



SH 119 BRT

Draft Purpose and Need

May 11, 2018

THE PURPOSE OF THE SH 119 BRT PROJECT IS TO:

The purpose of the SH 119 Bus Rapid Transit (BRT) project is to optimize regional connectivity and mobility between and within Boulder and Longmont by providing multimodal improvements that result in faster and more reliable transit travel in accordance with the Northwest Area Mobility Study (RTD, 2014). Specifically, the multimodal improvements include implementation of BRT service between Boulder and Longmont, improved local bus connections, and improved pedestrian and bicycle connections in response to the identified needs for these improvements.

The key is to optimize the BRT service in terms of reliability and travel time savings, along with the local bus service connections and improved pedestrian/bicycle access, to attract the highest number of transit riders. This will be a guiding principle in the development of real BRT service in the SH 119 corridor.

THE NEEDS OF THE PROJECT ARE:

1. Address future travel demand in the SH 119 corridor with multimodal improvements, including first and last mile connectivity;
2. Optimize transit services, connections, and ridership on the SH 119 corridor between and within Boulder and Longmont;
3. Reduce transit travel time and increase travel time reliability; and
4. Advance the recommendation from the 2014 Northwest Area Mobility Study (NAMS) to provide efficient BRT service between and within the cities of Boulder and Longmont.

1. Address future travel demand in the SH 119 corridor with multimodal improvements that increase person throughput, including first and last mile connectivity.

Travel demand is forecasted to rise over time between and within Boulder and Longmont on the SH 119 corridor, which will result in increased travel times and reduced reliability, particularly during peak periods. Boulder and Longmont are approximately 17 miles apart, with SH 119 serving as their primary roadway connection. SH 119 carries passenger vehicles, buses, bikes on shoulder, service vehicles and trucks between the two municipalities, as well as providing connections further to the east and west. The annual average daily traffic (AADT) on segments of SH 119 between Boulder and Longmont is 45,000 vehicles, which is expected to



increase to 56,000 vehicles by 2040 (CDOT Online Transportation Information System, Station ID 104352, 2016). The increased travel demand will contribute to congestion and delay for all persons when traveling between and within Boulder and Longmont.

SH 119 is an important route for commuters who experience heavier volumes during the morning and evening peak periods. The morning peak period is defined as 6:00 AM to 10:00 AM and the afternoon peak period is defined as 3:00 PM to 6:00 PM. As household and employment density increases in both Boulder and Longmont between the years 2015 and 2040, travel demand is also forecasted to grow. The number of households is expected to increase throughout the study area, which includes both cities and the segment of SH 119 between them. These increases are most pronounced in the downtown area of Boulder as well as to the east and west of downtown Longmont. The highest growth areas are forecasted to increase in households ranging from over 1,000 to 1,830 households by 2040%, although the majority of growth ranges from approximately 32% to 106% (Figures 1-3).

Similarly, the number and density of employees is projected to increase between 2015 and 2040 in both cities. The highest areas of increase range from over 1,000 to 2,215 additional employees by 2040. The areas with the largest increases are located in downtown Boulder, east Boulder in association with the expansion of the University of Colorado East Campus, adjacent to SH 119 near 63rd Street, west of downtown Longmont, and east of downtown Longmont (Figures 4-6).

Directly related to this increase in household and employee quantity and density, an overall 25% growth in the number of vehicular trips on SH 119 between and within Boulder and Longmont is forecasted by 2040. The areas projected to have the greatest increase in travel demand correlate to those projected to experience the highest growth in households and/or employees. In order to increase person throughput, multimodal improvements along SH 119 are needed to accommodate the greater anticipated travel demand.

