City of Boulder

# TMP 2014

## Transit Modal Plan

# ACKNOWLEDGEMENTS

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# 1 INTRODUCTION

## 1.1 OVERVIEW

This Transit Modal Plan provides a detailed report of the transit planning activities and recommendations that support the 2014 City of Boulder Transportation Master Plan (TMP). The Transit Modal Plan provides details of the "Renewed Vision for Transit," a key component of the TMP. The Renewed Vision consists of four primary elements—Service, Capital, Programs, and Implementation—that respond to the key trends and opportunities facing transit in Boulder and were developed based on an 18-month planning and public engagement process.

This chapter describes the city's role in providing transit and the motivations for developing a renewed vision, and summarizes the "Listening and Learning" phase that grounded the Renewed Vision for Transit. The overall path to the Renewed Vision is illustrated in Figure 1-1.

The remaining chapters in this document describe a "Complete Transit System" that is the foundation of the Renewed Vision for Transit and a means of realizing key TMP goals. The four elements of the Renewed Vision for Transit provide the blueprint for implementing a transit system that is an attractive travel option for all Boulder residents, employees, and visitors.

Figure 1-1     Renewed Vision for Transit Process
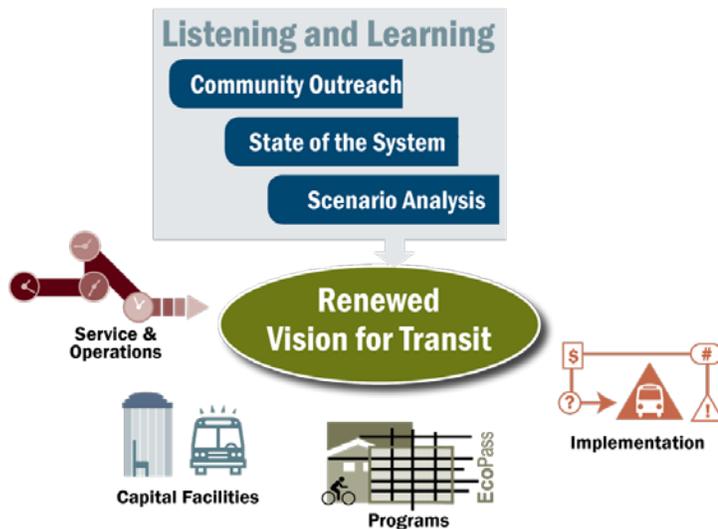


The Renewed Vision for Transit was grounded in the Listening and Learning phase of the project, including an extensive community and stakeholder outreach process, a State of the System report documenting current conditions and trends affecting transit, and an extensive analysis of future (2035) scenarios for transit system development in Boulder and surrounding communities.

The Renewed Vision for Transit has four key elements: Service, Capital, Programs, and Implementation.

Image from Nelson\Nygaard

## 1.2 CITY OF BOULDER'S ROLE IN DELIVERING TRANSIT TODAY

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 the Regional Transportation District (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 within Boulder, city staff and the community developed a model for a circulator shuttle that resulted in the HOP.

Over the last two decades, Boulder made unprecedented improvements to its transit system. With the creation of the "HOP" bus route, the popularity and success of the route increased demand for transit and led to the development of the Community Transit Network (CTN). Today, this network of routes makes connections throughout the City of Boulder, and Boulder County.  The city's role includes:

- Partnering with RTD and Via to operate the system
- Financial support for more frequent service on selected RTD-operated services and for operations of the HOP route in partnership with the University of Colorado (CU)
- Coordinating regional connections, fare programs, route planning, funding, and other initiatives with RTD, Boulder County, CU, Boulder Valley School District, and other transit partners
- Planning and building transportation infrastructure that supports transit and active transportation

Through continued effort, community investment, and partnerships with RTD, Via, Boulder County, CU, and other partners, the City of Boulder has among the most extensive public bus systems and one of the highest transit mode shares of any city of its size in the nation.

## 1.3 WHY A RENEWED VISION FOR TRANSIT?

Despite increased ridership and use of walking and bicycling modes and continued progress toward meeting the TMP goals, the city is not on course to meet the TMP's ambitious goals (see Chapter 3 of the TMP document), particularly reducing single-occupant vehicle (SOV) mode share to 20% of all trips for residents and to 60% of work trips for non-residents by 2035. Reducing the SOV mode share is a key strategy in meeting the city's goal of reducing greenhouse gas emissions by 16% and continuing to reduce emissions of other air pollutants.

The city faces numerous challenges in achieving these transportation and sustainability goals. For transit in particular, key challenges that have heightened the need for a renewed transit vision include declining RTD revenue due to the economy resulting in decreased transit service hours and a growing number of workers commuting to Boulder.

Complementing other TMP investments in complete streets and other initiatives and programs, improving transit service, capital facilities, and programs to enhance the transit customer experience will help Boulder attain its TMP goals.

# 1.4 LISTENING AND LEARNING PHASE: WHAT DID THE COMMUNITY HAVE TO SAY?

The Renewed Vision for Transit was guided by a robust community outreach process, including a Transit Technical Advisory Committee, the Transportation Advisory Board, City Council, a Community Feedback Panel, online and social media tools, open houses, and storefront workshops. For the first time, the outreach process used "social media" tools in a more robust and extensive manner which provided an opportunity to obtain input from the public in greater numbers, in addition to obtaining input from the more "traditional" open house and meeting style format. Figure 1-2 provides a high-level summary of the listening and learning phase.  See the Transportation Master Plan: Summary of Community Engagement for more information.

## Transit Technical Advisory Committee

The Transit Technical Advisory Committee (TAC) convened in January 2013. It held 16 meetings and was instrumental in assisting in developing the Renewed Vision for Transit. The TAC is comprised primarily of "technical staff" from local and regional policy, agency, and key community stakeholders, such as Boulder County, University of Colorado, Boulder Valley School District, Boulder Housing Partners, and RTD.



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

## Community Outreach Events and Activities

Activities and input opportunities included:

- **Stakeholder Interviews.** During the Listening and Learning Phase, stakeholder interviews were conducted with the University of Colorado, key City staff including the Mayor and the Director of Public Works, RTD, Boulder Community Hospital, CU, Chamber of Commerce, downtown interests, and other business leaders.

- **Community Storefront Workshops.** Community Storefront Workshops were held to gather the community's priorities for transit investment and help shape the Renewed Vision for Transit. Workshop locations included the CU Memorial Union, The Cup, and the Boulder Community Hospital, among others.

- **Design Your Transit System Online Tool and Questionnaire.** The Design Your Transit System online tool allowed the community to
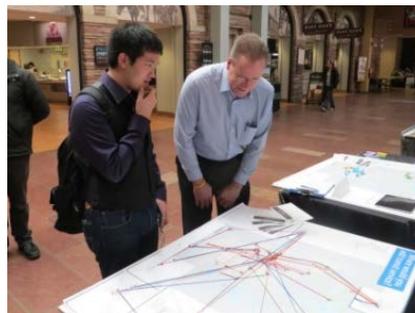


University of Colorado students provided input on the Renewed Vision for Transit at one of the Community Storefront Workshops in March 2013.
Image from Nelson\Nygaard

prioritize transit investments. The bottom portion of Figure 1-2 lists the top improvements. Over 1,500 responses were received. The tool proved to be a new, creative, and valuable means of soliciting feedback from the public.

- **Inspire Boulder.** Questions were posted to solicit input using the city's online community forum, Inspire Boulder.

- **Community Feedback Panel.** The Community Feedback Panel was a new social media outreach strategy for the 2014 TMP update and was comprised of a group of interested members of the public.

- **Community Open Houses.** Several  public open house were held including at the Hotel Boulderado on March 4, 2013 for the project kick-off;prior to Transportation Advisory Board meetings in March and May 2014; and at the Boulder Museum of Contemporary Art on May 28, 2014.

# State of the System Report

The State of the System report (Appendix A) developed during the Listening and Learning phase provided in-depth information about existing and planned transit service, travel demand trends, demographics, and land use patterns in Boulder. It also looked at leading transit innovations in the U.S. and abroad. Key opportunities and challenges identified in the report are summarized below.

## State of the System Report:
## Transit Challenges and Opportunities

Key findings from the State of the System Report include:

- **Community Transit Network** (CTN) routes are among the most cost-effective and productive transit routes serving Boulder County, particularly those operating largely in Boulder.

- **Ridership is approaching a 10-year high**, even as service hours on local routes have fallen by 9% since 2003.

- **There is a growing gap in funding for transit** due to a 40% decline in purchasing power since 2002 and stagnant sales tax revenue over the past ten years.

- **The city's transportation demand management system works.** Surveys show that people with an Eco Pass are 4 to 7 times more likely to ride transit.

- **The in-commute is growing** due to high housing costs and limited availability of housing in Boulder combined with a strong and growing job base.

- **Planned development in East Boulder** offers significant opportunity for transit investment, including Boulder Junction, Boulder Community Health Foothills Campus, CU East Campus, and Gunbarrel.

- **Significant investments will be needed to develop an interconnected, multimodal street network in East Boulder** that enables safe and efficient access to transit for pedestrians and bicyclists.

- **Changing demographics are shaping transit needs**, including Millennials, Generation X, and aging Baby Boomers.

- **US 36 BRT is an opportunity to improve regional mobility.** The Northwest Area Mobility Study (NAMS) has prioritized three additional arterial BRT corridors connecting Boulder with surrounding communities.

- **Partnerships will be critical to accomplishing the Renewed Vision for Transit**, including Boulder County, RTD, CU, and others.

# Transit Scenario Analysis

The community input received during the Listening and Learning phase and the analysis in the State of the System report were used to develop future year transit system scenarios. These scenarios were evaluated using performance measures aligned with city goals. These results and further input from the community, transit TAC, Transportation Advisory Board, and City Council were used to develop a recommended Preferred Scenario for the Renewed Vision. Figure 1-2 provides an overview of the scenario analysis process (see steps #3 to #7).

A summary of the transit scenario analysis process is provided in Chapter 3. A full report on the analysis is included in Appendix B.

Figure 1-2      Process to Develop the Renewed Vision for Transit
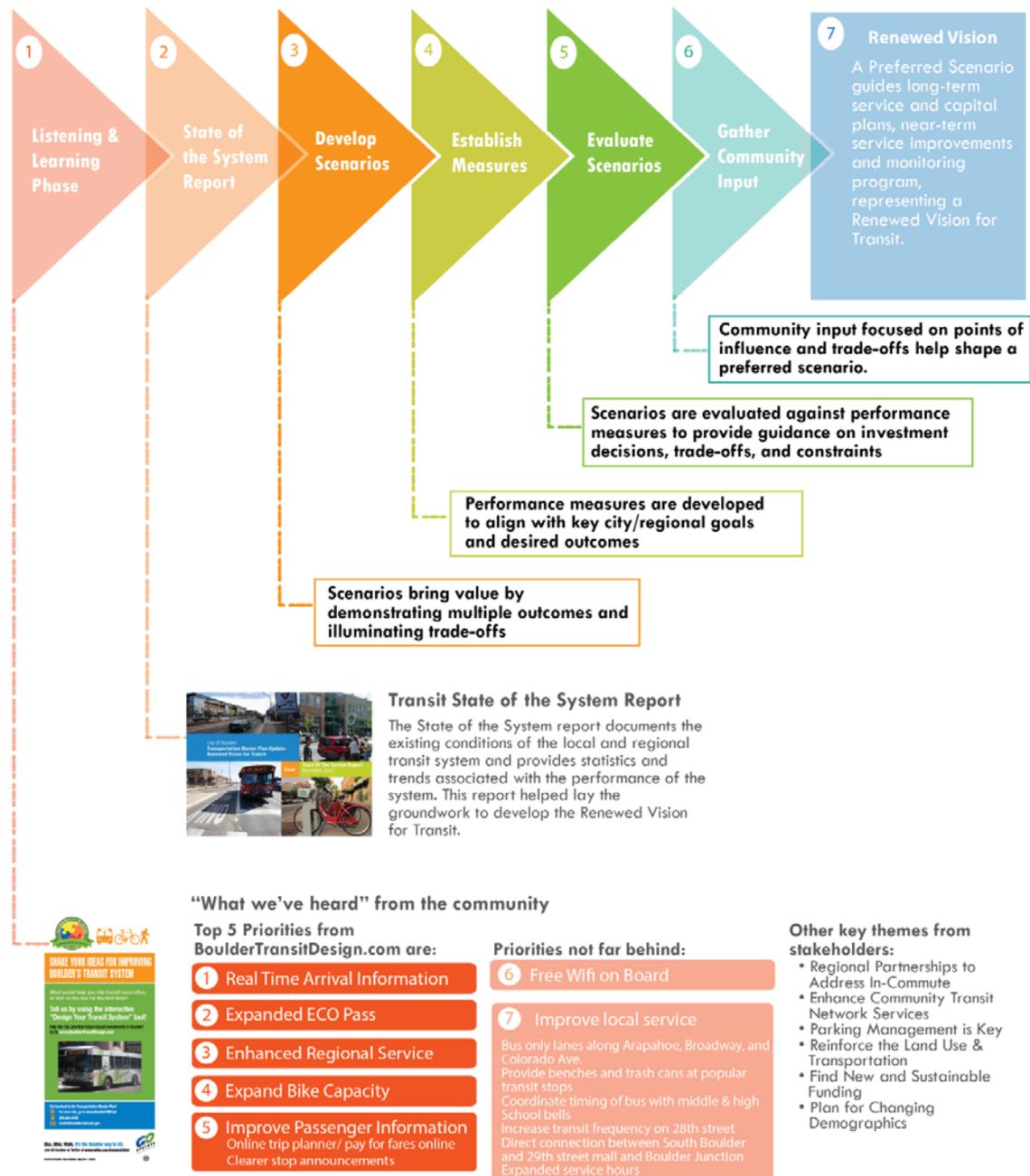
# 1.5 PLAN ORGANIZATION

The following five chapters of the TMP Transit Modal Plan are organized around the foundation of a "Complete Transit System" and four coordinated elements that describe how the Renewed Vision for Transit will work to build toward Boulder's transit and overall community goals.

## Chapter 2: Complete Transit System



Describes the vision for Boulder's transit system as four interrelated elements: (1) high-quality transit service, (2) coordination with land use (e.g., transit service quality and land use policies), (3) transit access and system connectivity, and (4) supportive demand management programs.

## Chapter 3: Transit Service Element
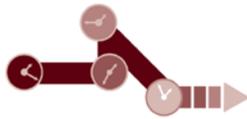


Describes the vision for transit service in Boulder and to/from surrounding communities. This chapter provides service design principles and describes different service types including the CTN and bus rapid transit (BRT).

## Chapter 4: Transit Capital Element



Defines capital elements of the Renewed Vision for Transit in Boulder, including transit corridors and facilities. This chapter describes priority corridors for developing BRT and the concept of Mobility Hubs for improving transit and multimodal connections.

## Chapter 5: Programs Element



Describes the programmatic elements of the Renewed Vision for Transit, including fare and transportation demand management programs and policies not included in either the service or capital elements.

## Chapter 6: Implementation Element



Describes how the Renewed Vision for Transit will be made a reality, including phasing and key partners.

# Appendices

**Appendix A:** [State of the System Report](). Provides a report on transit trends, conditions, and leading practices; a summary of key findings can be found earlier in this chapter.

**Appendix B:** [Transit Scenario Analysis](). Describes analysis of transit system scenarios for service and capital improvements in Boulder and surrounding communities.

**Appendix C:** [Immediate and Near Term Service Concepts and Options](). Provides additional detail to support implementation of immediate and near-term service elements.

**Appendix D:** [Fleet and GhG Scenario Analysis](). Describes an analysis of alternative transit fleet fuel/energy alternatives and their impact on reducing Boulder's greenhouse gas emissions.

**Appendix E:** [Transit Action Plan](). Provides Service, Capital, and Programs actions for implementing the Renewed Vision for Transit.

**Additional appendices available on the web:**

[TMP Summary of Community Outreach](). Summarizes the community outreach effort conducted as part of the current update of the TMP.

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# 2  THE COMPLETE TRANSIT SYSTEM

This chapter summarizes key elements of a Complete Transit System—one that emphasizes frequent service, fosters efficient and safe connections to transit, and supports existing and projected land uses.

## 2.1 WHY A COMPLETE TRANSIT SYSTEM?

The foundation of a Complete Transit System is high-quality transit service, coordination with land use (e.g., transit service quality and land use policies), and careful consideration and design of non-service elements (e.g., transit facilities, pedestrian and bicycle access, supportive programs, etc.). A Complete Transit System is the foundation  of the Boulder Transportation Master Plan and the Renewed Vision for Transit, making transit an attractive travel option for all residents and visitors.

High transit ridership and a much lower drive-alone rate than similarly-sized U.S. cities are the result of Boulder's commitment to and investment in its transit system over the last several decades. However, the City's aggressive goals to reduce single-occupant vehicle travel require a heightened commitment to creating a Complete Transit System. The Complete Transit System builds on Boulder's past success and strong commitment to continue to design and build a transit system that offers frequent, convenient, and accessible transit service throughout the city and to regional destinations.

Consistent with the overall TMP, the Transit Modal Plan will guide the City of Boulder in continuing to develop a Complete Transit System that:

- **Puts the passenger first.** Makes riding transit convenient and desirable for more people in the community, bringing additional people to transit for all types of trips.
- **Makes transit a convenient choice of travel.**
  - Removes barriers to access and mobility in and around Boulder.
  - Is responsive to the needs of all people, especially those for whom transit is a necessity such as older adults, youth, and people without reliable access to a car.
  - Is reliable, time-competitive with other modes, and provides mobility to a wide range of destinations.

The Complete Transit System supports community goals:

- **Environment**: reduces environmental impacts of personal mobility and improves livability
- **Economy**: fosters economic vitality by reducing automobile congestion and improving access to local businesses
- **Equity**: provides convenient and reliable mobility options for all people
- **Health**: supports health by building walkable, safe, and vibrant neighborhoods

- **Reduces the environmental impacts of travel.**
  - Helps meet Boulder's community goals of energy independence, environmental sustainability, and economic vitality.
  - Improves access and connectivity to transit.
- **Uses transit to build community**.
  - Creates great places adjacent to and accessible by transit, where modes connect to facilitate seamless integration of the pedestrian, bicycle, and transit network.
  - Provides transit facilities that support access to central community gathering places.
- **Improves transit service and ridership through regional partnerships.** Is coordinated and integrated with transit services and access in neighboring jurisdictions, improving access to transit and increasing regional transit ridership.

To develop the Complete Transit System, Boulder must prioritize and coordinate transit investments and set policies at a variety of scales. Boulder must make it easier and more desirable for people to take transit but also continue to coordinate transit service quality and access and connectivity with transportation demand management, land use policies, and community placemaking.

## 2.2 ELEMENTS OF A COMPLETE TRANSIT SYSTEM

A Complete Transit System thoughtfully integrates service design and investment, land use development and planning, placemaking, access and system connectivity, and supportive transportation demand management programs and infrastructure. The relationship between these elements is cyclical and interdependent as illustrated in Figure 2-1.

Figure 2-1    Complete Transit System Elements
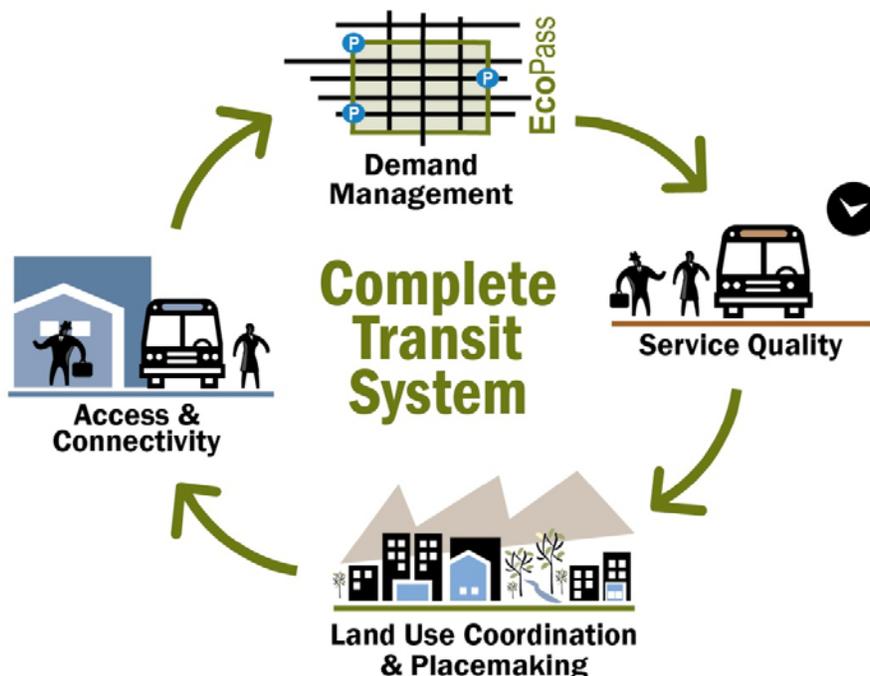
# 2.2.1 Transit Service Quality



Boulder has long been providing fast, reliable, and frequent service along its Community Transit Network (CTN) and has seen marked success in attracting ridership as a result of its investments. **Given the success of the CTN model, the Renewed Vision for Transit embraces a network of streets where transit service levels are aligned with the development, access, and mobility needs of the community.**

"Service quality" is defined as fast and reliable service that is safe, comfortable, and easy to use for all people, providing the greatest degree of mobility and access possible with the appropriate level of service. For transit to be successful, a strong network that allows access to a broad range of destinations and activities is needed. Key elements of transit service quality include:



The Community Transit Network provides high quality transit service with frequent service and buses that have large windows and perimeter seating to encourage rider interaction.
Image from Nelson\Nygaard

- Service design, service types, and vehicles
- Policies and investments related to management of street right-of-way (e.g., that provide priority to transit vehicles)
- Coordination of local and regional service

**The Renewed Vision for Transit prioritizes the following related to transit service quality:**

- Expansion of the Community Transit Network
- Arterial transit street management to provide priority to transit vehicles
- Enhanced connections between the University of Colorado campuses and the Boulder Junction and Table Mesa transit centers
- Enhanced service for older adults and persons with disabilities
- Implementation of arterial Bus Rapid Transit
- New transit centers and mobility hubs to provide high quality bus and multimodal connections.

More information on transit service quality can be found in Chapters 3 and 4.

## 2.2.2 Land Use and Placemaking

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.

Extensive industry research shows that the built environment—including the concentration (density) and mix of land uses, neighborhood form and transit accessibility, and overall transportation network connectivity—significantly impacts travel behavior and transit ridership. Compact development is also linked to positive externalities such as reduced greenhouse gas emissions and improved community health and livability.

The purpose of coordinating land use and transportation investments is to create and support great places. Transit service not only connects land uses, it can support placemaking through the creation of active public spaces at transit stops.

> **The Renewed Vision for Transit includes strategies to align transit investments with land use, particularly in areas where growth is expected.** This synergy allows transit to serve more trips and reduces dependence on single-occupant vehicle travel.

More information on land use and placemaking can be found in Chapter 5.

## 2.2.3 Access and System Connectivity



Boulder has a tradition of developing Complete Streets that link major activity, employment, and commercial centers. A focus of the Transportation Master Plan is to broaden the reach and appeal of walking and biking options. **The Renewed Vision for Transit emphasizes the importance of providing safe and convenient pedestrian and bicycle access to transit and enabling seamless transit system connectivity.**

Integration of walking, biking, and transit environments creates a fast, convenient, and easily-navigable transit network from the first to the last mile of a trip. Enhancing system connectivity is an important part of making transit accessible. A well-connected system brings people near the locations they wish to access and ensures a comfortable and safe walk to the places they wish to go.

At transfer and station locations, the Renewed Vision for Transit prioritizes legible wayfinding and clearly marked infrastructure. High-quality bicycle parking and connections to bicycle sharing are prioritized at major transit stops. Multimodal trip planning applications provide information about a range of travel options and reduce time spent waiting for the bus.



The Complete Transit System supports the mobility of even the most vulnerable users by improving access to/from transit facilities.
Image from Nelson\Nygaard

The Renewed Vision for Transit prioritizes bicycle and pedestrian access improvements to support transit investments including increasing the bike capacity on transit and supporting first-last mile connections in growing employment areas like Gunbarrel.

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**The Renewed Vision for Transit prioritizes the following related to access and system connectivity:**

- Legible wayfinding at transit centers and major transfer locations.
- High-quality bicycle parking and connections at major transit stops.
- Multimodal trip planning applications to provide information about a range of travel options.
- Bicycle and pedestrian access improvements to support transit investments.

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More information on access and system connectivity can be found in Chapters 3, 4, and 5.

## 2.2.4 Supportive Programs and Infrastructure

Boulder is nationally-known for its innovative and effective transportation demand management (TDM) programs. From the EcoPass to managed parking, TDM programs have significantly influenced travel behavior in Boulder. Transit-supportive programs and infrastructure leverage the value of the existing transit system and service and capital improvements identified in the TMP, helping Boulder achieve its community mode share goals.

**The Renewed Vision for Transit prioritizes the following transit-supportive programs and infrastructure:**

- Incentives for riding transit, such as expanding access to the EcoPass program.
- Transit-supportive infrastructure, including pedestrian and bicycle infrastructure to allow people to safely and conveniently access transit facilities.
- Real-time transit information to reduce time spent waiting for the bus.
- Transit-bicycle integration to enable bikes to serve more first-last mile connections on either or both ends of a transit trip.
- Transit education and encouragement programs targeting new local and regional transit riders.
- Public information campaigns to highlight the community and individual benefits of transit.

More information on supportive programs and infrastructure can be found in Chapter 5.

# 3  SERVICE ELEMENT

## 3.1 INTRODUCTION

This chapter describes the service elements of the Renewed Vision for Transit in Boulder and surrounding communities. This vision includes the future expansion of CTN service to build-out a high-frequency grid within Boulder and Bus Rapid Transit (BRT) service that will provide fast service and high-quality amenities on the major corridors connecting Boulder and neighboring communities. In the near-term it includes implementation of US 36 BRT and related local service changes in coordination with opening of the Boulder Junction Transit Center, serving East Boulder.

