Colfax BRT: Technical Working Group
October 19, 2017
Welcome and Introductions
Project Partners

- Regional Transportation District (RTD)
- Colorado Department of Transportation (CDOT)
- Denver Regional Council of Governments (DRCOG)
- City of Aurora
Technical Working Group Members

- Anschutz Medical Campus
- Auraria Higher Education Center
- City and County of Denver: Public Works
- City and County of Denver: Office of Economic Development
- City and County of Denver: Parks and Recreation
- City and County of Denver: Community Planning and Development
- City and County of Denver Police
- City of Aurora
- Colorado Department of Public Health and Environment
- Denver Housing Authority
- Denver Public Schools
- Denver Regional Council of Governments
- Federal Transit Administration
- Fitzsimons Redevelopment Authority
- Johnson & Wales University
- National Jewish Health
- Public Utilities Commission
- Regional Transportation District (RTD)
- State Historic Preservation Office
- U.S. Department of Housing and Urban Development
- U.S. Army Corps of Engineers
Meeting Purpose

- Provide project background and progress to-date
- Overview of what center-running BRT is and how it works
- Review key opportunities/differentiators/tradeoffs of new concept
- Answer questions and identify areas where more information is needed
Agenda

- Role of the TWG
- Project Background
- Review Current Analysis
- Q&A
- Next Steps
Center-Running BRT on Colfax
Study Area
Key Challenges and Opportunities

- Moving more people to destinations along East Colfax without adding lanes or taking property
- Growth of Denver region even greater than expected
- Very high Colfax corridor ridership today (22,000 / weekday)
# Community and Agency Feedback

## Supported Outcomes
- Doubles existing ridership
- Increases person-trip capacity
- Reduces transit travel time
- Reliability
- Enhanced Passenger Experience

## Opportunities for Improvement
- Be bold – think long term
- 24-hour transit lane
- Placemaking – opportunity to reimagine Colfax as Main Street
- Prioritize pedestrians and bicycle safety and access (Vision Zero)
Project Evolution

- Side-Running BRT concept refined based on community input, project goals and mobility needs
- Analyzed potential alternative options
- Center-Running BRT design better addresses key community, safety and mobility priorities
Corridor Development Timeline

Opportunity for Stakeholders and Public To Influence Project Design

Alternatives Analysis

Federal Transit Administration Project Development

Conceptual Design & Environmental Analysis

Engineering & Design

Construction

Revenue Service

Ongoing

Locally Preferred Alternative
- Definition of mode & alignment
- Conceptual station locations
- Operating plan
- Local decision

Concept Design & Environmental Clearances
- Design detail determined
- Environmental impacts identified

Fully Designed and Funded Project
- Design complete
- Finance package

We Are Here
The Colfax BRT Opportunity
MOBILITY ACTION PLAN

It's getting too hard to move around Denver and too many people are getting hurt on our streets. Our infrastructure is deteriorating, transportation options are limited and the ones we have are major sources of pollution.

The time to act is now. We must be smart and we must be bold. Denver's Mobility Action Plan will support the transportation choices people want to make and move more people, more efficiently and more safely. It will increase mobility options, improve safety, address climate change, improve public health, and create more accessibility.

Denver’s Mobility Action Plan

Denver is ready to transform its transportation system.

Strategic Goals

**CHOICE**
Providing more choices: Walk, Bike, Drive, Transit or Share

**SAFETY**
Improving safety through Vision Zero

**CLIMATE & HEALTH**
Expanding use of electric vehicles and charging stations

**ACCESSIBILITY**
Increasing technology to make your trip easier and faster

$2+ billion over the next 12 years to make it safer and easier to get where we need to go.

