



WELCOME to

SH7 PEL Planning & Environmental Linkages Study

SH7 Bus Rapid Transit Study

OPEN HOUSE

April 26, 2017



**Thank you for joining us!
Boulder County and
partner communities
along SH 7 would like to
hear your thoughts and
ideas for this important
corridor.**

PEL Project Overview

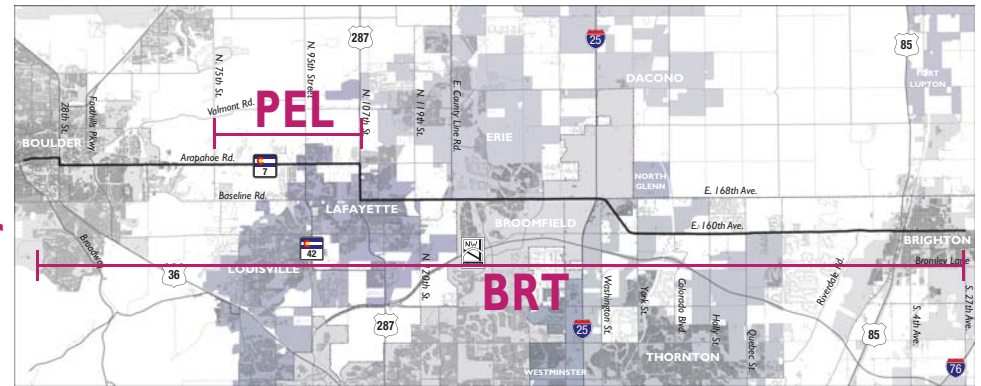
SH7 PEL PLANNING and ENVIRONMENTAL LINKAGES STUDY

The SH 7 PEL is being conducted to identify future transportation improvements that enhance safety and meet the growing demand for mobility for all modes of transportation between US 287 and 75th. Consideration is given to the corridor's existing and future transportation role as well as the rural, natural, and historic characteristics of the area.

SH7 BUS RAPID TRANSIT STUDY

This study is being conducted in coordination with the SH 7 PEL. It is evaluating the feasibility of future BRT service on SH 7 between Brighton and Boulder. The study is evaluating service patterns, station locations and travelway options along the corridor. The study will also recommend land use and zoning changes in support of future BRT service and enhanced economic development opportunities.

Study Area



Schedule

| Major Tasks | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG |
|---|-----|-----|-----|---------|-----|-----|-----|---------|-----|-----|-----|---------|-----|-----|-----|---------|-----|-----|
| Element 1: COMPLETING THE SH 7 PEL | | | | | | | | | | | | | | | | | | |
| 1.1 Corridor Conditions Assessment/Project Initiation | ★ | | | | | | | | | | | | | | | | | |
| 1.2 Purpose & Need Statement | | | | PTAC #1 | | | | ★ | | | | | | | | | | |
| 1.3 Develop & Evaluate Alternatives | | | | | | | | PTAC #2 | | | | PTAC #3 | | | | | | |
| 1.4 Identify Recommended Alternative | | | | | | | | | | | | | | | ★ | | | |
| 1.5 Documentation | | | | | | | | | | | | | | | | PTAC #4 | | ★ |
| 1.6 Public Engagement | | | | | | | | | | | | | | | | | | |
| Element 2: SH 7 BRT STUDY | | | | | | | | | | | | | | | | | | |
| 2.1 BRT Feasibility (Today & 2040)/Project Initiation | | | | BTAC #1 | | | | | | | | | | | | | | |
| 2.2 BRT Corridor Vision & Goals | | | | | | | | BTAC #2 | | | | | | | | | | |
| 2.3 BRT Capital Improvements & Operational Options | | | | | | | | | | | | | | | | | | |
| 2.4 Develop & Evaluate BRT Buildout Scenarios | | | | | | | | | | | | BTAC #3 | | | | | | |
| 2.5 Implementation & Phasing Strategy | | | | | | | | | | | | | | | | | | |
| 2.6 Public Engagement | | | | | | | | | | | | | | | | | | |
| 2.7 Documentation | | | | | | | | | | | | | | | | BTAC #4 | | |



