

**CITY OF BOULDER
TRANSPORTATION ADVISORY BOARD
AGENDA ITEM**

MEETING DATE: Dec. 9, 2013

AGENDA TITLE: Staff briefing and TAB input regarding TMP Update progress, with emphasis on the Complete Streets Focus Area including transit planning scenarios and evaluation framework, and a status update regarding bike/walk innovations

PRESENTERS: Tracy Winfree, Director of Public Works for Transportation
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EXECUTIVE SUMMARY

The primary purpose of this memo is to provide a status report, check-in and opportunity for the Transportation Advisory Board (TAB) to provide input on progress to date on the Transportation Master Plan (TMP) Update, with an emphasis on the Complete Streets Focus area. The Dec. 9 TAB meeting will include brief updates on all the TMP focus areas and feature a more in-depth discussion of the transit planning and bicycle and pedestrian innovations. In January 2014, staff will provide an update to TAB that features the other TMP Update Focus Areas including Funding, Transportation Demand Management, and Regional in more detail. The goal is to provide multiple opportunities for in-depth input from TAB for all areas of the TMP Update in advance of the City Council study session geared toward February/March 2014.

Staff will continue to move forward with the TMP Update process into 2014 in accordance with City Council and TAB guidance. Upcoming topics will include the results of the modeling of the transit scenarios, regional updates, the TDM toolkit and the TMP investment program. Staff will continue to incorporate TAB comments and community input throughout the update process. In addition, staff is actively working on a number of other efforts as part of the city's Sustainability Initiatives.

TAB ACTION REQUESTED

Review and provide input on work completed in the TMP update with emphasis on Complete Streets including transit planning scenarios, the proposed evaluation framework and activities in the Bicycle/Pedestrian Innovations.

COMMUNITY SUSTAINABILITY ASSESSMENTS AND IMPACTS

- **Economic:** Transportation costs are a significant portion of household expenses and important to business competitiveness and employee retention. Enhancing the travel options available to residents and employees supports more sustainable travel behavior and the movement of goods and people essential to the local economy. Transit is a particularly important option for in-commuters as it provides one of the few options to long distance single-occupant vehicle (SOV) travel. Biking and walking reduce road construction, repair and maintenance costs; bicyclists and pedestrians tend to shop local and invest in the local economy. Completing the walk, bike and transit systems also responds to the lifestyle choices and desires of younger workers, particularly those in the “creative class” that are a foundation of the Boulder economy. A local survey estimates the direct economic benefit of the bicycling industry in Boulder to be \$52 million.
- **Environmental:** Achieving the TMP objectives of reducing single occupant vehicle (SOV) travel, reducing congestion and air pollution emissions have direct environmental benefits. Integration of the TMP Update with the city’s Climate Commitment and Sustainability Framework places a greater emphasis on reducing greenhouse gas emissions. Transit has the potential to replace long distance SOV trips with significant greenhouse gas (GHG) emission reductions. Biking and walking are zero emission transportation options reducing greenhouse gas and vehicle miles traveled. Reducing the number of trips made by cars reduces congestion and frees up road space for essential motor vehicle trips.
- **Social:** Enhanced travel options improve access for all community members. Improved transit access is particularly important to seniors, low income and people with disabilities. Recent research shows that transit riders tend to walk more and be healthier than auto commuters while neighborhood accessibility is an increasing focus related to public health for both children and adults. The increased focus on transit and accessibility will have multiple benefits to the community. Additionally, a complete transportation system that supports walking and bicycling expands modal choice for low-income, older adults and children.

OTHER IMPACTS

- **Fiscal:** The TMP Update is supported by existing funding from the city’s budget in 2013 and 2014.
- **Staff time:** Staff resources for this project have been funded and included in the 2013 and 2014 budgets.

BACKGROUND

The TMP exists within the broader context of the Boulder Valley Comprehensive Plan (BVCP), the city’s Sustainability Framework and Climate Commitment goals. The resulting transportation system is expected to support the sustainability and quality of life goals set by the community. As a mature plan, the TMP reflects more than 20 years of consistent policy direction and

documented results. The TMP update began with the Policy Refinement phase in 2012, with the results and following work program approved and supported by City Council in 2012-13. Council has directed that:

- The plan should maintain the existing four TMP Focus Areas with the following emphasis:
 - *Complete Streets*, formerly Multimodal Corridors: Rename, address transit system planning, explore bike and pedestrian innovations
 - *Regional Travel*: continue existing approach with a focus on US 36, the Northwest Area Mobility Study and other regional connections
 - *Transportation Demand Management (TDM)*: explore community-wide Eco-Pass and develop TDM packages for development review
 - *Funding*: expand transportation funding focus as the funding shortfall has increased and funding is essential to continued progress. (While recent progress has been made to stabilize service levels and provide limited enhancements, the TMP will continue to explore appropriate funding approaches for future TMP enhancements.)
- Add “Integrate with Sustainability Initiatives” as a new, fifth Focus Area. This includes integration of the TMP Update with the city’s sustainability efforts including the Civic Area plan, Climate Commitment, Sustainable Streets and Centers, Access Management & Parking Strategies, East Arapahoe and North Boulder community/corridor plans.
- Add three new measurable objectives of *Safety, Neighborhood Accessibility and Vehicle Miles Traveled (VMT) Per Capita*.

TMP Focus Area Progress

Planning work continues under all the Focus Areas of the TMP Update with substantial progress to-date in the Complete Streets and Funding Focus Areas. While TAB will be receiving specific and detailed materials on each area in the coming months, a brief summary of the work and progress in each area is provided below.

Complete Streets

The Complete Streets Focus Area includes all the modes of travel, including transit and the Bicycle/Pedestrian innovations which are discussed in detail in the next section. Other areas of work related to Complete Streets include the East Campus planning effort which includes a variety of bicycle and pedestrian infrastructure improvements as well as corridor studies of 30th Street and Colorado. These studies are being recommended for inclusion in the Phase II analysis of the city’s Sustainable Streets and Centers project, which the TAB will discuss at the Dec. 19 Joint Board Workshop.

Investment Program

Staff has also begun an internal review of the existing TMP investment programs. While the recent successes of the transportation funding ballot measures provide additional funding, the majority of this funding will be dedicated to filling the existing operations and maintenance deficit. The biggest issues in the investment area for the update will be the level of transit and Eco Pass funding desired by the community, and the need to reconcile the existing Action Plan and Vision investment programs with current economic realities. In its support for the recent

ballot items, Council indicated that staff should continue to explore other appropriate funding approaches, such as those that are more user-based, for future possible additional and/or replacement funding. Also, the TMP seeks to “right-size” the investment plans for Action and Vision funding levels. Staff is conducting an analysis of all the projects proposed in the TMP and will be bringing initial findings to the TAB in Jan. 2014

Regional Travel

The city continues to work with our regional partners to advance our goals to fully implement true bus rapid transit (BRT) service on US 36 and to expand travel options on regional corridors through the Regional Transportation District’s (RTD) Northwest Area Mobility Study. City representatives have been active on both the technical and policy committees of the NAMS study. This work has included providing input to evaluation criteria, input to North Metro extension and evaluating the feasibility of Northwest Rail phasing, updated population and employment forecasts to reflect growth at University of Colorado (CU), review of initial modeling results and input regarding identification of the regional bus rapid transit candidate corridors for more detailed analysis. The transit scenarios discussed in the Analysis section of this memo have been defined to be consistent with the NAMS study corridors. The results of the TMP transit scenario analysis of different investment strategies on the regional corridors is being coordinated with the NAMS team.

Work has continued to promote high quality bus rapid transit (BRT) service on US 36 in the high occupancy toll (HOT) lanes to Boulder. Staff has been working with RTD on identifying the vehicle type and specifications for this service and in coordinating mitigation efforts for the project. The US 36 construction is scheduled to be complete by the end of 2015.

Transportation Demand Management (TDM)

This TDM Focus Area includes a number of partnership activities as described below:

Community-Wide Eco-Pass

The draft report of the Community-Wide Eco Pass Feasibility Study has been reviewed by city staff and returned to the consultants. Staff anticipates that the final report will be available to TAB, the City Council and the public in late December 2013/early January 2014.

The feasibility study results will be incorporated into the wider TMP Update presented to TAB and Council as part of the proposed February/March 2014 Study Session. The cost, impacts and benefits of the Eco Pass scenarios analyzed by the feasibility study will be considered as staff evaluates the transit scenarios in the sensitivity portion of the transit planning work.

Transportation Demand Management (TDM) Tool Kit

At the November TAB meeting, staff provided an overview of the TDM Plan process and TDM Toolkit update. The purpose of the presentation was to re-familiarize TAB with where past TAB and Planning Boards were in the update process which began in 2011 and had to be postponed.

Staff will work with the Access Management and Parking Strategies (AMPS) consultants to review best practices from peer cities and other municipalities for consideration as staff

continues to refine the package approach and evaluate additional policies and strategies. Staff will present to TAB in January 2014 an updated draft set of TDM Plan policies and the TDM Toolkit. Staff is scheduled to share the policies and toolkit with Planning Board in March. In April, staff will conduct a series of focus group discussions with developers and transportation engineers to gather input regarding the policies and toolkit and bringing them back to TAB, Planning Board, and City Council for final input as part of the TMP Update process.

Funding

With the recent voter approval of the transportation funding measures, the Boulder community has invested in the operations and maintenance of Boulder's multimodal transportation system, which includes streets as well as traffic signals, bikeways, sidewalks, medians, street sweeping, snow and ice removal, graffiti removal, resurfacing, pothole repair, and restoration of transit service. The new transportation funding sales tax will generate approximately \$4.2 million per year, with \$3.2 million used for transportation operations and maintenance (O&M) and the remaining funds allocated to core system enhancements.

This funding will also be used to complete the backlog of O&M projects for the city's Transportation system, bring the O&M work program back up to best practices, and fund a portion of enhancements that will be identified as part of the TMP Update.

Beyond the current stop-gap funding that was supported through the two recent ballot measures, Council indicated that it would like to continue to explore user-based funding sources for future additional/replacement funding. The TMP Update could outline a work plan/schedule and evaluation criteria for that continued funding exploration.

Integrate with Sustainability Initiatives

This new focus area emphasizes collaboration and integration across city-wide sustainability initiatives in alignment with the city's Sustainability Framework. Staff has continued periodic meetings of an interdepartmental executive team and staff participation in project management team meetings for the TMP Update as well as planning efforts for Climate Commitment, Sustainable Streets and Centers, the East Arapahoe planning project and the Access Management and Parking Strategies. Transportation staff members are actively working on the project teams for each of these projects in an unprecedented level of coordination.

STAFF ANALYSIS – TMP UPDATE: COMPLETE STREETS FOCUS AREA

The discussion in the section provides more detail information regarding progress to-date for the Bicycle and Pedestrian Innovations and transit planning portion of the Complete Streets Focus Area. Both areas have been working on developing alternatives and evaluation methods. The purpose of the Dec 9th TAB discussion is to review this information with TAB and seek input on these various alternatives and evaluation methods which will ultimately be used to inform the recommendations coming forward from the TMP Update..

Bicycle and Pedestrian Innovations

In June, staff briefed the TAB on the state of the system for biking and walking in Boulder. The objectives to increase bicycle mode share from 10 to 15 percent by 2015 and to achieve

recognition as a Walk Friendly Community were also presented. Supporting these objectives is the emphasis of this update on attracting and better accommodating “Interested but Concerned Cyclists” and in particular increasing trips by older adults, women and families with children.

As part of the TMP update, the City has introduced a Living Laboratory to learn what makes a good pedestrian environment and to test if a variety of new bicycle facilities and programs are appropriate for Boulder. The initiative includes the Boulder Walks program and bicycle pilot projects.

Boulder Walks Program Update

Throughout the summer and early fall, staff conducted Walk Audits to engage community members in assessing the built environment, share observations and identify deficiencies. Staff from Transportation and Community Planning and Sustainability (CP+S) partnered to host Walk Audits along Pearl Street from Broadway to 30th Street and along Goss/Grove from Folsom to 15th Street. The Walk Audits offered staff and community members insight into the varying contexts of the existing built environment and the extent they meet the needs and desires of pedestrians in creating a sense of place. Additionally, the Audits have helped identify design elements that support a walkable community.

Participants also offered suggestions to refine the audit materials and guide more meaningful community feedback. Due to the September flood event, additional Walk Audits and development of neighborhood based walking maps that highlight points of interest and encourage exploration of Boulder neighborhoods have been postponed. Staff plans to resume these efforts in the spring of 2014 once the weather has improved.

In addition to the walk audits providing direct observations of the conditions that support walking, the city has also developed a Neighborhood Access Tool that characterizes the access that pedestrians have to locations and businesses needed to meet daily needs. This tool illustrates aspects of the 20 minute neighborhood by displaying the walk shed for a given travel time around given attractors and can then aggregate these walk sheds to display the number of attractors available from a given location. The distance that one can cover in a given travel time is dependent on the quality of the pedestrian facilities available so information from the Walk Audits can be incorporated into the Neighborhood Access Tool.

Bicycle Pilot Projects Update

Installation of new bicycle treatment pilot projects began in August. The City has installed four treatments including buffered bike lanes along Spruce Street from 15th to Folsom and along University Avenue from 9th Street to Broadway, back in angle parking from Broadway to 17th Street and a protected bike lane along Baseline Road from 30th to 35th Streets. Additionally, the first segment of the multi-way boulevard along the south side of Pearl Parkway opened in October. This treatment and the planned shared roadway along Junction Place are being integrated into the Living Laboratory initiative and evaluation process.

E-bike Demonstration

The potential of piloting e-bikes on some Boulder facilities where they were not allowed was one of the bike innovations proposed in the update. This item was presented to the TAB on Sept. 23,

2013. On Nov. 12, City Council adopted an ordinance to create a pilot project allowing e-bike use on certain hard surfaced multi-use paths, not including paths on Open Space and Mountain Park lands or sidewalks except those designated as multi-use paths. **Attachment A** shows hard-surface multi-use paths on city land managed by OSMP.