## 3.2 SERVICE DESIGN PRINCIPLES

The Renewed Vision for Transit must embrace a new forward-thinking framework to achieve the goals envisioned within the Transportation Master Plan. The framework, presented in this section, consists of a set of ten service design principles around which the Renewed Vision has been constructed. These principles are not intended to be policies, but rather broad, unchanging service design concepts that provide the foundation for decision-makers, staff, and partners to use in shaping policies and strategies around transit service delivery.

## 1. Pedestrian Access and Mobility

**The Community Transit Network extends the range of the pedestrian.** Most studies show that people are comfortable walking a quarter-mile for most activities. As the number of destinations located within a mile distance increases, people are likely to increase the proportion of trips executed by walking. Beyond one-half mile to a mile, most persons will prefer other modes. Rather than competing with short walking trips, transit can support greater mobility without dependence on the private automobile. In particular, the CTN's emphasis on all-day, two-way connectivity with frequent service levels supports the pedestrian's mobility for trips beyond a comfortable walking range.

## 2. High-Frequency Service (CTN) Coverage and Connectivity

**Focus high quality service in well-defined corridors.** Even when it may mean increased access distance and a need to transfer, focusing service in high-quality frequent corridors provides the most attractive overall service. In Boulder this is easily demonstrated by the CTN. Although there are only a few CTN routes, the principle of high-quality service focused on singular corridors allows those routes to accommodate the vast majority of transit riders in Boulder very effectively.

The CTN should attempt to serve the greatest number of people possible and the greatest number of destinations possible within the community. This principle is the transit element of the TMP's 15-minute neighborhood goal—to increase the number of neighborhoods that have 15-minute walking access to grocery stores and other services and amenities. Serving broad geographic coverage and a broad array of transportation needs is an important goal for transit as a mode. Today the CTN does not serve all of Boulder. The goal of the Renewed Vision for Transit is for access to frequent transit service, i.e., the CTN, to be ubiquitous.

The CTN should connect Boulder's centers of activity, population, and jobs as much as possible. A key role for the CTN is to connect Boulder's activity centers, particularly those most amenable to pedestrian activity. The interaction between two such locations is positively associated with the amount of activity, but declines with increasing distance (or time) between them. The CTN contributes to desired community outcomes by reducing this distance and/or time. At the same time routes also need to serve well-defined markets and avoid overlap and duplication.

# 3. Strong Anchors

Routes should be designed with anchors in activity centers with healthy mixes of employment and housing. Routes should be anchored in activity centers, ideally with a mix of jobs and housing. As much as possible, routes should not end in low-density environments. Without strong anchors a bus will be chronically empty at the end of the route which creates less effective use of transit resources.

# 4. Service Hierarchy

Different types of routes will more successfully serve different markets. A strong transit network set in a regional context will be made up of several types of service, each specifically tailored to the needs of particular markets. The Renewed Vision for Transit includes different types of fixed-route service as well as more specialized services to meet specific needs, such as transportation for people with disabilities or older adults. These types include:

- **Rapid Service Routes.** "Premium" service routes connect regional centers (Denver, Longmont, Louisville, Lafayette, etc.) with fast and frequent service. These routes could be served by several suitable modes, but the Renewed Vision is focused on developing BRT routes on highways and major arterials.
- **Community Transit Network Routes.** These routes provide high-frequency "line-haul" service in high-ridership corridors and also provide local circulation where the activity center is very large, like CU Main Campus, downtown Boulder, and the 29th Street Mall; an example would be the HOP.
- **Local Service Network.** These routes provide access in lower-density areas where the street network does not exist to support CTN service or where land use patterns cannot support more frequent service in a productive manner.
- **Commuter Services.** These services are suitable for long-haul trips that are focused on work trips, typically in peak hours.

- ▪ **Express Corridor Service.** This service often develops from a commuter service where the activity level at both of the route is significant all day, not just at peak traffic times. The "B," "AB," and BOLT are examples of express corridors service.

## 5. Keep it Simple

**Simplicity equals understandability.** A simple route structure and simple schedules will attract more riders than a complex system. First and foremost, for people to use transit, they must be able to understand it, and simpler services are easier for riders to understand. Simpler systems help get people where they want to go, when they want to go with less frustration and problems. Transit systems with simpler route structures can more quickly attract new riders, and are also better able to attract casual riders. In contrast, as stated in a Transportation Research Board report,[1] systems with more complex route structures "put off riders with only a moderate inclination to try transit."

**Routes should operate along a direct path.** The fewer directional changes a route makes, the easier it is to understand. Conversely, circuitous alignments are disorienting and difficult to remember. Routes should not deviate from the most direct alignment unless there is a compelling reason. This principle applies in a different way for circulator-type services, e.g., the HOP. Even though they are designed to facilitate shorter trips between many activity centers, circulators should avoid routes that feature off-direction travel, interlocking loops, or "parking lot" operations.

**Service levels should be set based on service standards.** Using established design and service standards ensures the transit network is more usable for customers. Service standards can help to ensure that the appropriate amount of service is provided on each route and that customers know what to expect from the system. For example, service standards should be set to determine minimum levels of service in terms of the number of trips, service frequencies, and/or passenger loading and span of service.

**Service and schedules should be based on repeating patterns.** People can easily remember repeating patterns but have difficulty remembering irregular sequences. For this reason, routes that operate along consistent alignments and at regular headways are more attractive than those that don't.

**Services should be well-coordinated.** Where different routes connect or operate along the same alignment, schedules should be coordinated to the greatest extent possible to provide short connection times and to operate service at even intervals. This will make service more convenient and reduce overcrowding.

## 6. Speed versus Access

**Routes should be designed for the specific speed and access needs of the areas/populations they serve.** While people may prefer the fastest way between two points, point-to-point (non-stop) transit service is not feasible at a scale that would match the mobility provided by the automobile, or even the bicycle. Adding more access (i.e., pick-ups and drop-offs) can increase convenience to some riders, but can decrease speed and make a service less attractive to other riders, meaning they may avoid the service and reduce its

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[1] Transit Cooperative Research Program (TCRP) Report 95, Traveler Response to Transportation System Changes.

effectiveness. The number and spacing of transit stops must be balanced and should be directly related to the intended speed and market of the service.

## 7. Cost-Effectiveness

**Prioritize new transit service investments where demand is highest** to maximize efficiency and serve the most riders.

**Maintain services that have been given high priority by the community**, e.g., based on public and rider input.

**Explore lower-cost mobility options**, e.g., ridesharing, volunteer driver programs, etc., where transit is not the most cost-effective mobility option and these alternatives are both appropriate and/or more cost-effective.

## 8. Integration

**Transit services should integrate and provide connections with other modes and transport services.** The most critical mode with which transit should be integrated is the pedestrian (walking) mode. Integration between transit services (e.g., local, regional, interregional, etc.) and with other modes (bicycling, car share, park and ride, etc.) is important to expand transit's customer base and geographic reach.

**Transit services should be integrated with land use.** Transit-intensive land uses that locate away from transit create demand to provide service where it cannot be done efficiently. Integrating transit and land use planning helps ensure that planned and future development meets transit service access needs and promotes siting new transit-dependent land uses, such as social service offices and community institutions, in central, easy-to-serve locations.

## 9. Partnerships

**Effective partnerships optimize Boulder's investments in local and regional transit service and facilities and help meet local and regional community goals.** Key objectives include aligning transportation and land use goals across jurisdictions, joining to fund expanded regional service and amenities that attract more regional riders, and creating an integrated, passenger-first regional transit system. Key partnerships are identified in Chapter 6.

## 10. Permanence

**CTN and BRT services feature permanence of investments.** Regardless of mode, high-quality services in Boulder should express to the customer that they will be available in the future—through wayfinding, tactile enhancements at stations, architectural features, branding, and/or alignments. This permanence and definitiveness is also critical in focusing development activity and encouraging transit-intensive land uses and new growth to locate around high-quality transit corridors and facilities.

# 3.3 PROCESS FOR DEVELOPING SERVICE ELEMENT: TRANSIT SCENARIO ANALYSIS

The Renewed Vision for Transit was grounded in an extensive analysis of transit system scenarios for service and capital improvements in Boulder and surrounding communities. See Appendix B (Transit Scenario Analysis) for more information. An iterative scenario evaluation process provided the opportunity to test various levels and types of future transit investment under projected 2035 land use conditions. Figure 3-1 below illustrates the analysis process and how it helped obtain input from the community and led to the Renewed Vision for Transit.

Figure 3-1      Transit Scenario Analysis Process



**① Develop Scenarios**

Scenarios bring value by demonstrating multiple outcomes and illuminating tradeoffs

**② Establish Measures**

Performance measures are developed to align with key City/Regional goals and desired outcomes

**③ Evaluate Scenarios**

Scenarios are evaluated against performance measures to provide guidance on investment decisions, tradeoffs, and constraints

**④ Gather Community Input**

Community input focused on points of influence and tradeoffs shapes Renewed Vision for Transit

**⑤ Renewed Vision**

A Preferred Scenario guides long-term service and capital plans, near-term service improvements, and monitoring program

## Scenarios

Three 2035 transit investment scenarios were developed and evaluated along with a 2035 baseline scenario. The scenarios tested different approaches to transit investment. Figure 3-2 shows the four evaluation "accounts" and supporting measures that are tied to Boulder's Sustainability Framework and were used to evaluate the scenarios. These metrics helped city staff, the Transit Technical Advisory Committee, and the Transportation Advisory Board assess tradeoffs between the scenarios and distill elements of the three transit scenarios into the preferred transit vision described in this chapter.

The scenarios were designed to provide different approaches and levels of investment in the following areas:

- Markets served (e.g., focus on Boulder local market, focus on regional in-commute market)
- Level of service investment

- Service types (e.g., expansion of CTN high-frequency grid, addition of commuter express service, etc.)
- Level and type of capital investment

Figure 3-3 illustrates distinguishing features of the three scenarios.

## Evaluation Measures

The scenario evaluation included a number of common measures for assessing transit performance, including ridership, productivity, cost effectiveness, travel time performance, and reliability. The scenario evaluation measures also addressed broader community goals consistent with Boulder's Sustainability Framework. The process for developing the scenario evaluation framework was to:

1. Start with the Sustainability Framework, packaging its core principles into four evaluation accounts that are affected by transit: Community, Environment, Economy, and Efficiency.

2. Develop performance measures that were meaningful and measurable under each of these accounts.

3. Narrow the list of measures to reduce overlap between data sources and ensure those remaining best informed questions that the community, stakeholders, TAC members, and TAB want to answer.

Figure 3-2 identifies the evaluation accounts and provides examples of the measures included. The scenarios were evaluated against each performance measure to illustrate how well they met broad community goals.

Figure 3-2    Transit Scenario Evaluation Accounts and Measures



Transit Modal Plan Appendix B describes results of the Transit Scenario Analysis in more detail.

Figure 3-3    Distinguishing Features of 2035 Transit Scenarios



**Scenario 1:**
**Local and Regional Service**

**Scenario 2:**
**Local CTN Buildout**

**Scenario 3:**
**Rapid Transit/BRT**

Scenario 1 emphasized investment in very frequent (CTN) service on the most productive corridors in the city of Boulder and on regional connections to/from Boulder.

Scenario 2 emphasized building out the local CTN on all corridors in Boulder that were believed to have supportive land use attributes in the plan out-year (2035), including corridor speed and reliability capital investments.

Scenario 3 emphasized heavy capital development for Rapid and Enhanced Bus. It had a more modest level of local and regional service investment, but still a significant increase over current conditions.

**Service Type**

| | |
|---|---|
| Rapid Transit | |
| Enhanced Bus | |
| Local -- CTN + | |
| Local -- CTN | |
| Local | |
| Commuter Express | |
| Express Corridor | |
| Existing/Other Proposed | |

**Infrastructure Investments**

Existing / Funded Capital Investments

Existing / Funded Transit Hub

Future Transit Hub

*Note: Maps include only representative elements to illustrate the investment focus of each scenario.*

# 3.4 PREFERRED SERVICE ELEMENT OF THE RENEWED VISION FOR TRANSIT

## 3.4.1 Overview of Existing and Future Transit Services

The Regional Transit District (RTD) classifies its routes into categories including "Local" and "Regional" services. For Boulder, the routes RTD designates as local currently include:

- Seven named transit routes (e.g., HOP, SKIP, JUMP, BOUND, etc.) that are designated as part of Boulder's high-frequency Community Transit Network (see sidebar below)
- Six additional numbered routes (e.g., 204, 205, etc.)

RTD also operates regional routes designated with letters, such as the B series (Boulder-Denver) and J (Boulder-Longmont).

Figure 3-4 illustrates the existing routes serving Boulder. The solid blue lines in Figure 3-4 represent CTN routes. These routes extend to north and south Boulder, Gunbarrel, and several neighboring communities, but are concentrated in central Boulder. The gold lines represent the numbered local routes and the lettered regional routes.

This chapter describes these services in more detail along with the long-term vision for service in the Renewed Vision for Transit. The vision will be realized through incremental service improvements. In some cases, the improvements will be timed with major development or infrastructure projects; in other cases they will respond to land use changes (i.e., population and employment growth) that create sufficient demand to support frequent transit service. They will also be contingent on the availability of funding. Chapter 6 provides a more detailed roadmap for implementing future services.

## Development of the Community Transit Network

Boulder's Community Transit Network (CTN) has helped the city and RTD provide transit service that has broad appeal and high levels of ridership. The CTN originated with the HOP route in 1994 and now includes seven bus routes, which are among the most cost-effective and productive transit routes in Boulder County. Current CTN routes are the HOP, SKIP, JUMP, BOUND, STAMPEDE, DASH, and BOLT. Key CTN design principles include:

- Frequent service (every 10 minutes) so that no schedule is needed
- Community-oriented buses with large windows and unique branding
- Perimeter seating to encourage social interaction

The Renewed Vision for Transit includes expansion of the CTN to additional corridors in Boulder.

Figure 3-4    Boulder Existing and Future Transit Corridors

# 3.4.2 Boulder Service Types

The Renewed Vision for Transit includes both locally and regional-focused service but primarily defines service types that communicate the service quality, operating characteristics, and/or purpose of each service. These include:

- Boulder's **Community Transit Network** provides high-frequency, locally-focused transit service with broad appeal and high levels of ridership. The Renewed Vision for Transit includes expansion of the CTN to develop a grid of high-frequency service in Boulder. The dashed blue lines in Figure 3-4 identify the streets where this expansion is envisioned to occur incrementally over a 20-year horizon.



Branded HOP bus serving the CTN.

Image from Nelson\Nygaard

- **Rapid Transit or Bus Rapid Transit (BRT)** is a future service type illustrated with red lines in Figure 3-4, serving major regional corridors or other significant transit streets in Boulder. Planned BRT routes include US 36 BRT, scheduled to open in 2016. The sidebar on page 3-19 describes the Rapid Transit concept and the prioritization of these corridors through the RTD Northwest Area Mobility Study (NAMS) process that occurred concurrently with the TMP. Two of the top three NAMS corridors, SH-119 (#1) and SH-7 (#3) terminate in Boulder. South Boulder Road is also identified as a future BRT corridor. Although the BRT corridors are regionally-focused, they create the potential for community-oriented Rapid Transit within Boulder. As described in the sidebar, BRT service is characterized by higher levels of capital investment in transit priority, distinctive vehicles, stop amenities, off-board fare payment systems, longer spacing between stops, and other features and amenities.



MAX BRT vehicle in Fort Collins.

Image from City of Fort Collins



Branded motor coach used on BOLT CTN route. The SH 119 corridor (Diagonal) served by the BOLT is an identified Rapid Transit corridors.

Image from Flickr, BeyondDC

- **Commuter Service** describes primarily longer-distance regional services targeted at commuters. This may include "Commuter Express" routes focused on peak-only service (similar to current commuter-oriented services in Boulder) or "Express Service" routes that provide frequent all-day service. Commuter services may deviate to serve major



Standard RTD motor coach used on commuter routes.

Image from Flickr, Matt' Johnson

employment centers and/or may be coordinated with "First-Last Mile Services," including shuttles or other local transit services that carry passengers to their final destination (see sidebar on next page). "Interregional Service" connecting different regional centers can be considered a variation of the commuter service type.

▪ **Other Local Services.** Local fixed-route services complete the Boulder transit network and connect to high-frequency CTN and future Rapid Transit services. Some non-CTN local fixed-routes are envisioned to become part of the CTN as shown in Figure 3-4 while others are likely to be maintained as standard local routes in the future—depending on the ability of future land use to support a higher level of transit service, e.g., meet minimum thresholds for productivity



Local fixed-route buses such as the 205 route serve Boulder and neighboring communities.
Image from City of Boulder

(riders per service hour). Other local circulation services may be more efficient options for serving parts of Boulder, including services similar to the "Call-n-Rides" that RTD operates in about 20 communities throughout the region. (See sidebar below.)

## RTD Call-n-Ride Service Model

The RTD Call-n-Ride service model ranges from fully demand-responsive service to specified routes with some scheduled stops. On these "flex-route" services, riders can be picked up/dropped off at regularly scheduled timed checkpoints without calling in advance or can make advance reservations (at least two hours and up to 2 weeks before the desired time) to be picked up/dropped off anywhere within the Call-n-Ride service area. Riders can reserve a trip by leaving a message on the driver's cell phone or make reservations on the web.

RTD's service standards specify Call-n-Ride areas to be between 4 and 10 square miles with population densities of 2 to 4 persons per acre and 1 to 3 employees per acre. Call-n-Ride services typically range from about 3 (minimum standard) to 10 daily boardings per revenue hour.



Mini bus used on RTD Call-n-Ride services.
Image from Flickr, Paul Kimo McGregor

# First-Last Mile Strategies

A "trip" is a journey from an origin to a destination. A transit trip most often involves a walking, biking, or other trip on one or both ends in addition to the transit portion of the trip. To help more people comfortably, conveniently, and safely access transit, first-last mile strategies address gaps in the transit-supportive transportation system.

First-last mile access strategies connect people to transit by modes other than driving alone, including walking, biking, car sharing, and shuttles.

- Bicycle sharing programs with bike share stations at major transit stops encourage people to make multimodal trips without bringing a bicycle on-board.

- Safe and secure bicycle parking at transit stops and stations helps riders who only need their bike on one end of their trip and preserves relatively limited on-board capacity.

- Installing higher-capacity bicycle racks on transit vehicles where warranted, including higher-capacity front racks, on-board storage, and/or rear storage increases transit's ability to accommodate passengers with bikes.

- Complete pedestrian connections to the transit stop or station is an essential first-last mile strategy; this includes sidewalks in good condition that are wide enough for two people to walk side by side, curb ramps that meet ADA standards, well-lit facilities, well-marked crossings, and other safety improvements.

- Legible multimodal wayfinding makes finding transit and end destinations easier. Wayfinding, including signage, maps, and/or information kiosks, should guide people to the transit stop/station, available intermodal connections available, and orient people to local destinations. Including walking and bicycling times helps overcome perceived time and distance barriers.

- Shuttle services can provide last-mile connections to and within employment or institutional campuses, often from a BRT or rail station. These services may be operated through public-private partnerships. Reduced parking requirements can be one way to incentivize employers to contribute to such services.

- Car sharing services like the current eGo Car Share allow users to drive to and from transit without making an entire trip by car. While eGo requires pickup and drop-offs at fixed-locations, services like Car2Go, available in Denver, allow vehicles to be dropped off at any destination within the service area. Services such as Uber match riders to drivers using a mobile application.

- Future mobility applications will enable trip planning over a range of travel options, including "closed network" ridesharing within social groups with personal connections or relationships.

All strategies benefit from good maintenance, provision of safe crossing opportunities, and universal accessibility that ensures transit is accessible to individuals both walking and rolling.



Bicycle racks and lockers located at a transit station in San Mateo, CA
Image from City of San Mateo



Pedestrian access to transit is supported in many parts of Boulder through surface treatments like raised crossings and wider sidewalks.
Image from Nelson\Nygaard



Wayfinding near the Pleasant Hill BART station in the San Francisco Bay Area guides users along multi-use trails to bicycle parking and the transit station.
Image from Nelson\Nygaard



In Irvine (Southern California), the iShuttle connects to MetroLink commuter rail; Cash fare is $1.00 or free with a MetroLink or OCTA pass.
Image from octa.net



Car2Go shared vehicle
Image from Flickr user Atomic Taco

# 3.4.3 Service Design Policy

Figure 3-5 identifies service standards for each of the major transit service types described in the previous section. These are City of Boulder standards that define the desired service span[2] and service headway[3] for each type of service in the Renewed Vision for Transit. These standards are general guidelines for each type of service but are typically customized to the individual characteristics of a route. Routes operated by RTD need to meet RTD performance standards and the ability to increase service levels must be based on available funding and bus fleet availability.

In Boulder, many existing CTN routes do not currently meet the desired service standards for CTN service. The City of Boulder already provides funds to RTD to increase the level of service provided on some routes. The Renewed Vision for Transit identifies improving the service span and/or headway on CTN routes as a priority for the City of Boulder based on passenger demand and capacity needs of individual routes. Chapter 6 provides investment principles for the city's transit funds.

Figure 3-5     Service Design Policy

| Service Type | Span of Service | | | Service Headway (Frequency) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Weekday | Saturday | Sunday | Weekday | | | Saturday | | Sunday | |
| | | | | Peak | Mid | Eve | Day | Eve | Day | Eve |
| Bus Rapid Transit (BRT) | 5 AM - midnight | 6 AM - midnight | 6 AM - midnight | 7 | 10 | 15 | 10 | 15 | 10 | 15 |
| Local - CTN | 5 AM - midnight | 7 AM - midnight | 7 AM - midnight | 10 § | 15 § | 30 | 15 § | 30 § | 15 § | 30 § |
| Local | 6 AM - midnight | 7 AM - midnight | 8 AM - 10 PM | 15-30 | 30 | 30 | 30 | 30 | 30 | 30 |
| Commuter Express | 5 AM - 7 PM | N/A | N/A | 10+ | N/A | N/A | N/A | N/A | N/A | N/A |
| Express Corridor | 5 AM - midnight | 6 AM - midnight | 6 AM - midnight | 15+ | 15+ | 30+ | 15+ | 30+ | 15+ | 30+ |

§ May operate more frequently based on demand.  If maximum passenger load per trip in one direction is greater than 100% of capacity, frequency is increased to reduce load.

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[2] Service span is number of daily hours over which a route operates.

[3] Headway is the time interval between consecutive buses arriving at a particular stop along a route (in the same direction).

# 3.4.4 Renewed Transit Vision

Figure 3-7 illustrates the long-term Renewed Vision for Transit. It is emphasized that this map is a conceptual depiction of the vision.  The map is not to scale and is intended to illustrate the major elements of the Renewed Vision for Transit. As such it does not include all current services or identify specific routes; Figure 3-4 (page 3-9 above) shows the existing network including current routes and future Rapid Transit and CTN corridors. The following sections describe major service elements of the Renewed Vision for Transit. In addition to working with its transit partners to implement new or modified services and capital infrastructure, the City of Boulder would provide funding to help increase the span and/or frequency of service, prioritizing CTN and Rapid Transit services and routes with identified capacity constraints.

## Bus Rapid Transit

Bus Rapid Transit will provide fast service and high-quality amenities on the major corridors connecting Boulder and other communities, as shown in the Renewed Transit Vision map. These regional connections provide an opportunity to attract more of the growing number of workers commuting to Boulder from outside the city, 80% of whom currently drive alone, to use transit.

- **US 36 BRT** is scheduled to open in early 2016, with BRT trips serving the Downtown Boulder Transit Center or the new Boulder Junction Transit Center in East Boulder. Key actions for the City of Boulder include to:
  - Work with RTD and other partners to ensure a minimum of 15-minute peak and 30-minute off-peak service to Boulder Junction with no reduction in service to Downtown Boulder.
  - Partner with RTD to redesign local service to serve Boulder Junction and carry passengers to/ from other destinations in the city (see CTN and Commuter-Oriented Services sections below).
  - Design and implement transit wayfinding signage at Boulder Junction. The Boulder Junction transit facility is located underground and therefore only routes terminating and laying over at Boulder Junction will stop at the facility; other routes will stop at the street-level. Transit wayfinding signage will ensure legible transfers between routes.
- **NAMS Regional Arterial BRT Corridors.** SH-119 (Diagonal), SH-7 (Arapahoe), and South Boulder Road are corridors prioritized for "regional arterial BRT" service through the RTD Northwest Area Mobility Study (NAMS) initiative (see sidebar on page 3-19), which studied the feasibility of new BRT service along major corridors in the  northwest region of RTD service area. The City will have an important role in defining the level of transit priority and travel speed provided and the physical design of the BRT running way and stations.
- **Local BRT Corridors.** As shown in the Renewed Transit Vision map (see Figure 3-7), Broadway Street, Canyon Blvd., Arapahoe Avenue, 28th Street and South Boulder Road are the recommended local segments for the NAMS/BRT corridors. BRT improvements on these streets would provide speed and reliability benefits for CTN and other local services on these corridors, which may operate with shorter stop spacing than BRT. Bus Rapid Transit services on these corridors may allow existing

transit routes to be adapted to provide CTN or local service on streets where transit does not currently operate.

## Community Transit Network and Supporting Local Service Network

CTN routes are the most cost effective and productive routes in the Boulder system (see Appendix A: State of the System Report). The Renewed Vision for Transit includes future expansion of CTN service in Boulder that will build-out a high-frequency local service grid within Boulder that enables fast, convenient transfers between routes and puts CTN service within reach of more residents and jobs. The solid blue lines in the Renewed Transit Vision map in Figure 3-7 illustrate both current and future CTN corridors. The expansion would be realized through a combination of changes to the existing named routes serving the CTN, changes to numbered local service routes, and introduction of new routes. At full buildout, it is envisioned that there will be seven new CTN routes, including 2 new routes and 5 existing routes upgraded to CTN service levels. The major building blocks of the long-term expanded CTN are described below. Chapter 6: Implementation provides additional details on phasing.

- **US 36 BRT and the Boulder Junction Transit Center.** Key local routes operating within a half-mile of Boulder Junction are the HOP, BOUND, 205, 206, and 208 (see Figure 3-6). The long-term Transit Vision includes changes to some of these routes to provide a stop in proximity to Boulder Junction; some of these changes are dependent on completion of new street connections through Boulder Junction. In addition, the city will work with RTD and other key stakeholders to refine the "immediate" service changes needed to accommodate the opening of Boulder Junction and implementation of BRT in early 2016.

