City of Boulder

TMP 2014

Transit Modal Plan

Appendix B: Transit Scenario Analysis

ACKNOWLEDGEMENTS

The City of Boulder would like to thank the representatives of multiple city, community, and regional agencies and organizations who participated on the Transit Technical Advisory Committee.

The City of Boulder would also like to thank all residents of Boulder and neighboring communities who participated and provided their comments in surveys, outreach events, and public meetings.

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APPENDIX B EXECUTIVE SUMMARY: TRANSIT SCENARIO DEVELOPMENT AND EVALUATION

A key component of the 2014 Boulder Transportation Master Plan (TMP) Update is a Renewed Vision for Transit. The vision was grounded in an extensive, outcome-based analysis of future scenarios for transit system development in Boulder and surrounding communities.

Along with investments in other modes and programs, improved transit services, programs, and enhancements to the transit customer experience will help Boulder reach its target to have 75 percent of all local trips made by non-single occupant modes by the year 2025. As Boulder moves closer to this target, progress is more challenging and requires significant investment and programmatic support. Still, recent data shows that Boulder has been able to achieve a citywide non-SOV mode share of 64 percent for all trips. While a 75 percent non-SOV mode share would be considered unachievable in most U.S. communities, Boulder considers it a realistic goal and further, one that is essential to meet policy objectives that support the local economy, environmental goals, and a high quality of life.

A key step in developing the Renewed Vision for Transit was to develop transit scenarios that provide the opportunity to test various levels and types of capital and operating investment. This process informed preferred scenarios that were the framework for the Renewed Vision for Transit. It is important to note that the scenarios themselves were not meant to represent system plans that could be fully implemented. Rather, the scenario evaluation process helped to:

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

This Transit Analysis Report provides an overview of the transit scenario development process, methodology, and results.

TRANSIT SCENARIO DEVELOPMENT AND EVALUATION PROCESS

Figure B.ES-1 summarizes the approach to develop and evaluate the transit scenarios and how the scenarios were used to develop the Renewed Vision for Transit.

Figure B.ES-1 Transit Scenario Evaluation Process

Based on input from the Technical Advisory Committee,[1] the Transportation Advisory Board, City of Boulder staff, and the public, the following four transit scenarios were developed:[2]

- **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, 2, and 3, which represent varying levels of growth and system investment.
- **Scenario 1: Enhanced Local and Regional 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 in the plan outyear. Corridor capital investments are prioritized on corridors that best support CTN development by providing needed speed and reliability enhancements.

[1] The Transit Technical Advisory Committee (TAC) convened in January 2013 and is comprised primarily, but not exclusively, of "technical staff" from local and regional policy, agency, and key community stakeholders such as transportation staff from Boulder County, RTD, the Director of the Chamber of Commerce, CU representatives, and local Transportation Management Organizations (TMOs). The TAC is intended to be advisory and to provide input on the transit work and public outreach for the transit element of the TMP update.

[2] Scenario projections are based on 2035 population and employment data.

- **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 67% increase over the Baseline scenario. Capital development for Rapid Bus and Enhanced Bus is emphasized in this scenario.

The Boulder Transportation Master Plan (TMP) established a transportation plan that fits within 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.

In support of the community's Sustainability Framework and broader Transportation Master Plan goals, four evaluation accounts were developed to evaluate long-term transit plan scenarios and specific proposed evaluation measures. Each account includes the most important evaluation metrics that tie to the community's broader goals to enhance Boulder's quality of life, improve economic vitality, and protect valued open space and natural areas (Figure B.ES-2).

What is the Scenario Evaluation Process?

The scenario evaluation process is an iterative process that provides the opportunity to test various levels and types of investment. The analysis results answer these key tradeoff questions, among others:

- Which scenario results in the most cost effective investment from a ridership standpoint?
- Which scenario has the greatest impact on greenhouse gas reduction?
- Which scenario most effectively captures regional transit riders?
- Which scenario most effectively serves job access and transit dependent riders?

Figure B.ES-2 Transit Scenarios: Evaluation Accounts and Metrics

TRANSIT SCENARIO RESULTS

As evidenced by the key findings summarized in Figure B.ES-3 and Figure B.ES-4 below, there is no one scenario that performs the "best." Rather, the analysis highlights how local versus regional investments impact key tradeoffs differently. For example, local investment in transit (i.e., Scenario 2) is the most cost effective but does not perform the best from a transit dependent riders and job access standpoint. By comparison, regional investment (Scenario 1) has the greatest impact on reducing greenhouse gas emissions and capturing retained wealth in the local economy.

Figure B.ES-3 Summary of Accounts and Measures

Boulder TMP Update

Accounts and Measures Summary

EFFICIENCY	SCENARIO 1 Local & Regional Service	SCENARIO 2 Local CTN Buildout	SCENARIO 3 Rapid Transit/BRT
Ridership/Productivity	2nd	BEST	2nd
Travel Time	3rd	2nd	BEST
Cost Effectivness	2nd	BEST	2nd
User Experience	3rd	2nd	BEST

COMMUNITY	SCENARIO 1 Local & Regional Service	SCENARIO 2 Local CTN Buildout	SCENARIO 3 Rapid Transit/BRT
Transit Accessibility	2nd	3rd	BEST
Transit Mobility	2nd	3rd	BEST
Housing & Transportation Costs	BEST	2nd	BEST
Active Transportation	2nd	BEST	2nd

ECONOMY	SCENARIO 1 Local & Regional Service	SCENARIO 2 Local CTN Buildout	SCENARIO 3 Rapid Transit/BRT
Neighborhood Accessibility	BEST	BEST	2nd
Access to Jobs	BEST	2nd	BEST
Green Dividend	BEST	3rd	2nd

ENVIRONMENT	SCENARIO 1 Local & Regional Service	SCENARIO 2 Local CTN Buildout	SCENARIO 3 Rapid Transit/BRT
Change in VMT	BEST	3rd	2nd
Mobile Source Emissions/ GhG Reduction	BEST	3rd	2nd
Net New Operating Cost per kg GhG Reduced	BEST	3rd	2nd

Figure B.ES-4 Transit Scenario Analysis Results Key Findings

Account	Key Findings
Efficiency	▪ Scenario 2 (in-city CTN focused strategy) nets the most new riders at the lowest cost per ride ▪ Reducing travel time attracts regional ridership ▪ Regional investments are the least cost effective on a per rider basis but yield other benefits (i.e., travel time, GhG reduction, and other community benefits noted below) ▪ In Scenario 3, Longmont (SH 119) has highest ridership potential of all regional BRT routes, but Arapahoe and South Boulder are also strong ▪ Scenario 1 (local and regional investment) captures the most regional riders (total and net new riders) ▪ The net new operating cost per VMT reduced is also the most cost effective in Scenario 1
Community	▪ Scenarios with higher service investment outside of Boulder (i.e., Scenario 3) do a better job serving low to mid-income residents, jobs, and transit dependent populations ▪ Active transportation outcomes are better for in-city routes due to higher net new ridership and higher rates of walk and bicycle access to transit
Economy	▪ Scenario 2 has highest access to retail and services within Boulder ▪ Scenarios that focus on regional investment (i.e., Scenarios 1 and 3) put CTN/frequent service within walking distance of the most jobs and the most low- to mid-wage jobs ▪ At a corridor level, Rapid Transit on the Diagonal and Arapahoe are among the best performers for GhG reduced and therefore capture the most "retained wealth" ("retained wealth" is derived from VMT reduction)
Environment	▪ Scenario 2 maximizes reduction in GhG and VMT within the City of Boulder, but Scenario 1 (local and regional investment) has highest overall GhG and VMT reduction benefit ▪ Regional investments are a less cost effective way to get people on transit, but trip lengths are longer leading to greater GhG reduction benefits

APPENDIX B TRANSIT SCENARIO ANALYSIS

OVERVIEW

A key component of the 2014 Boulder Transportation Master Plan (TMP) Update is a Renewed Vision for Transit. The vision was grounded in an extensive, outcome-based analysis of future scenarios for transit system development in Boulder and surrounding communities.

Along with investments in other modes and programs, improved transit services, programs, and enhancements to the transit customer experience will help Boulder reach its target to have 75 percent of all local trips made by non-single occupant modes by the year 2025. As Boulder moves closer to this target, progress is more challenging and requires significant investment and programmatic support. Still, recent data shows that Boulder has been able to achieve a citywide non-SOV mode share of 64 percent for all trips. While a 75 percent non-SOV mode share would be considered unachievable in most U.S. communities, Boulder considers it a realistic goal and further, one that is essential to meet policy objectives that support the local economy, environmental goals, and a high quality of life.

This report describes the transit scenarios, the framework for evaluating those scenarios, and scenario analysis results that were developed in collaboration with GoBoulder staff, the project Technical Advisory Committee (TAC), and the Transportation Advisory Board (TAB) between August and February 2014.[1]

BOULDER TRANSIT VISION

In the early 1990s, the City of Boulder embarked on an effort to increase the use of transit within its city limits. At that time, all local transit service was operated by RTD using vehicles standardized across the regional system and an operational model that focused largely on serving regional travelers. Seeking to transform the system to one that appealed to many more local residents and offered a viable travel choice for many types of local trips, staff undertook customer-focused market research. A key element of this work was a community roundtable where local residents were asked what service and design features would make a community access shuttle successful in Boulder.

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[1] The Transit Technical Advisory Committee (TAC) convened in January 2013 and is comprised primarily, but not exclusively, of "technical staff" from local and regional policy, agency, and key community stakeholders such as transportation staff from Boulder County, RTD, the Director of the Chamber of Commerce, CU representatives, and local Transportation Management Organizations (TMOs). The TAC is intended to be advisory and to provide input on the transit work and public outreach for the transit element of the TMP update.

The result of these discussions was the establishment of the HOP route. When the City commenced service on the HOP route and subsequently expanded the Community Transit Network, several key design principles taken directly from the community roundtables were implemented:

The HOP bus was the first branded Community Transit Network (CTN) route, providing frequent service to downtown, the Unversity, and the 29th Street Mall. The CTN was founded on the principles of providing frequent service on low-floor pedestrian-scale buses.
Image from City of Boulder

- Service levels so frequent no schedule is needed (every 10 minutes)
- Community scaled vehicles that are smaller, lower to the ground, and have large windows allowing passengers to connect to the street environment
- Perimeter seating in vehicles to engender conversation and community on the bus
- Branding to give the local system a unique look and feel
- Direct routing to make service more transparent, making riders more confident
- A pass program that eliminates the need to have correct change when boarding
- Transition from a hub and spoke system to a high-frequency grid

The Community Transit Network constructed around these principles has been an unqualified success; the system is highly productive and has become a highly-valued element of Boulder's transportation system. A poll conducted in early 2013 for the Transportation Maintenance Fee development showed that residents valued the maintenance of the CTN (71 percent) higher than roadway maintenance or improvements to the bicycle network.[2] Community and stakeholder outreach conducted during the "listening and learning phase" of the TMP Update (February – August 2013) suggests the community believes that maintaining and expanding the CTN should continue to be a top priority for the City.

Since the 1990s and the unprecedented success of the CTN model, there have been many changes in the transit landscape that require Boulder to update and expand its transit vision. The Boulder State of the System Report for the Transit Element of the TMP Update describes these changes in detail. The following are among the major forces driving a Renewed Vision for Transit:

- **Regional travel.** High housing costs in Boulder combined with a strong and growing job base have dramatically increased the level of in-commuting in recent years. While Boulder has achieved a remarkably high mode share for non-SOV trips for local travel,

[2] http://www.bouldercolorado.gov/files/Transportation_Master_Plan/TMP%20Update/Boulder_Transp_Funding_Report__short_version_final.pdf

in-commute travel remains primarily SOV. In-commute travelers are still estimated to be driving alone at a mode share of approximately 80%.

- **Shared vision with Boulder County neighbors**. Perhaps more so than any time in recent history, Boulder County and the various cities of which it is comprised have aligned their transportation and land use goals. The recent Boulder County Transportation Master Plan directs the region to focus access and mobility policies on non-SOV modes of travel, with transit being a backbone to creating sustainable land use and transportation patterns countywide.
- **Climate Commitment.** The City of Boulder is a national leader in its commitment to addressing global climate change. The Climate Commitment program seeks to establish a long-term strategy to reach net-zero emissions as a City. The TMP is a critical element of City's climate strategy and will help to frame actions and measurable targets.

RENEWING THE VISION WITH A TRANSIT SCENARIO EVALUATION PROCESS

A key challenge in creating a Renewed Vision for Transit was to employ an evaluation process that recognizes the value of a "complete system" approach to transit development in Boulder and its surrounding markets. The City greatly values resident and stakeholder input in the process for shaping the future transit system. Therefore, a nimble and responsive evaluation process that allows the team to respond to community direction is needed. Further, the Renewed Vision for Transit requires a solid quantitative basis to justify future investments and identify short-term transit investments that provide the greatest return on investment.

This section describes the approach to match community values with a set of long-term scenarios. 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 B-1 summarizes the approach to develop and evaluate scenarios and how those can lead to a Renewed Vision for Transit.

Figure B-1 Transit Scenario Evaluation Process

Transit Scenarios Development

The GoBoulder team has collaborated with the Transit TAC to develop a set of transit scenarios that were evaluated in late 2013 and early 2014. That evaluation process will help shape a preferred scenario to form the basis of the Renewed Vision for Transit and a set of near-term transit improvement priorities.

Why Evaluate Scenarios?

It is important to stress that the scenario evaluation process is an iterative process that provides opportunity to test various levels and types of investment. The process will inform a preferred scenario that will be the framework for the Renewed Vision for Transit, but the scenarios themselves are not meant to represent system plans that could be fully implemented. The scenario evaluation process helps us to:

- Illuminate possible futures, not "the" future plan
- Test key constraints
- Test tradeoffs
- Inform decisions

During the August and September 2013 TAC meetings, the TAC provided input on key desired outcomes for the Renewed Vision for Transit. This input was 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/last mile connectivity
- Increase system efficiency and protect operating investments by investing in local and regional corridor capital facilities (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 regional 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

The following four transit scenarios were developed based on this input, a review of key operating data from the State of the System Report, and high-level financial projections:[3]

- **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, 2, and 3, which represent varying levels of growth and system investment.
- **Scenario 1: Enhanced Local and Regional 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 in the plan outyear. 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 67% increase over the Baseline scenario. Capital development for Rapid Bus and Enhanced Bus is emphasized in this scenario.

[3] Scenario projections are based on 2035 population and employment data.

Definition of Enhanced Bus

Enhanced bus provides 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. From a capital standpoint, enhanced bus includes 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. Enhanced Bus operates 5:00 a.m. to midnight on weekdays at a frequency of 10-15 minutes and 6:00 a.m. to midnight on Saturdays and Sundays at 15 minute intervals.

Figure B-2 provides an overview of the operating and capital elements of the three transit scenarios. Figure B-3 provides an overview of service type classifications, including service span, frequency, capital investment assumptions, and service type descriptions. Transit scenario maps are provided in Appendix B.1.