The ordinance also amends the definition of an e-bike to conform to state law and the definition of a motorized vehicle to exclude an e-bike during the pilot project. Additionally, it enables the City Manager, under rulemaking authority, to regulate the hard-surface paths where a person may activate the motor of an e-bike and establishes a sunset date of Dec. 31, 2014. The ordinance will be enacted 30 days after the Council action, on Dec. 12, 2013. Subsequently, the proposed rule will be published followed by a 15 day period for public comment, and then be signed by the city manager. It is anticipated that the pilot project will commence in January 2014. Staff is proceeding with implementation, including on-going community outreach, education, enforcement, and evaluation throughout the year long pilot project. The pilot project duration allows for data collection, evaluation, community input, and quarterly updates to the TAB and City Council on the pilot findings.

Additional bike pilot project treatments planned for installation in early 2014 include an advisory bike lane along Harvard Lane, a bike box for southbound Folsom Street at Canyon Boulevard and a Bike Boulevard along 13th Street north of Balsam. The Phase II treatment to replace the buffered bike lanes along University Avenue with a bike lane protected by on-street parking is anticipated to be installed during the summer of 2014.

Proposed changes to the bike parking requirements for new development also will be advanced in coordination with the TDM toolkit and AMPS. These innovations were delayed due to the expedited public process for the e-bike pilot project and the September flood event.

Evaluation

Bicycle pilot projects installed as part of the living laboratory are anticipated to continue for 12 to 18 months. Performance monitoring of the living laboratory bike innovation demonstration projects will include several qualitative and quantitative measurements. A matrix of quantitative transportation data collection and evaluation measures is provided in **Attachment B**. Staff collected before data in early August and initial after data for the installed projects in early November. Data collection will continue throughout the duration of the pilot projects.

Community feedback on the pilot projects has been on-going since installation of treatments through Inspire Boulder and direct contact with city staff. A self-guides Bike Audit map and route also is in development and will be available by year end. Overall, the buffered bike lane treatments have been well received and cyclists support the buffering in the “door zone”. Most comments from cyclists on the protected bike lanes also express support. The aesthetic treatment of the protected bike lane has prompted a mixed response from community members. Some drivers have stated that the concrete blocks and flexible poles are distracting, camouflaged, and are impediments that require defensive driving. Cyclists also have expressed concern for the lack of opening in the barrier to facilitate left turning movements.

A handful of community members have expressed concern for and displeasure with the back-in angle parking along University stating their concern for the new configuration. Compliance with the back in policy change has improved over time through education and enforcement efforts. In the initial weeks after installation, parking enforcement officers distributed an informational flier and warnings. More recently, they have issued approximately 1,000 parking summons and 170 warnings. Local print and television news media coverage has also helped inform the public of this change. But some drivers continue to park head-in. To help raise awareness on the new parking policy, staff has produced an instructional video and signs are being installed. The city has also received comments from the University of Colorado supporting the continuation of back-in parking in this area.

A Low-stress Bicycling Network Connectivity analysis also is being conducted citywide to understand the functionality of the existing bike network and quantify the value of proposed projects. A before/after level analysis of the Living Laboratory pilot projects is planned to determine whether these treatments reduce stress level for bicyclists. High-stress streets are measured as those with high speed limits, limited or non-existent bike lanes and signage, and large distances to cross at intersections. The low-stress network analysis also will help guide prioritization of potential transportation improvement projects that would create a connected low stress network.

Bike & Pedestrian Action Plan Development

In November, staff began working with the BikeWalk Steering Committee on development of the Bike & Pedestrian Action Plan. A committee meeting was convened and focused on Phase I of a two-phase approach to draft the Action Plan. The first phase is development of bike and walk related goals, performance measures and measurable objectives. Phase II is refining and prioritizing measurable objectives as well as identifying and prioritizing potential strategies to achieve the measureable objectives. The result will be a draft BikeWalk Action Plan included as part of the TMP Update plan recommendations. The Action Plan will help guide the city's bike and walk work program and identify immediate, short-term and long-range implementation strategies and tasks to achieve the TMP goals for walking and bicycling.

Staff developed a matrix to help guide the Phase I exercise with the Steering Committee.

Attachment C is the completed matrix detailing an initial set of goals, performance measures and measurable objectives identified by the Committee. The meeting served as a focus group to test the exercise process in advance of seeking feedback from the greater Boulder community.

BikeWalk Summit

To guide community-wide input on the Bike & Pedestrian Action Plan, staff is planning to host a BikeWalk Summit in late-January or early February 2014. The summit will serve as a co-design workshop to capture the vision of our community members of what success looks like with respect to the future as a walk and bike community. Participation from a broad-cross section of the community and agency partners will be sought. It is envisioned that products of the Summit will include conceptual drawings/images of the built environment envisioned by our community, a completed draft matrix of the goals performance measures and measurable objectives, and a draft Action Plan of strategies for Board and Council consideration as part of the TMP Update.

All of the community input collected through the summit, walk audits and bike innovations will be combined with the analysis from the Neighborhood Access Tool and the Low Stress Bike Network analysis to produce plan recommendations for the update and the BikeWalk Action plan. Staff anticipates that these efforts will be ongoing to support the emphasis of removing barriers and encouraging the Boulder population to use the bicycle and pedestrian systems for more of their daily trips.

Transit Planning

Transit was identified in the Policy Review phase of the TMP Update as an area that has lagged within the Complete Streets Focus Area. While the TAB receives periodic updates in all TMP focus areas, the last major review of the transit element of the Complete Streets focus area was at the August 2013 TAB meeting. At the August meeting, the TAB reviewed the Draft State of the System (SoS) Report and the key issues and themes identified from the public outreach efforts. The SoS report has been finalized and can be found at: <https://bouldercolorado.gov/transportation/complete-streets>.

While many “listening and learning” strategies will continue throughout the TMP Update, the transit element has transitioned into the plan development phase, focusing on identifying a wide array of transit scenarios and evaluation framework.

Transit Scenario Development and Evaluation

A key step in creating a Renewed Vision for Transit is a scenario development and evaluation process allowing the community to weigh the costs and benefits of various approaches to developing a complete transit system in Boulder and connecting with surrounding communities.

By modeling distinct capital and operating strategies for a complete transit system, the scenario process provides a quantitative basis for justifying future investments and for identifying near-term transit enhancements that provide the greatest return on investment. The scenario approach is relatively low cost, responsive to factors driving transit demand and responsive to local factors. This process uses a standard set of performance measures to evaluate scenarios and relies on resident and stakeholder input in the process of shaping a future transit system.

The following is a brief description of the proposed approach for prioritizing transit investments in a way that supports community values. The scenario development and evaluation process is built around factors we know to be most influential in increasing transit ridership and non-SOV mode share.

Figure 1 illustrates the approach being followed to develop and evaluate scenarios, which will provide elements and conclusions that will be used to develop the transit plan.

Figure 1 Transit Scenario Evaluation Process



Transit Scenario Development

Scenarios are used in the planning process to illustrate clear and distinct approaches to transit system design that can be evaluated relative to performance measures and community values. The scenarios have been developed with attention to operating, capital, and programmatic elements. The staff and consultants have collaborated with the Transit Technical Advisory Committee (TAC), RTD and other city department staff to develop the transit scenarios that will be evaluated in late 2013 and early 2014. That evaluation process will shape the Renewed Vision for Transit and a set of near-term transit improvements.

It is important to stress that the scenario evaluation process is an iterative approach providing opportunity to test various transit service levels and capital investments. The scenarios themselves are not meant to represent system plans to be implemented but the process will inform a preferred scenario as a framework for the Renewed Vision for transit. The scenario evaluation process helps us to:

- Illuminate possible futures, not “the” future plan
- Test key constraints

- Test tradeoffs
- Inform decisions

Since meeting with TAB and Council in August, the transit working group and TAC has been involved in the scenario development process, including holding scenario planning workshops that focused on guiding issues, tradeoffs, and challenges and to prioritize operating and capital improvements. The scenarios were then developed by the Nelson/Nygaard transit planning team and reviewed by the TAC. In developing these scenarios, findings from the *State of the System Report* including ridership performance on existing routes and service to existing and future activity and employment centers were considered. The TAC also helped develop and reviewed the proposed performance measures and the development of the Evaluation Matrix.

Input received from the TAC has been used to frame the Draft Transit Scenarios. Key “framing concepts” described by the TAC include:

- Develop a high-frequency local grid (CTN expansion) in Boulder to support the continued development of walkable neighborhoods, sustainable streets, and great community gathering places;
- Enhance regional service and connections to transit through first and final mile connectivity;
- Increase system efficiency and leverage operating dollars by investing in local and regional corridor capital improvements (Bus Rapid Transit and Enhanced Bus).

Desired outcomes described by the TAC to support these concepts included:

- Support Climate Commitment targets
- Invest in a productivity-oriented system (invest to optimize ridership outcomes)
- Provide a compelling vision to support a new local and/or region transit funding mechanism
- Improve access to jobs in Boulder and Boulder County
- Support sustainable, walkable community development
- Scale transit investments appropriately to land use plans and desired community outcomes for placemaking and community design

Transit Scenarios

Four transit scenarios were developed based on input from the TAC, RTD and the city interdepartmental team, a review of key operating data from the State of the System Report and high level financial projections. The scenarios represent a range of strategies representing the framing concepts developed by the TAC and were financially constrained to amounts judged to be meaningful and achievable. The four scenarios are:

- **Baseline:** This scenario represents a “No Net New Service” position based on the assumption that any financial growth is consumed by increases in operating costs and that capital development is limited to currently funded projects such as the US 36 Corridor BRT. The primary intent of this scenario is to act as a point of comparison for Scenarios 1 through 3, which represent varying levels of growth and system investment.

- **Scenario 1: Local and Regional Enhanced Service.** This scenario emphasizes investment in operating resources to develop a CTN level of service on the most productive corridors in the City of Boulder and on regional connections to/from Boulder. Capital investments in transit corridors are limited in this scenario.
- **Scenario 2: Boulder Local CTN Buildout.** This scenario focuses on local Boulder service investment, making the buildout of the CTN network a top priority. CTN service is delivered on all corridors that are believed to have supportive land use attributes by 2035. Corridor capital investments are prioritized on corridors that best support CTN development by providing needed speed and reliability enhancements.
- **Scenario 3: Local and Regional Rapid Transit Network.** This scenario has a more modest level of investment in local and regional transit operations, although it provides a 63% increase over the Baseline scenario. Capital development for Rapid Bus and Enhanced Bus is emphasized in this scenario to improve travel time and reliability. This scenario reflects the regional BRT corridors being evaluated by RTD as part of the NAMS analysis.

Detailed maps and descriptions of the four scenarios are contained in **Attachment D**. Each scenario is represented on two pages with the first illustrating the operating or service element of the scenario and the second page the capital or infrastructure investment element. On the operating page, the level of proposed service is color coded by service type and a summary description and estimated costs are included. Costs are divided up into local and regional categories, which represent where those costs are incurred without implying anything about who would be paying those costs. These operating cost estimates represent “fully loaded costs,” including fuel, maintenance, wage/benefits, administration, etc.

The capital page for each scenario illustrates those improvements that are known and will be completed shortly such as the US 36 BRT lanes. Proposed capital investments are then added to these, based on unit costing per mile for each service level. Capital cost estimates include amenities at all stops along the corridor, including shelters and passenger information; dedicated right of way for transit, such as transit only lanes where applicable; transit priority features, such as transit signal priority where applicable; and vehicle costs. A summary description for the capital scenario is provided along with the estimated costs, divided into local and regional categories based on where the investment would occur.

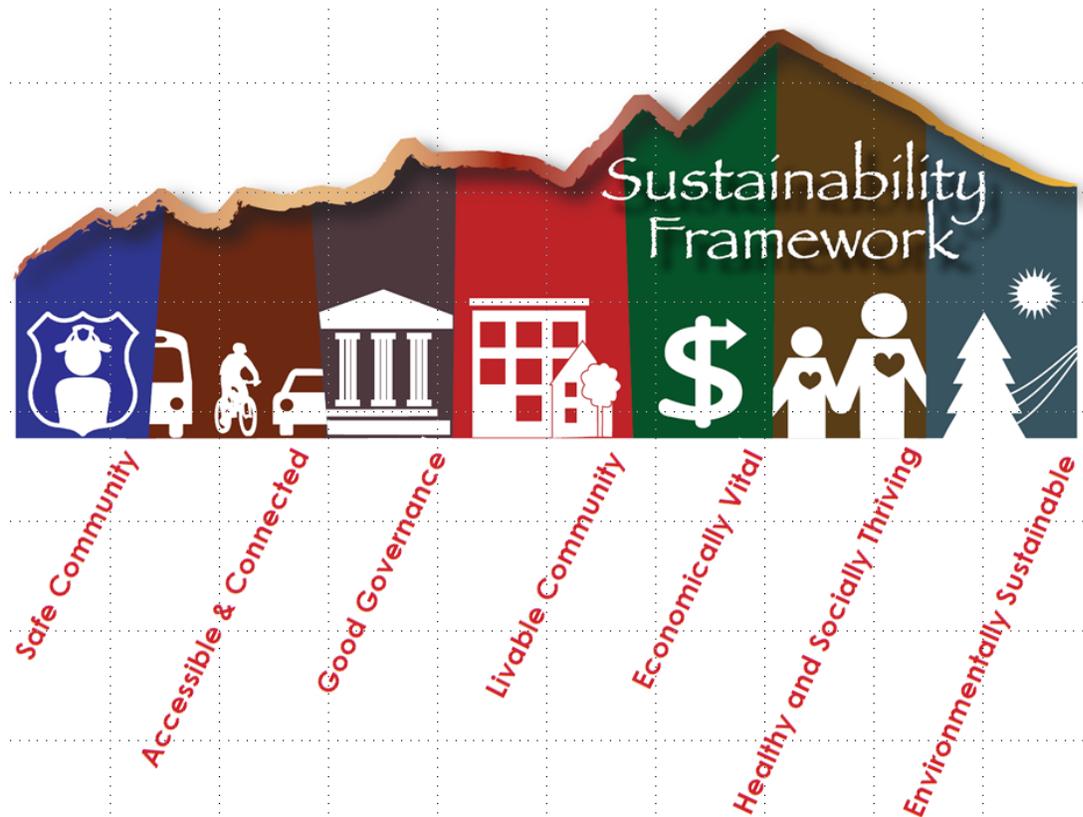
Following the detailed maps, elements from these as well as more detailed information are presented on the two following summary pages. The first summary page provides an overview of the operating and capital elements of the three transit scenarios. The second summary provides an overview of service type classifications, including service span, frequency, capital investment assumptions, and service type descriptions.