Figure 3-6    Boulder Junction Existing Transit Network and Walk Shed
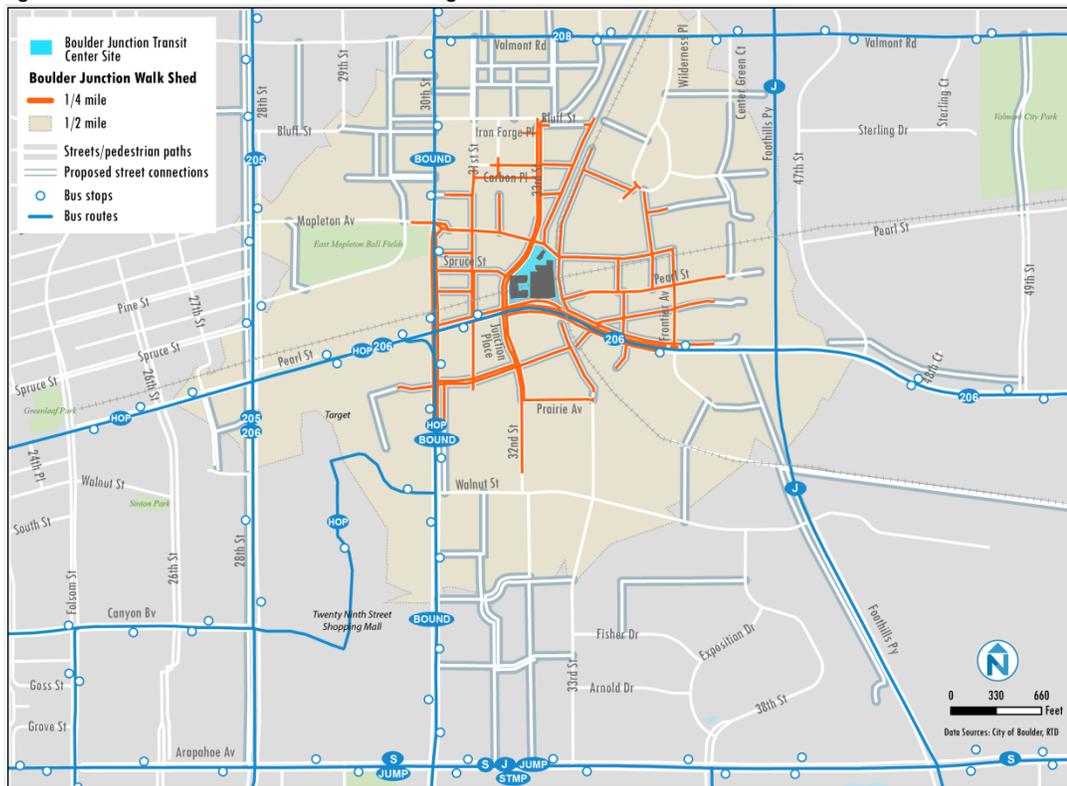
- **Development of CTN Grid in East Boulder.** East of Boulder Junction, the Transit Vision includes CTN-level service on Valmont Road and Pearl Pkwy to 55th Street, and on 55th Street south to East Boulder Community Center. This includes a currently unserved segment between Arapahoe Avenue and Baseline Road.

- **Balsam-Edgewood-Valmont CTN Service.** With future BRT service on Canyon Blvd., existing local service on Canyon already duplicated by the BOLT could be re-routed to build-out CTN service on Balsam Avenue, Edgewood Drive, and Valmont Road between Broadway and Boulder Junction.

- **University of Colorado Main and East Campus Connectivity.** The Renewed Vision for Transit includes various service elements to increase transit capacity to and between the CU campuses. These include:
  - Increased service on the STAMPEDE, including a potential "short" version of the route.
  - A connection between CU East Campus and Table Mesa TC using Foothills Parkway.
  - A US 36 BRT station serving Williams Village (see Capital Element – Chapter 4).
  - Development of a Central-East Circulator (see below).

- **Central–East Circulator.** Modeled on the HOP route, the Transit Vision includes a new high-frequency HOP-like circulator service connecting Boulder Junction, the CU Main and East Campuses, the new CU Housing area just north of Boulder Creek and along Folsom, and Williams Village. This service depends on constructing new street connections through the CU East Campus, between Arapahoe Avenue and Pearl Parkway, and a new bridge over Boulder Creek. Ridership projections indicate this route has the potential to be very successful.

- **North Boulder TC and Development of CTN Grid in North Boulder**. A new transit center in north Boulder will improve connections between regional and local services. The Renewed Vision for Transit identifies extension of CTN service on 28th to provide additional high-frequency local service options. It also includes upgrading service on Iris Avenue to CTN-level and introducing a new CTN route connecting North Boulder to the CU Main Campus using 26th and Folsom Streets.

- **Gunbarrel Service Enhancements.** The Transit Vision includes BRT service to Gunbarrel (BOLT CTN route) and enhanced commuter services (see next section). First- and last-mile connections, e.g., shuttle services, would provide access to/from these services. Extending CTN service to Gunbarrel is also part of the long-term transit vision. With introduction of BRT on SH 119 and Canyon Blvd., local service from Gunbarrel could be re-routed to serve Table Mesa TC and provide CTN service on the central and southern portions of 28th Street.

## Commuter-Oriented Services

### Denver to Boulder

RTD's current operating plans for the US 36 BRT service would integrate some existing commuter express routes between Boulder and Denver. The S commuter express route serving Arapahoe east of 28th Street and 55th Street to Flatiron Business Park would be maintained but re-routed to terminate at Boulder Junction.

### Boulder-Gunbarrel/Longmont

The J Commuter Express route serves the CU East Campus and Table Mesa Shopping Center. It could be modified to serve Boulder Junction. The long-term Transit Vision includes upgrading the J to all-day service (see Express Corridor service type) and implementing new Commuter Express routes serving Gunbarrel, including IBM and other Gunbarrel-area employers. These new routes would fill in gaps in service following implemention of BRT on the Diagonal and would be coordinated with first-last mile services between employment and/or residential areas.

## Interregional Services

The FLEX service currently provides interregional service between Fort Collins and Longmont provided by Transfort. The Renewed Vision for Transit includes extending this interregional service to Boulder.

Appendix C provides additional detail to support implementation of immediate and near-term service elements.

Figure 3-7    Boulder Renewed Transit Vision: Schematic of Priority Transit Corridors
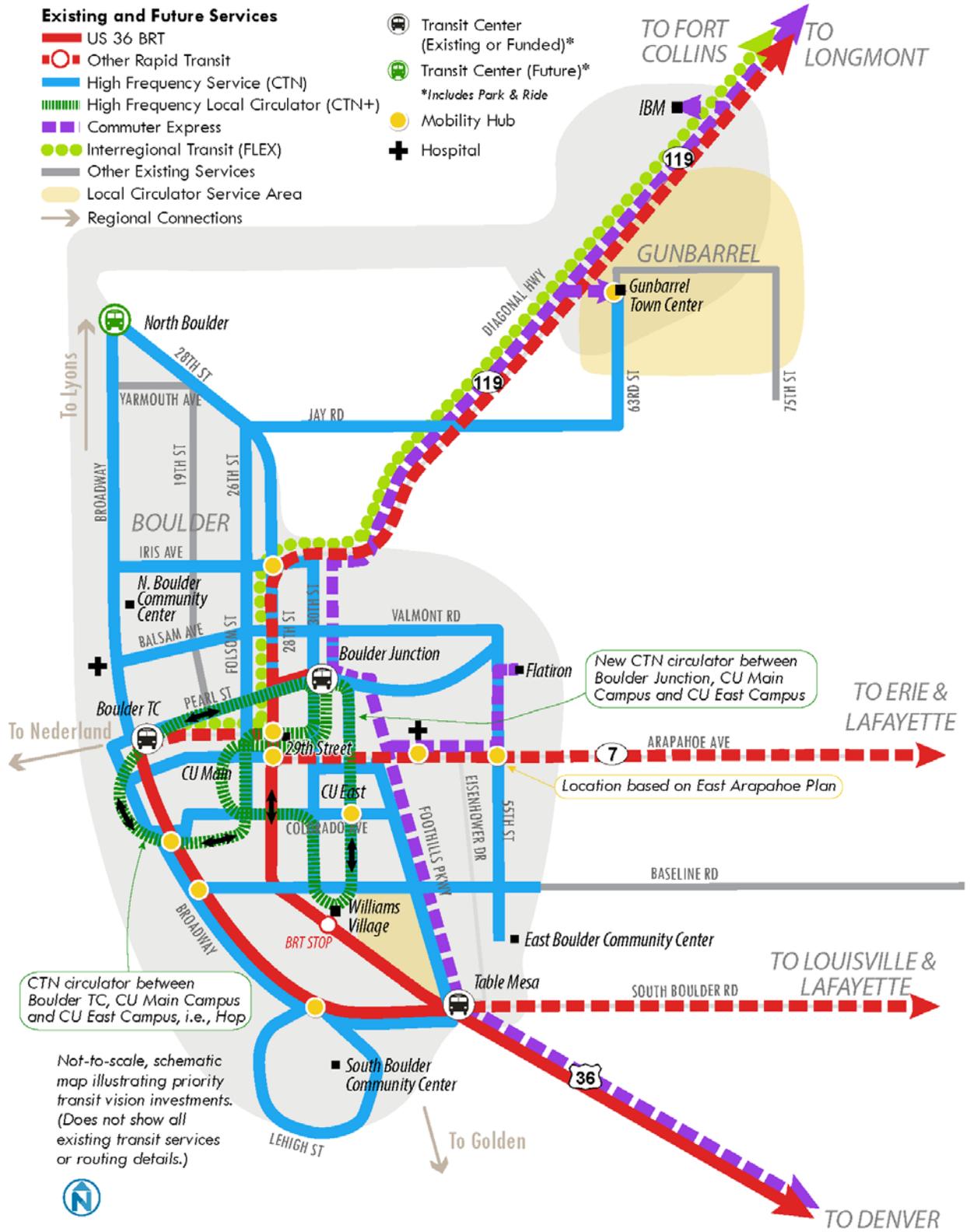
# Regional Mobility with Bus Rapid Transit: Implementing NAMS

### What is Bus Rapid Transit?

Bus Rapid Transit (BRT) is a rubber-tired bus transit mode that provides many of the advantages of rail service—capacity, speed, and quality—at a fraction of the cost. Key features of BRT include:

- Exclusive lanes or queue jumps and coordinated traffic signals with transit priority provide fast travel times. These features are important even along arterial streets and through urban centers to realize the full travel time benefit of BRT.
- High-end, stylized vehicles offer the look, feel, and increased capacity of light rail vehicles, including multiple boarding doors.
- Highly developed station areas with real-time information and off-board fare payment streamline passenger boarding.



Eugene's EmX features innovative use of existing medians and curbside stations.
Source: Nelson\Nygaard

### Examples of BRT

The Emerald Express (EmX) in Eugene (OR) uses transitways and dedicated lanes to bypass congestion as well as operating in mixed-traffic travel lanes with queue jumps and transit signal priority.

Cleveland's investment in the HealthLine BRT not only reduced commute times, improved air quality, and helped revitalize a neglected corridor, but also leveraged over $3 billion in new construction and $2.4 billion in building rehabilitation.



RTA HealthLine BRT vehicle at transit stop in Downtown Cleveland
Source:Nelson\Nygaard

### Implementing Bus Rapid Transit in Boulder: Northwest Area Mobility Study

The Northwest Area Mobility Study (NAMS) was initiated by RTD in response to rising costs associated with developing a commuter rail corridor linking communities to the northwest of Denver to the city. The study addressed cost increases in rail service connecting satellite communities to Denver and studied the feasibility of new BRT along major arterial corridors extending northwest from Denver. Arterial BRT was identified as a cost-saving approach to deliver high-quality, high-speed regional transit service. The NAMS process developed a prioritized list of mobility improvements. In addition to US 36 BRT service to Table Mesa TC, Boulder Junction, and downtown Boulder, scheduled to open in early 2016, three of the proposed NAMS priority corridors serve Boulder:

1. Boulder – Longmont via SH 119 (Diagonal)
2. Boulder – Erie/Lafayette via SH 7 (Arapahoe)
3. Boulder – Louisville/Lafayette via South Boulder Road

The Capital Element (Chapter 4) describes the proposed NAMS priority corridors in more detail.

## 3.5 MOBILITY FOR OLDER ADULTS AND PEOPLE WITH DISABILITIES

The TMP is committed to enhancing transit service to older adults and persons with disabilities, including support for programs that provide efficiencies and service enhancements to the paratransit system and associated programs. Improving mobility to these groups will require strong partnerships with Via Mobility Services and other community partners. The City of Boulder has a strong partnership history with Via spanning three decades. Through these partnerships, it is critical that travel training and peer-to-peer mentoring programs are expanded. The sidebar below and continuing on the following pages describes the recommended policy and program details.

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**Relevant Action Plan Items:**
- Service Action Plan: SI.2, SN.2, SL.2
- Programmatic Action Plan: PN.7, PN.8, PN.9, PL.1

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### Mobility for Older Adults and People with Disabilities

The City of Boulder recognizes that mobility is key to independence and quality of life for older adults, people with disabilities, and others in the city of Boulder with mobility challenges. The city collaborates and participates in community partnerships to ensure that specialized mobility needs are addressed. As the centralized coordinating agency and provider of transportation services to people with limited mobility in the City of Boulder and Boulder County, Via partners with community organizations including RTD, CU, and other public and private partners to leverage investments to meet the evolving mobility needs of older adults and people with disabilities, many of whom are unable to use the RTD transit system. In the Renewed Vision for Transit the city will continue to collaborate with Via and other community partners to ensure that cost-effective mobility strategies for older adults and persons with disabilities are implemented and expanded in Boulder.

**TMP Policy:** *The city will: Enhance mobility options for older adults and persons with disabilities, including increased funding and support for Via Mobility Services' programs including specialized transportation, travel training, mobility options information and referral, and programs that promote coordination, efficiencies and service enhancements to the city's paratransit system.*

***Background***

Since 1979 when the organization now known as Via Mobility Services was founded (in part with funding from the City of Boulder), the city has cultivated a unique partnership with Via. Via is a local, private, 501(c)(3) non-profit corporation located in the city of Boulder. Via is a provider of RTD's Americans with Disabilities Act (ADA)-mandated Access-a-Ride paratransit service for people with disabilities, as well as paratransit and other transportation options for older adults and persons with disabilities. Many of these individuals are unable to use the RTD bus system due to physical or cognitive limitations yet may not be eligible for Access-a-Ride service. Via is the only private non-profit local paratransit provider in the city. Via also operates the HOP bus route in partnership with the city, RTD, and the University of Colorado, reinvesting 100% of all earned income revenue from the HOP contract into its services for mobility-impaired Boulder residents ($373,000 in 2013). Equally unique is Via's financial position with 40 or more funding partners, all of whom provide financial support to ensure mobility for older adults and people with disabilities in Boulder County, thereby leveraging City of Boulder financial contributions to provide significantly more service to city residents.

For more than three decades, Via has provided a wide variety of community services that contribute to the mobility of Boulder's citizens for whom transportation is a challenge. Via has not only invested in vehicles and technology, but also a state-of-the-art, high-quality and expandable operating facility to ensure a substantial and efficient "place" from which to serve the community for generations to come. The City of Boulder, along with many other community partners, contributed support for Via's new operating facility. Unique to Via is its position as a "travel navigator" through its One Call Resource Center to help city residents with mobility limitations (and their families) connect to any transportation option that may meet their individual transportation needs. In 2013 nearly 1,600 individuals were assisted through this program.

The paratransit program includes a fleet of 10 dedicated vehicles in the city, primarily CNG-fueled, wheelchair-accessible low-floor vans and hybrid-electric sedans.

As demonstrated in the floods of September 2013, Via serves as a valuable community resource to assist in emergency evacuations as well as contributing to community resiliency in a subsequent recovery period.

In 2013, Via provided 44,061 passenger trips to 1,030 mobility-limited citizens of Boulder, as well as 15,032 trips to individuals served by the Boulder Shelter for the Homeless and Boulder Outreach for Homeless Overflow (BOHO).

Census growth projections illustrate that the number of individuals with a disability that inhibits independent travel will increase by almost 134% in the City in the next 10 years, primarily driven by the well-documented increase in the older adult population. Advanced age often presents concomitant disabilities such as vision and hearing loss as well as physical frailty.

Enhanced investment in transportation is critical as is flexibility to evolve and respond to mobility options needed for the future. Research shows that older adults are driven by a desire for connectedness and that being close to friends and family is the most important factor contributing to their outlook on life, physical and mental health. Policies need to look at how to retrofit our community with transportation options, housing and land use patterns that help people keep their independence as long as possible.

## Age of Via Paratransit Passengers
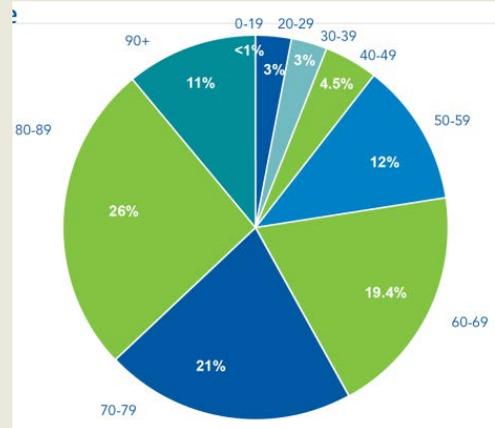


## Disability Status of Via Paratransit Passengers

**65%** lived with a disability or advanced frailty
**20%** lived with a chronic disease or condition
**15%** report no disability or chronic condition

## Via Trips by Purpose, 2013



| | |
|---|---|
| Medical & Therapy | 32% |
| Personal | 22% |
| Grocery Shopping | 10% |
| Recreation | 9% |
| Education | 7% |
| Employment | 7% |
| Aides | 5% |
| Volunteer | 3% |
| Adult Day Care | 3% |
| Senior Center Programs | 1% |
| Senior Meals | 1% |

Via also provided 15,032 trips to individuals experiencing homelessness in order to access safe shelter.
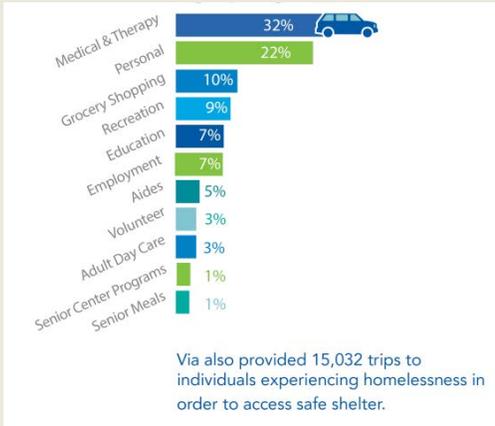
## Projected Mobility-Limited Population Growth, 2010-2025



**Population in service area**

According to the 2010 Census, the mobility limited population of older adults and people with disabilities in Boulder is expected to grow 134% between 2010 and 2025.

3,200 — 2010
7,500 — 2025
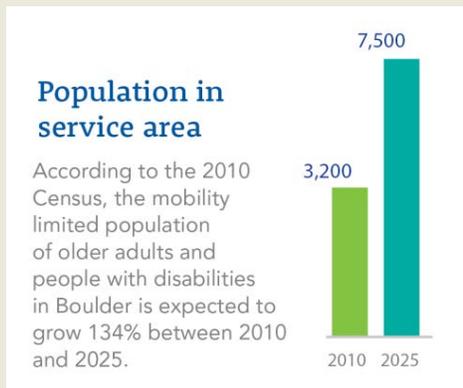
*Mobility Goal: Increase Mobility Options for Older Adults and Persons with Disabilities*

Within the City of Boulder, older adults and people with disabilities will be able to reach important destinations such as Boulder Community Health, City Hall, medical resources, shopping centers, community centers, employment, education, recreation and volunteer opportunities and other important locations.

- **One Call Center.** Older adults and people with disabilities can learn about their mobility options from one expert source through Via's mobility options specialists and receive potential solutions suited to their individual mobility needs. The essential opportunity is to increase public knowledge of this resource by including links from the City website and through City publications that discuss mobility or that are directed toward older adults and people with disabilities. The desired outcome is to ensure the **One Call Center** is publicized.
  The One Call Center provides:

  - **Mobility program eligibility matching.** Via staff maintain information on local transportation options to help match the situation of the individual to a particular program whenever possible. This activity does not guarantee the person is eligible or necessarily confer eligibility, or guarantee transportation, but helps determine which programs may match the individual's characteristics and help them start the eligibility process if needed.

  - **Connections to Via's own programs such as paratransit and travel training.** Via's travel training program is tailored to the needs of the individual. For example, training an older adult who has not used the bus before requires different adaptive training techniques than a person with developmental disabilities who wishes to learn how they can ride the bus to work each day.

  - **Counseling on family issues related to reducing or discontinuing driving for at-risk drivers.**

- **Funding.** The City intends to continue to provide funding for Via, to increase funding to keep pace with the growing population of older adults and persons with disabilities in Boulder, and to support Via's programs to increase efficiencies and provide service enhancements. The city will continue to collaborate with other community partners to fund Via programs that support and enhance mobility options for older adults and persons with disabilities.

- **On-going Reporting and Inventory.** The City maintains continuous communications with Via and other community partners to ensure the latest information on mobility needs is known to City staff. Performance indicators of how well the mobility programs are meeting the needs of Boulder residents are provided by Via in an annual report.

For more information on Via please see: www.viacolorado.org

## 3.6 SERVICE POLICIES AND STRATEGIES

### Transit Service Policies

The city will:

- **Maintain and improve the integrity of the Community Transit Network (CTN)** system, including frequent and direct service, discrete branding, etc.

- **Incrementally improve and expand the high-frequency CTN** throughout Boulder County as funding and collaboration with agency partners allows

- **Prioritize City operating subsidies to meet or surpass Boulder's minimum service level standards for the CTN** (10-minute peak and 15-minute off-peak headways, as defined in the TMP Transit Modal Element), particularly when routes serving the CTN exceed RTD's maximum passenger loading standards

- **Manage arterial transit streets to provide priority to transit vehicles** carrying high average passenger loads while considering cross-street pedestrian and traffic demand

- **Work with RTD to develop performance agreements** that ensure service hours gained through City-funded transit investments will be reinvested in routes that serve Boulder, particularly the CTN

- **Work with RTD and partners to establish a high level of US 36 BRT service to Boulder Junction and Downtown Boulder** and ensure no reduction in US 36 service to Downtown Boulder

- **Take a leadership role in implementing Northwest Area arterial BRT services** identified by NAMS and in this plan.

- **Enhance connections between the following major developing activity centers:** CU Main and East Campuses and the Boulder Junction and Table Mesa transit centers

- **Increase funding to Via** over time to enhance service to older adults and persons with disabilities, including support for programs that provide efficiencies and service enhancements to the paratransit system

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# 4  CAPITAL ELEMENT

## 4.1 INTRODUCTION

This chapter defines capital elements of the Renewed Vision for Transit in Boulder. Transit capital investments include both one-time investments in new transit infrastructure and amenities that improve transit speed and reliability and passenger experience, and recurring expenses such as fleet replacement. The city's capital investments help realize benefits including:

- Reduce ongoing transit operating and capital costs
- Provide transit passengers with faster and more reliable travel times
- Achieve community goals such as environmental sustainability and energy independence, community health and livability, and economic vitality
- Provide a quality, convenient, and safe travel experience

## 4.2 CAPITAL INVESTMENT PRINCIPLES

Boulder's guiding principles for transit investment decisions, described in Chapter 6, prioritize the strategic investment of local revenues. These principles include making transit investments that align with TMP priorities, using local revenues to leverage regional investments in local priorities, and prioritizing operating and capital investments that enhance transit operating efficiency and effectiveness. Ensuring accessibility, preserving the integrity of the CTN, emphasizing reliable and predictable transit service, and cultivating and expanding partnerships are other principles guiding capital investment. Key information used to prioritize capital investments includes:

- Lifecycle cost effectiveness measures (passenger and distance based)
- Alignment with regional BRT facility plans and prioritization process
- Delay or operating cost savings potential
- Industry standard thresholds for transit capital investment supportive land use/density
- Right-of-way opportunity or constraint
- Public Input

## 4.3 PROCESS FOR DEVELOPING CAPITAL ELEMENT

Priorities included in the Capital Element were developed based on TMP public and stakeholder input and were also coordinated with regional priorities including US 36 BRT and the Northwest Area Mobility Study (NAMS). The NAMS planning process developed priorities for arterial BRT service, including on SH 119 between Boulder and Longmont, SH 7 on

Arapahoe Road to Lafayette and Erie, and South Boulder Road to Louisville and Lafayette. The public and key stakeholders, including CU Boulder, Boulder County, and Boulder Valley School District, Via, etc., were consulted in the development of capital investment priorities. The Capital Action Plan prioritizes capital investments into immediate, near-term, and long-term actions and identifies potential partners for funding and implementation. The Action Plan identifies continued partnership and actions to further refine the Renewed Vision for Transit Priorities, including US 36 BRT implementation and implementation of real-time transit information, for example.

## 4.4 PREFERRED CAPITAL ELEMENT OF THE RENEWED VISION FOR TRANSIT

The Renewed Vision for Transit Capital Element is organized into several categories:

- **Corridor investments** related to Bus Rapid Transit and speed and reliability improvements for the CTN.
- **Facility investments** such as transit centers and stop improvements and amenities, including real-time information displays.
- **Fleet investments** including transitioning the transit fleet to cleaner fuel technology.

## 4.4.1 Corridor Priorities

Corridor investments help realize travel time and operating efficiency benefits for routes serving a given travel corridor and make transit a more comfortable and appealing travel option in Boulder.

Bus Rapid Transit, CTN, and local transit services are differentiated by the level of investment in corridor facilities, amenities, and vehicles:

- **Bus Rapid Transit** corridors require the highest level of capital investment in:
  - **Exclusive lanes, queue jumps, and/or transit signal priority** along most of the corridor.
  - **Highly-stylized vehicles** with multiple doors and off-board fare payment for fast boarding.
  - **High-quality amenities** such as shelters, mobility hubs, and real-time information displays.



Transfort MAX BRT in Fort Collins, opened in Spring 2014, has 12 stations and operates along a dedicated transitway for part of its alignment and in mixed-traffic. Amenities include real-time information and free Wi-Fi.
Source: City of Fort Collins, fcgov.com



Bus only lane in the CTN network.
Source: Nelson\Nygaard

- **CTN** corridors would have a more moderate level of capital investment and could include:

  – **Queue jumps and/or transit-only lanes** in key congested locations and/or future important locations warranting faster transit.

