



Bus Rapid Transit Feasibility Study

Stakeholder Working Group 2 | Feb 18, 2021



MEETING AGENDA

1. Project Status Update (10 min)
2. Goals & Screening Criteria – Small Group Breakout #1 (30 min)
3. Routing and Station Alternatives – Small Group Breakout #2 (30 min)
4. Guideway and BRT Improvements (30 min)
5. Next Steps & Public Meeting #2 (10 min)



US 287 BRT

FEASIBILITY

PROJECT UPDATE



OBJECTIVE

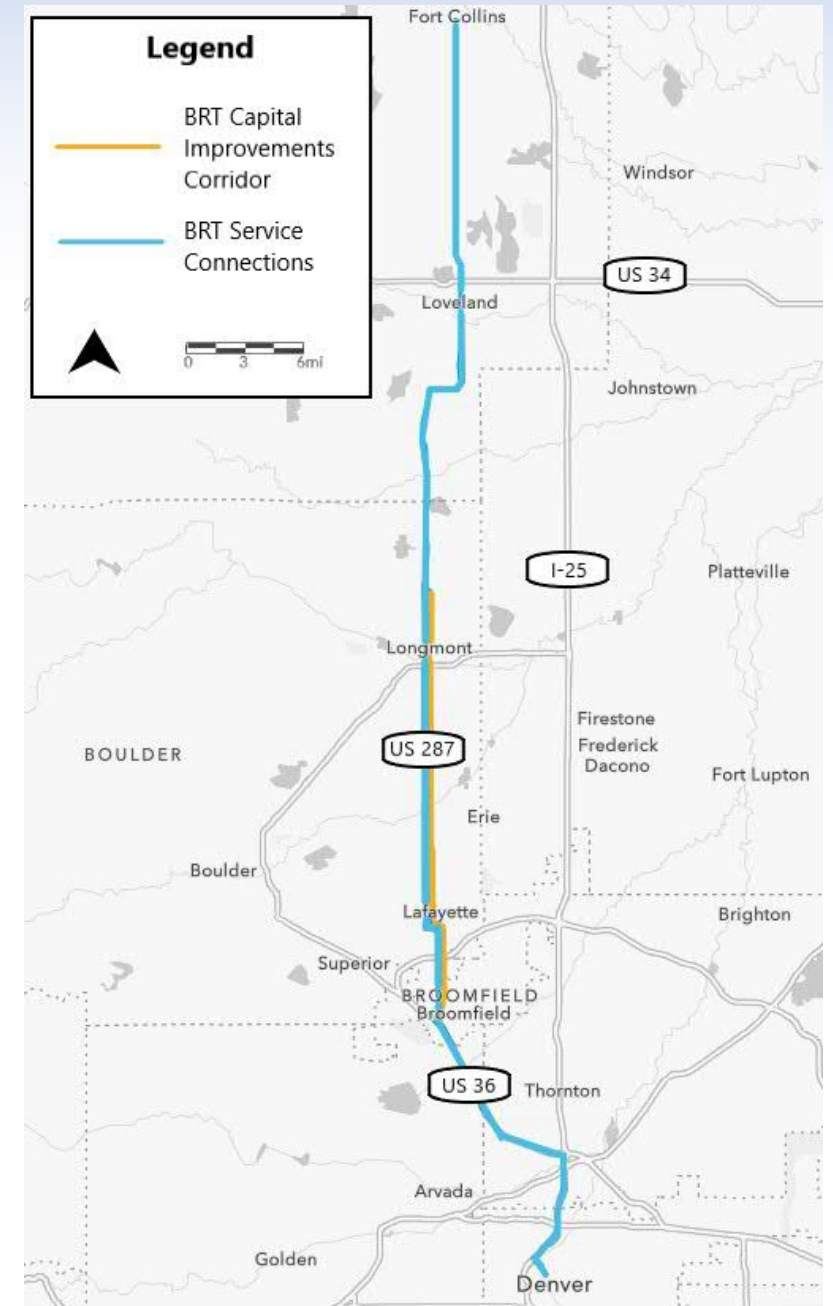
The US 287 Bus Rapid Transit Feasibility Study intends to study and understand north/south mobility needs along US 287 and recommend specific capital improvements and transit service enhancements for the corridor.

Communities on Capital Investment Corridor:

- Longmont
- Erie
- Lafayette
- Broomfield

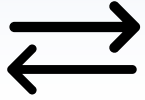
One Seat Ride Service to:

- Fort Collins
- Downtown Denver



SWG MEETING #1 RECAP: CORRIDOR THEMES

Strengths



Connections to other transit routes



Diverse land uses



Wide right-of-way



Stakeholder support for multimodal improvements



NAMS identified high ridership potential

Opportunities



Regional connections



Future development



Encourage and enhance cycling



Connections to existing park and rides

Weaknesses



Auto-centric corridor



Safety concerns



Lack of bicycle facilities



Lack of safe crossings and quality pedestrian facilities



High speed corridor

Threats



Qualifying for federal funding



Growing traffic and congestion



Community perception

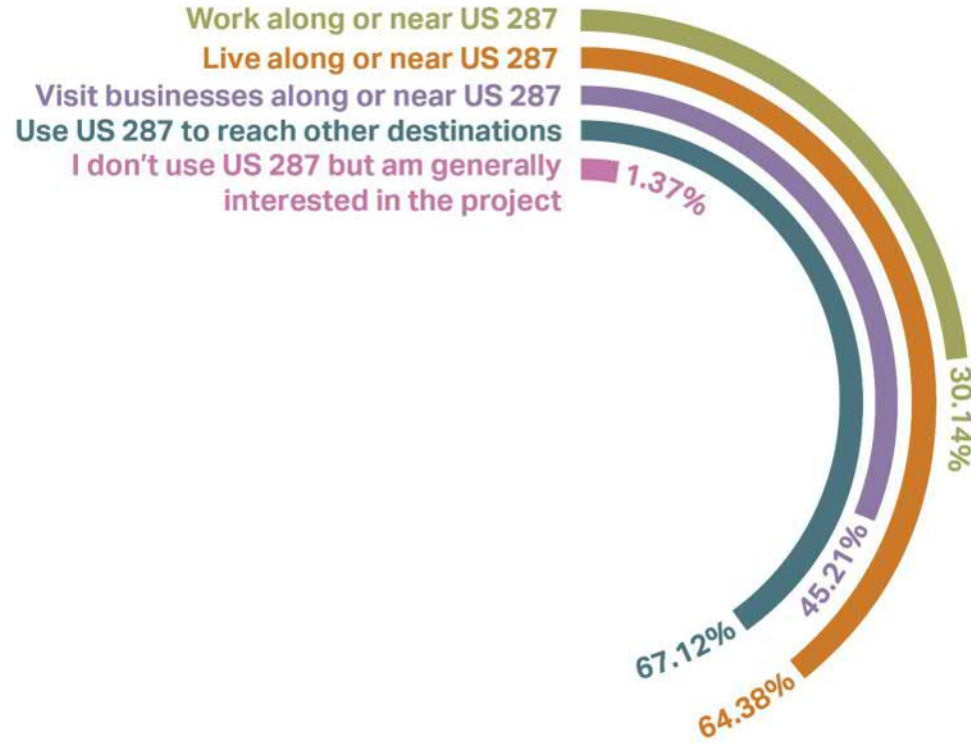


Potential to alter sense of place

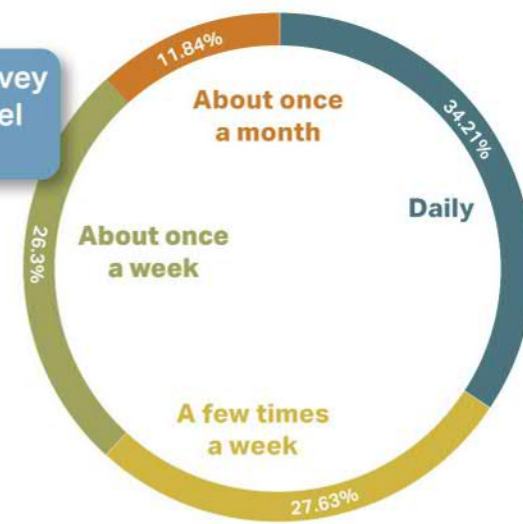
INDIVIDUAL STAKEHOLDER INTERVIEWS

- **Lafayette** – "getting ahead" of developments
- **RTD** – integrate within greater network
- **Broomfield** – desire for a new interchange
- **Fort Collins** – bus is bumpy, but customers happy; perhaps service tweaks.
- **CDOT Region 4** – safety; cross-overs and intersections
- **Longmont** – placemaking and building on existing plans
- **Erie** - entryway, placemaking, water retention and low maintenance trees
- **FTA** – consider more funding options if not branded as "BRT"
- **CDOT Division of Transit and Rail** - mobility hubs, 119 and Bustang
- **Northwest Chamber of Commerce** – new member of SWG

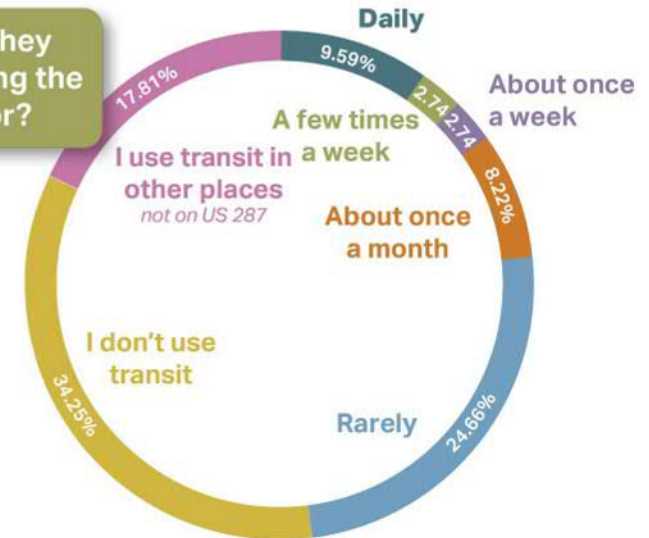
Why are survey takers interested in this study?



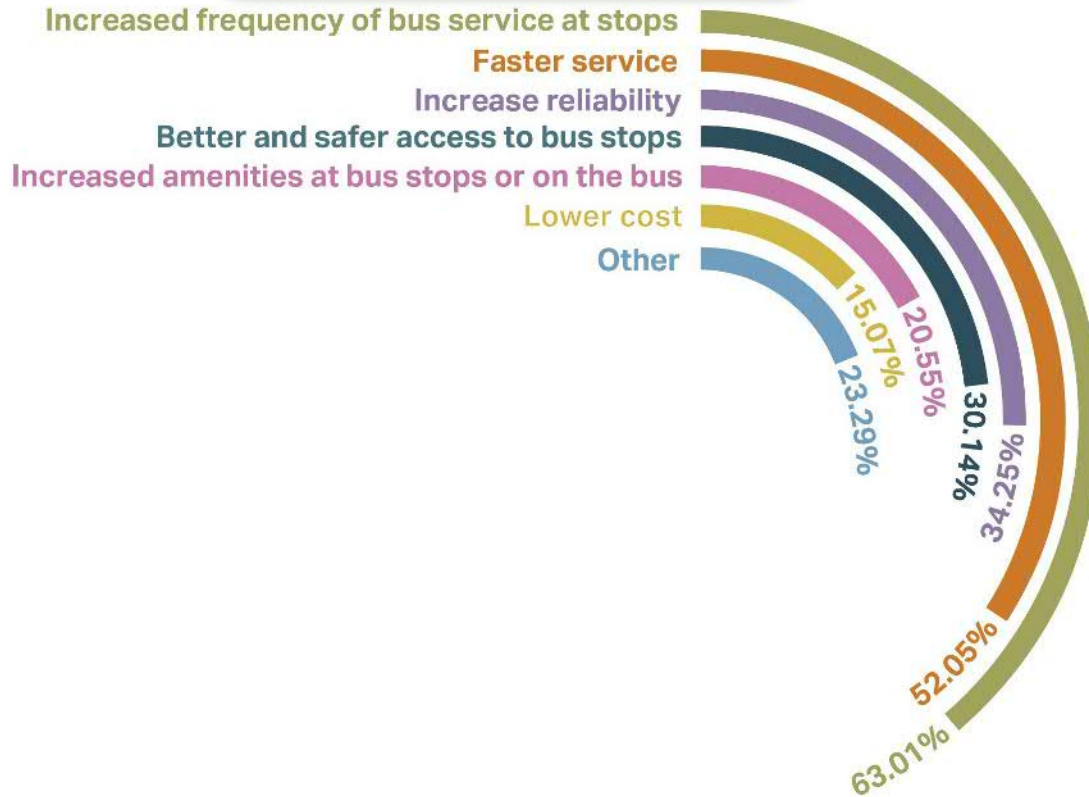
How often do survey respondents travel on US 287?