Evaluation Framework

A standard set of performance measures will be used to evaluate and compare each scenario. The 1996 Boulder Transportation Master Plan (TMP) established measurable objectives supporting broader community goals to protect the natural environment while enhancing Boulder's quality of life, improving economic vitality and protecting valued open space and natural areas. This update is building upon those objectives while responding to the city's adopted Sustainability

Framework. The areas included in the Sustainability Framework are shown in described in Figure 5. The areas of the Sustainability Framework have been classified into four accounts consistent with the three general areas of community sustainability plus an account for efficiency. Graphics illustrating these accounts are contained in **Attachment E** along with a detailed description of the proposed evaluation measures.

Figure 2 Boulder Sustainability Framework



The proposed ridership model will serve as the primary tool for measuring the ways that possible transit scenarios could help meet these objectives on the premise that a net gain in new transit system riders is a basic denominator when measuring their achievement. More people choosing to use transit for more trips translates to less driving, lower congestion, safer streets, affordable access to jobs, lower household transportation costs, and many other benefits.

However, it is not enough to only measure ridership or the productivity of the system given the Sustainability Framework. Success will also be measured by calculating how investments benefit low-income households, people with disabilities, seniors with limited mobility options, and other vulnerable populations. The evaluation will also look at transit’s ability to help Boulder residents and workers reduce household costs, retain wealth, and live more active, healthy lives. These factors are included in the draft evaluation measures included in **Attachment E**.

Scenario Modeling

A ridership forecasting model will be used to evaluate potential ridership generated by each scenario. The model employed for the Boulder TMP will treat each current or proposed transit route as an individual corridor. The model will be calibrated to baseline ridership for each travel corridor or a baseline ridership forecast will be developed based on current land use if no service is in place. A calibration process will be undertaken to calibrate existing ridership to model inputs. The model will then use elasticity factors or known relationships to “adjust” ridership in each corridor/route segment.

Major “drivers” of transit ridership that will be considered in the modeling process are shown in Figure 3 below. These variables respond to the described elements of the various transit scenarios. Since the relationship between these factors is not cumulative, origin-destination travel data from the DRCOG model can be used to calibrate ridership estimates in each corridor.

Figure 3 Model Variables

Service Level - Headway	<ul style="list-style-type: none"> • Extensive national research establishes elasticity factors of demand for local and regional long-haul services. • Review of local ridership response to service changes.
Travel Time and Reliability	<ul style="list-style-type: none"> • Use national or local model (DRCOG model) elasticity factor for change in travel time. • Will explore adjustment for improved network connections (i.e., headway improvements on intersecting lines, increased number of line connections).
Land Use	<ul style="list-style-type: none"> • Statistical regression analyses (Nelson/Nygaard Portland Primary Transit Network and Fehr and Peers Direct Ridership Generation) show similar results for predictive factors related to residential and employment density.
Fare Policy	<ul style="list-style-type: none"> • National research on mean fare elasticity for ridership changes; could also be derived from the DRCOG model if determined viable. • Different factors used for elimination of fare payment (i.e., Ecopass); possibly recent local and national peer experience (Charlotte and Corvallis).
Parking Policy/Management	<ul style="list-style-type: none"> • National research on mean parking price and availability elasticity for ridership changes; could also be derived from the DRCOG model if determined a viable, reliable source.
Urban Form	<ul style="list-style-type: none"> • Recent national meta-analysis (Ewing and Cervero) shows that destination accessibility or the ability for direct access to destinations (including transit stations) has the highest correlation to reduced SOV trip making of a number of factors related to transportation services, design, and built form. The

	model would use either intersection density or another measure of network quality to represent this factor.
User Experience – could include a range of user experience elements (station quality, user information, system branding, vehicle quality, etc.)	<ul style="list-style-type: none"> User experience elements will be limited to those for which established research or local experience provides viable adjustment factors. The ultimate scope of this combined factor is yet to be fully determined.

Sources:

- The Factors Influencing Transit Ridership: A Review and Analysis of the Ridership Literature, Brian D. Taylor and Camille N.Y. Fink. UCLA.
- Portland Metro Primary Transit Network Study, Nelson\Nygaard.
- Direct Ridership Forecasting, Fehr and Peers.
- California Air Quality Resource Board Urban Air Quality Emissions Model Trip Generational Element, Nelson\Nygaard.
- Travel and the Built Environment: A Meta-Analysis, Ewing and Cervero. JAPA 2010.

While the initial round of modeling will be based on existing land use and TDM programs, additional sensitivity analysis will consider factors like land use changes based upon the city’s current land use plans and more advanced TDM programs that affect transit use. These TDM programs include elements such as Eco Pass expansion and parking district management as well as transit access and connectivity improvements. Analyzing these factors in a second phase of analysis ensures that they do not distort the initial results. For example, different assumptions about Eco Pass distribution or paid parking policies could dramatically change ridership forecasts.

TMP UPDATE - COMMUNITY OUTREACH

A goal of any City of Boulder planning process is to involve a broad cross section of the community in shaping a vision for a particular issue or area. A wide range of new tools and technologies exist in the area of social media to bring more of the update process to community members and allow a greater portion of them to participate in a way that is convenient and efficient for them. In addition to the standard outreach practices of open houses, Web materials and print media, this update is utilizing a comprehensive set of social media tools. These include Twitter, Facebook, Tumblr and email blasts. These are used to announce events for all of the TMP update focus areas and encourage participation on the TMP update Web page, the Community Feedback Panel, the Inspire Boulder site, the Design Your Transit site, Bike Audits, Walk Audits, Focus Groups, and Storefront Workshops. Complementing the broad outreach, the planning process also includes two advisory committees of stakeholders in a given work area. Staff has also integrated outreach efforts with other planning initiatives ranging from Climate Commitment to North Boulder Subcommunity Planning.

Throughout the summer and fall, a focus of the outreach effort has been youth and CU students. Additionally, the TMP project team conducted a half day workshop with staff from the Boulder Valley School District and Boulder County Transportation. The Transportation Division also is working in partnership with staff at Growing Up Boulder to connect with elementary, middle, and high school teachers to see if they would like to participate in the TMP update and help collect feedback from their students. Several activities planned and assigned to students of all ages include mapping exercises and audits detailing where students live, want to go and how they want to get there. Walk Audits also were included.

On December 9th, 2013, staff will hold a Community Open House prior to the Transportation Advisory Board meeting. The Open House will provide an overview on the Transportation Master Plan Update process to date with information on all focus areas. In the transit planning area, this will be an opportunity for the public to provide input on the transit scenarios and the proposed performance measures and evaluation criteria. With respect to Bike and Walk Innovations, public review of an initial map detailing existing Low-stress Bicycling Network Connectivity will be presented along with a summary of key themes and living Laboratory feedback to date.

During the first quarter of 2014, the project team will present the initial findings of the bicycle and pedestrian innovations evaluation as well as transit scenario evaluation to the public, TAB and City Council. The purpose of this outreach will be to gather feedback on key tradeoffs and identify service, capital, and programmatic elements that the community supports. The specific details of the outreach efforts are still under development but could include storefront workshops, a public open house, and/or online feedback through Inspire Boulder and other social media tools.

NEXT STEPS

While the recent flooding redirected staff efforts for a period of time and put a pause on public outreach efforts, staff has used the time to develop technical materials and the public process for TMP update process will be ramping up in the new year. Given the winter conditions likely for the next few months, the focus of the Bicycle and Pedestrian Innovations effort will be on implementing the e-bike ordinance and the BikeWalk Summit in late-January or early February. Staff will also be working with the BikeWalk Steering Committee on developing the BikeWalk action plan that will be included in the TMP.

Staff will continue to move forward with TMP Update: Complete Streets Transit Planning work in accordance with City Council and TAB guidance. The primary focus for the remainder of 2013 and first quarter 2014 will be to conduct an evaluation and analysis of the transit scenarios, develop the TDM Toolkit and develop the TMP investment program. Staff plans to return to the TAB monthly in 2014 to present work in these areas and to prepare for two anticipated council study sessions on these materials currently being scheduled for February or March as well as April/May. The TMP Update is scheduled for completion in May/June 2014.

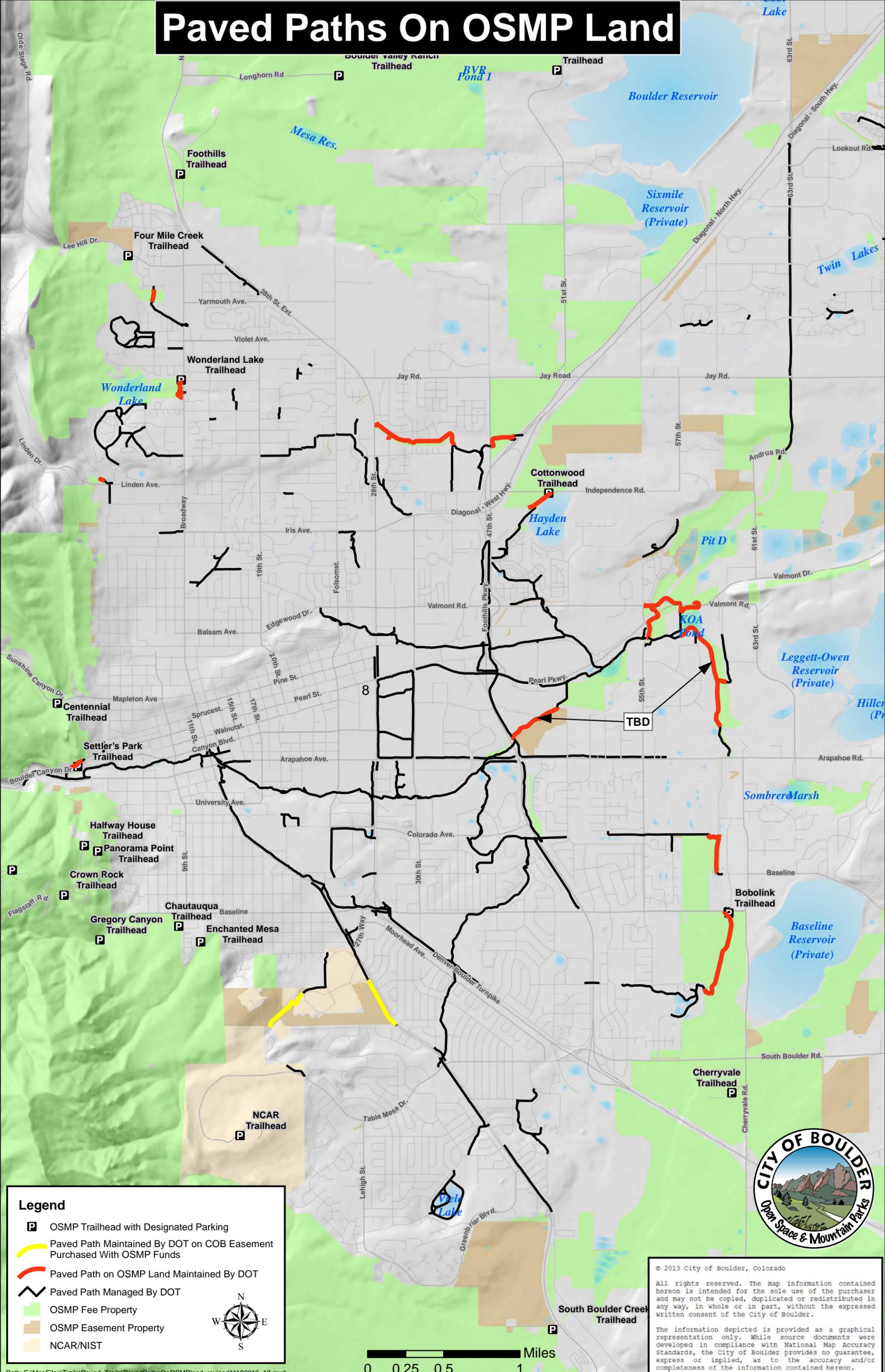
Key Questions for TAB:

- 1) Does the TAB have any questions or comment on the overall TMP Update and next steps?
- 2) Does TAB have input or questions about the Bicycle and Pedestrian Innovations and the draft performance measures and evaluation criteria?
- 3) Does the TAB have any questions on the draft transit scenarios and the performance measures and evaluation criteria?
- 4) Does the TAB have any questions or feedback on the public outreach completed to date?