30%
Commuters biking, walking or taking transit by 2030

80%
Reduction of emissions by 2050

Zero
Traffic Deaths by 2030
# The Colfax BRT Opportunity

<table>
<thead>
<tr>
<th>A SAFE Street</th>
<th>A Street for PEOPLE</th>
<th>A Street with Transit at its HEART</th>
<th>A Street that WORKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Vision Zero</td>
<td>• Create spaces for active neighborhood centers</td>
<td>• Efficient, reliable and comfortable operations</td>
<td>• Move more people, not just vehicles</td>
</tr>
<tr>
<td>• Pedestrian-first design</td>
<td>• Open sidewalks for retail and pedestrian uses</td>
<td>• Long-lasting redevelopment and mobility benefits</td>
<td>• Improve mobility for all modes of transportation</td>
</tr>
</tbody>
</table>

- **A SAFE Street**
  - Vision Zero
  - Pedestrian-first design

- **A Street for PEOPLE**
  - Create spaces for active neighborhood centers
  - Open sidewalks for retail and pedestrian uses

- **A Street with Transit at its HEART**
  - Efficient, reliable and comfortable operations
  - Long-lasting redevelopment and mobility benefits

- **A Street that WORKS**
  - Move more people, not just vehicles
  - Improve mobility for all modes of transportation

[Colfax Corridor Connections]
BRT as Centerpiece of A Complete Street

Delivering on transit, walkability and community development

- Provides healthy transportation options
- Allows the economy to grow
- Protects and improves our environment
- Supports vibrant, walkable neighborhoods
- Improves safety and comfort

colfax corridor connections
The Colfax BRT Opportunity
The Colfax BRT Opportunity
Center-Running BRT in Sister Cities
Denver’s Peers are Building Quality BRT

- Cleveland: HealthLine BRT
- Chicago: Ashland BRT
- Seattle: Madison RapidRide BRT
- Eugene: EmX BRT
- Others: San Francisco, Albuquerque, etc.
Healthline BRT, Cleveland

https://youtu.be/kF6EF3kOGQE
Cleveland: Euclid Avenue HealthLine

$5.8 BILLION IN NEW INVESTMENT resulting from the EUCLID AVENUE STREETSCAPE and BRT Project

Source: Greater Cleveland Regional Transit Authority
The remaking of Euclid Avenue was primarily a transportation project—a $397 million federally funded effort to improve a major artery and to connect downtown Cleveland to University Circle using a bus rapid transit line. But the project also promised economic development, with the revived road acting as a canvas for construction.

That growth is happening. More than 632 projects have been in the planning stages, under construction or completed near Euclid during the past two years. That number might be higher, if not for timing: The corridor re-opened in October 2008, when the nation was at the height of a financial crisis. The recession, a lending crunch and a real estate crisis have stalled some projects and wiped out others. And a number of projects that have emerged or survived are driven by institutions or propped up by tax credits and other subsidies.

This map gives an overview of much of the development around the Euclid corridor.

Source and Full-Size Map: Cleveland Plain Dealer: Cleveland’s Euclid corridor project has paved the way to economic development
Ashland BRT, Chicago

- Similar corridor and ridership to Colfax
- Population living within 0.5 miles of Ashland corridor expected to grow by 55,000 (about 24%) by 2040.

Source: [Chicago Transit Authority: Ashland Bus Rapid Transit](http://www.chicagotransit.org/)
Ashland BRT, Chicago

https://youtu.be/_csc2ZDuQLo
Center-Running BRT Evaluation and New Criteria
Where We’ve Been: Screen 3 Plus Results Summary

<table>
<thead>
<tr>
<th>Mobility</th>
<th>Environmental Measures</th>
<th>Fiscal Measures</th>
<th>Urban Character Measures</th>
<th>Deliverability Measures</th>
</tr>
</thead>
</table>

**KEY**
- **GOOD**
- **GOOD/FAIR**
- **FAIR**
- **FAIR/POOR**
- **POOR**

**Overall Results**
- Low capital and operating costs
- Moderate ridership
- Excellent cost effectiveness
- Limited economic benefit and high return on civic investment
- High capital and operating costs
- High ridership
- Excellent cost effectiveness
- Limited economic benefit and high return on civic investment
- High capital and operating costs
- High ridership
- Excellent cost effectiveness
- Limited economic benefit and high return on civic investment
- High capital and operating costs
- High ridership
- Moderate cost effectiveness
- High economic benefit but low return on civic investment
- High capital and operating costs
- High ridership
- Moderate cost effectiveness
- High economic benefit but low return on civic investment
- High capital and operating costs
- High ridership
- Moderate cost effectiveness
- High economic benefit but low return on civic investment
Screen 4 Evaluation Criteria

