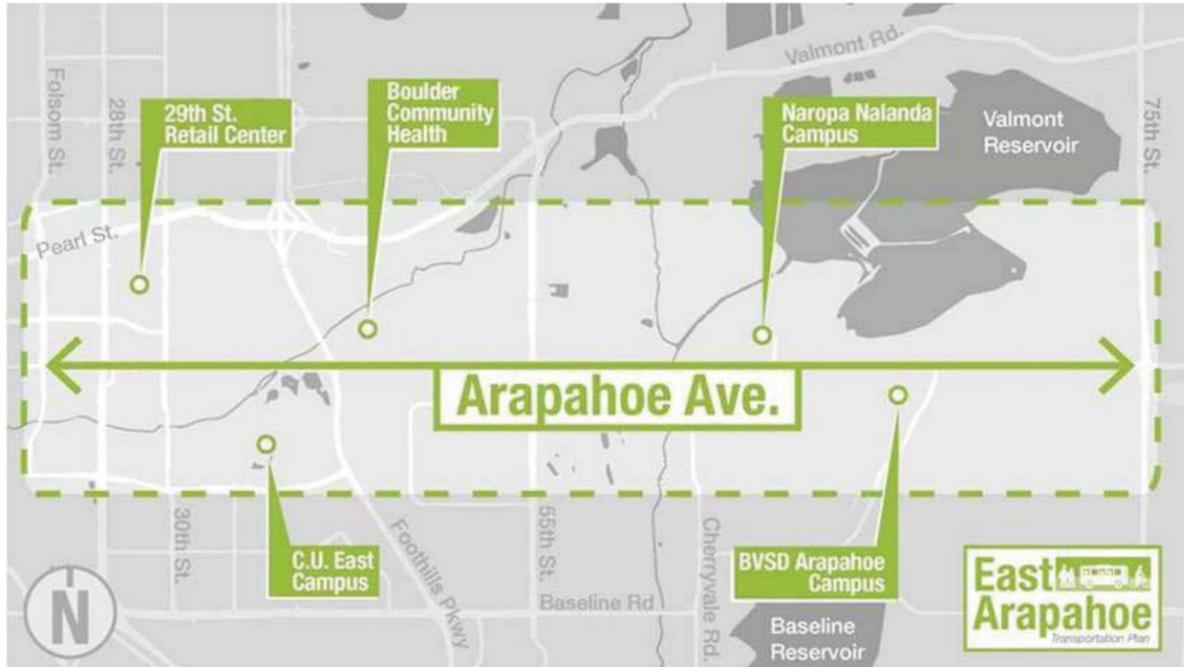


Planning Update



November 2015

Plan Overview



Plan Purpose

The **East Arapahoe Transportation Plan** is founded in the goals and Complete Streets approach of Boulder’s Transportation Master Plan (TMP). Complete streets accommodate all modes of transportation by planning, designing, and building facilities for pedestrians, bicyclists, transit riders, and vehicle drivers and passengers.

The **Plan’s purpose** is to address existing and future transportation needs in the East Arapahoe Corridor, including local and regional travel, and facilitate safe travel and access by people using all modes—walk, bike, transit, and auto.

The **Plan will address in-commuting in a key regional corridor.** Significant population growth to the east and employment growth in Boulder are projected to increase regional demand for travel to Boulder.

Plan Background

The East Arapahoe Transportation Plan grew out of the former Envision East Arapahoe (EEA) Study. While long-term land use planning for the East Arapahoe corridor was postponed in 2014, City Council supported moving forward with planning for transportation improvements in the corridor. This decision was based on:

- **Strong public interest** in addressing existing and future transportation needs in the East Arapahoe Corridor.
- **Advancing the goals** of Boulder’s Transportation Master Plan.
- **Forwarding the recommendations of RTD’s Northwest Area Mobility Study (NAMS)**, which identified the Arapahoe/State Highway 7 Corridor between Boulder, Lafayette, and Brighton as a strong candidate for an arterial BRT line. The State Highway 119 corridor between Boulder and Longmont was also identified as a priority in both the TMP and NAMS.
- **Coordinating with the future State Highway 7 Bus Rapid Transit Study** that will be led by Boulder County and is expected to begin in early 2016.