  – **Community-oriented, standard buses with wide boarding doors, large windows, and unique naming and branding** for high passenger recognition.

  – **Unique CTN branding and wayfinding elements** at stations and stops.



The SKIP is a CTN-branded bus that provides frequent service along Broadway.

Source: Nelson\Nygaard

- **Local** (non-BRT/CTN) corridors would benefit from BRT and CTN corridor improvements where they overlay portions of those corridors and could also include targeted improvements such as:

  – **Enhanced stop amenities**, prioritized based on the number of daily boardings at each stop

  – **Pedestrian access and safety improvements**, such as curb ramps, sidewalk infill, and enhanced street crossings serving stop locations

The following sections describe specific corridor capital priorities identified in the Renewed Vision for Transit.

## Bus Rapid Transit

The US 36 BRT project (anticipated opening in 2016) will build out BRT capital elements along the US 36 corridor, including "managed" lanes in the highway median, transit-only shoulder lanes, and station amenities such as enhanced shelters, real-time information, and fare vending machines. In addition, three of the top priority arterial BRT corridors that emerged from the Northwest Area Mobility Study (NAMS) serve Boulder, as described in Chapter 3. The SH 119 corridor was identified as the top NAMS priority while the SH 7 and South Boulder Road corridors along with arterial BRT improvements on 28th Street and Broadway were identified as longer-term NAMS priorities (next 7 to 20 years) but were not specifically prioritized. The City of Boulder's top priorities include the SH 119 and SH 7 corridors, and BRT-related improvements on 28th Street and Broadway; South Boulder Road is a longer-term priority for the City.

As illustrated in Figure 4-2, the top priority NAMS corridors for Boulder are:

- **SH 119 (Diagonal), Boulder – Longmont (NAMS Priority #1 and Boulder BRT High Priority).** The Boulder to Longmont corridor was identified as the top priority NAMS corridor. The NAMS process identified this corridor as a short-term priority (3 to 10

years). Developing BRT on the Diagonal is one of the top regional transit corridor priorities for Boulder identified through the TMP process with the City and agency partners.

▪ **SH 7 (Arapahoe), Boulder to I-25 (NAMS Long-Term Priority and Boulder BRT High Priority).** BRT on the SH 7 / Arapahoe corridor is a key priority for the City of Boulder and a top priority in the next tier of NAMS priority corridors. This corridor connects Downtown Boulder and the CU Main and East Campuses with Lafayette and Erie, and modeled well for future BRT service in the transit scenario analysis. The Envision East Arapahoe land use planning effort is getting underway in the second half of 2014 and will provide a community-driven plan for improving transportation connectivity and placemaking east of 28th Street. The Envision East Arapahoe project will integrate land use and transportation planning for all modes, including future arterial BRT.

▪ **South Boulder Road, Boulder to I-25 (NAMS Long-Term Priority and Boulder BRT Medium Priority)**. The South Boulder Road corridor is another key priority for the City of Boulder and a longer-term priority NAMS corridor. It connects Louisville and Lafayette to Table Mesa Park & Ride and to local and regional US 36 BRT connections to Downtown Boulder, Boulder Junction, and Denver.

▪ **28th Street/Broadway (NAMS Long-Term Priority and Boulder High Priority).** These streets will be used to link the US 36 BRT project to downtown and Boulder Junction, however only minimal operational enhancements are included in the initial implementation. The NAMS corridor project would implement additional transit speed and reliability improvements along both corridors.

### BRT Project Development Timeline

Figure 4-1 illustrates the general project development timeline for a BRT project from project planning through construction along with general time frames (per project). The Transit Capital Action Plan recommends that the city and regional transit partners engage in a partnership process to investigate federal funding opportunities for the TMP/NAMS corridors and refine funding priorities. The Action Plan also includes individual action items to carry each corridor through the stages of project development.

**Figure 4-1    BRT Project Development Timeline**



| CONCEPT IDENTIFICATION | PROJECT PLANNING | PRELIMINARY ENG. & ENVIRONMENTAL | FINAL DESIGN | CONSTRUCTION |
|---|---|---|---|---|
| Boulder TMP and NAMS Study | Mode Selection<br>Street Alignment Selection<br>Conceptual Design<br>LPA Adoption | 30% Design<br>Enivronmental Review | 100% Design<br>Bid documents<br>Permitting, DCE/FONSI | Duration varies based on complexity<br>Project Opening |
| 2014 | 2-3 Years | 1-1.5 Years | 1-1.5 Years | 2+ Years |

See also "Delivering Bus Rapid Transit" in Chapter 6, which discusses BRT project delivery in more detail.

**Figure 4-2      Bus Rapid Transit (NAMS) Priority Corridors**
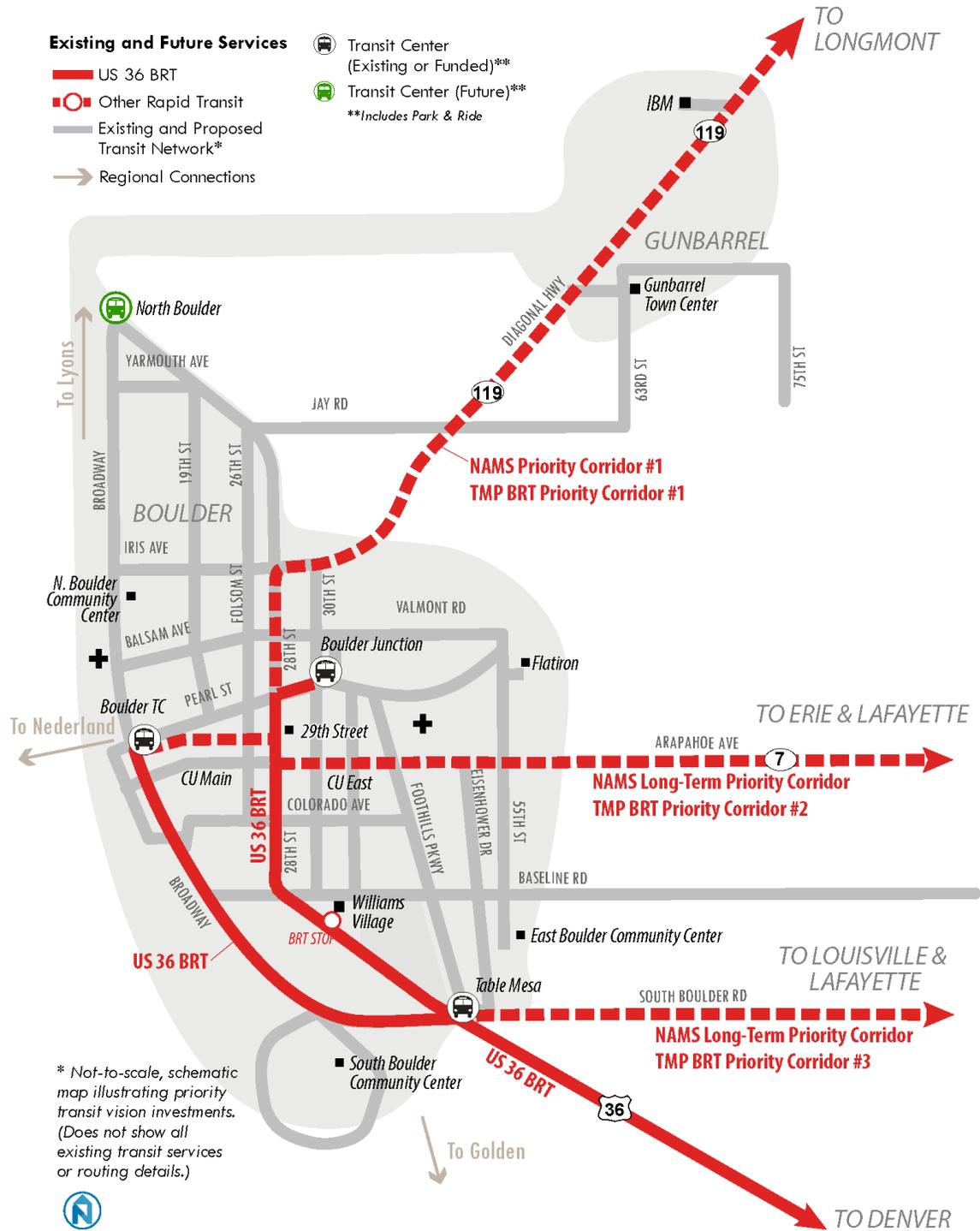
### Community Transit Network

As described in Chapter 3, the CTN is Boulder's high-quality, high-frequency transit service network. CTN capital investments in the Renewed Vision for Transit include transit speed and reliability enhancements and high-quality vehicles and amenities along the CTN routes. The sidebar below provides guidelines for implementing speed and reliability improvements that provide faster travel times for passengers and reduce the impacts of congestion on transit operating and vehicle capital costs, by potentially avoiding the need to add operators and buses.

## Guidelines for Developing Priority Corridors

A corridor approach is recommended for implementing speed and reliability improvements on TMP-identified priority corridors. This includes CTN corridors and also applies to BRT corridors. Coordinating capital improvements along a particular corridor concentrates benefits and provides maximum impact. The planning process should also consider where along the corridor contiguous improvements are most beneficial. The general approach for developing a priority corridor can include the following steps:

- **Consult with stakeholders, the public, and/or transit partners** (including transit customers and operations staff) to identify key opportunities and constraints
- **Assess potential synergies, opportunities, and conflicts with other modal priorities** along, parallel to, or crossing the corridor
- **Identify potential opportunities to improve transit operations**. Figure 4-3 below provides a toolbox of potential roadway, stop, and vehicle improvements, including:
  – **Intersection and roadway improvements**, e.g., traffic signal timing and transit signal priority, queue jump/priority lane needs and feasibility, etc.
  – **Station/stop and vehicle improvements**, e.g., stop location (far-side vs. near-side); consolidation opportunities (stop spacing); curb extensions; stop amenity upgrades; level-boarding platforms, low-floor vehicles, and sidewalk/curb ramp infill (prioritized based on access demand); safety (including enhanced street crossings at stops), etc.
- **Identify urban design and placemaking opportunities** to integrate stations with adjacent land use
- **Conduct planning-level analysis of identified improvement opportunities** including corridor travel time benefits and capital cost estimates
- **Develop concepts to higher-level of project definition** (e.g., 10% design)
- **Advance the defined corridor projects** into preliminary engineering, final design, construction, and operations and secure project capital and operations and maintenance funding commitments

**Figure 4-3    Transit Priority Toolbox: Roadway, Stop and Vehicle Treatments**

| Treatment | Definition | Constraints | Effectiveness[1] |
|---|---|---|---|
| **Roadway Treatments** | | | |
| Transit signal priority (TSP) | At traffic signals, buses communicate with the traffic signal system to provide a green signal indication to an approaching bus. Delay for buses may be reduced at intersections as a result. | Less effective when signals are operating at capacity. | Up to 10% reduction in signal delay. |
| Queue Jump Lanes | At signalized intersections, a bus is provided with a lane, adjacent to general-purpose traffic, and an advanced green signal indication to bypass congested areas. Buses "jump" the queue of waiting cars. | Lane must be as long as the typical queues. TSP makes these much more effective, particularly if there is no far-side receiving lane. May increase pedestrian crossing times. | 5-25% reduction in travel times at a signal. |
| Dedicated Bus Lanes (Business Access and Transit or BAT Lanes) | A lane is reserved for exclusive use by buses.  It may also be used for general-purpose traffic right-turn movements onto cross streets and for access to adjacent properties.  This treatment would speed bus travel times. | Conflicts with right-turn and delivery vehicles. Strong opposition from businesses that may lose on-street parking. | 5-25% reduction in travel times. |
| Dedicated Bus Median Lanes | A median lane is reserved for exclusive use by buses.  This treatment speeds bus travel times. | Conflicts with left-turning vehicles. Signalization challenges. | 5-25% reduction in travel times. |
| Contra-flow lanes | A contra-flow bus lane is a dedicated lane of an otherwise one way street reversed for buses and other mass transit.  It is typically used to get around bottle-necks or access limited access facilities. | Loss of roadway capacity. Pedestrian safety considerations. Signalization challenges. | Varies based on access needs. |
| Transit Priority Streets | A street that is dedicated to transit or is designed primarily as a transit corridor. Leading examples include 3rd Ave. in Seattle (WA), the Portland (OR) Transit Mall, and Nicollet Mall or Marquette/2nd in Minneapolis (MN). | Loss of roadway capacity. Limited number of streets in geographically constrained areas. | Highly effective strategy for moving high volumes of buses in urban centers. Effectiveness peaks at 80-100 buses per hour per lane. |

Transit Signal Priority (Johannesburg, South Africa)



Source: ITDP

Median Dedicated Bus Lane (Las Vegas, NV)



Source: Flickr user "hamster!"

Transit Priority Street and Boarding Island (Seattle, WA)



Source: Nelson\Nygaard

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[1] Measures of effectiveness are derived from the Transit Capacity Quality of Service Manual and other case studies.

| Treatment | Definition | Constraints | Effectiveness[1] |
|---|---|---|---|
| Limited or time prohibited general public (GP) turning movements: | GP turning movements are restricted at all times or during peak periods. May be implemented with queue jump or dedicated bus curb lanes. | Impacts on other roadways from diversion of GP traffic/turning movements. | Highly effective means to implement peak period queue jump lanes or transit only lanes. |
| Innovative bus-bike treatments | Treatments to provide bicycles with safe routes along high-volume transit corridors, manage bicycle-transit vehicle interactions, and allow bicycles to share transit lanes. Examples include shared lane markings, colored pavement, and bicycle-only signals. | Highly contextual and must be considered within balance of person travel delay/benefit for specific street or corridor conditions. | Difficult to measure impacts on transit, but can reduce transit delay on busy bicycle corridors and improve bicycling experience. |
| **Stop Treatments** | | | |
| Curb Extensions/ Bus Bulbs/Boarding Platforms | Sidewalks are extended into the street so that buses would stop in the lane of traffic. This prevents buses from getting trapped by passing vehicles, unable to return to the flow of traffic. The delays from merging back into lane may be minimized as a result. | Only applicable where an on-street parking lane exists. Impacts to traffic flow must be taken into accounted. | Depends on traffic. 8 seconds per stop is the assumed. |
| Boarding Islands | A transit access point constructed in a lane that allows buses to use the faster moving left-lane of a roadway. It also removes side friction caused by right-turning vehicles, parking maneuvers, and delivery vehicles. | Pedestrian safety and ADA access requirements. Effects on overall traffic due to taking an additional lane. | Varies based on access needs. Save up to 1 minute per run in some applications. |
| Level Boarding Platforms | A boarding platform that is level with the bus to enable easier and faster boarding, particularly for passengers with mobility impairments, using wheelchairs, or bringing a stroller on-board the bus. | Most applicable to BRT and rail systems where vehicle and platform design is standardized. | Varies depending on number of wheelchair and assisted boardings. Can provide significant time benefit. |
| Defined Platform Loading Locations | Defining the locations where doors will open allows passengers to wait in nearest proximity to their bus and can reduce dwell times. | May be most effective in a proof-of-payment system where passengers may board through any door. | Saves less than 1 second per boarding passenger. |
| Defined Bus Loading Positions | Defining the platform loading locations at a stop can reduce dwell times by allowing passengers to more quickly find/walk to their bus and ensure that a bus is correctly positioned to be able to depart before a bus in front of it. | Most effective with "platooned" bus arrivals (e.g., buses timed to leave a common origin point at the same time). | Effectiveness decreases as the number of loading locations at a stop increases. |

Innovative Bus-Bike Treatments (Seattle, WA)



Source: Nelson\Nygaard

Bus Bulbs / Curb Extensions (Los Angeles, CA)



Source: Nelson\Nygaard

Level Boarding Platform (Eugene, OR)



Source: Nelson\Nygaard

| Treatment | Definition | Constraints | Effectiveness[1] |
|---|---|---|---|
| `Bus stop consolidation | Reducing the number of stops on a route, particularly where spacing is less than a stop every 3 blocks, can result in travel time savings. | ADA and elderly/disabled access. Grades must be taken into account. | 2-20% of overall run time, up to 75% of dwell time. |
| Off board fare payment | Fare payment typically delays the loading and unloading of buses, as only one door may be used. Off-board fare payment may speed boarding and allow full utilization of all doors. | Capital and O&M expense of off-board payment machines. Passenger safety at night. | Saves 1 second per boarding passenger. |
| **Vehicle Treatments** | | | |
| Low-floor, Wide-Door Vehicles | Low-floor vehicles (including in conjunction with level boarding platforms) allow passengers to board more quickly without climbing steps, particularly for passengers with mobility challenges. Wheelchair lifts on low-floor vehicles operate more quickly and with fewer mechanical problems. Wide-door vehicles allow large volumes of passengers boarding at a stop to enter and exit vehicles more efficiently. | Wide-door vehicles are most effective if implemented in conjunction with prepaid fare payment. | Varies depending on number of wheelchair and assisted boardings. |
| On-Vehicle Perimeter Seating | On heavily loaded routes, increases standing capacity, makes more efficient use of seating capacity, and allows passengers to exit the vehicle more quickly, reducing dwell times. | More appropriate for shorter-distance routes. | Varies with passenger loads. |

Off-Board Fare Payment (Stockton, CA)



Low-Floor, Wide-Door Vehicles
(Los Angeles, CA)



Source: Flickr L.A. Urban Soul

# 4.4.2 Facilities

Safe, comfortable, and attractive passenger amenities at bus stops/stations and other transit facilities are an important element of the Complete Transit System for Boulder and an important means of encouraging transit use in Boulder and the region. The location, design, and operations of these facilities define how transit interacts with the community and passengers' first impression of the system. Figure 4-7 identifies the location of major transit facilities and describes the design elements typically identified for each type of facility. These facilities include transit centers, which provide bus layover and often provide Park-and-Ride spaces, Mobility Hubs, and transit stops located throughout the system. At major transit stops, shelters provide protection from inclement weather and sun; seats provide passengers a comfortable option while waiting for transit; information is available on bus routes and other travel options; and trash receptacles ensure that the stop remains clean and attractive. Higher-end station amenities can include bicycle parking and real-time bus arrival information to let passengers know when their bus will arrive (see box below). Transit Centers and Mobility Hubs include legible wayfinding to help passengers transfer to other routes and orient themselves to the surrounding neighborhood. Every stop should be ADA-accessible, provide a stop pole with basic route information, and have safe access to and from the bus, adjacent land uses, walkways, and bikeways. This section provides additional details on each facility type and prioritizing the amenities that make transit facilities comfortable, convenient, and attractive community spaces.

## Real-Time Transit Information

Real-time passenger information was the most requested transit improvement identified by the community in the Design Your Transit System online tool. Real-time information can be presented on fixed displays at transit centers and major bus stops and made broadly available to phones and web/mobile devices. The TMP identifies actions needed to make real-time information available including:

- Working with the city's transit partners to ensure that all transit vehicles have GPS-based Automatic Vehicle Location (AVL) capabilities and that the infrastructure to aggregate and provide access to this information is in place.
- Providing open-source access to this data, allowing private developers and/or universities to develop mobile and web applications for accessing real-time bus information.
- Providing passenger information displays at transit centers, mobility hubs, and Rapid Transit stops (see Figure 4-8 for key examples).
- Making real-time information available at home, work, and other stop locations through mobile/web devices.

Chapter 5 provides examples of real-time transit information display systems. The "Stop Amenities from Around the World" sidebar below includes examples of shelter designs that all incorporate real-time information.

## Transit Centers and Layover Facilities

Transit Centers (TC) are the primary locations for transfers between transit routes and modes, serve the highest volume of passengers, and have the highest level of amenities. TC improvements are planned and funded at the current Table Mesa Park-and-Ride, the existing Downtown Boulder TC, and at the new transit center opening at Boulder Junction in conjunction with the opening of the US 36 BRT. Routes that end at Boulder Junction will use the underground transit center facility, while routes continuing to other destinations will pick up and drop off passengers at



Boulder's Downtown Transit Center.
Image from Nelson\Nygaard

the street level. A future transit center in North Boulder is recommended to improve local and regional transit connections. Context-appropriate Park-and-Ride facilities are assumed as part of the four current or future transit center facilities identified in the TMP. In addition, a number of smaller park-and-ride facilities are located in locations around Boulder and neighboring communities with shared parking and mixed-use development.

Figure 4-8 shows existing, planned/funded, and future Transit Center locations.

## Mobility Hubs

The goal of a Mobility Hub is to fully integrate the transit network with multimodal access and connections at the intersection of frequent transit lines, e.g., CTN or Rapid Transit, or at locally- or regionally-significant activity centers with high transit demand. Mobility Hubs facilitate transit connections outside of the primary transit centers and include pedestrian and bicycle improvements and other sustainable modes (e.g., car or bike sharing) designed to connect transit passengers to adjacent neighborhoods and nearby land uses. Mobility hub improvements include transit amenities to support increased transit transfer activity and incorporate placemaking features to make transit stops attractive and vibrant community elements for the surrounding neighborhood. The box below highlights key elements of the Mobility Hub concept.

Mobility Hubs are context-sensitive solutions that are adaptable to a variety of locations. Each location requires a unique design; Figure 4-4 illustrates how these elements can be applied.

Figure 4-8 shows the recommended Mobility Hub locations in Boulder. These include:

- Arapahoe, Canyon, and Iris at 28th Street
- East Arapahoe near Boulder Community Hospital and an additional location to be determined through the East Arapahoe Visioning process
- CU East Campus
- Broadway near Euclid, Baseline Road, and Table Mesa Shopping Center
- Along SH 119 in Gunbarrel

**Figure 4-4    Mobility Hub Elements**



1. Enhanced bus stops with real-time information
2. Designated bus lanes and priority signals
3. Secure bike parking
4. Off-street bike path
5. Bike parking
6. Car sharing
7. Public art
8. Transit and community information kiosk
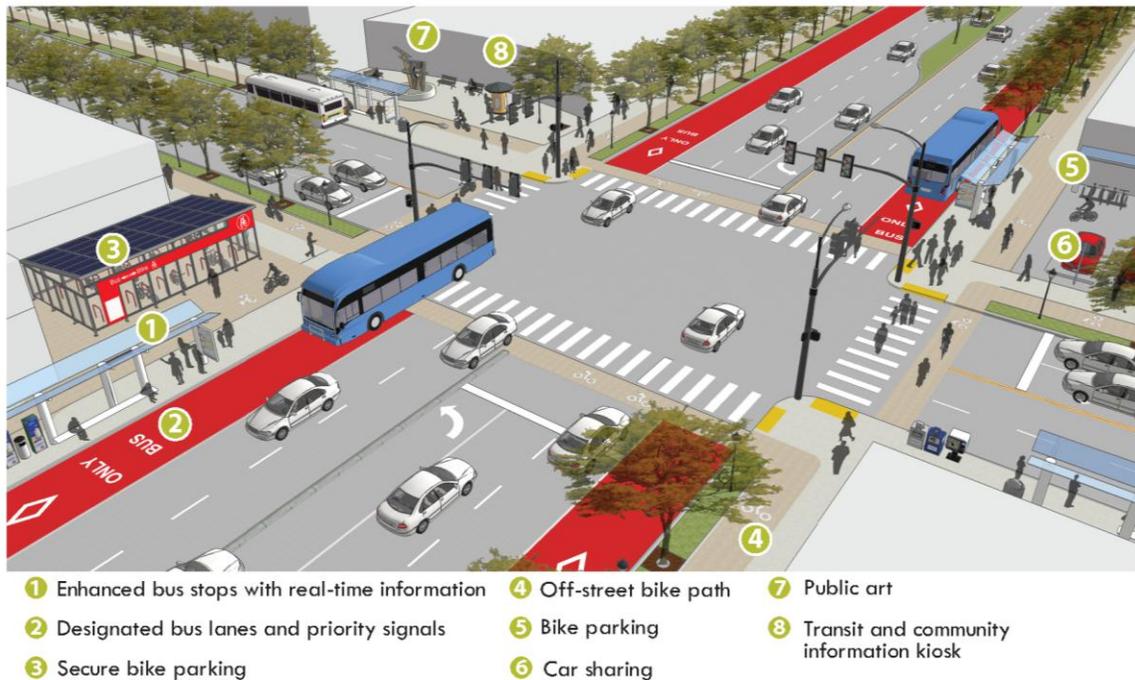
## Function of Mobility Hub Elements

- Accessible, universal design allows people of all physical abilities easy access to transit stops/stations
- Shared mobility services—including bike share stations, car share vehicles, and loading space for other private or public mobility services—enable access outside of the stop walkshed
- Integrated mobility technology—including kiosks, reader boards with real-time information on transit and other modes, and shared payment interfaces—assists travelers with trip planning and arranging shared rides, and provides opportunities for other evolving applications
- Placemaking elements, such as public art and public seating, active street environments with a mix of land uses, and strong land use anchors invite social interaction and vibrant business opportunity
- Secure, covered bicycle parking and access to the surrounding bicycle transportation network
- Excellent pedestrian infrastructure within a quarter- to half-mile walkshed and connections to the bicycle network
- Context-appropriate parking, preferably consistent with the "SUMP" principles—shared, unbundled, managed, and paid parking

# Mobility Hub Case Studies

Investments in mobility hubs respond to an opportunity to link transit infrastructure investments with concentrated land uses and significant development potential. Mobility hubs are critical nodes in the regional transportation system and serve as origins, destinations, and/or transfer points. As technology and the "sharing culture" have become more ubiquitous, kiosks with real-time information and bike or car share stations are becoming standard features to connect people and modes.

### Bremen, Germany: Connecting modes to reduce auto ownership

Mobility hubs first emerged in Bremen, Germany in 2003 to create better connections between transit, cycling, car sharing, and taxis in a central location. The concept began with an integrated fare card for the City's transit and car share programs. A network of strategically located mobility hubs further integrated transit, non-motorized modes, and car share services, featuring highly visible and branded electronic kiosks to provide real-time arrival and travel time information to travelers.