Figure B-2 Boulder TMP Transit Scenarios

Boulder TMP Update: Transit Element

Renewed Vision for Transit - Scenarios

		Annual Operating Elements & Costs				Capital Elements & Costs (Including Vehicles & Facilities)			
Scenario Title	**Scenario Description**	**Distinguishing Features**	**Total**	**Local**	**Regional**	**Distinguishing Features**	**Total**	**Local**	**Regional**
Baseline -- Current and Funded Service and Capital	• Illustrative of 20-year transit future under current funding sources • Provide point of comparison for other scenarios	• US 36 BRT • Service levels comparable to existing system	$60M	$26M	$33M	• 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	$112M	$37M	$74M
Scenario 1 -- Local and Regional Enhanced Service	• High operating cost • Low capital cost • Enhances local and regional service	• Provide circulation between Boulder Junction, 29th St, CU Main Campus, and CU East Campus (CTN+ route) • Expand service within other Boulder County communitites, including Lafayette, Louisville, Broomfield, and Superior • Provide commuter express service from Denver to IBM and other Gunbarrel employers via US 36	$106M	$33M	$73M	• US BRT facilities to Table Mesa • CTN bus stop improvements on Broadway, 19th/20th, 28th, 30th, Diagonal, South Boulder Rd, Arapahoe, Pearl, and Valmont	$173M	$45M	$128M
Scenario 2 -- Boulder Local Community Transit Network (CTN) Buildout	• Low operating cost • Medium capital cost • Builds out Boulder CTN grid • Enhances service on highest priority regional routes	• Provide rapid transit on N and S Broadway • Provide circulation between Boulder Junction, 29th St, CU Main Campus, and CU East Campus (CTN+ route)	$96M	$41M	$54M	• US 36 BRT facilities extended to North Boulder • CTN bus stop improvements on 28th, South Boulder Rd, Baseline, Arapahoe, Valmont, Iris, and Jay	$238M	$115M	$124M
Scenario 3 -- Local and Regional Rapid Transit Network	• Medium operating cost • High capital cost • Supports reliable, competitive regional connections with substantial capital investment • Coordinated with Northwest Area Mobility Study (NAMS)	• 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	$100M	$27M	$72M	• 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	$466M	$176M	$290M

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.

Updated 2/17/2014

Figure B-3 Service Type Classifications

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+

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

[1]Cost per Mile does not include the vehicle cost.

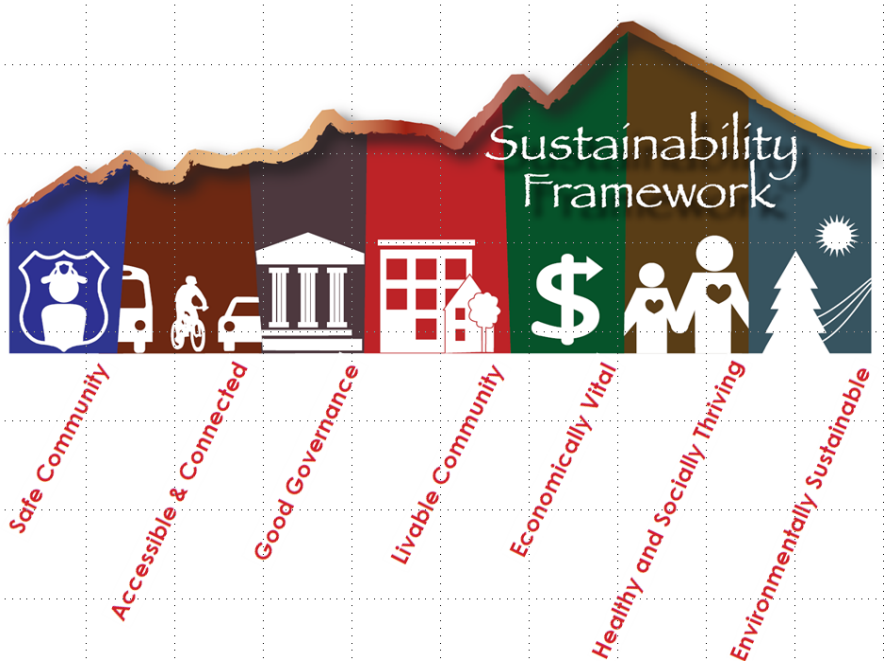
Descriptions and Features of Service Types

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).

Evaluation Measures

The Boulder TMP established a transportation plan that fits within 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. These community values are expressed in the Boulder Sustainability Framework included in the 2010 Boulder Valley Comprehensive Plan and outlined in Figure B-4 below.

Figure B-4 Boulder Sustainability Framework



The Boulder TMP seeks to uphold these values in prioritizing transportation investments and programs. The TMP is supported by a community desire to limit the impacts of growing vehicle traffic, leading to a goal of shifting 19 percent of peak hour trips out of single persons driving a car to other forms of personal travel. To reach this goal, the TMP established the following objectives:

- No long-term growth in vehicle traffic
- Reduction in travel by a Single Occupant Vehicle (SOV) to 25 percent of all trips
- Continuous reduction in automobile emissions of air pollutants
- No more than 20 percent of roadways congested (LOS F)
- Use of alternative modes of travel increases at same rate as employee growth
- Expanded fiscally-viable transportation alternatives for residents and employees

Three new objectives have been added for the current TMP update:

- Improve safety for all transportation system users
- Improve neighborhood accessibility (create 20-minute neighborhoods)
- Reduce vehicle miles traveled per capita

The Renewed Vision for Transit must help Boulder meet these objectives. The ridership model serves as the primary tool for measuring the contribution of various alternatives toward meeting these objectives. A close examination of these objectives shows that the 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, avoided increases in congestion, safer streets, affordable access to jobs, lower household transportation costs, and many other benefits.

That said, it is not simply enough to measure ridership or the productivity of the system. Boulder must also measure success by ensuring that new investments benefit low-income households, people with disabilities and seniors with limited mobility options, and other vulnerable populations. Also, transit's ability to move more people with less space can help Boulder design complete, safe, and business-friendly streets, since less space will be consumed by automobiles.

Figure B-5 and Figure B-6 illustrate four key evaluation "accounts" that constitute a framework for evaluating long-term transit plan scenarios, how they relate to Boulder's Sustainability Framework, and specific proposed evaluation measures. Each account houses a small number of the most important evaluation metrics that tie to the Boulder Sustainability Framework and TMP goals. Figure B-9 in the next section provides a more detailed description of the evaluation accounts, performance metrics, and sources and assumptions for data evaluation. 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 B-5 Transit Scenarios: Evaluation Accounts' Relationship to the Boulder Sustainability Framework

Figure B-6 Transit Scenarios: Evaluation Accounts and Metrics

Experience using this evaluation approach has shown that, while many ideas or values can be measured under these important goal areas (or accounts), data limitations suggest a small set of measures are most valuable. For example, a similar multiple account approach was used to evaluate transit scenarios in other communities/regions. Over 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 (i.e., ridership was the denominator for over 10 measures) and that evaluation of six to eight key measures produced the same result as the greater set. Measures determined for this process were 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.

Other areas of measurement that were included in similar evaluations in other communities, but found to be difficult to measure effectively or be repetitive of other measures, include:

- Improvement to human health indicators. (Change in ridership is typically the best source for measuring the potential to improve human health through increased activity levels such as walking and cycling to transit.) If included, the most effective measurement is improved access to zones or census tracts shown to have higher levels of obesity or disease correlated to low levels of physical activity.
- Supportiveness of land use policies (i.e., connections between designated growth centers).
- Impacts on other modal systems. Such measures are challenging to employ for system level analysis.

Transit Scenario Evaluation Methodology

As described above, scenarios were developed with attention to operating, capital, and programmatic elements. A fundamental element of measurement for the transit scenarios was the combined effect of these elements on transit ridership and the many measures of cost and system efficiency that use ridership as a denominator.

A multi-variant spreadsheet-based ridership forecasting model was used to evaluate potential ridership generated by service, pricing, and land use scenarios in Boulder and on regional transit routes serving Boulder. Traditional four-step modeling tools, such as DRCOG's regional travel demand model, are often ineffectual at predicting route or sub-regional level ridership based on changes in transit service level and quality of service factors. Since transit typically represents a relatively small percentage of regional travel, even minor imprecision in four-step model assumptions can produce large variants in sub-area specific ridership forecasts. Further, many of the transit quality elements that have made Boulder's Community Transit Network successful are difficult to represent in a traditional four-step modeling process.

The model employed for the Boulder TMP was designed to treat each current or proposed transit route (or in some cases a direction of a route, i.e., the HOP may have east-west and west-east segments) as an individual corridor. The model was based on existing transit ridership for each travel corridor and adjusted to reflect 2035 population and employment growth. A baseline ridership forecast was developed based on projected 2035 land use for corridors (or portions of corridors) where no service is currently in place. The model used elasticity factors or other known relationships to "adjust" baseline ridership in each corridor/route segment based on the proposed service or other changes included in the scenarios. This resulted in an estimate of future ridership for each corridor.

Major "drivers" of transit ridership that were considered in the modeling process include frequency or service headway (time interval between buses traveling in the same direction), travel time improvements, and urban form. Figure B-7 below illustrates how these factors were incorporated into the ridership modeling methodology.

Figure B-7 Ridership Methodology

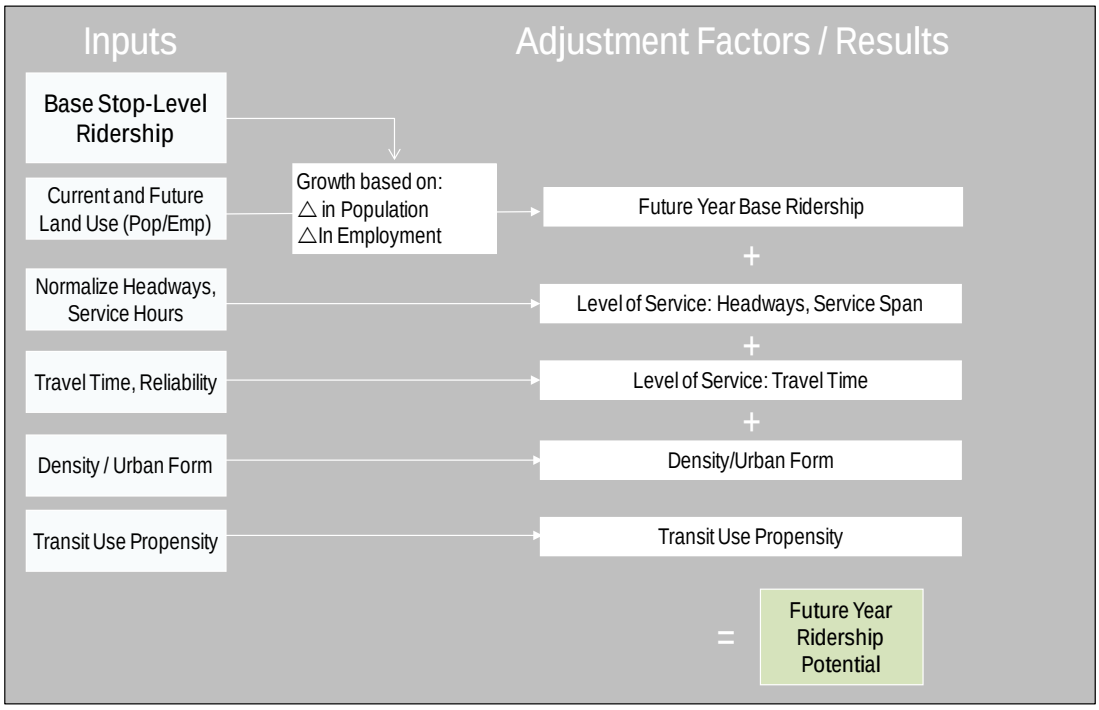


Figure B-8 illustrates how current and potential transit corridors were "segmented" for detailed analysis.

Figure B-9 details the overall methodology for all accounts and metrics used in the transit scenario analysis.

Figure B-8 Segmentation of Current and Potential Transit Corridors (corridor level)

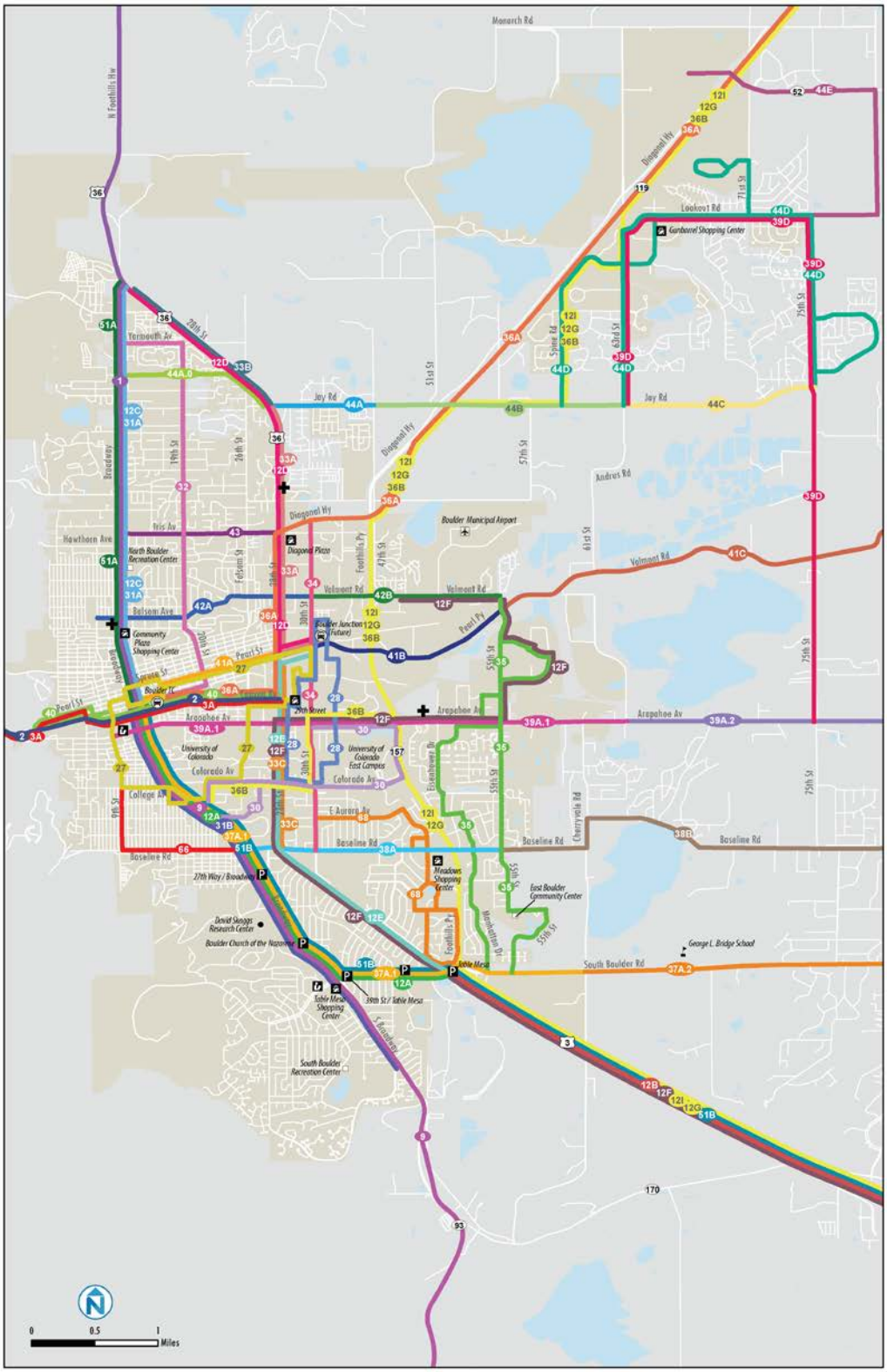


Figure B-9 Transit Scenarios: Evaluation Metrics and Assumptions

Account	Measure	Individual Metrics	Notes / Key Assumptions
Efficiency	§ Ridership/productivity	Total Daily Riders	Weekday daily rides, based on stop-level August 2012 average daily ridership
		Net New Riders	Net new figures for Scenario 1-3 are relative to 2035 baseline accounting for future population/employment growth
		Annual Weekday Riders	Assumes 255 weekdays per year
		Annual Net New Weekday Rides	Net new figures for Scenario 1-3 are relative to 2035 baseline accounting for future population/employment growth
		Annual Weekday Service Hours	
		Productivity	Weekday; rides per service hour
		Net New Riders/Service Hour	Net new figures for Scenario 1-3 are relative to 2035 baseline accounting for future population/employment growth
	§ Travel time/reliability	Aggregate Annual Travel Time Savings (hours)	Weekday daily rides, based on stop-level August 2012 average daily ridership
	§ Cost effectiveness	Annual Weekday Operating Costs	Existing weekday operating costs based on August 2012 service report and 2011 operating cost per route; assume 255 weekdays per year
		Net New Annual Weekday Operating Costs	Net new costs are for each scenario relative to a 2035 baseline
		Operating Cost per Ride	Annual operating costs divided by annual weekday rides
		Net New Operating Cost per Net New Ride	Net new figures for Scenario 1-3 are relative to 2035 baseline accounting for future population/employment growth Net new annual operating costs divided by net new annual weekday rides
		Lifecycle (annualized capital and operating cost) per net new ride	Capital costs annualized assuming 12-year vehicle life, 20+ year infrastructure life, and 2% discount rate
		Operating and Annualized Capital Cost per Net New Ride	Net new figures for Scenario 1-3 are relative to 2035 baseline accounting for future population/employment growth
	§ User experience	Qualitative measure of user experience based on incorporation of user amenity, information, and station design features (% of corridor network that is CTN, enhanced bus, or rapid transit)	Weighted miles based on capital improvement contribution (CTN, Enhanced Bus, Rapid Transit) to enhanced user experience divided by total corridor miles.

