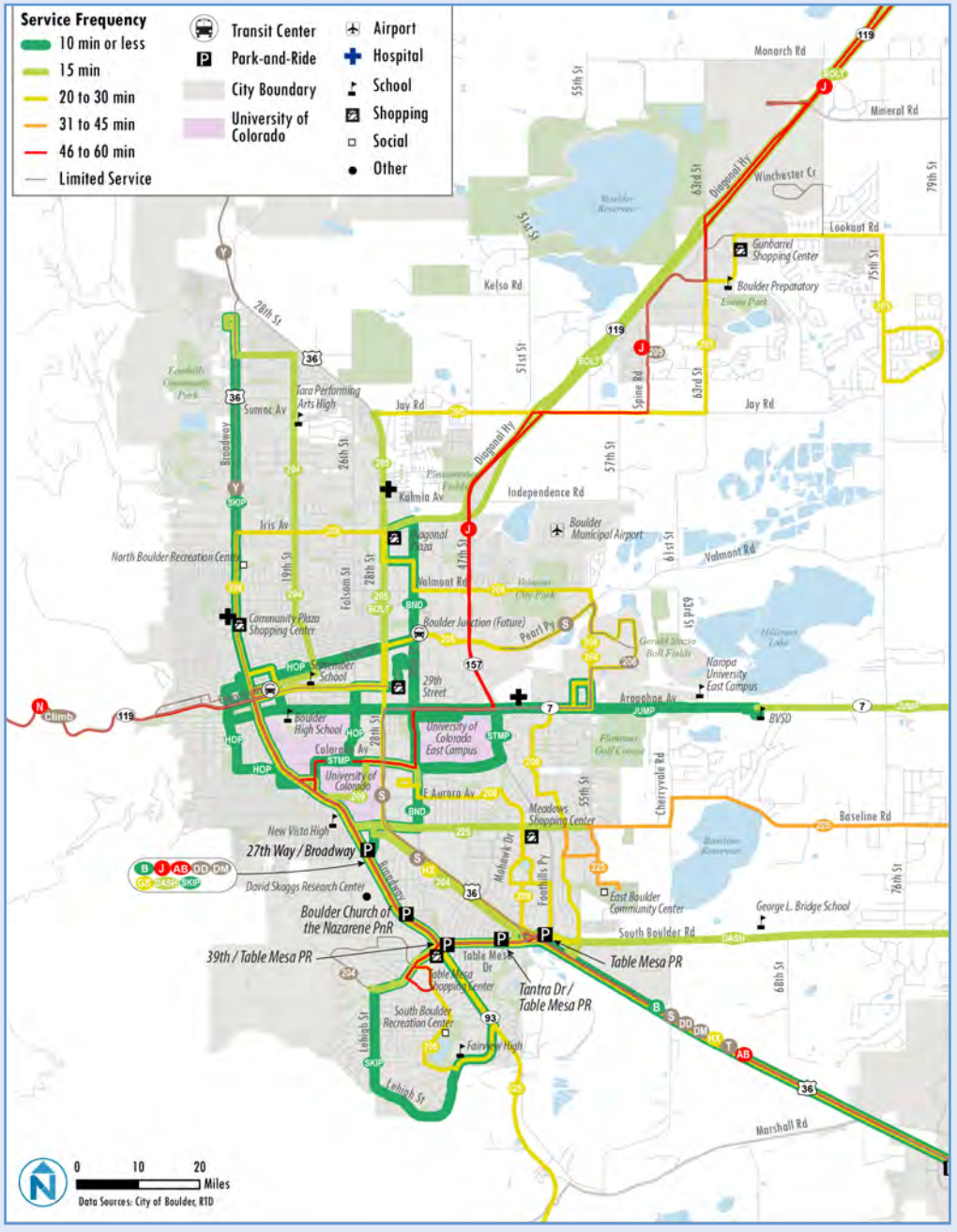


Figure 4-5 Regional Midday Transit Frequency

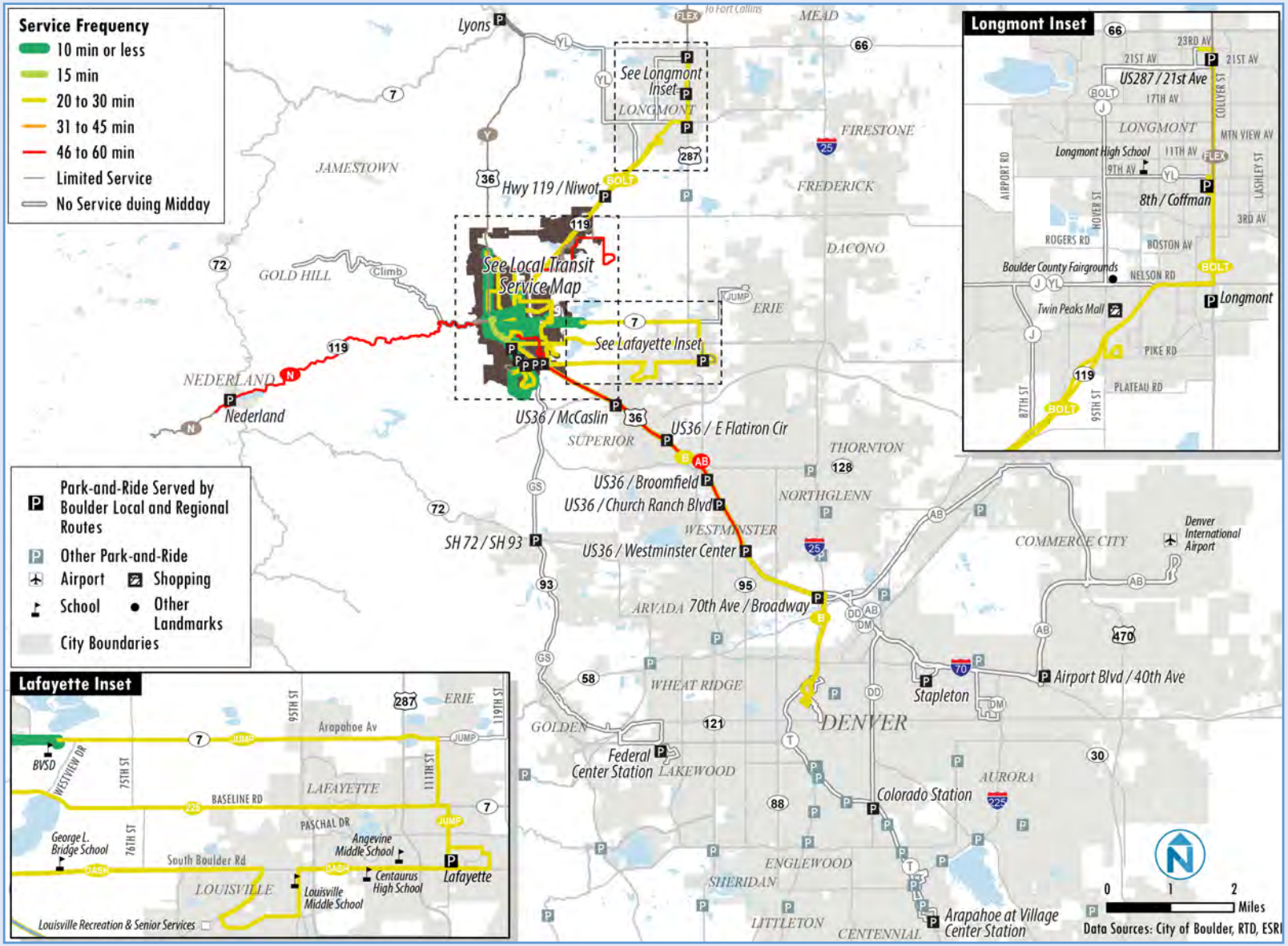


Figure 4-6 Regional Peak Hour Transit Frequency

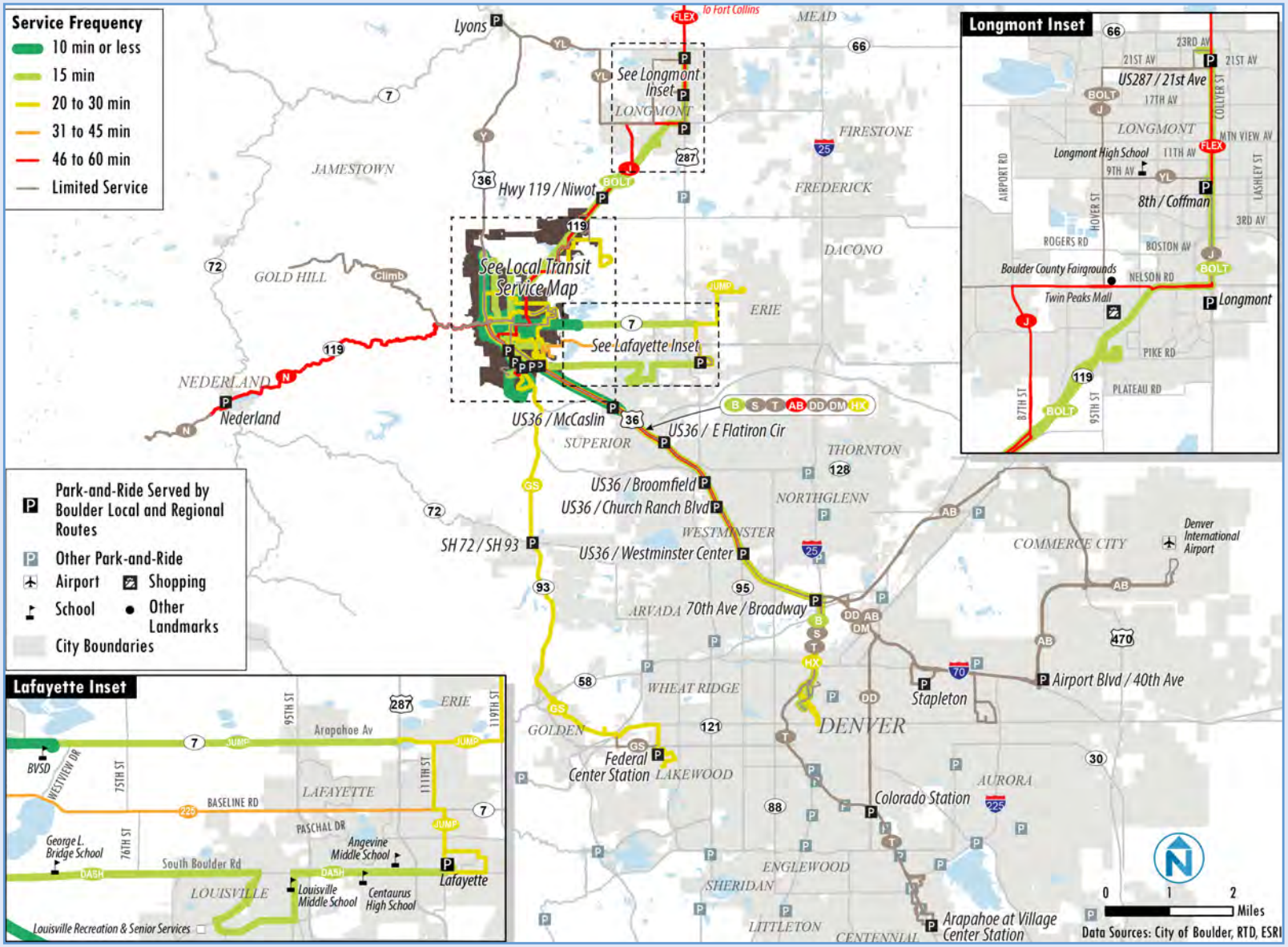
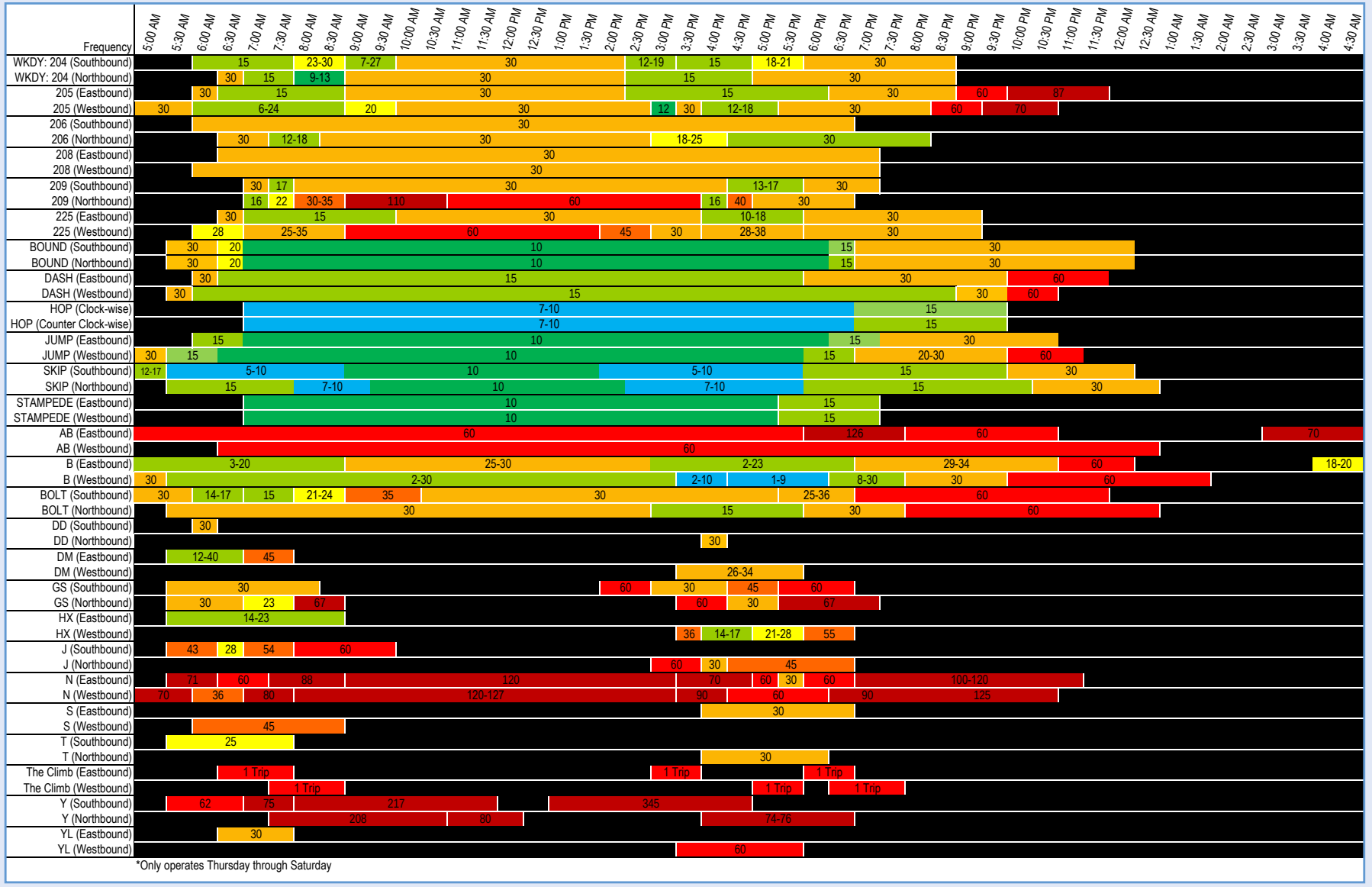


Figure 4-7 Weekday Frequency



*Only operates Thursday through Saturday

Figure 4-8 Saturday Frequency

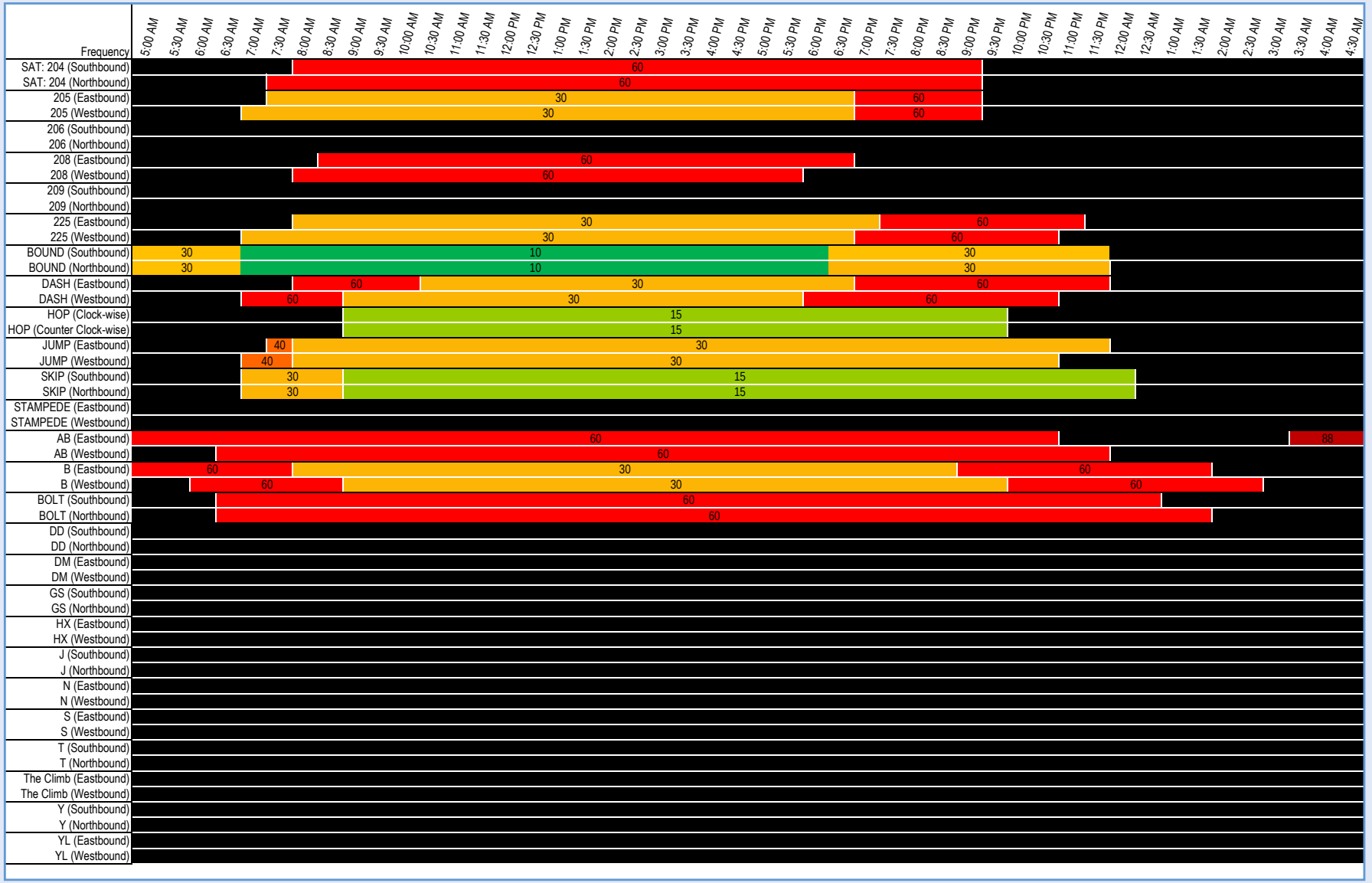
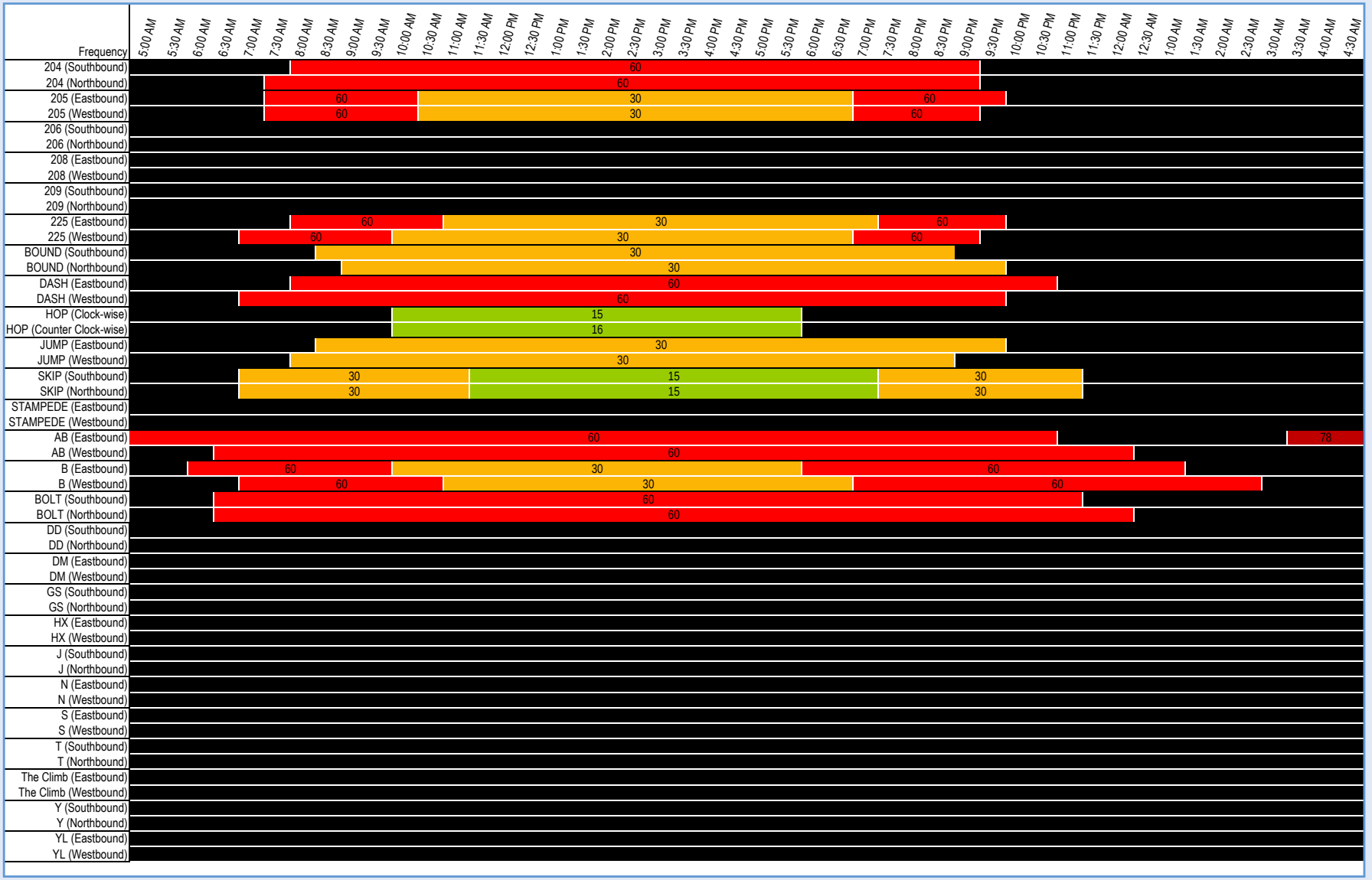


Figure 4-9 Sunday / Holiday Frequency



Key Transit Facilities

Downtown Boulder Transit Center

Boulder's Downtown Transit Center is located on the corner of Walnut and 14th streets. This facility, built in 1981, is one of the busiest in the RTD system and is the hub for routes 204, 205, 206, 208, AB, B, BOLT, DASH, DD, DM, GS, HOP, JUMP, N, and Y. The transit center includes an indoor seating area, ticket vending, a staffed information booth, extensive real-time bus displays, and bike lockers. The Downtown Transit Center is an aging facility in need of an upgrade to accommodate the need for more space for buses. The City of Boulder is planning physical improvements along 14th Street to increase bus docking capacity, simplify boarding for customers, and create a car-free street with pedestrian, bike, and transit access only. Planning is also underway to include a new bike center with enhanced and expanded bicycle storage.

The downtown Transit Center at 14th and Walnut Street is currently the main transit center in the city.
Image from Nelson\Nygaard

Depot Square at Boulder Junction

Boulder Junction – previously known as the Boulder Transit Village – is a 160-acre site at Pearl Parkway and 30th Avenue in East Boulder of which, the city owns 11 acres. The site is the future home of Depot Square, a partnership among the City, RTD, and the private sector. Depot Square includes a transit center and mixed-use development that will be located at the terminus of the US 36 BRT line and will include managed parking. The BRT line, scheduled to open in 2016, will include 18 miles of Bus Rapid Transit connecting downtown Denver and Boulder. The transit center at Depot Square will be in addition to the 14th and Walnut facility noted above, providing more efficient service for some passengers because they won't have to transfer in downtown Boulder. The facility is funded by $7.7 million in CMAQ grants along with other City and private investment and will include six bus bays, 71 units of affordable housing, a hotel with 140 rooms, 390 parking spaces, and a refurbished historic train station originally built in 1890 and moved to the site.

Boulder Junction will be a new complete neighborhood and destination in Boulder and provide important regional and local transit connections. The old train station (pictured at left) will be a centerpiece of the site. The bus transit center will be located underground, allowing a broad pedestrian plaza to be developed as the gateway to the site.
Image at left from Nelson\Nygaard; rendering at right from City of Boulder

Park-and-Ride Facilities

Park-and-Ride facilities offer a convenient place for commuters and visitors to park their cars and connect to transit, ridesharing, and bike options (see Figure 4-10 for Park-and-Ride locations, capacity, and utilization). Twelve Park-and-Ride facilities provide parking spaces for commuters to and from Boulder, Longmont, Denver, and other key destinations in the Boulder region. Many of these facilities are missing convenient and comfortable passenger amenities.

Figure 4-10 Park-and-Ride Capacity and Utilization, 2012

Boulder Park-and-Ride	Location	Capacity	Utilization
Table Mesa	South Boulder	824	62%
Table Mesa/Tantra Drive	South Boulder	105	20%
Table Mesa/39th	South Boulder	40	82%
27th Way/Broadway	South Boulder	59	89%
Boulder Church of the Nazarene	South Boulder	49	73%
Lafayette	Lafayette	136	52%
Hwy 119/Niwot	Longmont	28	49%
8th/Coffman	Longmont	97	93%
Longmont	Longmont	101	69%
Lyons	Lyons	27	50%
Nederland	Nederland	75	58%
US 36/McCaslin	Superior	466	81%

Source: RTD "April – June 2012 Average Daily Usage"

Table Mesa Pedestrian Bridge Opened in April 2013

The Table Mesa pedestrian bridge is an element of the US 36 Bus Rapid Transit project, an RTD FasTracks project. The bridge connects the Table Mesa Park-and-Ride with eastbound bus service, saving three-to-five minutes of travel time for commuters heading to Denver from Boulder. The bridge is a collaborative partnership between RTD and CDOT.

Image from RTD

Bus Stops

Bus stops are a key element of the transit experience. Bus stops with comfortable seating, shelter, and schedules, provide a comfortable and appealing place for people to catch the bus. In Boulder, there are almost 1,000 bus stops. Of these bus stops, nearly 300 serve an average of 10 or more boarding passengers per day, 120 serve an average of 40 or more boarding passengers, and 47 serve an average of 100 or more boarding passengers per day (Figure 4-11).