How often do they use transit along the US 287 corridor?



What would encourage survey takers to take transit more often?



Survey respondents indicated safety issues at these intersections

Plateau
Change stoplights
to roundabouts

Jasper Rd
Oxford
Campus Dr Dillon Rd
Baseline Rd Isabelle Rd
Arapahoe
3rd Ave
4th Ave
5th Ave
6th Ave
8th Ave
9th Ave
Lookout Rd
Mineral Rd
Hwy 52
South Boulder
**None of the intersections
are pedestrian friendly**
Explema Dr Not accessible
Longs Peak Ave
Niwot Rd
Quail **Hwy 66**



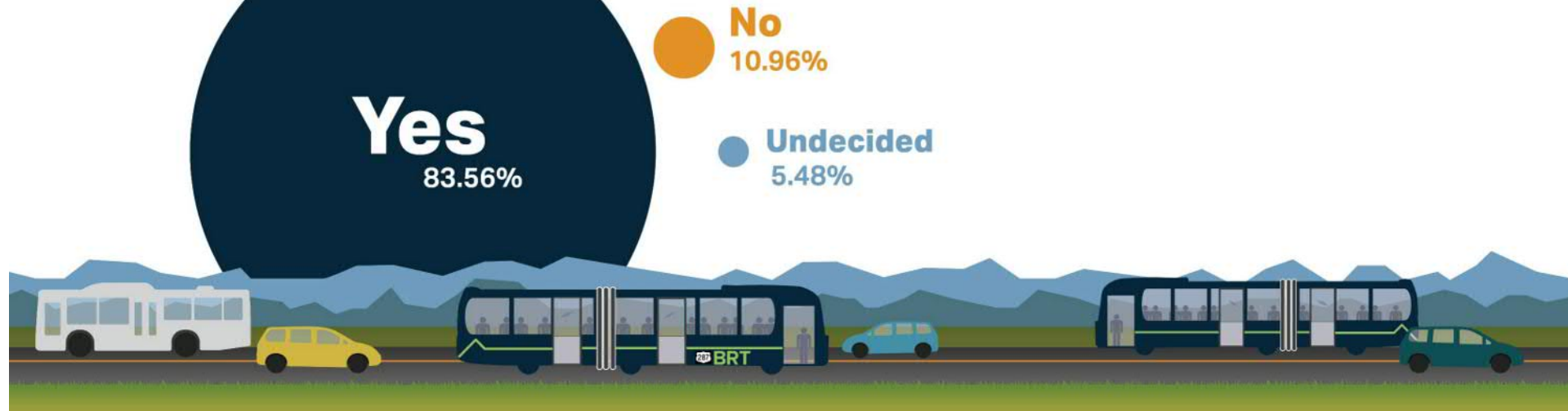
Desired bike improvements for US 287 were ranked by survey respondents.

- 1 Off street multiuse path
- 2 Bicycle improvements on nearby parallel roadways
- 3 On street bicycle lane

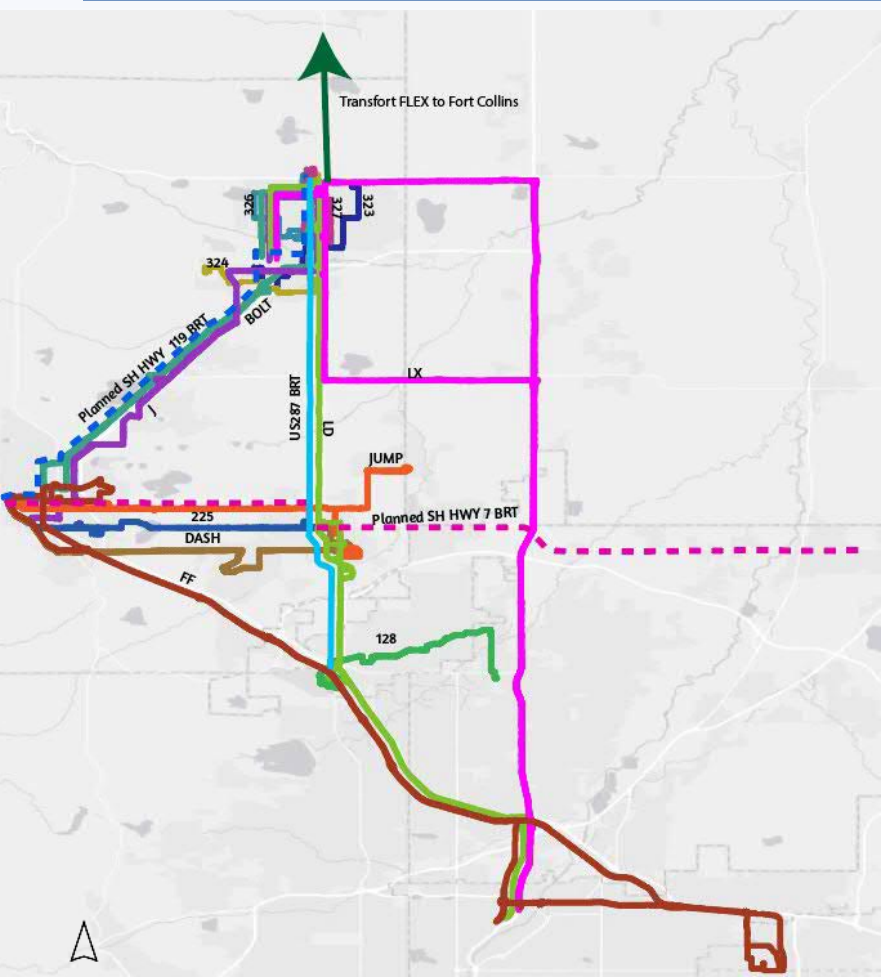
Desired transit improvements for US 287 were ranked by survey respondents.

- 1 Bus stop improvements
- 2 Dedicated shoulders for buses
- 3 Prioritization of buses at intersections
- 4 Dedicated center running bus lanes

Are you generally in favor of BRT improvements along US 287?



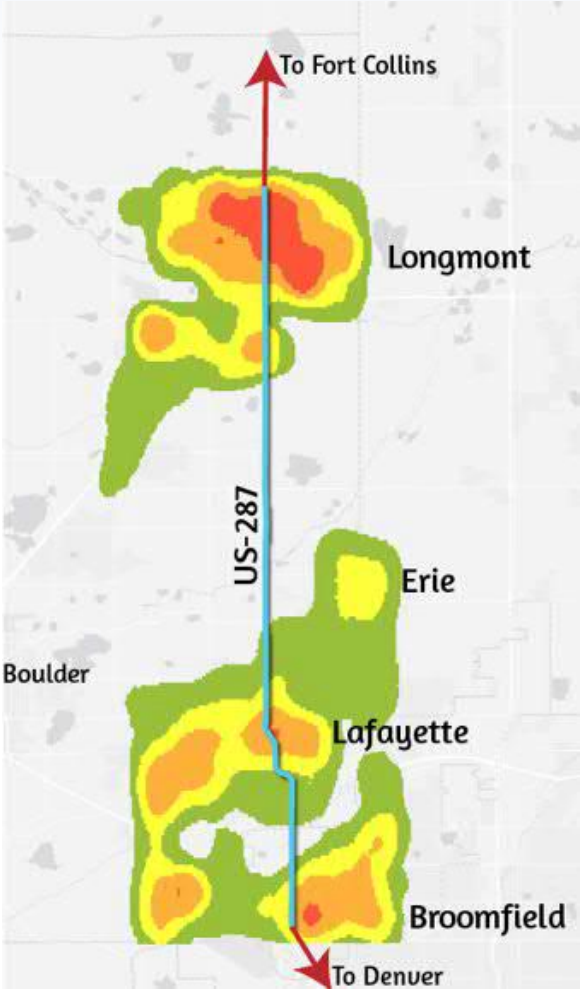
EXISTING CONDITIONS SUMMARY



Transit Network



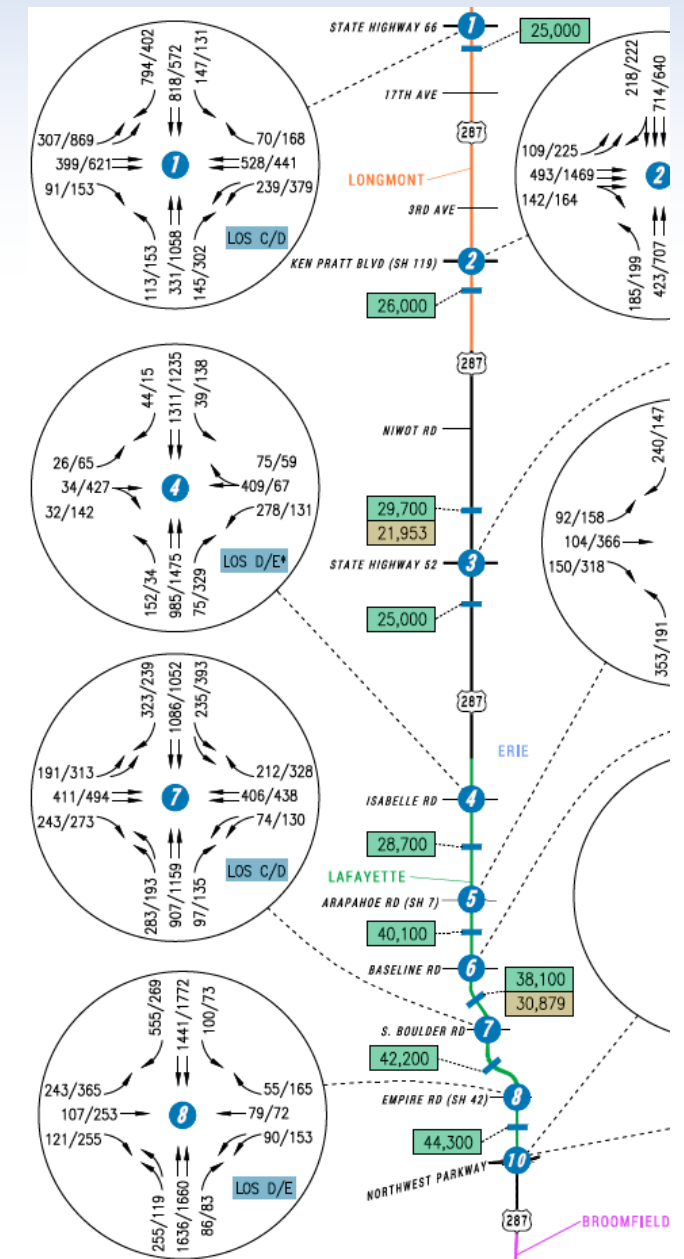
Employment



Population

TRAFFIC EVALUATION

- 25,000 to 48,000 vehicles per day
- Future growth forecasts 0.7% to 1.0% annually
- Speed limits range from 25 mph to 65 mph
- Average peak hour travel times 26-55 min
- Analyzed 10 major intersections for peak hour capacity
- Most intersections operating acceptably, but longest peak hour delays on US 287 at:
 - Baseline Rd
 - NW Pkwy EB
 - Isabelle Rd*
 - SH 66
 - SH 42
 - Ken Pratt & Main



GOALS & SCREENING

CRITERIA



ALTERNATIVES SCREENING PROCESS

- Mixed Traffic
- Bus on Shoulder
- Dedicated Side Running
- Dedicated Center Running



4. Guideway

- Baseline Condition
- Operational Bus Improvements
- Bus Rapid Transit - NAMS study focus



1. Mode

- Transition Points along the Alignment
- Major Station Locations
- Junctions with Other Bus Routes

3. Segments and Transitions



2. Alignment

- Rural Sections: US 287
- Longmont: Coffman or Main Street
- Lafayette: Public Rd or US 287
- Broomfield: Connection to US36
- Fort Collins
- Denver



VALUE STATEMENTS INFORM GOALS

Prioritize **moving number of people** over moving number of vehicles

Focus on **frequency of buses** during peak hours over span of service throughout the day