Account	Measure	Individual Metrics	Notes / Key Assumptions
Community	§ Neighborhood accessibility[4]	Accessibility score	Used Boulder Access Tool data in-city; intersection density data out of city; available only at the corridor level (see map).
	§Transit accessibility	% of residents (2035) within 3/8 mile walking distance of CTN/frequent service	From Boulder and regional population projections (2035).
		% of low-to-middle income jobs within 3/8 mile walking distance of CTN/frequent service	From LEHD; based on residential location.
	§ Transit mobility for low-income, people with disabilities, and seniors	% of transit-dependent residents within 3/8 mile walking distance of CTN/frequent service	
	§ Household housing and transportation costs	% of middle and low-income households within 3/8 mile walking distance of CTN/frequent service (households paying 45% or more of household income for housing and transportation costs	Average household income and housing cost from ACS; Average transportation cost from CNT H+T index. Households paying > 45% of block group average are counted.
	§ Active transportation	Annual calories burned from walking or cycling to transit by new riders	Assumed 0.25 mi walk and 1.5 mi bike distance per new trip, walk and bike access shares from 2008 RTD on-board survey for Boulder local, regional, and express. Converted to calories burned based on per-hour rates.
Economy	§ Neighborhood accessibility	Access (bus trips per day) to retail and neighborhood services, main streets, or shopping centers	Based on land use data and Scenario bus trips per day.
	§ Access to jobs	% of jobs (2035 Employees) within 3/8 mile of CTN/frequent service (% of Total)	From Boulder and regional employment projections (2035).
		% of low-to-middle income jobs within 3/8 mile walking distance of CTN/frequent service	From LEHD; based on job location.
	§ Green Dividend	Retained wealth in community ($ not exported for fuel)	Assumed VMT reduced, converted to fuel savings based on 2030 projected fleet fuel efficiency. Fuel cost component based on AAA driving cost per mile. Assumes about 75% of fuel savings would be retained in community based on NYC Green Dividend Report.

[4] A map illustrating neighborhood accessibility is provided in Appendix B.4.

Account	Measure	Individual Metrics	Notes / Key Assumptions
Environment	§ Change in VMT	Annual VMT reduced based on ridership projections, assumptions for length of trip, and % of new transit trips shifted from vehicle trips	Based on assumptions for local and regional transit trip distance, trips converted from vehicle trips.
	§ GhG reduction	Annual GhG reduction based on reduced vehicle miles travelled (see above)	Light Duty Vehicle replacement factor (APTA GhG guidance), assumed average distance of route traveled, 28 MPG 2030 fleet fuel efficiency, EPA CO2 content for gas factor.
		Net new operating cost per kilogram of GhG reduced	

Transportation Advisory Board, Transit Technical Advisory Committee, and Intradivisional Team Input

The Transportation Advisory Board, the Transit Technical Advisory Committee (TAC), and the Intradivision Team have been intimately involved in the development of the transit scenario analysis methodology and analysis.

The TAC's participation included the following activities at monthly meetings:

- June and July 2013: Reviewed and confirmed State of the System Report findings, which serve as important background to the scenario development and evaluation framework.
- August 2013: Held a workshop to discuss "framing concepts," which were a key consideration in creating the transit scenarios presented in this memo.
- September 2013: The TAC worked in small groups to review and develop evaluation measures that constitute the evaluation framework.
- October 2013: The TAC participated in an interactive service and capital planning "game." Each of three groups focused on developing an operating and capital "concept plan" using a set of fiscal and geographic constraints.
- November 2013: The TMP team presented the Draft Transit Scenarios and Evaluation Framework to the TAC for comment.
- January 2014: The project team presented preliminary transit scenario analysis results for the Efficiency Account. The TAC provided important feedback to fine tune the analysis methodology and transit scenario design.
- February 2014: The project team presented preliminary transit scenario analysis results for all accounts, including Efficiency, Community, Economy, and Environment. Feedback from the TAC, including a metrics prioritization exercise presented in Figure B-12, helped to inform elements of the Renewed Vision for Transit.

The transit scenario methodology and analysis results have also been vetted with the Transportation Advisory Board and the Intradivisional Team on a monthly basis.

TRANSIT SCENARIO ANALYSIS RESULTS

The transit scenario analysis results were presented to the Technical Advisory Committee and the Transportation Advisory Board between January and March 2014. The detailed analysis results are provided in Appendix B.2. Maps illustrating net new riders and total riders per scenario are provided in Appendix B.3.

The scenario evaluation process is an iterative process that provides the opportunity to test various levels and types of investment. The scenarios themselves were not meant to represent system plans that could be fully implemented, but rather illuminate possible futures and test key tradeoffs to help inform the development of the Renewed Vision for Transit. The analysis results answer these key tradeoff questions, among others:

- Which scenario results in the most cost-effective investment from a ridership standpoint?
- Which scenario has the greatest impact on greenhouse gas reduction?

- Which scenario most effectively captures regional transit riders?
- Which scenario most effectively serves job access and transit-dependent riders?

As evidenced by the key findings summarized in Figure B-10 and Figure B-11 below, there is no one scenario that performs the "best." Rather, the analysis highlights how local versus regional investments impact these key tradeoff questions differently. For example, local investment in transit (i.e., Scenario 2) is the most cost-effective but does not perform the best from a transit-dependent riders and job access standpoint. By comparison, regional investment (Scenario 1) has the greatest impact on reducing greenhouse gas emissions and capturing retained wealth in the local economy.

Figure B-10 Summary of Accounts and Measures

Boulder TMP Update

Accounts and Measures Summary

EFFICIENCY	SCENARIO 1 Local & Regional Service	SCENARIO 2 Local CTN Buildout	SCENARIO 3 Rapid Transit/BRT
Ridership/Productivity	2nd	BEST	2nd
Travel Time	3rd	2nd	BEST
Cost Effectivness	2nd	BEST	2nd
User Experience	3rd	2nd	BEST

COMMUNITY	SCENARIO 1 Local & Regional Service	SCENARIO 2 Local CTN Buildout	SCENARIO 3 Rapid Transit/BRT
Transit Accessibility	2nd	3rd	BEST
Transit Mobility	2nd	3rd	BEST
Housing & Transportation Costs	BEST	2nd	BEST
Active Transportation	2nd	BEST	2nd

ECONOMY	SCENARIO 1 Local & Regional Service	SCENARIO 2 Local CTN Buildout	SCENARIO 3 Rapid Transit/BRT
Neighborhood Accessibility	BEST	BEST	2nd
Access to Jobs	BEST	2nd	BEST
Green Dividend	BEST	3rd	2nd

ENVIRONMENT	SCENARIO 1 Local & Regional Service	SCENARIO 2 Local CTN Buildout	SCENARIO 3 Rapid Transit/BRT
Change in VMT	BEST	3rd	2nd
Mobile Source Emissions/ GhG Reduction	BEST	3rd	2nd
Net New Operating Cost per kg GhG Reduced	BEST	3rd	2nd

Figure B-11 Transit Scenario Analysis Results Key Findings

Account	Key Findings
Efficiency	▪ Scenario 2 (in-city CTN focused strategy) nets the most new riders at the lowest cost per ride ▪ Reducing travel time attracts regional ridership ▪ Regional investments are the least cost-effective on a per rider basis but yield other benefits (i.e., travel time, GhG reduction, and other community benefits noted below) ▪ In Scenario 3, Longmont (SH 119) has highest ridership potential of all regional BRT routes, but Arapahoe and South Boulder are also strong ▪ Scenario 1 (local and regional investment) captures the most regional riders (total and net new riders) ▪ The net new operating cost per VMT reduced is also the most cost-effective in Scenario 1
Community	▪ Scenarios with higher service investment outside of Boulder (i.e., Scenario 3) do a better job serving low to mid-income residents, jobs, and transit-dependent populations ▪ Active transportation outcomes are better for in-city routes due to higher net new ridership and higher rates of walk and bicycle access to transit
Economy	▪ Scenario 2 has highest access to retail and services within Boulder ▪ Scenarios that focus on regional investment (i.e., Scenarios 1 and 3) put CTN/frequent service within walking distance of the most jobs and the most low- to mid-wage jobs ▪ At a corridor level, Rapid Transit on the Diagonal and Arapahoe are among the best performers for GhG reduced and therefore capture the most "retained wealth" ("retained wealth" is derived from VMT reduction)
Environment	▪ Scenario 2 maximizes reduction in GhG and VMT within the City of Boulder, but Scenario 1 (local and regional investment) has highest overall GhG and VMT reduction benefit ▪ Regional investments are a less cost-effective way to get people on transit, but trip lengths are longer leading to greater GhG reduction benefits

The transit scenario analysis was also assessed at the corridor level. Corridor-level results are provided in Appendix B.5.

All accounts and metrics are important and will be used to develop the Renewed Vision for Transit, however some level of priority is needed to further refine the Renewed Vision for Transit. At the February 2014 TAC meeting, TAC members were asked to prioritize metrics from the transit analysis results. Figure B-12 provides a summary of TAC priorities. Ridership/productivity, transit accessibility, housing and transportation cost, and change in VMT/greenhouse gas reduction were identified as the top four priority metrics.

Key messages from TAC member comments and discussion include:

- Many TAC members felt that scenarios and projects that did the most to increase ridership should be prioritized, since ridership (and productivity) was emblematic of the investment's ability to help the City realize other key goals and priorities.
- TAC members placed great importance on transit accessibility, both in terms of the quality of pedestrian and bicycle access to high-quality transit services (i.e., CTN or

Rapid Transit routes) and the percent of the population and jobs that were afforded high-frequency service.

- TAC members emphasized that transit needed to play an important role to ensure Boulder and Boulder County remain a place where people of all income levels can work, live comfortably, and access jobs.
- There was a strong sentiment from the TAC that transit play an integral role in meeting Climate Commitment goals as well as a broader range of environment and sustainability measures. Recognizing that measures around GHG pollutant reduction and vehicles miles traveled reduced are the best quantitative measures for use in stressing this priority, the TAC also pushed for broader consideration of transit's role in improving the quality of the built environment, positively effecting public health, and leading to more sustainable community form.
- The TAC also recognized that in combination, many of the measured outcomes create a "virtuous circle" of benefit. Put simply, more riders on transit frees street space, changes capacity for more compact urban form, and allows safer passage for non-motorized modes. As these things happen, the market for transit improves, cycling and walking becomes more attractive, and neighborhood design becomes less auto-based. There is no proper order to these activities, but in concert they lead to the community form and function that Boulder prizes.

Figure B-12 TAC Accounts and Metrics Prioritization

Account	Metric	First Priority	Second Priority	Third Priority	Total
Efficiency	Ridership/Productivity	5	2	3	10
	Travel Time	2	1	2	5
	Cost Effectiveness	2	1		3
	User Experience		1	3	4
Community	Transit Accessibility	1	3	7	11
	Transit Mobility	1			1
	Housing & Transportation Cost	1	2	3	6
	Active Transportation				0
Economy	Neighborhood Accessibility				0
	Access to Jobs	2	2		4
	Green Dividend			1	1
Environment	Change in VMT	1	1	2	4
	GhG Pollution Reduction	3		1	4
	Cost per GhG reduced			1	1

SENSITIVITY ANALYSIS

In addition to analyzing the accounts, measures, and metrics described above, sensitivity testing was conducted to better understand the affects of policy and programmatic changes on transit ridership and performance. At this stage, sensitivity testing was used to evaluate the addition of parking management districts and the expansion of the EcoPass program. Changes to land use along key transit corridors will be analyzed in the near future.

EcoPass Sensitivity Analysis Methodology & Results

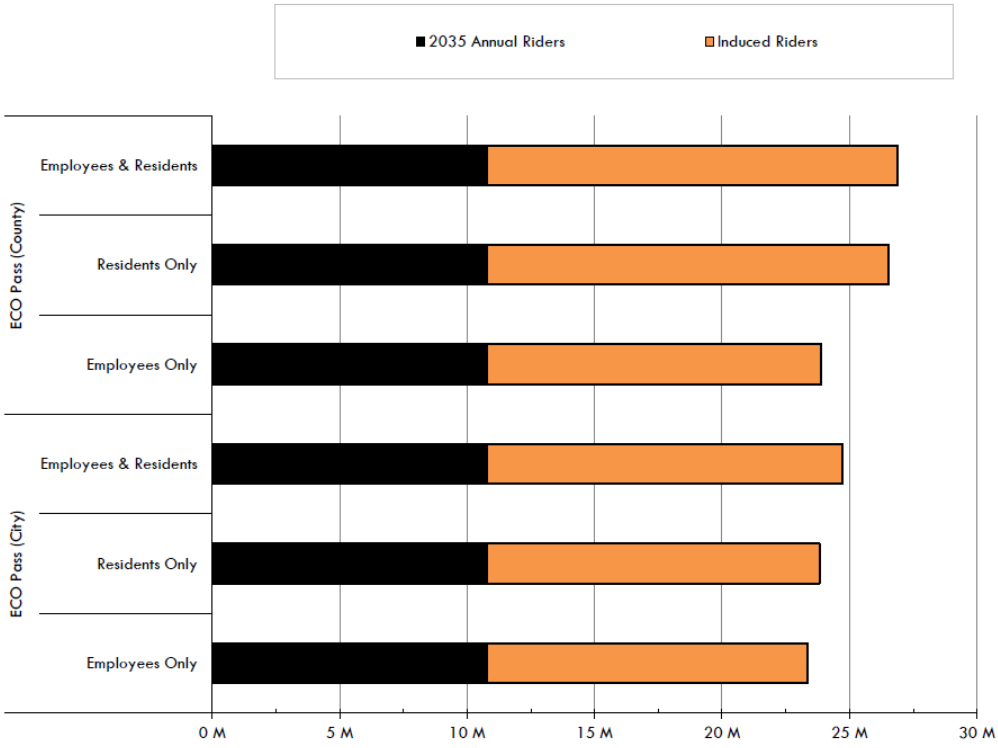
The EcoPass Sensitivity analysis answers this question: if the City only invests in EcoPass expansion (and did NOT invest in the transit scenarios), what would the effect on 2035 ridership be? To analyze the impact of the expansion of the EcoPass program in 2035, the project team used the Boulder County Countywide EcoPass Feasibility Study (2014) as a basis. This study assessed a number of scenarios for expanding EcoPass distribution in the City of Boulder and Boulder County. Three distribution scenarios were evaluated:

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

The scenarios were evaluated at two geographic scales: (1) City of Boulder and (2) all of Boulder County. Given the level of analysis detail in the recent County report, this work was used as a baseline for the TMP transit sensitivity analysis. The County study focused on the effects of EcoPass scenarios under current conditions (i.e., current population and employment levels). The TMP assessment adjusts the County's analysis to reflect 2035 population and employment projections, consistent with the out-year timeframe for the transit scenario analysis. The sensitivity test includes the same geographic and customer distribution scenarios as the County study.