Figure 4-11 Inventory of Bus Stops in Boulder

Category	Number
# of bus stops in Boulder	1,000
# bus stops service average of 10+ boardings per day	300
# bus stops serving average of 40+ boardings per day	120
# bus stops serving average of 100+ boardings per day	47
# bus stops serving average of 100+ boardings per day without adequate shelter	13
# bus stops serving average of 40+ boardings per day without adequate shelter	66
# bus stops serving less than 40 boardings per day with a shelter	27

Source: City of Boulder

This bus stop on the corner of 29th and Arapahoe includes covered and uncovered seating, a trash can, and bike parking.
Image from Nelson\Nygaard

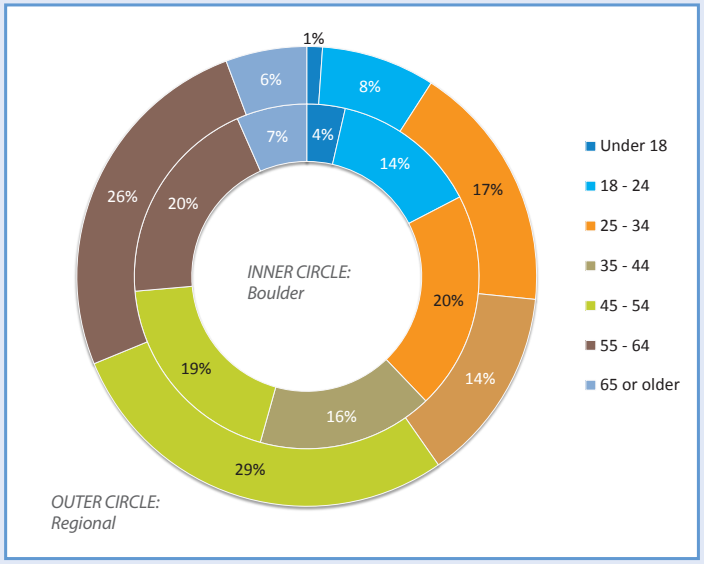
Who Rides Fixed Route Transit in Boulder?

This section of the State of the System focuses on the demographic characteristics of transit ridership in Boulder. Data for this section is taken from the 2011 RTD Customer Satisfaction Survey, which is conducted to provide RTD with information on who is using RTD transit services, how often they use it, and their satisfaction with the service. Responses used for this assessment include those categorized as customers of either Boulder local or the regional system. Note: "local" in this section refers to city of Boulder riders; "regional" refers to all RTD riders outside of Boulder.

Age and Gender

Ridership on Boulder local service tends to be slightly more female than male, 55% to 45%, respectively. Compared to regional service, ridership is also younger, with nearly twice as many riders under age 24 on Boulder local service.

Figure 4-12 Age of Local and Regional Riders

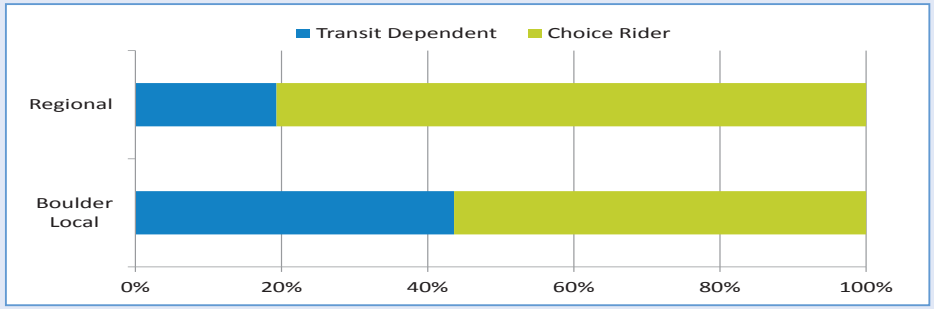


Source: 2011 RTD Customer Satisfaction Survey

Transit Dependency and Vehicle Access

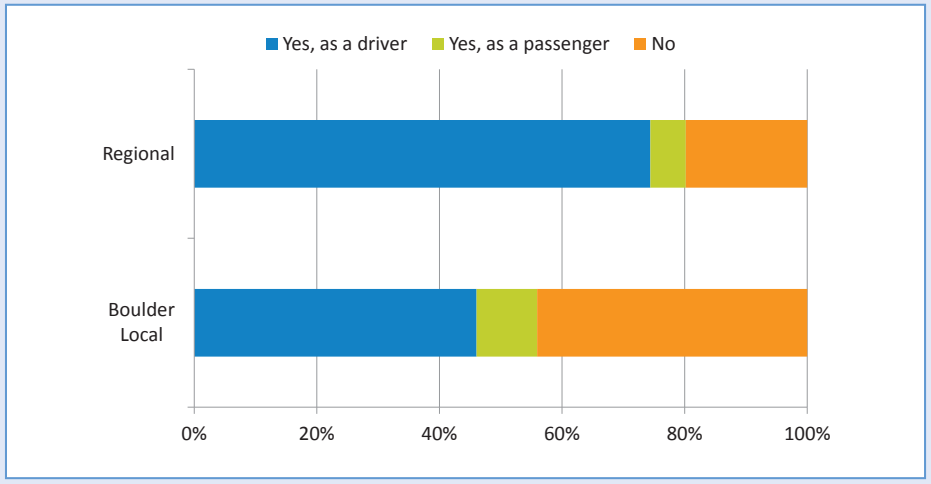
RTD classifies riders as either "transit dependent" or "choice riders" based on vehicle availability, disability, or impairment that prevents vehicle operation, and possession of a valid driver's license. According to the survey, local riders are much more likely to be considered transit dependent than regional riders. As the following graphs show, local riders are more than twice as likely as regional riders to report not having access to a car as a driver or a passenger, likely due in part to the large CU student population.

Figure 4-13 Transit Dependent Riders and Choice Riders for Local and Regional Riders



Source: 2011 RTD Customer Satisfaction Survey

Figure 4-14 Vehicle Access

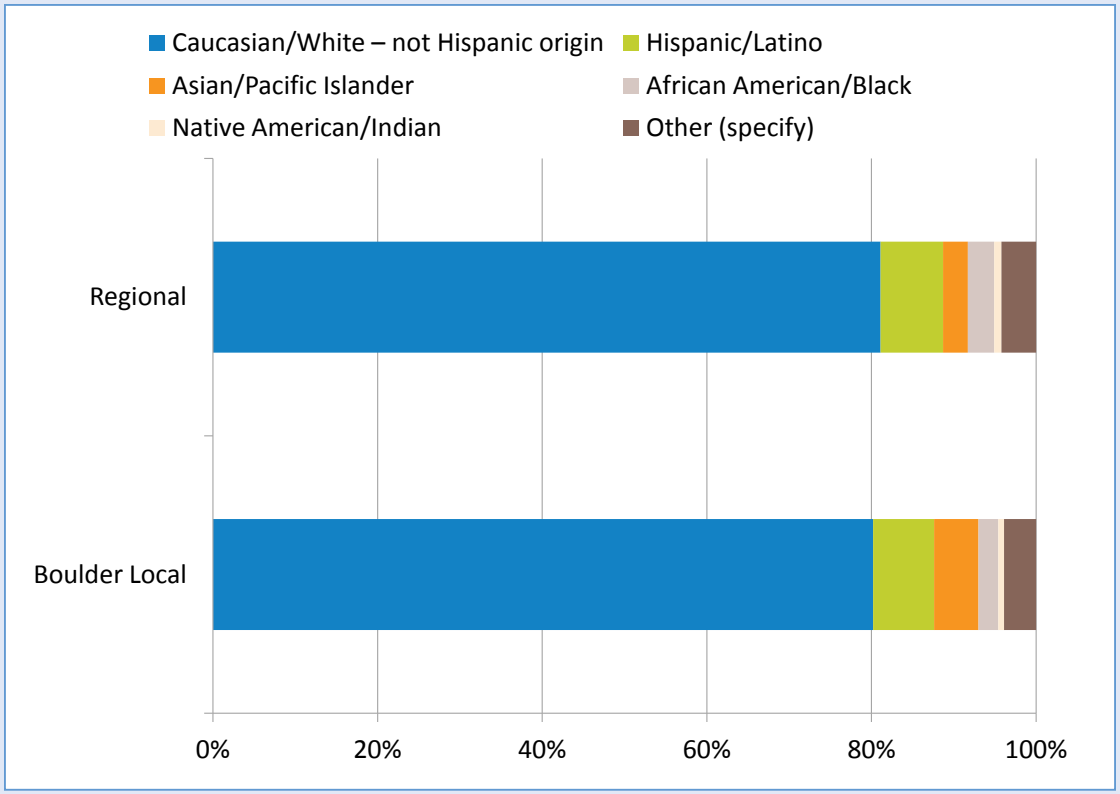


Source: 2011 RTD Customer Satisfaction Survey

Ethnicity and Language

Boulder local riders are very similar to regional riders with respect to ethnic background. Approximately 80% of riders on both types of service identify as Caucasian/White. A slightly higher percentage of local riders identify as Asian/Pacific Islander, and slightly lower percentage identify as Hispanic/Latino or African American/Black compared to regional riders. Boulder local riders are slightly more likely to report speaking a language other than English in the home (15% of local Boulder riders compared to 11% of regional riders).

Figure 4-15 Ethnicity

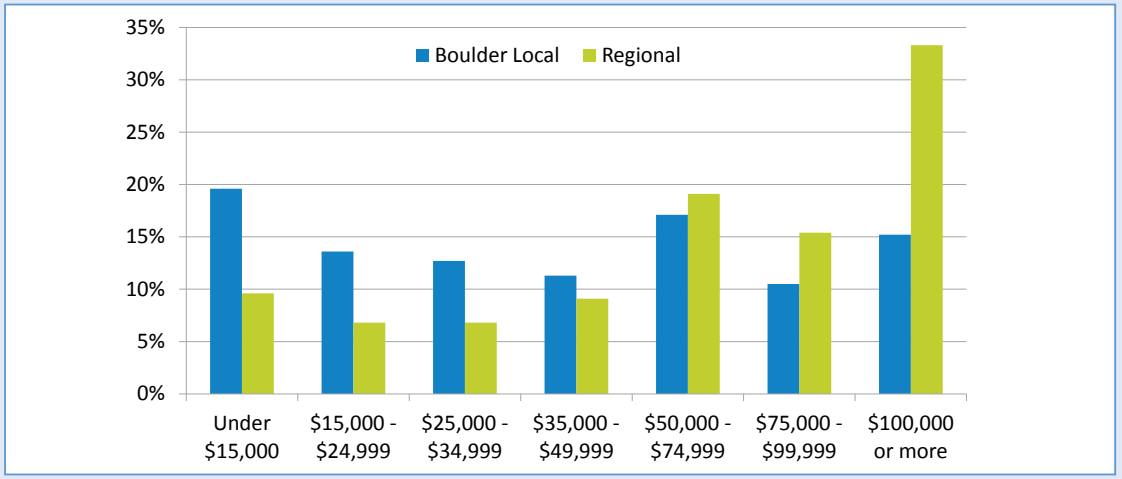


Source: 2011 RTD Customer Satisfaction Survey

Income and Employment

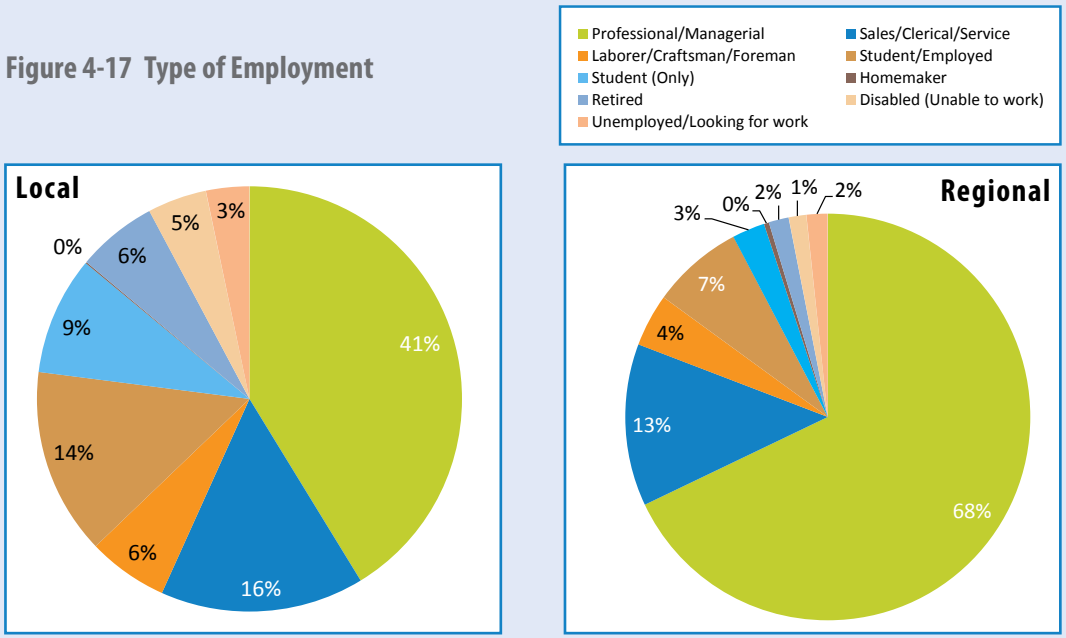
Local riders differ considerably from regional riders in terms of income, particularly at the lowest and highest income levels. Local riders are twice as likely to report earning less than $15,000 a year, while regional riders are more than twice as likely to report earning over $100,000 a year. Some of these differences are likely correlated with differences in employment between the rider groups; Boulder has a much larger student population, in addition to other population groups that are not part of the active workforce, such as retirees.

Figure 4-16 Reported Income



Source: 2011 RTD Customer Satisfaction Survey

Figure 4-17 Type of Employment



Source: 2011 RTD Customer Satisfaction Survey

Fixed Route Transit System Performance

This section summarizes transit performance in the city of Boulder for RTD and Via service and RTD regional routes that originate in Boulder, including transit ridership, boardings per service hour, operating cost per service hour, and operating cost per boarding. Detailed profiles for each route are provided in Appendix A.

Trends in Ridership, Service Hours, and Productivity

Figure 4-18 shows the average weekday ridership by year between 2003 and 2012 compared to service hours. Transit ridership on local and regional routes peaked in Boulder in 2008 at 22,028 average rides per day. The decline in ridership between 2008 and 2009 could potentially be due to decreased fuel prices, economic recession and service reductions by RTD. Between 2008 and 2011, ridership on Boulder local routes continued to decline from 22,028 to 19,992 average weekday riders. Local ridership increased slightly in 2012 to 20,789. Ridership on regional routes to Boulder experienced a similar decline after its peak in 2008, but has increased slightly since 2009 from 10,590 average weekday riders in 2009 to 11,518 in 2012. Similar to the ridership trend, service hours peaked in 2008 for local and regional routes. Since 2008, RTD service hours have declined steadily from 203,575 in 2008 to 193,062 in 2012. Regional services hours have increased slightly in the last two years from 109,980 in 2010 to 112,447 in 2012.

Productivity (which means passenger boardings per hour that a vehicle is providing revenue service) also peaked in 2008 at 31 boardings per service hour for local routes and 29 boardings per service hour for regional routes (Figure 4-19).

Figure 4-18 Average Weekday Ridership Compared to In-Service Hours, 2003-2012

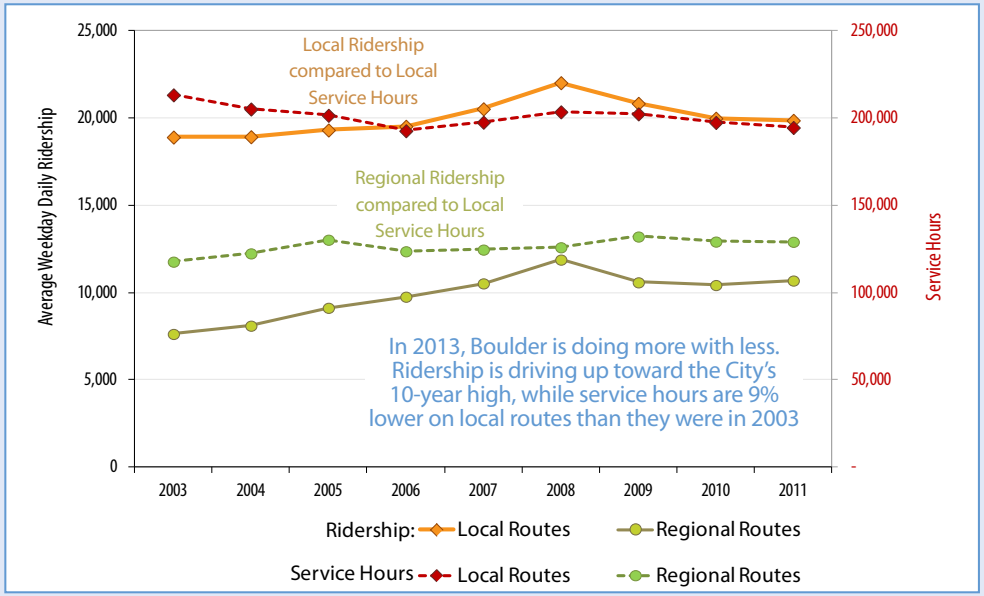
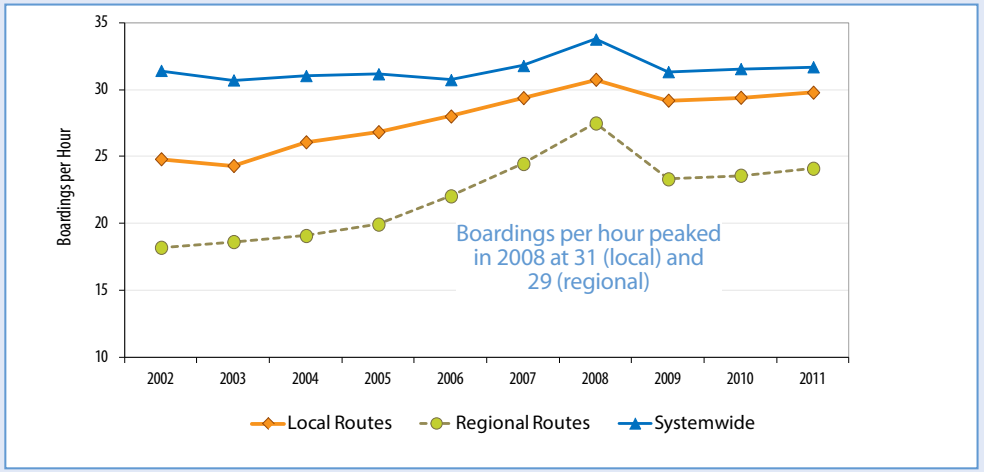


Figure 4-19 Boardings per Hour (Productivity), 2003 - 2012



Source: Data is from 2012 RTD Annual Ridership Data; HOP data was provided by the City of Boulder; Note: Climb data is not included

Figure 4-20 provides an overview of the average weekday ridership by route in 2003 compared to 2012. Daily transit boardings are based on 2012 data from RTD, the City of Boulder, Boulder County, and Via Mobility Services. In the nine-year period, the routes with the highest ridership have remained the same: the SKIP, the HOP, and the JUMP. Interestingly, ridership on the HOP has decreased 17% since 2003, from 3,547 average weekday riders in 2003 to 2,932 in 2012. Route B, which provides service between Boulder and Denver, is the regional route with the highest ridership, followed by the BOLT to Longmont and the AB (or SkyRide) to the Denver International Airport. Ridership on Route B increased almost 60% between 2003 and 2012, from 3,886 to 6,177 average weekday riders.

Figure 4-20 Average Weekday Ridership by Route, 2003 and 2012

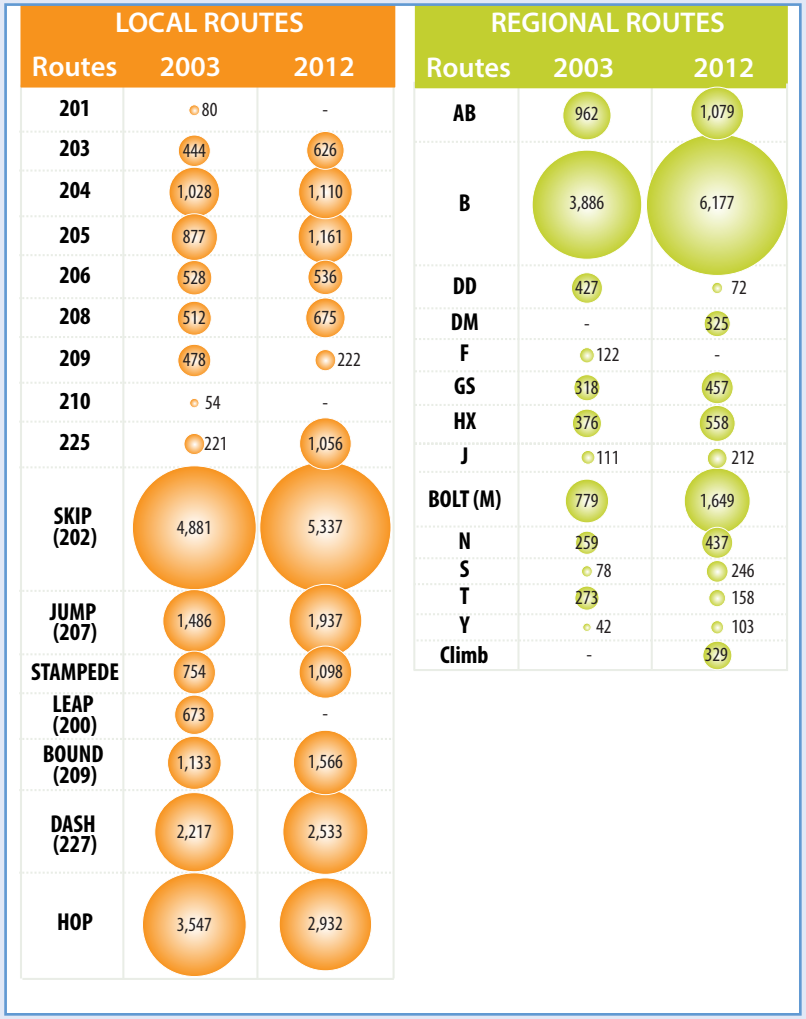
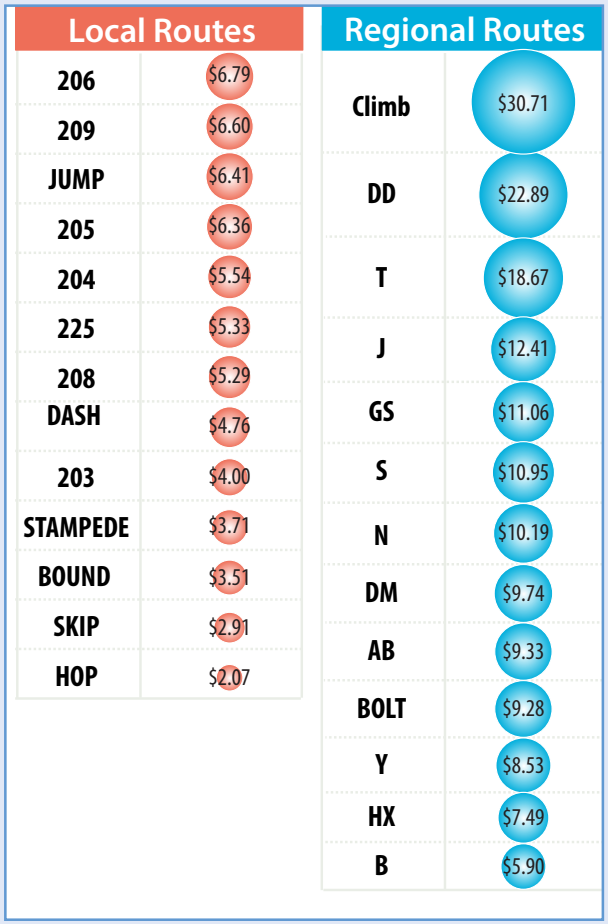


Figure 4-21 Cost Effectiveness (Cost per Boarding) of Local & Regional Routes



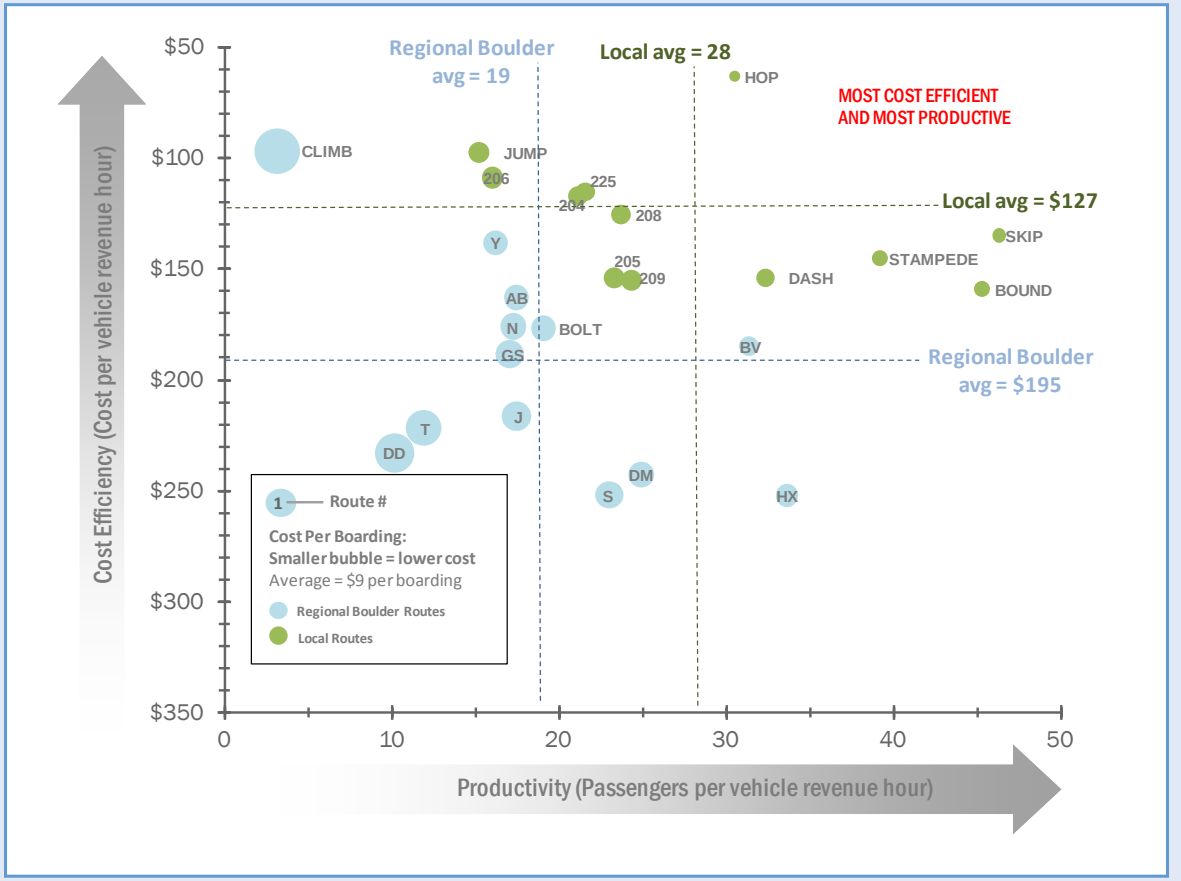
Cost effectiveness (cost per boarding) is a common metric used to measure the efficiency of transit service. The local CTN routes (namely the HOP, BOUND, SKIP) provide the most cost-effective service (cost per boarding).
Source: Nelson\Nygaard

Source: Unless otherwise specified, data is from 2012 RTD Annual Ridership Data; HOP data was provided by the City of Boulder; Climb data was provided by Via.

Bus Service Performance

Figure 4-22 compares performance measures for Boulder local and regional routes. The SKIP has the highest number of boardings per revenue hour at 46.3, while the HOP is the most cost efficient route with an operating cost per revenue hour of $63.03. On average, local Boulder routes operate at a lower cost per revenue hour ($127) compared to regional Boulder routes ($195). Not surprisingly, local routes also have a higher number of average passengers per vehicle revenue hour (28) compared to Boulder regional routes (19). Figure 4-23 provides a detailed route by route comparison.

