

EAST ARAPAHOE (SH 7) TRANSPORTATION PLAN

APPENDIX D: ADDITIONAL VISION ELEMENTS

March 2018



Intersection Treatments

Long-Term Vision

The City of Boulder will design intersections to increase comfort and safety for people approaching and crossing intersections on protected bicycle lanes and multi-use paths. The appropriate design for each intersection will vary depending on the available right-of-way, traffic volumes, and the bike or pedestrian facility at the location. The city will develop and analyze designs as part of 10-15% corridor design.

Elements

Directional Curb Ramp

Curb ramps are recommended at all intersections to be consistent with best practices for accessible design.

Channelized Right-Turn Lane with Speed Table

Channelized right-turn lanes shorten effective crossing distances by adding a pedestrian refuge island, and can reduce turning speeds.



Speed tables further reduce turning speeds and increase yield compliance. This treatment typically requires more space than non-channelized right-turn lanes. The City of Boulder has already successfully implemented several channelized right-turn lanes with speed tables on the East Arapahoe Avenue corridor and elsewhere in the City.

Separate Right-Turn Signal Phasing

Separate right-turn signal phasing reduces conflicts between right-turning vehicles and bicyclists proceeding straight through the intersection in protected bike lanes, where peak-hour right-turning volumes are high.

No Right-Turn on Red

A “no right-turn on red” treatment can be used at intersections where neither a channelized right-turn lane / speed table nor a protected right-turn signal phase is feasible. Prohibiting right-turns on red increases pedestrian comfort by decreasing driver encroachment into crosswalks during the “Walk” phase.

Two-Stage Turn Queue Box

Raised protected bike lanes on Arapahoe Avenue should be accompanied by intersection treatments that allow people on

bikes to make comfortable, safe left-turns onto intersecting bike facilities, and from intersecting facilities onto Arapahoe. Turn queue boxes allow bicyclists to make left-turns in two stages by providing a dedicated space to wait outside of the flow of traffic until it is safe to cross all lanes of traffic and continue on the intersecting street. They should be prioritized where bike facilities intersect, and could also be considered near major destinations.



Protected Left-Turns

Protected left-turns eliminate potential conflicts between left-turning automobiles and people walking or using off-street bicycle facilities by giving each a separate signal phase at intersections.

First and Final Mile Connections

Long-Term Vision

Improved transit service on East Arapahoe will directly serve many important destinations, but there are also major employers, shopping districts, and residential areas that lie further from the corridor. In the long-term vision, people traveling in the East Arapahoe corridor use a variety of easily accessible transportation options to connect to BRT stations. Better access to transit leads to higher ridership. The City of Boulder coordinates with neighboring jurisdictions, bicycle and pedestrian planning efforts, and private transportation providers to provide these options.

Elements

- **Pedestrian and bicycle connections** and improvements are prioritized within one-mile of stations, drawing from previous planning efforts such as the Boulder Bicycle and Pedestrian Modal Plans, the East Arapahoe Transportation Network Plan (2004 Draft), and the transportation element of the CU East Campus Master Plan. Specific types of projects include:



GRADE-SEPARATED MULTI-USE PATH CROSSING OF BASELINE RD

- **New multi-use path connections** parallel to and connecting to Arapahoe, including to a future multi-use path along the BNSF railroad line
- **Grade-separated crossings of the BNSF railroad line**, including connecting to Flatiron Business Park
- **Grade-separated crossings for existing multi-use paths** that intersect Arapahoe
- **On-street bike facilities or multi-use paths** on streets that intersect Arapahoe
- **Supportive bicycle facilities and infrastructure** serve people of all ages and abilities biking in the corridor, including bike share stations, bicycle parking, and wayfinding (see also Mobility Hubs).
- **Microtransit** serves major employers and education centers (see Advanced Mobility)
- **Transit connections** such as the planned HOP Refresh, are easy to navigate thanks to real-time arrival information and wayfinding (see Mobility Hubs)
- **Car share and ridehailing services** are easily accessible from transit stations

Lane Management

Long-Term Vision

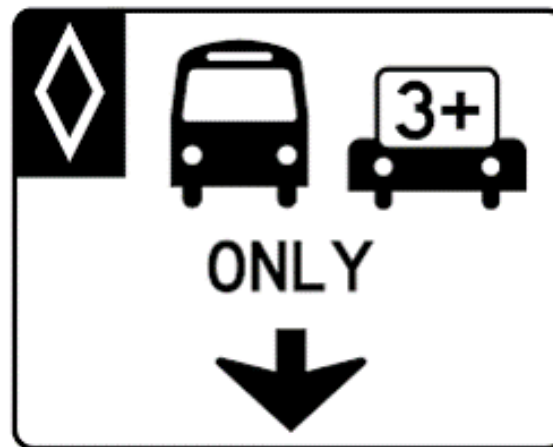
The City of Boulder will manage the curbside business access and transit lanes to ensure efficient and reliable movement of transit through the corridor.

Elements

Potential criteria and principles to help the City of Boulder manage BAT lanes along the East Arapahoe corridor include:

- **Person Throughput:** Restricting use of the lane is justified if the shift from general purpose travel lanes to transit-only or BAT lanes increases the total number of people that can be carried through a corridor and/or provides more person throughput than an arterial traffic lane during the peak hour or peak period of travel.
- **Traffic Volume:** Sharing the lane with other vehicles can ensure that a transit lane never looks “empty” and that the lanes move more people during an hour than a general purpose traffic lane. High-occupancy vehicles with 2+ or 3+ persons could be allowed to the extent that they do not reduce the transit travel time benefit of the lane.

- **Mode Share:** The BAT lane handles X% peak period transit mode share in the corridor (target TBD).
- **Speed:** The TOL or BAT lane provides 4-6 mph transit speed increase (or 40 – 50% average operating speed increase) over the distance of the lane.
- **Decreased Running Time:** Per treatment (approach to signalized intersection):
 - Per intersection: Bypasses at least half signal cycle at station intersections
 - Per segment: Saves at least a quarter of the headway of the route using it
- **Increased Reliability:** Reduces travel time variation (e.g., to below 25% of mean travel time given 50% or greater variation from mean travel time without the transit lane).



Driveway Consolidation

Long-Term Vision

Consolidation of driveways provides safety benefits for all users by decreasing the number of potential conflict points where motor vehicles cross the multi-use path and protected bicycle lanes and they enter and exit the roadway. Minor public streets leading to parking lots and businesses can also be consolidated. Accident rates are dramatically higher where the number of driveways per mile is higher along urban arterials.¹



Elements

- In the short-term time frame of the Plan, the city will develop an **Access Management and Connections Plan**, which includes consolidation of existing driveways and a framework for access to future development and redevelopment.
- New driveways are subject to a permit process through CDOT due to Arapahoe Avenue's status as a state highway.
- Adjacent parcels with access between parking lots may provide the first opportunities for **driveway consolidation**. Appendix C, the East Arapahoe Transportation Plan Evaluation of Alternatives Report, includes a survey of driveways and minor public streets in the corridor, and identifies those that have off-street connections between them. A summary of the results of the driveway survey and maps can be found in Appendix C Evaluation of Alternatives Report, Attachment E: Safety and Attachment E.1: Driveway Inventory Maps.

¹ National Cooperative Highway Research Program Report 3-52.