Results for the EcoPass sensitivity testing are provided in Figure B-13. This figure shows induced riders gained from a County-wide or City-ride EcoPass program compared to the Baseline in 2035.

Figure B-13 Estimated Annual Ridership Growth for EcoPass Expansion, 2035



Based on the induced riders in Figure B-13 above, the net new annual cost for a County-wide or City-wide EcoPass program in 2035 would be $5.1 million for employees and residents, $3.5 million for residents only, and $2.9 million for employees only.

Figure B-14 Net New Annual Cost for EcoPass Program, 2035

	Employees & Residents	Residents Only	Employees Only
Net New Annual Cost for EcoPass (County)	$9.4M	$8.6M	$4.0M
Net New Annual Cost for EcoPass (City)	$5.1M	$3.5M	$2.9M

The next step in the analysis looks at how investment in a City-wide or County-wide EcoPass program compares to investment in each of the three transit analysis scenarios. This comparison is shown in Figure B-15 below. It is important to note that the above estimate of net new riders due to expansion of the EcoPass program is not *in addition* to net new riders yielded from each of the Scenarios, i.e., a portion of the estimated new riders induced by an expanded EcoPass program would be induced by service investments, and vice-versa.

Figure B-15 Comparison of Transit Scenario Analysis Investment vs. EcoPass Investment

	Baseline Ridership	Net New Annual Riders	Net New Annual Cost[1]	Net New Annual Cost per Net New Ride[1]
Transit Scenario Analysis	Baseline Net New Annual Riders	1.9M	$10.1M	n/a
	Scenario 1 Net New Annual Riders	9.0M	$46.4M	$5.17
	Scenario 2 Net New Annual Riders	9.2M	$36.4M	$3.94
	Scenario 3 Net New Annual Riders	8.3M	$40.0M	$4.81
EcoPass Analysis (County)	Employees & Residents	5.4M	$9.4M	$1.75
	Residents Only	5.0M	$8.6M	$1.71
	Employees Only	2.4M	$4.0M	$1.68
EcoPass Analysis (City)	Employees & Residents	3.2M	$5.1M	$1.58
	Residents Only	2.3M	$3.5M	$1.52
	Employees Only	1.8M	$2.9M	$1.59

Notes: (1) Costs for transit scenarios represent net new annual weekday operating costs. Costs for EcoPass represent net new costs for purchase of EcoPass program from RTD. Additional operating costs that would be required to provide new system capacity are not considered.

Access District[5] 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. Per guidance from Boulder staff, the project team evaluated the impacts of transit ridership assuming paid parking was implemented in the following areas:

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

Of the four, only BJAD is a City-approved access district. The others are conceptual and represent future districts that could be developed in 2035, likely commensurate with future development in these areas. Arguably, the BJAD could be part of the baseline condition since it is approved, but to date ridership estimation has not factored in paid parking or TDM programs for this area.

[5] 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.

Ridership testing was conducted at the corridor level to assess ridership change for all impacted corridors. The following key steps were used to develop the estimates provided in Figure B-16 below:

- Drew a quarter-mile buffer around each potential Access District area, used to identify transit stops serving each Access District area
- Identified the number of 2035 Baseline transit riders in proximity to the Access District area
- Assumed parking would cost the same in these four districts as it currently does in the downtown paid parking district[6]
- Using peer-based demand elasticity, applied an elasticity range of 0.25 – 0.30 to determine the effect of paid parking on net new transit riders[7]

Figure B-16 Access District Estimated Net New Daily Weekday Transit Riders (2035)

Potential Access District	Net New Daily Weekday Transit Riders (Low) (1)	Net New Daily Weekday Transit Riders (High) (2)
Boulder Junction	700	840
CU East Campus	2,515	3,018
Broadway	908	1,089
Arapahoe	2,257	2,709
Total Net New Daily Weekday Transit Riders	6,380	7,656
Total Annual Net New Daily Weekday Transit Riders	1.6M	2.0M

Notes: (1) Assumes parking price of $4.50 per day and elasticity of 0.25; (2) assumes parking price of $4.50 per day and elasticity of 0.30.

[6] Assumed Access Districts would assume 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 (the analysis approach focused on employees only).

[7] Net new transit ridership results were also compared against 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.

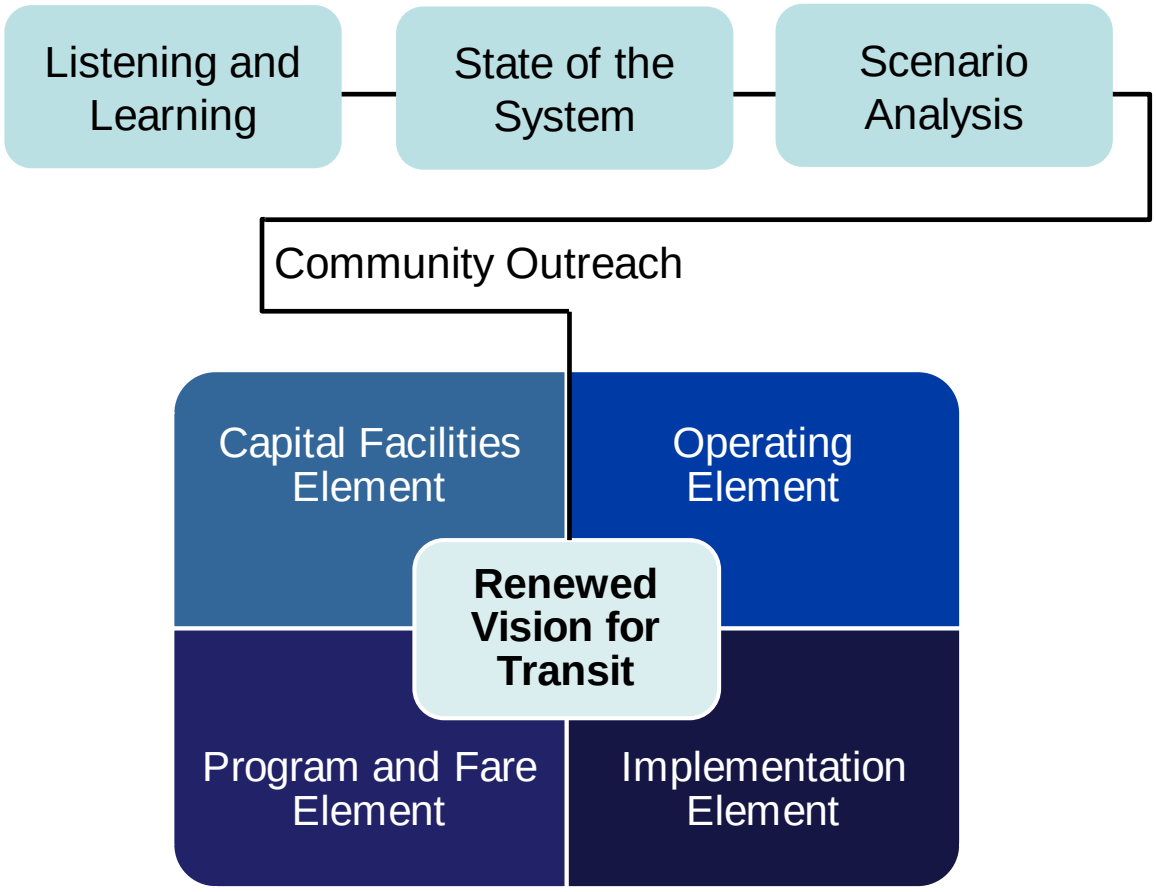
NEXT STEPS TO DEVELOP THE RENEWED VISION FOR TRANSIT

Over the course of the next five months, the project team will work with the GoBoulder team, the Transit Technical Advisory Committee (TAC), the Intradivisional team, the Transportation Advisory Board (TAB), City Council, and the public to develop Boulder's Renewed Vision for Transit. The Renewed Vision for Transit will be developed based on the following inputs:

- Transit scenario analysis results
- Feedback from the TAC on priority accounts and metrics
- Professional application of system planning efficiency

The Renewed Vision for Transit will include capital, operating, programmatic, and implementation elements (see Figure B-17). Specific steps to develop the Renewed Vision for Transit are outlined below.

Figure B-17 Path to the Renewed Vision for Transit



March

Based on the transit scenario analysis results and priorities identified by the TAC and GoBoulder staff, a list of priority projects will be developed. Capital projects (i.e., transit centers, CTN-level improvements, and a stop improvement program) and operating projects (i.e., Enhanced Bus service along Arapahoe) will be detailed separately. A detailed matrix will be developed for each Vision Element, which will include the project name, the estimated cost, implementing partners, and level of priority. Two tradeoff directions for the vision will be developed to facilitate discussion: one that emphasizes locally-based investment and efficiency and one that emphasizes regional investment to prioritize capturing the in-commute and greenhouse gas reductions. The intent is to eventually bring these two approaches to TAB and Council in April for feedback.

The March TAC meeting will be dedicated to reviewing and prioritizing the project lists. The outcome of the March TAC meeting will be a list of priorities, including near-term action items.

In addition to the operating and capital elements, the Renewed Vision for Transit will include a discussion on programmatic and fare elements, in addition to implementation elements such as funding and governance options.

April

Based on feedback received from the TAC in March, the project priority lists will be revised. Capital and operating priorities, in addition to programmatic and implementation elements, will be presented to TAB and Council.

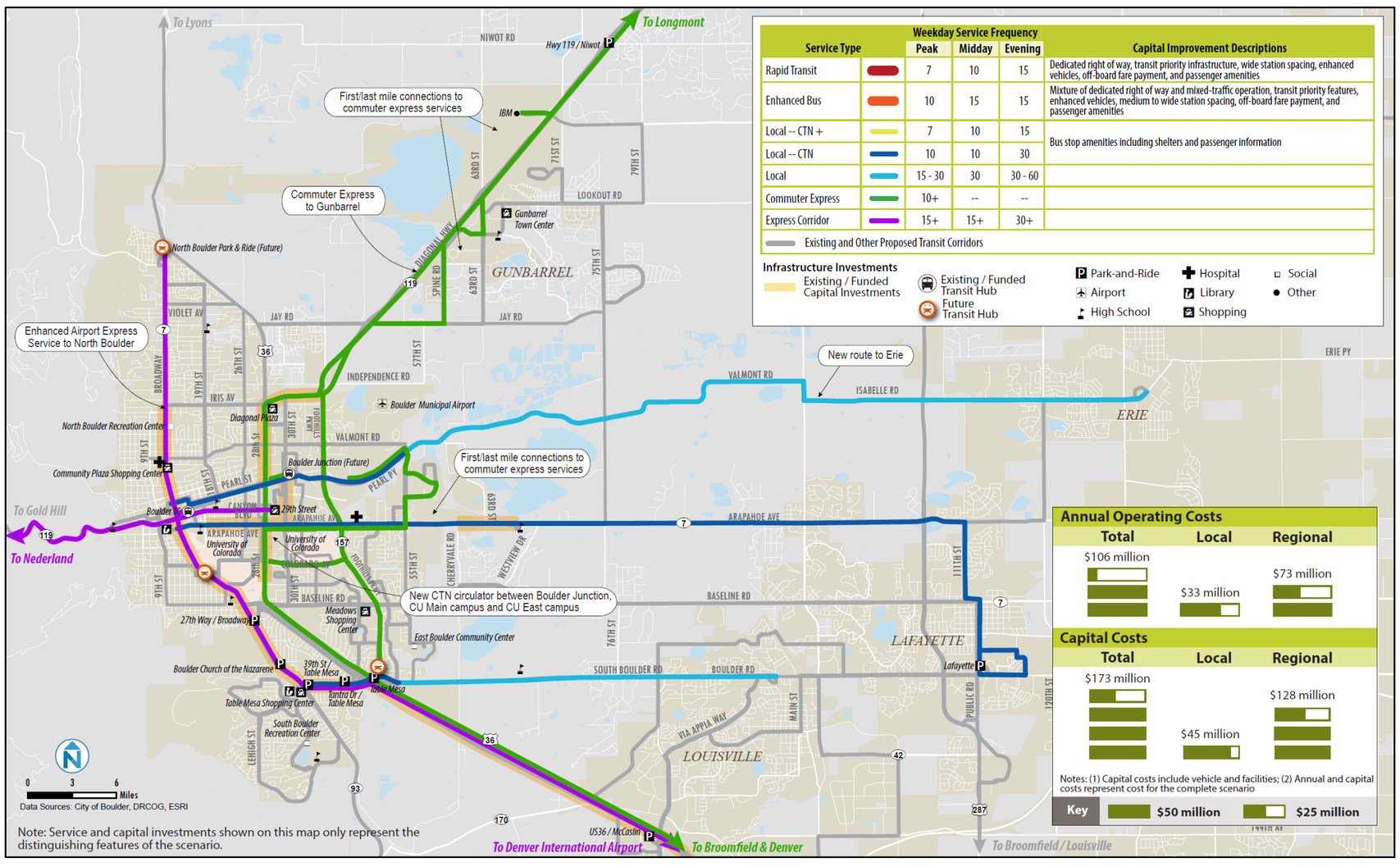
May – June

Based on feedback from TAB and Council, the project team will refine the Renewed Vision for Transit, including the near-term action plan. At this time, a phasing approach will be developed for the Renewed Vision for Transit, including near-, medium-, and long-term action items and priorities.

APPENDIX B.1 DRAFT TRANSIT SCENARIO MAPS

This appendix provides more detail on the operating, capital, and programmatic elements of the transit scenarios.