Leverage BRT integration with **economic development opportunities**

Maximize **transfer opportunities** with existing regional transit to integrate with the regional network

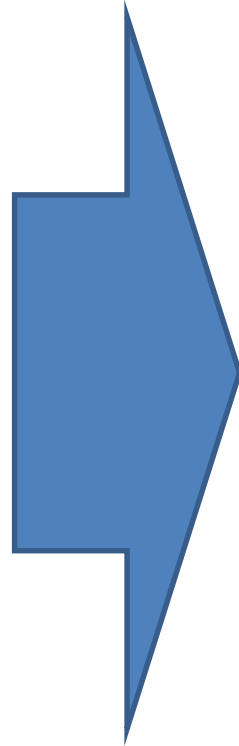
Prioritize **one seat rides** between high ridership origin and destinations

Improve **safety and mobility**

Provide bus service that **competes with car travel times**

Contribute significantly to **greenhouse gas reduction and Vehicle Miles Traveled reduction** with world class transit service

Offer **better amenities at bus stops** and more comfortable walking and biking connections



- **Goal #1:** Increase the efficiency, attractiveness and utilization of transit for all users
- **Goal #2:** Provide competitive transit travel to serve local and regional travel demand
- **Goal #3:** Contribute to a socially, economically, and environmentally sustainable network
- **Goal #4:** Develop and select an implementable and community supported project

VALIDATION OF GOALS AND CRITERIA: BREAKOUT #1

- Group 1: **Goal #1**
 - Alex Hyde-Write, Boulder County
 - Sarah Grant, Broomfield
 - Adam Parks, CDOT
 - Joliette Woodson, Lafayette
 - Sam Taylor, NW Chamber of Commerce
 - **Nick VanderKwaak, AECOM (Moderator)**
- Group 2: **Goal #2**
 - Scott Cooke, NW Chamber of Commerce
 - Mica Zogorski, Longmont
 - Phil Greenwald, Longmont
 - Chris Quinn, RTD
 - Bill Fox, Fox Tuttle
 - **Dayna Wasley, AECOM (Moderator)**
- Group 3: **Goal #3**
 - Alberto De Los Rios, Boulder County
 - Daniel Marcucci, CDOT
 - David Pasic, Erie
 - Audrey DeBarros, Commuting Solutions
 - Jeff Butts, Boulder County
 - **Steve Tuttle, Fox Tuttle (Moderator)**
- Group 4: **Goal #4**
 - Nataly Handlos, RTD
 - Seth Lorson, Fort Collins
 - Tracey MacDonald, FTA
 - Chad Endicott, Boulder County
 - Kathleen Bracke, Boulder County
 - **Ed Parks, AECOM (Moderator)**
- **15 minute breakout**
- Facilitator will review objectives and criteria
- Instructions/Considerations
 - Will criteria properly evaluate differences between alternatives?
 - Are there missing criteria or opportunities to include additional information?
- Regroup/Report back

GOAL #1 CRITERIA DEVELOPMENT

Increase the efficiency, attractiveness and utilization of transit for all users

Goal 1

Objectives

- Provide reliable, frequent service that improves the experience of existing bus users and attracts new riders
- Provide increased transit capacity
- Provide enhanced stop amenities and infrastructure
- Prioritizes moving number of people over number of vehicles
- Prioritize one seat rides between high origin and destinations
- Provide comfortable walking and biking connections to transit stops
- Provide bus service that competes with car travel times

Criteria

Criteria	Metric
Transit travel time (minutes)	2045 NB transit travel times (PM Peak) between US 36 (Broomfield) and SH 66 (Longmont)
	2045 SB transit travel times (PM Peak) between SH 66 (Longmont) and US 36 (Broomfield)
Mobility Improvements: Ridership	Measured by ridership forecasts per alignment
Congestion Relief: Do the proposed improvements increase weekday transit trips?	Measured by new weekday linked transit trips (compare no-build condition with build condition for each alternative).
Impact to vehicular travel times on corridor streets	Measured as a % increase in NB vehicular travel times (PM Peak) on the corridor from 2045 no-build conditions to 2045 build conditions
	Measured as a % increase in SB vehicular travel times (PM Peak) on the corridor from 2045 no-build conditions to 2045 build conditions
Ability to accommodate bicyclists	High, Medium, Low
Ability to accommodate pedestrians	High, Medium, Low

GOAL #2 CRITERIA DEVELOPMENT

Provide competitive transit travel to serve local and regional travel demand

Objectives

- Provide one-seat transit connections from Boulder County/Broomfield to Downtown Denver and Fort Collins
- Balance with acceptable levels of traffic operations in the corridor
- Improve pedestrian and bicycle access to stations along the corridor
- Focus on peak hour bus frequency versus all day service
- Coordinate with existing bus service and planned BRT service

Criteria

Metric

Land Use: Connect to existing corridor and station area development, pedestrian facilities, include access for persons with disabilities, near affordable housing

Number of activity centers, nearby employment, average population density within 1/4 mile of station. Alternatives measured relative to each other.

Ability to connect to bicycle and pedestrian facilities and routes (broader network)

Length of bike routes within 1/4 mile of proposed stations and length of existing sidewalk and first priority missing sidewalk within 1/4 mile of proposed station. Alternatives are measured relative to each other

Economic Development: Ability of proposed transit to enable economic development as identified in existing plans and policies

Evaluated based on economic development and zoning/land use plans. Alternatives are measured relative to each other

Goal 2

GOAL #3 CRITERIA DEVELOPMENT

Contribute to a socially, economically, and environmentally sustainable network

Goal 3

Objectives

- Promote an efficient and sustainable transportation system that reduces VMT and greenhouse gas emissions
- Increase mobility and accessibility for transit dependent populations
- Integrate with regional transit to develop a complete network with maximum transfer opportunities
- Support local goals for development along the corridor
- Support institutional and key stakeholder planning efforts

Criteria

Metric

Economic Development: Ability of proposed transit to enable economic development as identified in existing plans and policies

Evaluated based on economic development and zoning/land use plans. Alternatives are measured relative to each other.

Impacts from the proposed transit service to built resources (right of way, buildings, historic buildings, hazmat sites)

This criteria measures the current day impact to the built environment from the proposed actions. Alternatives are measured relative to each other.

Cost effectiveness: Estimated high level cost divided by number of trips

Measured by initial ROW cost estimate divided by average weekday ridership numbers. High indicates the lowest cost per rider and Low indicates the highest cost per rider. Alternatives measured relative to each other.

GOAL #4 CRITERIA DEVELOPMENT

Develop and select an implementable and community-supported project			
Goal 4	Objectives	Criteria	Metric
	<ul style="list-style-type: none"> • Identify and select transit improvements with strong public, stakeholder and agency support • Define a cost effective phased approach for transit improvements that meet existing needs and plan for long term success • Define and select transit improvements that are competitive for Federal Transit Administrative funding 	Is the proposed transit improvement supported by the public?	Evaluated based on input received from the public at open houses, through surveys, and other outreach. Alternatives are measured relative to each other
		Opportunity to improve street character	Level to which the alternative would help enhance street character consistent with plans. Evaluated based on amount of cross section dedicated to alternative travel modes.

RECAP OF DISCUSSION

- **Goal #1:** Increase the efficiency, attractiveness and utilization of transit for all users
- **Goal #2:** Provide competitive transit travel to serve local and regional travel demand
- **Goal #3:** Contribute to a socially, economically, and environmentally sustainable network
- **Goal #4:** Develop and select an implementable and community supported project