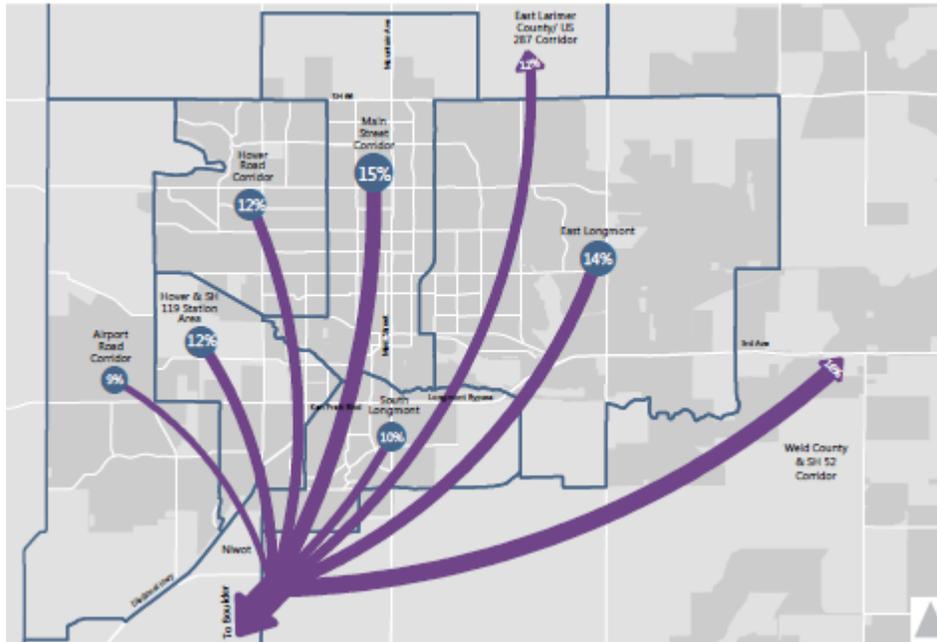
It is important to note that the two cities connecting the SH 119 corridor generate many different trip pairs between many different origins and destinations, as shown in Figure 7 which displays Streetlight data in terms of travel patterns between and within the two cities. As shown, the trip patterns are many-to-many, which encourages private automobile usage for the greatest flexibility. Serving these types of trip patterns with fixed route transit is challenging, and no single transit route can satisfy all of the trip demands efficiently, nor with one-seat rides, and still be considered BRT. Consequently, a combination of line haul service and local connecting services are needed, and therefore, some transfers will be required. In addition, improved pedestrian and bicycle connections will be needed.

The intent of BRT service is to cost effectively provide the largest number of direct, one-seat rides between the primary origin/destination pairs, and to serve as many additional trips as possible with efficient and timely local bus connections as well as good pedestrian/bicycle access to stations. The key is to optimize the BRT service in terms of reliability and travel time,