Attachments:

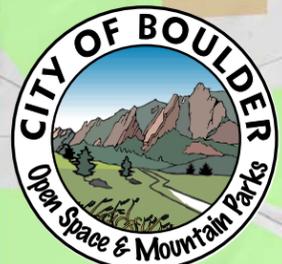
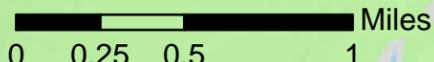
- A. Map of Paved Multi-use paths on City of Boulder Open Space Lands
- B. Living Laboratory Evaluation
- C. BikeWalk Performance Measures Matrix
- D. Transit Scenarios for Evaluation
- E. Evaluation Accounts and Framework

Paved Paths On OSMP Land



Legend

- OSMP Trailhead with Designated Parking
- Paved Path Maintained By DOT on COB Easement Purchased With OSMP Funds
- Paved Path on OSMP Land Maintained By DOT
- Paved Path Managed By DOT
- OSMP Fee Property
- OSMP Easement Property
- NCAR/NIST



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User Group and Community Perception – Evaluation Measures

Evaluation Measures	Data Measurement	Data Collection Method	Data Analyzed	Data Collection/Analysis	Data Collection Dates
Bicycle user groups using treatment	<ul style="list-style-type: none"> Before and after 	<ul style="list-style-type: none"> Field observation, field survey, and photo documentation Living Labs survey tools 	<ul style="list-style-type: none"> Total volume of female, seniors, teenagers, children, and non-white 	<ul style="list-style-type: none"> UCD graduate students 	<ul style="list-style-type: none"> September 2013 Spring 2014
Bicycle types being ridden on treatment	<ul style="list-style-type: none"> Before and after 	<ul style="list-style-type: none"> Field observation, field survey, and photo documentation Living Labs survey tools 	<ul style="list-style-type: none"> Total volume of cruiser, women, children, trailer, cargo, and commuter with bags 	<ul style="list-style-type: none"> UCD graduate students 	<ul style="list-style-type: none"> September 2013 Spring 2014
Motor vehicle driver & bicyclists behavior and courtesy	<ul style="list-style-type: none"> Before and after 	<ul style="list-style-type: none"> Field observation, field survey, and photo documentation Living Labs survey tools 	<ul style="list-style-type: none"> Total instance of verbal interactions, hand signals, horn use, and deliberate movements 	<ul style="list-style-type: none"> UCD graduate students 	<ul style="list-style-type: none"> September 2013 Spring 2014
Bicycle crashes	<ul style="list-style-type: none"> Before and after 	<ul style="list-style-type: none"> Police reports Living Labs survey tools 	<ul style="list-style-type: none"> Review accident reports to understand cause 	<ul style="list-style-type: none"> City staff and FT 	<ul style="list-style-type: none"> September 2013 Spring 2014
Bicycle law compliance	<ul style="list-style-type: none"> Before and after 	<ul style="list-style-type: none"> Police reports and field observation or video collection Living Labs survey tools 	<ul style="list-style-type: none"> Compliance with traffic control devices 	<ul style="list-style-type: none"> City staff and FT 	<ul style="list-style-type: none"> September 2013 Spring 2014

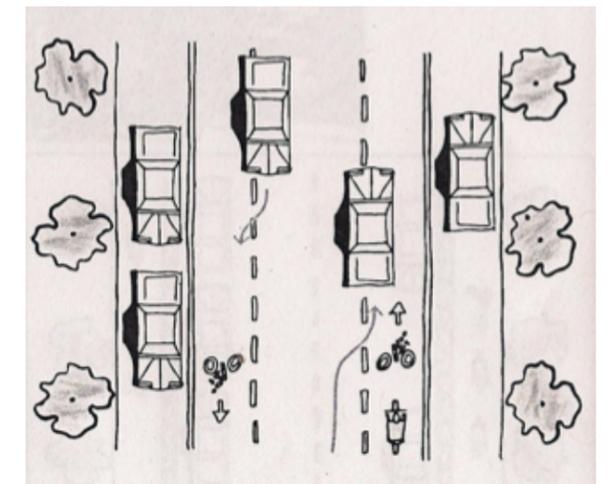


Peer Community User Perception Studies

- Washington, DC
- Chicago, IL
- Austin, TX
- Davis, CA
- Redmond, WA

Advisory Bike Lanes– Harvard Avenue (Dartmouth to Bear Creek Trail)

	Evaluation Measure	Data Measurement	Data Collection Method	Data Analyzed	Data Collection/Analysis	Data Collection Dates
1	Bicyclists riding in the intended zone	• Before and after	• Field observation with photo documentation	• Bicyclists riding position at 3 locations and parking utilization	• City staff and FT	• September 2013 • Spring 2014
2	Motor vehicles encounters when bicyclists are present	• Before and after	• Field observation with photo documentation	• Yielding and vehicle lane position at 3 locations. Also note position of bikes near encounters	• City staff and FT	• September 2013 • Spring 2014
3	Motor vehicles encounters when bicyclists are not present	• After only	• Field observation with photo documentation	• Yielding and vehicle lane position at 3 locations	• City staff and FT	• Spring 2014
4	Motor vehicle position when bicycles and on-coming vehicle is not present	• After only	• Field observation with photo documentation	• Vehicle lane position at 3 locations	• City staff and FT	• Spring 2014
5	Total instances of overtakes (motor vehicles are passing bicyclists)	• After only	• Field observation with photo documentation	• Total overtakes by direction (n/s) • Note position of bikes and cars	• City staff and FT	• Spring 2014
6	Estimated overtake width when motor vehicles are passing bicyclists	• After only	• Field observation with photo documentation	• Estimated overtake width by direction (n/s)	• City staff and FT	• Spring 2014
7	Travel speeds and volumes for motor vehicles and bicycles	• Before and after	• Tube and radar measurements	• Average speed and total daily volume	• City staff and FT	• September 2013 • Spring 2014

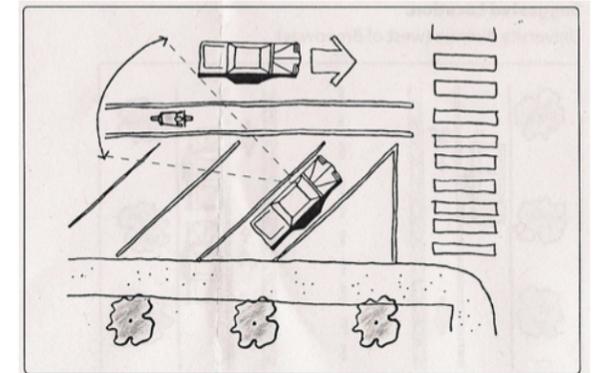


Peer Community ABL Treatments

- Minneapolis, MN (demonstration)
- Edina, MN (demonstration)

Back in Angle Parking – University Avenue (Broadway to 17th)

	Evaluation Measure	Data Measurement	Data Collection Method	Data Analyzed	Data Collection/Analysis	Data Collection Dates
1	Bicyclists riding in the intended zone	• Before and after	• Field observation with photo documentation	• Bicyclists riding position at 3 locations	• UCD graduate students	• September 2013 • Spring 2014
2	Parking space utilization	• Before and after	• Photo survey with photo documentation – OR- provided by parking services	• 12 hourly parking utilization rates	• UCD graduate students –OR- parking services	• September 2013 • Spring 2014
3	Vehicle parking location relative to curb and bike lane	• Before and after	• Photo survey with photo documentation	• Analyze photos to determine parked car proximity to curb	• UCD graduate students	• September 2013 • Spring 2014
4	Vehicle parking location relative to striped lines	• After only	• Photo survey with photo documentation	• Analyze photos to determine parked car proximity to lines	• UCD graduate students	• Spring 2014

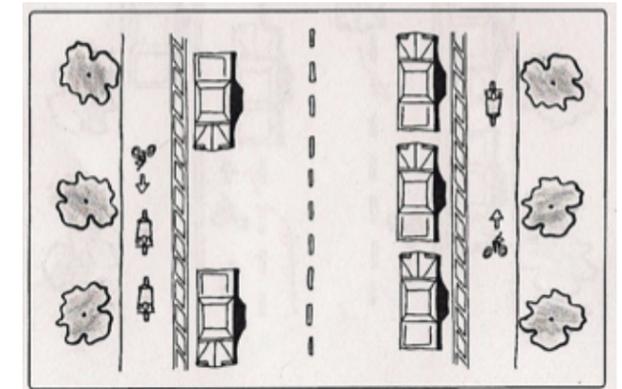


Peer Community Bi-AP Treatments

- Wheat Ridge, CO
- Glenwood Springs, CO
- Denver, CO

Cycle Track– University Avenue (7th to Broadway) & Baseline (30th to 37th)

	Evaluation Measure	Data Measurement	Data Collection Method	Data Analyzed	Data Collection/Analysis	Data Collection Dates
1	Bicyclists riding in the intended zone	• Before and after	• Field observation with photo documentation	• Bicyclists riding position at 3 locations	• Boulder Youth Corps	• September 2013 • Spring 2014
2	Motor vehicles yielding to bicyclists when turning from side streets	• After only	• Field observation with photo documentation	• Yielding and maneuvers to avoid collisions from left and right turning vehicles	• City staff and FT	• Spring 2014
3	Motor vehicles compliance with stop bar when turning from side streets	• After only	• Field observation with photo documentation	• Stop bar compliance at side streets or vehicles blocking CT	• City staff and FT	• Spring 2014
4	Motor vehicles yielding to bicyclists when turning from University	• After only	• Field observation with photo documentation	• Yielding and maneuvers to avoid collisions from left and right turning vehicles	• City staff and FT	• Spring 2014
5	Vehicle parking location relative to curb	• After only	• Photo survey with photo documentation	• Analyze photos to determine parked car proximity to curb	• UCD graduate students	• Spring 2014
6	Travel speeds and volumes for motor vehicles and bicycles	• Before and after	• Tube and radar measurements	• Average speed and total daily volume	• City staff and FT	• September 2013 • Spring 2014
7	Encounters between bicycles and pedestrians	• After only	• Field observation with photo documentation	• Bicycle and pedestrians near parked cars and at intersections	• City staff and FT	• Spring 2014

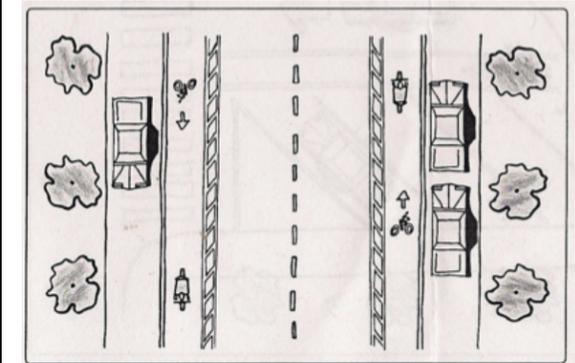


Peer Community Cycle Track Treatments

- Oakland, CA
- Salt Lake City, UT
- Lincoln, NE (in-design)

Buffered Bike Lane – University Avenue (9th to Broadway) & Baseline (30th to 37th) & Spruce (15th to Folsom)

	Evaluation Measure	Data Measurement	Data Collection Method	Data Analyzed	Data Collection/Analysis	Data Collection Dates
1	Bicyclists riding in the intended zone	<ul style="list-style-type: none"> • Before and after 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Bicyclists riding position at 3 locations 	<ul style="list-style-type: none"> • UCD graduate students 	<ul style="list-style-type: none"> • September 2013 • Spring 2014
2	Motor vehicles using BBL when turning from side streets	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Motor vehicles using BBL for decelerating or accelerating to side street 	<ul style="list-style-type: none"> • City staff and FT 	<ul style="list-style-type: none"> • Spring 2014
3	Motor vehicles compliance with stop bar when turning from side streets	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Stop bar compliance at side streets 	<ul style="list-style-type: none"> • City staff and FT 	<ul style="list-style-type: none"> • Spring 2014
4	Travel speeds and volumes for motor vehicles and bicycles	<ul style="list-style-type: none"> • Before and after 	<ul style="list-style-type: none"> • Tube and radar measurements 	<ul style="list-style-type: none"> • Average speed and total daily volume 	<ul style="list-style-type: none"> • City staff and FT 	<ul style="list-style-type: none"> • September 2013 • Spring 2014
5	Snow storage and freeze-thaw conditions	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Visual survey of the snow conditions and documentation of any safety issues 	<ul style="list-style-type: none"> • City staff and FT 	<ul style="list-style-type: none"> • Spring 2014
6	Cars encroaching in buffer with smaller travel lanes	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Visual survey of vehicles driving on buffer mid-block 	<ul style="list-style-type: none"> • City staff and FT 	<ul style="list-style-type: none"> • Spring 2014



Peer Community BBL Treatments

- Denver, CO
- San Jose, CA

Bike Boulevard – TBD

	Evaluation Measure	Data Measurement	Data Collection Method	Data Analyzed	Data Collection/Analysis	Data Collection Dates
1	Bicyclists riding position	• Before and after	• Field observation with photo documentation	• Bicyclists riding position at 3 locations	• UCD graduate students	• September 2013 • Spring 2014
2	Motor vehicles yielding to bicyclists when turning from side streets on Bike Boulevard	• Before and after	• Field observation with photo documentation	• Yielding and maneuvers to avoid collisions from left and right turning vehicles	• City staff and FT	• September 2013 • Spring 2014
3	Total instances of overtakes (motor vehicles are passing bicyclists)	• Before and after	• Field observation with photo documentation	• Total overtakes by direction (n/s)	• City staff and FT	• September 2013 • Spring 2014
4	Motor vehicles yielding to bicyclists when turning from Bike Boulevard	• Before and after	• Field observation with photo documentation	• Yielding and maneuvers to avoid collisions from left and right turning vehicles	• City staff and FT	• September 2013 • Spring 2014
5	Motor vehicles yielding to bicyclists at major intersections with Bike Boulevard	• Before and after	• Photo survey with photo documentation	• Yielding and maneuvers to avoid collisions at major intersections with Bike Boulevard	• UCD graduate students	• September 2013 • Spring 2014
6	Parking space utilization	• Before and after	• Photo survey with photo documentation	• 12 hourly parking utilization rates	• UCD graduate students	• September 2013 • Spring 2014
7	Travel speeds and volumes for motor vehicles and bicycles	• Before and after	• Tube and radar measurements	• Average speed and total daily volume	• City staff and FT	• September 2013 • Spring 2014

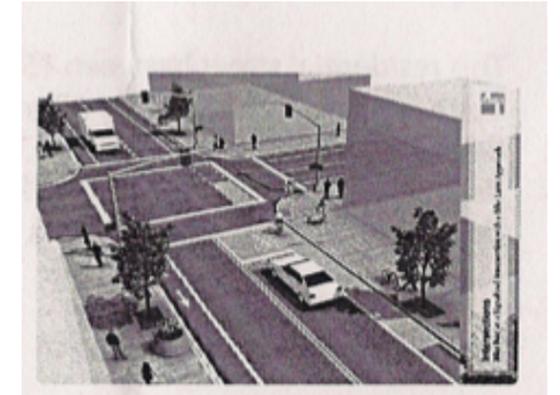


Peer Community BB Treatments

- Portland, OR
- Berkeley, CA

Bike Box –Folsom and Canyon (southbound)