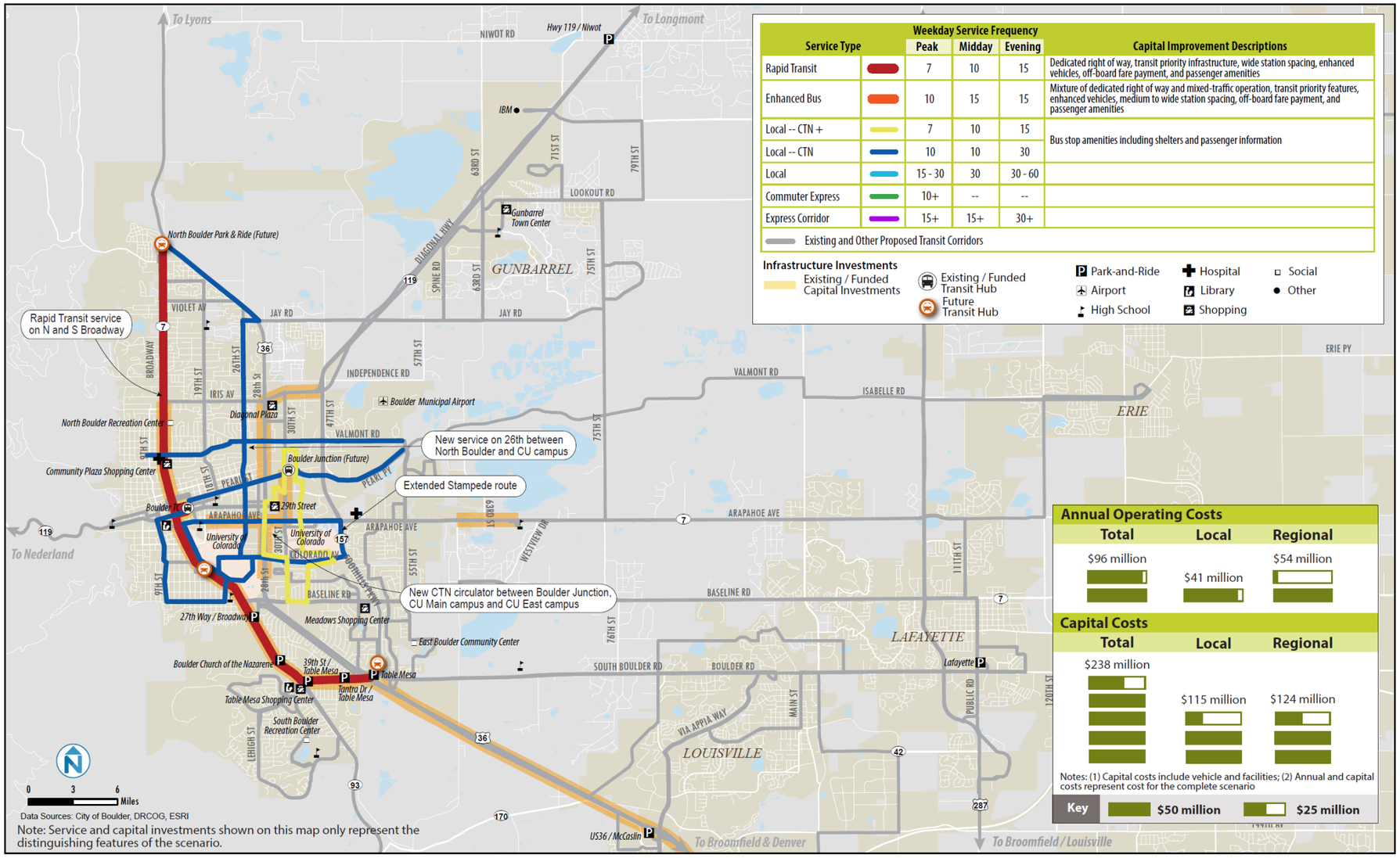
Scenario 1- Local and Regional Enhanced Service



Scenario 2 – Boulder Local Community Transit Network (CTN) Buildout

Boulder TMP Update: Transit Element
Renewed Vision for Transit

Distinguishing Features of Scenario 2 - Boulder Local Community Transit Network (CTN) Buildout
Embrace the Future of East and North Boulder



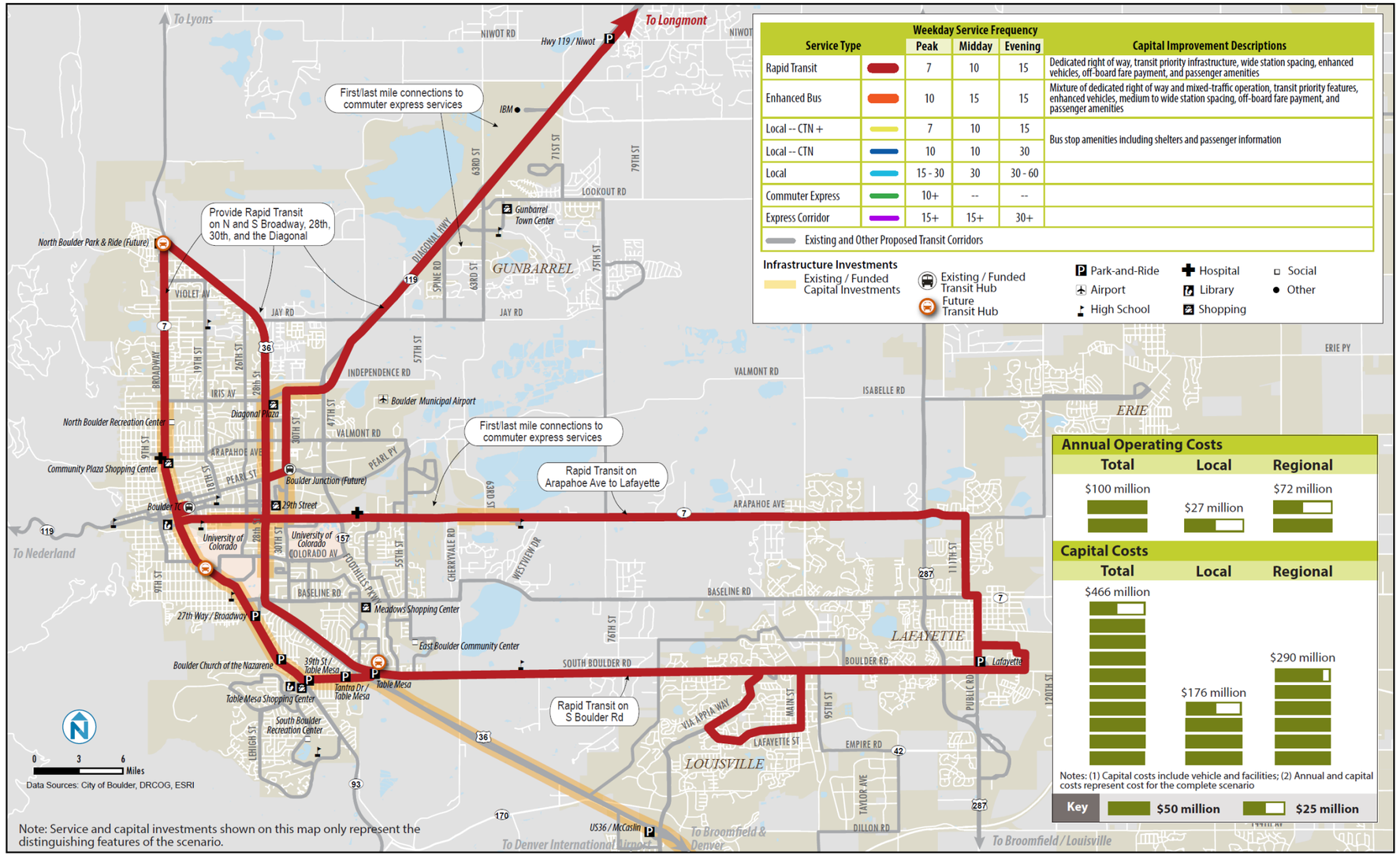
Scenario 3 – Local and Regional Rapid Transit Network

Boulder TMP Update: Transit Element

Renewed Vision for Transit

Distinguishing Features of Scenario 3 - Local and Regional Rapid Transit Network

Heavy Service and Capital Investment on Busy Corridors



Service Type	Weekday Service Frequency: Peak	Midday	Evening	Capital Improvement Descriptions
Rapid Transit	7	10	15	Dedicated right of way, transit priority infrastructure, wide station spacing, enhanced vehicles, off-board fare payment, and passenger amenities
Enhanced Bus	10	15	15	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
Local -- CTN +	7	10	15	Bus stop amenities including shelters and passenger information
Local -- CTN	10	10	30	
Local	15 - 30	30	30 - 60	
Commuter Express	10+	--	--	
Express Corridor	15+	15+	30+	
Existing and Other Proposed Transit Corridors				

Infrastructure Investments

- Existing / Funded Capital Investments
- Existing / Funded Transit Hub
- Future Transit Hub
- Park-and-Ride
- Airport
- High School
- Hospital
- Library
- Shopping
- Social
- Other

Annual Operating Costs

Total	Local	Regional
$100 million	$27 million	$72 million

Capital Costs

Total	Local	Regional
$466 million	$176 million	$290 million

Notes: (1) Capital costs include vehicle and facilities; (2) Annual and capital costs represent cost for the complete scenario

Key: $50 million; $25 million

APPENDIX B.2 DETAILED TRANSIT SCENARIO ANALYSIS RESULTS

Efficiency: TOTAL

		EXISTING (2012)	BASELINE (2030/2035)	SCENARIO 1	SCENARIO 2	SCENARIO 3
Ridership/ Productivity	Total Daily Riders	34,800	42,200	77,400	**78,400**	74,800
	Net New Daily Riders	N/A	7,400	35,200	**36,200**	32,600
	Annual Weekday Rides	8.9 M	10.8 M	19.7 M	**20.0 M**	19.1 M
	Annual Net New Weekday Rides	N/A	1.9 M	9.0 M	**9.2 M**	8.3 M
	Annual Weekday Service Hours	337,300	404,600	**728,100**	653,500	612,400
	Productivity (Riders/Service Hour)	26.3	26.6	27.1	**30.6**	31.1
	Net New Rides per Service Hour	N/A	4.7	12.3	**14.1**	13.6
Travel Time	Aggregate Annual Travel Time Savings (hours)	--	209,800	365,900	434,000	**716,200**
Cost Effectivness	Annual Weekday Operating Costs	$49.9 M	$60.0 M	$106.4 M	**$96.4 M**	$100.0 M
	Net New Annual Weekday Operating Costs	N/A	$10.1 M	$46.4 M	**$36.4 M**	$40.0 M
	Operating Costs per Ride	$5.62	$5.58	$5.39	**$4.82**	$5.24
	Net New Operating Cost per Net New Ride	N/A	N/A	$5.17	**$3.94**	$4.81
	Lifecycle (Annual Cost per Net New Ride)	N/A	$71 M	$123 M	**$117 M**	$136 M
	Operating & Annualized Capital Cost per Net New Ride	N/A	$37.41	$13.67	**$12.65**	$16.36
User Experience	User Experience Based on Incorporation of User Amenity, Info, and Station Design Features	--	14%	17%	23%	**32%**

Efficiency: IN-CITY

		EXISTING (2012)	BASELINE (2030/2035)	SCENARIO 1	SCENARIO 2	SCENARIO 3
Ridership/ Productivity	Total Daily Riders	23,800	28,800	49,700	**61,300**	52,300
	Net New Daily Riders	N/A	5,000	20,900	**32,500**	23,500
	Annual Weekday Rides	6.1 M	7.3 M	12.7 M	**15.6 M**	13.3 M
	Annual Net New Weekday Rides	N/A	1.3 M	5.3 M	**8.3 M**	6.0 M
	Annual Weekday Service Hours	181,300	215,800	279,800	**348,000**	206,000
	Productivity (Riders/Service Hour)	33.5	34.0	45.3	44.9	**64.7**
	Net New Rides per Service Hour	N/A	5.9	19.0	23.8	**29.1**
Travel Time	Aggregate Annual Travel Time Savings (hours)	--	0	0	209,800	**280,300**
Cost Effectivness	Annual Weekday Operating Costs	$21.9 M	$26.1 M	$33.4 M	$41.2 M	**$26.7 M**
	Net New Annual Weekday Operating Costs	N/A	$4.2 M	$7.4 M	$15.1 M	**$0.6 M**
	Operating Costs per Ride	$3.61	$3.55	$2.64	$2.63	**$2.00**
	Net New Operating Cost per Net New Ride	N/A	$3.27	$1.38	$1.82	**$0.10**
	Lifecycle (Annual Cost per Net New Ride)	N/A	$30 M	**$38 M**	$50 M	$39 M
	Operating & Annualized Capital Cost per Net New Ride	N/A	$23.22	**$7.06**	**$6.01**	$6.51
User Experience	User Experience Based on Incorporation of User Amenity, Info, and Station Design Features	--	23%	22%	**28%**	27%

Efficiency: OUT-OF-CITY

		EXISTING (2012)	BASELINE (2030/2035)	SCENARIO 1	SCENARIO 2	SCENARIO 3
Ridership/ Productivity	Total Daily Riders	11,000	13,400	**27,600**	17,100	22,500
	Net New Daily Riders	N/A	2,400	**14,200**	3,700	9,100
	Annual Weekday Rides	2.8 M	3.4 M	**7.0 M**	4.4 M	5.7 M
	Annual Net New Weekday Rides	N/A	0.6 M	**3.6 M**	0.9 M	2.3 M
	Annual Weekday Service Hours	155,900	188,900	**448,400**	299,400	395,700
	Productivity (Riders/Service Hour)	18.0	18.1	**15.7**	14.6	14.5
	Net New Rides per Service Hour	N/A	3.2	**8.1**	3.2	5.9
Travel Time	Aggregate Annual Travel Time Savings (hours)	--	209,800	365,900	224,200	**435,900**
Cost Effectivness	Annual Weekday Operating Costs	$27.9 M	$33.9 M	$73.0 M	**$54.3 M**	$72.1 M
	Net New Annual Weekday Operating Costs	N/A	$6.0 M	$39.0 M	**$20.4 M**	$38.2 M
	Operating Costs per Ride	$9.96	$9.93	**$10.37**	$12.46	$12.57
	Net New Operating Cost per Net New Ride	N/A	$9.77	**$10.78**	$21.64	$16.46
	Lifecycle (Annual Cost per Net New Ride)	N/A	$41 M	$85 M	**$66 M**	$96 M
	Operating & Annualized Capital Cost per Net New Ride	N/A	$66.83	**$23.47**	$69.95	$41.33
User Experience	User Experience Based on Incorporation of User Amenity, Info, and Station Design Features	--	12%	17%	24%	**34%**

Community: TOTAL

		EXISTING (2012)	BASELINE (2030/2035)	SCENARIO 1	SCENARIO 2	SCENARIO 3
Neighborhood Accessibility	Accessibility Score	Only provided at the corridor level (see map)				
Transit Accessibility	% of Residents Within 3/8 Mile Walking Distance of CTN/Frequent Service	24%	25%	30%	25%	**32%**
	% of Low-to-Middle Income Jobs Within 3/8 Mile Walk of CTN/Frequent Service	47%	48%	59%	50%	**63%**
Transit Mobility	% of Transit-Dependent Residents* Within 3/8 Mile Walk of CTN/Frequent Service	35%	36%	42%	37%	**44%**
Housing & Transportation Costs	% of Low-to-Mid Income Households Within 3/8 Mile Walk of CTN/Frequent Service	32%	33%	**41%**	34%	**41%**
Active Transportation	Annual Calories Burned from Walking to Transit by New Riders	--	--	176.1 M	**203.7 M**	175.3 M
	Annual Calories Burned from Cycling to Transit by New Riders	--	--	16.2 M	**18.6 M**	17.0 M