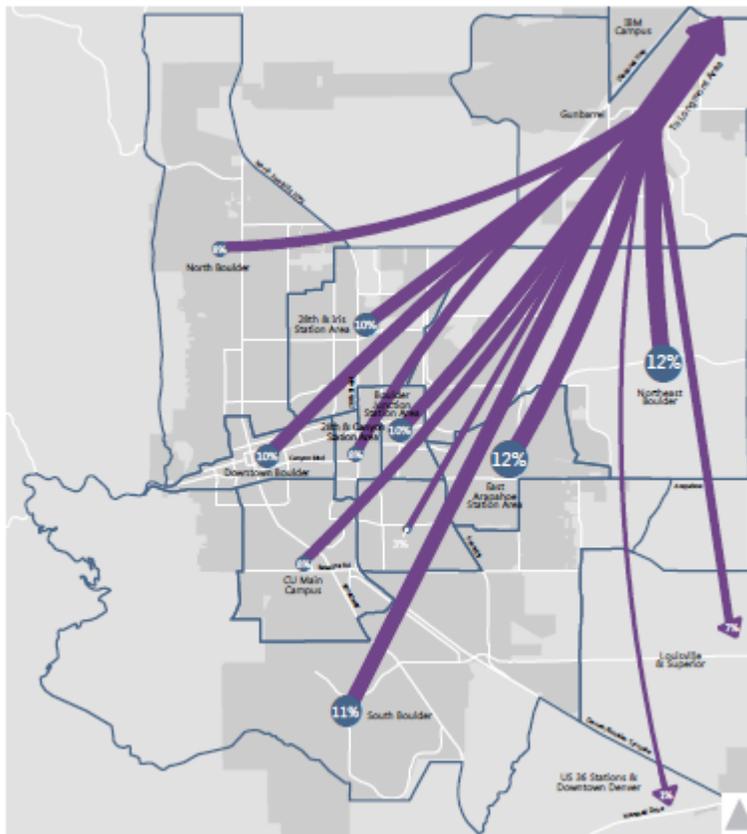


along with the local bus service connections, to attract the highest number of transit trips. This will be a guiding principle in the development of BRT service in the SH 119 corridor.

Another important aspect of BRT development in the SH 119 corridor is the morning and afternoon directional split of travel movements. Given the large residential base in Longmont and the large employment base in Boulder, there is a 60% southbound / 40% northbound split of traffic during the AM peak period, and there is a 55% northbound / 45% southbound split of traffic during the PM peak period. If the directional splits were closer to 65% / 35% during both peak periods, it might be possible to consider reversible dedicated BRT lanes as a viable alternative in the corridor, similar to the reversible managed lanes along I-25 to/from downtown Denver. But given conditions in the corridor, it is likely that directional lanes to speed BRT operations will be needed.



Streetlight Data Distribution of Trips in Longmont



Streetlight Data Distribution of Trips in Boulder



2. Optimize transit services, connections, and ridership on the SH 119 corridor between and within Boulder and Longmont.

The Regional Transportation District (RTD) operates the J and the BOLT routes, while Transfort operates the FLEX bus route between Fort Collins, Loveland, Boulder, and Longmont, all of which utilize SH 119 for a portion of the route. Currently, the average weekday ridership for the J and BOLT is 1,430 and 230, respectively (RTD, 2017). The J Route provides bus service between 18th Street and Euclid Avenue (University of Colorado, Boulder’s main campus) and the Hover Street/Boston Avenue intersection in Longmont. There are 30+ stops along this route. The BOLT bus route provides bus service between Downtown Boulder and 23rd/Main Street in Longmont, with 50+ stops between these destinations. Average weekday boardings for the FLEX route total 830, with approximately 19% (160 boardings) in Longmont and Boulder. On select BRT corridors across the U.S., average weekday ridership ranges from 6,000 up to 40,000 riders per day (Figure 8). Congestion throughout the SH 119 corridor, particularly at key intersections such as Niwot Road, SH 52, 63rd Street, and Jay Road, results in delays and increased travel times, which ultimately reduce transit reliability. Additionally, the high number of existing transit stops combined with constrained roadway capacity, particularly on city streets within Boulder and Longmont, also contribute to reduced transit reliability and increased travel time.

To address the lack of multimodal connectivity, including local transit connections, pedestrians and bicyclists, in the SH 119 corridor between and within Boulder and Longmont, the first and last mile connections are evaluated. The first and last mile of accessing transit service, which refers to how people get to/from the bus stations, can be a challenge that may discourage potential transit riders. Currently the J, BOLT, and FLEX bus routes operate on SH 119 along with passenger vehicles and trucks; bicyclists utilize the outside shoulders of SH 119, but there are only limited bike lanes on other roadways that connect to the SH 119 corridor. While the buses in operation are equipped with a limited number of bicycle racks, there are no bicycle lockers or enhanced amenities for riders at most stops in the SH 119 corridor. Within both cities there are good networks for connecting pedestrians and bicyclists with transit (e.g., sidewalks and bike lanes), but this infrastructure is lacking along SH 119.