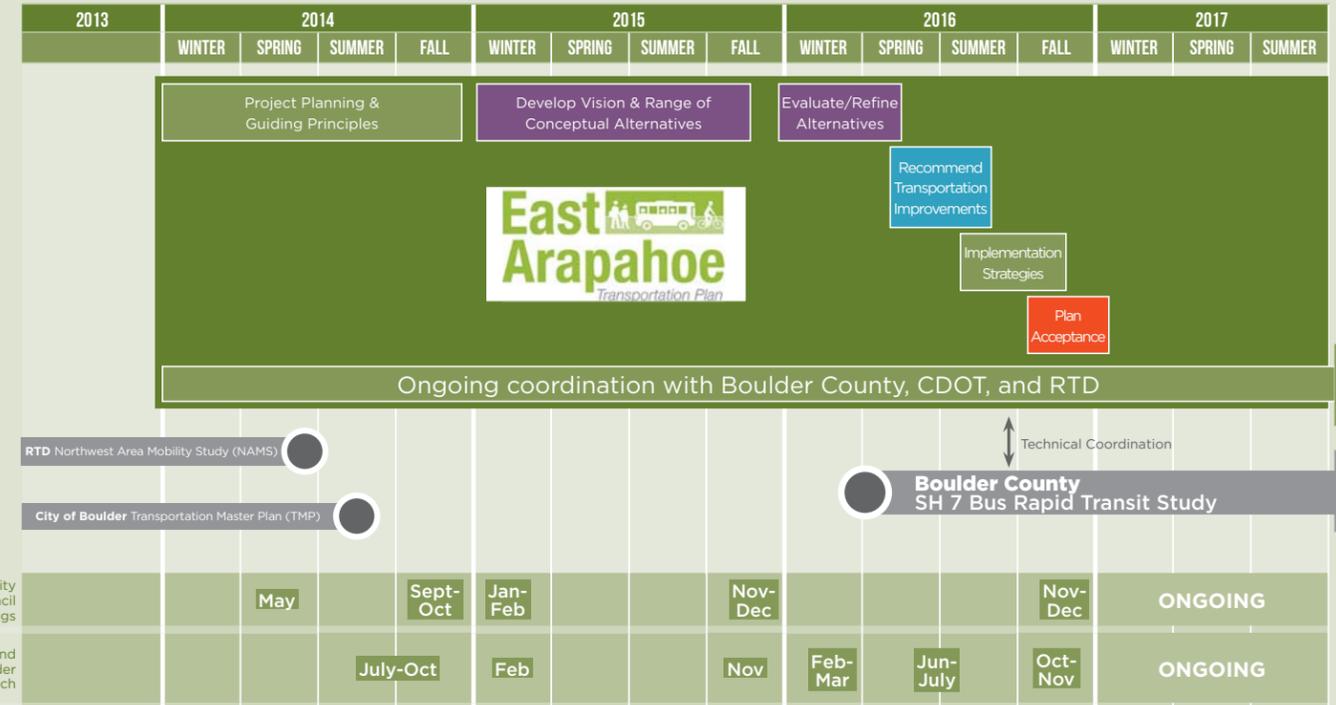
Planning Timeline

The East Arapahoe Transportation Plan is an early phase of a multi-stage planning process for developing a BRT project that will seek federal funding.

The project team held an interactive public workshop in February 2015 to obtain community input on BRT and other complete street design elements for East Arapahoe in Boulder.

Since then, the project team has been working to further define the ideas proposed by the workshop participants.

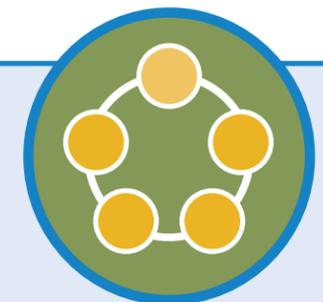
Starting in November 2015, the project team will solicit input from the public on conceptual alternatives for East Arapahoe. The alternatives will then be refined and evaluated in more detail.



Integrated/Coordinated Planning Initiatives

The East Arapahoe Transportation Plan is being closely coordinated with other concurrent local and regional initiatives, including:

- Boulder Valley Comprehensive Plan Update (2015-2016)
- Canyon Corridor Study (beginning early-2016)
- Access Management and Parking Strategy (AMPS) (2014-ongoing)
- Climate Commitment (update in 2015+)
- Boulder County SH 7 BRT Study (beginning early-2016)



Defining Characteristics of BRT/Complete Streets

The City is investigating a variety of potential transportation features within the East Arapahoe Corridor. These potential improvements are based on public feedback and known best practices from other

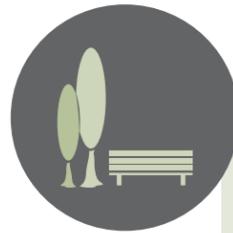
communities in Colorado, around the United States, and abroad. These improvements may include the elements described on this set of pages.



Eugene, OR: EmX BRT Source: Lane Transit District
Fort Collins: MAX BRT Source: City of Fort Collins



Bus Rapid Transit (BRT) is a rubber-tired bus transit mode that provides many of the advantages of rail service—capacity, speed, and quality—at a fraction of the cost. BRT typically includes exclusive lanes or queue jumps and coordinated traffic signals with transit priority to provide fast travel times, attracting transit riders to use the service. These features are important even along arterial streets and through urban centers to realize the full travel time benefit of BRT.



Streetscape/Urban Design. Complete street improvements could enhance the street environment with landscaping and street trees, pedestrian-scale street lighting, street furniture, and public spaces.

Eugene, OR: EmX BRT
Franklin Blvd. before BRT



Source: Nelson\Wigard



Bicycle/Pedestrian Facilities. Complete street improvements could enhance the existing multi-use path, complete current gaps, and develop a buffered or barrier-protected on-street bikeway.