Figure 4-22 Average Weekday Ridership Compared to In-Service Hours, 2003-2012



This graphic shows clearly that CTN routes, particularly those operating largely in Boulder, are both the most cost effective and productive elements of the transit system serving Boulder County.

Source: Data is from 2012 RTD Annual Ridership Data; HOP data was provided by the City of Boulder; Note: Climb data is not included

Figure 4-23 Detailed Analysis of Weekday Performance Measures for Local and Regional Boulder Routes

Route	Annual Boardings	In-Service Hours	Operating Cost	Boardings Per In-Service Hour	Operating Cost Per Boarding	Operating Cost Per In-Service Hour
Local						
204	345,017	16,317	$1,911,083	21.1	$5.54	$117.12
205	343,161	14,099	$2,183,696	24.3	$6.36	$154.88
206	154,152	9,631	$1,046,543	16.0	$6.79	$108.66
208	161,496	6,811	$854,237	23.7	$5.29	$125.42
209	133,828	5,747	$883,887	23.3	$6.60	$153.80
225	150,251	6,962	$801,396	21.6	$5.33	$115.11
BOUND	537,604	11,872	$1,889,109	45.3	$3.51	$159.12
DASH	692,467	21,419	$3,295,103	32.3	$4.76	$153.84
HOP	830,493	27,234	$1,716,578	30.5	$2.07	$63.03
JUMP	429,614	28,212	$2,752,844	15.2	$6.41	$97.58
SKIP	1,576,417	34,052	$4,590,725	46.3	$2.91	$134.82
STAMPEDE	217,920	5,567	$808,039	39.1	$3.71	$145.15
Total	5,572,420	187,923	$22,733,240	29.7	$4.08	$120.97
Regional						
AB	316,931	18,155	$2,958,444	17.5	$9.33	$162.96
BOLT	417,854	21,936	$3,877,846	19.0	$9.28	$176.78
B	1,706,586	54,474	$10,069,348	31.3	$5.90	$184.85
DD	28,713	2,822	$657,157	10.2	$22.89	$232.87
DM	83,175	3,339	$809,897	24.9	$9.74	$242.55
GS	119,702	7,027	$1,323,741	17.0	$11.06	$188.39
HX	146,836	4,366	$1,100,407	33.6	$7.49	$252.05
J	64,381	3,691	$798,790	17.4	$12.41	$216.43
N	110,766	6,418	$1,128,302	17.3	$10.19	$175.79
S	58,560	2,546	$641,417	23.0	$10.95	$251.96
T	34,425	2,899	$642,779	11.9	$18.67	$221.76
Y	23,505	1,451	$200,434	16.2	$8.53	$138.16
The Climb	4,255	1352	$130,687	3.1	$30.71	$96.66
Total	3,115,689	130,474	$ 24,339,251	23.9	$7.81	$186.54
Systemwide	**97,247,226**	**3,069,882**	**$430,704,915**	**31.7**	**$4.43**	**$140.30**

Source: RTD 2011 Service Performance Report (annual totals)

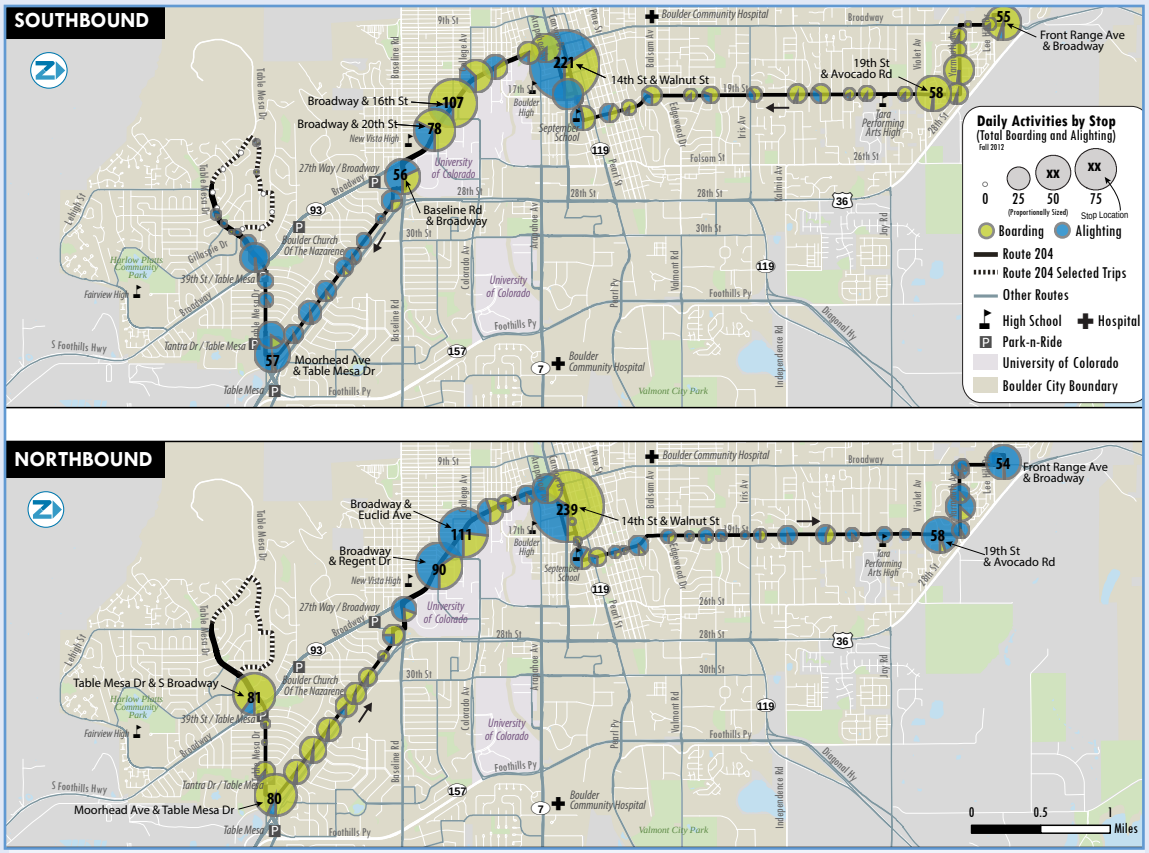
Summary of Route Performance

Ridership growth over the past decade on local and regional routes is, at best, lackluster, particularly given the level of service investment. There is evidence that ridership was growing ahead of the Great Recession. But the downturn in the economy dramatically slowed the accelerating growth rate. Although only one year of data is available, it seems that ridership is again growing, despite decreases in overall service investment. Although showing signs of recovery, growth rates are lagging behind what would be considered healthy given Boulder's long-term goals to improve transit mode share and achieve the community's transportation and climate commitment goals. This section provides a high-level summary of local and regional route performance (see detailed route profiles in Appendix A).

Local Routes

- Within the core of Boulder, the Community Transit Network routes are highly productive. However, as these routes reach into predominantly single-family neighborhoods, or in some cases beyond the city limits, ridership and productivity decline significantly.
- A few local RTD routes struggle to maintain good ridership and productivity. For example, routes 205, 206, 209, and the JUMP all have productivity that is nearly 50% of the average productivity for local routes. Most of this is due to operation in low density areas or on long stretches of roadway where there is no development.
- Some CTN and RTD local routes would benefit from having strong anchors at multiple nodes/districts, along and at both ends of the route, not just downtown and/or CU.
- Local routes serving the communities to the east, Louisville, and Lafayette seem to have ridership recovering at a rate better than other local routes. They tend to also have the largest ridership increases historically. This is due to a number of causes. In some cases introduction of new services to areas where service has not been offered, in cases like Nederland, the introduction of the Eco Pass, in other cases there appears to be a discovery about transit as a real access mode from the immediately adjoining communities into Boulder.
- There are overlaps between the Buff Bus and some of the local CTN and RTD routes that could be explored and, if resolved, have the potential to reduce service duplication and improve productivity.

Figure 4-24 Route 204 - Total Activities by Stop (Weekday)



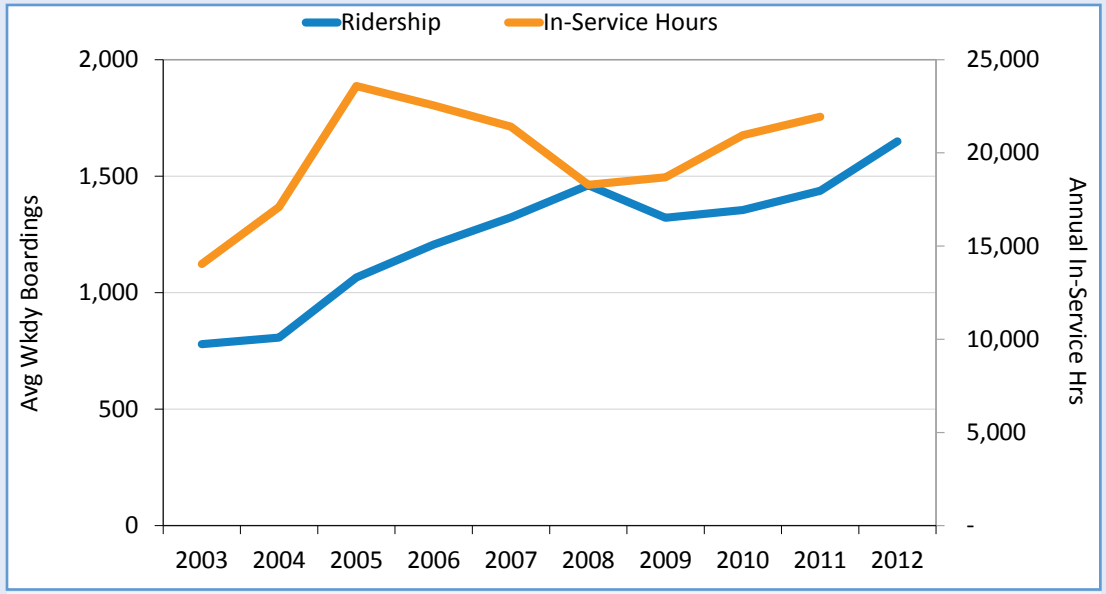
Route 204 is highly productive in the core of Boulder. However as it reaches into predominantly single-family neighborhoods, its ridership and productivity decline significantly. Detailed route profiles are provided in Appendix A.

Source: Nelson\Nygaard

Regional Routes

- More than three quarters of all RTD regional ridership that originates in or is destined for Boulder is accommodated on three routes. One of these routes, the B (US 36 corridor) accounts for 55% of ridership on the routes serving Boulder that are classified as regional in this study. The other two routes, the BOLT (Boulder-Longmont) and the AB (Boulder-Airport) account for 23% of total regional service that serves to Boulder.
- The BOLT is the second best performing regional route based on the measure of ridership, carrying nearly 1,700 riders per day. Although the route connects multiple communities – Boulder, Niwot, and Longmont – about 90% of all passenger activity on the route starts or ends in Boulder.
- Most notably, these three high performing routes are also the ones that operate the most complete span of service, seven days per week. The exception would be route N (to Nederland), which is in the middle tier of ridership and performance, but has one of the most encouraging recent ridership trajectories
- Regional routes with moderate to low daily ridership – moderate being 425 to 600 boardings per day (three routes, HX, GS, and N), low being 325 or fewer boardings per day (eight routes, the larger ones being DM, S and J) – tend to be commuter services that operate directionally in peak periods on weekdays only.
- Some regional routes that only have Boulder and one other community as end points, notably places like Longmont and Nederland, have shown great resiliency to the recession and better ridership history than other regional routes.

Figure 4-25 Route N BOLT Ridership History, 2003-2012



The BOLT provides service between the Boulder Transit Center and Longmont. Regional routes that only have Boulder and one other community as end points have shown great resiliency to the recession and better ridership history than other regional routes.
Source: Nelson\Nygaard

Fixed Route Transit Funding

City of Boulder transportation funding is provided by two primary sources: the Transportation Fund and the Transportation Excise Tax Fund. Revenue sources for the Transportation Fund include the 0.6 percent local city sales tax dedicated for transportation purposes, federal funds, Highway Users Tax, County Road and Bridge funds, and State Highway Maintenance Funds. The Transportation Development Excise Tax Fund is supported by a transportation related excise tax, levied against new construction for development related infrastructure needs. Of these sources of revenue, the primary contributions are from the city transportation sales tax (59%), federal funds (15%), Highway Users Tax (11%), and Transportation Excise Tax (4%). A total of $50.3 million was spent on fixed route transit service in Boulder in 2012 from a variety of sources detailed in the following sections.[3]

RTD Tax Contributions

In 2011, RTD spent $47.1 million to operate Boulder local and regional service. This revenue primarily comes from the $0.06 RTD sales tax collected in Boulder.

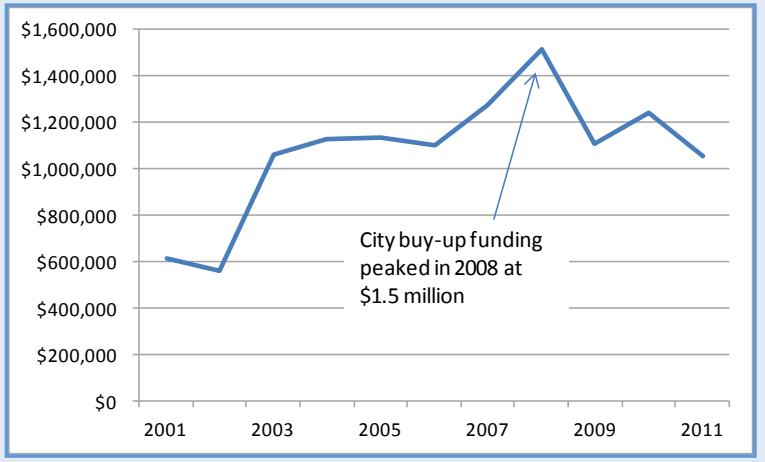
As is the case for transit agencies across the U.S., RTD is facing financial constraints as funding is reduced and operating costs increase. In the fall of 2011, RTD suggested more than $1 million in cuts for Boulder based routes. In the face of public concern, RTD rescinded its proposal to cut service on the SKIP route, but eliminated Route #203. Over the last ten years, RTD has cut 20,500 service hours – the equivalent to the DASH route. This continued vulnerability to service reductions combined with planned fare increases have heightened the need to establish more reliable funding mechanisms for Boulder's local and regional transit system.

RTD Transit Contributions for Boulder Local and Regional Service

Cost Category	2011 Budget
Boulder Local Service	$22,900,901
Boulder Regional Service	$21,250,120
AB SkyRide	$2,958,444
Total	$47,109,464

Source: RTD

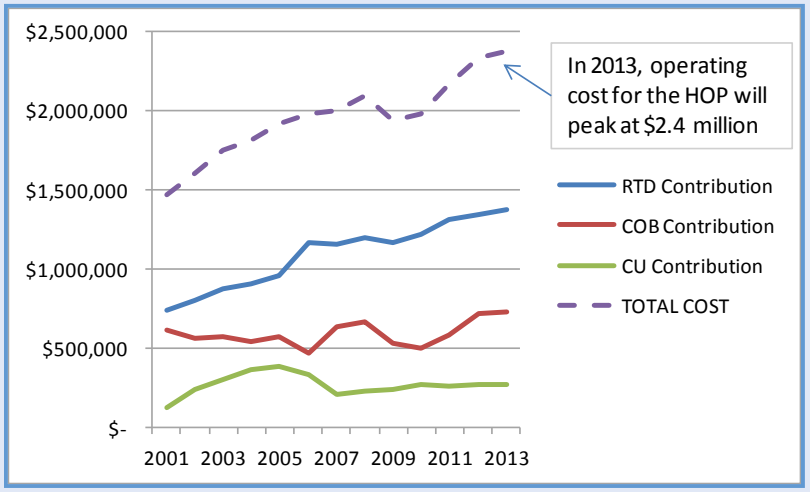
Figure 4-26 Route N BOLT Ridership History, 2003–2012



Source: City of Boulder

3 Note: data for RTD is from 2011.

Figure 4-27 HOP Funding History, 2001 – 2013



Source: City of Boulder

Transportation Maintenance Fee

Slowly but steadily, the costs of maintaining the transportation system have been consuming an ever-larger portion of the budget, reducing the City's ability to enhance the existing transportation system, largely due to the growth of the infrastructure network in the last decade and exacerbated by rising cost of materials and labor. In the near future, the cost of maintenance and operations are estimated to exceed existing revenues. Current calculations estimate a $3.2 million annual shortfall, including a $500,000 annual shortfall to support existing transit service levels. Moreover, an additional $7 million per year is needed between 2010 and 2025 to fulfill the Complete Streets Investment Plan.*

The City is currently investigating a variety of potential funding strategies to help cover increasing costs and demand for transportation maintenance and system improvements and could also contribute to new transportation services and facilities, such as transit service hours or bicycle facilities.

* City of Boulder. (2013) Boulder City Council Study Session Materials, April 9, 2013.

City of Boulder Contributions

Funding for transit in Boulder also comes from a partnership between the City of Boulder, RTD, and the University of Colorado. In addition to the regional sales tax collected by RTD, the City partners with RTD and the University to fund the HOP. The City subsidizes increased RTD services, or "buy-ups," on the JUMP and BOUND to maintain high frequencies (service every 10 minutes). City buy-up funding peaked in 2008 at $1.5 million. In 2011, City buy-up funds had declined to $1.1 million (see Figure 4-26 on page 4-25). The table above includes the City's contribution to fund the HOP, JUMP, and BOUND. In addition to directly paying for operating costs for the HOP, JUMP, and BOUND, the City currently expends approximately $350,000 per year on transit-related expenses, including overhead expenses, advertising, and personnel, and a $230,000 contribution to Via Mobility to subsidize paratransit services.

City of Boulder Transit Contributions

Cost Category	FY 2012 Budget
HOP	$ 722,797
JUMP & BOUND Buy-Up	$409,719
Paratransit	$228,568
Overhead, Advertising, Misc. Capital Expenses	$262,796
Personnel	$96,000
Total	$1,719,880

Source: City of Boulder

Boulder County Operations & Maintenance Contributions

Boulder County transportation revenue is funded in part by a County sales tax. Boulder County provides "buy-up" funds for the Climb to Goldhill, the BOLT to Longmont, and the Y to Lyons. In 2012, Boulder County contributions amounted to $151,012. (Note that this amount only includes the County's contributions to City of Boulder local and regional routes).

Boulder County Transit Contributions

Cost Category	FY 2012 Budget
BOLT Buy-Up	$46,000
Y Route to Lyons	$65,000
CLIMB Route	$38,000
Total	$151,012

Includes cost of community Eco Passes

Source: Boulder County 2013 Update on Countywide Transportation Sales Tax

Other Transportation Service

Via Mobility Services Paratransit Service

Via Mobility Services (formerly known as Special Transit) was established in 1970 by the Boulder County Commissioners to coordinate an efficient, cost-effective, and accessible transportation system for seniors and people with disabilities residing in Boulder County. Programs include demand response, travel training, mobility options, and individual travel planning. In 2012, the organization provided 46,264 passenger trips to mobility-limited citizens in Boulder, in addition to 14,289 trips to individuals served by the Boulder Shelter for the Homeless and Boulder Outreach for Homeless Overflow. The number of trips provided in Boulder in 2012 represents a 16% increase over 2011. According to the 2010 Census, the population of older adults and people with disabilities in Via's service area is expected to grow 95% between 2010 and 2025, from 12,463 to 24,365.[4] Keeping up with increased demand for specialized transit will be important.

Via Mobility Services is also contracted with RTD to operate the Access-a-Ride and Call-n-Ride programs in Boulder County:

- Access-a-Ride is an on-demand paratransit program mandated by the Americans with Disabilities Act (ADA) and is provided throughout RTD's fixed route service area. Riders on Access-a-Ride must be certified as having a disability that prohibits them from using the fixed route system.
- Call-n-Ride is a hybrid, demand-response service established to serve residents living in specific communities where fixed routes are generally not cost effective. Designed to connect people to the RTD Park-and-Rides during peak hours, the service is open to anyone living or working within the defined geographic service area for general transportation purposes.

The cost to a rider to use these services is $2.00 one way in most communities; $1.25 one way for smaller rural communities; and $4.00 one way between communities. Reduced fare and non-fare options are available based on income. In 2012, the City of Boulder contributed $228,568 to Via Mobility to supplement RTD's contributions. The total cost of paratransit service provided to Boulder amounted to $1.8 million.

4 Via. (2011). Annual Report.

University of Colorado

The University of Colorado is an important partner in the community, investing over $6.1 million in transit service in 2012.

University of Colorado Buff Bus Shuttle

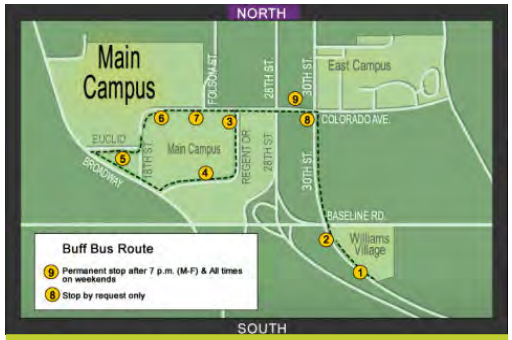
The Buff Bus Shuttle is a University of Colorado (CU) bus service owned and operated by CU for students living in residence halls at the University of Colorado. It provides transit from Williams Village/Bear Creek to Main Campus, and from College Inn to Main Campus. The Buff Bus shuttle is sponsored by CU-Boulder's Housing Department, and administered by Parking and Transportation Services. The Buff Bus also provides chartered service for special events. In 2012, ridership on the Buff was 811,506 for fixed route service and 131,264 for chartered service.

University of Colorado Transit Contributions

In 2012, CU invested over $6.1 million in local transit service.

Cost Category	FY 2012 Budget
RTD (Student Bus Passes)	$4,358,366
HOP	$274,593
Buff Bus Fixed Route	$1,088,954
Buff Bus Chartered	$190,930
Late Night Transit	$190,191
Stampede	$12,975
Ski Bus	$27,300
Total	$6,143,309

Source: University of Colorado CUTD Cost Summary (2012)



The Buff Bus Shuttle is available for University of Colorado students from the Williams Village/Bear Creek residence halls to the Main Campus and from East Campus to the Main Campus.

Image from University of Colorado

University of Colorado Late Night Transit Service

The Late Night Transit bus route provides expanded hours of operation on Thursday, Friday, and Saturday nights in conjunction with the start of CU's fall semester in late August. Buses arrive every 15 minutes from 10 p.m. to midnight on these nights. This route connects Boulder's main nighttime activity centers – downtown, CU, and Twenty Ninth Street. The Late Night Transit bus service is funded by the University and operated by Via Mobility Services using HOP and Buff buses. In fiscal year 2012, CU spent $190,191 to operate the Late Night Transit service.[5]

Rideshare

In addition to transit service, carpool and vanpool programs help commuters traveling longer distances. In 2012, 6% of Boulder residents shared rides to work. This number has declined over the last 12 years, from 10% in 1990. With a growing population of in-commuters traveling long distances to work in Boulder, strengthening regional vanpool and carpool programs will be crucial.

Carpool

The following carpool services are available:

- Way to GO Carpool (Denver Metro Area)
- SmarTrips (North Front Range)
- CUCommute (CU faculty, students, and staff)
- SkiCarpool

Vanpool

There are two formal vanpool organizations in the region:

- Way to GO Vanpool (Denver Metro Area)
- VanGo (North Front Range)

Third-party sponsorships are also popular throughout the Denver Metro Area. More than 100 total vans operate from Boulder, Denver, and Fort Collins.

Late Night Transit bus route provides expanded hours of operation on Thursday, Friday, and Saturday nights in conjunction with the start of CU's fall semester in late August.
Image from City of Boulder

5 University of Colorado CUTD Program Summary Fiscal Year 2012.

Key Issues to be Explored in the Renewed Vision for Transit

As the update to the TMP moves ahead, there are areas of need that should be considered further during the development of a renewed long-term vision for transit and short-term service recommendations.

Local Connections and CTN Routes

Land use activity in East Boulder is reaching a point that justifies attention in how the CTN is structured and how it embraces that activity. Some of the issues related to this are a factor of the route network, while others address the need for access to new or growing destinations. Specific areas include Boulder Junction, East Boulder Community Center, CU East Campus, Boulder Community Hospital, housing areas in the vicinity of Valmont and 55th as well as access to locations that front or are close to Arapahoe Avenue in East Boulder. Transit service is present on Arapahoe, but poor street connectivity and pedestrian facilities can be a challenge to its use. In areas such as Boulder Junction, strong, direct, frequent connections to major community attractors will be necessary to ensure access to the area, which is heavily dependent on multimodal access solutions.

The 28th Street corridor appears to have significant transit potential as it has a large number of destination type locations, e.g. grocery stores, along its length. Yet, between Colorado and Canyon, there is no service on the corridor, and north of Canyon, service is shared between two routes (205 and BOLT) for a distance, then one route (just the 205). The routes do not provide a consistent level of service along the corridor nor a peak versus off-peak service pattern that encourages transit trips consistent with the land use.

In the northwest part of Boulder, there is a lack of east/west connectivity. For example, to get from a location on north Broadway to a grocery store on 28th Street, passengers have to travel downtown first, then back north.

In the northeast part of Boulder, the IBM plant and the employment in Gunbarrel is underserved. Buses may be only part of the solution for such campus settings, as employees likely travel from many parts of Boulder County.

Why two systems for route naming? The named routes and service buy up has been a successful model for Boulder. But the local network includes some numbered routes and some routes that are "officially" part of the CTN, based on being named (and meeting CTN service levels). The mix-and-match nature of the network, how residents perceive the various routes, and how that impacts ridership response needs further investigation.

Routes in Boulder County

Factors for success in increasing transit ridership between adjacent communities should be investigated further, assessing how the same root motivators used to increase transit ridership in Boulder can apply to regional routes. Commuters both to and from Lafayette and Louisville, for example, are a considerable market according to the most recent travel demand/commute modeling conducted by Boulder County. This assessment should evaluate the need to provide expanded or new park-and-ride facilities in some of these communities. While these facilities currently exist, the long-term potential is greater than current park-and-ride capacity in several locations.

Regional Services

US 36 Corridor bus rapid transit (BRT) service is currently under development. A robust regional BRT service is a great opportunity for increased transit market share in the corridor. However, the question of how these services will be integrated to cover the larger activity centers in Boulder is an open one. Is it necessary to have a one seat ride to coax people out of their autos? For example, if someone uses the US 36 BRT from Superior can they get to their job at Boulder Community Hospital in an expeditious manner, or will the transfer and time required to transfer and travel from a BRT station reduce the convenience of transit? These same issues apply to today's network, but will become even more important as transit service levels improve on US 36.

Presently, there are a number of regional services that target people departing Boulder in the morning. Some are well utilized; others are not. The TMP update should evaluate the possibility for routes to operate two-way service, encouraging both "in" and "out" transit commuting in Boulder.

An increasing number of commuters to Boulder come from areas outside of RTD's boundaries – Fort Collins, for example. These markets should be examined for the possibility of developing intercity commuter services. Other non-single occupant options such as carpooling or vanpooling should be explored where the market for a transit route does not yet exist. Boulder's involvement in developing these markets is a noticeable "missing link" in today's activities.

CHAPTER 5

PEER REVIEW

IN THIS CHAPTER

- What is a peer review?
- Why a peer review for Boulder?
- The data
- Key findings
- Key issues to be explored in the Renewed Vision for Transit

CHAPTER FIVE
PEER REVIEW

What is a "Peer Review?"