	Evaluation Measure	Data Measurement	Data Collection Method	Data Analyzed	Data Collection/Analysis	Data Collection Dates
1	Bicyclists location at intersection on red signal phase	<ul style="list-style-type: none"> Before 	<ul style="list-style-type: none"> Field observation with photo documentation 	<ul style="list-style-type: none"> Bicyclists location at intersection when waiting for a red signal to proceed south or east 	<ul style="list-style-type: none"> City staff and FT 	<ul style="list-style-type: none"> September 2013
2	Right turn violations at fueling station on NW corner of intersection	<ul style="list-style-type: none"> Before and after 	<ul style="list-style-type: none"> Field observation with photo documentation 	<ul style="list-style-type: none"> Total movements from Folsom to Canyon 	<ul style="list-style-type: none"> City staff and FT 	<ul style="list-style-type: none"> September 2013 Spring 2014
3	Total bicyclists in the box during a red signal phase	<ul style="list-style-type: none"> After only 	<ul style="list-style-type: none"> Field observation with photo documentation 	<ul style="list-style-type: none"> Maximum and average number of bicyclists in box during red signal phase and protected left turn phase 	<ul style="list-style-type: none"> City staff and FT 	<ul style="list-style-type: none"> September 2013 Spring 2014
4	Lane utilization south of bike box on Folsom	<ul style="list-style-type: none"> Before and after 	<ul style="list-style-type: none"> Field observation with photo documentation 	<ul style="list-style-type: none"> Lane utilization documentation for the 2 SB lanes 	<ul style="list-style-type: none"> City staff and FT 	<ul style="list-style-type: none"> September 2013 Spring 2014
5	Motor vehicle turn movements and delay from Folsom to westbound Canyon	<ul style="list-style-type: none"> Before and after 	<ul style="list-style-type: none"> Field observation with photo documentation 	<ul style="list-style-type: none"> Total turn movements 	<ul style="list-style-type: none"> City staff and FT 	<ul style="list-style-type: none"> September 2013 Spring 2014
6	Motor vehicles and bicycle close encounters at onset of green	<ul style="list-style-type: none"> After only 	<ul style="list-style-type: none"> Field observation with photo documentation 	<ul style="list-style-type: none"> Total instances of vehicle occurrences 	<ul style="list-style-type: none"> City staff and FT 	<ul style="list-style-type: none"> Spring 2014
7	Right turn on red when restrictions are in place with Bike Box	<ul style="list-style-type: none"> After only 	<ul style="list-style-type: none"> Field observation with photo documentation 	<ul style="list-style-type: none"> Total instances of vehicle occurrences 	<ul style="list-style-type: none"> City staff and FT 	<ul style="list-style-type: none"> Spring 2014

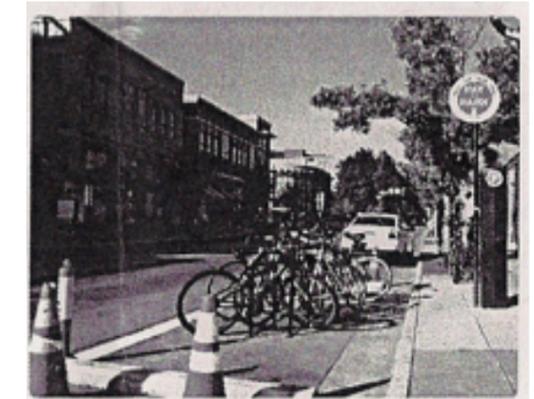


Peer Community BB Treatments

- Portland, OR
- Denver, CA
- New York, NY

Bike Parking Regulations –Evaluation Measures

	Evaluation Measure	Data Measurement	Data Collection Method	Data Analyzed	Data Collection/Analysis	Data Collection Dates
1	Total bicycles parked in the “improvement zone” by bicycle parking type	<ul style="list-style-type: none"> • Before and after 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Total bicycles parked at city provided bicycle parking near streets and sidewalks 	<ul style="list-style-type: none"> • UCD graduate students 	<ul style="list-style-type: none"> • September 2013 • Spring 2014
2	Types of bicycles parked in the “improvement zone” by bicycle parking type	<ul style="list-style-type: none"> • Before and after 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Presence of cruiser, women, children, trailer, cargo, commuter with bags, and other types 	<ul style="list-style-type: none"> • UCD graduate students 	<ul style="list-style-type: none"> • September 2013 • Spring 2014
3	Types of bicycle locks used in the “improvement zone” by bicycle parking type	<ul style="list-style-type: none"> • Before and after 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Presence of high and low security bicycle locks used 	<ul style="list-style-type: none"> • UCD graduate students 	<ul style="list-style-type: none"> • September 2013 • Spring 2014
4	Parking duration of bicycles parked in the “improvement zone” by bicycle parking type	<ul style="list-style-type: none"> • Before and after 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Total duration of parked bicycles in the improvement zone by hour 	<ul style="list-style-type: none"> • UCD graduate students 	<ul style="list-style-type: none"> • September 2013 • Spring 2014



Peer Community BP Treatments

- Jackson, WY
- Ft. Collins, CO
- Chicago, IL

Multi-way Boulevard– Pearl St (30th to BNSF Tracks)

	Evaluation Measure	Data Measurement	Data Collection Method	Data Analyzed	Data Collection/Analysis	Data Collection Dates
1	Bicyclists riding position	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Directional count of bicyclists riding in along general purpose lanes, the access Lanes, and on multi-use path at two locations • Bicyclists crossing Junction Place in crosswalk, general purpose lane or widened shoulder 	<ul style="list-style-type: none"> • City staff and/or consultant 	<ul style="list-style-type: none"> • Summer 2014
2	Bicycle conflicts with drivers or pedestrians	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Vehicles yielding to bikes on roadway • Bicyclists yielding to pedestrians on pathway 	City staff and/or consultant	<ul style="list-style-type: none"> • Summer 2014
3	Total pedestrians traveling	<ul style="list-style-type: none"> • Before and after 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Walkers and runners traveling at a location between 30th and BNSF tracks 	City staff and/or consultant	<ul style="list-style-type: none"> • Summer 2014
4	Bicycle volume and speed	<ul style="list-style-type: none"> • Before and after 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Bicyclists trips noted at a location between 30th and BNSF tracks • Bicycle speed 	City staff and/or consultant	<ul style="list-style-type: none"> • Summer 2014
5	Vehicle speeds and volumes	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Counter and radar measurements 	<ul style="list-style-type: none"> • Average speed and total daily volume counted in each Access lane and on main Pearl through lanes 	City staff and/or consultant	<ul style="list-style-type: none"> • Summer 2014
6	Motor vehicles compliance with traffic control, or any conflicts when turning from Boulevard or Access streets	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Stop control compliance at Access streets. Also not any other vehicle conflicts related to Access Street intersections 	City staff and/or consultant	<ul style="list-style-type: none"> • Summer 2014
7	Snow storage and freeze-thaw conditions	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Field observation with photo documentation • 	<ul style="list-style-type: none"> • Visual survey of the snow conditions and documentation of any safety issues or snow storage issues 	City staff and/or consultant	<ul style="list-style-type: none"> • Spring 2014
8	Total crashes in the corridor	<ul style="list-style-type: none"> • Before and after 	<ul style="list-style-type: none"> • Accident report review 	<ul style="list-style-type: none"> • Summarize by type and location 	City staff and/or consultant	<ul style="list-style-type: none"> • Summer 2014
9	Parking space utilization	<ul style="list-style-type: none"> • After only 	Photo survey with photo documentation –OR– provided by parking services	<ul style="list-style-type: none"> • hourly parking utilization rates 	City staff and/or consultant	<ul style="list-style-type: none"> • Summer 2014
10	Local events	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Community outreach 	<ul style="list-style-type: none"> • Keep track of events that enliven the area 	City staff	<ul style="list-style-type: none"> • Summer 2014

Junction Place Shared Street (Transit Center Access to Goose Creek Bridge)

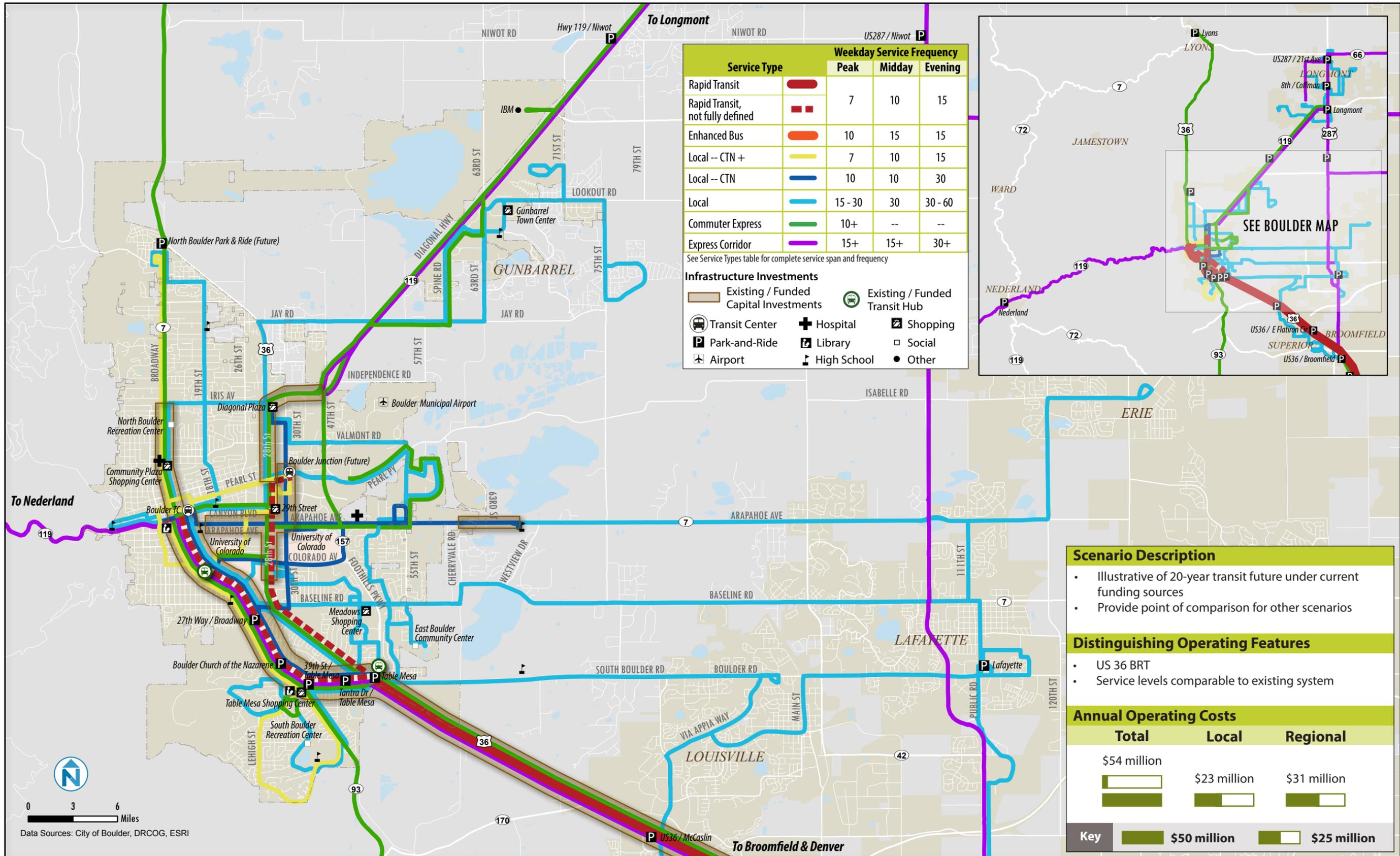
	Evaluation Measure	Data Measurement	Data Collection Method	Data Analyzed	Data Collection/Analysis	Data Collection Dates
1	Bicyclists volume and riding location	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Bicyclists riding through North-South • Bicyclists riding East-West or circulating • Bicyclists to/from Goose Creek Path 	<ul style="list-style-type: none"> • City staff and/or consultant 	<ul style="list-style-type: none"> • Summer 2014
2	Pedestrians volume and travel location	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Pedestrians traveling through N-S • Pedestrians traveling E-W or circulating • Pedestrians accessing the Goose Creek Path 	<ul style="list-style-type: none"> • City staff and/or consultant 	<ul style="list-style-type: none"> • Summer 2014
3	Automobile volume and speed	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Counters 	<ul style="list-style-type: none"> • N-S automobile volume and speed 	<ul style="list-style-type: none"> • City staff and/or consultant 	<ul style="list-style-type: none"> • Summer 2014
4	Traffic crash experience	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Review of traffic accident reports 	<ul style="list-style-type: none"> • Crash location and type 	<ul style="list-style-type: none"> • City staff and/or consultant 	<ul style="list-style-type: none"> • Summer 2014
5	Conflict or Near Miss: Auto v. Bike or Pedestrian Bike v. Pedestrian Transit v. other modes	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Note type and location of conflicts during peak hours 	<ul style="list-style-type: none"> • City staff and/or consultant 	<ul style="list-style-type: none"> • Summer 2014
6	Local events	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Community outreach 	<ul style="list-style-type: none"> • Keep track of events that enliven the area 	<ul style="list-style-type: none"> • City staff 	<ul style="list-style-type: none"> • Summer 2014
7	Snow storage and freeze-thaw conditions	<ul style="list-style-type: none"> • After only 	<ul style="list-style-type: none"> • Field observation with photo documentation 	<ul style="list-style-type: none"> • Visual survey of the snow conditions and documentation of any safety issues or snow storage issues 	<ul style="list-style-type: none"> • City staff and/or consultant 	<ul style="list-style-type: none"> • Spring 2014