Public Engagement Event



FTA Workshop/Community Forum



PEL FHWA Coordination

SH 7 BRT Project Timeline



PEL TECHNICAL ADVISORY COMMITTEE MEETINGS

- Meeting #1:**
 - Corridor Conditions
 - Draft Purpose & Need Statement
- Meeting #2:**
 - Final Purpose & Need Statement
 - Alternatives Evaluation Process
- Meeting #3:**
 - Alternatives Development and Evaluation
- Meeting #4:**
 - Recommended Alternative
 - Implementation & Phasing
 - Draft PEL Study



BRT TECHNICAL ADVISORY COMMITTEE MEETINGS

- Meeting #1:**
 - Corridor Tour & Community Visioning
- Meeting #2:**
 - Transit System Data
 - Land Use Data
 - Travel Model Elasticity
 - Vision & Goals
- Meeting #3:**
 - Capital Improvement and Operational Options
 - Evaluation of BRT Buildout Scenarios
 - Economic Development Opportunities
- Meeting #4:**
 - Recommended BRT Buildout Scenario
 - Implementation & Phasing
 - Funding options
 - Land Use Policy

PEL Purpose & Need

The purpose of the proposed multimodal transportation improvements is to address safety for all users and move people efficiently through the corridor.



Mobility Problem



During peak hour operations, SH 7 is a commuter corridor for users travelling to and from the City of Boulder from the communities along SH 7 and the surrounding area. Single-occupancy vehicles (SOV) are the predominant mode share. SOV is approximately 80 percent of the City of Boulder's current (2012) mode share for non-residents. The cumulative effects of this existing mode share split are increased parking demand and roadway network congestion exceeding capacity within the City of Boulder, City of Lafayette, and Boulder County.

PEL Purpose & Need



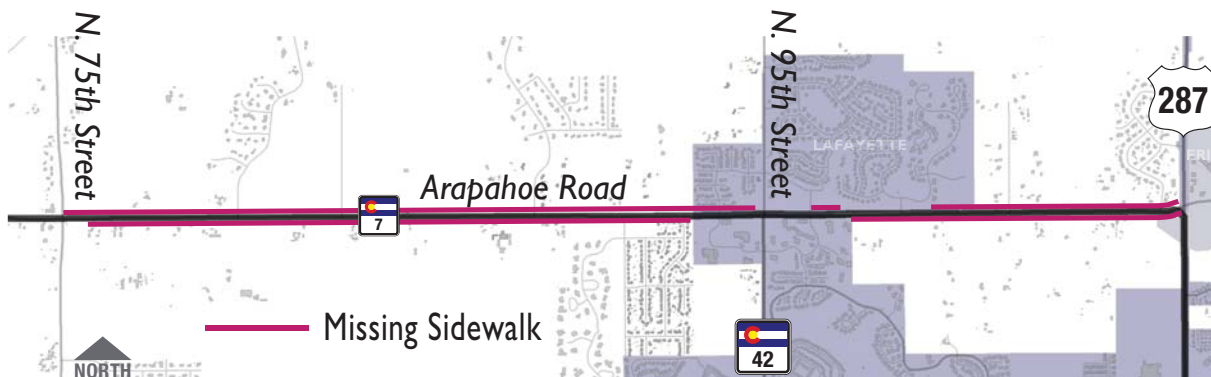
Bicycle Mobility Problem

Infrastructure for and connectivity with the existing and planned bicycle network for bicyclists does not exist along the corridor. On-street bike lanes/wider shoulders currently exists on West Baseline Road one mile south of SH 7. Today, bicyclists using the SH 7 must travel on extremely narrow shoulders or mixed with high speed vehicular traffic with a low level of comfort and perceived safety.