**Figure 4-5    Mobility Hub in Bremen, Germany**

Bremen's Mobil.Punkt integrates several travel modes at one central point

Source: Flickr user North Sea Region Programme

The mobility hub strategy helped residents and visitors shift their travel behaviors. Among the 550,000 central city residents in 2008, 14% commuted by public transport, 20% by walking, and 25% by bicycling.[1] Residents also credit lower rates of vehicle ownership to the ease of connecting to car share services via the mobility hubs. In the first year that car sharing services were accessed at the mobility hubs, 30% of the car share customers gave up their personal vehicles.[2] As a result, severe on-street parking shortages have been alleviated.[3]

### Toronto: Scaling mobility hubs according to context

The regional government of the greater Toronto area of Ontario, Canada undertook a major transportation planning effort, The Big Move, to accommodate rapid growth. The plan identified 51 sites for mobility hubs, paired with significant investments in transit. Local governments have committed $11.5 billion to implement the plan and several planning studies are underway for identified mobility hubs.

Key objectives of the mobility hubs are to: provide seamless connections between transportation modes, create centers of activity and entertainment, and influence land use to support residential and business development at a density that is transit-supportive.

Like Boulder, Toronto's proposed mobility hubs differ in size and scope. Toronto developed a context-sensitive hierarchy of hubs that accounts for current and planned transportation investments, employment and residential growth, and urban form.[4] The hierarchy was developed in conjunction with Mobility Hub Guidelines, a framework document to guide the planning and development of the hubs.[5] The guidelines were developed before local governments began planning studies for individual hubs and serve as a resource for local planners, developers, and transit agencies.

The guidelines define several hub classifications:

- **Anchor Hubs**. Significant centers anchoring regional transportation systems with high potential for population and employment densities, including intermodal facilities.

- **Gateway Hubs**. Major activity centers where two or more rapid transit lines intersect and where there will be significant passenger activity—including gateways such as airports, universities, and regional shopping centers.

- **Destinations/Major Transit Stations**. Important nodes and destinations within the system but do not have the level of transit activity to support full hubs.

Candidate locations were reviewed to determine the appropriate level of infrastructure investment based on the following criteria:

- Current and planned station characteristics and number and quality of modes
- Estimated future boardings and alightings
- Growth potential (future population + employment within a half-mile of the location)
- Current or planned development patterns that are transit-supportive
- Institutional destinations; unique or distinctive area features
- Existing or planned placemaking elements

The James Street North Mobility Hub, depicted in the rendering below, is in the final planning stages.[6] The hub is located in a transitioning district of Hamilton where substantial growth is anticipated. A large mixed-use development is planned with over 1,600 new residential units and the redevelopment of City-owned industrial land.

**Figure 4-6    Rendering of Planned James Street North Mobility Hub in City of Hamilton**



The James Street North hub (Gateway Hub type) is envisioned as a pedestrian-friendly streetscape where passenger rail lines will connect with bus rapid transit, bicycle paths, a park-and-ride, and pedestrian plazas.

Source: James North Go Mobility Hub Study

Each zone surrounding the hub represents different transportation opportunities. The innermost zone (2.5 minute walk) emphasizes high levels of pedestrian and transfer activity and balances multiple access modes. A secondary zone (up to 5 minute walk) focuses on safe and direct pedestrian and bicycle access. Beyond the secondary zone, local area bicycle connections, transit feeder service, and auto access are emphasized.

**Notes:**(1) Sustainability Mobility & Accessibility Research and Transformation, "Mobil Pinkt- Mobility Hubs in Bremen, Germany." http://www.um-smart.org/resources/enews/070317.php#study1. (2) Towards a New Mobility Culture: Reclaiming Street Space in the City through Innovative Car-Sharing, Guangzhou International Award for Urban Innovation http://www.guangzhouaward.org/650/content_811.html, (3) http://mobilpunkt-bremen.de/index.php?/English.html (4) "The Big Move", www.metrolinx.com. (5) MetroLinx, About Mobility Hubs (includes link to Guidelines document), http://www.metrolinx.com/en/projectsandprograms/mobilityhubs/mobility_hubs.aspx. (6) James Street North Mobility Hub Study, http://www.hamilton.ca/NR/rdonlyres/C76A1926-F266-4A71-B4E7-CF3DBD21ABA7/0/JamesSNMobilityHubStudy.pdf.

## Stops/Stations

Stations for BRT services include high-capacity shelters and the highest-level of stop amenities outside of Transit Centers and Mobility Hubs, including real-time information displays. Improvements for all services are based on the number of passenger boardings and existing/future adjacent land uses. Improvements are prioritized for the CTN. Figure 4-7 identifies stop amenities for basic, moderate, and high amenity stops.

## Facility Design Guidelines

The Capital Action Plan recommends the development of Transit Stop and Station/Facility Standards and Design Guidelines. These guidelines help ensure consistent quality and design of a range of transit passenger facility types and community contexts. Having standards and guidelines in place will streamline the development of both corridor and individual stop improvements. Related to local and regional BRT corridors, the guidelines should emphasize the importance of universal design standards and a strong understanding across agencies. Guidelines will reduce the cost for scoping, design, and maintenance of new and upgraded facilities; help set budget priorities; and prepare for grant opportunities. In conjunction with the guidelines, the Action Plan includes developing a stop improvement program with criteria for prioritizing stop improvements based on existing and future transit markets and a funding program that sets aside capital dollars for priority enhancements.

**Figure 4-7    Transit Facilities and Prioritized Level of Amenities**

| Facility Type | Facility Location | | 20-Year Plan Improvements |
|---|---|---|---|
| **Transit Center** *(Includes Park & Ride)* | Existing | Boulder Transit Center | Mobility Hub and BRT/high amenity bus station/stop features plus:<br>▪ Real-time passenger information displays<br>▪ Comprehensive multimodal wayfinding and highly legible bicycle and pedestrian network integration<br>▪ Bike share stations |
| | Existing | Table Mesa Park & Ride | |
| | Planned/Funded | Boulder Junction | |
| | Future | North Boulder Transit Center | |
| **Mobility Hub** | Future | Multiple locations (see Figure 4-8) | BRT/high amenity bus stop features plus:<br>▪ Real-time passenger information<br>▪ Transit wayfinding<br>▪ High quality bike parking (long and short term)<br>▪ Bicycle network integration/bike share stations<br>▪ Placemaking features (street furniture, public spaces) |
| **BRT Station/Stop** | Future | Multiple locations | High amenity bus stop features plus:<br>▪ High-capacity shelters and seating at all stations<br>▪ Level boarding platforms<br>▪ Transit information for all routes serving area<br>▪ Real-time bus arrival information<br>▪ Off-board fare payment (where route appropriate)<br>▪ Stop and area lighting<br>▪ Passenger/disabled waiting beacon (after dark)<br>▪ Curb bulbs where appropriate<br>▪ Fully improved intersections including curb ramps<br>▪ Bicycle parking (long and short-term)<br>▪ Pedestrian improvements within ½-mile radius of stop |
| **Bus Stop** *(Prioritized for CTN and by level of boarding activity)* | High Amenity | Multiple locations | Basic and moderate stop amenities, plus:<br>▪ Shelter with transit information<br>▪ Crossing markings and pedestrian signals (sufficient crossing time; based on roadway width, design speed)<br>▪ Bicycle parking (long and short term) |
| | Moderate Amenity | | Basic amenities plus:<br>▪ Seat or bench<br>▪ Bike rack<br>▪ Trash receptacle |
| | Basic Stop | Standard | ▪ Stop pole and sign with stop identifier<br>▪ ADA accessible bus pad with sidewalks and curb ramps |

**Figure 4-8     Current and Planned Transit Facilities**
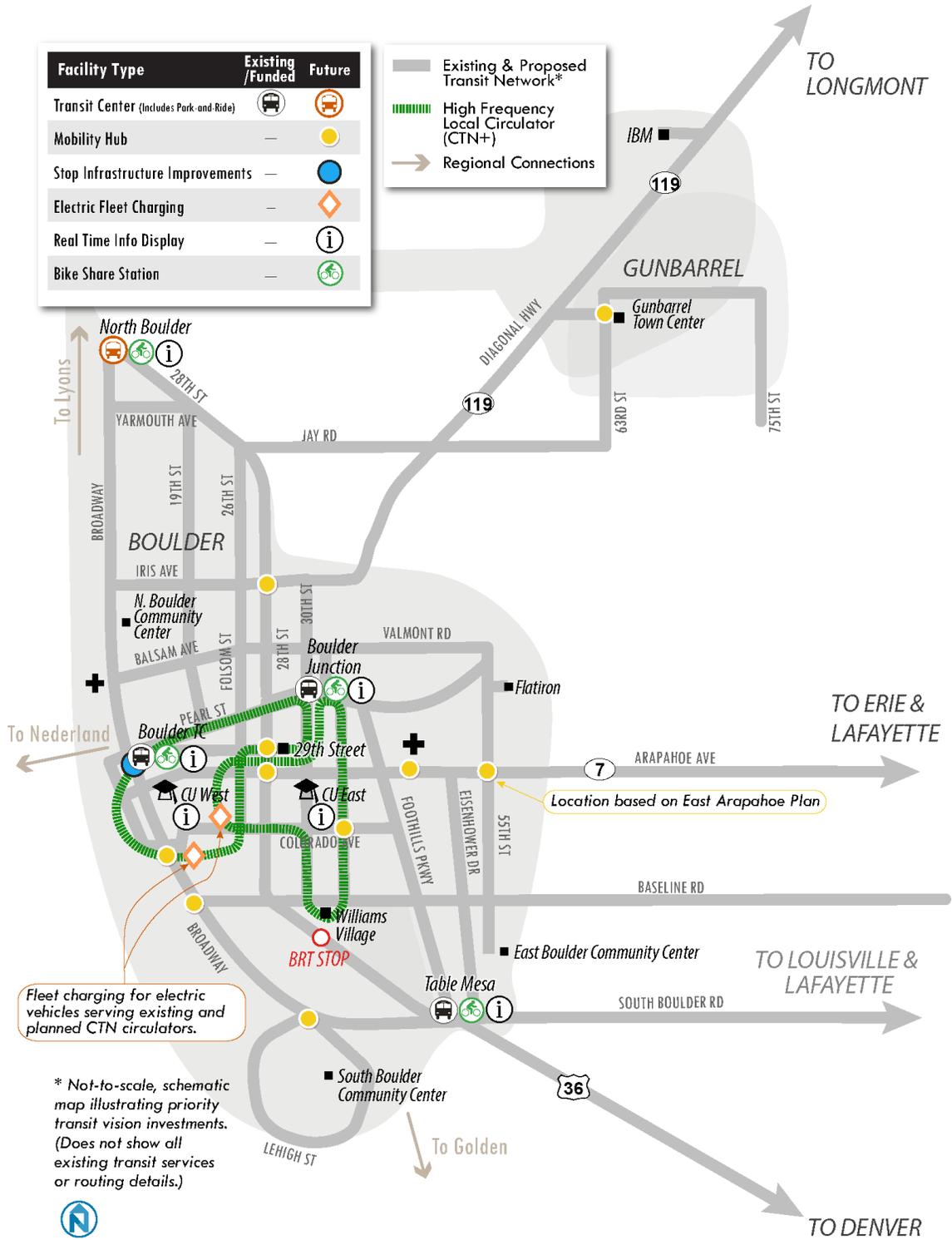
# Examples of Stop Amenities from Around the World

High-quality amenities at stop locations make 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. Going beyond the features identified in Figure 4-7, enhanced amenities appropriate for high-profile and high-ridership stop locations include landscaping and streetscape enhancements, retail services, restrooms, bike share stations and secure bike parking, and pedestrian-scaled lighting. The table below provides several leading examples, which all include real-time information.

| Feature | Where has it been done? | What is it? |
|---|---|---|
| Heated shelters | New Haven, CT (photo) and  Rochester, MN <br>Image from Nelson\Nygaard | New Haven (photo) built several award-winning heated bus shelters, activated by cold temperatures and passengers entering the station.<br><br>The city of Rochester, MN also incorporated on-demand heat lamps and nighttime lighting into new downtown bus shelters. |
| Covered stations with off-board payment | Bogotá, Columbia <br>Image from Flickr user Edgar Zuniga Jr. | 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 |
| Solar-powered shelters | San Francisco, CA <br>Image from SFMTA | 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 Wi-Fi. Additional power generated by the solar panels is returned to the power grid. |

# 4.4.3 Fleet Requirements

The replacement of transit vehicles is a significant capital cost and an opportunity to integrate City of Boulder sustainability goals and enhance the quality of on-board passenger experience. Currently, the average age of the RTD-owned and leased fleet is 10 years old. The industry standard for the useful life of a standard transit bus is 12 years or 250,000 miles. After 12 years of service, RTD is eligible to receive a subsidy from the federal government for replacement.

The Transit Action Plan identifies immediate, near-term, and long-term capital needs for transit fleet replacement and expansion. In the near-term, a priority for the City of Boulder and Via is to buy two HOP vehicles to replace existing end-of-life vehicles. The City of Boulder will work with RTD and regional partners to identify other fleet requirements based on future service changes. The Action Plan identifies the need to transition the transit fleet to cleaner fuel alternatives to the current diesel fleet. This could include diesel-electric hybrid buses or targeted introduction of electric buses; electric buses would have a more positive impact on greenhouse gas (GhG) emissions together with a cleaner electricity source mix.

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 and high speed charging stations). 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.

The Transit Action Plan identifies recommends working with RTD, Via, and other transit partners to explore clean fuel technologies for the transit fleet. It also specifically recommends evaluating electrification of the HOP and the proposed Central-East circulator (or adoption of other clean fuel technologies). These services are most directly under City of Boulder control and would each require 10-12 electric buses and supporting infrastructure, e.g., charging stations. Electric vehicles currently appear to be a leading clean fuel technology with a growing rate of adoption. In the future, advances in other technologies may make an alternative fuel/energy sources such as fuel cells the most cost-effective and appropriate to reduce GhG emissions of the transit fleet.

> Appendix D provides additional details on analysis of transit fleet clean fuel alternatives.

# Leading Edge Transit Technology

Transportation technology is rapidly changing, employing and advancing new technologies. Hybrid vehicles are likely to continue to improve in efficiency and become more mainstream as costs decline. The path forward with new technology at the leading edge is not clear. Current trends (2014) suggest rapid uptake of electric buses and electric bus charging technology. Two manufacturers of electric buses are gearing up to deliver multiple hundreds of units. Meanwhile, other promising technologies, such as fuel cells, are advancing at a much slower rate. This suggests the leading edge of technological deployment over the next 10 to 15 years is weighted heavily toward electric buses. However, as described in Appendix D, realizing potential greenhouse gas emissions benefits of electric buses in Boulder depends on shifting to cleaner electricity generation sources.



Proterra Ecoliner, Foothill Transit, San Gabriel, Calif.
Source: flickr user lucian400

### Electric Bus

Manufactured by Proterra and BYD in the United States, electric buses are ready for fleet integration today. Electric buses offer quiet, smooth operations. Fast acceleration and regenerative braking work well for transit. On-route charging is possible but requires special infrastructure.

### Hydrogen Fuel Cell
### Hybrid Electric Drive Bus

Hydrogen fuel cell hybrid buses are electrically propelled buses using proton exchange membrane fuel cells to convert hydrogen gas to energy. Hydrogen fuel cell buses offer performance and range similar to diesel vehicles without noxious emissions. The local emissions from these vehicles are only water vapor and heat. The vehicles offer quick refueling. These vehicles can travel longer distances than electric buses but are very expensive to purchase and operate at this time due to the expense to get renewable hydrogen.

### Emerging Technologies

Electric school buses, electric bus rapid transit (e-BRT), and advances in materials are all nascent technologies that may influence the development of future transit vehicles.

School buses often operate on short routes with a single morning and afternoon route, ideal for electric conversion as the price of battery technology continues to decrease.



Cleveland RTA's hydrogen fueling station. RTA is among ten fuel cell pilot programs are taking place around North America including AC Transit's HyRoad (Alameda and Contra Costa Counties, California) and SunLine Transit Agency (Riverside County, California).
Source: NASA.gov

## 4.4.4 Operations and Maintenance Base Capacity

RTD's current bus operations and maintenance (O&M) facility in Boulder is at capacity. The City of Boulder and its partners, including RTD, Via, CU, Boulder County, and CDOT, should evaluate the most cost-effective options and locations for expanding O&M capacity to meet future needs for expansion. In addition, the city and its partners should explore opportunities for facility sharing such as joint fueling stations for clean fuels, bus washing, and possibly other joint shared facility elements. These options could include developing new facilities in east Boulder and expanding existing maintenance facilities for shared use, e.g., the Via facility. Future needs will likely include:

- Adoption of new fuel technologies such as hybrid-electric, electric, or other clean fuel buses
- New types of vehicles including those for BRT service on corridors identified through the NAMS process (see page 3-19)
- Introduction of interregional service (i.e., FLEX)
- Introduction of new local services (e.g., Central-East Circulator).

The RTD FasTracks Program includes plans to construct an additional bus maintenance facility around or after 2020. This facility is planned to be outside central Denver, but the location has not been determined.[2]

## 4.5 CAPITAL POLICIES AND STRATEGIES

### Transit Capital Policies

The city plans to:

- **Design and implement bus priority** (speed and reliability) improvements for CTN routes
- **Support implementation of arterial Bus Rapid Transit service in Boulder County**, as prioritized through the Northwest Area Mobility Study (NAMS) process
- **Collaborate with RTD, Via, and other partners to transition the transit fleet to "clean," low-carbon emissions fuel/energy sources** through vehicle acquisition for new services and fleet replacement
- **Design major transit centers and mobility hubs** to provide high-quality bus and multimodal connections
- **Provide funding for transit stop improvements**, prioritized based on a tiered facility investment hierarchy linked to the level of current and/or projected ridership

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[2] http://www.rtd-fastracks.com/mf_4

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# 5  PROGRAMS ELEMENT



## 5.1 INTRODUCTION

Transit service and capital investments are only two components of developing a Complete Transit System in Boulder. This chapter describes the Programmatic Elements of the Renewed Vision for Transit including key initiatives, programs, and investments that are critical to realizing the Renewed Vision for Transit. Programmatic elements ensure that transit service and capital investments are optimized by encouraging higher levels of use and access. Beyond providing frequent transit to as many people as possible and the right destinations, the priorities outlined in the Programs Element ensure that transit in Boulder is convenient, well-used, understood by all users of the system, and contributes to building great community places.

## 5.2 PROCESS FOR DEVELOPING PROGRAMS ELEMENT

Programmatic investment priorities were guided by the City Council, TAB, and TAC, and community input including the Boulder "Design Your Transit System" online tool which was completed by over 1,500 community members. This interactive exercise asked the community, "How Would You Improve Transit in Boulder?" Community members prioritized programmatic and service-related transit investments. As shown in Figure 5-1, the top four enhancements included: (1) investments in real-time arrival information, (2) an expanded EcoPass program, and (3) enhanced regional service and (4) increased bike capacity on transit. Input from the community was also received through in-person storefront workshops and Transportation Master Plan open houses throughout the process.

Community input helped to guide discussions with advisory groups including the Transit Advisory Committee, the Transportation Advisory Board, city boards and commissions and City Council. Ultimately, the policies provided in this chapter and related action items in the Program and TDM Action Plans are the result of guidance from the community and these advisory groups, in addition to state of the practice research conducted in the State of the System report (Appendix A).

Figure 5-1    Design Your Transit System Tool: Desired Enhancements
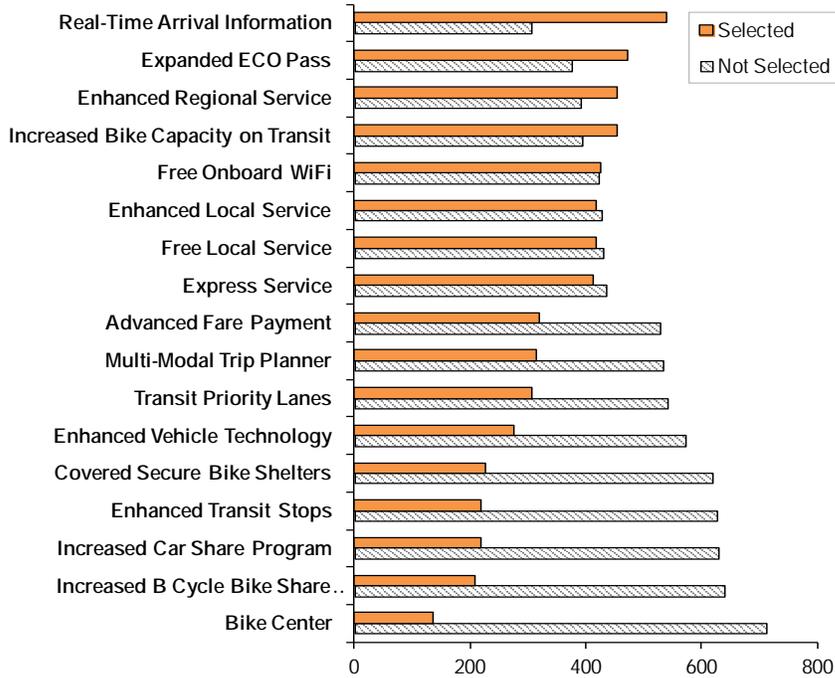


## 5.3 PROGRAM ELEMENTS OF THE RENEWED VISION FOR TRANSIT

To develop the Complete Transit System, Boulder must prioritize and coordinate transit investments and set policies at a variety of scales. A particular focus is to make it easier and more desirable to take transit by enhancing the user experience, improving access and connectivity, and implementing community placemaking initiatives around transit stops and stations. This section provides an overview of programs and initiatives to help realize the Renewed Vision for Transit.

## 5.3.1 Real-Time Information and Trip Planning

Communities across the U.S. and Europe are providing real-time arrival information to enhance the transit passenger experience and to make transit more convenient. Real-time 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. Not surprisingly, Boulder residents and employees rated real-time information as the top priority to improve the transit system in Boulder.

Implementing real-time information requires a strong partnership with RTD and private application developers. RTD controls access to the data needed to provide the real-time information and private developers are needed to drive the innovative technology to develop effective smartphone apps and web tools that users will adopt. In the Renewed Vision for Transit, the City of Boulder plans to take a leadership role, working with jurisdictional partners and RTD to ensure bus location data is available to private application developers who can create effective and well-maintained phone and Web applications.



Real-time arrival information can be provided on cell phones, online, and at the transit station.

Image from Nelson\Nygaard



RTD's next-generation stop signs will each include a 5-digit stop identifier. In the future this could cost-effectively enable access to real-time information at all stops through phones or smartphones.

Image from RTD
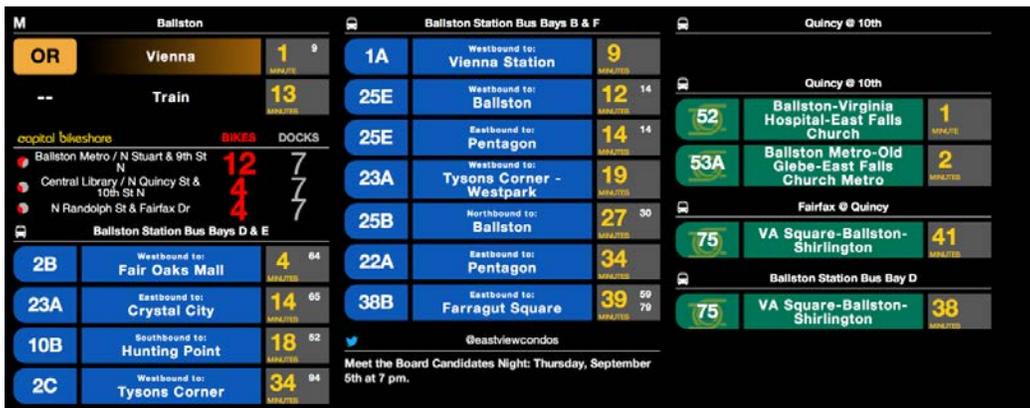


Open source data enables third-party real-time information displays that can include transit and other modes (such as a bike share).

Image from Transit Screen

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**Relevant Action Plan Items:**

- Programs Action Plan: PI.1, PI.2, PI.3, PL.2, PL.3 (see also TDM Action Plan)

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## 5.3.2 Fare Programs

Eliminating the hassle of having to keep exact change to ride the bus—not to mention providing monetary incentive to do so—is understandably a high priority for the Boulder community. Over the last decade, the Boulder EcoPass has seen marked success encouraging people to ride transit; EcoPass holders are four to seven times more likely to take the bus. Expanding the city's already popular EcoPass program was rated as the second highest priority investment by Boulder community members in the Design Your Transit System tool. As described in the sidebar on the following page, an analysis conducted as part of the TMP illustrated that investing in policies and programs that reduce the effort and relative cost required to take transit are a highly cost-effective means of increasing ridership and complement TMP transit service and capital priorities.

An expanded EcoPass program could make discounted transit passes available to residents and/or employees city or county-wide. The program is currently limited to employees/residents of participating businesses or neighborhoods. Building off of the recently completed Boulder County Community-Wide EcoPass Feasibility Study, the City will continue current work with Boulder County and RTD to expand the EcoPass program.



A recently-completed feasibility study examined options for extending the program to residents and/or employees within the City of Boulder or County-wide.

Image from Boulder County

Beyond providing monetary incentive to ride the bus, communities across the U.S. and internationally are seeing great success in expanding ridership by implementing mobile ticketing technology. Mobile ticketing allows the passenger to buy and store bus tickets on their mobile phones without the hassle of having exact change or carrying a paper ticket. Transit agencies save on the cost of collecting fares and can partner with application vendors to underwrite development costs. In the age of cell phones, implementing mobile ticketing options is a key strategy to capture the audience of millennials.



The graphic at right illustrates the TriMet (Portland, OR) mobile ticketing application developed by GlobeSherpa, which can be used for multiple riders and is integrated with TriMet's trip planning tools including schedules, maps, real-time arrival information, and service alerts. The City of Boulder will explore innovative fare payment options and opportunities to integrate transit payment with other shared mobility options. This strategy requires close partnership with RTD.

Mobile ticketing platforms can be used to purchase transit tickets and passes and could also be integrated with other mobility applications.

Image from Nelson\Nygaard

**Relevant Action Plan Items:**
- Programs Action Plan: PI.4, PN.1, PN.2 (see also TDM Action Plan)

# TDM and Parking Management Relationships to Transit Outcomes

The Renewed Vision for Transit included analysis to help understand the effects of policy and programmatic changes on transit performance. The analysis was intended to inform policy tradeoffs between transit service and TDM program investments. Two key areas analyzed were expansion of the EcoPass program and addition of parking management ("access"[1]) districts. **The analysis demonstrated that these policies and programs are cost-effective means to increase transit ridership and realize the full benefit of TMP transit service and capital priorities.**

### TDM (EcoPass) Sensitivity Analysis

The EcoPass program is one of the most effective TDM programs developed by the City of Boulder and its partners. The sensitivity analysis was intended to answer following hypothetical question: If the City only invests in EcoPass expansion (and does NOT invest in enhancing transit service), what is the projected impact on future transit ridership?