DRAFT

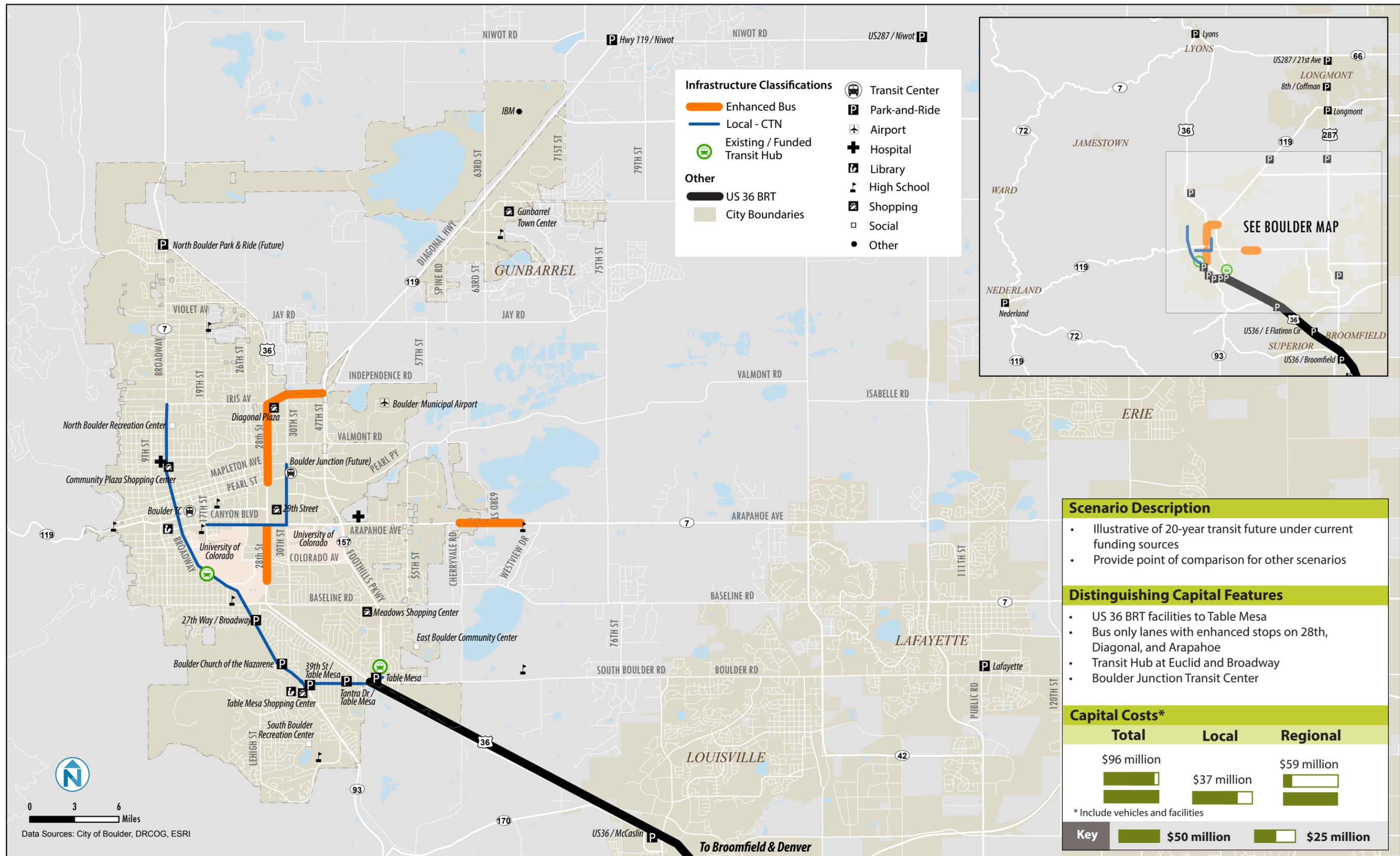
What Does success look like? - WalkBike Steering Committee

Developing performance measures for the Bike and Pedestrian Network

Transportation Master Plan Objectives	What does success look like?	What is an indicator of success?	What is an indicator of success?	What tools can we use to measure it?	Sustainability Framework : Performance Monitoring and Reporting						
	Goal	Performance Measure	S.M.A.R.T. Objectives (Specific. Measurable. Achievable. Relevant. Time Framed)	Evaluation Sources	 Environmentally Sustainable Community	 Safe Community	 Economic Vital Community	 Good Governance	 Livable Community	 Accessible and Connected Community	 Health and Social Thriving Community
• No Long term vehicle traffic	Everyone in Boulder can walk to common destinations (grocery, store, restaurants,	15 minute neighborhoods	5 new 15 minute neighborhoods by 2025 evenly dispersed	Neighborhood accessibility tool							
	People in Boulder walk, bike or bus for the majority of their daily trips	Mode share	Increase bike, mode share of work trip by residents from 10% to 15% by 2015	American Community Survey, Travel Diary, Boulder Valley Employee Survey							
• Reduce SOV to 25% of trips	Increase access to bikes	Bike ownership / B-cycle and Community Cycles memberships	Increase B-cycle memberships by 100% by 2020	B-cycle memberships							
	More kids bike to school	Bike to school mode share	Increase youth bike to school mode share 10% by 2015	National SRTS Student Tally (standardized)							
• Reduce Mobile Source Emissions	Increase bike/ped safety	Bike or pedestrian related motor vehicle collisions	Decrease 10 % by 2015	Crash data							
	Cultivate rich bike culture	Number of events; Bike use by out of state	Increase B-cycle memberships by out of state visitors 20% by 2015	Bcycle							
• Max of 20% Roadways at Level	Change perception of safety	More Enthused & Confident; less Interested but Concerned	Decrease "Interested but Concerned" from 60% to less than 40% by 2015	Community survey / BVSD Parent surveys							
	Increase safety & security (perceived)	People feel safe	Increase from Baseline to 80%	Survey biannual							
• Expand fiscally viable alternatives	Complete network of low stress facilities	Low Stress Network									
	Toward vision zero			Crash data							
• Increase alternatives with	Increase slow zones	Speed limit traffic calming	Increase # slow zones for x-x								
	Safety	Respect rights	people understand & respect rules	Survey							
• Neighborhood Accessibility	Middle income housing near destinations with multi-modal	More housing around \$300K for families; Quality of rental	Increase percentage of middle income 10% by 2025	Census / Cost of rental housing							
	Walking is interesting	Ped activity / Income tax (non-Pearl Street)	Increase ped volume / sales tax revenue (non-Pearl St.)	Ped counts							
• VMT Per Capita	Easy to bike through downtown	Bike facilities on current corridors in both directions	Provide a low-stress connection into / through downtown	low-stress network							



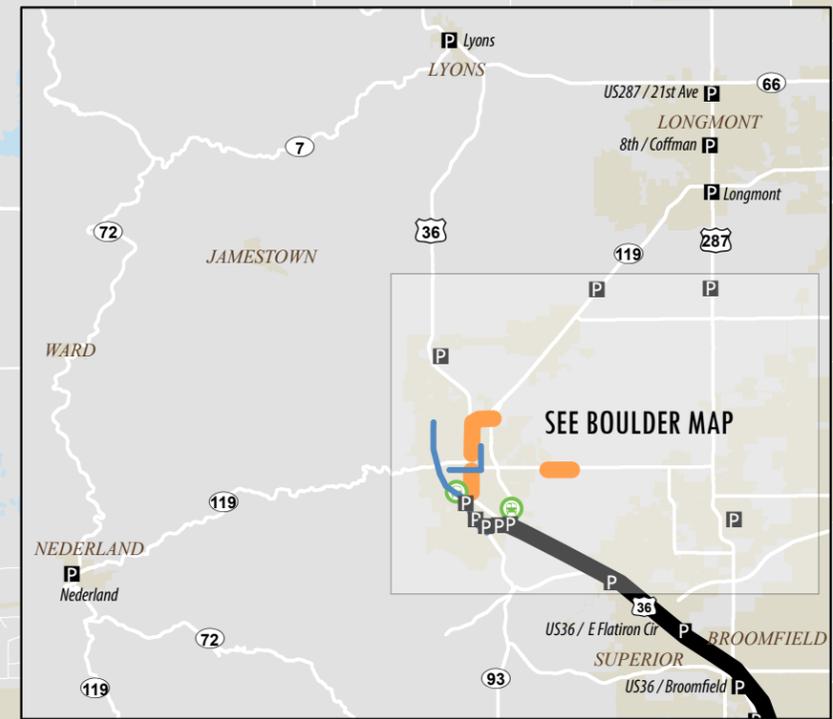
0 3 6 Miles
 Data Sources: City of Boulder, DRCOG, ESRI



Infrastructure Classifications

- Enhanced Bus
- Local - CTN
- Existing / Funded Transit Hub
- Other
 - US 36 BRT
 - City Boundaries

- Transit Center
- Park-and-Ride
- Airport
- Hospital
- Library
- High School
- Shopping
- Social
- Other



Scenario Description

- Illustrative of 20-year transit future under current funding sources
- Provide point of comparison for other scenarios

Distinguishing Capital Features

- US 36 BRT facilities to Table Mesa
- Bus only lanes with enhanced stops on 28th, Diagonal, and Arapahoe
- Transit Hub at Euclid and Broadway
- Boulder Junction Transit Center

Capital Costs*

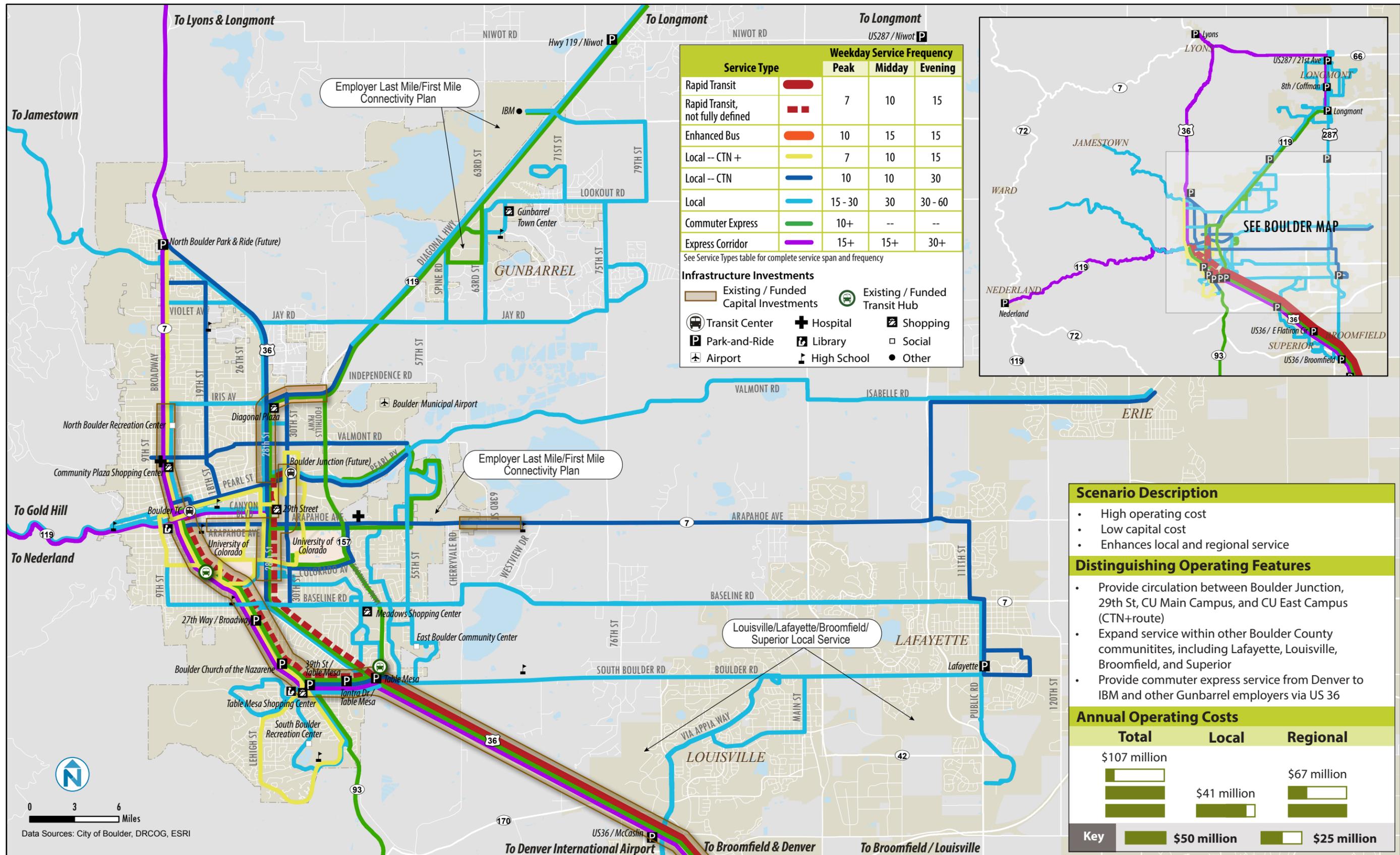
Total	Local	Regional
\$96 million	\$37 million	\$59 million

* Include vehicles and facilities

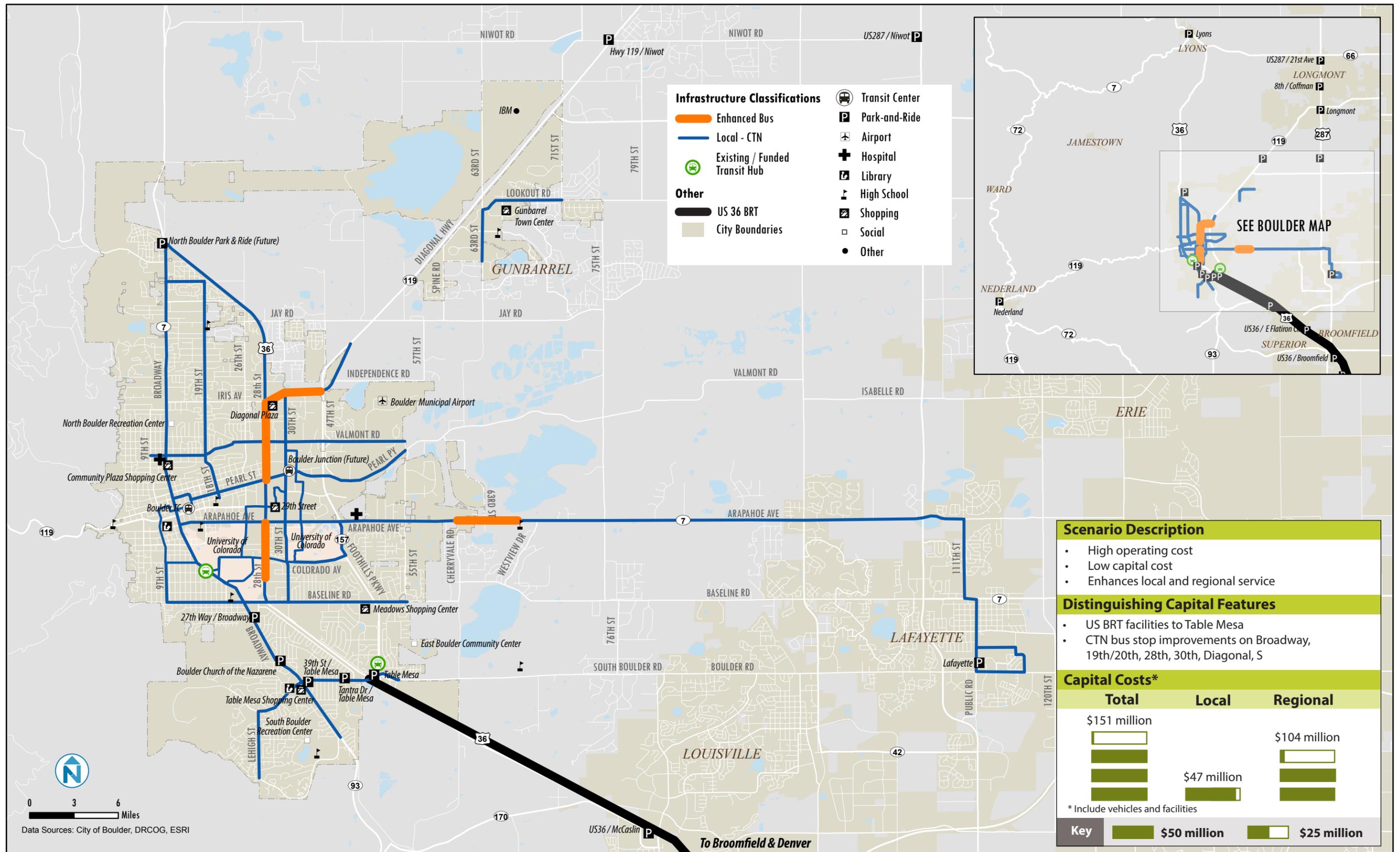
Key	\$50 million	\$25 million

Data Sources: City of Boulder, DRCOG, ESRI

To Broomfield & Denver



Data Sources: City of Boulder, DRCOG, ESRI



Infrastructure Classifications

- Enhanced Bus
- Local - CTN
- Existing / Funded Transit Hub
- Other
 - US 36 BRT
 - City Boundaries