3. Reduce transit travel time and increase travel time reliability.

Travel times are projected to increase, and the reliability of trip times is projected to decrease over time. There are two intersections under evaluation that currently operate at a Level of Service (LOS) E or F, meaning an average vehicle (and thus, all the passengers in those vehicles) experiences congestion and delay of 55 seconds or greater at the intersection, during at least one peak period (CDOT, 2017). The LOS results for northbound and southbound general-purpose traffic during the peak hours are shown on the next page in Table 1.



Table 1. LOS and Seconds of Delay by Primary Transit Movement for Existing Vehicular Traffic along SH 119*/**

Intersecting Roadway	Northbound AM LOS (Seconds of Delay)	Northbound PM LOS (Seconds of Delay)	Southbound AM LOS (Seconds of Delay)	Southbound PM LOS (Seconds of Delay)
SH 119/Jay Road	B (15)	C (27)	D (40)	D (43)
SH 119 /63rd Street	B (12)	B (12)	B (15)	D (35)
SH 119/SH 52	D (44)	F (83)	F (76)	D (37)
SH 119/Niwot Road	A (7)	B (15)	F (56)	D (41)
SH 119/Airport Road	Uncontrolled Movement	Uncontrolled Movement	C (23)	B (18)
SH 119/Hover Street	D (42)	D (48)	Uncontrolled Movement	Uncontrolled Movement

**LOS and Delay represents primary movement associated with bus travel. For most intersections, this is the northbound/southbound SH 119 through movement. For the SH 119/Hover Street Intersection, this is the Longmont-bound left turn from SH 119 or Boulder-bound right turn from Hover Street.*

*** The above table includes intersections of interest along the SH 119 corridor. The data for all intersections analyzed can be found in the Alternatives Analysis Report.*

In general, without transit specific operational improvements, poor LOS results in high delay for transit at intersections. The delay in seconds for northbound and southbound transit during the peak hours at select intersections are shown in Table 2. It should be noted that existing queue jumps for transit are at the Jay Road and 63rd Street intersections, resulting in lower bus delay than general traffic delay.

Table 2. Seconds of Delay by Intersection for Buses (Bolt Route)*

Intersecting Roadway	Northbound AM Seconds of Delay	Northbound PM Seconds of Delay	Southbound AM Seconds of Delay	Southbound PM Seconds of Delay
Canyon Boulevard/17 th Street	11	20	11	11
Canyon Boulevard/Folsom Street	33	58	13	10
28 th Street/Valmont Road	9	20	7	5
SH 119/Jay Road	9	3	13	15



Intersecting Roadway	Northbound AM Seconds of Delay	Northbound PM Seconds of Delay	Southbound AM Seconds of Delay	Southbound PM Seconds of Delay
SH 119/63 rd Street	5	4	3	5
SH 119/SH 52	52	13	17	3
SH 119/Niwot Road	10	5	0	0
SH 119/Airport Road	Uncontrolled Movement	Uncontrolled Movement	10	9
SH 119/Hover Street	9	11	22	37
Main Street/3 rd Avenue	6	10	4	6
Main Street/Mountain View Avenue	12	15	2	6
Main Street/17 th Avenue	7	13	5	8

* The above table includes intersections of interest throughout the SH 119 corridor. The data for all intersections analyzed can be found in the Alternatives Analysis Report.

Source: RTD TriTAPT Data from January 2017 Run Board

While poor LOS affects travel time for all modes of travel, it also reduces the reliability of transit, a key determinant in people’s decision to use transit (Transit Center, 2016). The punctuality of buses at each of the stops along the diagonal are shown in Table 3. Punctuality of zero means that a bus consistently arrives on time, positive values mean a bus consistently arrives later than the scheduled arrival time, and negative values mean a bus consistently arrives earlier than the scheduled arrival time. As shown in Table 1, all of the BOLT bus stops shown typically experience delay in bus arrival sometime throughout the day. Along the BOLT route, the southbound direction in the PM peak experiences the least reliable service with a number of stops typically seeing buses leaving the stops over two minutes later than their scheduled time.