Transit systems are a reflection of the communities they serve and, much like those communities, no two systems are identical. So much so, that there are virtually no industry accepted standards for what makes a transit system effective or efficient. While there are generally accepted rules of thumb, even those "rules" are regularly violated. So, how does one judge the quality, effectiveness, and efficiency of a transit system?

One way is to compare transit system performance to other communities that are similar in scale, values, design, and other important attributes such as the presence of a major university. In the transit industry, this process is called a peer review.

Why a Peer Review for Boulder?

A key to Boulder's success in developing a world-class multimodal transportation system is to regularly set targets that reach beyond the achievement of the "average" American city. The Renewed Vision for Transit provides an opportunity for Boulder to continue its leadership and meet community goals as the transit system continues to evolve. Chapter 6 offers inspirational examples of transit innovations and leading practices from around the nation.

This chapter focuses more directly on current conditions and comparative data commonly used to measure operational efficiency and performance. It answers a few simple, but important questions about how transit performs in Boulder compared to other mid-sized cities with major universities. The table on the next page describes the peer systems and communities and how Boulder compares in the peer review. Of these communities, Boulder is the only one located within a major urban area and served by a regional transit system; the others are the primary cities within their transit systems, with some service outside the city. This makes accurate peer data comparisons more challenging because Boulder has more regional service than the peers and data for Boulder routes must be extracted from the RTD system-level data.

The Data

Transit agencies that accept federal funds are required to report standard operating information to the USDOT/Federal Transit Administration each year. This information is compiled into a National Transit Database (NTD), a resource for transit system comparison.

In the Denver Metropolitan area, NTD data is reported for the entire RTD system. To attempt to develop a more accurate comparison between Boulder and the peers, most of which are not part of larger metro areas, data was subsegmented from the RTD system for the Boulder Area.

For this peer review the "Boulder Area" is assumed to be the portion of Boulder County east of the mountains with an estimated population of about 287,000. This is the primary area analyzed and reported in the following figures and tables. Some routes serving the city of Boulder extend outside of Boulder County, so the service area is an approximation. For some metrics, just the area in the Boulder city limits was analyzed.

Peer Transit Systems and Boulder Areas Evaluated

Image from transformgov.org

GAINESVILLE, FL
Gainesville Regional Transit System

Population: 124,364*

Population Density (person per sq. mile): 2,028

University Population: University of FL: 49,589

Modes: Local bus, campus routes

Operates entirely within City Limits; includes 8 route campus circulation system


Image from Nelson Nygaard

EUGENE, OR
Lane Transit District

Population: 156,342*

Population Density (person per sq. mile): 3,572

University Population: University of OR: 24,591

Modes: Bus rapid transit (EmX), local bus, inter-city bus

Serves Eugene and Springfield and some rural areas

Image from annarbor.com

ANN ARBOR, MI
Ann Arbor Transportation Authority

Population: 113,939*

Population Density (person per sq. mile): 4,094

University Population: University of MI: 43,426

Modes: Express bus, local bus

Serves two cities: Ann Arbor and Ypsilanti

Image from fcgove.com

FORT COLLINS, CO
Transfort

Population: 144,000*

Population Density (person per sq. mile): 2,653

University Population: Colorado State University, Fort Collins: 27,500

Modes: Local bus, intercity bus, bus rapid transit (under construction)

First Front Range bus rapid transit line planned to open in 2014

*Source: 2010 U.S. Census

Existing Boulder Service

Image from the-climb.org

BOULDER COUNTY AREA *(east of mountains)*
RTD, City of Boulder, Boulder County

Population: 286,996*

Population Density (person per sq. mile): 941

University Population: University of Colorado, Boulder: 32,697

Modes: Local bus, Intercity bus

Includes 200 series routes, CTN, B series routes, and other regional routes that serve Boulder

Image from flickr user rorowe8

BOULDER COUNTY AREA *(City of Boulder proper)*
RTD, VIA

Population: 97,385*

Population Density (person per sq. mile): 3,948

University Population: University of Colorado, Boulder: 32,697

Modes: Community Transit Network, regional bus, university bus

Service provided by RTD (regional transit agency) and Via (contracted by the City)

Peer Transit Systems and Boulder Areas Evaluated *(continued)*

Image from Nelson\Nygaard

MADISON, WI
Metro Transit

Population: 233,337*

Population Density (person per sq. mile): 3,037

University Population: University of WI, Madison: 42,820

Modes: Express bus, local bus, campus routes

Serves Madison and surrounding Cities


Image from noozhawk.com

SANTA BARBARA, CA
Santa Barbara Mass Transit District

Population: 88,409*

Population Density (person per sq. mile): 4,541

University Population: UC Santa Barbara: 18,977

Modes: Express bus, local bus, intercity bus

Serves three cities: Santa Barbara, Carpinteria, and Goleta

Image from trip.scc.com

SANTA CRUZ, CA
Santa Cruz METRO

Population: 59,948*

Population Density (person per sq. mile): 4,705

University Population: UC Santa Cruz: 17,903

Modes: Express bus, local bus, intercity bus

Provides service to all of Santa Cruz County

*Source: 2010 U.S. Census

Existing Boulder Service

Image from thecl...org

BOULDER COUNTY AREA *(east of mountains)*
RTD, City of Boulder, Boulder County

Population: 286,996*

Population Density (person per sq. mile): 941

University Population: University of Colorado, Boulder: 32,697

Modes: Local bus, intercity bus

Includes 200 series routes, CTN, B series routes, and other regional routes that serve Boulder

Image from flickr user rorowe8

BOULDER COUNTY AREA *(City of Boulder proper)*
RTD, VIA

Population: 97,385*

Population Density (person per sq. mile): 3,948

University Population: University of Colorado, Boulder: 32,697

Modes: Community Transit Network, regional bus, university bus

Service provided by RTD (regional transit agency) and Via (contracted by the City)

Key Findings

Boulderites are less likely to drive, more likely to take transit. The city of Boulder has the lowest drive-alone rate for commute trips of any of the peer cities at 52.8%, compared to a peer average of 62.6% (see Figure 5-1). Its transit rate is also highest at 9.6%, compared to a peer average of 6.2%. Boulder's non-motorized share of travel at 20.5% is also the highest of all peers where the average is 16.2%.

Per capita transit use for the Boulder Area is lower than the peer average. Transit use in the city compares to the best performing peers. Using the service area described on page 5-1, the number of trips taken annually per resident in the Boulder Area is 31, which is below the peer average of 41.7 (See Figure 5-2). However, this is largely reflective of how service area and population are calculated for the Boulder Area. This same metric calculated as transit boardings made in the Boulder city limits is 56 boardings per capita. The larger study area number is much lower as populations living in other portions of Boulder County use transit at a much lower rate than residents within the city limits. This shows that Boulder residents use transit at a rate on par with some of the best performing national peers, including Gainesville, Ann Arbor, and Madison.

Not included in the "transit data" for Boulder are the riders served by CU's "Buff Bus" connecting high density student residential areas with the campus. In several of the peer locations, comparable services are included in the transit data.

Figure 5-1 Means of Transportation to Work

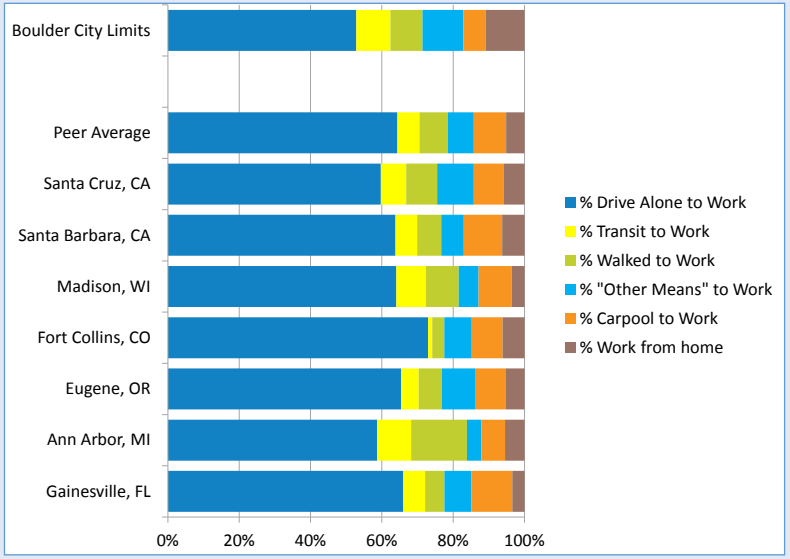
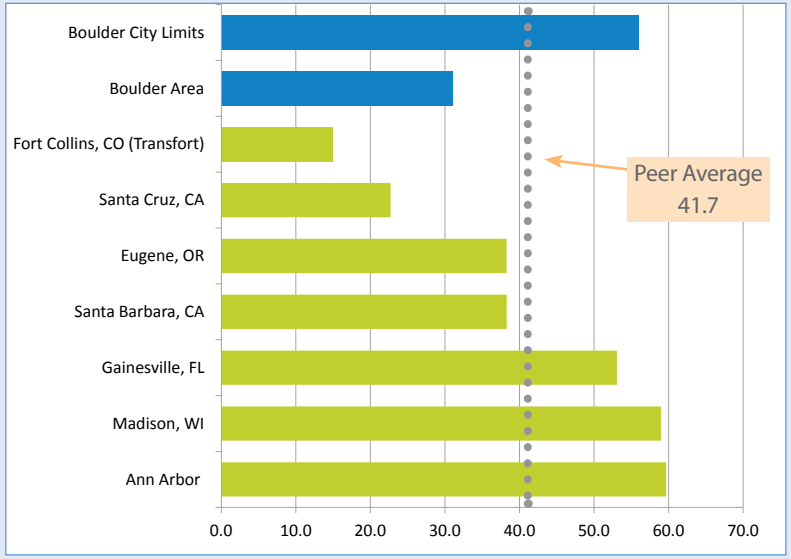


Figure 5-2 Annual Rides Per Capital



Total service offered is high. The total amount of service provided (measured in annual revenue hours and annual revenue miles) is significantly higher than the peer average. Selected peer cities are in smaller metropolitan areas and are served by smaller-scale transit agencies. Significant regional transit investment by RTD pushes Boulder's offerings above many peers.

Investment in transit is significant compared to peers. The annual operating cost of routes serving Boulder is $47.8 million, more than double the peer average of $23.4 million.

Boulder riders cover more of transit's operating costs through fares and fare programs. Annual farebox revenue on routes serving Boulder is $20.6 million, compared to the peer average of $7.6 million. Farebox revenues pay for 43% of the total cost of transit operations in the Boulder area, higher than the peer average of 30% (see Figure 5-3). Boulder riders are paying a higher proportion of operating costs than riders in the peer cities. Much of this difference is attributable to the presence of the Eco Pass.

The cost per passenger served is high. The average cost per passenger served in the Boulder area is $5.37 compared to a peer average of $2.81 (see Figure 5-4). This is due in part to the higher cost to operate regional services, but also indicates that Boulder may not be getting optimal value for transit dollars invested. Cost per passenger on Boulder's most cost effective routes – the HOP ($2.07) and the SKIP ($2.91) – compare favorably with the most efficient peer systems.

Figure 5-3 Farebox Recovery

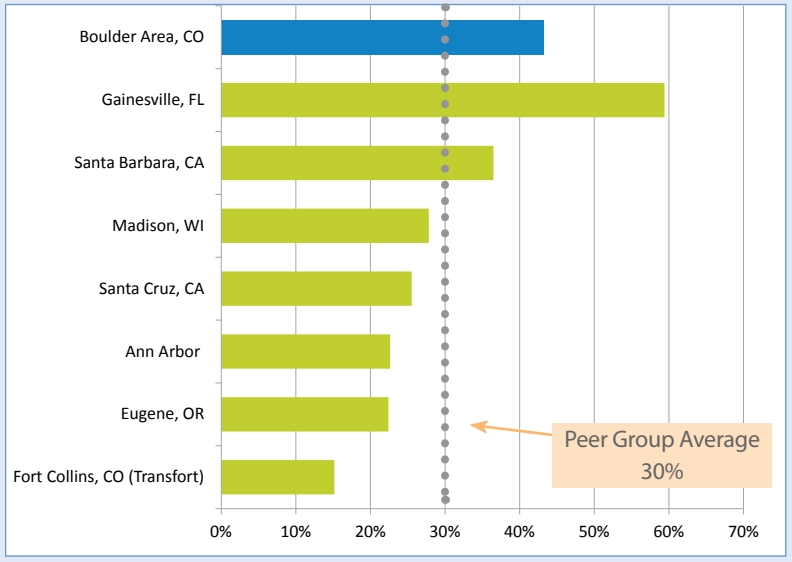


Figure 5-4 Cost per Passenger Trip

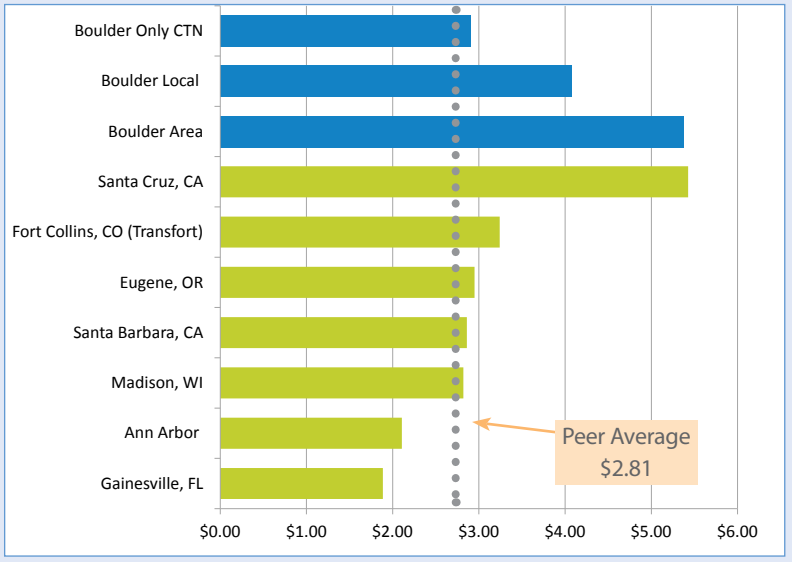


Figure 5-5 Peer Service and Ridership Statistics

Peer Transit Provider	Annual Passengers (unlinked trips)	Annual Revenue Hours	Annual Revenue Miles	Passengers per Revenue Hour	Passengers per Revenue Mile
Gainesville, FL (RTS)	9,964,034	272,364	3,138,234	36.6	3.2
Ann Arbor, MI (AATA/UM)[1]	12,680,685	279,344	3,358,684	45.4	3.8
Eugene, OR (LTD)	11,239,339	249,500	2,914,830	45.1	3.9
Fort Collins, CO (Transfort)	2,156,876	77,355	995,858	27.9	2.2
Madison, WI (Metro)	14,923,970	383,107	4,818,879	39.0	3.1
Santa Barbara, CA (SBMTD)	7,686,388	209,234	2,559,672	36.7	3.0
Santa Cruz, CA (SCMTD)	5,776,444	215,262	3,156,743	26.8	1.8
Peer Average	**9,203,962**	**240,881**	**2,991,843**	**38.2**	**3.1**
Boulder Area (RTD)[2]	**8,906,534**	**422,220[3]**	**6,273,049**	**21.1**	**1.4**
RTD Total (Bus Only)	**75,954,767**	**2,727,571**	**36,662,056**	**27.9**	**2.1**

Notes: 1 Data for both AATA and UM service. 2 Data for routes serving City of Boulder (2011). 3 RTD does not publish revenue hour by route data, but it does publish in-service hours, and system revenue hours are available from NTD. To estimate revenue hours for Boulder area routes, the RTD system ratio of revenue hours to in-service hours was calculated by dividing year 2011 revenue hours (from NTD) by year 2011 in-service hours (from RTD 2011 service performance report). This ratio is 1.304. Multiplying annual in-service hours (323,728) by 1.304 gives estimated revenue hours of 422,220.

Sources: National Transit Database 2011 data, RTD

Figure 5-6 Peer Service and Ridership Statistics

Peer Transit Provider	Total Operating Cost	Farebox Revenue	Net Subsidy	Cost per Revenue Hour	Cost per Passenger	Subsidy per Passenger
Gainesville, FL (RTS)	$18,796,130	$11,166,654	$7,629,476	$69.01	$1.89	$0.77
Ann Arbor, MI (AATA/UM)[1]	$26,702,900	$6,048,077	$20,654,823	$95.59	$2.11	$1.63
Eugene, OR (LTD)	$33,154,593	$7,432,593	$25,722,000	$132.88	$2.95	$2.29
Fort Collins, CO (Transfort)	$6,991,846	$1,060,437	$5,931,409	$90.39	$3.24	$2.75
Madison, WI (Metro)	$42,090,315	$11,712,963	$30,377,352	$109.87	$2.82	$2.04
Santa Barbara, CA (SBMTD)	$21,990,891	$8,022,954	$13,967,937	$105.10	$2.86	$1.82
Santa Cruz, CA (SCMTD)	$31,341,694	$8,002,031	$23,339,663	$145.60	$5.43	$4.04
Peer Average	**$25,866,910**	**$7,635,101**	**$18,231,809**	**$107.38**	**$2.81**	**$1.98**
Boulder Area (RTD)2	**$47,832,261**	**$20,643,215**	**$27,189,046**	**$113.29**	**$5.37**	**$3.05**
RTD Total (Bus Only)	**$287,598,365**	**$79,496,929**	**$208,101,436**	**$105.44**	**$3.79**	**$2.74**

Notes: 1 Data for both AATA and UM service. 2 Data for routes serving City of Boulder (2011).

Sources: National Transit Database 2011 data, RTD

Key Issues to be Explored in the Renewed Vision for Transit

Focus on investments that have led to peer ridership growth: Peer cities and agencies show the greatest bump in transit ridership where significant investments in speed and reliability (i.e., BRT services) have been made. This is an important consideration for Boulder moving forward.

Efficiency: Boulder's efficiency metrics (i.e., cost per passenger, cost per revenue hour) don't compare well to peer cities that are not part of broader regional transit systems. While this is expected, it does present a key tradeoff question for Boulder in defining a renewed vision for transit: "Focus on transit improvements and coordinated land use improvements inside City boundaries or broaden the City's preview to deal with regional travel patterns?" Of course, this is not an either/or question, but it will be a key tradeoff that must be addressed in future TMP evaluation.

Integrate university transit services: Many peers have intercampus transportation services integrated with local/regional transit, simplifying system offerings and creating a more cohesive, transparent transit product. There could be substantial cost tradeoffs associated with integration; this is worth exploring in the next phase of the project.

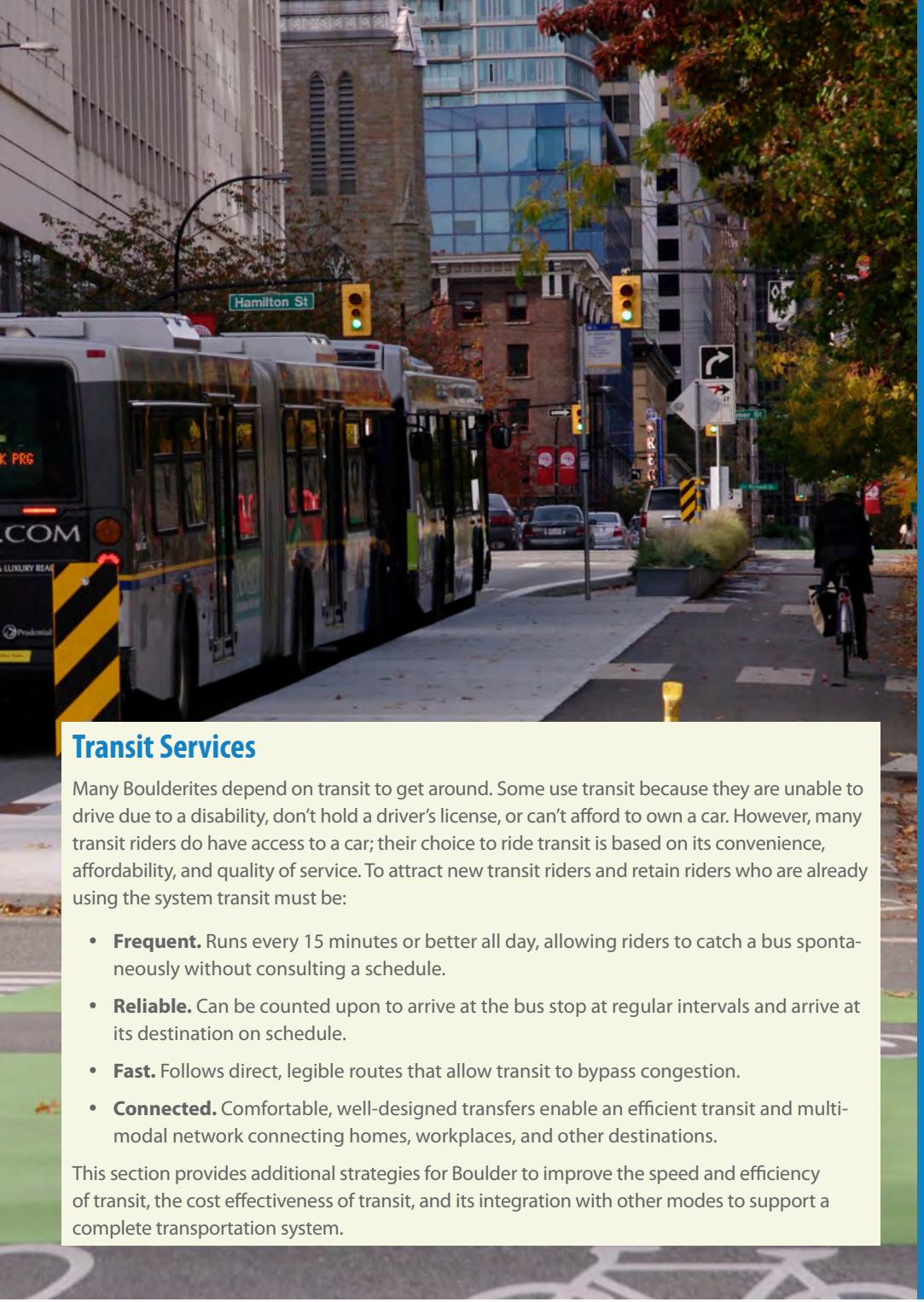
Build on fare program successes: Eco Pass programs combined with strong ridership help Boulder transit routes to operate with less subsidy than peer systems. The transit plan will look at opportunities to further reduce public subsidies for transit. Coordination with the Boulder County's Eco Pass study will be critical.

CHAPTER 6

TRANSIT INNOVATIONS & LEADING PRACTICES

IN THIS CHAPTER

- Transit Service
- Transportation & Land Use
- Access & Connections
- Information
- Amenities
- Fares & Funding



Transit Services

Many Boulderites depend on transit to get around. Some use transit because they are unable to drive due to a disability, don't hold a driver's license, or can't afford to own a car. However, many transit riders do have access to a car; their choice to ride transit is based on its convenience, affordability, and quality of service. To attract new transit riders and retain riders who are already using the system transit must be:

- **Frequent.** Runs every 15 minutes or better all day, allowing riders to catch a bus spontaneously without consulting a schedule.
- **Reliable.** Can be counted upon to arrive at the bus stop at regular intervals and arrive at its destination on schedule.
- **Fast.** Follows direct, legible routes that allow transit to bypass congestion.
- **Connected.** Comfortable, well-designed transfers enable an efficient transit and multi-modal network connecting homes, workplaces, and other destinations.

This section provides additional strategies for Boulder to improve the speed and efficiency of transit, the cost effectiveness of transit, and its integration with other modes to support a complete transportation system.

Transit Services

In this section:

Image from Nelson\Nygaard

Bus Rapid Transit & Corridor-Based Bus Improvements

Coordinated investments in transit service and facilities along bus corridors improve transit travel speed, reliability, and passenger comfort relative to traditional fixed-route bus service. These investments can include a broad continuum of features such as dedicated transit lanes and priority at traffic signals, enhanced station amenities and vehicles, off-board fare collection, and distinctive marketing and branding. A full Bus Rapid Transit (BRT) system may have many or all of these enhancements and often runs in an exclusive transit right-of-way. A more moderate level of investment is often referred to as "Rapid Bus" or "BRT Lite." These same principles can also be applied to frequent bus corridors. BRT systems are currently in development in Colorado: the MAX BRT system is scheduled to open in 2014 in Fort Collins; RTD is also planning a BRT system along the US 36 corridor between Denver and Boulder, scheduled to open in 2016.

Why is it important?

Bus corridor improvements can be implemented cost-effectively and incrementally, enabling benefits to be distributed across a range of corridors. A critical aspect of a corridor-based bus strategy is the coordination between the transit agency and city. Transit agency investments in vehicles, station amenities, and service have the greatest ridership response when street infrastructure under the city's control is designed to provide fast and reliable transit service, and when city land use policies encourage population and employment growth along major transit corridors. Marketing these services with a unique brand helps make them more "legible" or easier to understand, even for more infrequent and casual users who may not be comfortable navigating the fixed-route bus system. As the Boulder region looks to implement corridor-based bus on US 36 and other major corridors, it will be important to implement efficient and attractive bus service to provide a competitive transportation option for those currently commuting into Boulder by single occupancy vehicle.

Fort Collins, Colorado will open the state's first BRT system in May 2014.
Image from City of Fort Collins

Institute for Transportation and Development Policy BRT Standard

The Institute for Transportation and Development Policy (ITDP) BRT Standard was developed to create a common definition of bus rapid transit and recognize high-quality BRT systems around the world. It also functions as a technical tool to guide and encourage municipalities to consider the key features of the best BRT systems as they move through the design process. To achieve the ITDP BRT "gold" standard, the system must include: (1) busway alignment; (2) dedicated right-of-way; (3) off-board fare collections; (4) intersection treatments; and (5) platform-level boardings. More information on the rating system is available here.

Where has it been done?

Lane Transit EmX: Eugene, Oregon

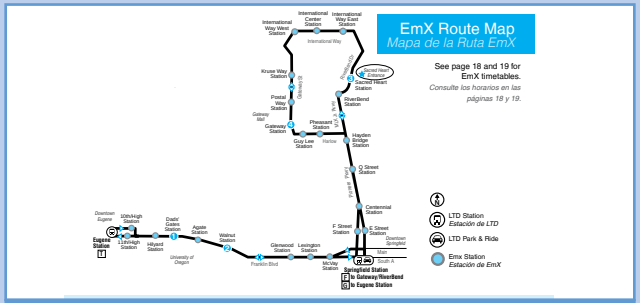
The EmX (Emerald Express) Green Line Bus Rapid Transit (BRT) service connects downtown Eugene and downtown Springfield along the Franklin Corridor, serving the University of Oregon and Sacred Heart Medical Center. The goals of EmX are to increase frequency, speed, and capacity of transit service in the corridor, while reducing operating costs. The EmX runs every 10 minutes, compared to every 15-30 minutes on the bus service (Route 11) that it replaced, and 60% of the corridor uses exclusive transit lanes.

The line was designed to support mixed-use districts around stations and enhance the surrounding streetscape with an attractive median busway coupled with bicycle and pedestrian facilities. More information is available here.

EmX Highlights

- Attracted a large share of choice riders (roughly 16% previously used private automobiles for similar trips).
- Reduced end-to-end travel time by one minute on average compared to previous bus service. Service is more reliable—average passenger travel time is six minutes faster than the scheduled time for previous bus service.
- Within two years, daily ridership more than doubled compared to earlier conventional bus service, and EmX served over 1.5 million riders per year at about a third the cost per boarding of the overall Lane Transit District system.
- Cost $25 million to build ($6.25 million per mile).