The analysis was based on the TMP transit scenario analysis and the Boulder County Countywide EcoPass Feasibility Study (2014). The EcoPass study evaluated the following three scenarios for both the City of Boulder and all of Boulder County:

- All residents, employees and university students receive an EcoPass
- All residents receive an EcoPass
- All employees receive an EcoPass

The projected ridership potential and cost per new ride of these EcoPass expansion scenarios was compared to the projected cost per new ride from investing in each of the three transit analysis scenarios (described in Chapter 3).

- **Depending on the scenario and geography extent, EcoPass expansion would result in between 1.8M to 5.4M new annual riders at a cost of $1.50 to $1.75 per new ride.**
- **The transit scenarios were projected to attract between 8.3M to 9.0M new rides annually at a cost of about $4 to $5 per ride.**

It is important to emphasize that these are independent estimates, i.e., new rides due to expansion of the EcoPass program are not *in addition* to new rides yielded from the transit scenarios. And while there is existing capacity on some routes and times of the day, additional operating costs would be required to expand capacity to serve some of the new rides induced by an expanded EcoPass program; the cost per new ride of the EcoPass analysis does not include these costs. In turn the service enhancements included in the transit scenarios would support the induced EcoPass ridership.

### Access District[1] Sensitivity Analysis & Results

Implementation of paid parking along with policies and programs that manage access to a district influences traveler behavior and increases transit use. The transit ridership impacts of paid parking were evaluated for the following areas:

- Boulder Junction Access District (BJAD)
- CU East Campus – based on CU decision to price parking on the East Campus
- East Arapahoe between 30th and 63rd Streets
- North Broadway area (between Violet Avenue and Lee Hill Drive)

Only BJAD is a City-approved access district. The others are conceptual and represent future districts that

could be developed by 2035, likely based on future development in these areas.

The analysis assumed parking costs in these districts would be the same as current costs in the downtown paid parking district.[2] A peer-based demand elasticity[3] was used to estimate the potential effect of paid parking on net new transit riders.[4] **The results indicated the access district policies would increase daily weekday transit ridership by about 1.6 to 2.0 million riders annually.**

The Transit Scenario Analysis Report (Appendix B) provides additional detail on the sensitivity testing of TDM and parking management policies and programs and further work is being developed as part of the City's ongoing Access Management and Parking project.

Notes: (1) An "access district" is a term used to describe a paid parking district. For example, the City of Boulder currently manages two paid parking districts: the Central Area Improvement District in downtown and the University Hill District adjacent to the University of Colorado. (2) It was assumed that Access Districts would have same parking pricing as is currently in place in the Downtown district. Daily parking cost was assumed at $285 per quarter or $4.50 per day (analysis approach focused on employees only). (3) Elasticity is a measure of the responsiveness of one variable to the change in another variable, in this case transit ridership to the cost of parking. An elasticity range of 0.25 – 0.30 was applied based on industry research and applicable peer examples. (4) Results were also compared to downtown and citywide transit mode split numbers using 2035 employment projections, the 2011 Downtown Boulder Employee and Boulder Valley Employee Survey Surveys, and mode split data from other cities with paid parking districts.

## 5.3.3 Transit-Bicycle Integration

Transit-bicycle integration allows transit riders to use bikes for first-last mile connections on either or both ends of a transit trip. Increasing on-board bicycle capacity accommodates riders who need to bike on both ends of their trip. Secure and/or covered bicycle parking facilities at bus stops preserves limited on-board bike capacity and serves riders who only need their bicycle on one end of their trip.

Expanding bicycle capacity, storage, and access to transit is critical particularly when serving regional transit riders to enhance transit connections in the Gunbarrel and east Boulder employment areas. The City is partnering with Boulder County to expand the County's existing Bus-then-Bike program and identify opportunities to expand bike-transit commuting options between Boulder and communities with the highest rates of in-commuters.



A 10-minute cycling catchment area expands the walking catchment area by 25 times.

Image adapted from Translink Transit-Oriented Communities Design Guidelines by Nelson\Nygaard



SWIFT BRT service (Seattle, WA) provides on-board storage for 3 bikes in addition to racks on the front of the bus.

Image from Flickr, Oran Viriyincy

**Relevant Action Plan Items:**
- Service Action Plan: SI.11, SL.9
- Programs Action Plan: PN.10

## 5.3.4 Shared Mobility Applications

Shared mobility applications are the next-generation technological advancements that provide passengers with a range of non-SOV options for getting where they need to go. These applications broaden the capabilities of current-generation multimodal trip planner applications and websites, e.g., driving, walking, biking, transit, to include real-time information on bike share, car share, taxis, vanpools, and other mobility services. In partnership with RTD and the private sector, the City of Boulder:

- Supports development of a common application programming interface (API) and platform to support aggregation of mobility data and push information to web and mobile devices in real-time
- Advances use of dynamic ridesharing, including supporting development of closed network ridesharing applications, e.g., to enable communication and shared rides between people with personal or social connections
- Supports development of both physical and virtual devices/interfaces for reserving and paying for shared mobility services
- Supports development of a personal mobility dashboard for residents and employees to track commuting and other trip making patterns

**Relevant Action Plan Items:**
- Programs Action Plan: PN.3, PN.6, PL.4, PL.5, PL.6 (see also TDM Action Plan).



Peer-to-peer ridesharing enables passengers to request rides from drivers. A mobile application, such as this example from Lyft, allows patrons to request drivers, pay for their ride, and track the location of their driver. A next-generation mobility application platform would integrate information for multiple modes to provide people with a range of transportation options.

Image from Lyft

# 5.3.5 Signage and Wayfinding

Enhancing transit information and wayfinding standards is important for the City of Boulder as new service is introduced with the US 36 BRT and transit service begins to serve Boulder Junction.  In partnership with RTD, the City of Boulder should develop a detailed set of standards to govern transit wayfinding within Boulder and to regional connections. These standards help reach new riders that are not familiar with transit by providing clear wayfinding, route, and schedule information. Wayfinding standards also support intermodal transfers, pedestrian and bicycle access to transit, and standards to convey real-time information.

**Relevant Action Plan Items:**

- Programs Action Plan: PI.6



New York City MTA integrated real-time information into an overall program to overhaul wayfinding.

Source: StreetsBlog

Pedestrian wayfinding around major transit stops and along major transit corridors should orient pedestrians to connecting transit routes, key activity centers, and overall neighborhood context through distinctive signage and maps. Including walking and/or biking times helps people understand the actual walking range to destinations. Placement and design of maps and signage should follow universal design principles to ensure legibility for most people. A range of signage and map options from the Legible London wayfinding program is depicted below.



Image from Transport for London

# 5.3.6 Education and Outreach

Shifting more trips to transit requires both general and targeted education and outreach programs to help customers learn how high-quality transit options can work for them and to gain experience using the system. Attracting regional riders is a key challenge for the City of Boulder and its partners. Capturing more long-distance in-commute trips on transit is a key element of the strategy to meet the city's Climate Commitment goals and assists with other community sustainability and resiliency goals.

## Public Information Campaigns

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, public information campaigns focusing on in-commuters are 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. Individualized marketing programs (see below) are a useful mechanism to help deliver a public information campaign.

LA Metro estimated that its public information campaign and service rebranding increased the share of "discretionary" riders from 22% to 36%.

Image from Los Angeles Metro

## Individualized Marketing

Individualized marketing programs for targeted groups such as commuters, students, and older adults have proven successful at both the neighborhood and business scale. For example, Portland (OR) SmartTrips is an active education and outreach program that has demonstrated a 9 to 13% reduction in drive-alone trips. It targets a specific neighborhood or corridor each year and also includes ongoing SmartTrips Business (employers) and SmartTrips Welcome (new residents) programs. Boulder should focus resources to target new residents and employees (specifically new in-commuters) and market new transit service such as US 36 BRT.
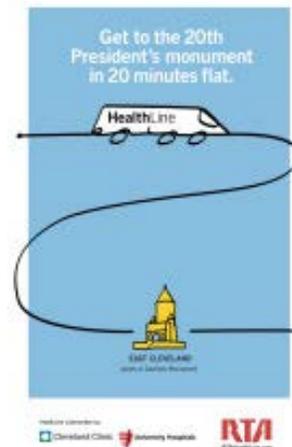
Promotional materials for the Cleveland HealthLine BRT line communicate its convenience and other benefits as well as its transportation function.

Image from Greater Cleveland RTA

> **Relevant Action Plan Items:**
> - Programs Action Plan: PI.8, PN.4 (see also TDM Action Plan)

## 5.3.7 On-Board Amenities and Experience

Boulder's Community Transit Network was founded on the principle that the transit experience should be pleasant, inviting, and foster community interaction. Amenities like large windows, perimeter seating, and music on the HOP have made Boulder's CTN into the successful system that it is today. The City of Boulder continues to push innovation to ensure transit is a first choice of travel. On-board amenities, in addition to amenities to connect people to the bus, enhance the transit experience and help retain and attract ridership.

> **Relevant Action Plan Items:**
> ▪ Programs Action Plan: PN.5



The HOP route has community-oriented features like large windows, perimeter seating, and music.

Image from Nelson\Nygaard

## Branding

Transit vehicles are the face of transit and therefore must appear attractive and comfortable from the outside. Transit "branding" uses transit elements to communicate information about the service. Branding is most effective when it is applied to all transit elements, including stops and shelters, information materials and signage, and vehicles. Branding can be employed at the system-level and to communicate specific aspects of service quality for both families of routes and individual routes.

The benefits of branding can be difficult to quantify, particularly for new BRT systems that introduce new branding as part of an overall package of amenities. However, studies have estimated ridership effects from branding and image alone ranging from a modest 6% increase[1] to as much as a 20% increase.[2] The FTA recognizes the importance of a unique brand identity; it is one of six minimum elements required to make a corridor-based bus project eligible for funding under the federal Small Starts Program.

Boulder's CTN buses have long been branded with distinguishable names and bus wrapping. The city has invested in branding CTN buses since 1994, with the start of the HOP bus. There is also an important opportunity to brand premium BRT services on US 36 and identified NAMS priority corridors and communicate the CTN-type vehicle amenities and passenger experience on these routes.

The city should conduct a study to refresh the CTN brand and consider establishing additional types of branding to improve system understanding and attract ridership. This study should consider:

- Developing a CTN sub-brand based on service-level
- Extending branding to the numbered routes to improve customer recognition and legibility
- Developing branding for arterial BRT services (as a premium CTN-level service and/or at the route-level)





Los Angeles Metro uses a color-coded system to brand service families, such as the "Rapid" and "Local" as well as individual lines.

Images from WikiMedia Commons user AllyUnion (top), Flickr user Chris (bottom)



In the Minneapolis-St. Paul area, Metro Transit differentiates its high-frequency service network using color and a graphic symbol, which extends to stop signs and marketing collateral.

Image from Metro Transit

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[1] Henke, Cliff, Parsons Brinckerhoff Inc. (2007) How Customer-Appealing Design and Branding Win New Riders: Data and Best Practices. http://www.apta.com/resources/standards/Documents/APTA%20BTS-BRT-RP-001-10.pdf

[2] American Public Transportation Association Standards Development Program. (2010) BRT Branding, Imaging, and Marketing. http://www.apta.com/resources/standards/Documents/APTA%20BTS-BRT-RP-001-10.pdf

## Vehicle Amenities

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. Finally, amenities such as low-floor boarding aid fast and easy passenger loading and unloading.



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



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

## 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. With the growing adoption of connected smartphones, the demand for a higher speed and bandwidth Wi-Fi connection is likely primarily on longer-distance routes. Wi-Fi is a low-cost, high-impact amenity that attracts and maintains riders, especially millennials. On-board amenities such as free Wi-Fi would be attractive on longer-haul routes where people are riding for 15 minutes or more. Wi-Fi received a moderate to high level of community support through the Design Your System Tool.



Wifi is prominently advertised as an on-board amenity on Santa Clara Valley Transportation Authority buses.
Image from Flickr user Kei!

The City should work with RTD to explore options to add Wi-Fi to the existing transit fleet particularly on long-haul transit serving Boulder.

## 5.4 LAND USE AND PLACEMAKING RELATIONSHIPS TO TRANSIT OUTCOMES

As described in Chapter 3 of the State of the System report (Appendix A), land use has a strong influence on transit demand. Land use factors related to transit demand are often summarized in a set of factors known as the "6Ds," including the density and distribution of population and employment; land use diversity; destinations and urban design, including integrating active community places into transit stops and streets; and demand management.

The city is currently undertaking the Envision East Arapahoe planning effort in the East Arapahoe area (approximately Folsom Avenue to 75th Street), to develop a community-driven vision plan to transform the corridor into a place with more mixed-use, compact and walkable districts that are better connected with west Boulder and the region. The project includes an analysis of different land use (i.e., population/employment growth) scenarios including their relationship to potential transit ridership and how transit can support the new vision.

Chapter 3 of the State of the System report (Appendix A) provides a comprehensive discussion of the 6Ds and land use and travel demand patterns in Boulder. The Transportation and Land Use section in Chapter 6 (page 6-11) of the State of the System report provides additional discussion including community placemaking.

## 5.5 PROGRAMMATIC POLICIES

### Programmatic Policies

The city plans to:

- **Work with partners to make real-time transit information available** at major transit centers/facilities and accessible over the web and on mobile devices by working with RTD and other partners.

- **Explore and pursue expansion of the EcoPass transit pass program** and other TDM and parking management programs.

- **Promote urban design and development that supports walking, cycling, and safe access to transit.** Encourage affordable housing and transit demand generating land uses along existing or planned CTN and BRT corridors.

- **Expand and support first- and last-mile programs** with local and regional partners.

- **Support development of technology and standards** that enable current and evolving shared mobility applications in Boulder.

- **Work with local and regional partners to explore the most effective and efficient transit service delivery and governance options** for implementing the Renewed Vision for Transit.

Note: The TDM Action Plan provides additional programmatic policies.

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# 6  IMPLEMENTATION ELEMENT

## 6.1 INTRODUCTION

This chapter describes the phasing approach, funding and delivery mechanisms, and key partnerships for implementing the service, capital, and programs elements of the TMP Transit Modal Plan described in the previous chapters.

## 6.2 TRANSIT INVESTMENT PRINCIPLES FOR BOULDER

The following principles guide future investment decisions for new City of Boulder transportation funds for transit.

**Strategically Invest Local Revenues:**

- **Invest resources that are consistent with Transportation Master Plan priorities.**
- **Local revenues need to support local improvements**. Locally-raised transit funds should benefit the local community.
- **Prioritize operating and capital investments for efficiency and effectiveness.** Strive to achieve a cost-effective investment program that increases transit ridership and mobility.
- **Leverage public investments to achieve multiple purposes whenever possible**. The transportation system should also support other community goals such as environmental sustainability, economic vitality, and community health and energy independence.

**Ensure Accessibility:** The transportation system must be accessible and safe for users of all abilities and incomes in all stages of life.

**Preserve Integrity of Community Transit Network**: Branded, direct, frequent and user-friendly service attributes are the hallmarks of the CTN, which has increased ridership significantly.  Maintain and expand CTN service attributes.

**Emphasize Reliable and Predictable Transit Service**: The reliability of the system and predictability of travel time are frequently as important as speed. Prioritize multiple multimodal options over reliance on a single option.  Expand real-time travel information.

**Cultivate and Expand Partnerships:**

- **Develop and maintain effective regional partnerships and coalitions.** Regional transit is important to provide enhanced options to in-commuters to support the local employment base and improve air quality for Boulder residents and employees.

- **Coordinate and pursue regional partnerships that leverage local funds.** Improve regional transit to and from Boulder. Develop and maintain regional partners to help provide effective regional service and collaborate on funding.

**Maintain and expand "net" service hours in Boulder:** During the last decade, there has been significant reduction in RTD transit service in Boulder.

- Ensure rebuilding of the local transit system to ensure "no net loss" of service hours and if possible, service expansion and enhancement to transit routes that is effective, productive, meets community needs, and is consistent with the Transportation Master Plan.
- Some parts of the transit system may need to be reduced while other parts are enhanced or expanded to meet changing demand.
- As Boulder invests more in transit, assure that RTD does not divest resources.

## 6.3 TMP INVESTMENT SCENARIOS

As described in Chapter 5 of the Transportation Master Plan, transportation investments are classified into three investment programs:

- **Current** (fiscally-constrained) is based on current funding sources from 2014-2035.
- **Action** identifies strategic investments as additional funding becomes available.
- **Vision** (not fiscally-constrained) represents the desired buildout of the TMP priorities.

The Funding section below discusses options, e.g., grant programs, for the city to use to increase available funding for TMP transit priorities.

## 6.4 IMPLEMENTATION PHASING: TRANSIT ACTION PLAN

### 6.4.1 Implementation Phasing

Implementation of the Renewed Vision for Transit is organized into three time frames: Immediate (2014-2016), Near-Term (2017-2020), and Long-Term (2021-2035). These phases are conceptual, will likely evolve over time, and will be implemented based on available funding and success of regional partnerships.

### 6.4.2 Summary of Transit Action Plans

The Transit Action Plans, provided in Appendix E, provide a complete listing of the city's actions for implementing each of the Transit Modal Plan elements. The Action Plans specify phasing, stakeholders/partners, and the investment program for each action.

Figure 6-1 provides a high-level summary of actions by time frame to implement service, capital, and program initiatives in each time frame. The Renewed Vision for Transit is organized into three time frames to illustrate how the system may evolve over time during the next several decades, including the major elements listed below (see 6.4.1 to 6.4.3).

Figure 6-3 to Figure 6-10 provide sets of maps and tables for each time frame that illustrate how the service and capital elements of the Renewed Vision for Transit (described in Chapters 3 and 4) can be implemented over the time horizon of the TMP.

### 6.4.1 Immediate: 2014-2016

Figure 6-2 illustrates the immediate time-frame phasing of the Renewed Vision for Transit described in Chapter 3. Figure 6-3 and Figure 6-4 provide tables summarizing key elements. The immediate time-frame action items primarily address/respond to:

- The need to enhance transit capacity and connectivity between the CU Main and East campuses.
- The opening of US 36 BRT in 2016 (Boulder's first BRT route) and the new Boulder Junction Transit Center and related service changes.
- Initial steps and partnerships related to implementing real-time transit information and making transit data available to private developers.
- Initial steps related to expanding the EcoPass program and providing the additional services needed to accommodate the anticipated increase in transit demand.
- Initial steps and planning for additional local and regional BRT routes, develop partnering collaborations, corridor planning, and street operational enhancements.
- Expand support for VIA for services for older adults and persons with disabilities.
- Enhance BOUND frequencies to bring up to "CTN" standards.
- Explore options for first-last mile enhancements.

### 6.4.2 Near-Term: 2017-2020

Figure 6-5 illustrates near-term time-frame phasing of the Renewed Vision for Transit. Figure 6-6 and Figure 6-7 provide tables summarizing key elements. Key near-term time-frame action items address:

- Continued enhancement of transit capacity and connectivity between the CU Main and East campuses.
- Add several new CTN routes (upgrade local routes to CTN service level).
- Opening of the North Boulder Transit Center and related service changes.
- Introduction of arterial BRT service on the first two NAMS corridors on the Diagonal (SH 119) and Arapahoe (SH 7) and related service changes, including in Gunbarrel.
- Development of 1-2 pilot Mobility Hub projects and opening of a US 36 BRT stop at Williams Village.
- Implementation of real-time transit information, including transit and multimodal trip planning tools for mobile devices.
- Improve transit circulation in Gunbarrel.

Appendix C provides a more detailed plan for implementing near-term service changes.

### 6.4.3 Long-Term: 2021-2035

Figure 6-8 illustrates the long-term strategies for the Renewed Vision for Transit. Figure 6-9 and Figure 6-10 provide tables summarizing key elements. Key service and capital elements introduced in the long-term time frame include:

- Implement several new CTN routes including the Central-East Circulator and upgrades of existing routes to CTN service level.

- Introduction of arterial BRT service on the third NAMS corridor priority (South Boulder Road).
- Continued development of mobility hubs at various locations.
- Continued implementation of service improvements focused on CTN and BRT corridors.
- Support for developing applications to support transportation mobility options.

Figure 6-1    Transit Action Plan Summary by Time Frame

| | Immediate: 2014-2016 | Near-Term: 2017-2020 | Long-Term: 2021-2035 |
|---|---|---|---|
| **Service** | | | |
| Maintain/enhance existing services | ▪ RTD frequency buy-up (SI.1)<br>▪ Via services support (SI.2)<br>▪ HOP funding (SI.3) | ▪ RTD frequency buy-up (SN.1)<br>▪ Via services support (SN.2) | ▪ RTD frequency buy-up (SL.1)<br>▪ Via services support (SL.2)<br>▪ Increased service levels on HOP (SL.3) |
| Enhance Service to CU East Campus | ▪ Phase I: Address capacity and connectivity issues between CU Main and CU East Campus (SI.4) | ▪ Phase II: Implement second phase of transit enhancements to CU East Campus (SN.8) | |
| Advance Development of Interregional FLEX Service | ▪ Interregional express service (one-seat ride) between Ft. Collins and Boulder (SI.5) | | |
| Support US 36 BRT / Boulder Junction Station Opening | ▪ Continue working with RTD and agency partners to support opening day US 36 BRT service (SI.6)<br>▪ Connect Table Mesa to CU East Campus.(SI.7)<br>▪ Boulder Junction/US 36 Regional Service (SI.8)<br>▪ Adapt local routes to serve Boulder Junction (SI.9)<br>▪ Vehicle bicycle-carrying capacity (PI.10) | | |
| Improve Transit Circulation in Gunbarrel | ▪ Phase I: Planning (SI.11) | ▪ Phase II: Re-align current local service; initiate first-last mile services (SN.3, SN.4) | ▪ Phase III: Commuter Express service to Gunbarrel/IBM, including expansion of first-last mile services and all-day commuter express services (J) (SL.7, SL.8) |
| North Boulder Transit Connectivity Improvements | | ▪ Extend CTN on 30th St corridor and Iris to North Boulder (SN.5) | |

| | Immediate: 2014-2016 | Near-Term: 2017-2020 | Long-Term: 2021-2035 |
|---|---|---|---|
| Implement Diagonal/SH 119 BRT (NAMS corridor) | | ▪ Implement Diagonal/SH 119 BRT (NAMS corridor) (SN.6) | ▪ Enhance SH/119 BRT frequency (SL.4) |
| Implement Arapahoe/SH 7 BRT (NAMS corridor) | | ▪ Implement Arapahoe/SH 7 BRT (NAMS corridor) (SN.7) | |
| Implement Central-East Circulator | | | ▪ Implementation dependent on 32nd/33rd Pearl Parkway to Arapahoe and Marine to Innovation connections (SL.5) |
| Implement South Boulder Road (NAMS Corridor) | | | ▪ Table Mesa to Louisville (SL.6) |
| Complete CTN Buildout | | | ▪ Complete CTN Buildout (SL.9) <br> ▪ 26th/Folsom CTN Corridor (SL.10) |
| **Capital** | | | |
| Develop Transit Stop and Facility Standards and Design Guidelines | ▪ Provide standards, guidelines, and conceptual designs for stop and station facilities (CI.1) | | |
| Stop and Station Improvements | | ▪ Phase I (CN.1) | ▪ Phase II stop improvements at future high ridership stops (CL.1) <br> ▪ Phase III stop improvements at moderate ridership stops (CL.2) |

| | Immediate: 2014-2016 | Near-Term: 2017-2020 | Long-Term: 2021-2035 |
|---|---|---|---|
| Conduct Corridor Planning for Priority Local and Regional BRT/BRT Improvements | <ul><li>Phase I: Identify, design, and implement queue jumps, signal priority, etc. (CI.7)</li><li>Establish regional partnerships strategy (CI.2)</li><li>Williams Village BRT Stop Phase I planning and design (CI.3)</li><li>Diagonal/SH 119 BRT (NAMS Priority Corridor) planning and design (CI.4)</li><li>Arapahoe/SH 7 BRT (NAMS Corridor) (CI.5)</li></ul> | <ul><li>Williams Village BRT Stop Phase II Final Design (CN.6)</li><li>Williams Village BRT Stop Phase II Construction (CN.7)</li><li>SH 119 BRT construction (CN.15)</li><li>Arapahoe/SH 7 construction (CN.16)</li></ul> | <ul><li>South Boulder Road planning and design (CL.14)</li><li>South Boulder Road construction (CL.15)</li></ul> |
| CU East Campus to Main Campus Transit Enhancements | <ul><li>Planning and design (CI.6)</li></ul> | | |
| Fleet Replacement/Expansion for HOP (Via) | <ul><li>Vehicle replacement (CI.8)</li></ul> | <ul><li>Fleet replacement/expansion for HOP (Via) (CN.9)</li><li>Transition transit fleet to cleaner fuel/energy technology (CN.10)</li></ul> | <ul><li>Transition transit fleet to cleaner fuel/energy technology (CL.4)</li><li>Central East Circulator electric fleet and charging infrastructure (CL.5)</li><li>Central West Circulator (HOP) electric fleet and charging infrastructure (CL.6)</li><li>Fleet replacement/expansion for Via (CL.7)</li></ul> |
| Study Boulder County Bus Base Needs/Solutions | <ul><li>Study needs (CI.9)</li></ul> | | |

| | Immediate: 2014-2016 | Near-Term: 2017-2020 | Long-Term: 2021-2035 |
|---|---|---|---|
| Develop Mobility Hubs | | ▪ Mobility Hub 1: Arapahoe and 28th (CN.2)<br>▪ Mobility Hub 2: Canyon and 28th (CN.3) | ▪ Mobility Hub 3: Iris and 28th (CL.8)<br>▪ Mobility Hub 4: Boulder Community Hospital (CL.9)<br>▪ Mobility Hub 5: East Arapahoe (CL.10)<br>▪ Mobility Hub 6: Gunbarrel (CL.11)<br>▪ Mobility Hub 7: CU East Campus (CL.12)<br>▪ Mobility Hub 8: Future additional mobility hub to support long-term transit vision (CL.13) |
| N Boulder TC/Mobility Hub | | ▪ Final Design (CN.4)<br>▪ Construction (CN.5) | |
| Central East Circulator Capital Improvements | | ▪ Phase I Planning and Design (CN.8) | ▪ Phase II: Infrastructure construction (CL.3) |
| Boulder Junction Transit Wayfinding | | ▪ Create transit wayfinding for Boulder Junction Access District (CN.12) | |
| Enhance Transit-Bike Integration and Capacity | | ▪ On-board storage (CN.12)<br>▪ Stop/station storage (CN.13)<br>▪ Bike sharing stations (CN.14) | |
| **Programs** | | | |
| Develop a Real Time Information Implementation Plan | ▪ Implementation Plan (PI.1) | | |
| Open Source Vehicle Location Information Data | ▪ Develop partnerships (PI.2)<br>▪ Make open source data available (PI.3) | | |
| EcoPass Program Expansion | ▪ Phase I (PI.4) | ▪ Phase II (PN.1) | |
| Explore Service Delivery and Implementation Strategies | ▪ Explore models for delivering local and regional transit service (PI.5) | | |

| | Immediate: 2014-2016 | Near-Term: 2017-2020 | Long-Term: 2021-2035 |
|---|---|---|---|
| Develop Transit Information and Wayfinding Standards | ▪ Identify standards (PI.6) | | |
| Coordinate with Boulder Valley Comprehensive Plan Update | ▪ Identify locations for policies to support future transit-oriented land uses/districts (PI.7) | | |
| Develop a Safe Routes to Transit (SR2T) Program | ▪ Develop program (PI.8) | | |
| Transit Implementation Outreach Process | ▪ Establish an ongoing collaborative process with transit partners (PI.9 | | |
| US 36 BRT Ongoing Implementation/Refinement Working Group | ▪ Collaborate with RTD and other partners (PI.10) | | |
| Work with RTD to Implement Mobile/Smart Phone Ticketing | | ▪ Smart phone ticketing application (PN.2) | |
| Work with RTD to Develop a Multimodal Trip Planner | | ▪ Multimodal trip planner (PN .3) | |
| Develop Transit Education and Outreach Program | | ▪ Develop program (PN.4) | |
| Refresh/Refine CTN Branding | | ▪ Conduct a study to refine brand (PN.5) | |
| Dynamic Ridesharing/Networked Transportation Project | | ▪ Develop working group/partner relationships to advance use of dynamic ridesharing (PN.6) | |

| | Immediate: 2014-2016 | Near-Term: 2017-2020 | Long-Term: 2021-2035 |
|---|---|---|---|
| New/Expanded Programs for Older Adults and Persons with Disabilities | | ▪ Expand volunteer driver program (PN.7)<br>▪ Support Via to expand travel training and peer-to-peer mentoring (PN.8)<br>▪ Explore opportunities to cost-effectively serve older adults and persons with disabilities (PN.9) | |
| Build and Operate Boulder Junction Bike Center | | ▪ Build and operate bike center (PN.10) | |