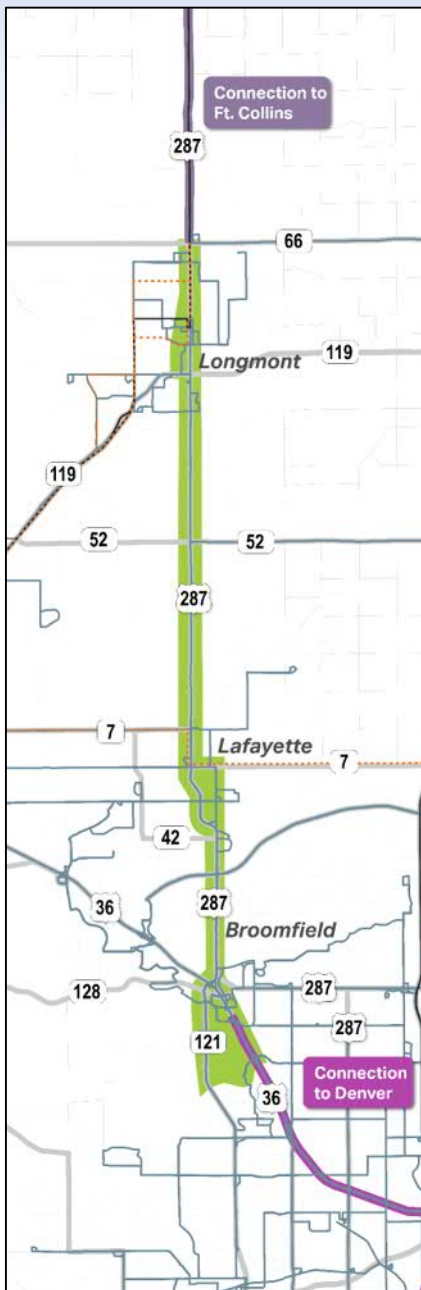
ROUTING

ALIGNMENTS &

STATION

DEFINITION





Legend

■ Proposed US 287 BRT Area

Existing and Planned Transit

— RTD Bus Routes

— Transfort FLEX Service

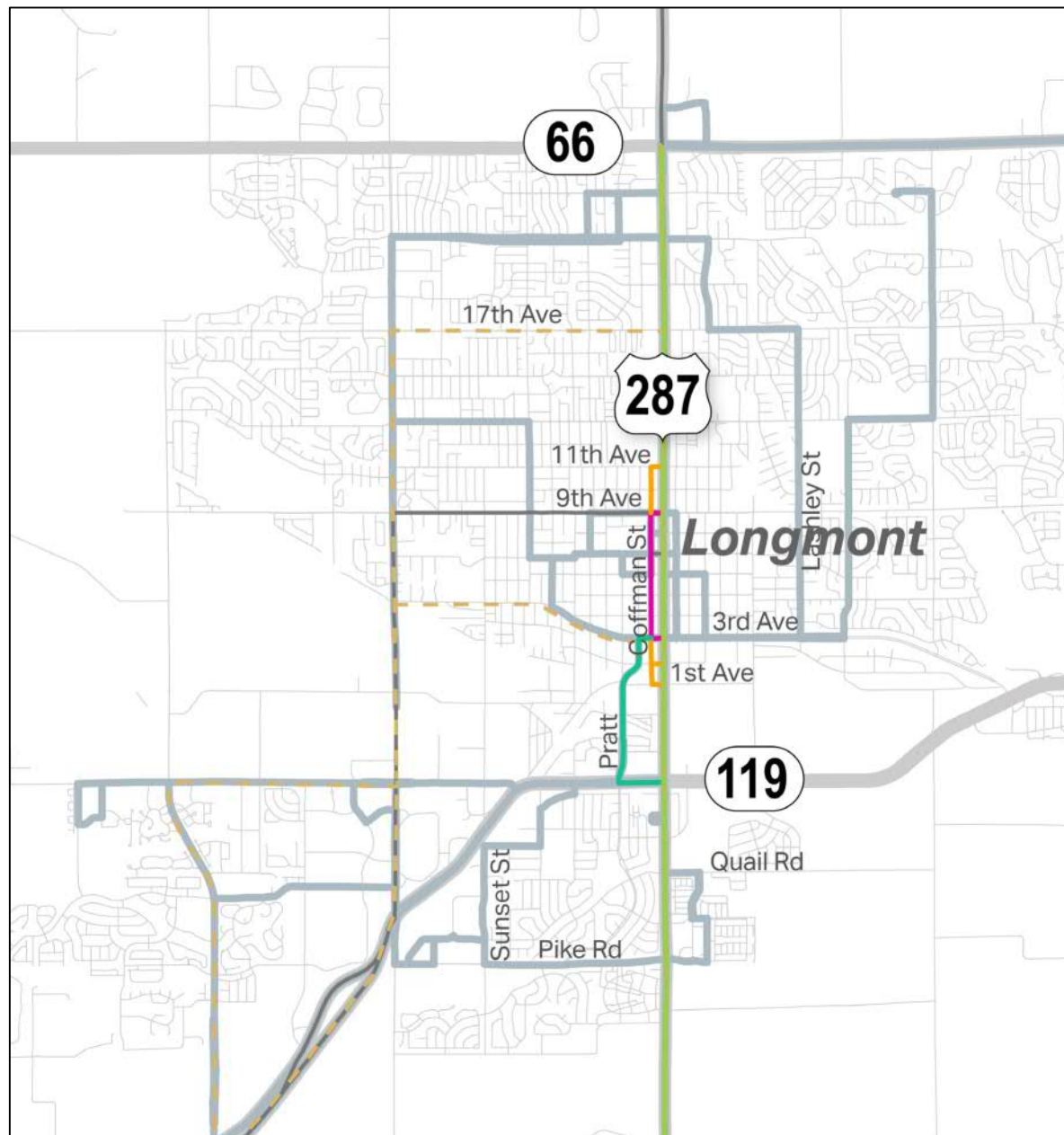
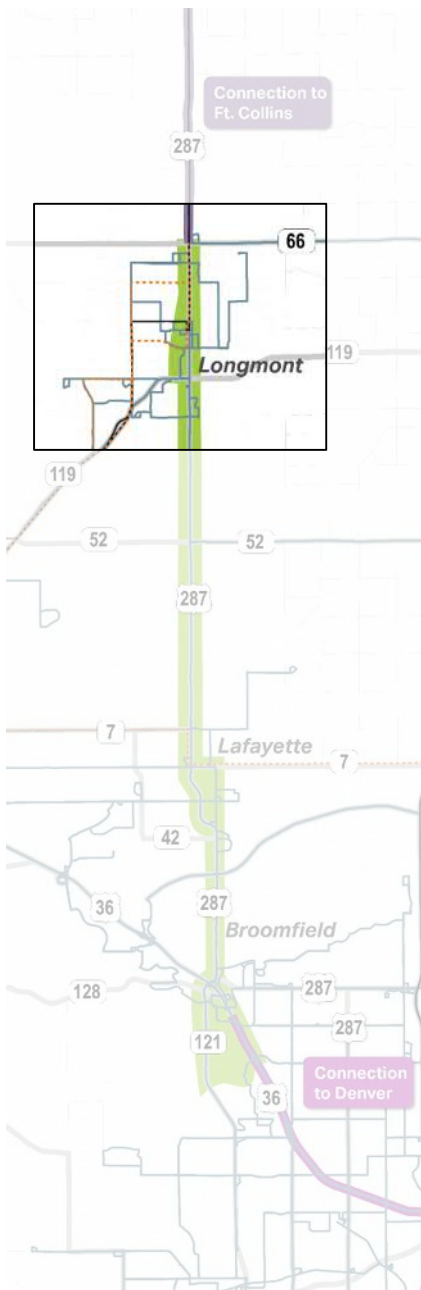
- - - Proposed Transit Routes

— Connection to Ft Collins

— Connection to Denver

DEFINING ROUTE ALIGNMENTS

- Bus alignment focused on US 287
- Where do deviations from US 287 make sense?
- Should parallel roads be considered?
- Multiple branching options?
- Formalize potential alternatives to evaluate in the screening process
- Varying levels of investment along routes



Legend

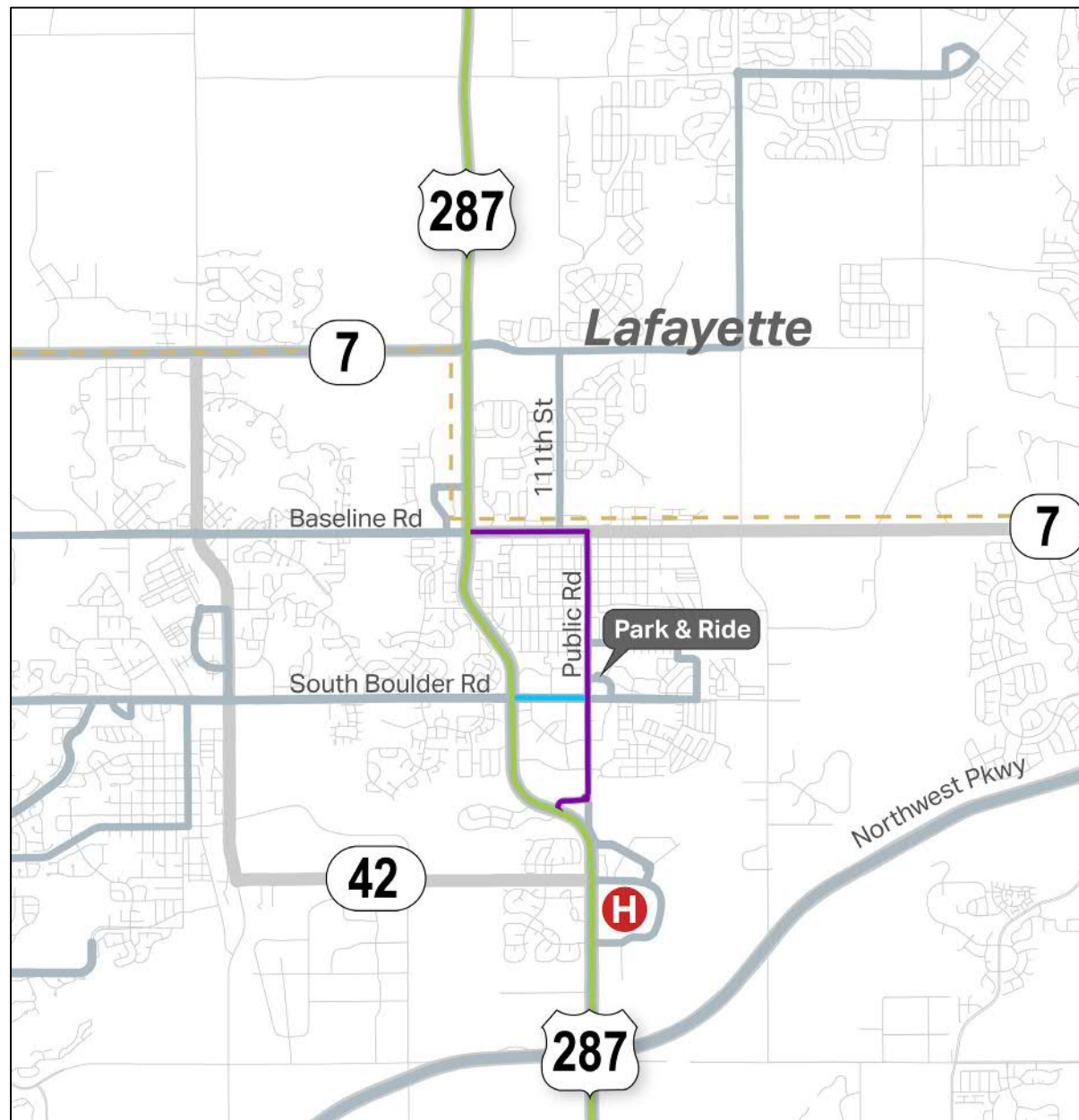
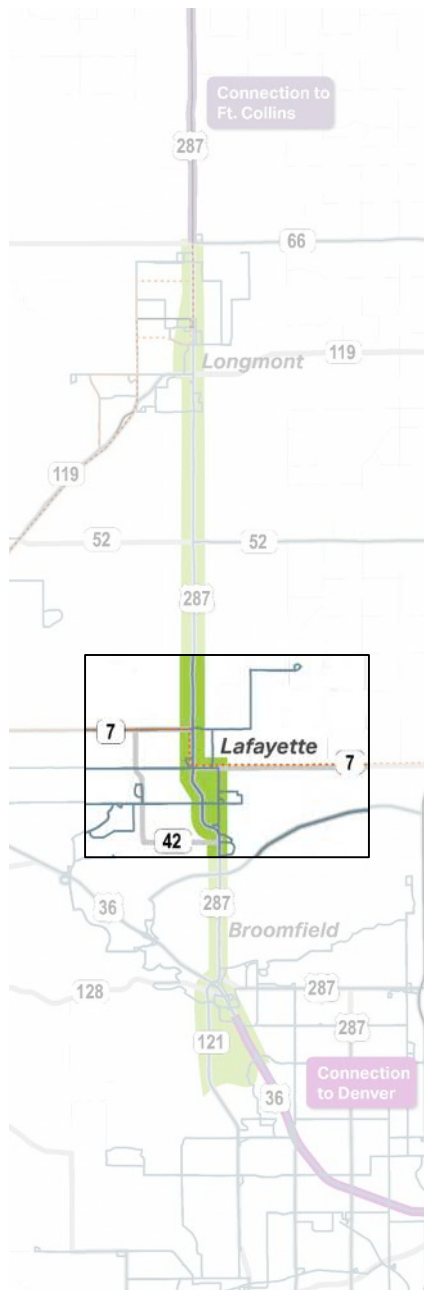
Proposed Route Alternatives

- US 287 Section
- Coffman Street
- Alternative Coffman Route
- Pratt Parkway

Existing and Planned Transit

- RTD Bus Routes
- Transfort FLEX Service
- - - Proposed Transit Routes

- US 287/Main Street
 - Most direct
- Coffman: 3rd to 9th
 - Planned BRT improvements (119 route)
- Options for Access to Coffman
 - South: 1st Ave, 2nd Ave or 3rd Ave
 - North: 9th Ave, 10th Ave, or 11th Ave
- Pratt Pkwy
 - Bypass Main Street
 - Grade separated rail crossing