Multi-Use Path
Portland, OR: Orange Line



Source: Nelson\Wigard

Los Angeles: Orange Line BRT

Buffered Bike Lane
Santa Clara County, CA: El Camino Real BRT



(Planned) Source: VTA

Boulder: Baseline Road

Protected Bike Lane
Chicago: Central Loop BRT (Planned)

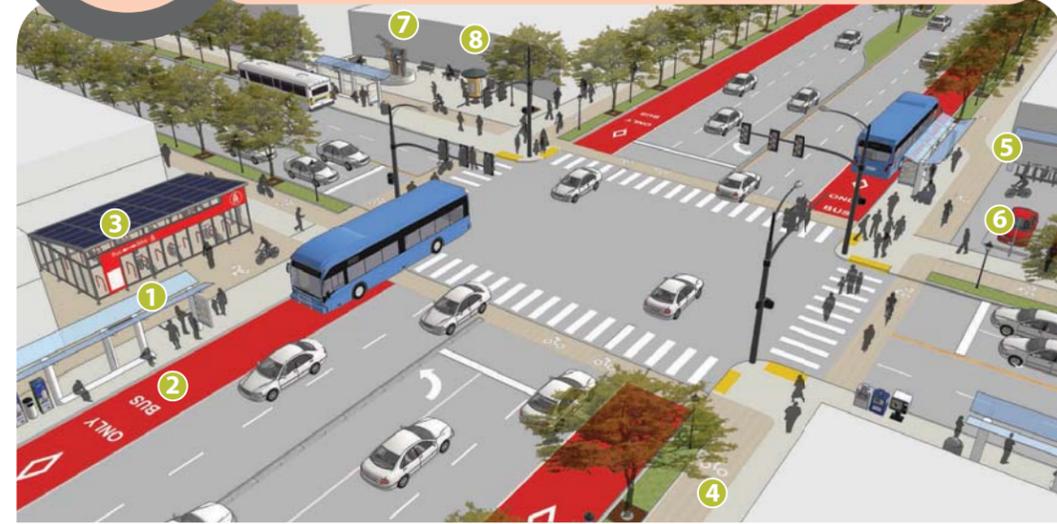


Source: City of Chicago

Seattle: RapidRide



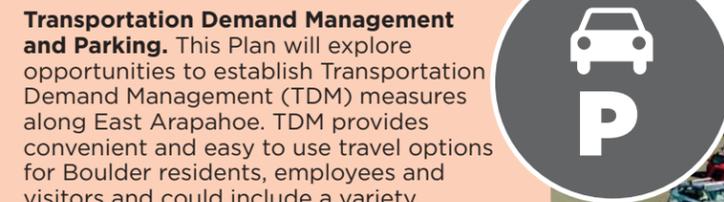
Mobility Hubs provide seamless mobility between the transit network and pedestrian and bicycle facilities, car/ridesharing, and context-appropriate parking supply, including excellent pedestrian infrastructure and connections to the bicycle network.



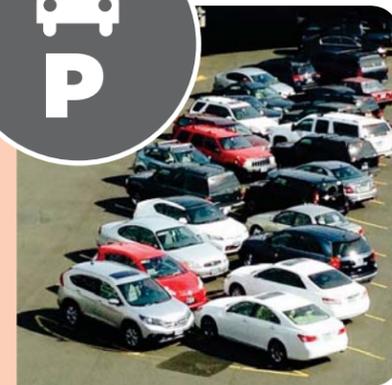
- 1 Enhanced bus stops with real-time information
- 2 Designated bus lanes and priority signals
- 3 Secure bike parking
- 4 Off-street bike path
- 5 Bike parking
- 6 Car sharing
- 7 Public art
- 8 Transit and community information kiosk



General Purpose Lanes. There could be two or three general purpose lanes in each direction on East Arapahoe, depending on the street design and the land use context. General purpose lanes could potentially be “repurposed” for transit lanes or on-street bike facilities, or additional right-of-way could be required.



Transportation Demand Management and Parking. This Plan will explore opportunities to establish Transportation Demand Management (TDM) measures along East Arapahoe. TDM provides convenient and easy to use travel options for Boulder residents, employees and visitors and could include a variety of programs, policies, and initiatives customized for the East Arapahoe corridor. For example, mobility hubs could be developed at key locations to provide seamless mobility between the transit network and pedestrian and bicycle facilities, car/ridesharing, and context-appropriate parking supply. Other examples of TDM in the East Arapahoe corridor might include business EcoPasses and satellite parking for in-commuters.



Transit Lanes. BRT could operate in shared lanes (mixed-traffic) with queue jumps and/or signal priority, or a semi-exclusive business-access-and-transit (BAT) lane along the curb, which all vehicles could use to make right-turns. Center-running BRT would have an exclusive transit lane in the street median.