* Low-Income, disabled, and/or senior residents

Community: IN-CITY

		EXISTING (2012)	BASELINE (2030/2035)	SCENARIO 1	SCENARIO 2	SCENARIO 3
Neighborhood Accessibility	Accessibility Score	Only provided at the corridor level (see map)				
Transit Accessibility	% of Residents Within 3/8 Mile Walking Distance of CTN/Frequent Service	--	--	21%	**24%**	21%
	% of Low-to-Middle Income Jobs Within 3/8 Mile Walk of CTN/Frequent Service	--	--	40%	**48%**	39%
Transit Mobility	% of Transit-Dependent Residents* Within 3/8 Mile Walk of CTN/Frequent Service	--	--	33%	**36%**	33%
Housing & Transportation Costs	% of Low-to-Mid Income Households Within 3/8 Mile Walk of CTN/Frequent Service	--	--	**30%**	**34%**	30%
Active Transportation	Annual Calories Burned from Walking to Transit by New Riders	--	--	126.0 M	**189.0 M**	143.6 M
	Annual Calories Burned from Cycling to Transit by New Riders	--	--	10.9 M	**16.3 M**	12.4 M

* Low-Income, disabled, and/or senior residents

Community: OUT-OF-CITY

		EXISTING (2012)	BASELINE (2030/2035)	SCENARIO 1	SCENARIO 2	SCENARIO 3
Neighborhood Accessibility	Accessibility Score	Only provided at the corridor level (see map)				
Transit Accessibility	% of Residents Within 3/8 Mile Walking Distance of CTN/Frequent Service	--	--	18%	9%	**24%**
	% of Low-to-Middle Income Jobs Within 3/8 Mile Walk of CTN/Frequent Service	--	--	41%	25%	**53%**
Transit Mobility	% of Transit-Dependent Residents* Within 3/8 Mile Walk of CTN/Frequent Service	--	--	28%	17%	**33%**
Housing & Transportation Costs	% of Low-to-Mid Income Households Within 3/8 Mile Walk of CTN/Frequent Service	--	--	26%	13%	**31%**
Active Transportation	Annual Calories Burned from Walking to Transit by New Riders	--	--	**50.1 M**	14.7 M	31.7 M
	Annual Calories Burned from Cycling to Transit by New Riders	--	--	**5.3 M**	2.3 M	4.6 M

* Low-Income, disabled, and/or senior residents

Economy: TOTAL

		EXISTING (2012)	BASELINE (2030/2035)	SCENARIO 1	SCENARIO 2	SCENARIO 3
Neighborhood Accessibility	Access (Bus Trips per Day) to Retail, Main Streets, etc.	1,674	1,668	**2,950**	2,940	2,725
Access to Jobs	% of Jobs Within 3/8 Mile Walking Distance of CTN/Frequent Service	36%	39%	**50%**	44%	**50%**
	% of Low-to-Middle Income Jobs Within 3/8 Mile Walk of CTN/Frequent Service	24%	26%	31%	25%	**34%**
Green Dividend	Retained Wealth in Community	--	--	**$4.4 M**	$2.2 M	$2.8 M

Economy: IN-CITY

		EXISTING (2012)	BASELINE (2030/2035)	SCENARIO 1	SCENARIO 2	SCENARIO 3
Neighborhood Accessibility	Access (Bus Trips per Day) to Retail, Main Streets, etc.	--	--	2,073	**2,431**	1,774
Access to Jobs	Jobs Within 3/8 Mile Walking Distance of CTN/ Frequent Service	--	--	37.4%	**41.7%**	35.4%
	Low-to-Middle Income Jobs Within 3/8 Mile Walk of CTN/Frequent Service	--	--	21%	**24%**	21%
Green Dividend	Retained Wealth in Community	--	--	$0.7 M	**$1.1 M**	$0.7 M

Economy: OUT-OF-CITY

		EXISTING (2012)	BASELINE (2030/2035)	SCENARIO 1	SCENARIO 2	SCENARIO 3
Neighborhood Accessibility	Access (Bus Trips per Day) to Retail, Main Streets, etc.	--	--	877	509	**951**
Access to Jobs	Jobs Within 3/8 Mile Walking Distance of CTN/ Frequent Service	--	--	31.2%	21.2%	**37.5%**
	Low-to-Middle Income Jobs Within 3/8 Mile Walk of CTN/Frequent Service	--	--	18%	8%	**25%**
Green Dividend	Retained Wealth in Community	--	--	**$3.8 M**	$1.1 M	$2.1 M

Environment: TOTAL

		EXISTING (2012)	BASELINE (2030/2035)	SCENARIO 1	SCENARIO 2	SCENARIO 3
Change in VMT	Annual VMT Reduction (miles)	--	--	**39.2 M**	19.3 M	25.2 M
Mobile Source Emissions/GhG Reduction	Annual GhG Reduction (MT CO2e)	--	--	**12,400**	6,100	8,000
	Net New Operating Cost per Kilogram GhG Reduced	--	--	**$0.70**	$1.50	$1.00

Environment: IN-CITY

		EXISTING (2012)	BASELINE (2030/2035)	SCENARIO 1	SCENARIO 2	SCENARIO 3
Change in VMT	Annual VMT Reduction	--	--	5.8 M	**9.9 M**	6.1 M
Mobile Source Emissions/GhG Reduction	Annual GhG Reduction (MT CO2e)	--	--	1,800	**3,100**	1,900
	Net New Operating Cost per Kilogram GhG Reduced	--	--	**$3.00**	$2.70	$3.20

Environment: OUT-OF-CITY

		EXISTING (2012)	BASELINE (2030/2035)	SCENARIO 1	SCENARIO 2	SCENARIO 3
Change in VMT	Annual VMT Reduction	--	--	**33.4 M**	9.4 M	19.1 M
Mobile Source Emissions/GhG Reduction	Annual GhG Reduction (MT CO2e)	--	--	**10,600**	3,000	6,100
	Net New Operating Cost per Kilogram GhG Reduced	--	--	**$0.30**	**$0.30**	$0.40

