SH 119 Multi-Modal Planning and Environmental Linkages Study

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Regional Transportation District

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Appendix A: FHWA Colorado Division Planning Environmental Linkages Questionnaire

Appendix B: SH 119 MMCV PEL Study Corridor Conditions and Environmental Impacts/Mitigation Strategies/Next Steps Report

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- D.1 FTA, FHWA, CDOT, RTD, Local Agencies
- D.2 TAC/PAC
- D.3 Agency Workshops
- D.4 Stakeholder Involvement

Appendix E: SH 119 MMCV PEL Study Funding Plan

ACRONYMS AND ABBREVIATIONS

ADA	Americans with Disabilities Act
AM	morning
APEN	Air Pollution Emission Notice
Ave	Avenue
BAT	business access and transit
Blvd	Boulevard
BMPs	Best Management Practices
BNSF	Burlington Northern and Santa Fe Railway
BOLT	Boulder/Longmont bus route
Boulder	City of Boulder
BRT	Bus Rapid Transit
CatEx	Categorical Exclusion
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CDPS	Colorado Discharge Permit System
CFR	Code of Federal Regulations
CO	carbon monoxide
CPW	Colorado Parks & Wildlife
CU	University of Colorado
DRCOG	Denver Regional Council of Governments
EA	Environmental Assessment
EE	Environmental Evaluation
EJ	Environmental Justice
EPA	US Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FY	fiscal year
HCM	Highway Capacity Manual
ISA	Initial Site Assessment
Longmont	City of Longmont
LOBO	Longmont to Boulder
LOS	Level of Service
LWCF	Land and Water Conservation Fund
MBTA	Migratory Bird Treaty Act
MMCV	Multi-Modal Corridor Vision
MMP	Materials Management Plan
MS4	Multiple Separate Storm Sewer System
MSAT	Mobile Source Air Toxic
NAMS	Northwest Area Mobility Study
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act

ACRONYMS AND ABBREVIATIONS (CONT.)

NRHP	National Register of Historic Places
NWP	Nationwide Permit
O_3	ozone
O&M	operation and maintenance
OAHP	Office of Archaeology and Historic Preservation
OSMP	Open Space and Mountain Parks
PAC	Policy and Advisory Committee
PEL	Planning and Environmental Linkages Study
PIP	Public Involvement Plan
Pkwy	Parkway
PM	evening
PM_{10}	particulate matter
POET-ML	Policy Options Evaluation Tool for Managed Lanes
PRT	Personal Rapid Transit
Rd	Road
REC	recognized environmental concern
ROW	right-of-way
RTD	Regional Transportation District
RTP	Regional Transportation Plan
SB	Senate Bill
sec.	second
SH	State Highway
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
St	Street
SWMP	Stormwater Management Plan
SWQCP	Storm Water Quality Control Permit
TAC	technical advisory committee
TAZ	traffic analysis zone
TIP	Transportation Improvement Program
TSM	Transportation System Management
TSP	transit signal priority
VIA	Visual Impact Assessment
US	United States
USACE	US Army Corps of Engineers
USFWS	US Fish & Wildlife Service
WUS	Waters of the United States

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1. INTRODUCTION

Fast-growing Boulder County is attracting new businesses and residents which will increase congestion on State Highway (SH) 119, which is also referred to as the "Diagonal Highway" between the City of Boulder (Boulder) and the City of Longmont (Longmont). To address growing travel demand and provide improved mobility in the northwest region, the Regional Transportation District (RTD) completed the *Northwest Area Mobility Study* (NAMS) in 2014 (RTD, 2014). NAMS resulted in a prioritized list of mobility improvements, and Bus Rapid Transit (BRT) along SH 119 was identified as a high priority. RTD initiated this study as a National Environmental Policy Act (NEPA) study in the summer of 2017 to implement the NAMS recommendation to optimize regional connectivity and mobility between and within Boulder and Longmont with a goal of providing multi-modal improvements that would result in faster and more reliable travel throughout the SH 119 corridor.

The NAMS recommendation for SH 119 was a single BRT route that was planned to operate in mixed use traffic and use the shoulder of SH 119 as needed. However, with regard to the purposes and needs of the project, RTD clearly stated that "The purposes shall include multi-modal and comprehensive goals from all local agencies along the corridor. Accessibility for all modes including transit, bike, freight, auto, and pedestrian should be discussed to determine the consensus priorities for the corridor." (RTD, 2016). As the project progressed and stakeholders from local, state, and federal agencies were engaged, it was determined that a multi-modal corridor vision (MMCV) would be needed to meet the study's purposes, needs, and goals. During the alternatives' development and evaluation conducted as a part of this PEL Study, numerous BRT routing alternatives were assessed; the route alternatives started with the NAMS alignment and evolved during the study based on traffic data, existing bus route usage, forecasted growth in population and employment and stakeholder input. Section 3 of this document discusses the route alternatives. Additionally, the physical configuration of BRT on SH 119 between the cities was evaluated. The physical configuration options were BRT/bus-on-shoulder, as BRT/queue jump lanes as the SH 52/SH 119 intersection, and BRT/managed lanes.