Pedestrian Mobility Problem

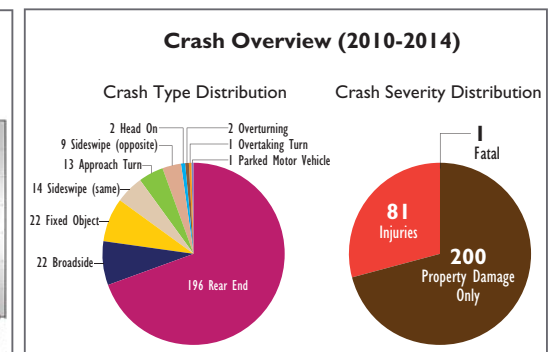
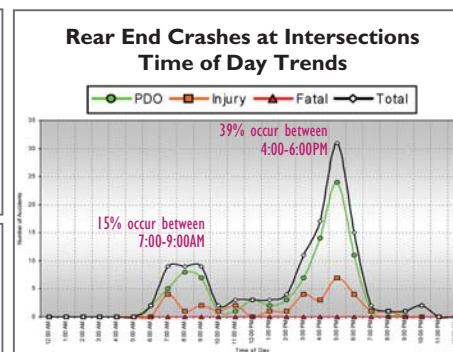
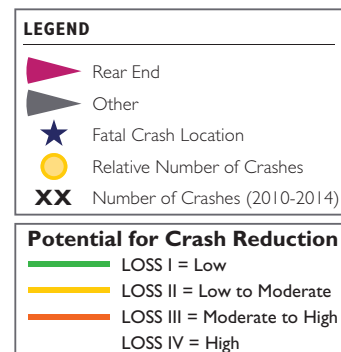
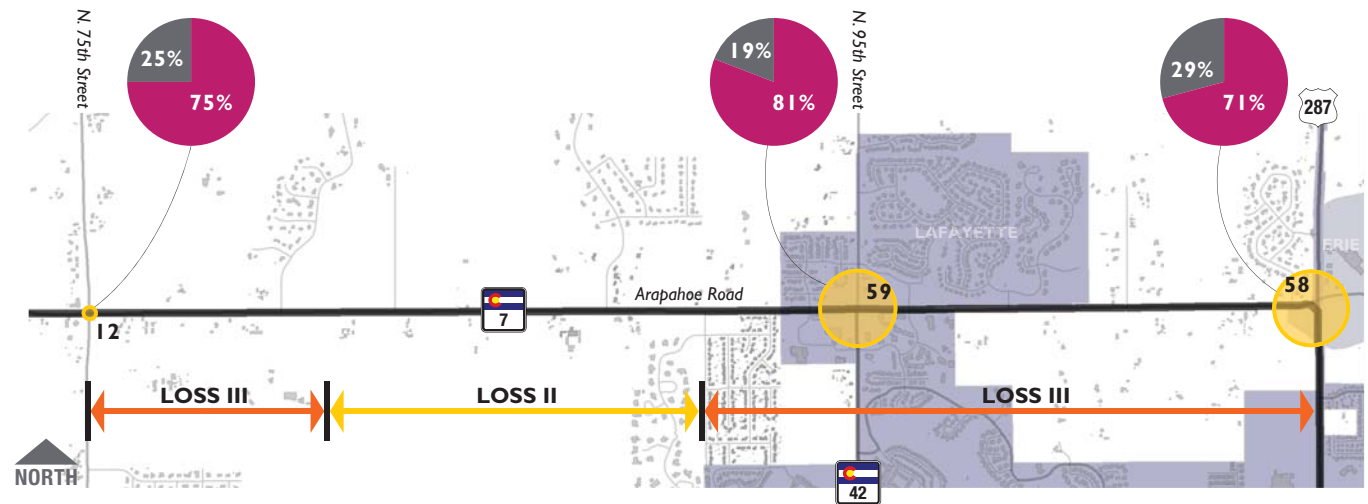
Pedestrian facilities along the corridor consist of 8-foot detached sidewalks in the immediate vicinity of the SH 7/95th Street intersection. Pedestrian facilities do not exist within the remaining portions of the corridor. Land uses and land use densities along the corridor generate limited pedestrian trips both today and in the future. However, bus service does exist along the corridor and demand for this service is expected to grow in the future. This service is largely accessed on foot and pedestrians accessing bus stops must travel on narrow shoulders or along the vegetated slope of the roadway, which creates a low level of comfort and perceived safety for the pedestrian.



PEL Purpose & Need

Safety Problem

There is a higher than expected frequency of rear-end vehicle crashes at the SH 7/ 75th Street, SH 7/ 95th Street, and SH 7/US 287 intersections along the corridor, primarily due to traffic congestion and queuing that occurs at these intersections. The overall corridor also has a higher than expected frequency of rear-end crashes, when compared to similar rural facilities. However, despite being identified as a rural corridor, the roadway is similar to urban roadways because it carries a high volume of traffic. When compared to urban corridors, the frequency of rear-end crashes is close to the expected rate.