Figure 6-2    Renewed Vision for Transit - Existing and Immediate Phasing: Schematic of Priority Transit Corridors
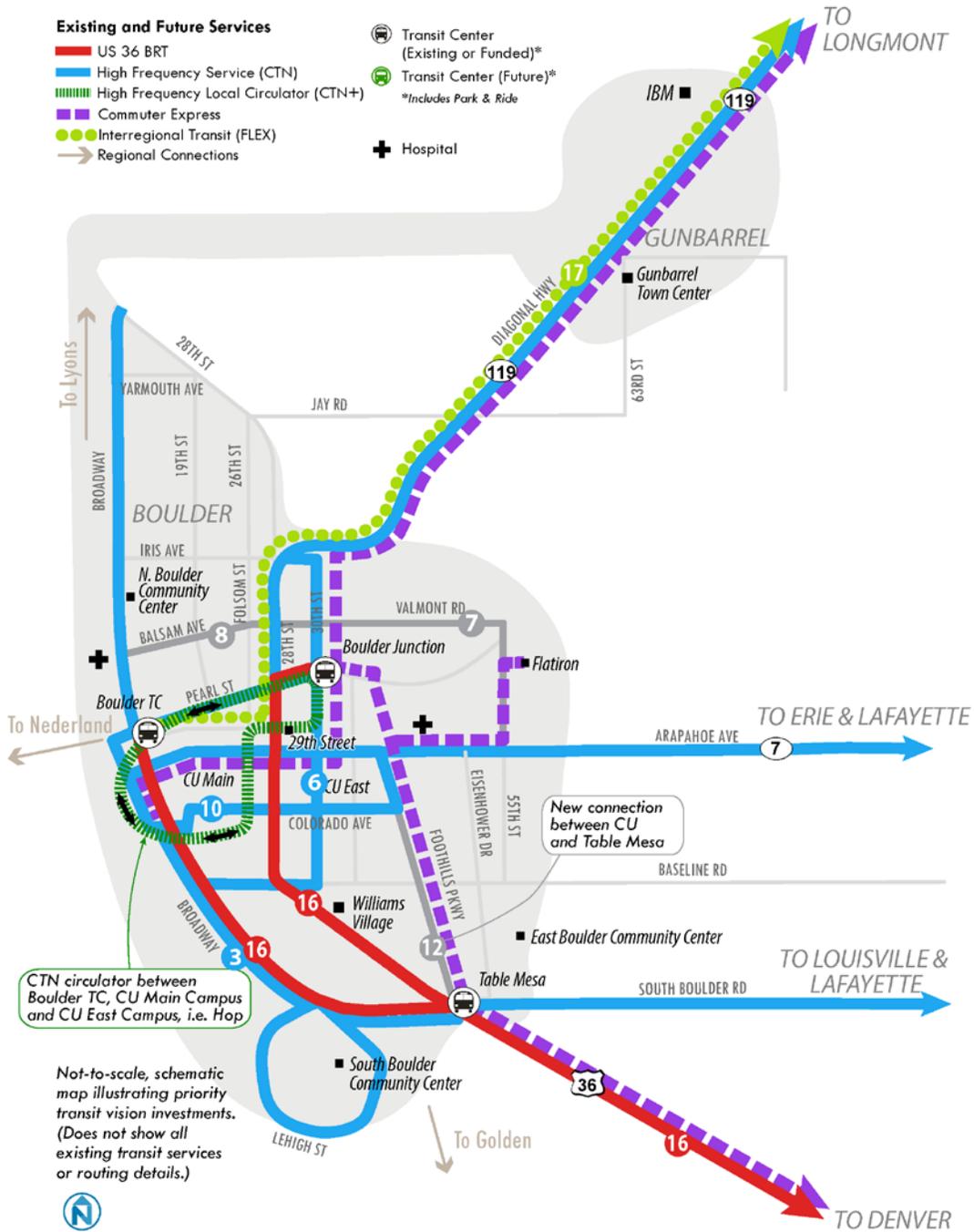
Figure 6-3      Immediate Time-Frame Service and BRT Corridor Projects

| MAP ID | Primary Corridor | Affected Route(s) | Route Type | Action Item Description | Notes | Implementation Partners | COB Investment Program and/or Funding Partners | Action Plan ID(s) |
|---|---|---|---|---|---|---|---|---|
| 3 | Broadway | SKIP | CTN | Adjust frequency/schedule to balance US 36 BRT and local service (SKIP would be maintained as a CTN route). | 3 | COB, RTD, BoCo, CU | Current (Cost-Neutral) | SI.1 |
| 6 | 30th | BOUND | CTN | Increase frequency to meet CTN standard | 4 | COB, RTD, BoCo, CU | Current | SI.1 |
| 7 | Valmont | 208 | Local | Increase frequency | 3 | COB, RTD, BoCo, CU | Current | SI.8 |
| 8 | Pearl | 206 | Local | Modify to Edgewood-Balsam-Broadway routing | 2 | COB, RTD, CU, BoCo | Current (Cost-Neutral) | SI.8 |
| 10 | Colorado | STAMPEDE | CTN | Add service to increase capacity | 2,5 | RTD, CU, COB | CU/RTD | SI.4 |
| 12 | Foothills | 209 | Local | Connect CU East to Table Mesa TC | 2 | RTD. COB, CU, BoCo | Current | SI.6 |
| 16 | US 36 | | BRT | Opening of US 36 BRT | | RTD | RTD | SI.7 |
| 17 | Diagonal | FLEX (New) | Interregional | Introduce service to Fort Collins | | RTD, BoCo, Transfort, DRCOG, CU, COB, Via, CDOT | Current / TBD | SI.5 |

Notes: (1) New CTN Route, (2) Modify routing, (3) Add/modify service (headway or span), (4) Add service to meet CTN standards, (5) Add service beyond CTN standards to address capacity constraints, (6) Upgrade numbered route to CTN, (7) Convert CTN route to BRT. Implementation Partners: COB=City of Boulder, BoCo=Boulder County. CU=University of Colorado.

Figure 6-4      Immediate Time-Frame Capital Facilities

| Description | Locations | COB Investment Program and/or Funding Partners | Action Plan ID(s) |
|---|---|---|---|
| Transit Centers | ▪ Funded development of Boulder Junction Transit Center<br>▪ Improvements at Table Mesa Transit Center | N/A | N/A |

**Figure 6-5** Renewed Vision for Transit - Near-Term Phasing: Schematic of Priority Transit Corridors
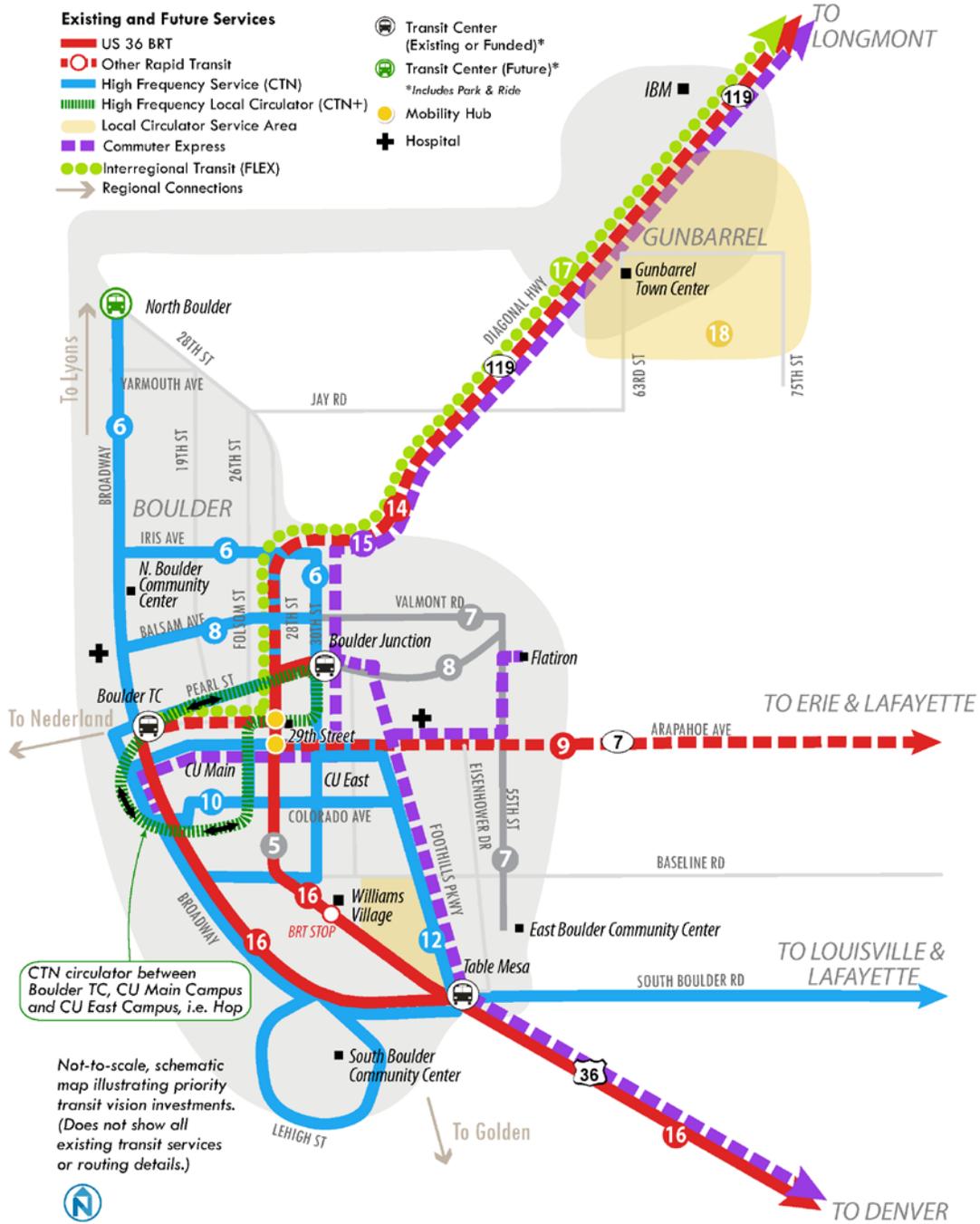
Figure 6-6    Near-Term Time-Frame Service and BRT Corridor Projects

| MAP ID | Primary Corridor | Affected Route(s) | Route Type | Action Item Description | Notes | Implementation Partners | COB Investment Program and/or Funding Partners | Action Plan ID(s) |
|---|---|---|---|---|---|---|---|---|
| 5 | 28th | 205 | Local | Modify route to provide service on 28th to Table Mesa TC | 2, 3 | COB | Action | SN.10 |
| 6 | 30th / Iris | BOUND | CTN | Extend to North Boulder Transit Center | 2 | COB, RTD | Action | SN.5 |
| 7 | Valmont | 208 | Local | Extend to East Boulder Community Center | 2 | COB, RTD | Action | SN.6 |
| 8 | Pearl | 206 | Local → CTN | Upgrade to CTN between downtown and Boulder Junction | 6 | COB, RTD | Action | SN.11 |
| 9 | Arapahoe | JUMP | CTN → BRT | Upgrade to BRT as far east as SH 287 | 7 | COB, RTD | Action (Cost-Neutral) | SN.9, CI.5, CN.17 |
| 10 | Colorado | STAMPEDE | CTN | Increase service and modify to improve access | 2,5 | RTD, CU | CU/RTD COB: Action | SN.12 |
| 12 | Foothills | 209 | Local → CTN | Upgrade CU East to Table Mesa TC connection to CTN service level | 6 | COB, RTD, CU | CU/RTD COB: Action | SN.12 |
| 14 | Diagonal | BOLT | CTN → BRT | Upgrade to BRT | 7 | COB, RTD | Action (Cost-Neutral) | SN.7, CI.4, CN.16 |
| 15 | Diagonal | J | Commuter Express | Re-route to serve Boulder Junction | 2 | COB, RTD | Action (Cost-Neutral) | SN.8 |
| 18 | Gunbarrel | | Local | Re-align local service and initiate first-last-mile connectivity improvements | 2,3 | COB, RTD, BoCo, Employers | Current | SN.3, SN.4 |

Notes: (1) New CTN Route, (2) Modify routing, (3) Add/modify service (headway or span), (4) Add service to meet CTN standards, (5) Add service beyond CTN standards to address capacity constraints, (6) Upgrade numbered route to CTN, (7) Convert CTN route to BRT. Implementation Partners: COB=City of Boulder, BoCo=Boulder County. CU=University of Colorado.

Figure 6-7    Near-Term Time-Frame Capital Facilities

| Description | Locations | COB Investment Program and/or Funding Partners | Action Plan ID(s) |
|---|---|---|---|
| North Boulder TC | North Boulder TC | Action | CN.4, CN.5 |
| Mobility Hubs | <ul><li>Arapahoe & 28th</li><li>Canyon & 28th</li></ul> | <ul><li>Current</li><li>Action</li></ul> | <ul><li>CN.2</li><li>CN.3</li></ul> |
| BRT Stops | Williams Village BRT Stop | Action | CN.6, CN.7 |
| Stop Improvements | Phase I: Prioritize current high-ridership stops | Action | CN.1 |

Figure 6-8     Renewed Vision for Transit - Long-Term Phasing: Schematic of Priority Transit Corridors
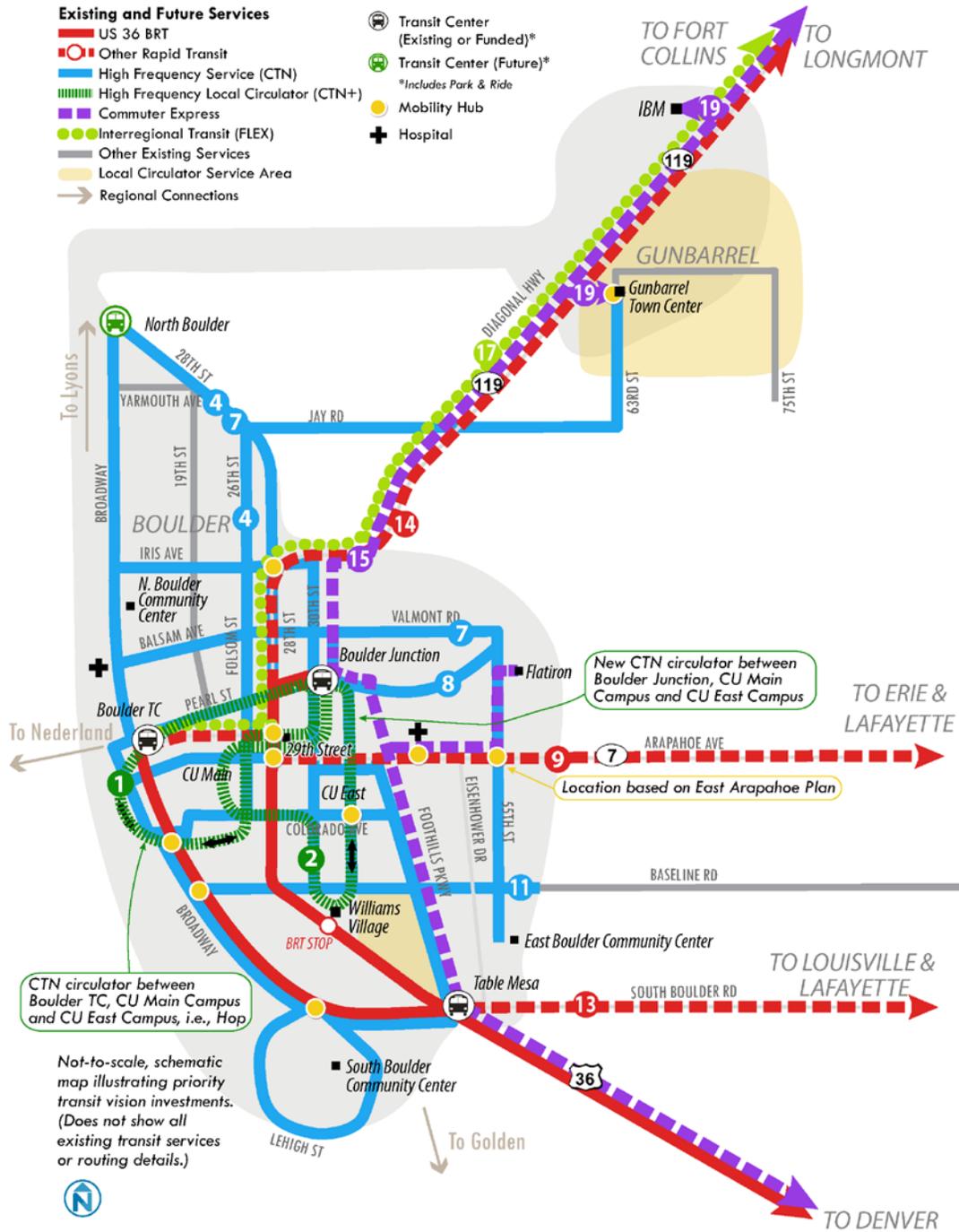
**Figure 6-9      Long-Term Time-Frame Service and BRT Corridor Projects**

| MAP ID | Primary Corridor | Affected Route(s) | Route Type | Action Item Description | Notes | Implementation Partners | COB Investment Program and/or Funding Partners | Action Plan ID(s) |
|---|---|---|---|---|---|---|---|---|
| 1 | Central-West Circulator | HOP | CTN+ | Add frequency | 5 | COB, Via, CU, RTD | Action | SL.3 |
| 2 | Central-East Circulator | New Circulator | CTN | Central-East Circulator connecting Williams Village, CU East and West Campus, and Boulder Junction | 1 | COB, Via, CU | Action | SL.5, CN.8, CL.3 |
| 4 | Folsom/26th | New CTN | CTN | New CTN route connecting CU Main Campus to North Boulder | 1 | COB, RTD, CU, Via | Vision | SL.11 |
| 7 | Valmont | 208 | Local → CTN | Extend to North Boulder TC via 28th or 19th | 2, 4 | COB, RTD, | Vision | SL.10 |
| 8 | Pearl | 206 | Local → CTN | Upgrade to CTN between Boulder Junction and 55th/Arapahoe | 4 | COB, RTD | Vision | SL.10 |
| 9 | Arapahoe | JUMP | BRT | Extend BRT to Erie | 7 | COB, RTD, CDOT, BoCo, Erie | Vision | SL.6 |
| 11 | Baseline | 225 | Local → CTN | Extend CTN to 55th | 4 | COB, RTD | Vision | SL.10 |
| 13 | S. Boulder Rd. | DASH | Local → BRT | Convert to BRT | 7 | COB, RTD | Vision (Cost-Neutral) | SL.7, CL.14/15 |
| 14 | Diagonal | BOLT | BRT | Increase BRT frequency | 4 | COB, RTD, BoCo, Longmont | Action | SL.4 |
| 15 | Diagonal | J | Commuter Express | Upgrade to all-day service | 3 | COB, RTD, BoCo, Employers | Action (Cost-Neutral) | SL.8 |
| 19 | Diagonal | New | Commuter Express | Commuter Express services to IBM / Gunbarrel to fill gaps in employment transportation post-US 36 / SH 119 BRT. | 2,3 | COB, RTD, BoCo, Employers | Action / Current | SL.8, SL.9 |

Notes: (1) New CTN Route, (2) Modify routing, (3) Add/modify service (headway or span), (4) Add service to meet CTN or BRT standards, (5) Add service beyond CTN standards to address capacity constraints, (6) Upgrade numbered route to CTN, (7) Convert CTN route to BRT

Figure 6-10    Long-Term Time Frame Capital Facilities

| Description | Locations | COB Investment Program and/or Funding Partners | Action Plan ID(s) |
|---|---|---|---|
| Mobility Hubs | ▪ Iris & 28th<br>▪ Boulder Community Hospital<br>▪ East Arapahoe (based on East Arapahoe Plan)<br>▪ Gunbarrel<br>▪ CU East Campus<br>▪ To be determined | ▪ Action<br>▪ Action<br>▪ Action<br>▪ Vision<br>▪ Vision<br>▪ Vision | ▪ CL.8<br>▪ CL.9<br>▪ CL.10<br>▪ CL.11<br>▪ CL.12<br>▪ CL.13 |
| Stop Improvements | ▪ Phase II: Prioritize future high-ridership stops<br>▪ Phase III: Prioritize moderate-ridership stops | ▪ Current<br>▪ Action | ▪ CL.1<br>▪ CL.2 |

## 6.5 FUNDING STRATEGIES/OPTIONS

Implementing the Renewed Vision for Transit will require a significant and sustained effort by the City of Boulder and agency partners to identify, secure, and efficiently utilize new and creative sources of funding. Regional, state, and federal funding sources for transit are, and appear likely to continue to be, increasingly scarce and competitive. Securing additional resources for transportation given this challenging funding environment will require heightened effort and creativity. Strong partnerships with RTD, Via, CU, Colorado Department of Transportation, Boulder County, neighboring jurisdictions, community institutions, non-profits, private sector partners, and other stakeholders will be essential to secure and sustain needed funding. This section provides an overview of both existing and potential funding sources for the City of Boulder and its partners to use to fund service, capital, and programmatic elements of the Renewed Vision for Transit.

# 6.5.1 Existing Funding Sources

RTD, the University of Colorado, the City of Boulder, and Boulder County contributed a combined $50.3 million to fund the transit system, as shown in Figure 6-11.

- RTD contributed $42.8 million, which makes up 85% of total funding. Most of RTD's operating revenue comes from sales taxes, a revenue source that is cyclical and shrinks during economic downturns.

- Boulder provided $1.5 million in funding, including for the Hop, support for increased frequency for selected RTD routes, and Via Mobility services. The city's transit funding derives from the Transportation Fund and the Transportation Excise Tax Fund. The largest underlying funding source is a dedicated sales tax.

- Boulder County provided $149,000 in funding support for selected RTD routes.

- CU provides nearly $6 million in annual funding, including support for the Hop and operating the Buff Bus.

- Via operates services including the Hop and RTD ADA Paratransit services with funding from RTD, the City of Boulder, and/or CU. Via also receives grant funding and private donations to provide services such as travel training and facilitate volunteer driver programs.



Figure 6-11    Transit Funding Sources, 2012

City of Boulder, $1.5M, 3%
CU, $5.9M, 12%
RTD, $42.8M, 85%
Boulder County, $0.1M, 0.3%

**Total: $50.3M**
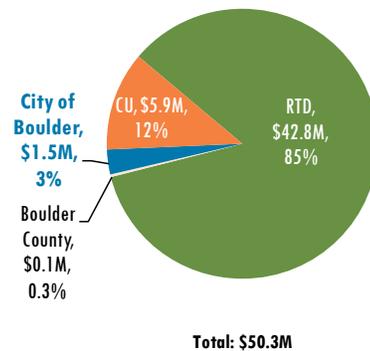
Additional information related to transit funding can be found in the State of the System report (Appendix A):

- Pages 4-25 to 4-26: Existing transit funding
- Pages 6-51 to 6-54: Transit funding options

# 6.5.2 Federal Funding Sources

The recently enacted Moving Ahead for Progress in the 21st Century Act (MAP-21) legislation provides a new structure for federal funding programs and is effective from October 1, 2012 through the end of federal fiscal year (FY) 2014. This legislation will then either be reauthorized or a new federal funding bill passed. The following formula-based programs for urbanized areas in are relevant to Boulder; unless otherwise noted, these programs require a 20% local match for capital assistance and a 50% match for operating assistance (if applicable). Revenue from these funding sources is typically allocated at the regional level.