Shared Lane



Boulder, JUMP

Business-Access-and-Transit (BAT) Semi-Exclusive Lane



Seattle, RapidRide

Exclusive Lane



San Francisco: Van Ness BRT (Planned)

Source: SFCTA

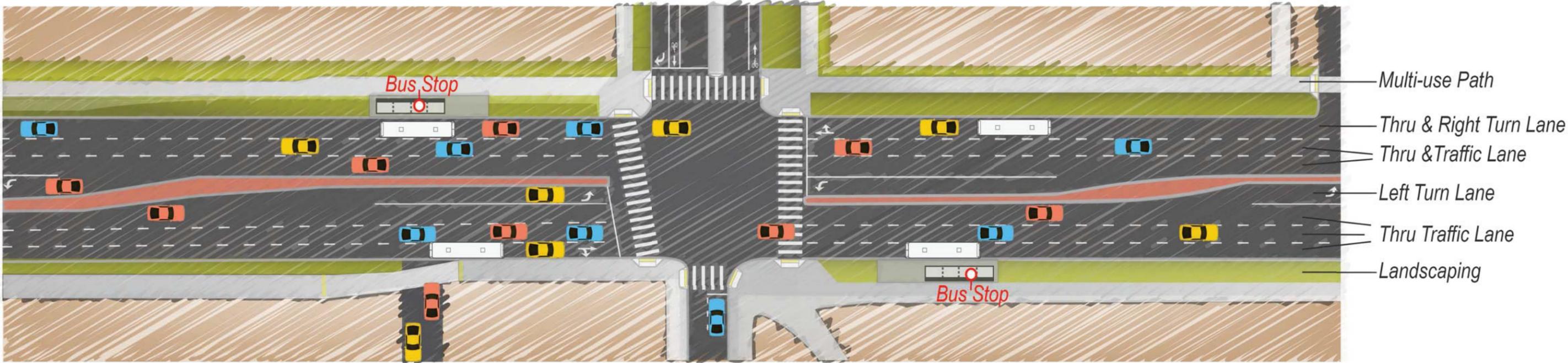
Conceptual Design Alternatives

The tables and concept diagrams on the following spreads identify a range of alternatives that incorporate the potential BRT/complete street elements in various combinations. These alternatives are intended to illustrate a range of potential complete street design options for Arapahoe Avenue.

Other variations on these alternatives are possible. It is anticipated that the alternatives will continue to evolve through the conceptual design phase of the project, based on the evaluation results and public input. Elements of each concept may be "mixed and matched" depending on factors such as right-of-way availability, traffic conditions, and the character of various segments of East Arapahoe.

No Change: Side-running bus with **three** general purpose lanes in each direction and **existing** pedestrian and bicycle facilities and landscaping

Description	Level of New Investment	Lane Repurposing	Roadway Widening (Right-of-Way Expansion)	Bike/Ped Facility Design Treatment	Exclusive BRT Lane	Other BRT Elements	Streetscape Elements
3 general purpose lanes + multi-use path	None	No	No	Off-street: existing multi-use path (with gaps)	No	Existing buses, stops, and shelters	Existing landscaping



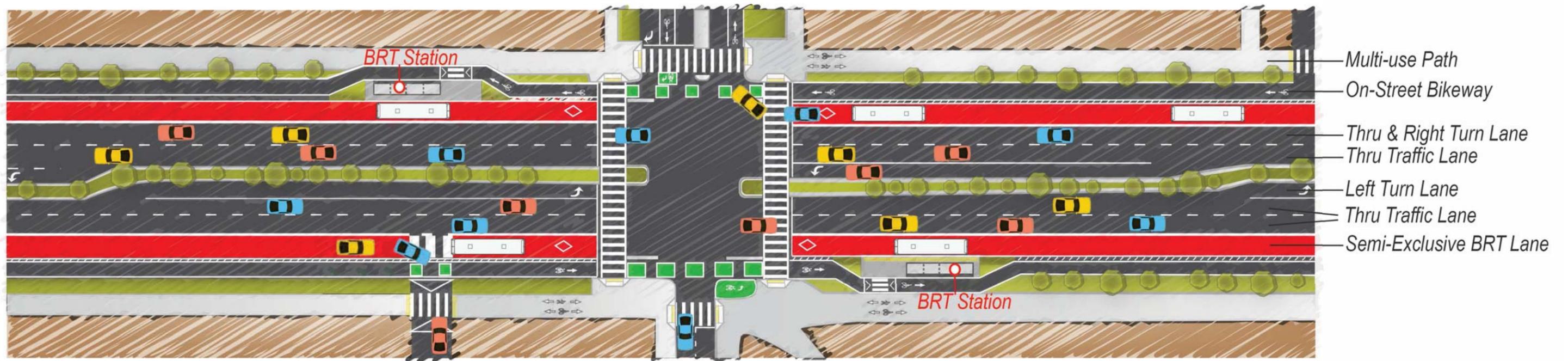
Alternative A: Enhanced bus in **mixed-traffic** with three general-purpose lanes and a **completed multi-use path** for pedestrians and bicycles