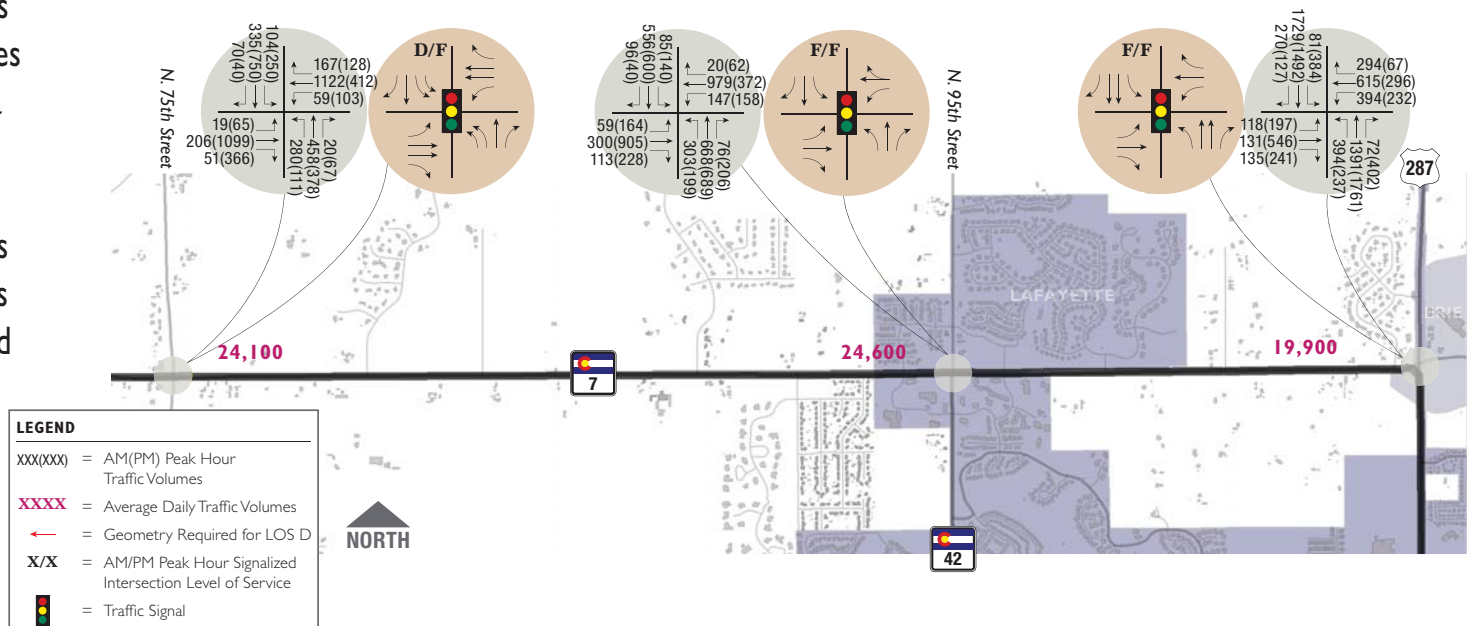


PEL Purpose & Need



Transit (Bus) & Vehicular Operational Problem

Traffic (bus and vehicular) operations along the corridor and the SH 7/N. 75th Street, SH 7/95th Street, and SH 7/US 287 intersections are over capacity today and are expected to worsen by 2040 due to regional population and employment growth. Bus operations are affected by congestion at these intersections resulting in unreliable travel times and delays for transit users. At a number of bus stops along the corridor, the bus stops in the single travel lane causing vehicles to queue behind the stopped bus waiting for transit users to board and alight.



Transit User Mobility Problem

At the SH 7/95th Street intersection, transit users can access the JUMP bus route stop via a sidewalk. Otherwise, Americans with Disabilities Act (ADA) compliant pedestrian facilities to access bus stops along the corridor do not exist. Bus stop amenities, such as benches and shelters, do not exist along the corridor, which creates a low level of comfort for boarding and alighting transit users.



Alternatives Development and Evaluation

Alternatives development and evaluation is an iterative process designed to select the best solution for addressing the Purpose and Need.