Other

- Transit Center
- Park-and-Ride
- Airport
- Hospital
- Library
- High School
- Shopping
- Social
- Other

Scenario Description

- High operating cost
- Low capital cost
- Enhances local and regional service

Distinguishing Capital Features

- US BRT facilities to Table Mesa
- CTN bus stop improvements on Broadway, 19th/20th, 28th, 30th, Diagonal, S

Capital Costs*

Total	Local	Regional
\$151 million		\$104 million
	\$47 million	

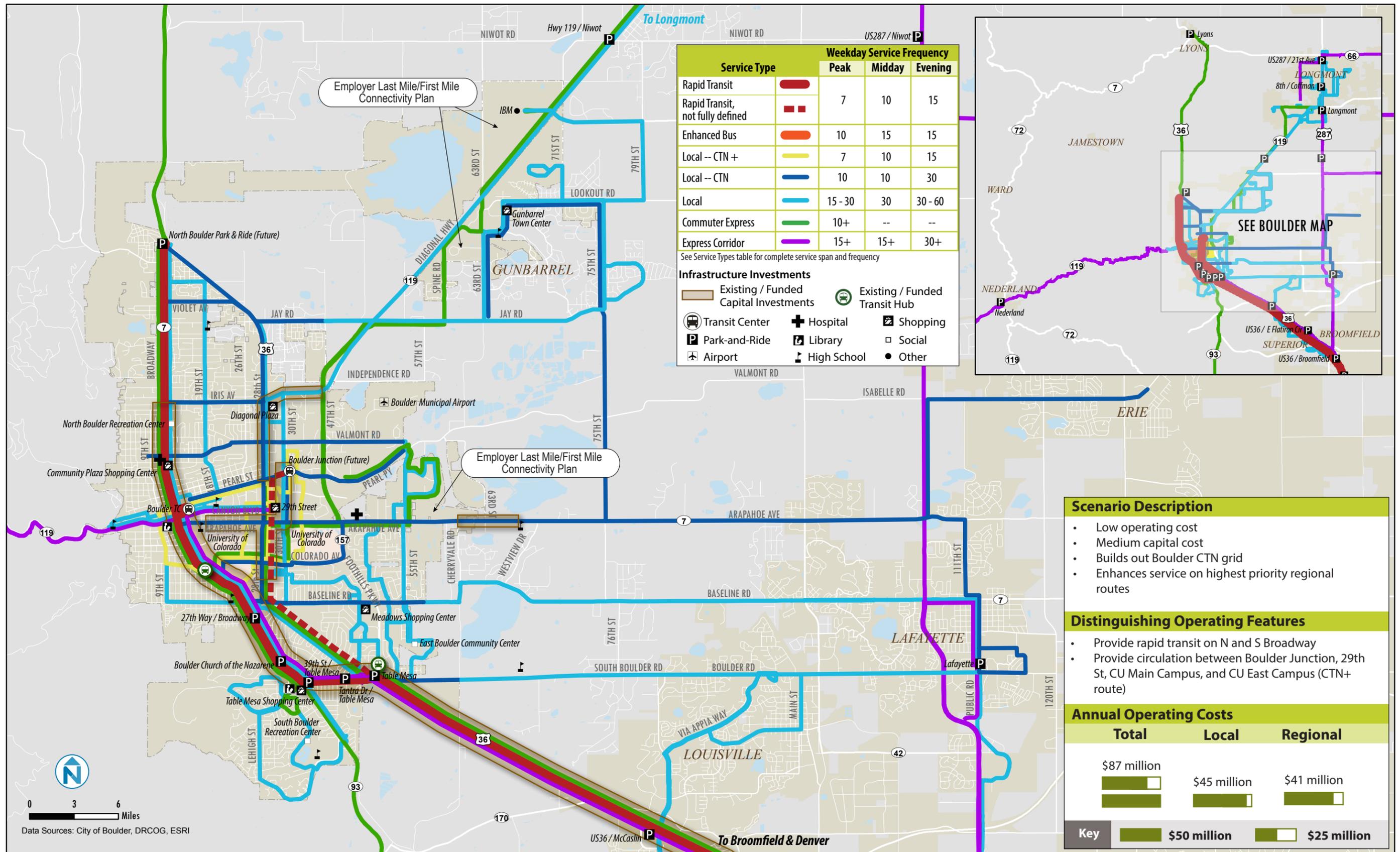
* Include vehicles and facilities

Key

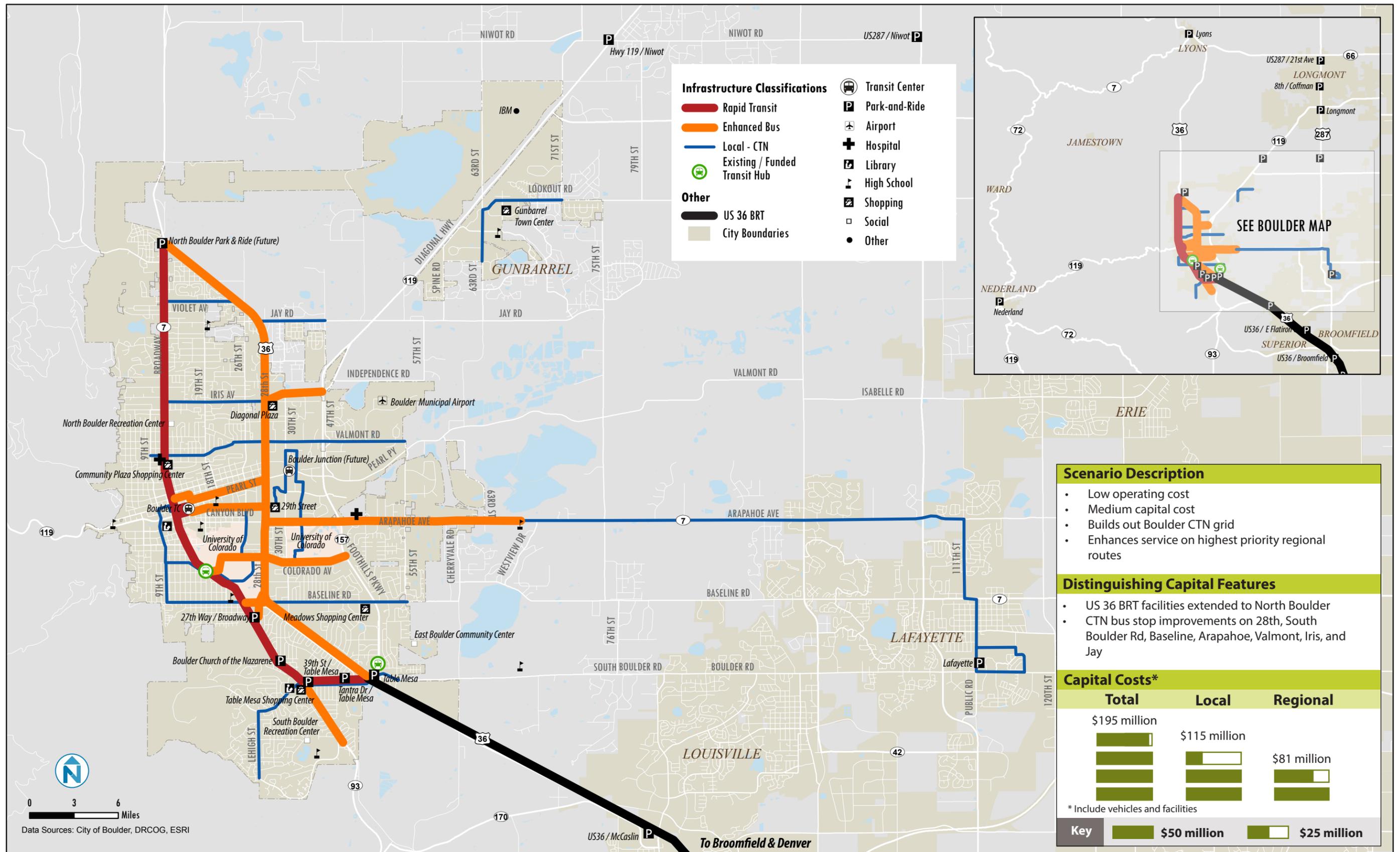
Dark Green Bar	\$50 million	Light Green Bar	\$25 million
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0 3 6 Miles
Data Sources: City of Boulder, DRCOG, ESRI

To Broomfield & Denver



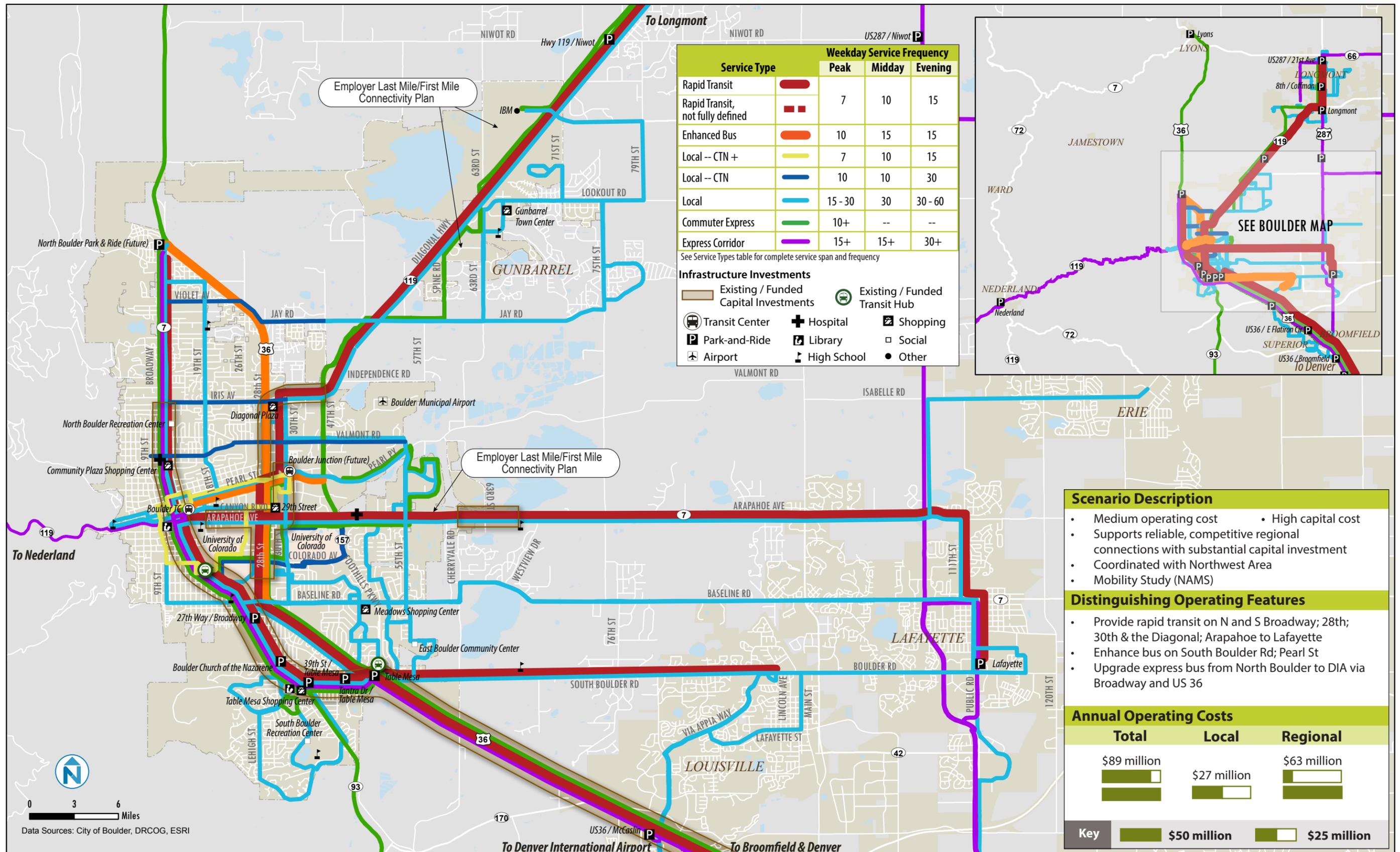
Data Sources: City of Boulder, DRCOG, ESRI