APPENDIX B.3 NET NEW AND TOTAL RIDERSHIP MAPS

Figure B.3-1 Scenario 1 Net New Riders

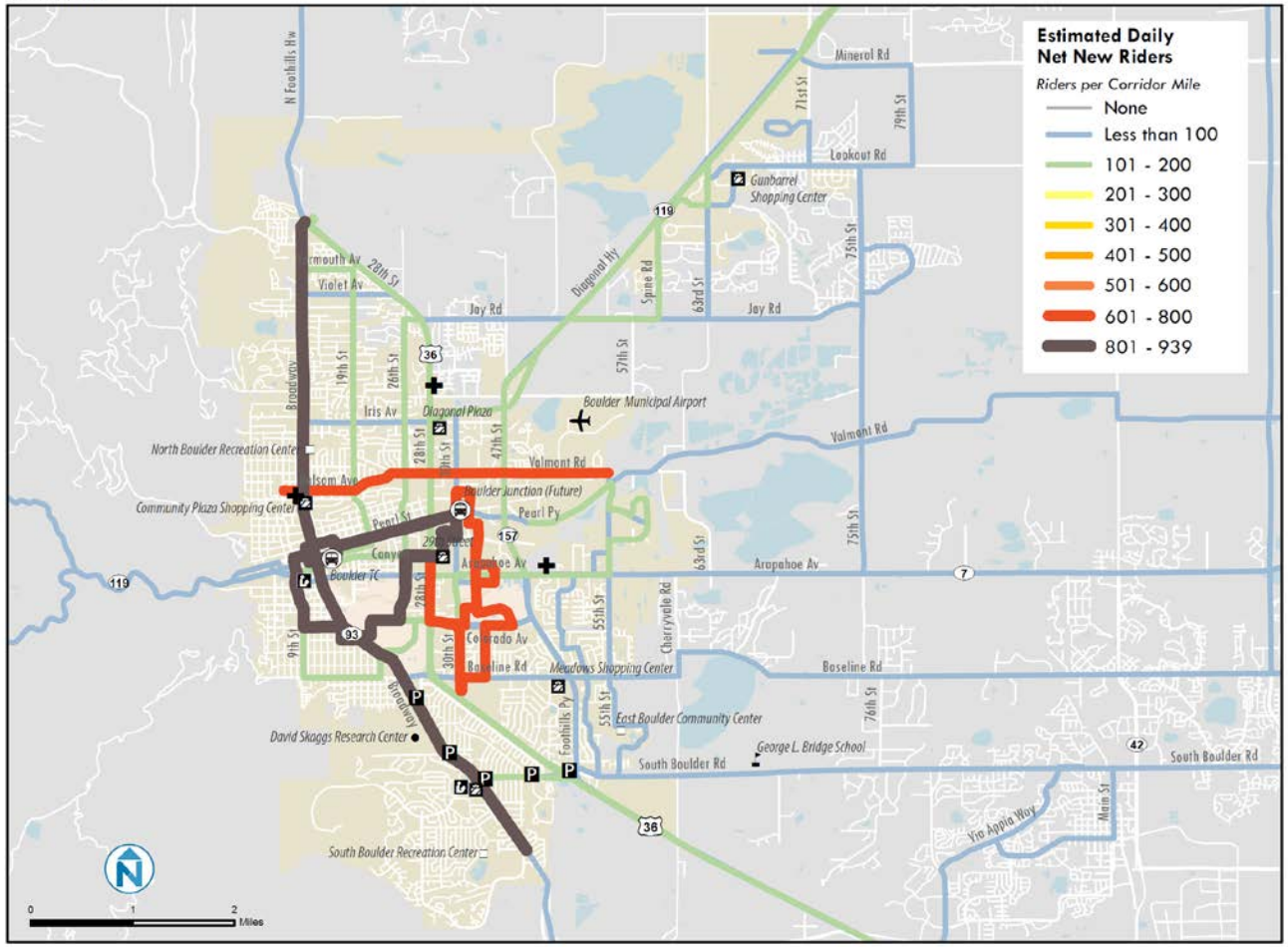


Figure B.3-2 Scenario 2 Net New Riders

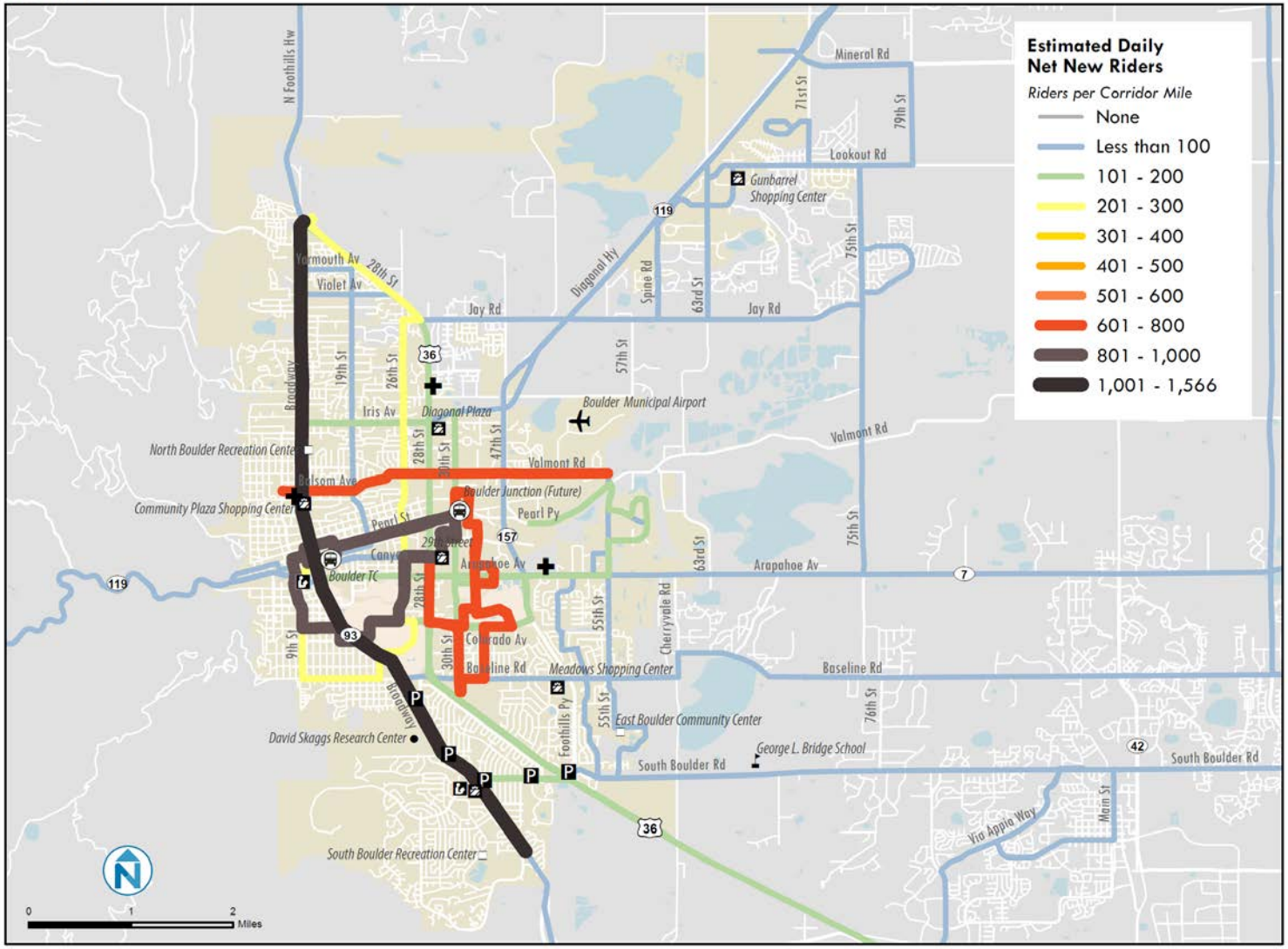


Figure B.3-3 Scenario 3 Net New Riders

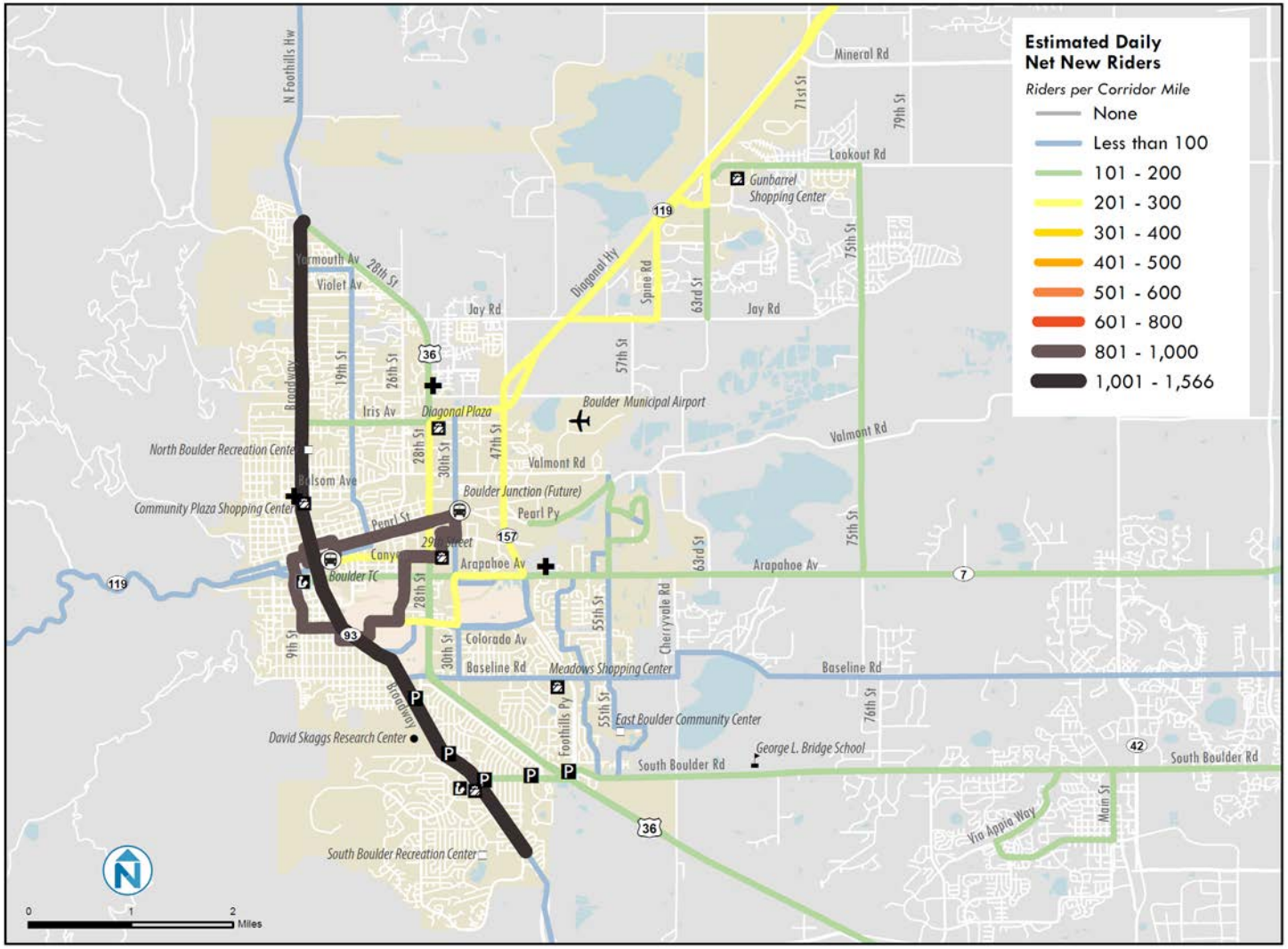


Figure B.3-4 Scenario 1 Total Riders

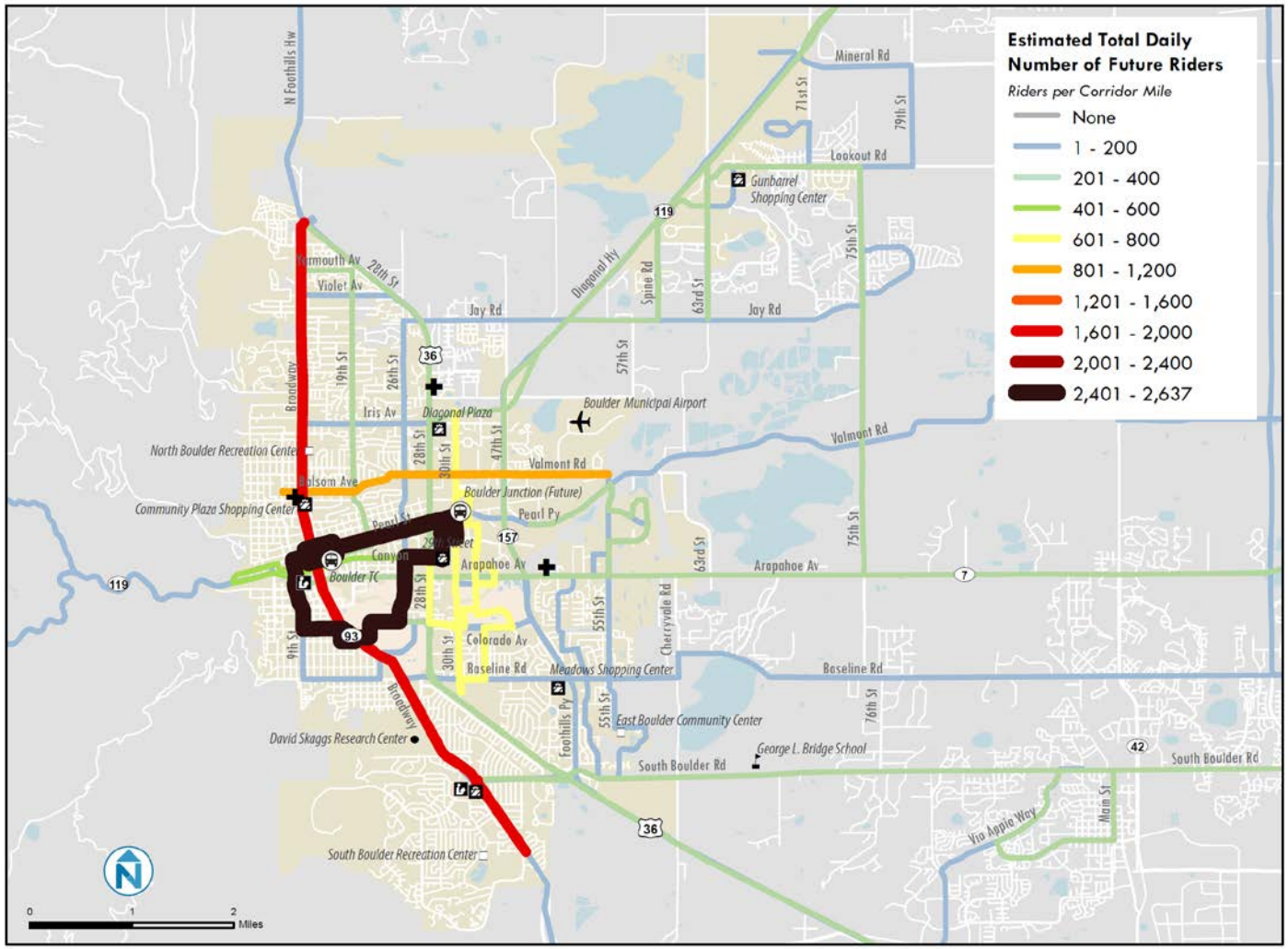


Figure B.3-5 Scenario 2 Total Riders

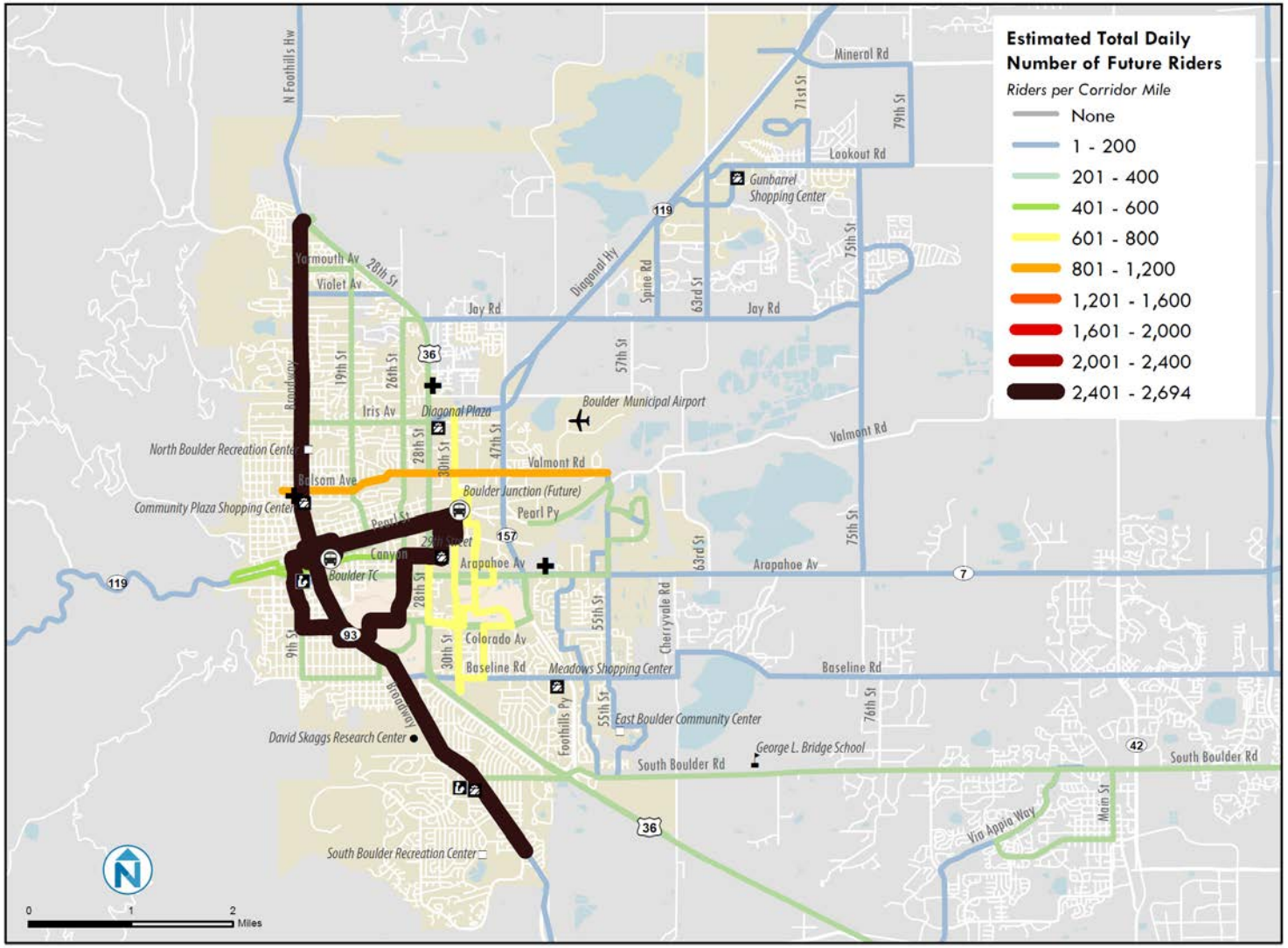
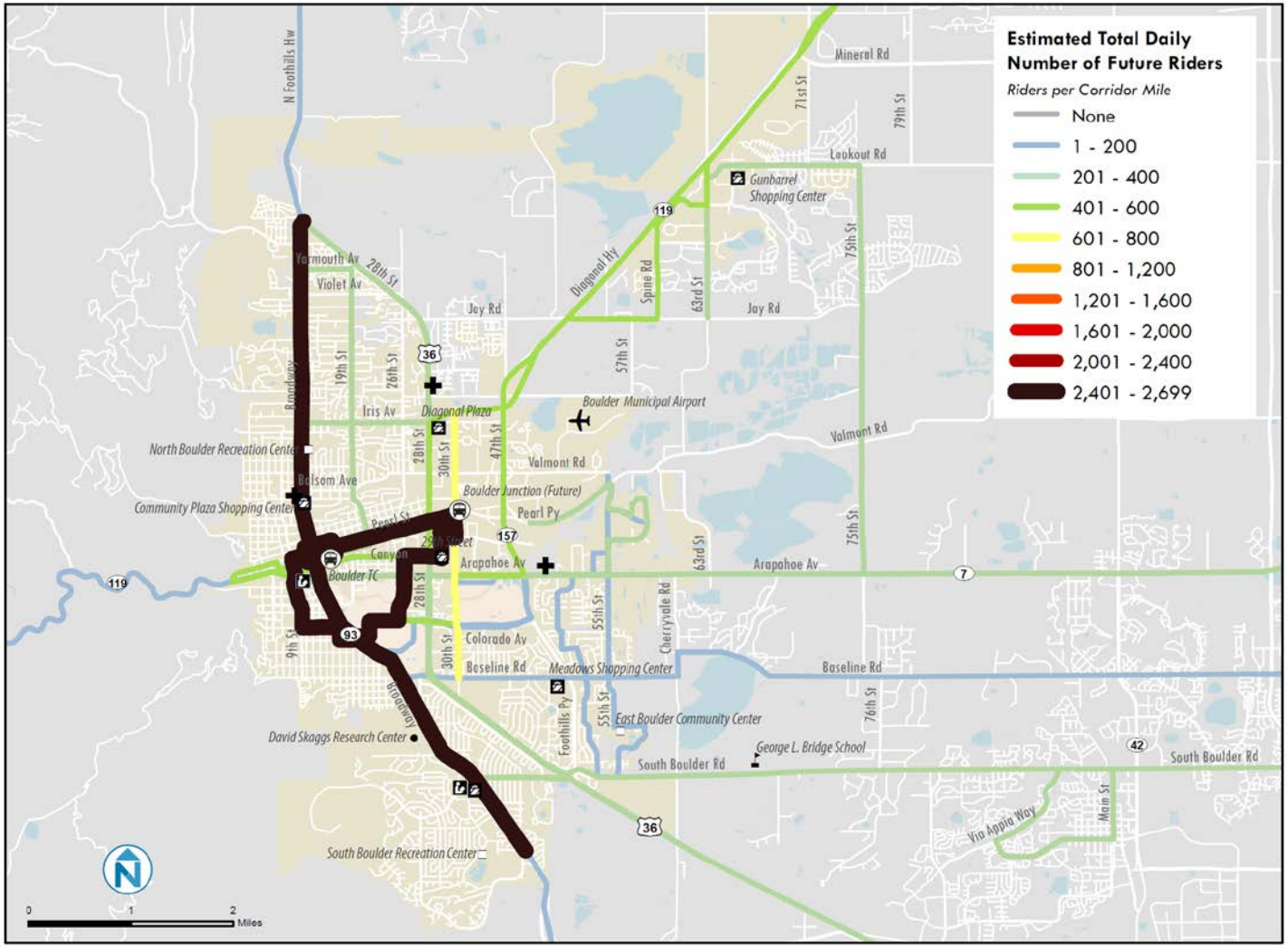