Description	Level of New Investment	Lane Repurposing	Roadway Widening (Right-of-Way Expansion)	Bike/Ped Facility Design Treatment	Exclusive BRT Lane	Other BRT Elements	Streetscape Elements
3 general purpose lanes + side running Enhanced Bus in mixed traffic + multiuse path	Low	No	No	Off-street: complete gaps in multi-use path	No	Off-board fare payment, high-quality shelters, stylized vehicles with multiple door boarding, branded vehicles and stations	Existing landscaping



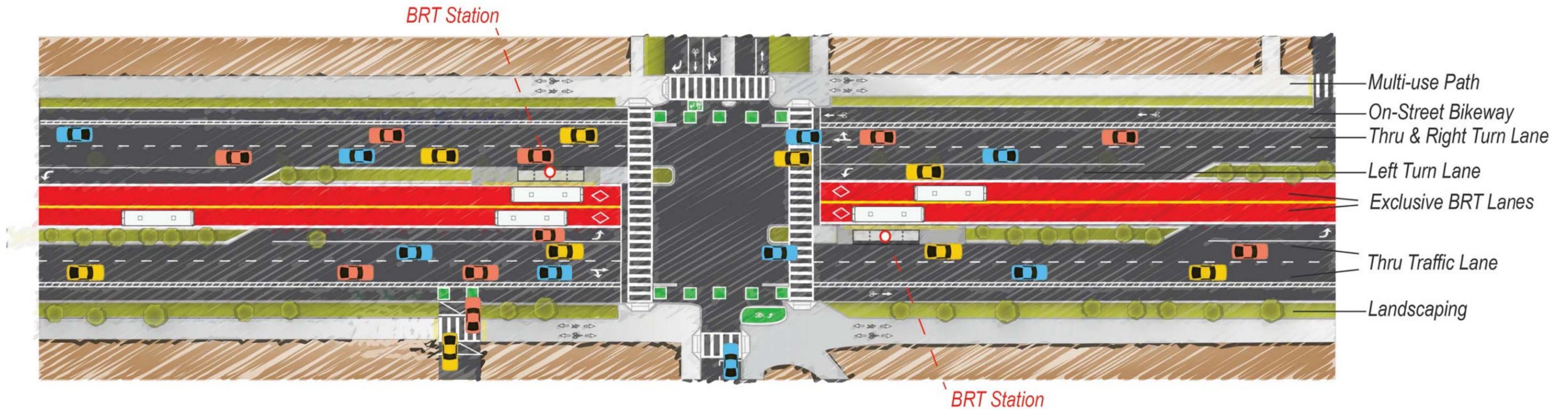
Alternative B: Side-running BRT in a semi-exclusive business-and-transit (BAT) lane (allows right turns) with two general purpose lanes, an on-street bikeway, and a completed multi-use path

Description	Level of New Investment	Lane Repurposing	Roadway Widening (Right-of-Way Expansion)	Bike/Ped Facility Design Treatment	Exclusive BRT Lane	Other BRT Elements	Streetscape Elements
2 general purpose lanes + side running BAT lane + on-street bike facility + multi-use path	Medium	Partial (outside lane becomes BRT + right turn only lane)	Yes	On-street + off-street	Semi-exclusive	Same as Alternative A	Enhanced landscaping in median and along both sidewalks



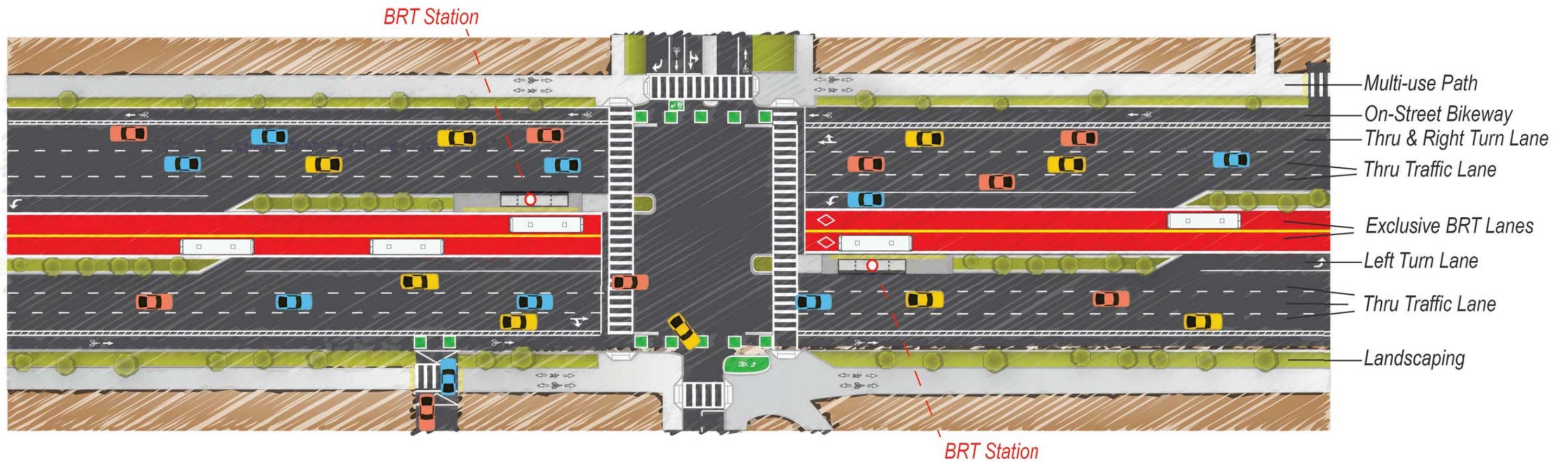
Alternative C: Center-running BRT in an **exclusive transit lane** with **two** general purpose lanes, an **on-street bikeway**, and a completed multi-use path