Table 3. Punctuality by Stop for Buses (Bolt Route)*

Intersecting Roadway	Northbound AM (min:sec)	Northbound PM (min:sec)	Southbound AM (min:sec)	Southbound PM (min:sec)
Downtown Boulder Station Gate 3	01:22	01:34	-00:25	-00:24
Canyon Boulevard/Folsom Street	00:42	01:13	00:10	01:51
28 th Street/Valmont Road	00:47	02:11	-00:46	02:19
SH 119/Jay Road	01:25	02:23	00:08	02:15
SH 119/63 rd Street	00:14	01:08	00:39	02:52
IBM Corporation	01:01	N/A	N/A	02:14
SH 119/SH 52	02:10	01:52	01:11	02:52
SH 119/Monarch Road	01:21	01:32	00:22	01:33
SH 119/Niwot Road	00:39	01:40	-00:07	02:03
SH 119/Airport Road	-00:36	00:35	00:36	03:24
SH 119/Fordham Street	-01:07	00:04	01:10	03:53
SH 119/Hover Street	-01:19	00:00	01:39	04:23
Main Street/3 rd Street	-00:24	01:06	01:09	01:53
8 th /Coffman PnR Gate C	-00:17	01:41	00:39	00:53
23 rd Avenue/Main Street	-01:04	01:59	00:57	00:46

* The above table includes intersections of interest throughout the SH 119 corridor. The data for all intersections analyzed can be found in the Alternatives Analysis Report.

Source: RTD TriTAPT Data from January 2017 Run Board

Another important aspect of transit usage is the communication of schedules, including potential delays. RTD offers several smart phone applications that allow the transit rider to find nearby stops, departure times, and see real time vehicle locations and arrival estimates. However, there currently is no active system in the SH 119 corridor, such as messaging signs at stops that provide bus arrival/departure times for travelers.

4. Advance the recommendation from the Northwest Area Mobility Study (NAMS).

RTD conducted a study of transit opportunities for the northwest area of the district. Completed and adopted by the RTD Board in June 2014, NAMS prioritized transit routes and improvements for near-term implementation. This collaborative planning study included RTD, the Colorado Department of Transportation (CDOT), the Denver Regional Council of Governments (DRCOG), and the Northwest area stakeholders, which included government representatives and public stakeholders from both Boulder and Longmont.

Implementation of BRT on SH 119 between and within Boulder and Longmont as a cost-effective transit option was identified as a high priority in NAMS. The study determined that BRT would support and increase transit usage along SH 119, increase mobility, improve reliability, and was feasible for implementation in the near-term (5 to 10 years), while funds were raised to support construction of a commuter rail line. The construction of a commuter



rail along the existing Burlington North Santa Fe (BNSF) Railroad corridor, which parallels SH 119, is part of the FasTracks Program that was established in 2004 by voter approval to expand transit services in RTD's service area. NAMS contained a consensus statement that confirmed a commitment to Northwest Rail as outlined in the FasTracks program and also supported the advancement of the planning and design for SH 119 BRT between and within Boulder and Longmont, which is not part of the FasTracks Program. This consensus agreement serves as direction for RTD to move forward with implementation of SH 119 BRT in the near-term, which will serve to attract additional ridership in the near term and complement the future commuter rail line in the long-term.

CDOT, 2015. SINGLE OCCUPANCY VEHICLE REFERENCE.

CDOT, 2017 AVERAGE ANNUAL TRAFFIC VOLUMES REFERENCE.

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RTD, 2017. RTD TriTAPT Data from January 2017 Run Board

Transit Center, 2016. Who's on Board. Website accessed December 24, 2017. <http://transitcenter.org/publications/whos-on-board-2016/#summary-of-key-findings>

<http://www.rtd-denver.com/mobile.shtml>