Legend

Proposed Route Alternatives

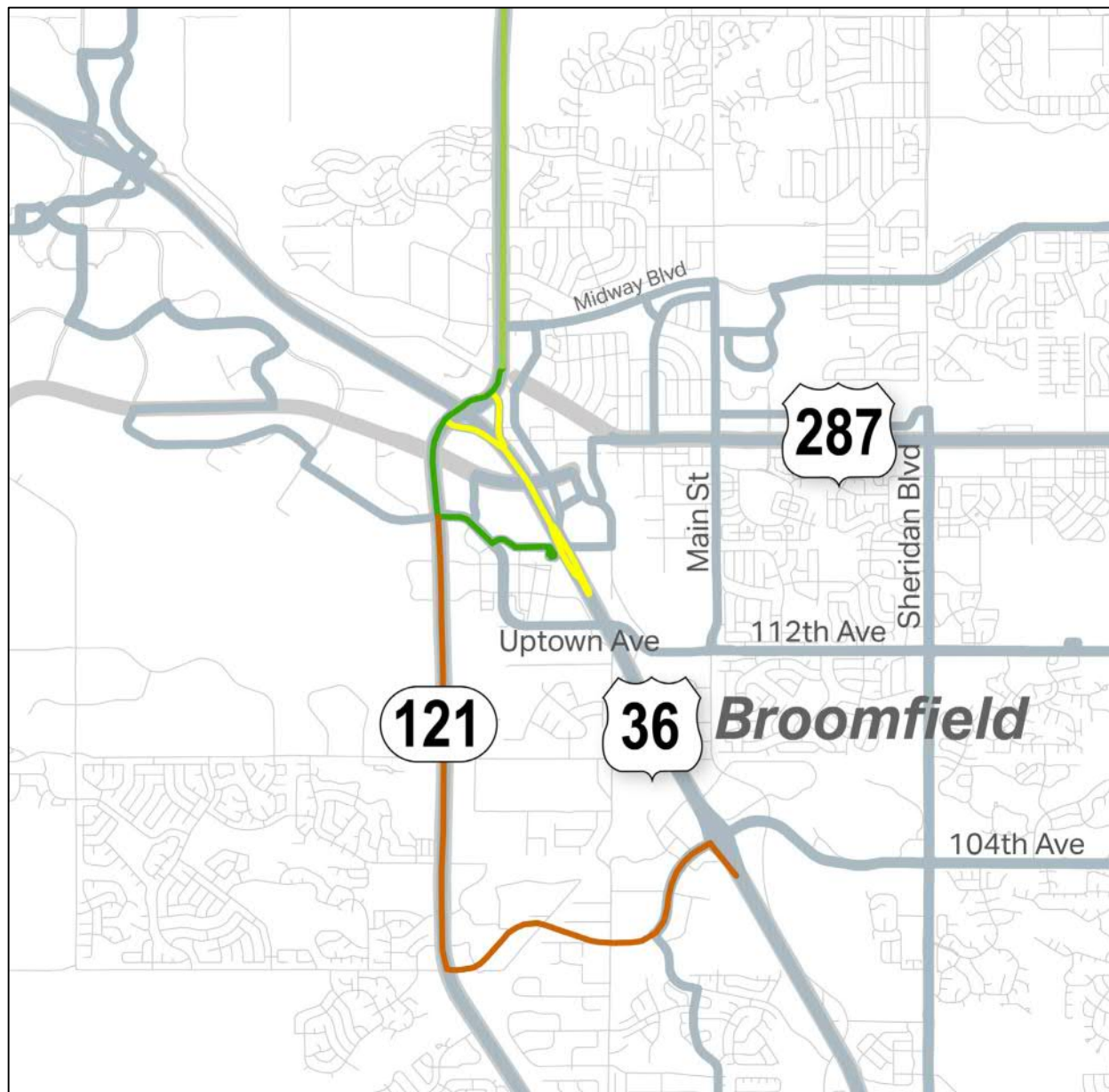
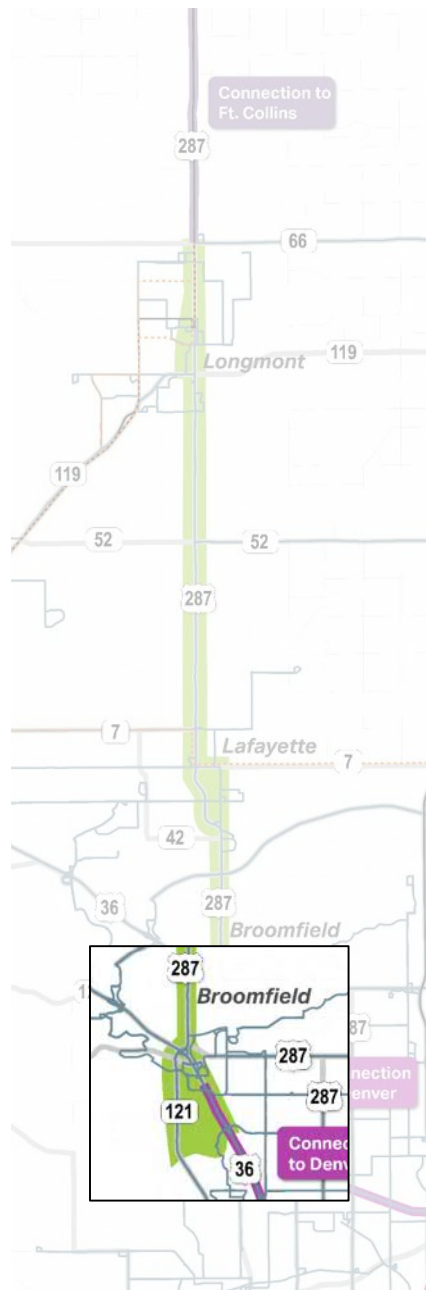
- US 287 Section
- Public Road
- South Boulder Road

Existing and Planned Transit

- RTD Bus Routes
- Transfort FLEX Service
- Proposed Transit Routes

Considerations

- Public Rd has more destinations and access to Park n Ride
- S. Boulder Rd could provide access to some destinations
- US 287 bypass is faster



Legend

Proposed Route Alternatives

- US 287 Section
- US 36 Slip Ramps to Park and Ride
- Wadsworth from Park and Ride to US 36
- Wadsworth to US 36 Park and Ride

Existing and Planned Transit

- RTD Bus Routes
- Transfort FLEX Service
- Proposed Transit Routes

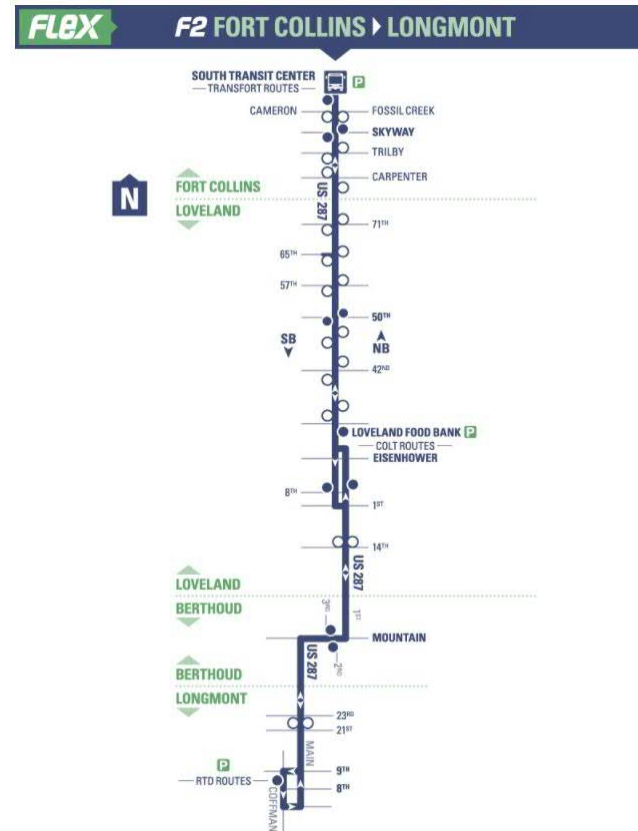
Considerations

- Buses terminating in Broomfield
- Express service continuing to Denver

FORT COLLINS ROUTING

■ Existing Transfort FLEX service on US 287

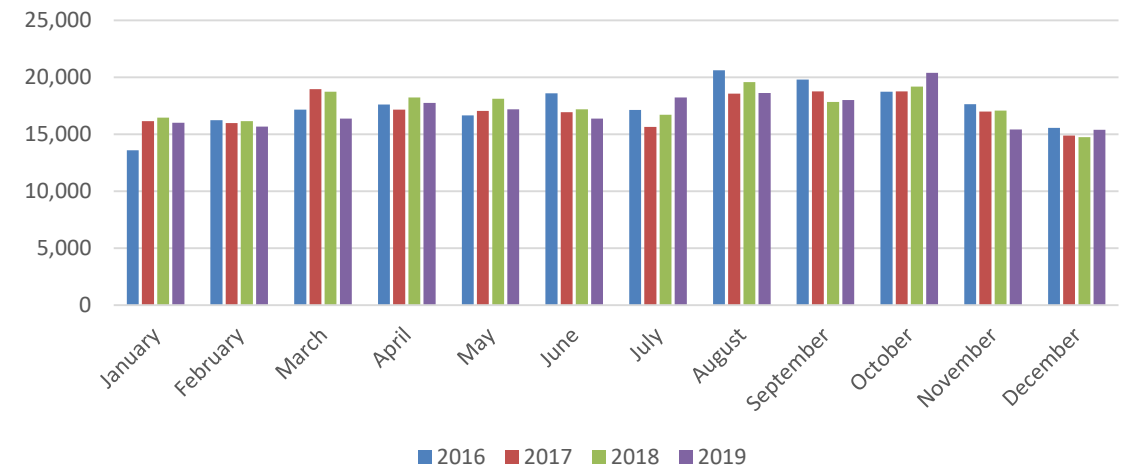
- Longmont
 - Coffman & 8th
 - Mountain & 2nd
- Berthoud
 - Lincoln & 8th
- Loveland
 - Loveland Food Bank
 - US 287 & 50th
- Fort Collins
 - College & Skyway
 - South Transit Center



■ Considerations

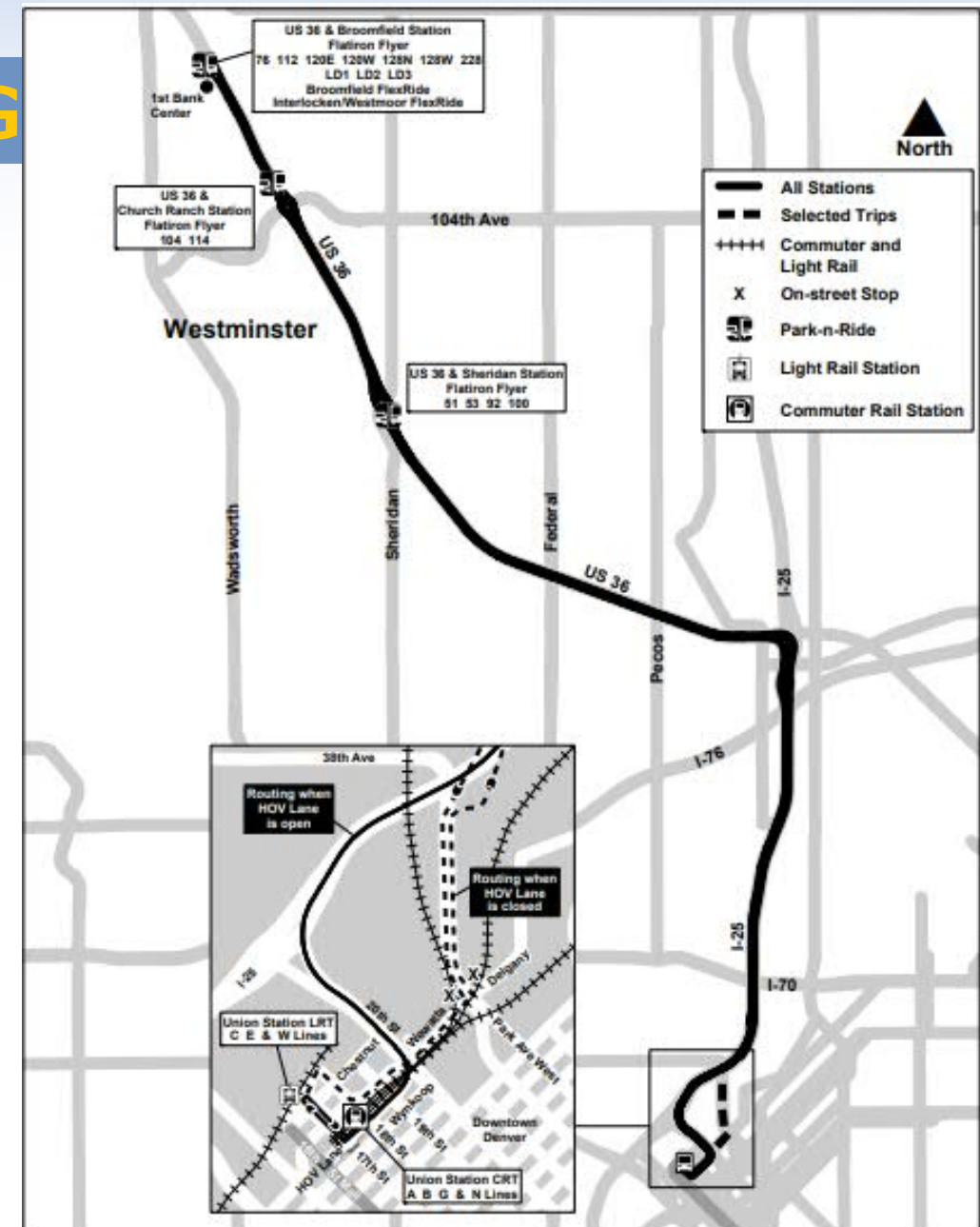
- Stop assumptions
- Service assumptions
- Ideally consistent across alternatives