Level 1 Evaluation

Assesses each alternatives' ability to meet the Purpose and Need.

Does the alternative have the potential to:

- Reduce single-occupant vehicle demand?
- Improve comfort and safety of bicyclists along the corridor?
- Address disconnected and missing pedestrian facilities along the corridor?
- Address reliability of transit service and the safety and comfort of transit users along the corridor?
- Address rear-end vehicle crashes at intersections and along the corridor?

Level 2 Evaluation

Provides a comparative analysis of how well each alternative meets the purpose and need compared to other alternatives and its potential impact to the corridor character.

Does the alternative have the potential to:

- Provide a multimodal transportation system for all users?
- Preserve the natural, rural and historic character of the corridor?





Level 3 Evaluation

A qualitative and quantitative evaluation of the packages retained for consideration in Level 2. Evaluation criteria include:

- Person carrying capacity
- Modal travel time comparison
- Ease of implementation
- Future technologies
- Support

RECOMMENDED ALTERNATIVE

PEL Level I Evaluation

| <div><div><div></div><div></div><div></div></div><div>Minimally</div><div>Moderately</div><div>Substantially</div></div> | | Vehicular Safety | SOV Demand | Bicycle Mobility & Safety | Pedestrian Mobility & Safety | Transit Mobility | Retain for Level 2 Evaluation? |
|---|--|------------------|-------------|---------------------------|------------------------------|------------------|---|
| <div><div><div>Bicycle</div><div></div></div></div> | | | | | | | |
| On-street bike lanes | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Shared-use path | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Cycle track (one-way) | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Cycle track (two-way) | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| <div><div><div>Pedestrian</div><div></div></div></div> | | | | | | | |
| Sidewalk | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Shared-use path | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Crossing treatments | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| <div><div><div>Vehicle</div><div></div></div></div> | | | | | | | |
| Additional general purpose lanes | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Managed lanes | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Intersection operation treatment | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> <div>(In support of other alternatives)</div> |
| Travel demand management | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Left turn treatments | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> <div>(In support of other alternatives)</div> |
| Speed reduction | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Increased shoulder width for bikes | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Roundabouts | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Access control | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| <div><div><div>Transit</div><div></div></div></div> | | | | | | | |
| Bus-only lanes | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Transit signal priority | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| Queue jumps | | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |

PEL Alternatives

A wide range of alternatives were developed for consideration. Some respond to a specific issue included in the Purpose and Need and some were suggested by stakeholders or members of the PEL Technical Advisory Committee. **Bicycle, Pedestrian, Vehicle, and Transit** alternatives are outlined on this and the following boards.

Bicycle

On-street bike lanes:

- Designated bike facility located outside of both directions of the vehicular travel lanes.
- Could have a painted buffer separating the bike lanes from the vehicular travel lanes.

Shared-use path:

- Path distinctly separated from the vehicle travel way that is shared by bicyclists and pedestrians.
- Typically, at least 12 feet wide to accommodate bidirectional travel of both pedestrians and bicyclists.

Cycle track (one-way and two-way):

- A high ease of use bike facility that combines a separated path with the on-street infrastructure.
- Physically separated from vehicular traffic and distinct from the sidewalk.



Pedestrian

Sidewalks:

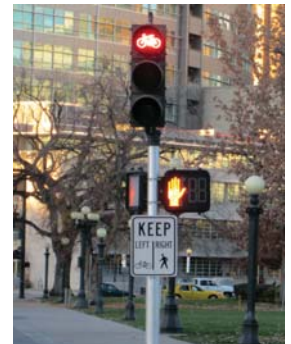
- Path distinctly separated from vehicle travel way that is most often used by pedestrians or leisurely bicyclists.
- Typically, not wide enough to comfortably accommodate bidirectional travel of both bicyclists and pedestrians.

Shared-use path:

- Path distinctly separated from the vehicle travel way that is shared by bicyclists and pedestrians.
- Typically, at least 12 feet wide to accommodate bidirectional travel of both pedestrians and bicyclists.

Crossing treatments:

- ADA compliant curb ramps.
- Sidewalks that are well-maintained and navigable by wheelchairs.
- Rectangular rapid flash beacons (RRFBs) or high-intensity activated crosswalk beacons (HAWK signals) to warn vehicles of the presence of bicycles and pedestrians where appropriate.