OPERATIONS
- Transit Operating Cost
- Expansion Capacity
- Traffic Operations
- Cost-Effectiveness
- Ridership
- Person Capacity

EXPERIENCE
- Travel Time Reliability
- Placemaking
- Passenger Experience
- Multimodal Access (Station Spacing)

COMMUNITY
- Multimodal Safety – Vision Zero
- Vehicle Miles Traveled
- Economic Development
- Construction Impacts
- Business Access
- Community & Agency Support
- Construction Impacts
## SCREEN 4

### RESULTS SUMMARY

<table>
<thead>
<tr>
<th>Category</th>
<th>Side-Running in Exclusive Lanes - All Day</th>
<th>Center-Running in Exclusive Lanes - All Day</th>
<th>KEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ridership</td>
<td></td>
<td></td>
<td>GOOD</td>
</tr>
<tr>
<td>Transit Travel Time</td>
<td></td>
<td></td>
<td>GOOD/FAIR</td>
</tr>
<tr>
<td>Auto Travel Time</td>
<td></td>
<td></td>
<td>FAIR</td>
</tr>
<tr>
<td>Person Capacity</td>
<td></td>
<td></td>
<td>FAIR/POOR</td>
</tr>
<tr>
<td>Transit Reliability</td>
<td></td>
<td></td>
<td>POOR</td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td>TBD</td>
</tr>
<tr>
<td>Vehicle Miles Traveled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multimodal Access</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedestrian Safety + Experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multimodal Safety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expansion Capacity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curb Access</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle Access</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Design/Placemaking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Impact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agency + Community Support</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Overall Results

- TBD
- TBD
- TBD
Task Force Feedback

- Strong support for CRBRT
- Placemaking and ability to transform street was cited as key area of support
- Safety and support of Vision Zero are high priorities
- Understand vehicular access tradeoffs; access by all modes and individuals should be valued
- Balance travel time benefits with ease of access (i.e. stop spacing)
- Ensure the corridor is permeable and connected to the larger transportation system
- Desire to know more about CRBRT operations and the passenger experience
- Challenge will be to communicate benefits to the broader public
Screen 4 Criteria:

*Key Differentiators, Benefits and Tradeoffs*
Criteria Topics for Today’s Discussion

- Transit Travel
  - Time
  - Reliability
  - Operating Cost
  - Future Proofing

- Multimodal Safety
  - Pedestrian Comfort & Experience

- Placemaking
  - Passenger Experience

- Traffic Operations

- Business Access
  - Parking & Loading

- Pedestrian, Bicycle, ADA Access

- Station Spacing

- colfax corridor connections
Transit Reliability

The Bottom Line:

- Center Running BRT (CRBRT) has less friction with other road users including curbside conflicts, providing more reliable travel.
- Changes to traffic and corridor development don’t affect future transit operations.
- CRBRT operators can accurately predict future operating costs/avoid year-over-year increases.

Tradeoffs/Other Considerations:

- More left turn restrictions
- Less auto travel lanes

Future proofing from delay as land-use, traffic, and curb uses change.
Reduced Conflicts

No conflicts with turning vehicles, parallel parking, or truck loading.
100% Near-Level Boarding

Off Board Fare Payment & Level Boarding are major contributors to improved travel speed and reliability.
Local Business Access

The Bottom Line:

- CRBRT will restrict auto left turns at most non-signalized left turns
- CRBRT has similar curb use (parking and loading) impacts to SRBRT (no conflicts with buses)
- CRBRT will improve pedestrian safety and crossing opportunities, making it more attractive to park and cross the street to access businesses
- CRBRT will also improve bicycle and motor vehicle safety

Tradeoffs/Other Considerations:

- On-street parking movements don’t negatively impact transit operations

Given current vehicle oriented uses on corridor, side running has lesser impacts. This may change over time.
Vehicle Access

Before Center-Running

After Center-Running
Conclusions and Observations:

- Both side-running and center-running BRT provide significantly more total person trips than No Action.
- Center-running results in an increase in daily person trips on Colfax of 14%.
Stop Consolidation/Local Service