Description	Level of New Investment	Lane Repurposing	Roadway Widening (Right-of-Way Expansion)	Bike/Ped Facility Design Treatment	Exclusive BRT Lane	Other BRT Elements	Streetscape Elements
2 general purpose lanes + center running BRT lane + on-street bike facility + multi-use path	High	Yes	Yes	On-street + off-street	Yes	Same as Alternative A	Enhanced landscaping in median (and along both sidewalks)



Alternative D: Center-running BRT in an **exclusive transit lane** with **three** general purpose lanes, an **on-street bikeway**, and a completed multi-use path

Description	Level of New Investment	Lane Repurposing	Roadway Widening (Right-of-Way Expansion)	Bike/Ped Facility Design Treatment	Exclusive BRT Lane	Other BRT Elements	Streetscape Elements
3 general purpose lanes + center running BRT lane + on-street bike facility + multi-use path	Highest	No	Yes	On-street + off-street	Yes	Same as Alternative A	Enhanced landscaping in median (and along both sidewalks)



Bicycle-Transit Integration

Bicycle-transit integration refers to strategies that facilitate convenient and safe bicycle connections to transit stops and final destinations. Potential bicycle-transit integration strategies include providing:

- **On-board bicycle storage.** Low-floor BRT vehicles provide easy loading and unloading of bicycles.
- **Short-term and long-term/secure bicycle storage** at/near stations. Secure, covered parking is important for bike-transit commute trips.
- **Bike share** at/near major stations.
- **Route information and wayfinding** at and around stations.
- **Bicycle and pedestrian facilities** designed to minimize conflicts between bicycles and transit vehicles, transit passengers, and pedestrians adjacent to transit stops.
- **Safe and convenient bicycle access routes** within a half-mile area around transit stops.



There are four “Bus then Bike” shelters in Boulder County. Source: Boulder County



On-board bicycle storage on Community Transit SWIFT (Snohomish County, WA) Source: Flickr user Oran Viriyincy



Bicycle facilities and wayfinding at a First Hill Streetcar stop (Seattle, WA) Source: Fox-Tuttle-Hernandez

Potential BRT Operating Plan & Station Locations

OPERATING HOURS AND FREQUENCY

Existing JUMP bus service in the Arapahoe/SH 7 corridor within Boulder runs every 10 minutes during peak hours and midday and every 30 minutes in the evenings, between approximately 5 AM and midnight (varies depending on travel direction).

A potential weekday operating plan for BRT in the Arapahoe corridor would connect the Downtown Boulder Transit Center on the west end with I-25 and Brighton on the east end, with BRT and local buses running every 6 to 7.5 minutes during the day and every 15 minutes in the early morning and evenings.

POTENTIAL STATION LOCATIONS

Stations would be located at least a quarter-mile apart and preferably between a third of a mile and a half-mile from adjacent stops. Criteria for siting station areas include the presence of major generators (such as the 29th Street Mall), important transit and multimodal connections (such as US 36 BRT), land use, right-of-way feasibility, existing ridership, and stop spacing considerations.

The project team conducted a high-level assessment of potential BRT station locations. A station spacing scenario with a minimum half-mile distance between stations could include six stations between Folsom and 75th:



Additional BRT stations would be located between Folsom Street and the Downtown Boulder Transit Center (depending on the BRT routing).

Additional station options were identified for consideration at:

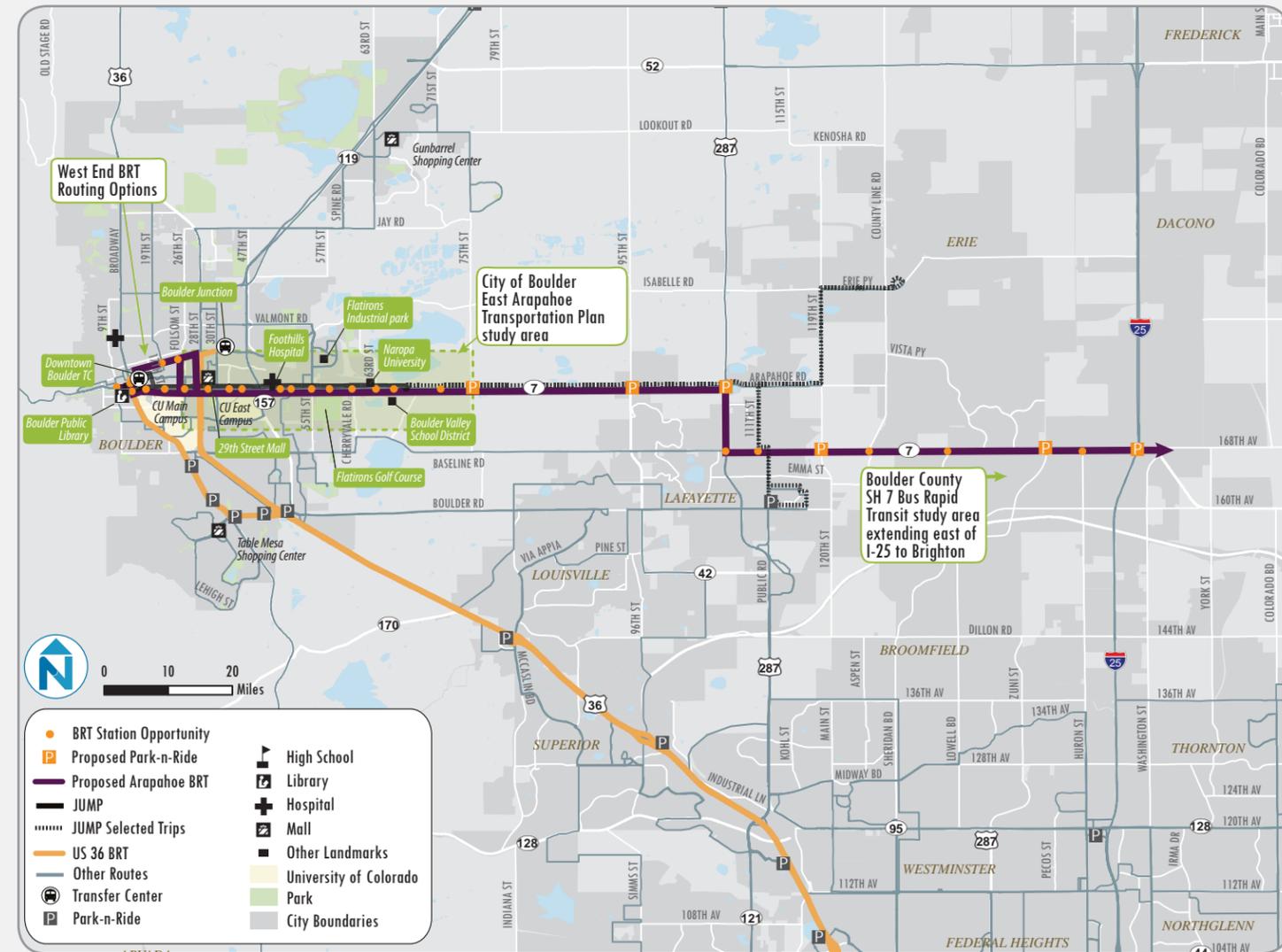
- 29th Street
- 38th Street
- 48th Street
- 55th Street
- Cherryvale Road
- Either 63rd Street or 65th Street
- 32nd Street
- 38th Street
- Eisenhower Drive/Commerce Street
- Flatirons Golf Course
- Both 63rd Street and 65th Street
- Valtec Drive

Corridor Map

City of Boulder East Arapahoe Transportation Plan & Boulder County SH 7 BRT Study

The City of Boulder East Arapahoe Transportation Plan study area is primarily focused on the State Highway 7 (SH 7) corridor between Folsom Street and 75th Street. On the west end, BRT is assumed to connect to the Downtown Boulder Transit Center using either Arapahoe or Canyon.

In 2016, Boulder County is initiating the State Highway 7 Bus Rapid Transit study between downtown Boulder and I-25, potentially extending east of I-25 to Brighton. The findings from the city’s East Arapahoe Transportation Plan will inform this larger study.



POTENTIAL TRADEOFFS BETWEEN CONCEPTUAL DESIGN ALTERNATIVES

The table below provides preliminary observations of the key tradeoffs between the conceptual design alternatives, based on both local knowledge of corridor conditions and national experience with implementation of BRT and other bus corridor projects. The alternatives will be analyzed in detail following public input on the evaluation criteria and the conceptual design alternatives and operating plan.