Vehicle - Roadway Treatments

Additional general purpose lanes:

- New vehicular travel lanes in each direction along the corridor.
- Lanes would be available to all users.

Managed lanes:

- New vehicular travel lanes in each direction along the corridor.
- Lanes would be limited to select users such as high occupancy vehicles, electric vehicles, or transit vehicles.
- Could be managed full time or during identified peak periods.

Travel demand management:

- Strategies intended to reduce reliance on single occupancy vehicles.
- Incentives or disincentives to encourage new travel behaviors.
- Could include free or discounted RTD transit passes, parking management, flexible working hours/ telecommute, peak period roadway access pricing, or private or public shuttle services.

Speed reduction:

- Strategies to decrease speeds and improve safety for all users of the corridor.
- Could include geometric modifications to the corridor and/or reducing the posted speed limit along the corridor.

Increased shoulder width:

- Construction of a wider shoulder to accommodate bicyclists.

Access control:

- Limits full movement access points directly to the corridor to reduce conflicts and improve comfort and safety for all modes.
- Could be accomplished by consolidating access points and/or restricting movements at existing and planned access points.



Transit Treatments

Bus-only lanes:

- Lanes designated exclusively for bus/transit use.
- Design could include the addition of an outside lane in each direction, a median lane in each direction or a single median contra flow lane.
- A contraflow lane would operate inbound in the AM peak periods and outbound in the PM peak periods. Travel in the off peak direction would occur in the existing general purpose lanes.



PEL Alternatives

Vehicle - Intersection Treatments

Intersection operation treatments:

- Signal timing and progression optimization treatments reduces delay at signalized intersections.
- Decreases emissions.
- Increase vehicle throughput.
- Decrease travel times through the corridor.



Left turn treatments:

- The addition of a left turn lane at unsignalized access points identified as having a higher than expected number of rear-end crashes.



Roundabouts:

- Could replace signalized intersection control.
- Could replace stop-controlled intersections.

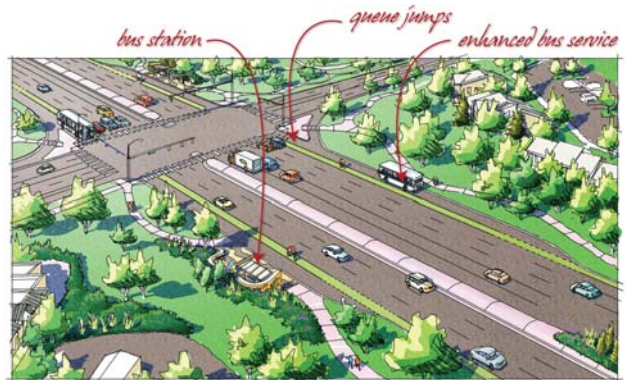
Transit Treatments

Transit signal priority:

- Traffic signal upgrades that communicate with the bus to extend green times or provide bus priority.
- Assists the bus in meeting identified schedules and reduce travel time.

Queue jumps:

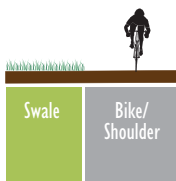
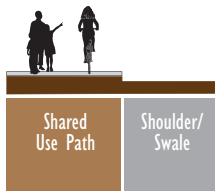
- A lane designated at signalized intersections for bus use only.
- Allows the bus to bypass queued vehicles and therefore improves transit travel time reliability.