Figure B.3-6 Scenario 3 Total Riders



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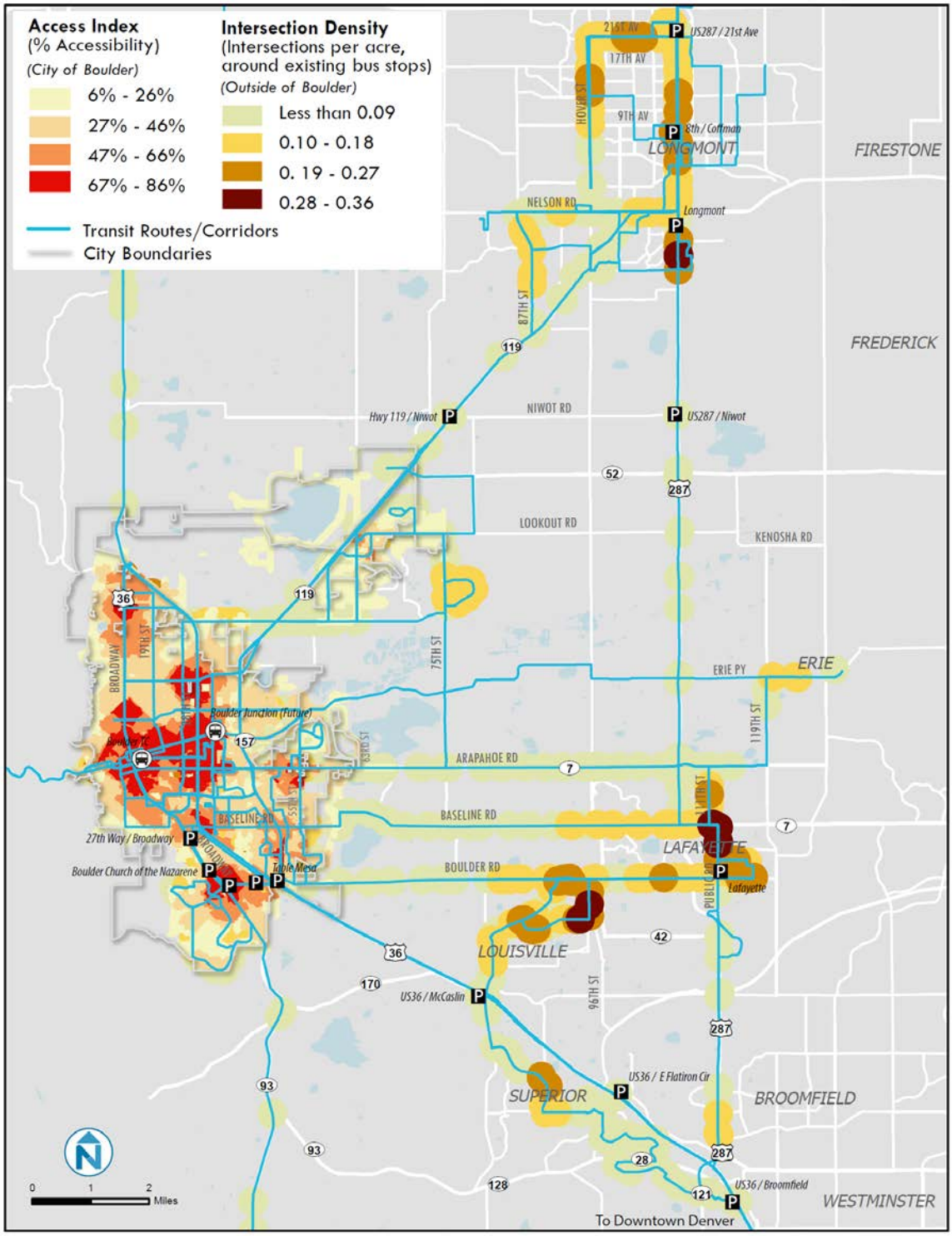
APPENDIX B.4 ACCESSIBILITY SCORE

Figure B.4-1 uses the Boulder Access Tool (within the City of Boulder) and intersection density (outside of the city of Boulder) to assess the accessibility of key corridors. This map was used during the transit scenario analysis process to understand if proposed transit investments aligned with accessible corridors.

Figure B.4-1 Boulder Accessibility Score



APPENDIX B.5 CORRIDOR-LEVEL ANALYSIS RESULTS

Figure B.5-1 Corridor Level Analysis Results

					EFFICIENCY						COMMUNITY			ECONOMY			ENVIRONMENT			DEMOGRAPHICS			ACCESSIBILITY	
		Service Type (Highest)			Annual Net New Weekday Riders (2035 Total - 2035 Baseline)			Total Weekday Operating Cost per Total Weekday Riders			Annual Calories Burned by Walking to Transit by New Riders			Green Dividend (Retained Wealth from Fuel Savings by New Riders)			Annual VMT Reduced from New Riders			Pop w/in 3/8 mile	Emp w/in 3/8 mile	Transit-Dependent Pop w/in 3/8 mile	Average Boulder Access Score (In-City Only)[a]	Average Intersection Density (In/Out-of-City)[b]
Corridor	Corridor Description	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	2035	2035	2012	% Accessible	Int. per Acre
REGIONAL FOCUS CORRIDORS																								
12	Boulder - Denver	US 36 BRT	US 36 BRT	US 36 BRT	999,000	832,000	949,000	$10.50	$15.70	$17.80	13.8 M	11.9 M	13.5 M	$1,105,000	$951,000	$1,074,000	9,821,000	8,452,000	9,546,000	62,000	86,000	33,000	41%	0.12
36	Diagonal (Longmont - Boulder)	Local - CTN	Local 2	Rapid Transit	693,000	96,000	1,029,000	$5.10	$6.30	$6.30	11.0 M	1.7 M	18.7 M	$311,000	$34,000	$338,000	2,764,000	300,000	3,007,000	111,000	119,000	48,000	27%	0.12
37	South Boulder Rd	Local - CTN	Local - CTN	Rapid Transit	176,000	176,000	447,000	$3.20	$3.20	$4.10	3.9 M	3.9 M	9.8 M	$27,000	$27,000	$69,000	241,000	241,000	616,000	32,000	27,000	20,000	66%	0.12
38	Baseline (Broadway - Lafayette P&R)	Local 2	Local - CTN	Local 2	47,000	111,000	47,000	$7.90	$5.30	$6.70	0.8 M	2.5 M	0.8 M	$12,000	$9,000	$11,000	104,000	83,000	94,000	23,000	7,000	10,000	22%	0.11
39	Arapahoe (Downtown TC - Louisville or Erie)	Local - CTN	Local - CTN	Rapid Transit	223,000	158,000	551,000	$4.20	$6.90	$8.10	3.5 M	2.9 M	9.9 M	$23,000	$21,000	$85,000	201,000	189,000	756,000	35,000	45,000	13,000	46%	0.09
LOCAL FOCUS CORRIDORS																								
31	Broadway	Local - CTN +	Rapid Transit	Rapid Transit	1,469,000	2,794,000	2,794,000	$1.60	$0.30	$0.30	33.5 M	63.8 M	63.8 M	$163,000	$310,000	$310,000	1,450,000	2,758,000	2,758,000	32,000	31,000	20,000	37%	0.17
33	28th (Broadway - Baseline)	Local - CTN	Local - CTN	Enhanced Bus	101,000	115,000	151,000	$11.50	$10.80	$6.00	2.3 M	2.6 M	3.4 M	$6,000	$7,000	$8,000	55,000	60,000	76,000	18,000	19,000	8,000	59%	0.13
34	30th (Iris - Baseline)	Local - CTN	Local - CTN +	Local - CTN	37,000	91,000	37,000	$2.60	$2.20	$2.60	0.8 M	2.1 M	0.8 M	$3,000	$8,000	$3,000	27,000	67,000	27,000	18,000	15,000	8,000	56%	0.11
40	Canyon (Downtown - 28th)	Local - CTN +	Local - CTN +	Local - CTN +	33,000	33,000	33,000	$3.50	$3.50	$3.50	0.8 M	0.8 M	0.8 M	$2,000	$2,000	$2,000	19,000	19,000	19,000	12,000	23,000	7,000	37%	0.22
41**	Pearl (Downtown - Erie)	Local - CTN	Local - CTN	Enhanced Bus	334,000	232,000	123,000	$8.60	$5.00	$6.20	6.7 M	5.3 M	2.8 M	$67,000	$9,000	$5,000	594,000	84,000	46,000	20,000	32,000	5,000	39%	0.12
					0	0	0	#DIV/0!	#DIV/0!	#DIV/0!												0%	
OVERALL CORRIDORS*																								
1	US-36 to Lyons / Longmont	Express Corridor	EXISTING	EXISTING	55,000	0	0	$21.00	$6.60	$6.60	0.7 M	0.0 M	0.0 M	$65,000	$0	$0	580,000	0	0	12,000	21,000	5,000	55%	0.08
2	Canyon West (to Nederland)	Express Corridor	EXISTING	EXISTING	178,000	0	0	$5.50	$6.00	$6.00	2.3 M	0.0 M	0.0 M	$113,000	$0	$0	1,006,000	0	0	13,000	24,000	7,000	55%	0.04
3	Gold Hill/ Canyon Dr/Four Mile Canyon	Local 3	Not Included in Scenario	EXISTING	5,000	0	0	$186.30	$0.00	$27.00	0.1 M	0.0 M	0.0 M	$3,000	$0	$0	31,000	0	0	13,000	24,000	7,000	54%	0.05
9	Golden - Boulder	Commuter Express	EXISTING	EXISTING	13,000	0	0	$8.40	$9.10	$9.10	0.2 M	0.0 M	0.0 M	$9,000	$0	$0	84,000	0	0	16,000	22,000	14,000	16%	0.08
12	Boulder - Denver	US 36 BRT	US 36 BRT	US 36 BRT	999,000	832,000	949,000	$10.50	$15.70	$17.80	13.8 M	11.9 M	13.5 M	$1,105,000	$951,000	$1,074,000	9,821,000	8,452,000	9,546,000	62,000	86,000	33,000	41%	0.12
27	Central / West Circulator	Local - CTN +	Local - CTN +	Local - CTN +	1,101,000	1,101,000	1,101,000	$0.70	$0.70	$0.70	25.1 M	25.1 M	25.1 M	$161,000	$161,000	$161,000	1,428,000	1,428,000	1,428,000	25,000	38,000	16,000	50%	0.20
28**	Central / East Circulator	Local - CTN +	Local - CTN +	Not Included in Scenario	740,000	1,199,000	0	$2.30	$2.30	$0.00	16.9 M	27.4 M	0.0 M	$87,000	$228,000	$0	772,000	2,028,000	0	34,000	41,000	14,000	45%	0.11
30**	CU/East Campus	Local - CTN	Local - CTN	Same as Existing STMP	26,000	206,000	7,000	$9.10	$10.10	$7.60	0.6 M	4.7 M	0.2 M	$2,000	$32,000	$1,000	22,000	285,000	6,000	47,000	59,000	40,000	45%	0.12
31	Broadway	Local - CTN +	Rapid Transit	Rapid Transit	1,469,000	2,794,000	2,794,000	$1.60	$0.30	$0.30	33.5 M	63.8 M	63.8 M	$163,000	$310,000	$310,000	1,450,000	2,758,000	2,758,000	32,000	31,000	20,000	37%	0.17
32	19th / 20th / Yarmouth	Local - CTN	Local 2	Local 2	138,000	35,000	35,000	$5.30	$3.90	$3.90	3.2 M	0.8 M	0.8 M	$16,000	$4,000	$4,000	139,000	36,000	36,000	14,000	13,000	6,000	53%	0.19
33	28th (Broadway - Baseline)	Local - CTN	Local - CTN	Enhanced Bus	101,000	115,000	151,000	$11.50	$10.80	$6.00	2.3 M	2.6 M	3.4 M	$6,000	$7,000	$8,000	55,000	60,000	76,000	18,000	19,000	8,000	59%	0.13
34	30th (Iris - Baseline)	Local - CTN	Local - CTN +	Local - CTN	37,000	91,000	37,000	$2.60	$2.20	$2.60	0.8 M	2.1 M	0.8 M	$3,000	$8,000	$3,000	27,000	67,000	27,000	18,000	15,000	8,000	56%	0.11
35	55th (Valmont - S. Boulder)	Local 2	Local 2	Local 2	6,000	6,000	6,000	$10.90	$10.90	$10.90	0.1 M	0.1 M	0.1 M	$1,000	$1,000	$1,000	6,000	6,000	6,000	6,000	12,000	3,000	66%	0.06
36	Diagonal (Longmont - Boulder)	Local - CTN	Local 2	Rapid Transit	693,000	96,000	1,029,000	$5.10	$6.30	$6.30	11.0 M	1.7 M	18.7 M	$311,000	$34,000	$338,000	2,764,000	300,000	3,007,000	111,000	119,000	48,000	27%	0.12
37	South Boulder Rd	Local - CTN	Local - CTN	Rapid Transit	176,000	176,000	447,000	$3.20	$3.20	$4.10	3.9 M	3.9 M	9.8 M	$27,000	$27,000	$69,000	241,000	241,000	616,000	32,000	27,000	20,000	66%	0.12
38	Baseline (Broadway - Lafayette P&R)	Local 2	Local - CTN	Local 2	47,000	111,000	47,000	$7.90	$5.30	$6.70	0.8 M	2.5 M	0.8 M	$12,000	$9,000	$11,000	104,000	83,000	94,000	23,000	7,000	10,000	22%	0.11
39**	Arapahoe (Downtown TC - Louisville or Erie)	Local - CTN	Local - CTN	Rapid Transit	223,000	158,000	551,000	$4.20	$6.90	$8.10	3.5 M	2.9 M	9.9 M	$23,000	$21,000	$85,000	201,000	189,000	756,000	35,000	45,000	13,000	46%	0.09
40	Canyon (Downtown - 28th)	Local - CTN +	Local - CTN +	Local - CTN +	33,000	33,000	33,000	$3.50	$3.50	$3.50	0.8 M	0.8 M	0.8 M	$2,000	$2,000	$2,000	19,000	19,000	19,000	12,000	23,000	7,000	37%	0.22
41**	Pearl (Downtown - Erie)	Local - CTN	Local - CTN	Enhanced Bus	334,000	232,000	123,000	$8.60	$5.00	$6.20	6.7 M	5.3 M	2.8 M	$67,000	$9,000	$5,000	594,000	84,000	46,000	20,000	32,000	5,000	39%	0.12
42	Valmont (9th - 55th)	Local - CTN	Local - CTN	Local - CTN	301,000	301,000	301,000	$3.70	$3.70	$10.40	6.9 M	6.9 M	6.9 M	$16,000	$16,000	$16,000	147,000	147,000	147,000	13,000	13,000	3,000	53%	0.15
43	Iris (Broadway - 28th)	Local 2	Local - CTN	Local - CTN	16,000	50,000	50,000	$5.40	$6.80	$6.60	0.4 M	1.1 M	1.1 M	$1,000	$2,000	$2,000	6,000	18,000	18,000	4,000	4,000	2,000	34%	0.17
44**	Jay (28th - 75th)	Local 2	Local - CTN	Local - CTN	147,000	202,000	62,000	$11.80	$11.00	$20.50	3.3 M	4.6 M	1.4 M	$16,000	$18,000	$6,000	141,000	161,000	51,000	13,000	13,000	4,000	9%	0.06
51**	Airport Express Bus	Express Corridor	EXISTING	Express Corridor	464,000	0	323,000	$9.70	$3.70	$3.70	5.9 M	0.0 M	4.1 M	$904,000	$0	$617,000	8,035,000	0	5,483,000	27,000	36,000	17,000	55%	0.12
66	9th/Baseline/Folsom	Local 2	Local - CTN	Not Included in Scenario	306,000	485,000	0	$5.80	$6.50	$0.00	7.0 M	11.1 M	0.0 M	$77,000	$121,000	$0	682,000	1,079,000	0	29,000	33,000	20,000	27%	0.17

Notes:
* Listing does not include all corridors
** Notes by Corridor Number
28: Extended East-West Circulator in Scenario 2
30: Stampede with CTN Upgrade in Scenario 1, Extended Stampede in Scenario 2, Existin g Stampede in Scenario 3
39: Scenario 2 includes service to Gunbarrel from Arapahoe corridor, but lower level of service outside of Boulder
41: Scenario 1 includes service from Boulder Junction to Erie

Other Notes
a. Shading for Boulder Access Score column is relative to 40%
b. Shading for Intersection Density column is for top quartile of corridor average (> 0.16)