The EmX is a full BRT line with highly-developed stations including off-board fare payment. EmX vehicles are train-like, with doors that can open on both sides, fold-out ramps for accessibility, and on-board bicycle storage.
Image from Flickr user Wolfram Burner



The EmX was extended to the Gateway area in 2011; an additional extension to West Eugene is being planned.
Image from Lane Transit District

Mountain Link: Flagstaff, Arizona

Flagstaff Mountain Link is Flagstaff's branded, high-frequency, limited-stop cross-town bus service. Route 10 (the dark purple route in the map below) currently connects downtown Flagstaff to Northern Arizona University (NAU), which previously lacked a transit connection to the rest of the city, and the Woodlands Village residential and commercial areas. The service runs every 10 to 15 minutes and is free for students. The route follows a dedicated transit way (open to bicycles and pedestrians) through the NAU campus.

Mountain Link Highlights

- Served over 500,000 boardings in its first year, exceeding projections of 300,000 annual boardings
- Cost $8.2 million to build ($1.4 million per mile)

Mountain Link vehicles are not highly-stylized like the EmX, but their distinctive branding helps market the service, clearly defining the destinations the service connects.
Image from NAIPTA

Image from Nelson\Nygaard

Transit Priority Lanes and Treatments

Transit priority treatments are relatively inexpensive improvements that increase the speed and reliability of transit service. Priority treatments range from reserving roadway lanes for exclusive transit use to designing intersections and traffic signals so that buses can bypass traffic congestion. Priority treatments can be implemented as part of specific bus corridor projects (e.g., BRT or Rapid Bus) or on streets with frequent bus service.

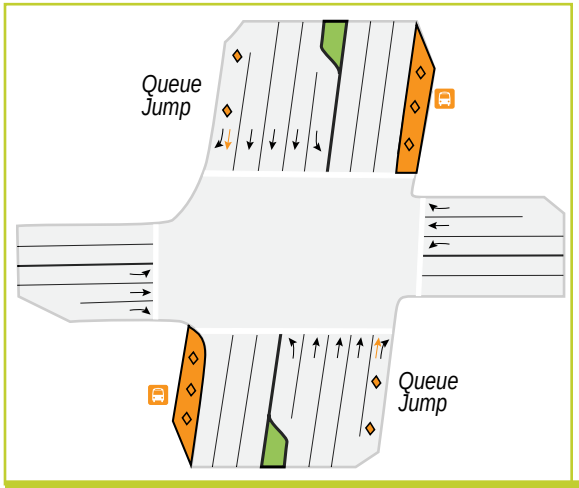
Why is it important?

Effective transit priority treatments optimize management of major transit streets to reduce delay for transit vehicles and passengers while minimizing impacts on other users of the street. Enabling buses to run faster saves time for existing riders and provides an added incentive to attract new riders to use transit. More efficient service saves transit providers money – fewer buses and operators are required to serve a route – which can then be put back into service improvements.

Where has it been done?

Transit Signal Priority (TSP) and Queue Jumps

TSP allows buses to communicate with traffic signals, requesting that a green light be extended several seconds for an approaching bus. Queue jump lanes, together with TSP, allow buses to bypass cars queued at intersections. In some cases, a special traffic signal phase allows buses to move ahead of traffic.



Queue jumps allow buses to bypass traffic to reach a stop at the far side of the intersection (Portland, OR).
Images from Nelson\Nygaard

Exclusive Transit Lanes

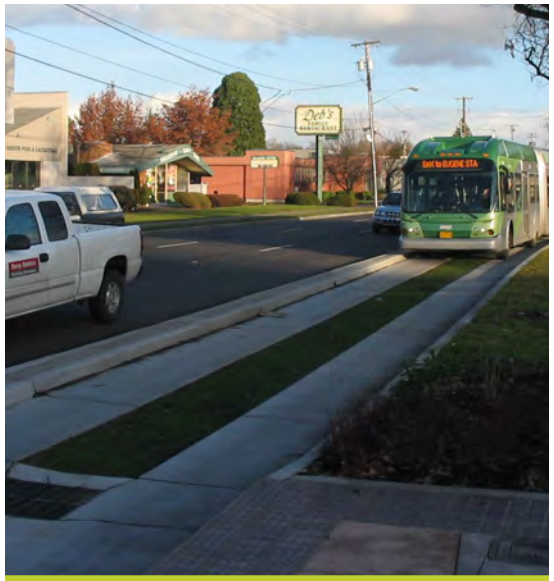
Bus-only lanes provide transit vehicles with priority on congested roadways. Bus-only lanes are most often curb lanes, but may also run "contra-flow" or against the primary travel direction or in the street median. Median bus-only lanes typically require specialized buses that have left-side doors (see EmX BRT) above.

This curbside bus lane on Marine Drive in Vancouver, BC includes a priority signal and queue jump that allows buses to bypass traffic queued to cross the Lions Gate Bridge; buses carry about a quarter of peak-hour traffic on the bridge.
Image from Flickr user TranBC

Bus lanes that run along the curb often allow cars to make right turns or access on-street parking. Lanes may be exclusive all-day or may be open to all vehicles outside of peak hours (Seattle, WA).
Image from Flickr user Oran Viriyincy

Visual and Physical Separation

Visual and physical barriers discourage or physically prevent autos from using transit lanes. As illustrated in the photo and other examples provided in the next section, visual separation is also frequently used to clearly identify parallel transit and bicycle facilities.



A raised concrete barrier provides physical separation between the roadway and the curbside bus lane for the EmX BRT (Eugene, OR). A grass strip adds a natural visual element to the design and improves natural absorption of storm water.
Image from Flickr user functoruser

A painted bicycle lane separates this bus lane in Lucerne, Switzerland from general-purpose traffic. Yellow pavement markings within the bus lane provide further delineation.
Image from flickr user thisisbossi

Image from Nelson\Nygaard

Integrating Bikes and Transit

Integrating bikes and transit is critical to ensure bikes and transit can safely share the roadspace. Cycle tracks and shared lanes are two strategies to help these two modes integrate seamlessly.

Why is it important?

Given that bicyclists, pedestrians, and transit often utilize the same travel corridors, careful consideration must be given to integrating these modes safely and efficiently along transit corridors. If a street is wide enough, separate, adjacent facilities are generally preferable; however shared bicycle and transit lanes can work well under certain conditions. The examples below introduce best practices for avoiding conflicts between bicycles, pedestrians, and transit vehicles when designing and implementing bicycle and bus facilities.

Where has it been done?

Cycle Tracks: Vancouver, BC, Sydney, Australia, New South Whales, Australia

Cycle tracks are a type of bike facility that provides cyclists with physical separation from buses and other vehicle traffic. Careful design is needed to reduce conflicts with transit passengers who need to cross the cycle track for access to and from bus stops. The designs illustrated in these examples route bike lanes on the curb side of the bus stop, forming a passenger waiting "island." This design allows bicyclists to continue riding without interruption while buses pull in and out of bus stop areas. However, passengers must cross the cycle track to reach the sidewalk, and may not be expecting bicyclists. Best practices strongly encourage formalizing crossings for pedestrians between the sidewalk and the bus stop through the use of "ladder" and/or raised crosswalks, median islands, and signage. By formalizing the crossing zone, the design raises the visibility of pedestrians to bicyclists and ensures that pedestrians understand that they are about to cross a bicycle throughway.

The Dunsmuir Separated Bike Lane in Vancouver BC is an example of a separated cycle track with a sidewalk that is clearly defined from the cycle track, and a bus stop with defined transitions to the sidewalk for safe pedestrian movement.

Image from Flickr user pwkrueger

This neighborhood cycle track in Bourke Street Cycleway in Sydney, Australia defines the transition from the stop to the sidewalk to ensure pedestrian safety.

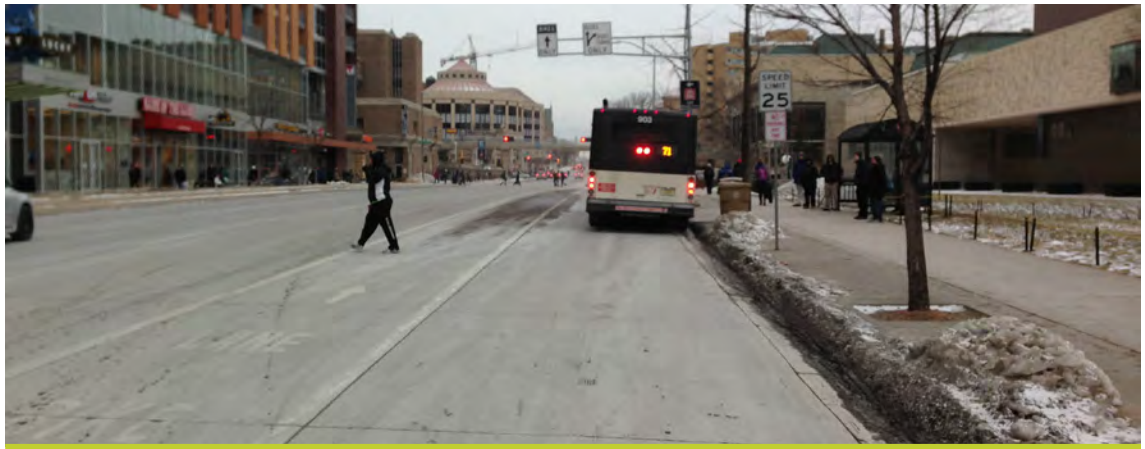
Image from Flickr user Neal Jennings

Bicycle and Bus Lanes: Madison, WI

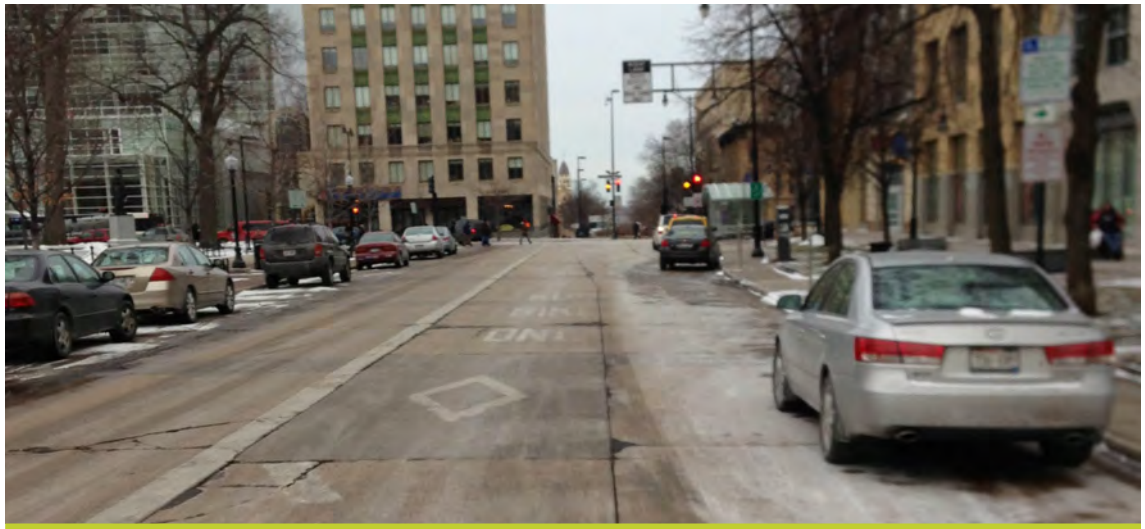
A bicycle lane is traditionally located adjacent to the curb. An advantage of this design is that a bus-only lane can serve as a buffer and facility separator between the bike and auto travel lanes.

However, buses and bicycles may "leapfrog" each other when buses pull to the curb to pick up and drop off passengers. Locating a bike lane to the left of the bus lane (see photo) can help avoid such leapfrogging. An additional two to three-foot buffer can be used to provide added separation between the bicycle and auto lanes.

When there is not enough right-of-way for both bus and bike lanes, shared lanes can be used under certain conditions. In this example from Madison, WI, curb right-of-way is used for on-street parking and curbside bus stops. In some situations, bicyclists may have to move out into vehicle traffic to avoid a bus that has stopped to load/unload passengers. Similarly, buses may have to pass bicyclists as they accelerate away from the stop.



This bike lane in Madison, WI is located to the left of a bus lane, allowing buses to serve curbside stops without conflicts with bicycle traffic.
Image from Nelson\Nygaard



Shared bus and bike lanes work best when bus and bicycle volumes are low to moderate, or to bridge gaps between dedicated bike facilities.
Image from Nelson\Nygaard

Market Street in San Francisco, a multi-modal street utilized by a variety of users.
Source: Nelson\Nygaard

Reallocation of Street Space

A variety of modes can successfully mix on streets with appropriate scale, design, traffic speeds, and enforcement. In the United States and Canada, cities are increasingly reallocating street space to better balance space allotted to automobiles with the needs and safety of more active users of the right-of-way—pedestrians, bicyclists, and transit riders.

The cases presented in this section are examples of streetscape redesign and right-of-way reallocation that accommodated the needs of multiple modes and energized the streetscape without major reinvestment or expansion of the right-of-way.

Why is it important?

On congested roadways, reallocating space for transit, bicycle, and pedestrian movement may increase operational speeds, efficiency, and safety for all users, as well as foster economic vitality and improve community livability. Street space reallocation can increase biking, walking, and transit usage because of increased efficiency and comfort; reduce peak-hour traffic; and improve access along transportation corridors.

Where has it been done?

Bike/Transit Integration: Portland, OR

The Rose Quarter Transit Center, served by six TriMet bus routes and at the confluence of the Yellow, Blue, Green, and Red MAX light rail lines, is a major transportation hub on the eastside of the Willamette River with close proximity to the Rose Garden arena and Convention Center. It is also along a major north-south bicycle corridor. In 2008, Portland's Bureau of Transportation opened the Transit Center to bicycle traffic with a two-way bike lane, painted green for visibility to both TriMet operators and bicycle riders, and large bike boxes that place the bicycle riders well ahead of transit vehicles. The design allows for important bicycle and transit connections to be made with limited mixing or safety implications.

Streetscape Design: New York City

New York has gained worldwide notoriety for recent innovations in streetscape redesign. These improvements include the Broadway re-design and many buffered bike lanes and transit priority lanes. See summary at right for more information on the transformation of Broadway from 14th Street to Columbus Circle.

Portland, Oregon's Rose Quarter Transit Center is an example of shared space for transit, pedestrians, and bicyclists with limited access for single-occupancy vehicles. The facility was utilized by nearly 4,000 cyclists in 2011.
Image from Nelson\Nygaard

New York City has reallocated street space in order to better accommodate bicyclists, pedestrians, and transit vehicles. Beginning in 2009, for example, over 2 miles of Broadway from Union Square at 14th Street to Columbus Circle on 59th Street midtown Manhattan have been improved with pedestrian plazas and bike lanes. See the NYDOT Street Design Manual here.
Image from NYDOT

Bollards: Delft, Netherlands

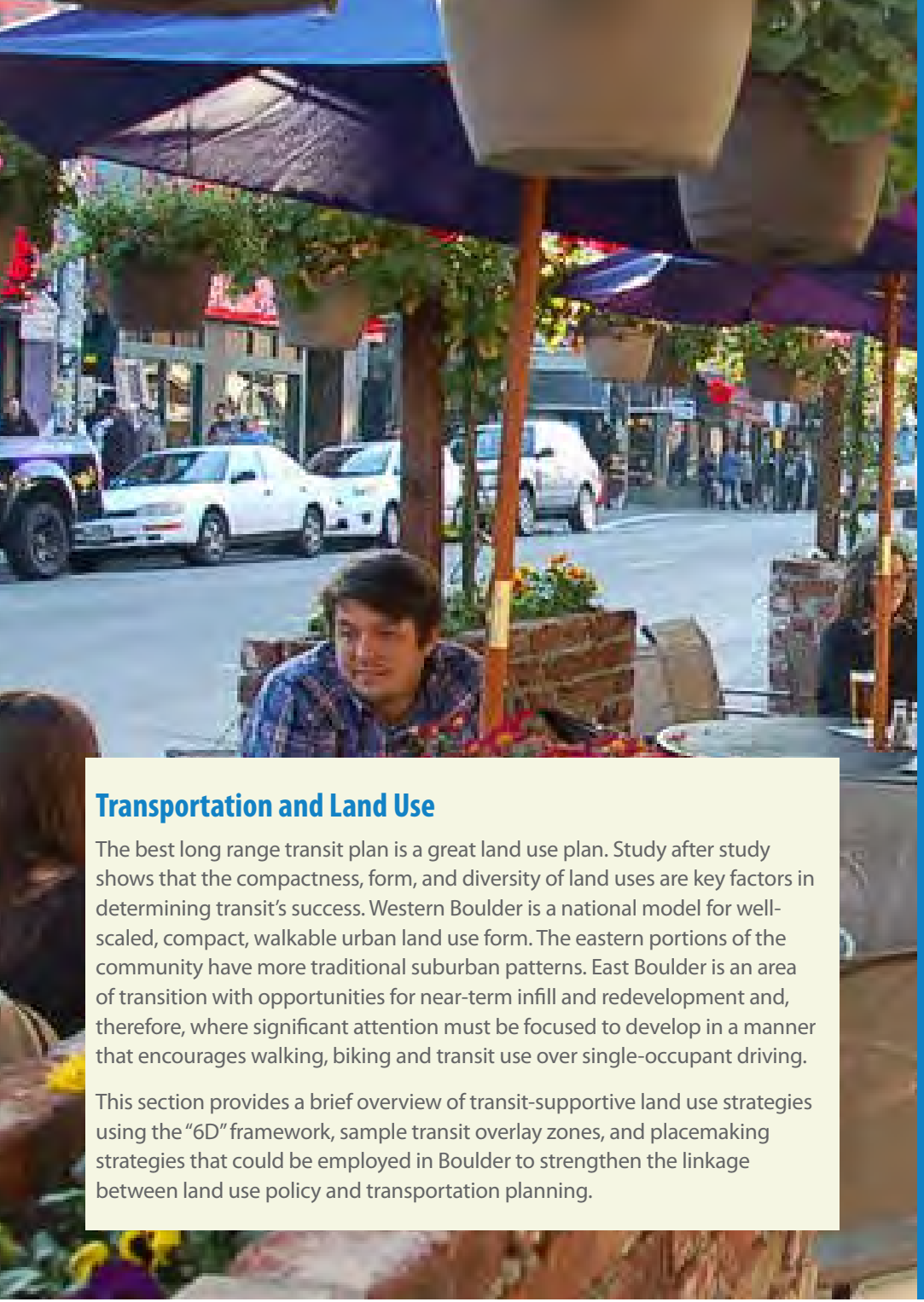
Bollards can be used to prioritize space in limited streets that carry multiple modes. Bollards allow narrower transit and bicycle lanes to be used on streets with limited right-of-way. Mechanical, retractable bollards can also be used to create pedestrian and transit spaces. Buses and emergency vehicles have transponders that allow them to retract the bollard automatically. Such bollards can allow transit to operate on an otherwise pedestrian street.

Electronically-activated bollards allow buses or deliveries access to the Delft, NL city center, which is otherwise a pedestrian and bicycle-only zone.
Image from nl2011transpo

Transit Service

KEY ISSUES TO BE EXPLORED IN THE TRANSIT PLAN

- **Corridor Options:** Explore corridor-based bus options for key corridors in Boulder, such as on Broadway, Arapahoe, and other corridors
- **Priority Lanes:** Explore opportunities to implement transit priority lanes in corridors with frequent service and high traffic volumes
- **Bike Safety:** Explore opportunities to install cycle tracks and protected bicycle facilities to avoid transit and bicycle conflict



Transportation and Land Use

The best long range transit plan is a great land use plan. Study after study shows that the compactness, form, and diversity of land uses are key factors in determining transit's success. Western Boulder is a national model for well-scaled, compact, walkable urban land use form. The eastern portions of the community have more traditional suburban patterns. East Boulder is an area of transition with opportunities for near-term infill and redevelopment and, therefore, where significant attention must be focused to develop in a manner that encourages walking, biking and transit use over single-occupant driving.

This section provides a brief overview of transit-supportive land use strategies using the "6D" framework, sample transit overlay zones, and placemaking strategies that could be employed in Boulder to strengthen the linkage between land use policy and transportation planning.

TRANSPORTATION & LAND USE

In this section:

- Applying a '6D' Framework
- Placemaking: Turning Transit Streets Into Active Community Places
- Transit Overlay

Director's Park in Portland, OR
Image from Nelson\Nygaard

Applying a 6D Framework

Key principles for designing transit supportive communities are often referred to as the 6Ds.* The 6Ds include destinations, distance, density, diversity, design, and demand management (*see Chapter 3*).

We know that a high concentration of homes, workplaces, and other community activities and facilities within a short walk of frequent transit stops and stations supports more frequent and efficient transit service. The market for transit increases in areas with a mix of uses, an attractive walking environment, increased density, and a well-connected street network. So how do we make principles practice?

Cities around North America are applying the 6Ds through specific code requirements, incentives, and programs. This section describes how it is being done.

** The 6D factors are frequently written about and presented by experts in the transit-oriented development field, including Reid Ewing who has frequently lectured on "Successful Transit Oriented Developments and the 6Ds."*

Why is it important?

Transit-supportive land use policies integrate land use and transit via the creation of compact, walkable, mixed-use neighborhoods within walking distance of a transit stop or station. These policies bring together people, jobs, and services and are designed to make it efficient, safe, and convenient to walk, bike, or ride transit.

Where has it been done?

Communities large and small have realized the impact of connecting land use decisions with transportation investment priorities. The next page outlines the "6D" guidelines. TransLink's Transit Oriented Communities Design Guidelines provides more information on the "6D" approach here.

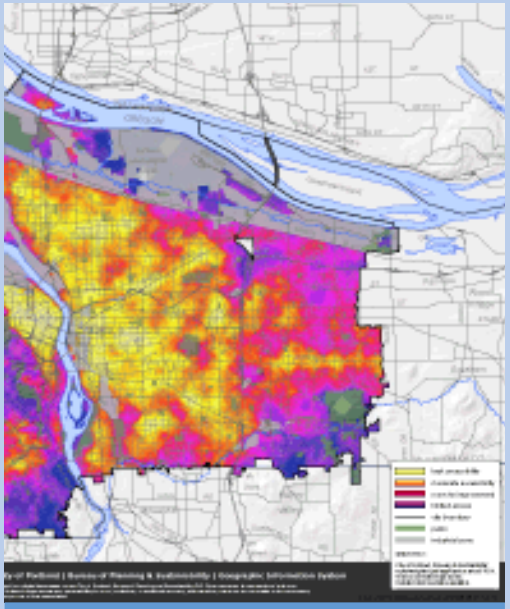
Santa Monica, CA, mixed use development is paired with high frequency transit service and a comfortable walking environment.
Image from Nelson\Nygaard

6D Framework: Characteristics of Transit-Supportive Land Use Policy

1 DESTINATIONS

Coordinate Land Use and Transportation

- 20 minute neighborhoods
- Mix of uses within walking, biking, or transit distance to access daily needs and services
- Transit service aligned with major destinations
- Establish strong anchors along transit (major destinations on each end of a route)



The Portland Plan 20-Minute Neighborhoods objective has a goal for 90% of Portland residents to be within walking distance of basic services by 2030. See more information here. ***Tool for success: 20-Minute Neighborhood policy and goal set in the Comprehensive Plan.***

Image from City of Portland

2 DIVERSITY

Include a Mix of Land Uses

- Mixed-used development; live-work units
- Medium to High Residential Density
- Mixed Employment
- Professional Office
- Light Industrial
- Central Business
- Limitations on auto-oriented uses such as vehicle sales or repair
- Suggested Prohibited Land Uses: drive-thru restaurants and other commercial uses, car dealerships, industrial (manufacturing, processing, warehousing), single family residential

The Selkirk Waterfront Community in Victoria BC supports a range or uses, including light industrial, commercia/office, residential, institutional, and services. More information available here. ***Tool for success: Comprehensive Development Plan process and form based code.***

Image from Jawl Properties

3 DISTANCE

Create a Well-connected Street Network

- ¼ to ½ mile walking distance to transit station
- Minimum block lengths no longer than 500 feet
- The number of local routes and intersections can provide for more direct trips and shorter distances between uses
- Minimum unobstructed sidewalk width requirements
- Pedestrian amenities, such as well-lit facilities, landscaping, public art, and clear pedestrian markings (cross-walks, curb-ramps, etc.)

In Surrey, BC, the land use plan includes guidelines for new streets and pedestrian connections to support a fine-grained street network and connections to transit. See the Surrey City Center Connections Concept plan. ***Tool for success: City Center Connections Concept Plan.***

Image from TransLink "Transit-Oriented Communities Design Guidelines"

4 DESIGN

Create Places for People

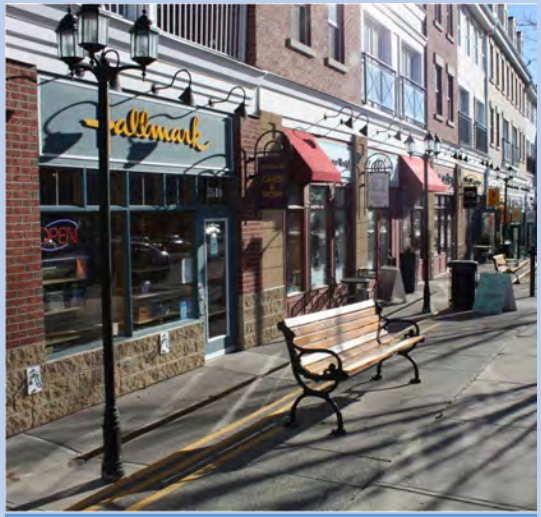
- Maximum building set-backs to encourage "active" frontages (i.e., 0-10 feet)
- Outdoor seating for restaurants
- Street buffers (i.e. landscaped buffers)
- Active frontage buildings with at least one main entrance on the street located closest to the transit station
- Minimum lot coverage (i.e., 65%)
- Higher allowable building heights
- Accessible design for all road users (i.e. curb ramps, audible walk signals, etc.)
- Prohibit surface parking abutting the roadway
- Allow parklets (see sidebar on San Francisco's "Pavement to Parks" program)
- Minimize driveways
- Short block lengths, e.g., 400 feet

Santa Monica's Bergamot Area Plan will transition the Bergamot neighborhood into a "complete" new neighborhood featuring a finely scaled network of pedestrian streets and open space amenities. ***Tool for success: Bergamot Area Plan.***
Image from City of Santa Monica

5 DENSITY

Concentrate Activities Around Transit

- Density (combined persons and jobs per acre) typically within ¼ to ½ mile of transit is a key predictor of mode share
- Density should be paired with urban form principles (i.e., short block length)
- Minimum floor area ratio requirements (e.g., Non-residential: 0.5 to 2.0 depending on the use or location; Residential: average density of up to 15-25 dwelling units per acre)



Industry experience suggests that residential densities in the range of about 4 to 7 households per gross acre are a minimum threshold for high-performing transit and also represent a point at which overall mode shift away from driving begins to increase exponentially. In Calgary, the Garrison Woods area built more than 12 households per acre by implementing a network of narrow streets, mixed uses, and diverse housing types. ***Tool for success: the CFT Community Plan.***
Image from Frances Dares and Associates

6 DEMAND MANAGEMENT

Discourage Driving

- Reduced off-street parking minimums (e.g., reduce requirements by up to 40% for development in a Transit Overlay Zone and/or maximums (e.g., parking shall not exceed 125% of minimum City requirement)
- Prohibit parking between buildings and street
- Encourage shared parking
- Design requirements for ingress/egress and landscaping of surface parking
- Minimum bicycle parking requirements (i.e., 1 bicycle parking space per 2,000 – 3,000 square feet of leasable space and/or 1 bicycle parking space for every 10 employees)
- On-street bicycle parking program to replace car parking with bicycle parking (i.e. bike corrals)

In Hayward, CA, the city has implemented a transit zone parking reduction policy. This policy provides developers with a parking credit for proximity to transit. For development within 500 feet of transit, a 15% reduction is given. Retail uses must provide a bus stop and shelter adjacent to the site to receive the credit. ***Tool for success: the Off Street Parking Regulations Code.***
Image from Flickr user neighborhoods.org

The street is a great asset for the community. It can be used and repurposed in new and innovative ways as seen here in San Francisco, CA.
Image from SÃ¸ren Schaumburg Jens

Placemaking: Turning Transit Streets Into Active Community Places

Creating places for people means designing an urban environment to accommodate their needs regardless of their chosen mode of transportation. Streets make up our largest public space, providing the "living room" of any neighborhood–a place to socialize, recreate, and travel on.