FLEX Ridership

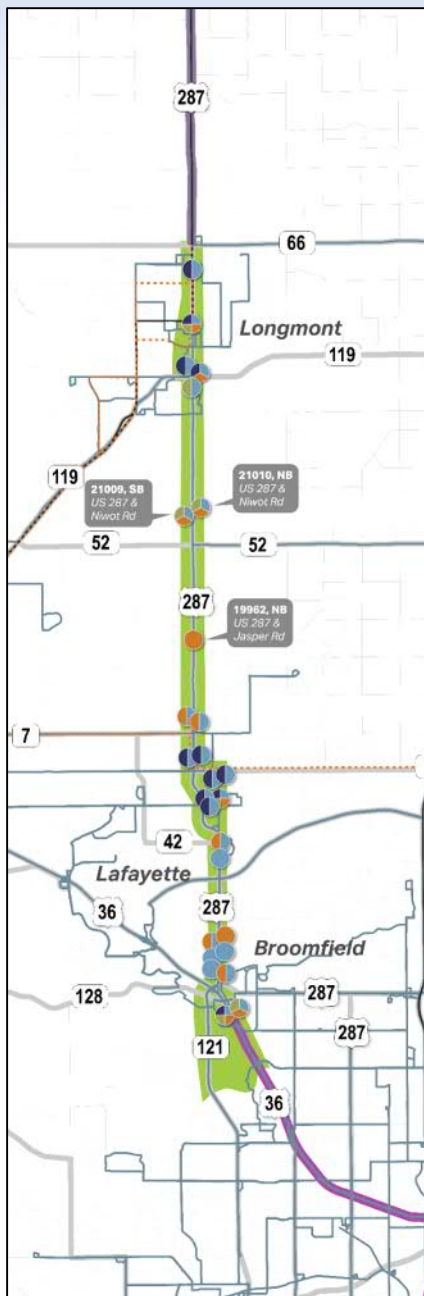


RTD SERVICE TO DENVER ROUTING

- Existing RTD FF3: Denver to Broomfield
 - US 36 & Broomfield Station
 - US 36 & Church Ranch Station
 - US 36 & Sheridan Station
 - Union Station
- Assumptions for US 287 Service
 - Transfer at Broomfield PnR for local connections
 - Express from Broomfield to Denver Union Station
- RTD LX: Longmont to Denver
 - Maintain express route on I-25 or eliminate with BRT implementation



STATION LOCATIONS



Legend

- Proposed US 287 BRT Area
- Top Candidates for Stations
- High Activity Level
- NAMS
- Park and Ride
- Transfer

Existing and Planned Transit

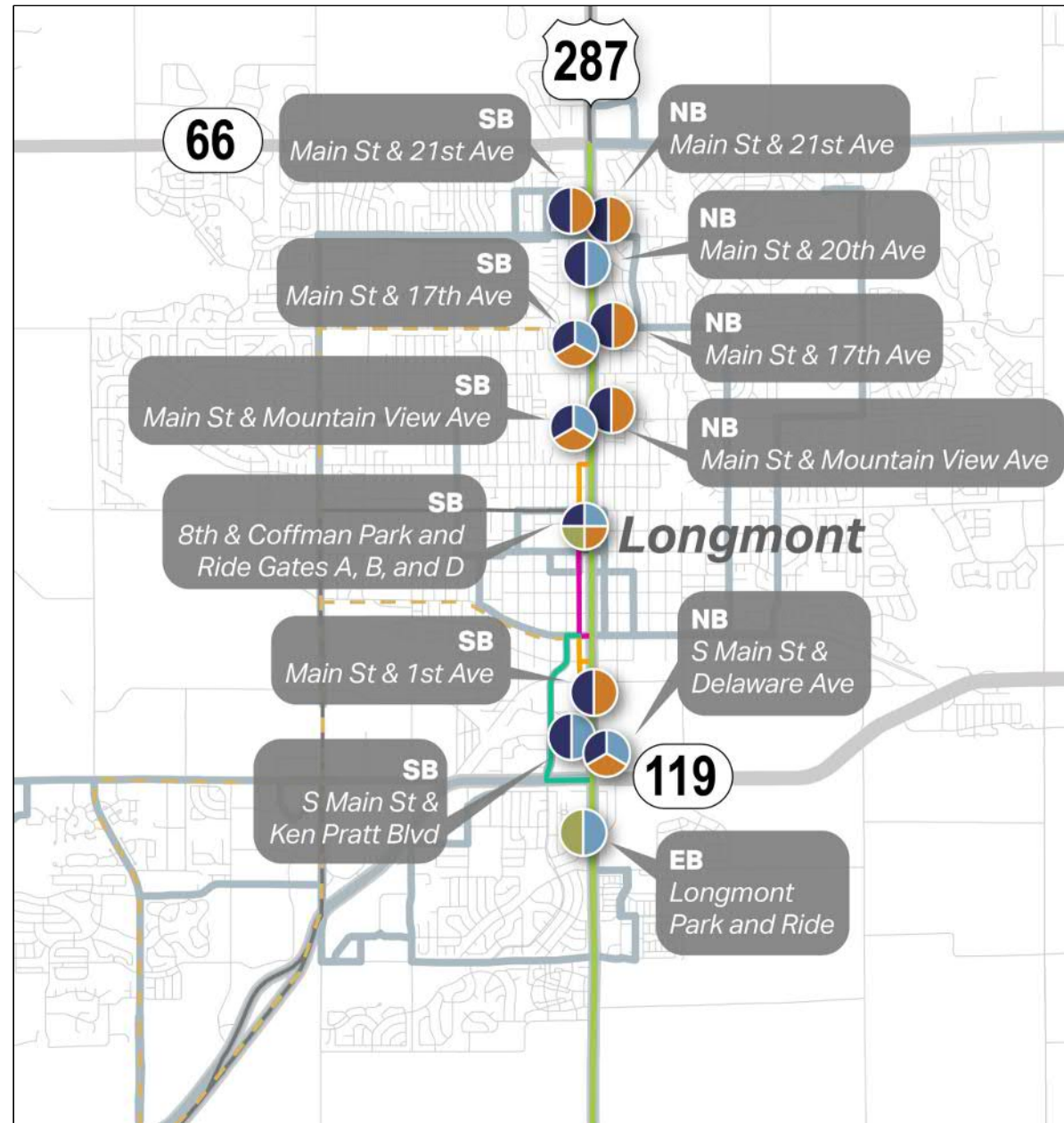
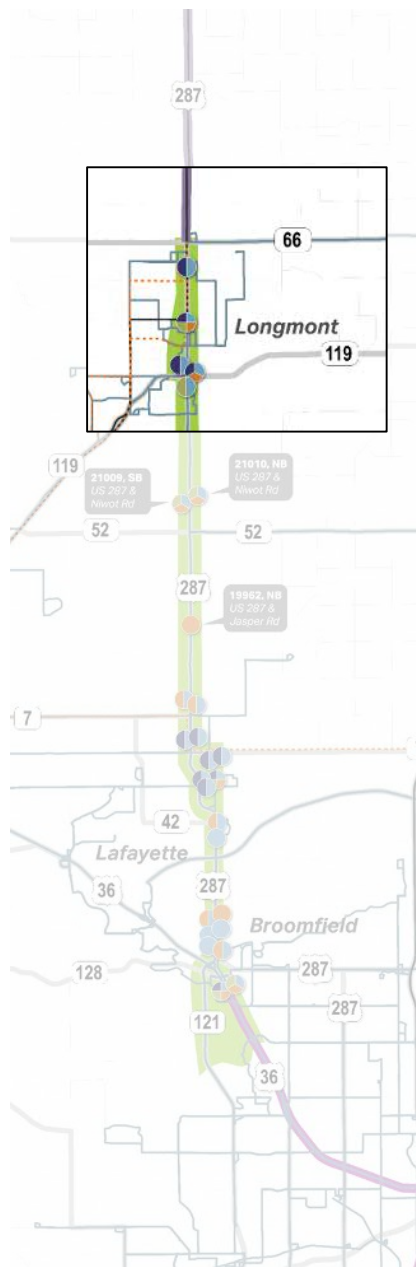
- RTD Bus Routes
- Transfort FLEX Service
- Proposed Transit Routes
- Connection to Ft Collins
- Connection to Denver

Criteria

- High Activity: Ridership
- NAMS: Considered in previous study as major station
- Park and Ride
- Transfer to local service

Other Considerations

- Stop Spacing
- Land Use
- Major Trip Generators
- Equity



Legend

Proposed Route Alternatives

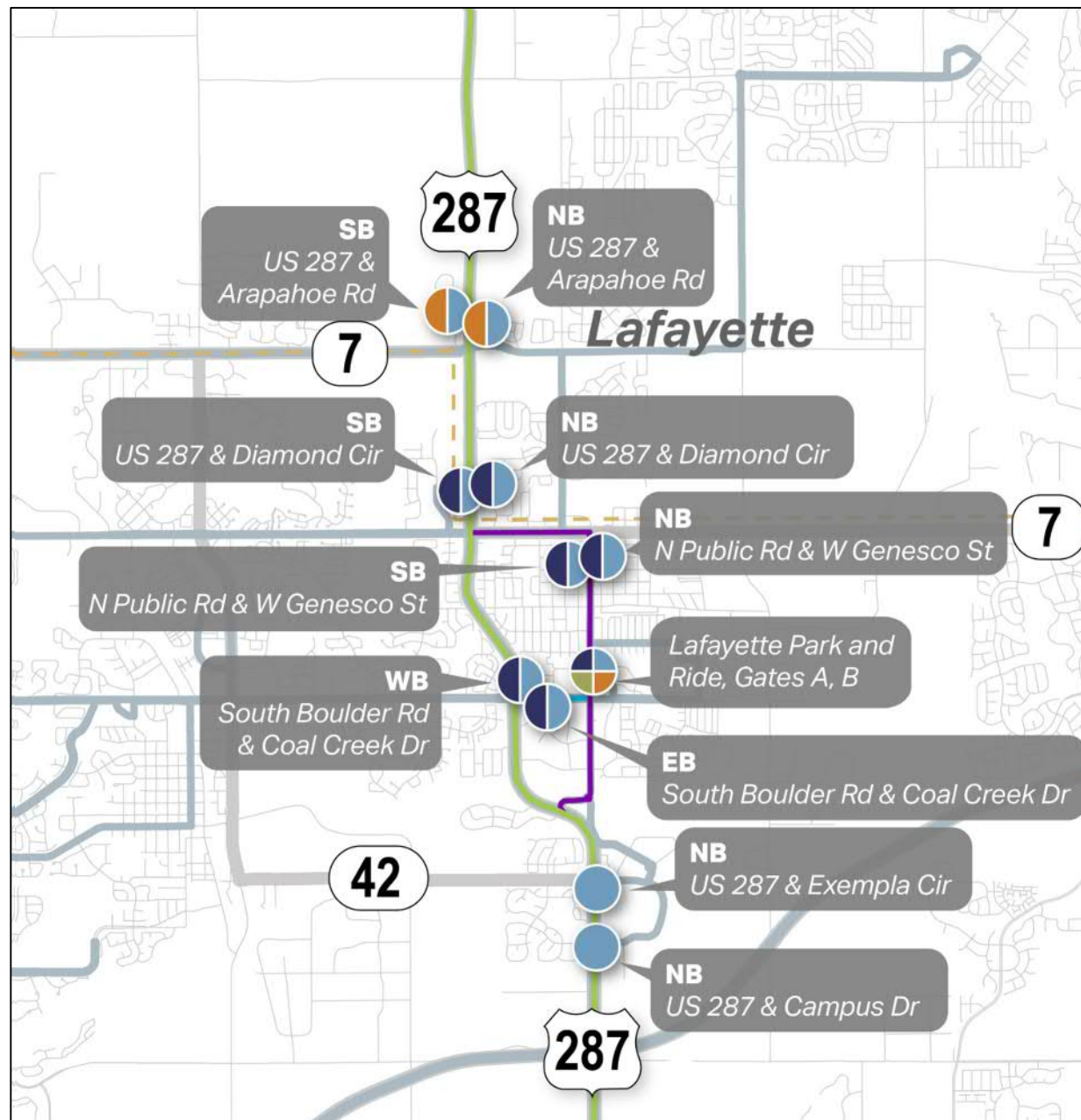
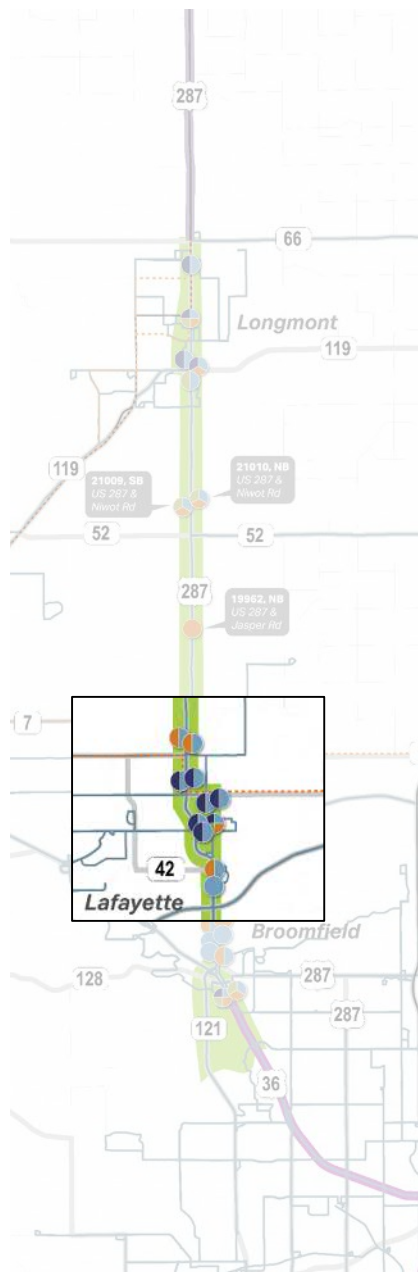
- US 287 Section
- Coffman Street
- Alternative Coffman Route
- Pratt Parkway