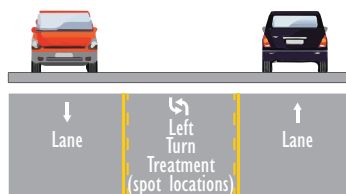
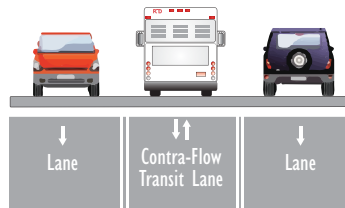
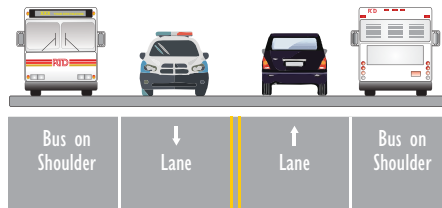
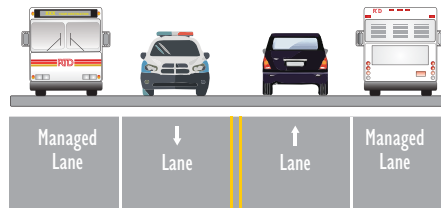
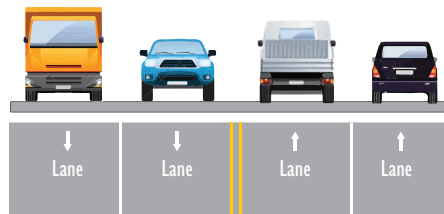
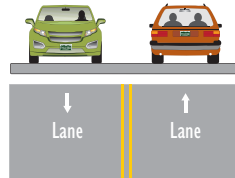
Cross Section Options

Vehicular options and bicycle & pedestrian options can be mixed and matched to accommodate bikes and pedestrians on one or both sides of SH 7.

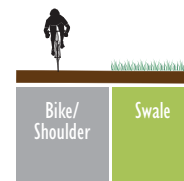
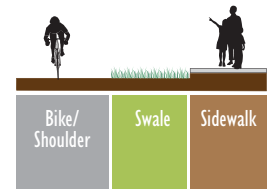
Bicycle & Pedestrian Options