Streets don't simply provide a way to travel. Beyond the traditional consideration of street geometry, through-put, and level of service, placemaking upholds community character, form, and function at a human scale.

Why is it important?

Integrating transit into the community fabric can help facilitate the safe movement of all modes and the prioritization of vulnerable road users. Places that are pedestrian, bicycle, and transit oriented have lower automobile traffic volumes and speeds, creating calmer and safer environments. Transit stations and stops are natural meeting places in the community and can be enhanced to serve as more than just a place to wait for the bus. These design principles will be critical for Boulder as the east end of town develops.

Where has it been done?

Pioneer Courthouse Square: Portland, OR

Downtown Portland's Pioneer Courthouse Square is an example of connecting transit to placemaking. A hard-scaped park referred to as Portland's "Living Room," Pioneer Courthouse Square offers a multitude of places for people to sit including steps, street furniture, and moveable seats and tables. This park is bordered on three sides by light rail transit corridors and the northbound transit mall with over a dozen high frequent transit routes.

TriMet's Land Use & Transportation Planning

In Portland, Oregon the Community Building Guidebook is published by the regional transit agency, TriMet, and provides a wealth of knowledge about TriMet's approach to linking land use and transportation investments:

http://trimet.org/pdfs/publications/community_sourcebook.pdf

The Portland Transit Mall in downtown Portland runs for 25 city blocks, pairing high frequency transit service with beautiful community spaces:

http://trimet.org/portland-mall/

http://trimet.org/publicart/greenline/index.htm

Pioneer Courthouse Square in Portland, Oregon offers ample and flexible seating, activity and event space, public facilities, and connection to a variety of transportation corridors.
Image from Nelson\Nygaard

Euclid Corridor: Cleveland, OH

Once dubbed "Millionaire's Row," through the second half of the twentieth century Cleveland's Euclid Corridor suffered disinvestment, abandonment, and decay. Development of the Euclid Corridor bus rapid transit line, the HealthLine, provided an opportunity for the city to reshape and reinvest in the area. Throughout the 7-mile extent of the HealthLine, a number of streetscape improvements and placemaking efforts have been made. These include small and large parks integrated throughout the line, a public arts campaign, and streetscape redesigns built to a human scale. Design cues tie together the entire corridor and distinct districts give neighborhoods character. Institutions such as the Cleveland Clinic and Cleveland State University, have updated Master Plans to embrace the transit line as a redevelopment tool. The results? An estimated $5 billion invested in development along Euclid Avenue and revitalized places for residents and visitors. See more information on the Euclid Corridor here.

Community Transit Hubs: Paris, France

Paris has gone to great lengths to prioritize the movement of transit throughout the city. With the subterranean transit system above capacity, the city has turned to retrofitting most city boulevards to include bus-only lanes. A key component in attracting riders to the bus system has been the development of bus stops as places that people can use for a variety of activities other than simply waiting for the bus. These bus stops include tickets, coffee, mini libraries for book loans, bikeshare, heated waiting areas, and adjacent food service. This new type of bus stop provides an attractive community space that draws people to transit.

Small details make a big difference. Cleveland, Ohio's Euclid Avenue HealthLine features medians vegetated with flowers and other landscaping elements to create a more beautiful and vibrant streetscape. Stops are comfortable, covered, and allow access to service in both directions.
Image from trans4m.org

Paris, France is piloting community transit hubs that offer much more than a seat to wait. Interactive computers allow riders to see news, weather, and route information. A lending library allows people to exchange books and a small café serves coffee. These amenities make for a comfortable and engaging user experience.
Image from designboom.com

Pavement to Parks Program:
San Francisco, CA

Parklets re-purpose street space for people instead of cars by providing space for the general public to sit and enjoy the street where existing narrow sidewalks would preclude such occupancy. In 2010, San Francisco launched its Pavement to Parks program – a collaborative effort between the San Francisco Planning Department, the Department of Public Works, the Municipal Transportation Agency, and the Mayor's Office.

Funding for the parklets is provided by a combination of private donations and economic development funds assembled by the Mayor's Office of Workforce and Economic Development (MOEWD). Each plaza costs approximately $30,000 to construct and each parklet is less than $15,000. Business owners or residents can apply for the installation of a parklet. In just three years, forty-two parklets have been installed under the City's program.

A parklet on the corner of Haight Street and Clayton Street in San Francisco allows diners to enjoy the street.

San Francisco Department of Public Works Parklet guidelines can be found here.

Image from Aaron Bialick, SFStreetsblog

Image from Nelson\Nygaard

Transit Overlay

Transit overlay zones ensure development patterns match transportation investments. As noted in the previous sections, there is a strong correlation between urban design, land use policies, and the propensity to use transit. This section provides example transit overlay zoning codes, which can be a useful tool to realize transit-supportive urban form.

Why is it important?

Cities can create or update zoning through transit overlay zones to create a supportive policy environment for transit oriented development. This mechanism enables cities to establish a vision for transit oriented development and identify priority areas where that vision can be realized. As areas in east Boulder, such as the Boulder Community Hospital Foothills Campus and the Boulder Junction, take shape, there is an opportunity to establish transit overlay zones to aid the development of transit supportive development.

Where has it been done?

Example Transit Overlay Ordinances

Transit Oriented Development Overlay Zone: Eugene, OR

The City of Eugene's Transit Oriented Development Overlay Zone is designed to encourage compact urban growth, increased choice of transportation mode, reduced reliance on the automobile, and a safe and pleasant pedestrian environment. These outcomes are accomplished by insuring an attractive streetscape, a functional mix of complementary uses, and provision of amenities that support the use of transit, bicycles, and pedestrian facilities. Currently, the Transit Oriented Overlay Zone is in effect in downtown Eugene.

Specific elements of the code include:

- **Building Setbacks:** Maximum of 15 feet.
- **Building Frontage:** Buildings must provide a main entrance on the facade of the building that is within the 15-foot maximum street setback facing the street.
- **Floor Area Ratio (FAR) Minimum:** 0.62 - 2.0 FAR minimum (distinction between inside and outside the core transit oriented development area zone).
- **Parking between Buildings and the Street:** Automobile parking, driving, and maneuvering areas shall not be located between the main building(s) and a street. For sites that abut a street, parking may be located at the rear of the building or on 1 or both sides of a building when at least 60 percent of the site frontage abuts the street.
- **Structured Parking:** On-street structured parking on sites that abut a street shall have at least 50 percent of the ground floor street frontage developed for office, retail, or other pedestrian-oriented uses.
- **Improvements Between Buildings and Streets:** The land between a building or exterior improvement and a street must be landscaped and/or paved with a hard surface for use by pedestrians.

View the complete zoning code under Section 9.4500.

The Transit Oriented Development Overlay Zone in Eugene, OR supports the EmX Bus Rapid Transit System

Image from Nelson\Nygaard

Example Transit Overlay Ordinances *(Continued)*

Transit Overlay Zone: Sacramento, CA

The City of Sacramento transit overlay zone was instituted in response to a plan to build a high-speed rail line in California, which would stop in Sacramento. The City also saw an opportunity to develop the code to accommodate its growing population, which is expected to grow as much as 65% by 2035. The code supports a new development plan that focuses on compact growth and transit use in an attempt to mitigate the effects of the city's already existing problems of urban sprawl, transportation congestion, and poor air quality. The transit overlay zone can be implemented under two circumstances: (1) within a quarter-mile radius of an existing or proposed light rail transit (LRT) station, or (2) within a half-mile radius of a proposed/existing LRT station if the property is part of a transit village plan. In addition to similar building setback, frontage, and parking requirements noted in the Eugene example above, specific elements of the Sacramento code include:

- **Height:** Buildings in the TO zone shall not exceed fifty-five (55) feet in height; however, the planning director may permit additional height up to seventy-five (75) feet in mixed use buildings with at least twenty-five (25) percent of the gross building square footage devoted to residential use, or buildings that include structured parking and open space. Any portion of a building within one hundred (100) feet of a parcel zoned or used for single-family use shall not exceed thirty-five (35) feet in height.
- **Density Requirements:** Non-residential projects shall have a net FAR of not less than 0.4 and not more than 3.0. Residential projects shall be developed with a minimum of fifteen (15) dwelling units per net acre and shall not exceed sixty (60) dwelling units per net acre; provided that density greater than sixty (60) units per net acre may be allowed by approval of a planning and design commission special permit if the higher density is consistent with the general plan and applicable community or specific plan.
- **Pedestrian Access:** Projects may be required to provide public pedestrian access through or across a development to facilitate convenient pedestrian access to transit.

View the complete zoning code here.

Transit Oriented Development Ordinance: Austin, TX

The City of Austin began the development of a TOD Ordinance in 2004 (Ordinance (#20050519-008). City staff was guided by a Community Advisory Group that consisted of representatives from the Design, Planning, Urban Transportation, Zoning and Planning Commissions, and private stakeholders. To implement the TOD Ordinance, the City of Austin first selected five TOD districts that the ordinance would affect. The second phase of the process involved development of a Station Area Plan (SAP) for each TOD district. The SAP process allowed the City to identify the unique characteristics of the site. Some districts were surrounded by undeveloped land, while others abutted established single-family neighborhoods. Developing a Station Area Plan enabled Austin to implement the TOD Ordinance while being sensitive to the district's surroundings. The SAP process identified the "type" of TOD district which aligned with the Zoning Ordinance:

- **Neighborhood Center TOD -** located at the commercial center of a neighborhood; lowest density of all classifications (average density at approximately 15-25 dwelling units per acre). Typical building height is one to six stories. (Density, building height, and land use specifications are to provide guidance for station area planning and are not prescriptive).
- **Town Center TOD -** located at a major commercial, employment or civic center; moderate densities relative to other classifications.
- **Regional Center TOD -** located at the juncture of regional transportation lines or at a major commuter or employment center; greater densities relative to other classifications but less than in a Downtown TOD.
- **Downtown TOD -** located in a highly urbanized area; highest density of all classifications; allows for high-rise development.

View the complete zoning code here.

Transportation & Land Use

KEY ISSUES TO BE EXPLORED IN THE TRANSIT PLAN

- **Neighborhood Access:** Develop a 20-Minute Neighborhood Access GIS tool to guide policy framework (currently underway as part of the TMP Update)
- **Connectivity & Placemaking:** Develop guidelines to improve street connectivity and place making in east Boulder (currently underway as part of the Sustainable Streets and Centers work)
- **Transit Overlay Zones:** Explore Transit Overlay Zones for priority transit corridors in east Boulder and along other key transit corridors

Access & Connections

Seamless and safe pedestrian and bike access to public transit is critical for attracting new riders, increasing ridership among existing passengers, and improving the overall travel experience. An attractive and safe street environment can be a deciding factor when choosing whether or not to take transit at all, especially for those with the option to drive. This section provides an overview of roadway treatments and facilities to improve access and connections to transit service.

Access & Connections

In this section:

- Pedestrian Access to Transit
- Bikes on Transit
- Bike Parking and Bike Centers

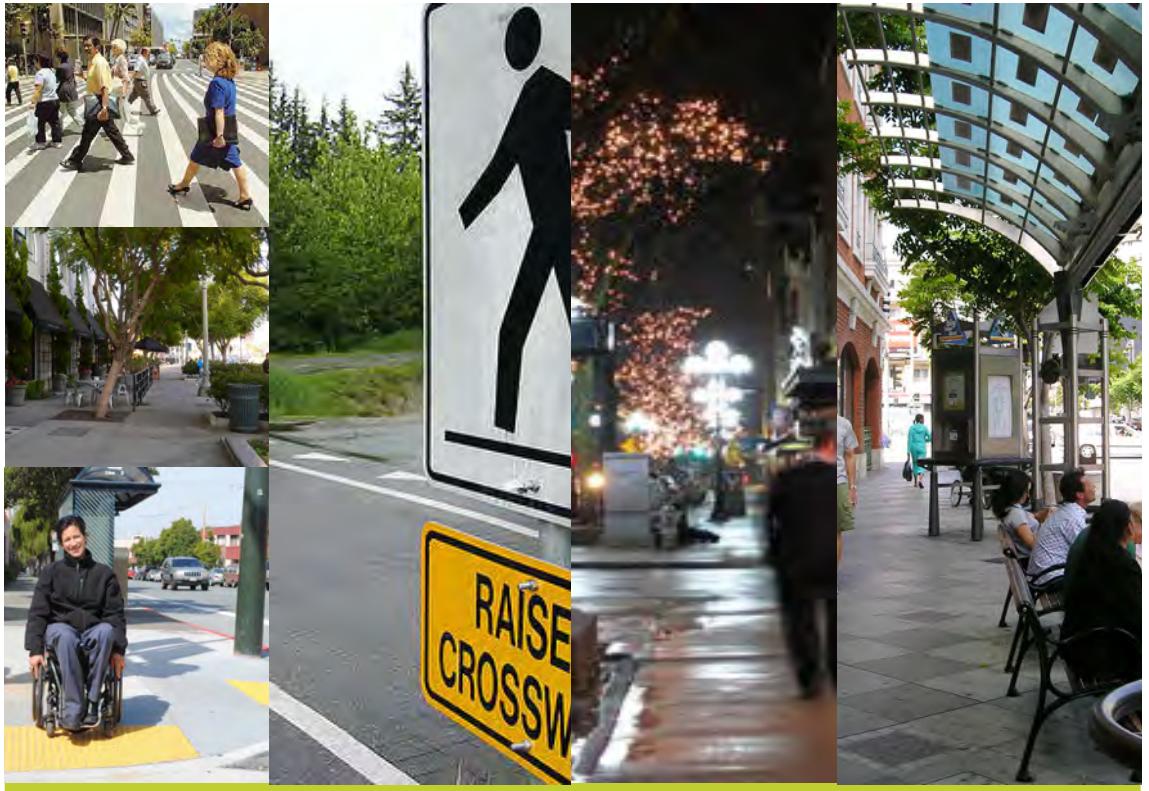
Image from
San Francisco Planning Department

Pedestrian Access to Transit

Every transit trip starts and ends with a walking trip. Safe, convenient, and comfortable access to transit stops and stations is fundamental to effectively serve transit customers in any neighborhood and particularly important for attracting new customers to the system. Gaps in the sidewalk network, walking to reach a stop or waiting at a stop along high speed roads, and insufficient waiting areas all contribute to less attractive transit facilities and can deter transit riders. Seamless, integrated pedestrian linkages support all forms of multimodal transportation including walking, biking, carsharing, carpooling, and park and ride facilities.

Why is it important?

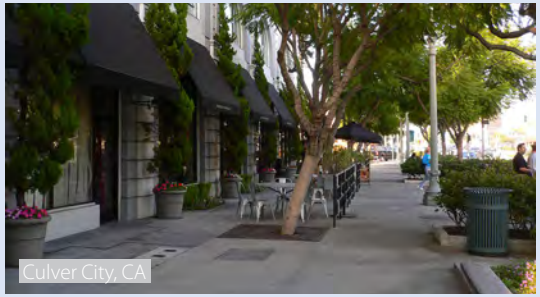
As cities grow from their urban cores, development often shifts from pedestrian-friendly development to automobile-oriented urban form. We see this on the eastern sections of Canyon Boulevard in Boulder where four-lane traffic abuts narrow sidewalks with no barriers for pedestrians using the sidewalk. Conversely, the benefits of great pedestrian environments have been demonstrated on Pearl Street in Boulder where swarms of pedestrians enjoy the streets every day, fully separated from vehicle traffic, but always just a few short blocks from a transit stop. The design principles described in the sidebar below must be emulated in east Boulder to build an attractive environment for all modes of travel. Accessible pedestrian access to transit will be critical to support a transit-supportive urban form in the developing areas of Boulder Junction, CU East Campus, and the Boulder Community Hospital Foothills campus.



A variety of options facilitate pedestrian access to transit *(see 'Designing Streets for Pedestrians' on page 6-23 for an overview).*

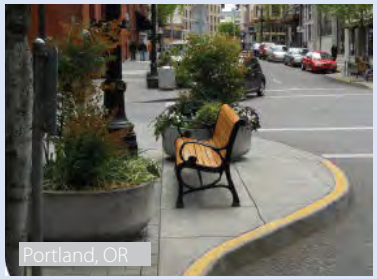
Images from Nelson\Nygaard

Designing Streets for Pedestrians

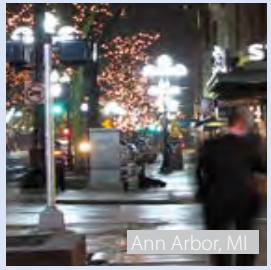


◀**Wide Sidewalks:** Continuous sidewalks of at least 4 feet in width seamlessly connected to the sidewalk network in the area. A wide and accessible sidewalk network should be complete within a half-mile perimeter of transit.

Land Use: The environment beyond the street is also important to provide a comfortable and inviting pedestrian environment. Amenities include benches and drinking fountains, street-fronting doorways and windows, and human scale building design.▶



◀**Curb Extensions:** Curb Extensions: On streets with on-street parking, underutilized pavement at the intersection can be rededicated to expand the pedestrian realm and reduce crossing distance. Curb extensions also improve pedestrian and motorist sightlines at intersections and help manage vehicle turn speeds.



◀**Lighting:** Well-lit crosswalks and sidewalks provide increased safety and security.

Refuges: ▶ Where there is higher volume automobile traffic or higher speeds present, pedestrian refuge islands, center medians, bollard or planter protection, on-demand push button pedestrian crossing lights, and curb extensions and bulb-outs should serve as traffic calming devices.

Well-Marked Crossings: ▶ Transitions and street crossings should be well-marked and preferably include raised crossings that prioritize pedestrians. Raised crossings are better for people walking and rolling and also serve as a traffic calming measure.

▲**Traffic Calming:** Explicit vertical and horizontal traffic calming can greatly improve the quality of the pedestrian environment. These features include road diets, speed bumps, speed tables, raised intersections, diagonal diverters, chicanes, traffic circles, and shared streets such as Dutch-style woonerfs.

▲ **Universal Design:** Intersections should provide facilities that can safely move people of all ages and capabilities across the street. Design elements like curb ramps, level landings and gutter seams, visible and audile signals, smooth surfaces, accessible push buttons (or default WALK phases), and signage that may help pedestrians navigate intersections should be integrated into intersection design.

Where has it been done?

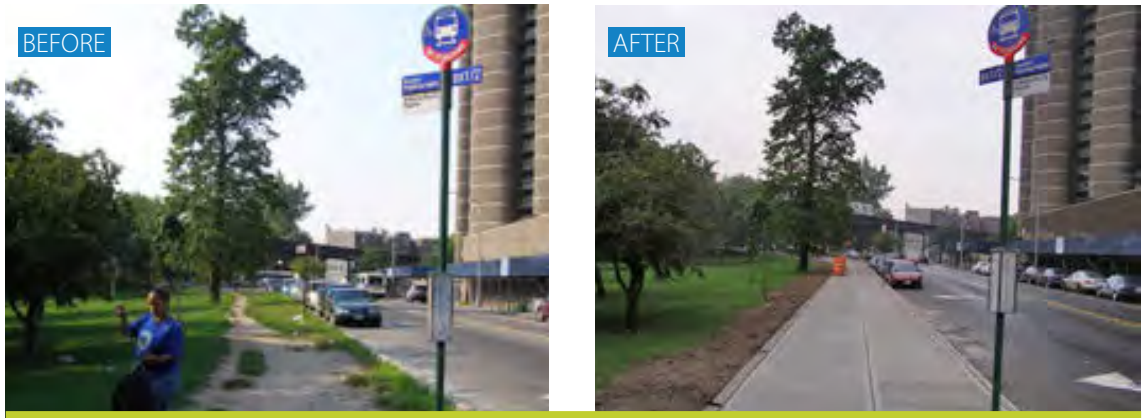
Alleyways: Vancouver, B.C., Canada

Utilizing the alleyways paralleling major streets, Vancouver, B.C. has created pedestrian-friendly small-scale streets. These shared spaces prioritize pedestrians, allow services such as garbage haulers to access the streets, and provide vegetated buffers for rainwater management.

In Vancouver, B.C. small alleyways are used to make pedestrian connections without encouraging drivers to use the streets. Through this system pedestrians can access transit via low-stress walkways.
Image from Nelson\Nygaard

Safe Routes to Transit Program, New York, NY

The New York City Department of Transportation's Safe Routes to Bus Stops program identifies locations with poor access, especially for the most vulnerable populations: youth and older adults. The program implements pedestrian facilities to foster safer, more comfortable access to transit. Sidewalks to bus stops and crossing treatments near transit are prioritized for improvement to calm traffic and improve pedestrian safety. A similar program in Boulder may be most applicable at the regional or county level, helping to repair places with poor transit access in east Boulder and other parts of Boulder County. More information provided at http://www.nyc.gov/html/dot/html/pedestrians/safertstransit.shtml.



New York City Department of Transportation Safe Routes to Bus Stops. The City of New York prioritized access by all users to bus stops while also providing great connections to work, home, and daily needs.
Image Source: New York Department of Transportation, NYC.gov

Swiss Pedestrian Priority Zones in Bern, Switzerland illustrate that pedestrians have priority in the 20 kilometer per hour Pedestrian Zones.
Image from City of Bern

Pedestrian Priority Zones: Bern, Switzerland

Communities as small as the 545-person village of Bellerive to the 400,000 person city of Zurich in Switzerland have adopted the concepts of Pedestrian Priority Zones. Many of these zones are located near transit to tame the potentially chaotic interactions of multiple modes. By having a 20kmh (12.4 mph) zone established, it is possible to set precedence in the areas for pedestrians. The Swiss concept holds that pedestrians should be able to cross roads or walk anywhere in the road in Pedestrian Priority Zones, making for more accessible, controlled, and safe environments for all users.

Bikes on Transit

Connecting bicycle riders to transit increases the catchment area of transit riders. For many, bus stops are located more than a half mile distance from home, which is the general rule of thumb for how long people are willing to walk to a bus stop. Bike access to transit is an effective way to extend the range of first/last mile connections to transit.

People tend to walk up to a half a mile to a transit station, while they will bike nearly two miles.

Source: Adapted from TransLink Transit-Oriented Communities Design Guidelines, Nelson\Nygaard

Why is it important?

Using a bicycle to access transit allows the rider greater range and flexibility. While space on transit vehicles is often limited, having a bicycle at each end improves transit usability.

In Boulder, the B-cycle bikeshare program allows users greater mobility and flexibility within Boulder by providing a rentable bicycle at one or both ends of a transit trip. However, many transit riders, especially those traveling greater distances to transit from neighboring communities, would prefer to ride their own bicycles to connect to transit. Feedback from the community has emphasized the need to expand the capacity of bicycles on transit, particularly for regional trips. As the region works with RTD to implement BRT service along the US 36 corridor, efforts will be needed to increase the carrying capacity of bikes on transit.

Where has it been done?

Luggage Bay Carrier Racks: AC Transit, Alameda County, CA

AC Transit operates commuter buses equipped with bicycle storage in the luggage bay. This system built by SportWorks allows three bikes to be carried in the bay of many Van Hool and MCI buses. Commuters use this service to transport bikes over longer distances.

For intercity commuter buses the inclusion of a SportWorks luggage bay carrier racks allows for three bicycles to be stored securely and out of inclement weather. These racks are currently available on AC Transit's Interbay buses in Alameda and Contra Costa counties.

Image from SportWorks, sportworks.com

On-Board Bicycle Storage: Swift Bus Rapid Transit, WA

Swift Bus Rapid Transit was launched in 2009 to provide commuter service along I-5 between Everett and Seattle Washington. Swift vehicles are equipped with bicycle racks on-board for those commuters who ride to the station by bike or use their bikes to access their destinations. The low-floor buses make for easy loading. Passengers enter at the rear door and simply push their bikes into the bike racks. Standees are given priority over bikes inside the bus.

Swift BRT vehicles allow bicycles on board using custom bicycle racks. This extends the catchment of BRT ridership and allows multi-modal commuting for passengers.

On-board carrying can be more efficiently accomplished with racks like the ones found on the Swift BRT buses operating between Everett and Seattle.

Images from Flickr user Oran Viviyincy

Electric Bike Pilot Project in Portland, Oregon intends to expand the reach of transit

In Portland, the regional MPO, Metro, is sponsoring a new study connecting folding e-bikes to transit. The pilot project will pay for more than 150 electric bikes to be used by employees of Kaiser Permanente to study how the bikes are used. The folding e-bike study is particularly focused on the first and last mile challenge faced by many bike commuters. Electric bikes can provide an important connection for people traveling long distances or in hilly terrain. Public funding of this program demonstrates commitment to increasing transit ridership and to incorporating more bicycle connections to transit.

This project is funded through a Regional Travel Options grant. RTO grants support projects that reduce the number of people driving alone, improve community health, and improve air quality. The pilot project is scheduled to launch in 2013.

For more information on the project, see http://bikeportland.org/2013/04/12/grant-will-push-potential-of-e-bikes-as-commute-vehicles-85411.

Note: The City of Boulder Transportation Master Plan Bike Innovations "Living Lab" has proposed a pilot program in 2014 for e-bikes on multiuse paths.

Conscious Commuter e-bike, produced in Portland, Oregon.
Image from Conscious Commuter

Image from Nelson\Nygaard

Bike Parking and Bike Centers

Secure and covered bike parking is an essential component of linking bikes to transit because it allows transit riders to confidently store their bikes. Covered bike parking that is key-accessed and video monitored improves confidence of cyclists that their bicycles are securely stored. Large-scale bike centers feature bike shops, storage facilities, showers, lockers, and bike valet parking. Bikestation and Bike and Park are two consulting/branding companies that help establish bike centers in cities around the country.

Why is it important?

Secure, indoor bicycle parking encourages more commuters to connect to transit by bicycle. In Boulder, the Boulder County-led Bike-then-Bus program has installed two bike cages at key transfer points – one on 28th and Iris Street in North Boulder and one at the Roosevelt Park and Ride in downtown Longmont. These facilities are needed in more locations to facilitate the easy transition between bike and bus trips, specifically for regional trips.

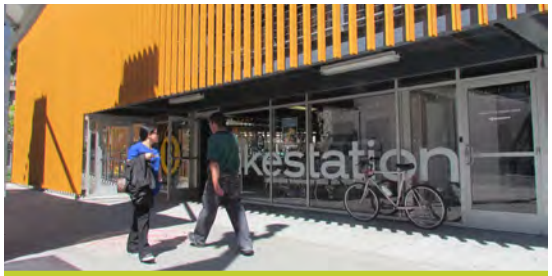
Where's it being done?

Santa Monica, CA

The largest bike center in the United States is the Santa Monica Bike Center located at 2nd Street and Colorado. Opened in 2011,Bike and Park retrofitted an old garage to accommodate 360 secure bike parking spots, locker rooms, repair, and retail services. Membership dues help cover operating costs. Construction of the facility was funded with a $1.6 million grant from local transportation authority Metro and a $950,000 contribution from the City. Funding is an important consideration to implement this type of bicycle amenity. In most communities, bike stations have been built through a partnership between local governments, private operators, and corporate sponsorships. Federal funding has been granted through FHWA and FTA grants focusing on congestion and air quality mitigation.