Top Candidates for Stations

- Criteria
- High Activity Level
 - NAMS
 - Park and Ride
 - Transfer

Existing and Planned Transit

- RTD Bus Routes
- Transfort FLEX Service
- Proposed Transit Routes



Legend

Proposed Route Alternatives

US 287 Section

Public Road

South Boulder Road

Top Candidates for Stations

Criteria

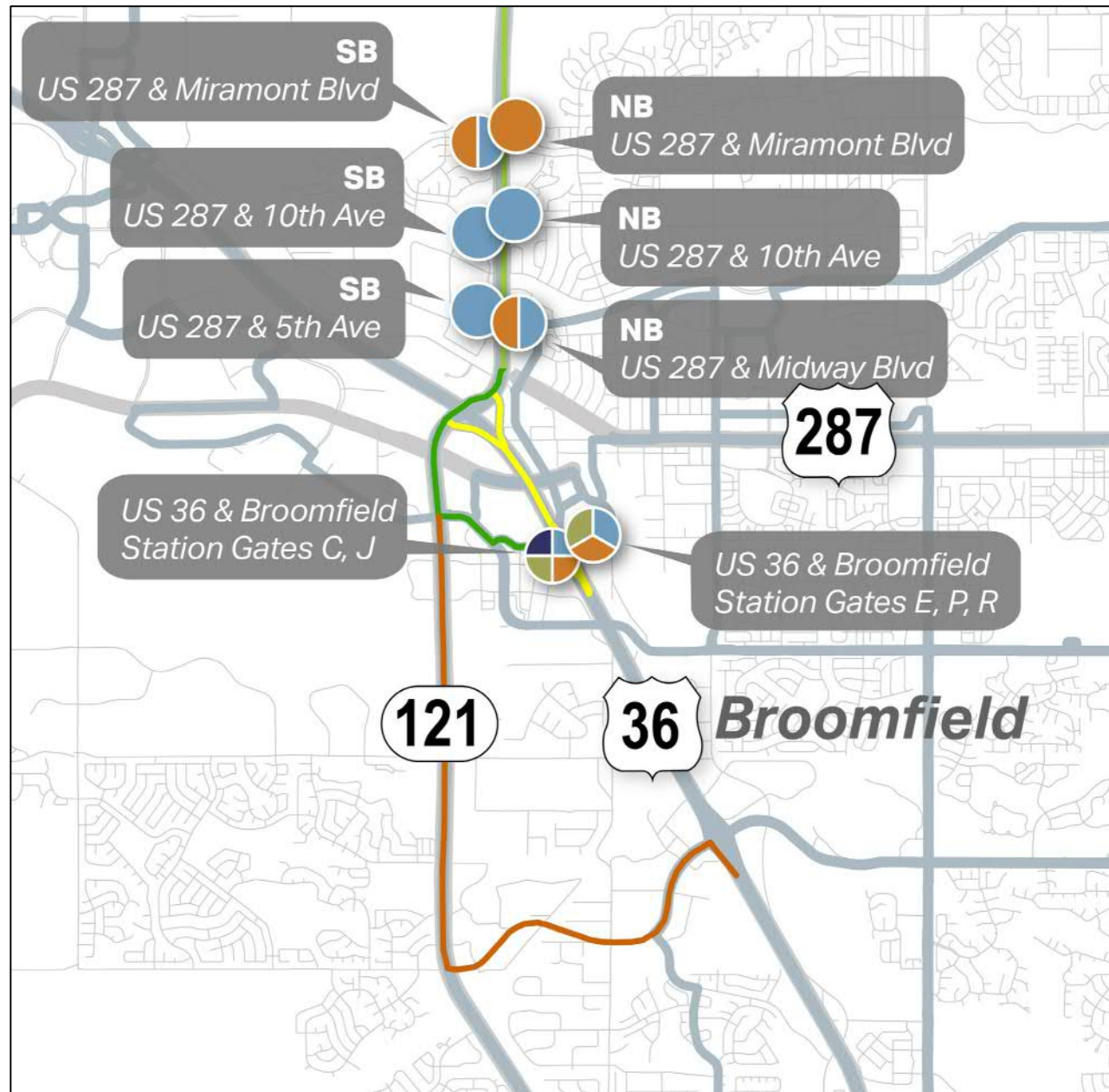
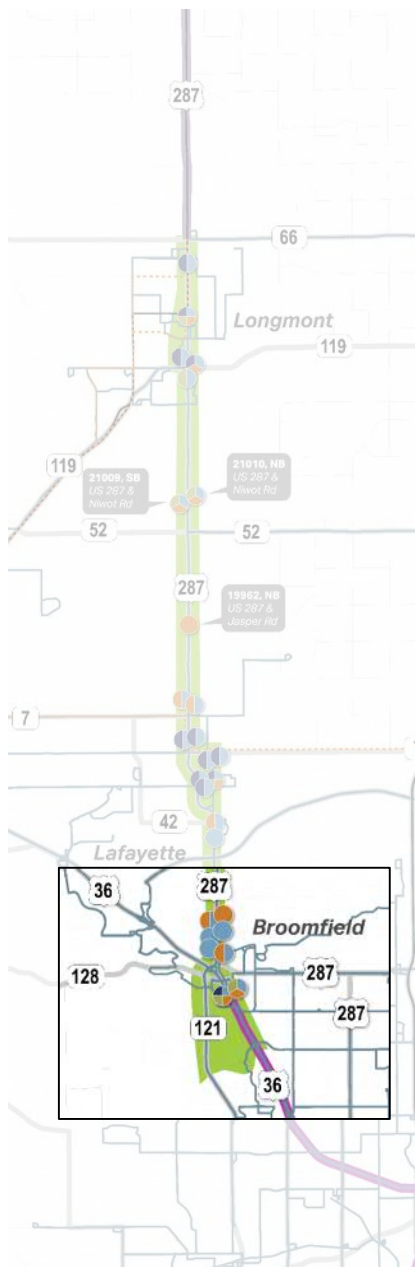
- High Activity Level
- NAMS
- Park and Ride
- Transfer

Existing and Planned Transit

RTD Bus Routes

Transfort FLEX Service

Proposed Transit Routes



Legend

Proposed Route Alternatives

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- Wadsworth to US 36 Park and Ride

Top Candidates for Stations

Criteria

- High Activity Level
- NAMS
- Park and Ride
- Transfer

Existing and Planned Transit

- RTD Bus Routes
- Transfort FLEX Service
- Proposed Transit Routes

RURAL STATIONS

Legend

Proposed Route Alternatives

— US 287 Section



Top Candidates for Stations

Criteria

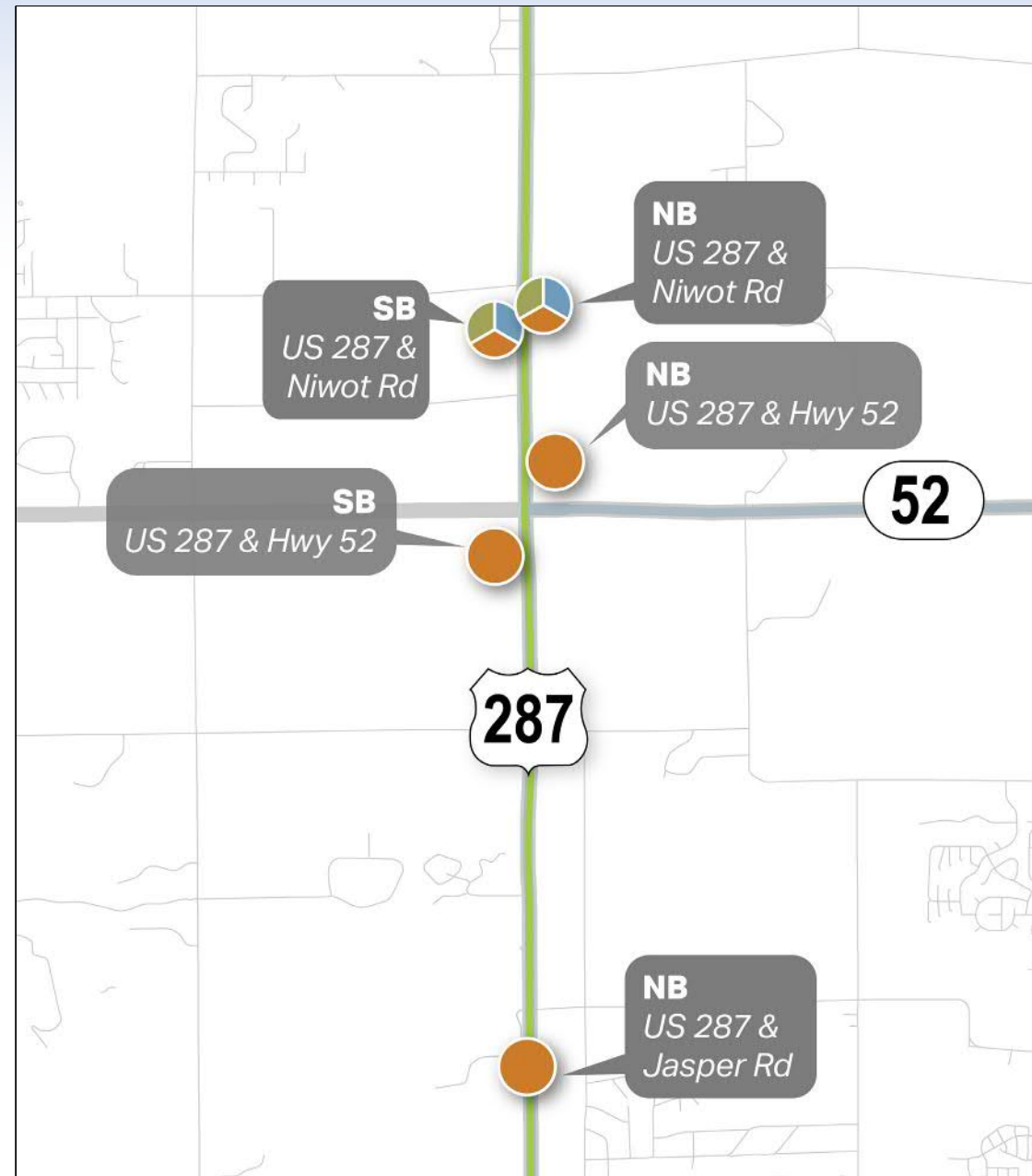
- High Activity Level
- NAMS
- Park and Ride
- Transfer

Existing and Planned Transit

— RTD Bus Routes

— Transfort FLEX Service

— Proposed Transit Routes



GEOGRAPHIC SMALL GROUP DISCUSSION

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 - Alex Hyde-Write, Boulder County
 - Sarah Grant, Broomfield
 - Adam Parks, CDOT
 - Joliette Woodson, Lafayette
 - Sam Taylor, NW Chamber of Commerce
 - **Nick VanderKwaak, AECOM (Moderator)**
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 - Phil Greenwald, Longmont
 - Chris Quinn, RTD
 - Bill Fox, Fox Tuttle
 - **Dayna Wasley, AECOM (Moderator)**
- Group 3: **Rural/Boulder County**
 - Alberto De Los Rios, Boulder County
 - Daniel Marcucci, CDOT
 - David Pasic, Erie
 - Audrey DeBarros, Commuting Solutions
 - Jeff Butts, Boulder County
 - **Steve Tuttle, Fox Tuttle (Moderator)**
- Group 4: **Fort Collins/Denver**
 - Nataly Handlos, RTD
 - Seth Lorson, Fort Collins
 - Tracey MacDonald, FTA
 - Chad Endicott, Boulder County
 - Kathleen Bracke, Boulder County
 - **Ed Parks, AECOM (Moderator)**

- **15 minute** geographic breakout instructions
 - Identify any additional alignments not shown
 - Discuss benefits/drawbacks for each alternative route
 - Identify fatal flaws
 - Identify priority stations