Car & Transit Options

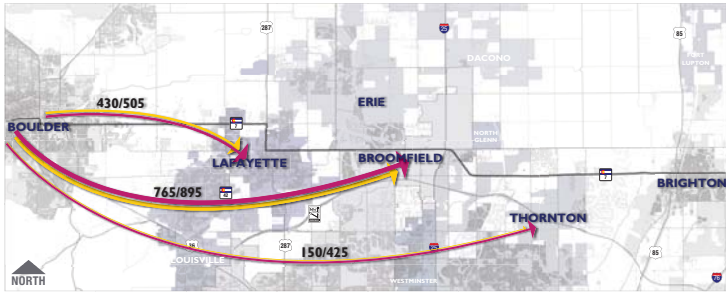


Bicycle & Pedestrian Options

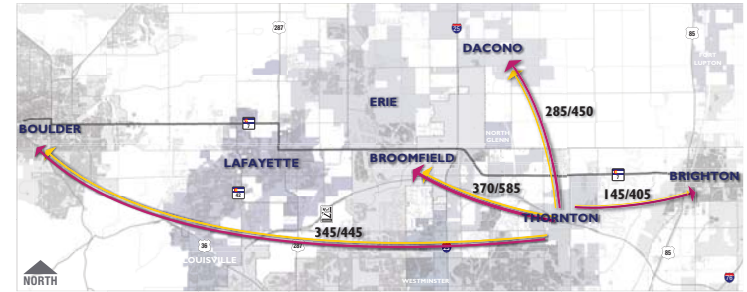


Existing & Future Work Travel Patterns

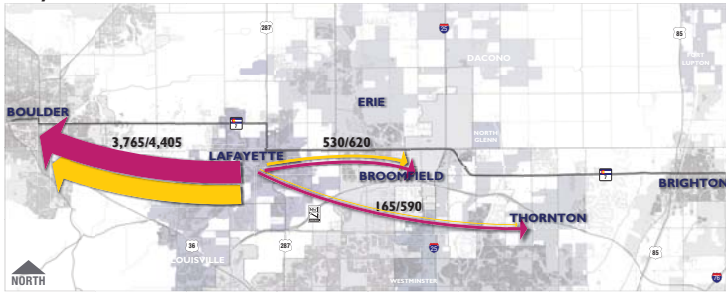
Boulder



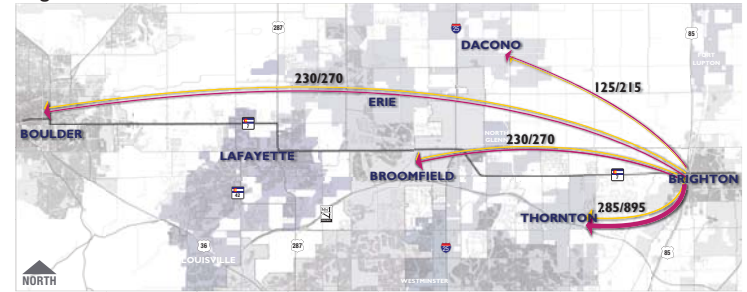
Thornton



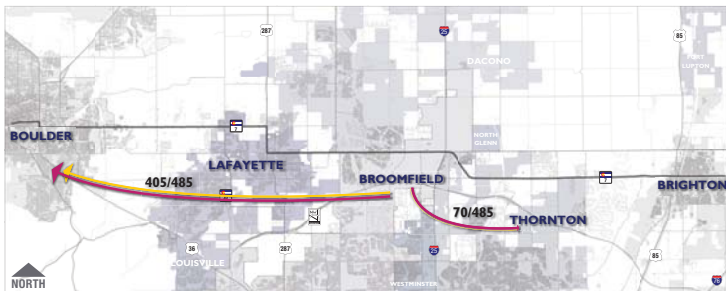
Lafayette



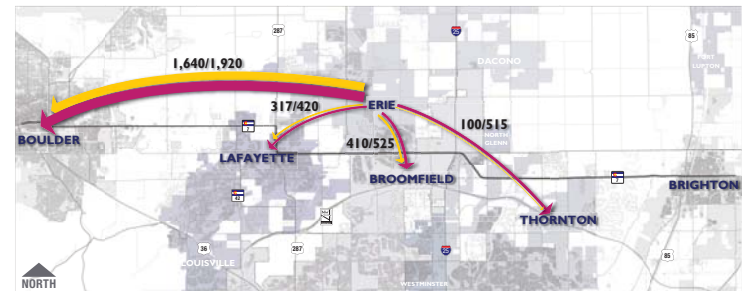
Brighton



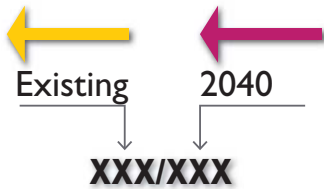
Broomfield



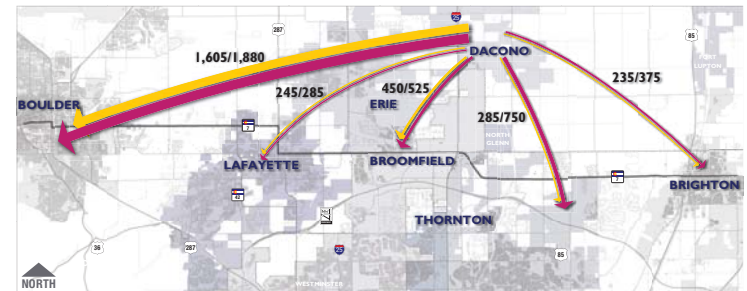
Erie



LEGEND



Dacono/Frederick/Firestone



SH 7 Planned Cross Sections - US 85 to US 287



SH 7 Looking East - East of Iowa Ave.



SH 7 Looking West - West of Existing County Line Rd.



SH 7 Looking West at Lowell Blvd.

Source: SH 7 PEL, 2014



SH 7 Looking West at Huron St.



SH 7 Looking East - East of I-25



SH 7 Looking East - West of Colorado Blvd.



SH 7 Looking East - West of South Platte River

BRT Study Preliminary Findings

- ✓ BRT service from Brighton to Boulder is feasible.
- ✓ Daily boardings in 2040 could be 6,000 to 8,500.
- ✓ Capital cost is about \$240 million.
 - Travelway (vehicle & bus) - \$205 Million
 - Transit Stations - \$3 Million
 - Park and Rides - \$6 Million
 - Buses - \$26 Million
- ✓ Annual operating cost is about \$11 million.
- ✓ Current zoning/land use plans can be modified to more fully support BRT service.
- ✓ Funding will need to be identified.
- ✓ BRT service supports communities' mobility needs.
- ✓ BRT service supports economic development in the corridor.

How to Comment

Share your thoughts with
a project team member



Fill out a comment card and
leave it at the sign in desk



Next Steps

- Select a preferred set of corridor improvements
- Complete conceptual design for SH 7 from 75th Street to US 287
- Hold final Technical Advisory meetings
- Host Open House #2