Chicago, IL

McDonald's Cycle Center in Chicago offers free bicycle parking, day lockers, and showers. The Cycle Center secured a $5 million grant from McDonald's that covers all operations for 50 years. This public-private partnership that brought together the City of Chicago, federal funds for capital expenses, operations by the private Bike and Park company, and grant support by McDonald's is a great example of creative funding that may be needed to build large facilities.



The Bike Station in Long Beach, California features hundreds of secure, indoor parking spots for riders, is located adjacent to transit, and offers commuters a host of important services. See Bike Center homepage here.
Image from Nelson\Nygaard


Chicago's McDonald's Cycle Center offers commuters 300 parking spots, lockers, and showers all free, sponsored by McDonald's.
Image from streetsblog.org

Beaverton Transit Center Bike SPA: Beaverton, OR

Beaverton Transit Center Bike Secure Parking Area (SPA) offers secure bike parking facility at the transit station. The large facility is conveniently located at the transit center and secure. There are a total of 100 bike parking spots that are accessed using a BikeLink card. This keycard allows a rider to pay a one-time $5 activation fee and then pay $.03/hr. 8am-8pm weekdays; $.01/hr. all other hours.

TriMet Beaverton Transit Center's Bicycle Secure Parking Area (SPA).
Image from Nelson\Nygaard

International Bike Parking Solutions

Northern European and Asian cities with high population densities utilize imaginative solutions for bicycle parking that may be used near transit hubs and to facilitate multimodal lifestyles.

Large bicycle garages abound in northern Europe. These covered structures encourage transit users to leave bicycles in the city to make last mile connections.

In Copenhagen, families can forego car ownership by utilizing cargo bikes and transit. The CarGo cargo bike parking offers secure parking outside of garages and homes.

In South Korea, industrial designers are crafting novel ways to store bicycles in artistic and space efficient ways. A concept for integrating art and bicycle parking, the Bike Hanger allows for compact pedal-powered bike parking. Similar designs could be incorporated into transit stations and alongside parking garages.

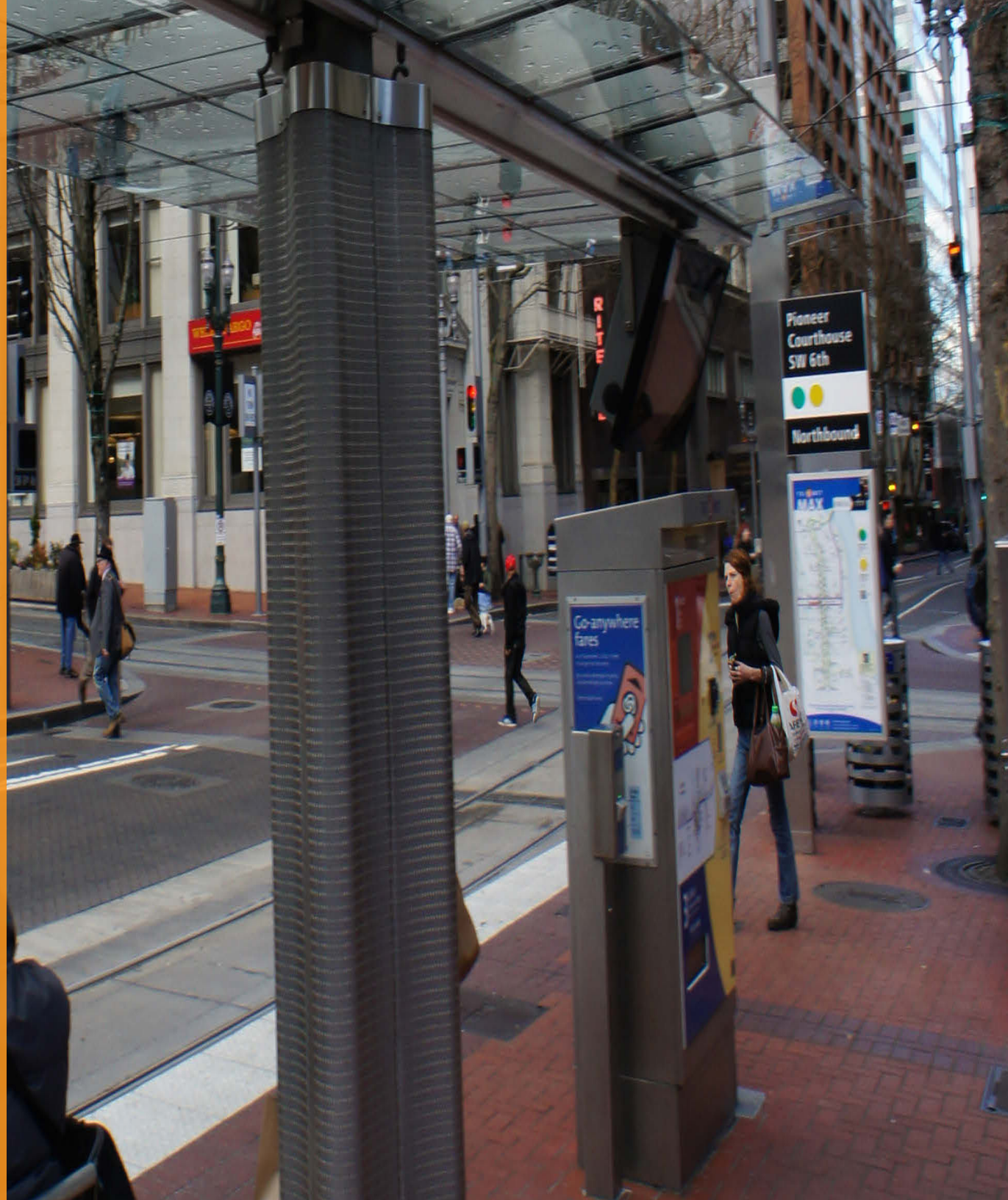
A concept for integrating art and bicycle parking, the Bike Hanger allows for compact pedal-powered bike parking. The concept is being developed in South Korea as seen in this video: http://vimeo.com/29399173
Image from vimeo.com

Cargo bike parking in Copenhagen allows cargo bike users to securely park their bikes on-street, saving a trip up narrow stairs to apartment homes.
Image from http://onourowntwowheels.files.wordpress.com

Access & Connections

KEY ISSUES TO BE EXPLORED IN THE TRANSIT PLAN

- **Bikes on Buses:** Investigate opportunities to add more bicycle storage capacity on buses, particularly on regional routes
- **Bus Stop Facilities and Accessibility:** High-quality stops that are accessible to all users are a basic need throughout Boulder.



Information

We live in an age infiltrated with branding campaigns, images, and icons that aim to influence our behavior – from where we shop, to the products we buy, to the way we travel. For decades, the automobile industry has spent billions of dollars convincing us of the speed, ease, and sexiness of a brand new car. Further, our public investments have prioritized mobility, storage, and wayfinding for individuals in vehicles. Our perception of the "best" way to travel has been shaped by this ideology and these investment priorities. Much work is needed to shift this cultural perception to level the field and make transit, biking, and walking the "best" choices for travel. Easy access to information, such as real-time transit arrival, can help improve the convenience and competitiveness of these other modes compared to the automobile. This section provides an overview of different strategies used to help capture the next wave of transit riders by providing accessible information.

Information

In this section:

- Real-Time Arrival Information
- Public Information Campaigns

Real-Time Arrival Information

Communities across the U.S. and Europe are providing real-time arrival information to enhance the transit passenger experience. This information gives passengers the comfort of knowing exactly when the next bus will arrive. Passengers can look online, on their cell phones, or at a digital sign at the station to know exactly how long they have to wait – or they can choose to stay at home or at work a little longer and catch the bus just in the nick of time.

TransitTimes provides real-time arrival information.

Image from UTA

Why is it important?

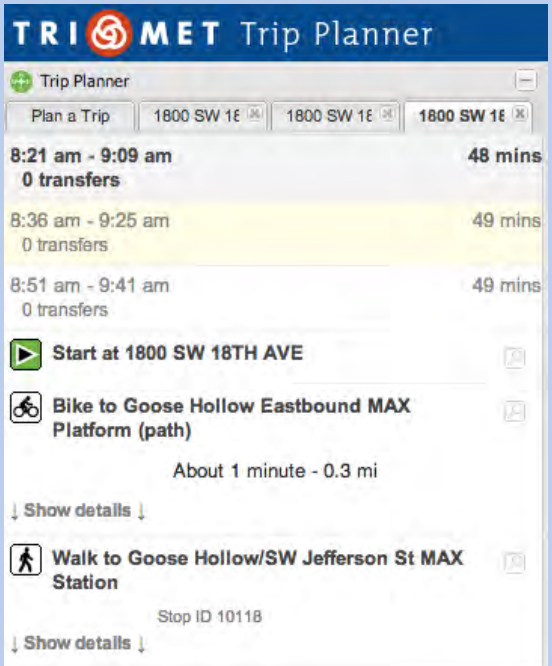
Communicating when the bus will arrive in real-time makes transit more dependable. In Boulder, although some transit routes operate so frequently (i.e. less than every 10 minutes) that a schedule is not needed, many routes – particularly in the mornings, evenings, and on weekends – run every 15 minutes or longer. By communicating exactly when the bus is going to arrive, people can plan their schedule accordingly. Riding the bus becomes as dependable as hopping in the car. Open sourcing transit agency data is a key to the success of real-time systems, as the private sector can often take these applications to the next level.

Multimodal Trip Planner, Portland, OR

In 2012, TriMet launched its online multimodal trip planner, which allows riders to plan their trip using multiple modes. The open source tool is the first of its kind produced by a transit agency in the U.S., and offers the following features:

- Combines transit, biking, and walking into a single itinerary.
- Customizes routes based on user selection, such as quickest, flattest, or most bike-friendly.
- Displays an elevation chart for bike routes.
- Uses OpenStreetMap to keep bike routes and walking paths up to date.
- Provides carshare locations to easily integrate carshare trips with other modes.

According to TriMet, the online tool cost a total of $240,500 to launch. This figure reflects the cost of system design and development (public phasing interface, internal facing interface, backend development, routing algorithm, and feature requirements); data improvements to support multimodal routing; testing and reporting; beta and public launch. Annual support for the system is estimated at $25,000 per year.



To view, the multimodal trip planner, go to: http://rtp.trimet.org/#/

Image from TriMet

Where has it been done?

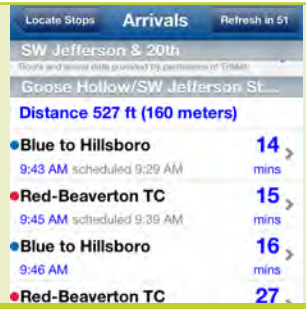
Real-Time Arrival: TriMet, Portland, OR

In 2004, TriMet – Portland's regional transit service – launched its real-time arrival information system TransitTracker.™ Using satellite tracking on buses and sensors in the train tracks, TransitTracker estimates when the next vehicle will arrive based on its scheduled speed and last reported location. In 2005, it was among the nation's first transit agencies to open source its data. Today, over 50 on-line applications from the private developer community help area residents and commuters plan their transit trip in real time. In addition to a strong on-line resource, TriMet has installed over 15 real-time arrival information displays at major transit stations. Open source data can encourage technology companies and universities to develop innovative products that a transit agency would not have the expertise or capacity to develop. Figure 6-1 provides the estimated capital, operating, and maintenance costs for the Transit Tracker.

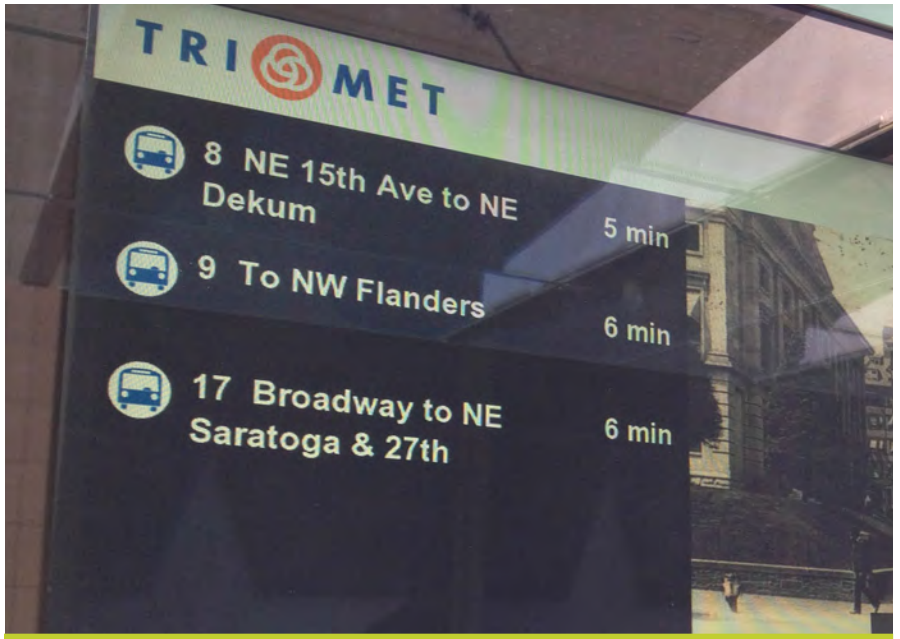
Figure 6-1 TriMet Transit Tracker
Estimated Capital and Operating & Maintenance Costs

Cost Type	Cost Description	Cost
Capital	Hardware (primarily field equipment)	$950,000
	Servers & Software	$125,000
	TOTAL CAPITAL	**$1,075,000**
Annual Operations & Maintenance	Operations	$93,750
	Maintenance	$558
	TOTAL ANNUAL O&M	**$94,308**

Source: 2006 "Real-time Bus Arrival Information Systems Return-on-Investment Study" U.S. DOT Federal Transit Administration



Multiple open-source applications in Portland, OR allow passengers to access real-time information from their cell phones.
Image from PDX Bus Application



In Portland, OR, real-time arrival information tells passengers exactly when the next bus is expected to arrive on their cell phones, online, and at the transit station.
Image from Nelson\Nygaard

Open Source Data: Utah Transit Authority, UT

In 2012, the Utah Transit Authority (UTA) created an interface to allow app developers to access the agency's real-time trip information. To share the information, UTA purchased SIRI (Service Interface for Real-Time Information), which is an XML standard that provides the following information for public transportation:

- Vehicle Monitoring: provides real-time arrival information about one vehicle or many vehicles on one route.
- Stop Monitoring: provides real-time information about vehicles serving a particular stop.
- Close Stop Monitoring: allows users to query the nearest transit stops.

Today, seven real-time apps developed by the private sector are available for UTA passengers.

TransitTimes is one of many applications that provides real-time arrival information for UTA transit riders. The application is possible due to the UTA's open source data policy.
Image from UTA

In 2008, Los Angeles Metro launched an aggressive public information campaign.

Image from LA Metro

Public Information Campaigns

Public information campaigns effectively inform the public about their transportation options, communicate the benefits of transit, and allow people to make more informed decisions. Public information campaigns for public transportation are contending against automobile manufacturers who spend in excess of $20 billion per year. To compete, it is imperative that transit providers and local jurisdictions understand the needs of the community to best tailor quality service; customize rider and non-rider education efforts; and develop selective and focused marketing campaigns.

Why is it important?

Public information campaigns are needed to communicate the benefits of transit to bolster overall ridership. As demographics shift, it is likely that many older adults and younger people will forego automobile trips. Penetrating these disparate markets will be a challenge for transit agencies in the coming years. In Boulder, a public information campaign focusing on in-commuters will be critical to attract more transit riders at the regional level. Campaigns should focus on the environmental, health, and economic benefits of transit to support broader community goals such as the City's Sustainability Framework and the Climate Commitment. Commuters and students are among the most important to reach with a marketing campaign, as these groups tend to have the most predictable travel patterns.

Where's it being done?

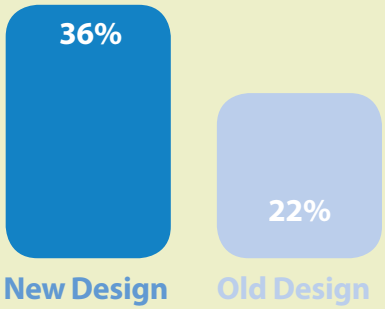
Public Information Campaign: Los Angeles, CA

In August 2008, Los Angeles Metro launched an aggressive public information campaign to educate people about the benefits of transit and the social ills resulting from automobile dependency. The agency created an in-house ad agency that focuses exclusively on communicating the benefits of public transit and improving the passenger experience. The goal was to improve the public's perception of transit and increase the number of discretionary riders.

In 2008, LA Metro launched the "Opposites" campaign, including published online content, billboards, t-shirts, and on-board graphics to create a consistent brand. The brand communicated that Metro was the solution to many of the community's problems (congestion and greenhouse gas emissions, for example).

LA Metro also sponsors a public art campaign in which they contracted with over 300 artists to beautify transit stops and stations.

Discretionary Riders on LA Metro



LA Metro estimates that the newly branded system and information campaign has resulted in a significant increase in "discretionary" riders – those who choose to ride transit.

Source: LA Metro "Promoting Mass Transit" Video

Los Angeles' Metro overhauled their marketing and branding to provide a unified voice. A multimedia campaign was created around the new, modern branding. This campaign includes the Opposites campaign showing Metro as a solution to a range of regional problems.
Image from: Zev Yaroslavsky

LA Metro: Promoting Mass Transit

Watch this video on how LA Metro is working to transform the image of the transit system:

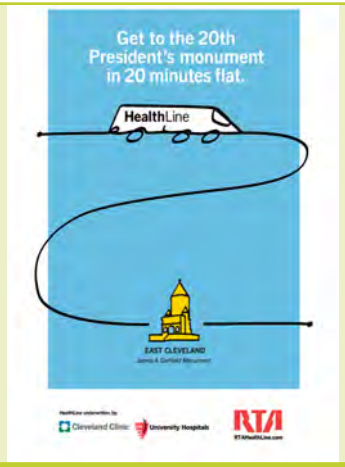
http://vimeo.com/7984623

Billboards: HealthLine BRT, Cleveland, OH

The HealthLine BRT has brought great economic, community, and environmental benefit to the Euclid Corridor. Through a series of large billboards along the corridor, Cleveland's Regional Transit Authority (RTA) has advertised the many social, economic, and environmental benefits of the new BRT line. This allows riders to understand the influence of the BRT line, but more importantly it ties the transportation project to the larger land use and redevelopment changes taking place in the area. While billboards might not be an acceptable communication tool in Boulder, the intent of the campaign could be carried out in other media.

"No Ridiculous Car Trip" Campaign: Malmö, Sweden

Scandinavia is a world leader in developing effective social marketing campaigns. Humorous videos and advertising campaigns help municipalities to effectively market walking, biking, transit, and other actions. Malmö, Sweden addressed the preponderance of short car trips under three miles with a unique multimedia public information campaign. Malmö's "No Ridiculous Car Trips" campaign asked residents: "What is your most ridiculous car trip?" This campaign makes the simple point that using an automobile for short trips, especially in the city, is ridiculous. The city invited citizens to tell their stories of ridiculous car trips to win a prize: a new bicycle. A robust public campaign was centered on the competition including television advertisements documenting people's ridiculous car trips. After the campaign awarded a winner, a short video was made to document the influence and importance of encouraging people to get out of their cars. The campaign included personal stories, humorous advertisements like live actors on billboards riding bikes, and a trip time tracking comparison challenge. The campaign was branded throughout with orange and white.



Greater Cleveland's RTA advertises the benefits of using transit for the economy, for community building, and for the environment.
Image from RTA

Malmö, Sweden's "No Ridiculous Car Trips" utilized unique advertising, public information, trip time tracking for commuters, and a number of humorous efforts asking people about their most ridiculous car commute under three miles.
Image source Midtrafick Youtube video

Cool Bus Video: Oslo, Norway

Oslo, Norway airs advertisements highlighting the stresses of driving and the negative social and environmental externalities, including this spot noting that a single bus can replace one kilometer of car queue. Oslo has used a number risqué advertisements to reach a broad group of consumers: http://www.advertolog.com/oslo-public-transportation/adverts/big-bus-9518155/

Information

KEY ISSUES TO BE EXPLORED IN THE TRANSIT PLAN

- **Real-time information:** Explore opportunities to partner with RTD to implement real-time information at transit stops and online
- **Public information campaign:** Explore opportunities to launch a public information campaign to raise awareness of travel options

Transit Amenities

In this section:

- Wi-Fi on Buses
- High Amenity Stations
- Vehicles: Technology and Efficiency

Wi-Fi is prominently advertised as an on-board amenity on Santa Clara VTA buses.

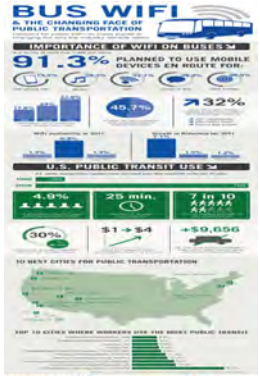
Image from Flickr user Kei!

Wi-Fi on Buses

In a world where customers expect wireless connections everywhere from the coffee shop to mid-flight on an airplane, many transit providers are adding "on the bus" to the list of places people can stay connected. New technology is helping to make on-board wireless possible for bus services ranging from commuter express service, employer-provided bus shuttles, and private long-distance bus companies. For example, the increasing availability of 4G cellular networks means faster speeds and wider bandwidth at lower costs. Transit agencies are also experimenting with funding models that allow advertisers to deliver sponsored messages along with free Wi-Fi, lowering agency costs.

Why is it important?

Wi-Fi can help to attract new riders, whether they turn to transit for the opportunity to relax and browse the internet while they travel, or to get a jump start on the workday by logging on. While these tasks may be easy to do using a smart-phone on shorter routes, Wi-Fi might be particularly attractive on longer-haul routes where people are riding for 15 minutes or more and will have time to watch a short video, connect to their corporate server, or browse an on-line newspaper. Most of the research in this field so far has focused on the use of mobile devices on intercity buses, commuter trains, and other long-distance trips. These studies, such as a recent survey conducted by DePaul University, suggest that Wi-Fi can give bus transit a competitive edge over other modes. Their research found that over 90% of transit riders planned to use a mobile device while on board, and more than a third said that access to Wi-Fi is important when choosing a travel mode.



Studies show that over 90% of riders planned to use mobile devices en route.

Image from Singlepoint

Where has it been done?

Transit providers from Seattle to Beijing have been experimenting with adding wireless connections on bus services. High-tech employers like Microsoft and Google also include wireless connections on their employee shuttle services.

However, some transit agencies have had mixed results from early implementation projects. For example, Golden Gate Transit decided to discontinue wireless service on 120 buses because the service wasn't providing enough connectivity through the area's hilly terrain. They haven't given up on Wi-Fi plans and are hoping to use 4G network technology going forward. Because the cost of implementation can be signifi-cant—some transportation officials indicate that the cost of implementation can range from $1,000-$2,000 per bus[1]—shrewd agencies might consider wireless internet as part of broader upgrades. An evaluation of the Chattanooga Area Transportation Authority's (CARTA) SmartBus project conducted by the USDOT found that CARTA could offer Wi-Fi to the public at little additional cost because the agency was introducing other technologies that required network connectivity for all vehicles. Finally, some agencies, such as the Santa Clara Valley Transportation Authority (VTA), have used a sponsorship model to cover the cost of installation. A few examples of on board Wi-Fi as part of branding or higher-fare commuter service are highlighted at right.

Seattle, WA

In 2010, King County Metro launched the first of six planned RapidRide rapid bus lines, all of which offer free Wi-Fi for passengers via on board mobile routers. The RapidRide system is designed to provide BRT service to select high ridership urban and suburban corridors in King County.

Sound Transit also offers wireless on some express bus service and commuter rail lines.

Image from Flickr user Oran Viriyincy

Salt Lake City, UT

The Utah Transit Authority (UTA) was one of the first transit agencies to provide wireless on board buses, introducing free wireless to the first routes in 2008. UTA now provides a free Wi-Fi connection on all express routes.

Wi-Fi is promoted as a free amenity for passengers who pay a premium for express bus fares.

Image from Flickr user Edgar Zuniga Jr.

1 USA Today (2008) "More Cities Offer Wifi on Buses."

MTA Select Bus Service offers ticket vending machines at stop locations.
Image from Wikimedia Commons, Adam E. Moreira

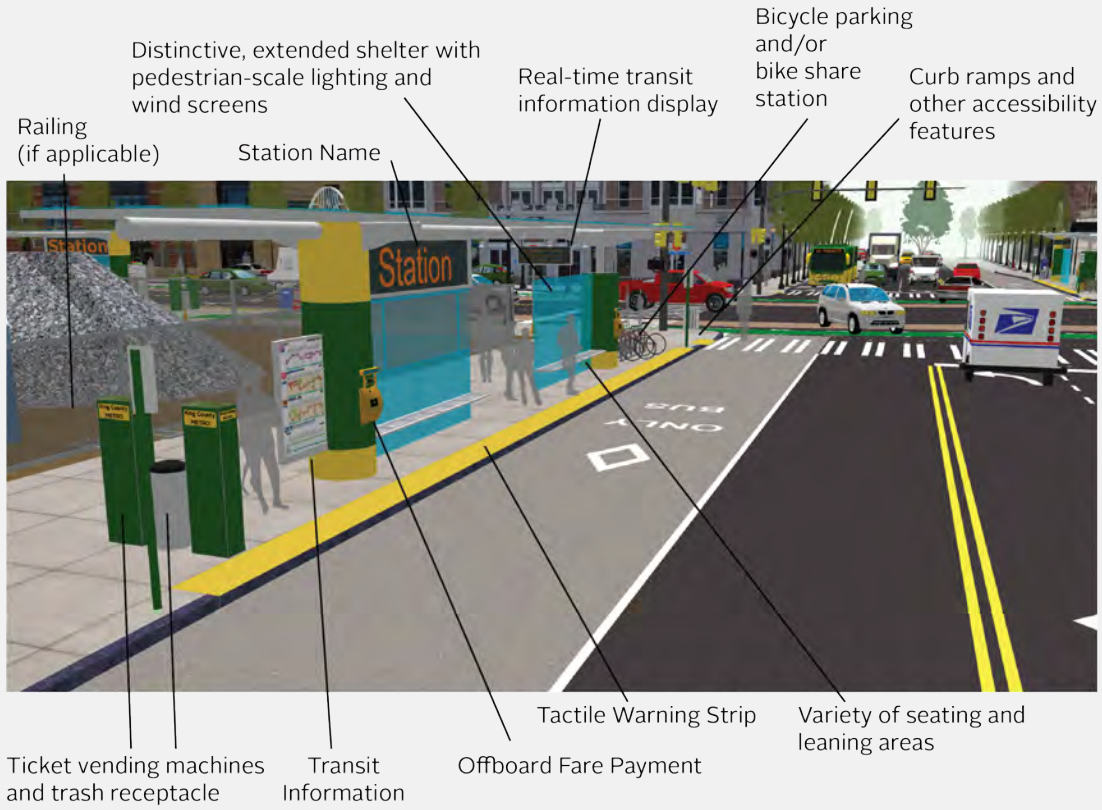
High Amenities Stations

In addition to improvements on-board vehicles, better amenities at stop locations can go a long way towards making waiting for the bus a more pleasant part of the transit experience. Many cities are developing innovative station designs that are highly visible and include a range of features to improve passenger comfort. At a minimum, high-amenity stations may include features such as comfortable seating and leaning areas, shelters, information kiosks, wayfinding, real-time passenger information, trash receptacles, and bike parking. For high-profile and high-ridership stop locations, enhanced amenities may be appropriate, such as landscaping and streetscape enhancements, retail services, restrooms, bike share stations and secure bike parking, and pedestrian-scaled lighting.