PRELIMINARY OBSERVATIONS OF CONCEPTUAL DESIGN TRADEOFFS	
PEDESTRIAN & BIKE COMFORT AND ACCESS	<ul style="list-style-type: none"> All alternatives complete gaps in the multi-use path Alternatives B, C, and D reduce potential conflicts between pedestrian, bicycle, and auto modes Alternative D has longest pedestrian crossing distance
TRANSIT RIDERSHIP	<ul style="list-style-type: none"> All alternatives likely to make transit travel faster and increase ridership Alternatives B, C, and D likely to increase ridership the most Alternatives C and D (center-running BRT) likely to be the fastest and most reliable for transit
TRAFFIC OPERATIONS	<ul style="list-style-type: none"> Future baseline auto travel times and congestion may increase based on regional traffic projections Alternatives A, B, and D likely to have lowest impact on traffic Alternative C likely to have the highest impact on traffic Alternatives B, C, and D could affect business access (driveways) Alternatives C and D could require left-turn restrictions
TRANSIT OPERATING COSTS	<ul style="list-style-type: none"> All alternatives would cost more to operate than existing transit, due to more frequent BRT service that also extends east beyond the current JUMP route Alternatives B, C, and D would potentially cost slightly less to operate than BRT in mixed-traffic, due to fewer buses and operators required
CAPITAL COSTS	<ul style="list-style-type: none"> Alternative A likely to require no/limited right-of-way and have lowest capital cost Alternatives B, C, and D require expanding right-of-way and are likely to be more complex to implement Alternative D requires the most right-of-way and likely has the highest capital cost
COMMUNITY SUSTAINABILITY	<ul style="list-style-type: none"> Alternatives B, C, and D would expand space for landscaping/street trees and potentially for other public space All alternatives could potentially increase safety (reduce number of crashes)

Evaluation of Conceptual Alternatives

The tables below summarize the conceptual design alternatives and provide the draft criteria that have been developed to evaluate the alternatives. The alternatives will be evaluated in the next stage of this planning process.

SUMMARY OF DESIGN ALTERNATIVES

	 No Change	 Alternative A	 Alternative B	 Alternative C	 Alternative D
TRANSIT OPERATIONS	Side-running Bus (Mixed-Traffic)	Enhanced Bus (Mixed-Traffic)	Side-Running BRT (Semi-Exclusive BAT Lane)	Center-Running BRT (Exclusive Lane)	Center-Running BRT (Exclusive Lane)
GENERAL PURPOSE LANES / LANE REPURPOSING	3 (per direction) / None	3 (per direction) / None	2 (per direction) / Partial	2 (per direction) / Yes	3 (per direction) / None
PEDESTRIAN AND BICYCLE FACILITIES	Existing Multi-Use Path with Gaps	Gaps Filled in Multi-Use Path	On-Street Bikeway and Multi-Use Path	On-Street Bikeway and Multi-Use Path	On-Street Bikeway and Multi-Use Path
ROADWAY WIDENING / RIGHT-OF-WAY EXPANSION	None	None / Limited	Yes	Yes	Yes (Most Expansion)

DRAFT EVALUATION CRITERIA

CRITERIA	EVALUATION MEASURES
PEDESTRIAN & BIKE COMFORT AND ACCESS	
Perceived Ease of Access or Comfort for Walking Along or Across the Corridor	<ul style="list-style-type: none"> Sidewalk coverage, Number of protected crossings, Frequency/spacing of crossings, Change in number of network connections
Perceived Ease or Comfort for Bicycling Along/Across the Corridor	<ul style="list-style-type: none"> Change in miles of bike facilities, Level of facility protection from traffic, Number of protected or separated crossings, Frequency/spacing of crossings, Change in number of network connections
SAFETY	
Safety Evaluation	<ul style="list-style-type: none"> Qualitative assessment of anticipated increase or decrease in traffic crashes
Access Management	<ul style="list-style-type: none"> Management of turning movements and business access
TRAVEL MODE SHARE	
Estimated pedestrian, bicycle, transit, auto mode share	<ul style="list-style-type: none"> Change in mode shares
TRANSIT OPERATIONS	
Transit Travel Time and Service Reliability	<ul style="list-style-type: none"> Adjusted transit travel time
Transit Ridership	<ul style="list-style-type: none"> Total and new transit trips
Transit Operating Costs	<ul style="list-style-type: none"> Total and net new operating cost
VEHICLE OPERATIONS	
Auto Travel Time and Level of Service (LOS)	<ul style="list-style-type: none"> Average AM and PM auto travel time PM Peak Level of Service (LOS) letter grade and average delay (seconds/vehicle)
Auto Vehicle Miles Traveled (VMT)	<ul style="list-style-type: none"> Auto VMT in corridor
Freight Impacts	<ul style="list-style-type: none"> Qualitative assessment based on traffic analysis
CAPITAL COSTS / IMPLEMENTATION	
Capital Costs and Right-of-Way	<ul style="list-style-type: none"> Total capital costs/Right-of-way impacts
Cost-Effectiveness	<ul style="list-style-type: none"> Lifecycle operating & capital cost per user
Ability to Phase Improvements / Complexity	<ul style="list-style-type: none"> Qualitative assessment
COMMUNITY SUSTAINABILITY	
Streetscape Quality	<ul style="list-style-type: none"> Increase in public space and street trees/landscaping
GhG Emissions from Transportation	<ul style="list-style-type: none"> GhG emissions in corridor, Progress toward city goals



For more information about the East Arapahoe Transportation Plan, please contact:

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