- **Urbanized Area Formula Program (FTA Section 5307)**. This program is primarily intended to fund fixed-route operating or capital costs and consolidates several previous programs. A 20% local match is required for capital and a 50% local match for operating expenditures. Up to 10% of 5307 funds can be applied to preventative maintenance or ADA Paratransit service and matched at 20%.

- **Enhanced Mobility for Seniors and Individuals with Disabilities Program (FTA Section 5310).** This program provides funding for services to seniors and persons with disabilities that go beyond traditional fixed-route services and ADA paratransit. It can be used for operating and capital costs. In general, this funding source requires a 20% local match for capital and a 50% local match for operating expenditures, however only a 10.27% match is required for purchased transportation services.

- **Bus and Bus Facilities Formula Grants Program (FTA Section 5339).** This program funds capital expenses related to vehicles and facilities. It requires a 20% local match and is only eligible for capital expenditures.

## Other Federal Funding Sources

### TIGER Discretionary Grants

The U.S. Department of Transportation's Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant program invests in transit capital projects that address national objectives in congestion mitigation, economic recovery, and emissions reductions. There have been six rounds of funding since 2009 for a total of $4 billion in grants awarded. The most recently enacted FY 2014 Appropriations Bill includes $600 million for the TIGER Program. Recent projects funded in the Greater Denver-Boulder region include the I-25 North Managed Lanes Extension and Express Bus Project ($15 million) and the US 36 Managed Lanes/BRT ($10 million). Although a highly competitive program, this is a highly flexible grant program for capital spending.

Potential TIGER grant applications include partnerships with CU and others for the Williams Village BRT stop and NAMS BRT corridors and related infrastructure.

### Congestion Mitigation and Air Quality Program Grants

The federal Congestion Mitigation and Air Quality Improvement (CMAQ) Program was implemented to support surface transportation projects and related efforts that contribute to air quality improvements and provide congestion relief in "non-attainment" areas.  Boulder

County and the greater Denver region are currently classified as a non-attainment area for 8-hour ozone (2008) by the U.S. Environmental Protection Agency.

The Denver Regional Council of Governments (DRCOG) is responsible for selecting projects for CMAQ funding in the Denver region. CMAQ has been used in the past to provide startup funding for the Dash and Stampede routes. Although the statewide allocations vary, transit projects have been allocated more than 40% of total funding. In recent years, this has resulted in more than $20 million annually for transit.[1] Agencies and municipalities solicit CMAQ-type projects as part of the four-year transportation improvement program (TIP) update cycle. DRCOG allocated $106 million in CMAQ projects for the FY 2008–2013 TIP, which is 4.3% of the overall CMAQ pool of $2.5 billion.[2]

## New Starts/Small Starts

The FTA's New Starts program is the federal government's primary financial resource for supporting locally planned, implemented, and operated major transit capital investments. The New Starts program funds fixed guideway transit projects including: commuter rail, light rail, heavy rail, bus rapid transit, streetcars, and ferries. New Starts projects have three phases: (1) evaluation of alternatives leading to the selection of a locally preferred alternative, (2) preliminary engineering during which design and environmental issues are addressed, and (3) final engineering during which final construction plans are developed. The process can take seven to 10 years or more from initiation of an alternatives analysis (AA) to execution of a full funding agreement. Projects must have a total capital cost over $250 million and local match requirements are 20% of that total cost; in recent years the FTA has been pushing recipients to pay closer to a 50% local match. The Small Starts Program was established to fund and speed implementation of simpler, less capital-intensive projects. To qualify for Small Starts, requests must be for less than $75 million in federal funding and have a total project cost under $250 million. The project must be a fixed guideway for at least 50% of the project length in the peak period, and/or be a corridor-based bus project with the following minimum elements:

- Substantial Transit Stations
- Signal Priority/Pre-emption (for Bus/LRT)
- Low Floor/Level Boarding Vehicles
- Special Branding of Service
- Frequent Service - 10 min peak/15 min off peak
- Service offered at least 14 hours per day

The Small Starts program is primarily identified as a funding opportunity for developing the Northwest Area Mobility Study (NAMS) BRT corridor priorities. These priorities are intended to provide near-term high-capacity transit mobility in advance of future implementation of the Northwest Rail Line to Boulder and Longmont, as originally envisioned in the FasTracks program. Completing the BRT corridor priorities will require continued partnership with RTD

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[1] Colorado Department of Transportation. (2008) 2007-2008 Annual Report.
http://www.coloradodot.info/programs/commuterchoices/cmaq.html

[2] Federal Highway Administration. SAFETEA-LU 1808: CMAQ Evaluation and Assessment Phase II Final Report.
http://www.fhwa.dot.gov/environment/air_quality/cmaq/research/safetea-lu_phase_2/chap06.cfm

and a significant commitment from RTD to construct and operate these projects. Alternative approaches to advancing project development are described in the next section (see 6.6.2).

### Clean Fuels Program

The Clean Fuels Grant Program (FTA 5308) was developed to assist non-attainment areas in achieving or maintaining the National Ambient Air Quality Standards for ozone. The program supports emerging clean fuel and advanced propulsion technologies for transit buses. Eligible projects include purchasing or leasing clean fuel buses or bus facilities and projects related to clean fuel, biodiesel, hybrid-electric, or zero emissions technology buses. The grants provide a 17% match for vehicles and vehicle-related equipment and a 10% match for facilities. Most grants are between $1 million and $4 million.

The City of Boulder and its partners can apply for these grants to acquire clean fuel transit vehicles to reduce fleet emissions.

## 6.5.3 State Funding Options

### Gas Tax

The State of Colorado levies a 22 cent per gallon gas tax. Formerly, this tax was only to be used for roadway projects. Recent legislation, however, has allowed for the $250 million per year in state gas tax revenue to be used for transit projects. Transit projects have not yet benefited from this change in legislation.

### Vehicle Registration Fees

The State of Colorado levies the Funding Advancements of Surface Transportation & Economic Recovery (FASTER) vehicle registration fee. This fee raises an estimated $250 million per year for repairs to roads and bridges. FASTER supports transit projects with $15 million every year based on a statutory set-aside. Among the projects that have been awarded are the purchase or replacement of transit vehicles, construction of multimodal stations, and acquisition of equipment for consolidated call centers.[3] Additional vehicle registration fees may also be employed by counties in Colorado.

## 6.5.4 Local Funding Options

Many recent capital projects in the United States have relied largely, if not solely, on local funding for construction and operations. In a number of cities around the country, avoiding complex requirements associated with federally-funded construction projects has allowed for more cost-effective and rapid construction and implementation of service.

The following are some of the potential local sources of funding for constructing transit projects called for in this plan. Some sources also have potential to raise operating funds.

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[3] Colorado Department of Transportation. FASTER Transit Grants.
http://www.coloradodot.info/projects/faster/faster-transit-grants

## General Obligation Bonds

Bonds are a primary source of funds for constructing major capital improvements. Voter-approved bonds are sold to provide up-front funding for transportation projects, including street and transit corridor improvements. A set of projects may be grouped into a "bond package" that goes before the public for voter approval. General obligation bonds could be supported through the city's existing property tax base, or backed with incremental increases in universally-applied city taxes, such as those on sales or property, or parking meter revenues.

## Taxes

### Sales Tax

General sales taxes or taxes on tourism (hotel/motel/transient occupancy taxes) can provide a relatively stable funding source for transit operations or capital projects. Sales and use taxes are a major revenue source for RTD and an additional regional sales tax of 0.4% was used to fund the FasTracks capital improvement program. A 0.6% local sales tax is a primary source of transportation funding for Boulder, including for transit. In 2013, Boulder voters approved a 0.15% dedicated sales tax for transit. Finally a Boulder County sales tax helps fund the County's contribution to transit operations.

Boulder County voters approved two sales tax revenue measures in November 2013. These measures redirected two different increments of expiring sales tax revenue to transportation, providing a total of 16 years of additional funding. The funding will provide core system enhancements and maintain transit service hours among a number of other operations, maintenance, and capital needs.

### Payroll Tax

A payroll tax is imposed directly on employers. It is based on payroll for services performed within a transit district, including traveling sales representatives and employees working from home. This tax applies to covered employees and self-employed workers. Advantages include flexibility of revenues (capital and operating purposes), administrative ease, and equity.

For example, the Oregon Legislature has authorized two districts to levy payroll taxes: TriMet in Portland (0.72% or $7.20 per $1,000 earned) and Eugene (0.69% or $6.90 per $1,000 earned). The tax accounts for over half of TriMet's operating revenue (or $232 million in FY 2011).

### Employee Head Tax

Employee head taxes charge employers a flat tax on each worker, typically annual. Head taxes are not a common revenue sources, but one example is the Employers' Expense Tax in Chicago, which applies to employers with more than 50 employees. The rate is $2.00 per employee per month. For example, an annual $25 tax on each of Boulder's 100,000 employees would result in $2.5 million in additional revenue. If implemented such a tax would be placed only on people who work in Boulder, so residents who work in other municipalities would be exempt.

## Usage Fees

### Congestion Pricing and Toll Revenue

Congestion pricing and toll revenue provide a potential funding for transit and road infrastructure maintenance while also increasing the cost of driving, which can make transit more cost-competitive. Congestion pricing can use variable pricing mechanisms to charge road users more during peak hours; this can encourage drivers to shift to other modes or opt for earlier or later travel. Tolls may charge a flat or variable fee by time-of-day and some are based on the distance of the roadway traveled.

Toll revenue most commonly feeds into the maintenance and operating fund of roadways or transit service along the same travel corridor. In international examples of congestion pricing, such as London, transit has benefited directly from pricing revenue. Vanpools and other high-occupancy vehicles may be exempt from paying a toll. For example, on the US 36 Express Lanes project, high-occupancy vehicles (HOV) would be exempt from paying a toll, while single-occupancy vehicles would be charged for use of the express lane.

Administrative costs of collection can reduce the revenues received from congestion charges and tolls. Revenues are often flexible (operating or capital purposes) but in some cases their use is limited to a specific corridor or zone. While the use of tolls and congestion pricing has faced barriers to implementation in other jurisdictions nationally, existing toll facilities in the region include the I-25 HOV Express Lanes. Typically, tolls are only implemented on new roads or roads that have recently undergone major improvements.

### Vehicle-miles Traveled (VMT) Fees

Unlike tolls, VMT fees are distance-based fees that are not facility- or zone-specific. VMT fees have been considered by many states and municipalities, but none have been implemented for personal vehicles in the United States. Miles traveled in a particular vehicle are envisioned to be collected through the use of an onboard vehicle device through GPS or other technology. This would then be linked to a method of payment, such as manual cash payment or automatic deductions from a prepaid costumer account. Due to the infrastructure requirements, such a fee would like only be feasible at the state level. Oregon is considering such a tax as a replacement for the gas tax, with several collection options available to allay privacy concerns, including a flat charge option.[4]

### Transit Access (Utility) Fee

A transit access (utility) fee is paid by households and businesses and is designed to support the transit agency over time. A transit access fee could be assessed for all households within the transit district. Transit access fees are typically a monthly charge of between $1 and $5 per household and often have discounted rates for low-income households. Alternative rates are assessed for businesses. These revenues can be used for operations, administration, and capital expenses.

Only a handful of cities have adopted this revenue source. Corvallis (Oregon), a college city with a population of about 55,000, generated $850,000 in the first year of a transit utility fee

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[4] Federal Highway Administration. Road Pricing Defined
http://www.fhwa.dot.gov/ipd/revenue/road_pricing/defined/vmt.aspx

in 2011. The fee, charged on water bills, cost $3.73 per month per single-family dwelling or $2.58 per housing unit per month for multi-family residential customers. The amount varies for commercial and industrial customers, based on typical transportation demand generated.

> The State of the System Report (Appendix A), page 6-52, describes application of this funding source in Corvallis.

### Development Impact Fees

Municipalities tax developers based on the impact of a new development on the transportation system. These fees are used to pay for infrastructure improvements that will mitigate the level of service concerns brought by the new development. This is a common fee used for road infrastructure but is less commonly used to fund transit. San Francisco, for example, collects fees to ensure the new development receives adequate transit service. Depending on local implementation, use of this revenue source can be flexible, paying for operating or capital improvements. The City of Boulder currently assesses a transportation excise tax on new construction in the city.

> The State of the System Report (Appendix A), page 6-51 provides a more detailed discussion of this funding source in Santa Monica, CA.

### Greenhouse Gas Emissions Fee

In 2006, Boulder voters approved the first carbon tax in the United States. The tax, paid through energy utility bills, raises a new source of revenue to reduce Boulder's carbon footprint. Additional revenue from this source could be used to increase the use of transit through marketing campaigns, more affordable transit passes, or other programs.

## Special Districts

### Access Districts/Parking Meter Revenues

Pricing of parking is an effective way to raise revenue for transportation services. Pricing parking provides a stable revenue source and also reduces reliance on single-occupant vehicles. Downtown Boulder and University Hill are Boulder's two "Access Districts" with paid parking. Boulder Junction is an Access and a TDM District in anticipation of future development.

Parking meter revenue may be prioritized to support parking-related operations and maintenance, used for improvements benefitting a parking district, used to fund transit operations or capital costs, or bonded (see general obligation bonds above). In Boulder, revenue from the downtown parking district is used to provide highly-effective TDM programs including the EcoPass program. In some cities, such as San Francisco, variable pricing ensures that spaces are always available for people visiting business districts.

> The State of the System Report (Appendix A), page 6-53 describes use of parking meter revenues for transit in Portland, OR and San Francisco, CA.

### Business Improvement District

A business improvement district (BID) is an area within which businesses pay an additional tax to enhance the area within the district's boundaries. The Downtown Boulder BID is a 49-block neighborhood that uses the funding for enhancements to the area and events. This is not a substantial source of funding for transportation, but in other cities, BIDs have been used to fund safety and aesthetic enhancements that support transit within the district.

### Property Access Fee, Land Value Capture, and Benefit Assessment Districts

Property access fee, land value capture, and benefit assessment districts are approaches to sharing transit costs with owners of property located near a transit resource (e.g., a transit station) who benefit directly from proximity to the transit resource. These funding mechanisms provide a way to finance transit through taxes on nearby private development, where property values increase as a result of transit investments. These revenues can be used for operations, administration, and capital expenses.

### Transportation Benefit Districts

While not present in Colorado, some states have enacted special transportation benefit districts that can impose fees more broadly to benefit transit. For example, in Washington State, the city of Seattle is authorized to impose up to a $100 total annual vehicle license fee with voter approval, of which $20 is currently authorized. This revenue ($8 million annually) preserves King County Metro Transit service in the city.

### Tax Increment Financing

Tax increment financing (TIF) is a mechanism for funding redevelopment projects in Colorado exclusively targeted at improving blighted areas. TIF revenue is generated when an urban renewal area (URA) is designated and the assessed value of all property in the area is "frozen." Over time, total assessed value in the area increases above the "frozen base" from appreciation and new development. The value greater than the frozen base is the incremental assessed value; taxes generated on the incremental assessed value are received by the URA, rather than other taxing districts.

TIF could only be used on capital transit projects that directly benefit the URA. Projects that benefit the broader area can only receive TIF funding proportional to the benefits the URA receives. TIF funds could provide a substantial source of revenue to fund capital projects within the URA, including transit projects. The revenues generated by the program would increase over time as property values increase, and new development occurs in the area. Urban renewal authorities and downtown development authorities in Colorado have allocated more than $70 million annually on projects improving blighted areas.[5]

## 6.5.5 Public and Private Partnerships

Transit agencies can work with major employers and trip generators to help pay for transit service and facilities. Major institutions, such as the University of Colorado, or private companies may sponsor a station or purchase transit passes for their employees, students, or

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[5] Colorado Legislative Council Staff. Memorandum: Property Tax Accruing to Tax Increment Financing Districts. (January 9, 2008). http://preview.tinyurl.com/keyeeud

visitors. The City of Boulder, Boulder County, and RTD are already pursuing such strategies through the EcoPass and CollegePass programs.

## Advertising/Sponsorships

Transit systems can raise revenues by selling advertising to businesses and non-profit organizations. Opportunities for advertising on buses include: (1) ads inside the bus, (2) ads on the outside of buses and (3) ads in stations or at stops. Revenue from advertising is generally relatively small, generally accounting for less than 3% of revenues for small transit districts. Potential issues with advertising include: (1) controlling the content of the advertising and (2) preserving aesthetic appeal of buses.

Historically, selling naming rights in exchange for a donation for a capital improvement was most common for large organizations, such as universities or hospitals. Selling naming rights has become more common among smaller organizations as well. Some transit agencies sell naming rights on an annual or biannual basis; this can include placing the sponsor's name on a vehicle, stop shelter, or an audible announcement at a stop.

Advertising and sponsorship revenues can be used for operations, administration, and capital expenses.

## Institutional Partners

CU's transit contributions include employee EcoPass and Student Pass programs (latter paid for by student fees). In other cities, major employers such as hospitals have developed similar programs to support transit. In addition to purchasing transit passes for employees, institutional partners may sponsor stations, transit way development, and/or station amenities that will make stations more attractive to employees or students, as well as running or supporting shuttle services connecting to local and regional transit.

## Public-Private Partnerships and Joint Development

A public-private partnership is a mutually beneficial agreement between public and private entities that seeks to increase revenues or improve the value of an asset. Examples include private entities that rent space for concessions, shared right-of-way (e.g., utilities), shared fueling facilities for alternative fuel vehicles, shared maintenance facilities, and other opportunities.

## 6.6 SERVICE DELIVERY OPTIONS

## 6.6.1 Local and Regional Service Delivery Options

The City of Boulder has developed extensive partnerships for collaborating to provide transit service in the community such as with RTD, Via, the University of Colorado, Boulder County, DRCOG, Colorado Department of Transportation (CDOT), and other interregional partners. Of these, there are three transit providers that operate transit service in Boulder: RTD, Via, and CU for the Buff Bus. RTD, Via, and CU all have maintenance facilities based in the city of Boulder. There are other private, for-profit transit operators in the Front Range region but not based in Boulder.

The City of Boulder is within the Regional Transportation District taxing and service district. RTD is the local and regional mass transit operator and services 8 of the twelve counties in the broader Denver-Aurora-Boulder combined statistical area. RTD's primary source of operating funds is a 1% sales tax collected throughout its service area. Since 2004 when the region voted to support FasTracks, a major capital construction program supported by a 0.4% sales tax increase, RTD has been focused on delivery of corridor capital projects in the RTD service area. Northwest Rail, a commuter rail line originally identified in Fastracks to serve Boulder and other communities in the northwest portion of the region, has been identified by RTD for implementation in 2042 and currently does not have funding. RTD has recently completed the Northwest Area Mobility Study to explore the feasibility of Bus Rapid Transit on a variety of corridors in the Northwest area to speed up implementation of enhanced transit options to the area.

While RTD provides the majority of regional and local transit service in Boulder, the HOP service is operated by Via, a local non-profit located in Boulder that also provides transit service to older adults and persons with disabilities in Boulder, Boulder County, and other communities. Via is the primary operator of RTD's ADA paratransit service. The HOP bus route is provided in partnership with CU, RTD, and the city. The Buff Bus is operated by CU to provide fixed route transit service on the CU campus.

A significantly more detailed analysis is required to explore service delivery options, such as evaluating costs, benefits, opportunities, and challenges associated with potential service delivery options. With the future of BRT service implementation and other CTN enhancements, there is significant opportunity to explore different types of service delivery models.

The potential service delivery models range from maintaining the status quo, to developing new partnerships for future transit service delivery. Funding and legislative issues associated with service delivery options would be significant and would require extensive study.

The proposed direction of the TMP is for the city to use additional transit resources to leverage service enhancements identified in the Renewed Vision for Transit and to increase staff and financial resources to implement key CTN improvements and a BRT program. The city should explore implementation options in the future as part of a regional discussion with key stakeholders and transit partners.

# 6.6.2 Delivering Bus Rapid Transit

Both the Boulder Renewed Vision for Transit and the RTD Northwest Area Mobility Study support the development of an extensive arterial BRT system including three routes that operate to/from and within Boulder.  The top priority corridor from the NAMS study was the SH 119 corridor between Longmont and Boulder.  The results of the Boulder TMP transit scenario analysis also supported this as the highest ridership BRT corridor.  The SH 7 (Arapahoe) and South Boulder Road corridors were also supported by both studies and performed well in projected ridership forecasts.

Moving even one of these projects forward will require a significant investment from all project partners, including RTD, City of Boulder, Boulder County, CDOT, and other corridor communities.

Assuming Federal Transit Administration (FTA) capital grant funds will be pursued to support the cost of building the project, there is a clear, multi-phase pathway to project construction. With a decision to begin the collaborative project development process occurring this year, project development and delivery is likely to take at least 6 to 8 years.  Figure 6-12 provides an aggressive and optimistic schedule for moving through the next steps in the development of a federalized capital project.

Figure 6-12     BRT Project Development Process



There are several options for Boulder to consider for delivery of the SH 119 BRT project and the remainder of the NAMS/TMP BRT program:

1.  **RTD project development, design and engineering, and construction**.  In this scenario, RTD capital development staff would initiate the project and work with support of local stakeholders in the corridor to evaluate alternatives, identify a locally preferred alternative (LPA), manage the design and NEPA work, and construct the project.

2.  **Local jurisdiction project development and concept design, CDOT and RTD design and engineering, CDOT and RTD construction.**  In this scenario, a local jurisdiction (or group of local jurisdictions under a joint agreement) would initiate and manage the project development.  RTD would participate as a stakeholder in this phase of the project, taking back more management responsibility as the project moves into later phases of design, environmental evaluation and construction.

In either case, RTD or CDOT would be the construction grant recipient for federal funds, and design, build and operate the project.   Given RTD's intense capital development workload as it continues to build out the projects funded through FasTracks, the City of Boulder should explore the latter option with the City of Longmont and Boulder County.   This would allow

project planning and development to progress while RTD completes its FasTracks commitments.   This approach would require a deliberate discussion between all parties and may require legal agreements between jurisdictions to define roles and responsibilities. A first step could be to hold a facilitated workshop with key local, regional and corridor partners to discuss the requirements, challenges, and commitments that would be associated with such an approach.

MAP-21 makes clear that the Federal Transit Administration views the selection of a preferred alignment, mode, and operating plan as a local decision. While certain information and analysis is require to advance the project as a federalized project by entering into project development, the pathway to developing this information can be achieved as preferred by local governments.

Next phases of BRT project development should be conducted with an eye toward federal funding opportunities, in particular the FTA New Starts/Small Starts capital grant program. Small Starts grants are for capital construction on projects of up to $250 M, with a federal share no greater than $75 M.   The program is competitive and projects are assessed against their finance plan (50% of overall rating) and the following six criteria, which make up the other 50%.

- **Land Use.**  Criterion includes existing density and zoned development capacity.
- **Economic Development.**  Criterion includes the potential for economic development to occur as part of the transit development.  Project sponsors are allowed to submit mode-specific economic development scenarios.
- **Cost Effectiveness.**  The criterion for cost effectiveness for Small Starts projects is the cost/ride for the federal share of the project.  To achieve a high rating, the cost per ride must be below $1.00.
- **Mobility Benefits.**  Mobility benefits are determined by the number of people served or benefitted by the investment.
- **Environmental Benefits**.  Environmental benefits are determined by the use of the mode and the effectiveness in reducing environmental impacts.  The benefits of land use development patterns are not included in this criterion which is limited to evaluating the mode being utilized.
- **Congestion Relief**. The criterion for congestion relief is the number of new transit trips that are forecast as a result of the project.

The Renewed Vision for Transit Action Plan (see Appendix E) details key strategies for initiating and carrying out next phase project development activities, including development of BRT program capacity and a more detailed internal (city) work plan as well as the development of local design standards for BRT facilities and right-of-way operations.

# 6.7 STRATEGIC PARTNERSHIPS

Local and regional partnerships will be critical to implementing the Renewed Vision for Transit and realizing community mode share goals. Success in reducing SOV travel will require an active stance from Boulder coupled with strong partnerships with RTD, Boulder County, CU, CDOT, Boulder Valley School District (BVSD), neighboring jurisdictions, and Via Mobility Services, among others.

Partnerships are particularly important given the growing in-commute in Boulder. As Boulder adds more jobs, an increasing percentage of the population is expected to live in east Boulder County and other counties. To realize the Renewed Vision for Transit, key strategic partnerships include the following:

- **RTD** is a critical partner to expand service options and help improve the overall passenger experience for transit riders in Boulder and traveling to Boulder. In addition to providing improved transit service, RTD will be an important partner in launching US 36 BRT, developing NAMS BRT corridors, and implementing programmatic elements of the Renewed Vision for Transit, such as real-time information, stop improvements, and advancements in mobile ticketing, among other initiatives.

- **Boulder County, neighboring jurisdictions, interregional agencies,** and the City of Boulder are already working in partnership to align their transportation and land use goals. In addition to partnering on a policy level, these neighboring jurisdictions can join together to help fund expanded regional service and transit amenities to attract more regional riders. A key City of Boulder and Boulder County initiative, working closely with RTD, is to continue their efforts to expand the successful EcoPass program. Boulder has developed a strong coalition with neighboring jurisdictions through its work on regional commuting, transit, and mobility projects. The base is strong to expand these partnerships to forward the development of BRT in regional corridors and advance regional service enhancement priorities.

- **University of Colorado Boulder** is a key partner for improving connectivity between the Main and East Campuses and developing street connections to support the introduction of the Central-East circulator service. CU is a significant funder of local transit service and programs and is strongly committed to aiding in the development of regional transit solutions that address in-commuting challenges and continue to allow it to support a broad range of programs, research, and educational pursuits in Boulder.

- **Via Mobility Services** is a critical partner in operating the HOP and potentially other future transit services and expanding service and programs for older adults and persons with disabilities.

- **Boulder Valley School District** provides important connections to students and their families. Strong partnerships with BVSD can help encourage families to take transit to school and for other types of trips.

- The **private sector**, including partnerships with application developers, can help Boulder and its regional partners develop cutting-edge applications to deliver real-time information and multimodal trip planning to web and mobile devices.

- Other partners such as **US 36 Commuting Solutions, Boulder Transportation Connections, Boulder Chamber of Commerce, and Boulder Convention and**

**Visitors Bureau** help Boulder reach new transit markets as new service comes on line, such as the US 36 BRT service.

The Renewed Vision for Transit Action Plan, which can be viewed in Appendix E, provides details on what recommended actions and programs require partner support and funding.