The Bottom Line:

- CRBRT will maintain or improve overall transit travel times when considering walk, wait, and ride
- All CRBRT stations will offer more rail-like boarding experience, making it easier for seniors and people with disabilities to ride
- CRBRT and SRBRT provide opportunities for improved sidewalks and bike and pedestrian access to corridor

Tradeoffs/Other Considerations:

- Some passengers will need to walk further to access service
- Some local stops are consolidated
Conceptual Stops

Project Map
CRBRT Stop Pattern
How stop spacing affects walking distances

<table>
<thead>
<tr>
<th>Blocks Traveled by Service Provided</th>
<th>Walking Travel Path to Transit Stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8 mi. Service</td>
<td>BRT 1/4 mi.</td>
</tr>
<tr>
<td>Household A</td>
<td>2 blocks</td>
</tr>
<tr>
<td>Household B</td>
<td>3 blocks</td>
</tr>
<tr>
<td>Household C</td>
<td>3 blocks</td>
</tr>
</tbody>
</table>

colfax corridor connections
Anatomy of a Trip

Side Running BRT
- Walk to Transit
- Wait @ Station
- Ride
- Walk to End

Wait time perceived as most punitive

Center Running BRT
- Walk to Transit
- Wait @ Station
- Ride
- Walk to End

colfax corridor connections
Traffic Operations

The Bottom Line:

- CRBRT will shift some vehicle trips to parallel corridors, but impacts are limited to a few intersections (will be focus for mitigations)
- CRBRT will reduce total vehicle volume on corridor but increase person throughput and access
- CRBRT or SRBRT will provide opportunity for operational improvements (signal optimization, extended/new turn lanes, re-striping, minor curb/gutter relocation) that will aid vehicle and transit operations

Tradeoffs/Other Considerations:

- Some vehicles will shift to parallel corridors
- Auto trips are more susceptible to minor delays due to parallel parking and truck loading
- Auto trips will experience a few additional minutes of travel time from end-to-end

Grid street network can absorb diversion with minimal vehicle travel time increases
Safety

The Bottom Line:

- CRBRT will eliminate many of the most significant conflict points that lead to serious injury and fatal collisions.
- CRBRT will reduce crossing exposure.
- CRBRT design could provide center pedestrian refuges at non-signalized crossings (under discussion).
- CRBRT provides vertical features in the roadway that serve as traffic calming.

Tradeoffs/Other Considerations:

- Left turns only allowed at signalized intersections. May require U-turns or multiple lefts to get to destinations.
- Will require careful design decisions about pedestrian crossings at non-signalized intersections.
Improves Crossing Safety and Comfort

- Island stations calm traffic
- Pedestrian refuges reduce crossing distance
- Shorter crossing distances = less exposure to vehicle traffic
- Eliminating unprotected lefts improves pedestrian safety
- Station lighting enhances security
Placemaking/Streetscaping

The Bottom Line:

- CRBRT will open sidewalk space for pedestrian, retail activation by removing bulky shelters and waiting passengers
- CRBRT alternative eliminates all curbside transit stops and boarding
- CRBRT improves transit customer security by separating transit customers from other sidewalk users (and providing transparent design and lighting)
- CRBRT can increase space for landscaping and public art
- CRBRT station design is less constrained, allowing for signature design

Tradeoffs/Other Considerations:

- Passenger may feel more isolated in the center of the street during off-peak times (lighting and station design can mitigate)
Placemaking/Streetscaping

- Frees sidewalk space for retail and community activation
- Increases opportunity for public art and streetscape improvements
- Landscaping increases property values
Street Design

HealthLine BRT, Cleveland
Public Art

Steve Manka, “Chorus Line”  HealthLine BRT, Cleveland
Questions?
Next Steps and Path Forward
Where Do We Go From Here?

- Identify Local/Regional Funding Sources
- Compete for Federal Funding*
- BID/RNO presentations and updates
- Gather community feedback and complete more detailed design and implementation schedule

*requires environmental clearance by Federal Transit Administration and funding availability
www.ColfaxCorridorConnections.com
Info@ColfaxCorridorConnections.com