Why is it important?

Keeping passengers out of the elements and informed about how long their wait will be can decrease the perceived burden of waiting for the bus. Real time arrival information has been shown to reduce perceived wait times, and has now become a standard element of transit stops in many places (see the Information Section for more details). In cities like Boulder that experience cold temperatures and extreme weather during the winter, shelters can be especially important. In one survey of Chicago transit riders, shelter from the weather was cited as the most important feature of bus stops.

In addition to attracting new riders and improving the visibility of transit, high amenity stations can also improve transit operations. For example, New York City's Metropolitan Transportation Authority (MTA) found significant improvement in travel times after implementing off-board fare payment as part of the first phase of "Select Bus Service" on the Bx12 Limited corridor. With stops equipped with ticket vending machines, dwell times for boarding and alighting fell from 16 minutes to 10 minutes, on average. High amenity stations can also attract high quality transit oriented development at stations.



This design illustrates elements of a high amenity transit stop, with features designed to help integrate modes, accommodate the needs of different user types, and provide information and convenience to the passenger.
Source: Nelson\Nygaard

Where's it being done?

Cities around the world are implementing one or more of the elements of high amenity stations, with some of the most innovative ideas shown below.

Examples of Stop Amenities from Around the World

HEATED SHELTERS
Rochester, MN and New Haven, CT

The city of Rochester, MN (pictured) incorporated on-demand heat lamps and nighttime lighting into new downtown bus shelters.

New Haven built several award-winning heated bus shelters, activated by cold temperatures and passengers entering the station.

Image from Look Design

COVERED STATIONS WITH OFF-BOARD PAYMENT
Bogotá, Columbia

Bogotá, famous for its extensive Transmilenio BRT system, has developed simple station designs that include turnstiles before entry to the station, real time arrival information and announcements, and station attendants.

Image from Flickr user Edgar Zuniga Jr.

SOLAR-POWERED SHELTERS
San Francisco, CA

The winning design from a competition sponsored by San Francisco Municipal Transportation Agency can now be spotted all over San Francisco. The new shelters are made from recycled materials and include photovoltaic panels that power the intercom, LED lighting, and wireless routers. Additional power generated by the solar panels is returned to the power grid.

Image from Flickr user monster media

Some bus systems are adopting train-like vehicles as part of BRT systems, such as this rubber-tired vehicle in Nancy, France.
Image from Nelson\Nygaard

Vehicles: Technology and Efficiency

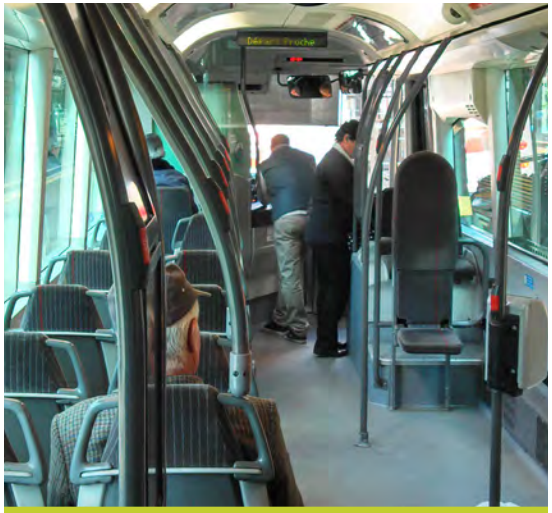
Transit agencies in the United States and abroad are starting to replace traditional diesel bus fleets with transit vehicles running on alternative fuels (e.g., electric, diesel-electric hybrid, biofuel, natural gas, and hydrogen fuel cell-powered vehicles) and incorporating new bus technologies (e.g., regenerative breaking systems). In many cases, transit providers are leading the way as early adopters of alternative fuels. According to a 2012 memo from the American Public Transportation Association, the percentage of buses using alternative fuels climbed from only 2% in 1992 to 36% in 2011 – far outpacing the consumer market.

Transit vehicles are also becoming high-tech on the inside, featuring improved seating arrangements and interior coach design and using GPS to provide real-time location information, automated stop announcements, and enhanced security features.

Why is it important?

Benefits of new vehicle technologies include better fuel efficiency and reduced impact of high fuel costs, lower noise and visual impacts (e.g., avoiding the need for overhead catenary electric wires by replacing traditional electric vehicles with battery electric vehicles), and lower maintenance costs. Low or zero tailpipe emission vehicles can fit into sustainability efforts and marketing campaigns to promote transit as an environmentally-friendly option. Transit agencies of all sizes have been able to meet new federal and state fleet requirements and take advantage of incentive programs to start replacing diesel vehicles with cleaner alternative fuel vehicles. Clean burning vehicles are also important for cities working towards improving air quality, reducing greenhouse gas emissions, and improving public health.

The benefits of clean fuel vehicles vary based on the specific technology used. The US Department of Energy reports that alternative fuel buses can cost 20%-40% more than diesel buses to purchase, and may require additional infrastructure investment. However, vehicle costs may decrease as these technologies become more common, and cost savings from fuel, maintenance, and applicable grants and credits may offset the upfront expenditure. For example a report from the National Renewable Energy Laboratory reported that CNG buses have accounted for nearly a quarter of all transit bus sales over the past 10-15 years, resulting in a reduction in petroleum consumption of more than 200 million gal/yr. However, adding CNG buses to a fleet also requires constructing appropriate fueling facilities, and vehicle purchase costs can be higher than traditional diesel buses. More detailed information on the costs and benefits associated with different technologies is available from the Federal Transit Administration, including a 2006 report to Congress on alternative fuels.



The interior of this vehicle in Lyon, France offers large windows and open interior space, allowing passengers to feel like part of the street and urban environment as they travel.
Image from Nelson\Nygaard

Where's it being done?

Clean Air Fleet: Los Angeles, CA

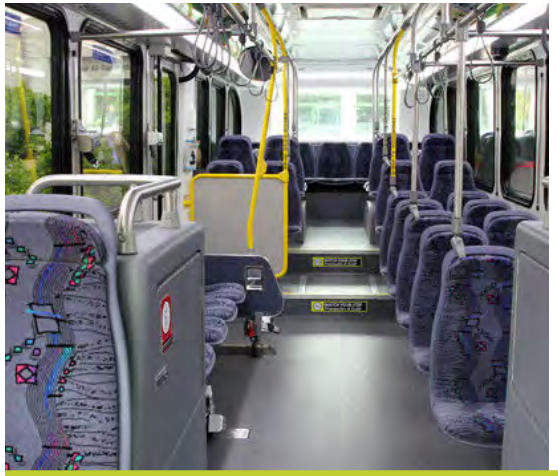
The Los Angeles County Metropolitan Transportation Authority (LACMTA) promotes its fleet as the largest "Clean Air" fleet in the nation. LACMTA first introduced clean fuel vehicles in 1994, purchasing 196 Compressed Natural Gas (CNG) buses. CNG buses now make up 100% of the fleet, enabling LACMTA to retire its last diesel bus in 2011, and in doing so becoming the first agency in the country to operate only alternative clean fueled buses.

According to LACMTA, the CNG buses are 97% cleaner than the diesel buses they replaced, reducing cancer-causing particulate matter by 98%, carbon monoxide by over 80% and greenhouse gases by over 20%.

LACMTA's CNG vehicles are used on Metro Rapid, the agency's Bus Rapid Transit service.
Image from Wikimedia Commons, AllyUnion

Ecoliner Coaches: Foothill Transit, Pomona, CA

Foothill Transit – which serves a 327 square mile area and over 14 million annual riders – began purchasing Compressed Natural Gas (CNG) vehicles in 2002, with a goal of achieving a 100% clean fleet by 2013. To meet their goal, the agency used a grant from the 2009 American Recovery and Reinvestment Act to purchase new "Ecoliner" coaches, branded as the world's first heavy duty fast charging electric buses. These buses recharge at specially-designed stations during their normal 10-minute layover time, adding to their convenience. The project has been so successful that Foothill Transit received an additional $10.2 million grant in 2011 to expand the program. Ecoliner buses are approximately twice as expensive as regular buses (just over $1 million) but are expected to last 18 years instead of a typical bus that lasts only 12 years. See more information here.



Foothill Transit's "Ecoliner" coaches run on electricity without overhead wires. Find out more about the Proterra Ecoliner here.
Image from Wikimedia Commons, George Lumberas

City of Boulder STATE OF THE SYSTEM REPORT

Hydrogen Buses:
Alameda-Contra Costa Transit, Alameda, CA

AC Transit became a pioneer in testing hydrogen buses as part of the HyRoad program in 1999, and has continued to lead demonstration projects and data collection on the latest hydrogen fuel cell technologies. From 2006 to 2010, the agency tested three hydrogen vehicles, working with manufacturers to apply lessons learned to the next generation of fuel cell buses.

The next generation of vehicles is now being tested as part of the Zero Emissions Bay Area (ZEBA) project. AC Transit, along with Golden Gate Transit (GGT), Santa Clara Valley Transportation Authority (VTA), San Mateo County Transit District, Bay Area Transit (SamTrans), and the San Francisco Municipal Transportation Agency (SFMTA), is now testing a fleet of 12 hydrogen fuel cell vehicles. The buses use lithium ion batteries and hybrid-electric technology to store regenerative braking energy, and refuel at two on-site energy stations that are designed to demonstrate "renewable hydrogen use," using biogas or solar-powered electrolysis to produce hydrogen.

Funding for the project, including the purchase of vehicles and the construction of new fueling stations, is provided by the California Energy Commission, California Air Resources Board, Bay Area Quality Management District, Metropolitan Transportation Commission, and the FTA. The Department of Energy's National Renewable Energy Laboratory (NREL) will monitor performance and public perception to inform future guidance for transit agencies hoping to adopt hydrogen fuel cell technologies.

AC transit's hydrogen fuel cell buses, part of the ZEBA program with four other Bay Area transit agencies, are branded as zero emissions.
Image from Flickr user Eric Fischer

TRANSIT AMENITIES

KEY ISSUES TO BE EXPLORED IN THE TRANSIT PLAN

- **Wi-Fi:** Explore opportunities to install free Wi-Fi on the HOP
- **Transit Stop Amenities:** Explore opportunities to improve transit stops, particularly at high demand stops
- **Vehicle Options:** Explore low emission and quiet vehicle options for the HOP and other local and regional Boulder routes in partnership with RTD

Fares & Funding

What would it take to make the bus as easy as grabbing your keys in the morning? Many communities are helping customers purchase tickets at the click of a button on their smartphone, or, better yet, they are going cash free. This section provides an overview of new technologies in smart ticketing and approaches to reducing payment barriers such as free fare systems. A brief overview of innovative local funding sources for the operations and maintenance of transit is also provided.

Fares & Funding

In this section:

- Smart Phone Ticketing
- Fare-Free Transit
- Funding

Smart Phone Ticketing

Over half of Americans currently own a smart phone, and this number is expected to continue to increase in the near future. Top transit agencies in the U.S. are trying to stay ahead of the curve and respond to the growing trend of making purchases on the go. Reusable smart cards are already starting to look outdated with the rapid expansion of smart phone use. Smart phone vending allows customers to purchase and store their bus or rail tickets on a mobile phone, instead of having to buy, store, and carry a single, monthly, or annual pass. The benefits? Customers don't have to keep track of paper tickets, and transit agencies save on the cost of collecting fares since the need for physical ticketing machines and labor required to collect cash receipts are reduced.

Why is it important?

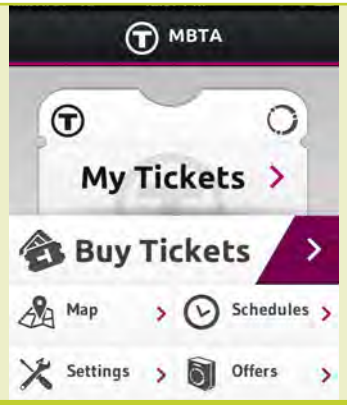
Riding the bus should be as easy as jumping in your car. A key barrier that people often site to riding the bus is the need to purchase tickets with exact change. Smart phone ticketing allows bus riders to purchase tickets on the go without the hassle of exact change or carrying a paper ticket. With more and more people with smart phones, mobile ticketing will be critical to capturing the bust riders of the future.

Where has it been done?

MBTA, Boston, MA

In 2012, the MBTA in Boston launched its mobile ticketing app for smartphones on their commuter lines – the first of its kind in the U.S.

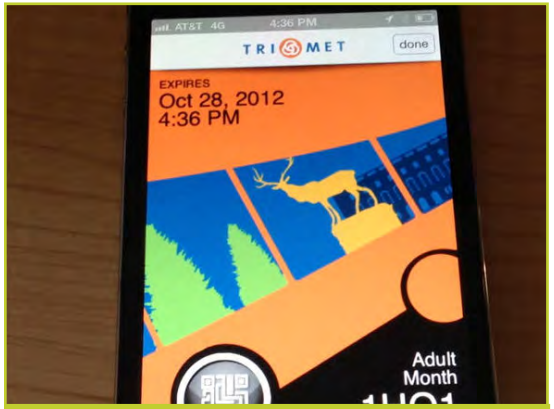
- 12% of tickets are being sold on smart phones
- Mobile ticketing is estimated to save agency money on fare collection
- System manager Masabi gets 2.8% of each transaction



MBTA in Boston launched its mobile ticketing app for smartphones on their commuter lines.
Image from MBTA

TriMet, Portland, OR

TriMet is currently beta testing a mobile ticketing app scheduled to release in summer 2013. TriMet has partnered with a local Portland software company GlobeSherpa to develop the system. The development of the application is free; GlobeSherpa will receive up to 11% of each transaction.



Caption: TriMet is currently beta testing a mobile ticketing app scheduled to relase in 2013.
Image from TriMet

Hasselt Belgium was one of the first European cities to implement fare-free transit
Image from flickr user Generaal Gibson

Fare Free Transit

In the United States, fare increases have been commonplace as transit agencies and local jurisdictions struggle to maintain and improve service in light of decreasing federal dollars and reduced local tax revenue. In this context, the concept of fare free transit may come as a surprise. But in Europe – and even a few cities in the U.S. – transit providers are offering fare free transit to residents and visitors to boost ridership, reduce congestion, and save costs on expensive roadway projects. The resulting increase in ridership is supporting community environment, economic development, and mobility and access goals. Among the many strategies explored in this report, fare free transit is among the most promising for getting many more people to ride transit. To be clear, fare free transit doesn't necessarily mean that the riding public pays less, just that other means of generating operating funds are used. Boulder has already implemented the Eco Pass and is exploring the expansion of this program through the countywide Eco Pass Study in 2013.

Why is it important?

If implemented properly, a fare free system communicates that transit is an essential and valued mode in the community. The hassle – if not the economic barrier – of buying a transit pass or having exact change can be a deterrent. People are more likely to ride the bus if they do not have to pay to board the vehicle. Since its inception in the early 1990s, Boulder's Eco Pass program has provided subsidized transit passes to downtown employees and neighborhoods. City of Boulder surveys have found that those with an Eco Pass are five to nine times more likely to use transit than those without a pass. Expanding the accessibility of transit can only increase the number of people riding the bus, helping communities meet their environmental and mode share goals.

Where has it been done?

U.S. and European cities have been the pioneers of fare free transit systems over the last two decades and have seen marked increases in ridership. In the land-constrained cities of Europe, cities large and small have committed to providing cash free transit to help solve congestion issues, and help meet community economic development and environmental goals. In the U.S., some small cities find that farebox recovery is so low that the cost of going fareless does not outweigh the benefit of increased ridership; in each case, alternative local funding sources were developed.

Chapel Hill, NC

Chapel Hill Transit (CHT) provides service to the communities of Chapel Hill, Carrboro, and the University of North Carolina at Chapel Hill. In 2002, Chapel Hill Transit (CHT) went fare free. The two towns and the University share annual operating and capital costs associated with the transit service. The fare free system was first considered because its farebox recovery rate was quite low — at approximately 10 percent. Most of its revenue was already coming from the University of North Carolina in the form of pre-paid passes and fares for employees and students. The university and taxpayers of Chapel Hill and Carrboro agreed to make up the difference.

Since going fare free in 2002, CHT ridership has increased from 3 million passengers per year to nearly 7 million. In addition to free transit service, over half the bus riders note using the system due to expensive and scarce parking downtown and at the University.

Chapel Hill Transit serves over 6.9 million riders annually at a cost of $2.31 per ride fare free. Since going free in 2002, ridership has more than doubled, from 3 million passengers per year to nearly seven million.
Image from Wikimedia Commons

Fare Free Transit Increases Transit Ridership

- **Chapel Hill, NC:** 133% increase in 10 years
- **Corvallis, OR:** 57% increase in one year
- **Hasselt Belgium:** 1,200% increase in 4 years
- **Aubagne, France:** 170% increase in 4 years
- **Tallinn, Estonia:** 10% increase in 3 months

The Mayor of Tallinn has coined the free fare program as the "13th monthly salary," claiming that families will be able to save a month's salary on previously incurred transportation costs.
Image from Flickr user rallyhook

Highlights from Europe

In the last decade, a number of European cities have implemented fare free transit in an effort to reduce road congestion, save money on costly roadway expansion projections, and increase transit ridership.

Hasselt, Belgium – *population 70,000* – led the way in Europe in 1997 when it instituted a free fare policy. The city saw a 1,200 percent increase in ridership in just four years.

Aubagne, France – *population 46,000* – launched its free transit system in 2009. The city raised the transport tax on large businesses from 0.6 to 1.8 percent to help pay for the system. Ridership has increased 170 percent and traffic congestion is down 10 percent in four years.

Tallinn, Estonia – *population 450,000* – implemented a free transit system in January 2013. To retain the "value" of transit, Tallinn requires residents to initially purchase a smart card for $2 Euros, much like Boulder's Eco Pass. This strategy provides a slight "barrier to entry" to help shift existing drivers to transit, and not just those who want a free ride. Once on board, passengers scan their smart card on an electronic reader, providing the City with instant origin-destination data to improve transit service design.

Tallinn's Transport Authority reports that passenger numbers are up 10 percent, while the number of cars on city streets has been reduced by as much as 15 percent in the program's first three months of operation. To cope with the new demand, Tallinn has invested in 70 new buses and 15 new trams. It has also instituted a series of deterrents to private car use, including expansion of exclusive bus lanes barred for private vehicles, increased parking charges, and expanded paid parking areas.

In Tallinn, Estonia, free transit has resulted in a 10% increase in transit ridership and a 15% decrease in road congestion in just three months. In April, 2013 twenty-four new eco-friendly buses were introduced to help support the new fare free system.
Image from Revolve Magazine

Corvallis, Oregon implemented a transit operations fee in 2011.
Image from City of Corvallis

Funding

With federal funding in flux, many transit agencies are looking to secure local and dependable funding sources for transit. Local funding for transit has been secured in multiple ways, including transit impact development fees and a transit operations fee assessed to residents and businesses based on expected trip generation.

Why is it important?

Increased local funding for transit operations can be used to improve service frequency, hours of operation, and/or develop new routes. Cities served by a regional transit provider may want to implement services that achieve goals differing from those prioritized by a regional transit agency. For example, a local jurisdiction may place more value on circulation in downtown or high frequency service. As in Boulder, many communities rely on sales tax to supplement regional service. Reliance on sales tax revenues makes transit vulnerable in tough economic times and requires agencies to cut and increase service in a manner that affects people's use and perception of transit as a stable piece of public infrastructure. Finding new, innovative, and steady sources of funding for transit operations will benefit Boulder in the near-term and long-term – both to secure funding but also to help address climate the community's climate goals .

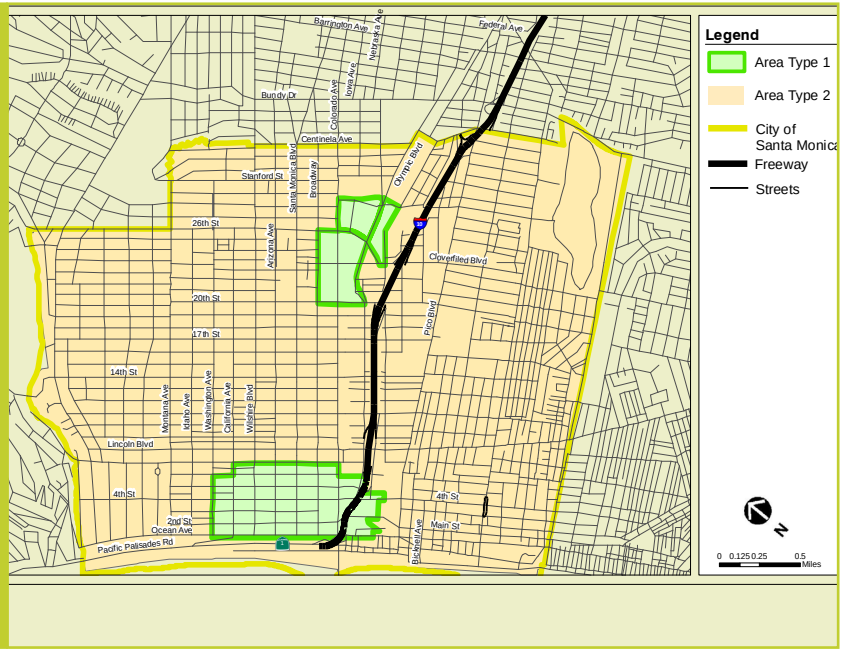
This section provides a brief overview of local funding sources for transit operations and maintenance.

Where has it been done?

Transportation Impact Fee: Santa Monica, CA

In 2013, Santa Monica adopted a policy to achieve no net new automobile PM peak hour trips. To implement this goal, the City set a transportation impact fee to mitigate the effects of new development on the transportation system. The fee is based on land use type and ranges between $2,600 - $7,800 per residential dwelling unit and $3.60 - $21.00 per square foot for commercial development. The policy has a dual benefit of supporting citywide environmental goals and generating a sustainable transportation funding source.

The Santa Monica Transportation Impact Fee (TIF) mitigates the transportation impact of new development. The map above highlights two areas where the fee is assessed. The TIF for Area 1 (including downtown, the Special Office District, and the Bergamont Transit Village) is lower because these areas have lower vehicle trip generation rates due to transit accessibility, and the presence of complementary land uses. Area 2 includes the remainder of the city not included in Area 1.
Source: City of Santa Monica



Transit Operations Fee: Corvallis, OR

Corvallis, Oregon is located in the Willamette Valley, half way between Portland and Eugene. The municipally-run Corvallis Transit System (CTS) serves approximately 55,000 local residents, including the Oregon State University with over 26,000 students.

How much is the Fee? In 2011, Corvallis implemented a Transportation Operations Fee (TOF) as a surcharge on customer utility bills. The TOF replaced the portion of the City's General Fund previously dedicated to transit, making those funds available for other uses such as the Library, Parks and Recreation, and the Police and Fire Departments. The Transit Operations Fee is calculated using the Institute of Traffic Engineers trip generation model. The model estimates the average number of vehicle trips generated by a property based on the property type. The fee is $2.75 per month for single-family residential customers and $1.90 per month for multi-family residential customers. About $0.90 of the fee is fare box replacement; the remainder replaces the general fund contribution. Businesses are assessed based on the type of business and the trip generation associated with that use.

How much money will the fee raise? The fee is expected to generate $850,000 in the first year. Roughly $400,000 of this replaces the property tax revenue that previously supported the CTS. The Transportation Operations Fee comprises approximately 30% of the CTS budget.

What is the benefit of the fee? In addition to establishing a steady source of revenue for CTS, the utility fee enabled the City to institute a free fare system. Making the bus fare free, and reducing greenhouse gas emissions, were noted as co-benefits of a solution to a revenue problem, and served to make the utility fee more politically palatable. The free fare system caused an immediate increase in riders. Ridership increased 24% between February 2010 and February 2011. March 2011 showed an even greater increase with a 43% jump in ridership over March 2010. Ridership has increased from 700,000 riders in 2009 to 1.1 million in 2012.

Local Funding Opportunities for Boulder

Funding Type	What is it?	Where has it been done?	What is the impact?
Transit Impact Development Fee	A fee charged to developers in order to fund transit service necessary to offset the traffic impacts of their projects.	Santa Monica, CA San Francisco Municipal Transportation Agency (SFMTA)	SFMTA has generated more than $120 million in revenue from the fee since 1981
Employer or head tax	A fee assessed to employers based on payroll taxes.	TriMet, Portland, OR Seattle, WA	Payroll tax amounts to 27% of TriMet's 2013-2014 budget
Transportation Maintenance /Operations Utility Fee	A fee charged to each household and business typically through a utility bill. The fee is based on estimated trip generation by land use.	Corvallis, OR Hillsboro, OR Loveland, CO	$850,000 generated in 2011 (30% of transit budget)
Parking Revenue	Parking revenue in specific districts or city-wide is used to fund transit operations.	San Francisco, CA Portland, OR	Parking fees and fines account for nearly 35% of MTA's operating budget
Motor Vehicle Excise Tax	Car owners pay a small percent of vehicle value to fund transportation projects.	Washington State	0.7 percent tax on motor vehicles amounts to $140 increase in license fees for a $20,000 automobile
Local Transportation Benefits District* Fees: Car Tag Fee	Fee associated with car licenses renewal.	Host of Washington cities, including Seattle, Tacoma, and Olympia	$20 per vehicle
Utility Tax	Portion of utility tax is allocated to transportation projects.	Pullman, WA**	0.3% utility tax yielded $1.1 million in revenue for transit in 2011

* Transportation Benefit Districts are quasi-municipal corporations with independent taxing authority, including the authority to impose property taxes and impact fees for transportation purposes. In Washington, RCW 36.73.020 governs formation by counties, and RCW 35.21.225 governs formation by cities.

** The transit portion of the utility tax was enacted by Ordinance No. 78-39 adopted by the City Council on September 19, 1978, and approved by the voters of the city at a special election conducted on November 7, 1978. (Pullman Municipal Code Sec. 6.15.055).

Parking Meter Revenue: San Francisco, CA and Portland, OR

Parking meter revenue helps fund transit:

- **San Francisco Metropolitan Transit Agency (MTA):** The MTA dedicates 80% of the total parking tax revenues collected by the City to support transit. The result of a 2007 ballot measure – MTA doubled the previous 40% share allocated to transit. As of 2012, parking and traffic fees and fines comprise nearly 35% of the MTA's operating budget. An increased share of parking revenues is expected to come from parking fees rather than fines under SFpark, a federally-funded pilot program that the city is implementing to test market-based pricing of the city's parking supply. Although the goal of the program is not to raise money, it may increase revenue due to increased prices, extended time limits, and flexibility of credit card payments.
- **Portland, Oregon:** In Portland, Oregon, the City uses parking revenue to fund streetcar operations, which is run by Portland Streetcar, Inc., a non-profit. Revenue from parking meters installed in the districts served by the streetcar is used to fund about one third of the streetcar's operating cost ($2 million budgeted for 2011).

Boulder currently uses parking system revenue to support purchase of Eco Passes for downtown employees. It should be recognized that parking revenue is often prioritized for operation and upkeep of the parking system.

The SFpark program parking meters adapt pricing based on demand.
Image from SF.Streetsbog

Fares & Funding

KEY ISSUES TO BE EXPLORED IN THE TRANSIT PLAN

- **Cash Free Transit:** Continue to explore opportunities to expand cash free transit through the Countywide Eco Pass study
- **Taxes & Fees:** Continue to explore options for a transit tax or fee through the Transportation Maintenance Fee process