RECAP OF SMALL GROUP DISCUSSION

- Group 1: **Broomfield/Lafayette**
- Group 2: **Longmont**
- Group 3: **Rural**
- Group 4: **Fort Collins/Denver**

GUIDEWAY AND BRT INVESTMENTS



BRT PHYSICAL INVESTMENT AND SERVICE ALTERNATIVES

1. **Baseline Condition:** No change to physical or service elements
2. **Mixed Flow:** Substantial changes to service plan and technology but operate in mixed traffic
3. **Bus On Shoulder:** Buses run in mixed traffic but utilize shoulders during peak congested times
4. **Dedicated BRT Guideway in Side Lanes:** Service, vehicular, and technology improvements in a curbside lane
5. **Dedicated BRT Guideway in Center:** Operates in a center running (rather than side-running) lane

BASELINE CONDITION: NIWOT RD & US 287



- Park n Ride
- Existing NB and SB bus stops both sides of road
- Intersection area shown is wider than roadway to north and south (84')

Google Earth



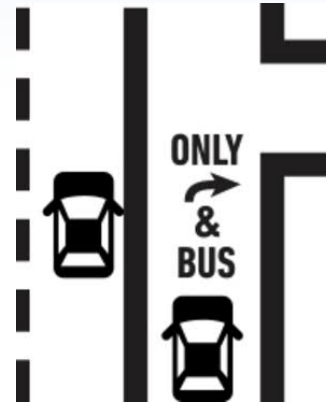
Bus Rapid Transit
Feasibility Study



MIXED FLOW AND BUS ON SHOULDER

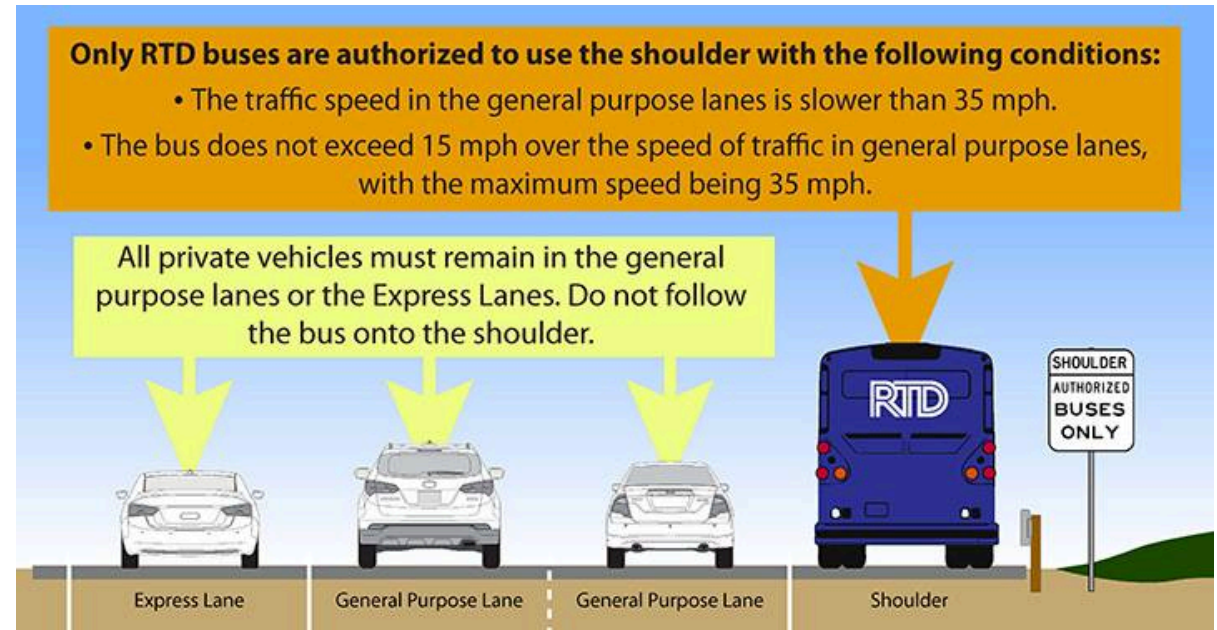
■ Mixed Flow

- BAT lanes when space available
- Intersection Improvements such as queue jumps or Transit Signal Priority (TSP)



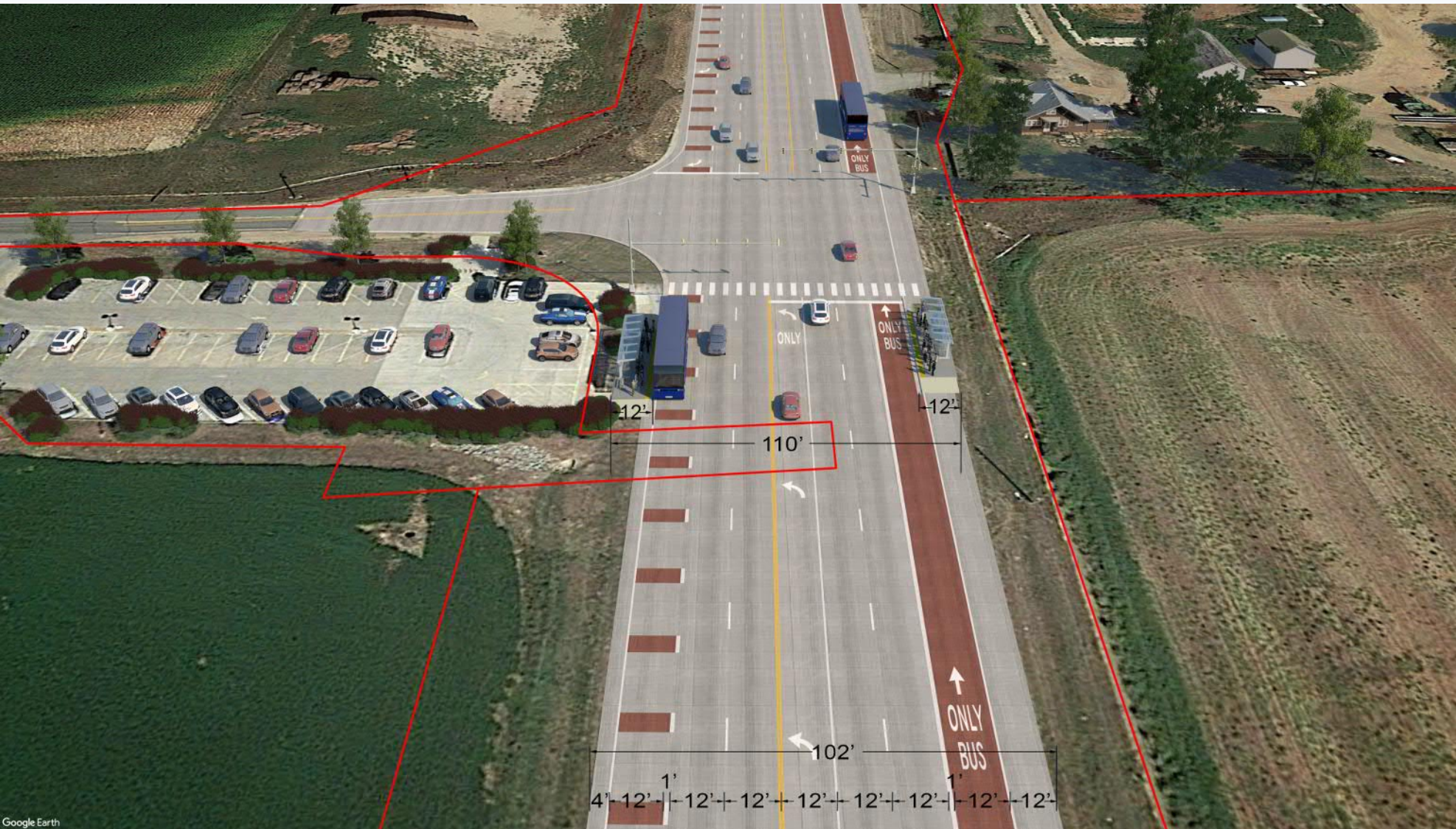
■ Bus On Shoulder

- Similar to mixed flow, but bus allowed to use shoulder during identified times with slower traffic speeds



Flatiron Flyer Bus on Shoulder

BRT IN DEDICATED SIDE LANES CONCEPT



- 12 foot lanes
- Dedicated NB bus lane
- Shared bus SB right turn lane

Google Earth

BRT IN DEDICATED SIDE LANES (NARROWED LANES)

- 11 foot lanes
- Could stay within existing pavement



Google Earth



Bus Rapid Transit
Feasibility Study



BRT GUIDEWAY IN CENTER CONCEPT



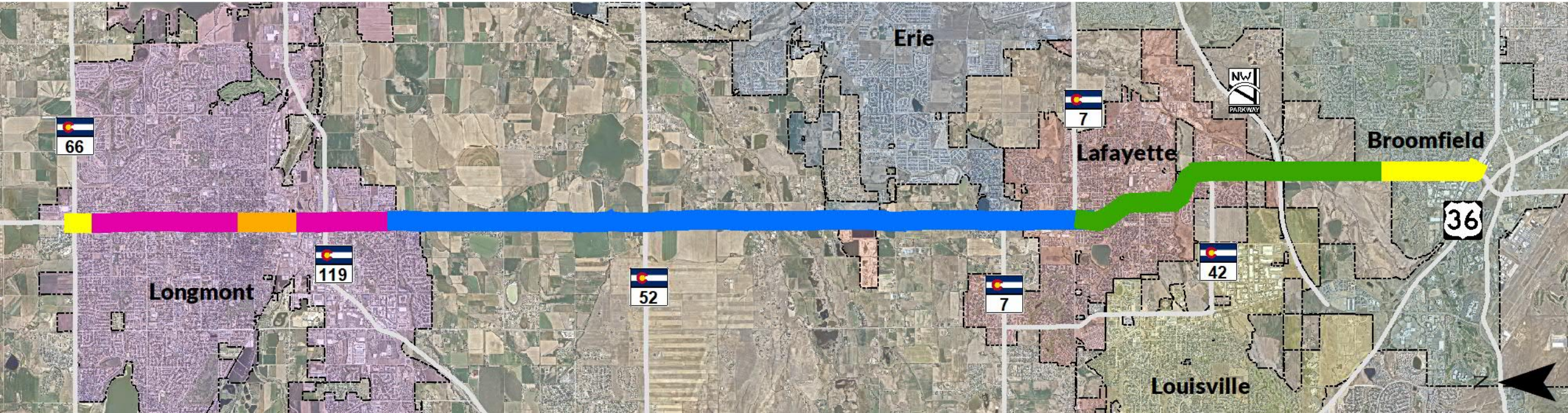
- 12 foot center running dedicated bus lanes
- Wider footprint at intersection/station
- Significant investment

Google Earth

ADDITIONAL LOCATIONS

1 Physical Median, Sidewalks; 1.4 Miles

2 Two-Way Turn Lane, Sidewalks; 3.5 Miles



3 Physical Median, Sidewalks ,On-Street Parking; 0.8 Mile

5 Physical Median, Shoulder; 4.6 Miles

4 Two-Way Turn Lane, Shoulder; 9.6 Miles

KEY CONSIDERATIONS FOR DISCUSSION

- Dimensions
 - Bus lane widths and buffers
 - Turning lane width
 - Acceleration and deceleration lanes
 - Shoulders
 - Medians
- Side running versus center running
 - Cost of investment versus operational improvement
 - Ease of use
 - Multimodal considerations
 - Transfers
- Modeling Assumptions
 - How do bikes load?
 - Offboard fare collection (impacts dwell time)
 - Loading all doors
 - Near level boarding
 - Bus stopping in lane or out of lane?
 - End of line operator facilities needed?

NEXT STEPS

- US 287 Coalition – Commuting Solutions TBD (before Public Meeting #2)
- Public Meeting #2 – Tentatively Week of April 5
 - Virtual Zoom meeting: 20 minutes presentation with Q&A via chat (English only)
 - Follow up survey under development
- Community Conversations (on-going)
- Engagement Round #3 - Summer (June)
 - SWG Meeting #3: Confirmation and Evaluation of Alternatives and Station Area Toolkit
 - Public Meeting #3: Presentation of Alternatives and Station Area Toolkit
- Feasibility Study Complete – August 2021
 - SWG #4: Comment review of Draft Document

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DISCUSSION + QUESTIONS

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