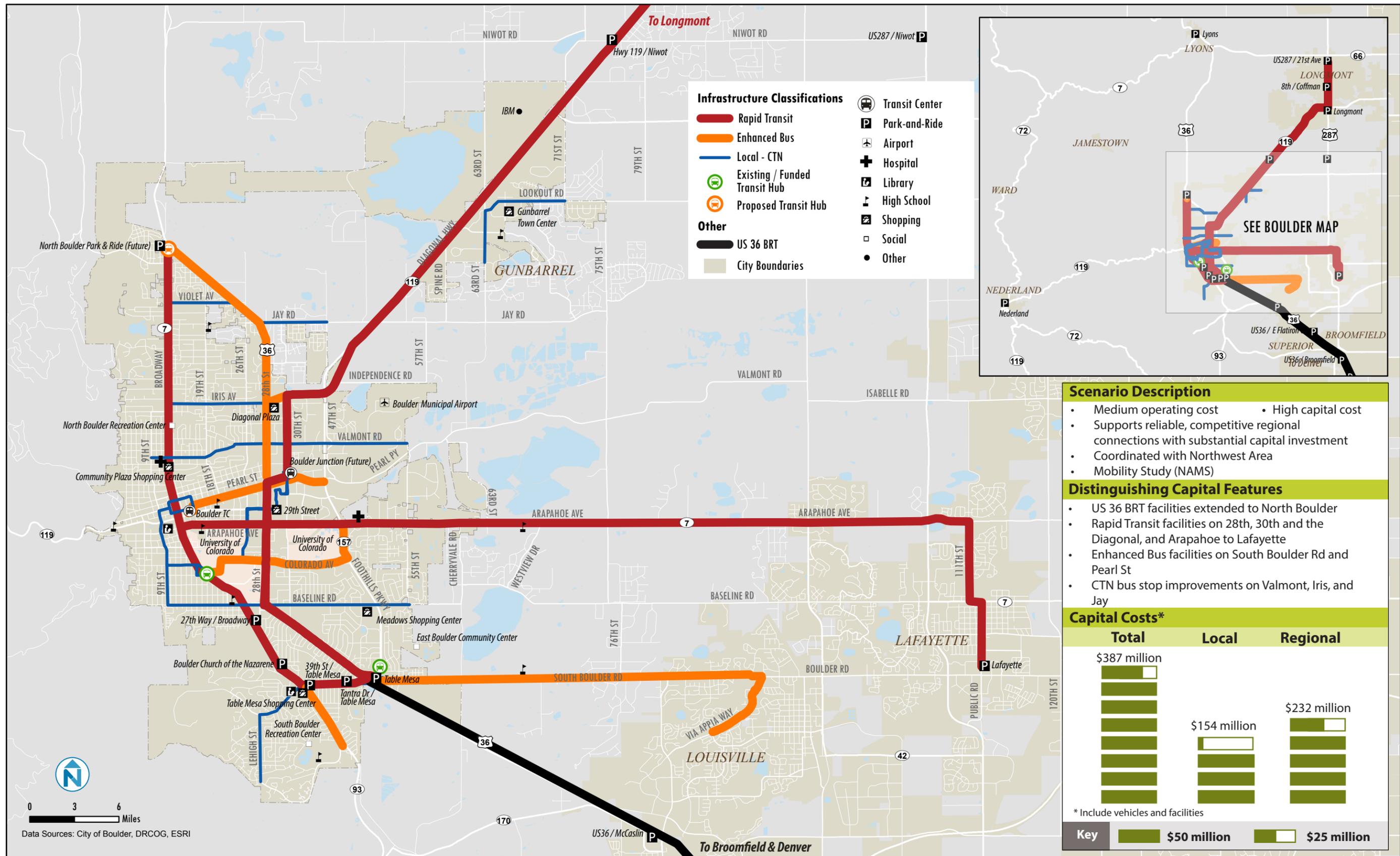


0 3 6 Miles

Data Sources: City of Boulder, DRCOG, ESRI

US36 / McCaslin P To Broomfield & Denver





0 3 6 Miles

Data Sources: City of Boulder, DRCOG, ESRI

To Broomfield & Denver

Boulder TMP Update: Transit Element

Renewed Vision for Transit - Scenarios

Scenario Title	Scenario Description	Annual Operating Elements & Costs			Capital Elements & Costs (Including Vehicles & Facilities)				
		Distinguishing Features	Total	Local	Regional	Distinguishing Features	Total	Local	Regional
Baseline -- Current and Funded Service and Capital	<ul style="list-style-type: none"> Illustrative of 20-year transit future under current funding sources Provide point of comparison for other scenarios 	<ul style="list-style-type: none"> US 36 BRT Service levels comparable to existing system 	\$54 million 	\$23 million 	\$31 million 	<ul style="list-style-type: none"> US 36 BRT facilities to Table Mesa Bus only lanes with enhanced stops on 28th, Diagonal, and Arapahoe Transit Hub at Euclid and Broadway Boulder Junction Transit Center 	\$96 million 	\$37 million 	\$59 million
Scenario 1 -- Local and Regional Enhanced Service	<ul style="list-style-type: none"> High operating cost Low capital cost Enhances local and regional service 	<ul style="list-style-type: none"> Provide circulation between Boulder Junction, 29th St, CU Main Campus, and CU East Campus (CTN+ route) Expand service within other Boulder County communities, including Lafayette, Louisville, Broomfield, and Superior Provide commuter express service from Denver to IBM and other Gunbarrel employers via US 36 	\$107 million 	\$41 million 	\$67 million 	<ul style="list-style-type: none"> US BRT facilities to Table Mesa CTN bus stop improvements on Broadway, 19th/20th, 28th, 30th, Diagonal, South Boulder Rd, Arapahoe, Pearl, and Valmont 	\$151 million 	\$47 million 	\$104 million
Scenario 2 -- Boulder Local Community Transit Network (CTN) Buildout	<ul style="list-style-type: none"> Low operating cost Medium capital cost Builds out Boulder CTN grid Enhances service on highest priority regional routes 	<ul style="list-style-type: none"> Provide rapid transit on N and S Broadway Provide circulation between Boulder Junction, 29th St, CU Main Campus, and CU East Campus (CTN+ route) 	\$87 million 	\$45 million 	\$41 million 	<ul style="list-style-type: none"> US 36 BRT facilities extended to North Boulder CTN bus stop improvements on 28th, South Boulder Rd, Baseline, Arapahoe, Valmont, Iris, and Jay 	\$195 million 	\$115 million 	\$81 million
Scenario 3 -- Local and Regional Rapid Transit Network	<ul style="list-style-type: none"> Medium operating cost High capital cost Supports reliable, competitive regional connections with substantial capital investment Coordinated with Northwest Area Mobility Study (NAMS) 	<ul style="list-style-type: none"> Provide rapid transit on N and S Broadway; 28th; 30th & the Diagonal; Arapahoe to Lafayette Enhance bus on South Boulder Rd; Pearl St Upgrade express bus from North Boulder to DIA via Broadway and US 36 	\$89 million 	\$27 million 	\$63 million 	<ul style="list-style-type: none"> US 36 BRT facilities extended to North Boulder Rapid Transit facilities on 28th, 30th and the Diagonal, and Arapahoe to Lafayette Enhanced Bus facilities on South Boulder Rd and Pearl St CTN bus stop improvements on Valmont, Iris, and Jay 	\$387 million 	\$154 million 	\$232 million

Key

\$50 million

\$25 million

NOTE: Scenario programmatic elements will be determined in coordination with City and County studies that evaluate EcoPass expansion and opportunities for new or expanded parking districts; strategies identified in the City of Boulder Climate Commitment; and through the US 36 Commute Solutions partnership that has identified first and last mile commuting needs.

Boulder TMP Update: Transit Element

Renewed Vision for Transit Draft Scenarios: Service Types

Service Type	Span of Service	Service Frequency									
		Weekday	Saturday	Sunday	Weekday			Saturday		Sunday	
					Peak	Midday	Evening	Day	Evening	Day	Evening
Rapid Transit	5 a.m. - midnight	6 a.m. - midnight	6 a.m. - midnight	7	10	15	10	15	10	15	
Enhanced Bus	5 a.m. - midnight	6 a.m. - midnight	6 a.m. - midnight	10	15	15	15	15	15	15	
Local -- CTN +	6 a.m. - midnight	9 a.m. - midnight	9 a.m. - midnight	7	10	15	15	15	15	15	
Local -- CTN	5 a.m. - midnight	7 a.m. - midnight	7 a.m. - 10 p.m.	10	10	30	15	30	15	30	
Local	6 a.m. - 10 p.m.	7 a.m. - 10 p.m.	7 a.m. - 10 p.m.	15 - 30	30	30 - 60	30	30 - 60	30	30 - 60	
Commuter Express	5 a.m. - 7 p.m.	--	--	10+	--	--	--	--	--	--	
Express Corridor	5 a.m. - midnight	6 a.m. - midnight	6 a.m. - midnight	15+	15+	30+	15+	30+	15+	30+	

Descriptions and Features of Service Types

Service Type	Service Features/Descriptions
Rapid Transit	Very frequent all-day service on major corridors, high speed operation due to fully dedicated right of way, wide station spacing, and transit priority infrastructure (e.g. US 36 BRT, Lane Transit EmX).
Enhanced Bus	Frequent all-day service, medium to high speed operation due to transit priority features, segments of dedicated right of way, and medium to wide station spacing (e.g. MetroRapid in L.A., RapidRide in Seattle).
Local -- CTN +	Very frequent all-day service providing circulation within a limited geographic area, such as central Boulder (e.g. HOP and SKIP).
Local -- CTN	Frequent service during the peak and midday with less frequent service in the evenings. Service is designed to provide frequent service on major corridors (e.g. JUMP and BOUND).
Local	Less frequent service designed to provide service underlying Rapid Transit or Enhanced Bus or to lower demand areas (e.g. #203, #209).
Commuter Express	Very frequent service during peak periods to serve commuters traveling to and from major employment areas (e.g. HX).
Express Corridor	Frequent service during the peak and midday, with less frequent service in the evenings. Service is designed to provide high-speed service between major regional destinations (e.g. AB).

Renewed Vision for Transit Draft Scenarios: Capital Investments

Transit Corridor Type	Corridor Facility Features/Description	Stops per Mile	Cost per Mile ¹	Vehicle Types	Vehicle Cost (per vehicle)
Rapid Transit	Rapid transit service with fully dedicated right of way, transit priority infrastructure, wide station spacing, enhanced vehicles, off-board fare payment, and passenger amenities.	1.5	\$5 - \$20 million	Articulated BRT	\$1.2 million
Enhanced Bus	A mixture of dedicated right of way and mixed-traffic operation, transit priority features, enhanced vehicles, medium to wide station spacing, off-board fare payment, and passenger amenities.	2	\$2 million	Articulated BRT	\$1.2 million
Local -- CTN	Bus stop amenities, including shelters and passenger information.	4-5	\$70,000	30-40 foot bus	\$300,000 - \$425,000
Commuter Express	--	--	--	Over the road coach	\$550,000
Express Corridor	--	--	--	Over the road coach	\$550,000

¹Cost per Mile does not include the vehicle cost.

Evaluation Accounts and Framework

Figure 1 illustrates four key “accounts” that constitute a framework for evaluating long-term transit plan scenarios and how they relate to the Sustainability Framework. Figure 2 provides a more detailed description of the evaluation “accounts,” performance metrics, and sources for evaluation data. Each account houses a small number of the most important evaluation metrics that tie to the Boulder Sustainability Framework and TMP goals. The metrics under each account can be added to or adjusted based on coordination with other TMP efforts (i.e., Bicycle Innovations and Sustainable Streets and Centers) or other City and regional plans.

Figure 1 *Transit Scenarios: Evaluation Accounts’ Relationship to the Boulder Sustainability Framework*



Figure 2 *Transit Scenarios: Evaluation Accounts and Measures*

Draft Evaluation Measures

The TMP update consultant team has extensive experience using this evaluation approach. This experience shows that while many ideas or values can be measured under these accounts, data limitations suggest a small set of measures are most valuable. In similar efforts in Portland and Seattle, 30 to 40 measures were developed based on community and stakeholder input. However, in the evaluation process it was determined that many measures were reliant on the same data sources and that the evaluation of a much smaller set of measures produced the same result as the greater set. Limiting the number of measures is also a more cost effective approach. The measures suggested in Figure 8 are tailored based on this experience and feedback received from Boulder stakeholders and the broader community. The TAC participated in two workshop sessions to assist in developing these measures which have also been reviewed by city interdepartmental staff and RTD.

Figure 8 Transit Scenarios: Proposed Evaluation Measures

Community	▪ Neighborhood accessibility	▪ Boulder Neighborhood Access Tool; intersection density or WalkScore in County
	▪ Transit accessibility	▪ Percent of residents within ¼ mile of CTN/frequent service; percent of jobs within ¼ mile CTN/frequent service (network distance); percent of low to middle income jobs within ¼ mile CTN/frequent service
	▪ Transit mobility for low-income, people with disabilities, minorities, and seniors	▪ Net change in revenue hours available to seniors, youth, persons with disabilities, minorities, and low income populations within corridor catchments
	▪ Household housing and transportation costs	▪ Net change in revenue hours of service available to middle and low income households within corridor catchments (households paying 45% or more of household income for housing and transportation)
	▪ Active Transportation	▪ Induced walking/cycling from transit improvements
Economy	▪ Neighborhood accessibility	▪ Change in access (measured in seats/capacity per hour/day) to retail and neighborhood services/activities as nodes, main streets, or shopping centers
	▪ Access to jobs (including reverse commute)	▪ Change in number of jobs within ¼ mile of transit; service hours per job served; jobs served by route ▪ Access to service sector jobs based on ¼ mile catchment assessment (i.e., use University of Pennsylvania's "Living Wage Job Calculator")
	▪ Green Dividend	▪ Retained wealth in community (\$ not exported for fuel, retained for spending in Boulder)
Environment	▪ Per capita VMT	▪ Estimate of reduction in per capita VMT based on ridership projections and length of trip (adjusted based on developed assumptions for % of new transit trips shifted from vehicle trips)
	▪ Mobile source emissions/GhG reduction (to be developed w/ Climate Commitment team)	▪ Reduction in per capita vehicle miles travelled and related greenhouse gas and particulate reduction benefits; progress toward Climate Commitment targets
	▪ Transit vehicle energy use	▪ Reduction in transit vehicle GhG
Efficiency	▪ Ridership/productivity	▪ Corridor/system boardings; net new corridor/system riders; rides per service hour; net new rides per service hour
	▪ Travel time/reliability	▪ Percent reduction in corridor travel time; change in system rider travel time; estimated improvement to on-time performance; travel time/directness for highest volume trips
	▪ Financial feasibility	▪ Change in system operating cost; capital cost; lifecycle costs (annualized capital and operating costs)
	▪ Cost effectiveness	▪ Operating cost per ride/net new ride; lifecycle cost per net new ride
	▪ User Experience	▪ Qualitative measure of user experience based on incorporation of user amenity, information, and station design features