The MMCV elements identified through and recommended by this study include BRT within and between Boulder and Longmont with the bus operating on managed lanes on SH 119 between the cities (one lane in each direction), 5 Park-n-Rides, and enhancements at 23 stops/stations in and between Boulder and Longmont. Additionally, through the collaborative effort to identify a set of discrete and complementary transportation improvements that would support the implementation of BRT between and within the cities, Boulder identified the need to convert three streets that are also state highways to business and transit (BAT) lanes as well as intersection improvements at two locations. Longmont similarly identified the need to reconstruct Coffman Street between 1st Avenue and 9th Avenue to include center-running BRT dedicated lanes and make intersection improvements at two locations. Further, in response to a strong desire by stakeholders to improve the bicycle connectivity between Boulder and Longmont, CDOT undertook a study to identify an alignment of a separated bikeway in the SH 119 corridor between the cities; bicyclists currently utilize the shoulder

of SH 119 in close proximity to vehicles. The MMCV has consensus from the local, state, and federal stakeholders that its elements should be advanced.

Understanding that distinct projects, with different funding sources and timing, will be undertaken by different agencies in the future in order to fully implement the MMCV, the environmental process shifted from a NEPA study to a Planning and Environmental Linkages (PEL) study. A primary impetus for this shift is that in order to obtain a NEPA Decision Document (which is a federal action accepting/approving the recommendations of the NEPA study), the proposed action(s) or project(s) must be in the fiscally constrained transportation plan. Currently not all MMCV elements are funded; meaning that unfunded elements cannot advance through NEPA studies into design and construction. Further it has been determined that implementing BRT on SH 119 is unlikely to receive funding from the Federal Transit Administration's (FTA) Small Starts Programs. This is based on the application of the FTA's scoring criteria for Small Starts Funding to the BRT element of the MMCV. This means that FTA does not have an action to respond to as part of a NEPA study and associated NEPA decision document. For these reasons, completion of a NEPA study and subsequent decision document is not possible for the full MMCV. Completion of a PEL study provides a basis that can be built upon to implement each MMCV element as funding becomes available; it enables the information and analyses completed as part of this study to be documented to use in future NEPA studies, as appropriate. This study, the *SH 119 Multi-Modal PEL Study,* has been completed in accordance with the Colorado Department of Transportation's (CDOT's) PEL Handbook (CDOT, 2016).

FHWA and CDOT have developed a standard questionnaire to summarize the PEL process and to facilitate the transition from planning to a NEPA study. This questionnaire has been completed as a part of this PEL Study and is attached as Appendix A. It summarizes the information that was analyzed in the SH 119 Multi-Modal PEL Study and identifies issues so a future project team can efficiently move forward through the NEPA phase.

The MMCV elements are listed below in Table 1-1 along with the anticipated level of NEPA study that is expected to be required in order to implement them. The remainder of this report discusses the process through which the BRT-related elements were developed and evaluated, including the Purpose and Need. This report also includes a summary of the anticipated location and magnitude of environmental impacts associated with implementing each MMCV element, potential mitigation strategies, and next steps for the NEPA studies that will likely need to be completed. Additionally, an overview of the stakeholder engagement program conducted during this PEL Study and potential funding scenarios for implementation are included in Sections 6 and 7 of this report.

Table 1-1. MMCV and Anticipated Level of NEPA Study

MMCV Element	Description	Future Level of NEPA Study Anticipated
Park-n-Rides		
63rd St/SH 119	This will be a new Park-n-Ride with the capacity of approximately 100 spaces. It will be located entirely within the SH 119 median.	Programmatic Categorical Exclusion (CatEx)
Niwot Rd/SH 119 (existing)	This is an existing Park-n-Ride located in the SH 119 median with access from Niwot Road; its current capacity is approximately 40 spaces. The proposed improvement will expand and upgrade the Park-n-Ride to approximately 140 spaces.	Programmatic CatEx
1st Ave/Main St (modification to this existing parking lot are a part of RTD's FasTracks Program)	This is an existing Park-n-Ride facility. It is part of RTD's FasTracks Program and includes transit-oriented development and multi-modal connections to the site, including bus service connections in the interim of the future planned Northwest Rail station. The parking structure will be three stories tall and have 375 parking stalls.	Programmatic CatEx
8th Ave/Coffman St (existing)	This is an existing Park-n-Ride located on the west side of Coffman St, south of 8th Ave, with access off Coffman St. There will be no change to the amount of parking spaces, however it will be updated with ticketing kiosks; canopies; route and schedule information; and additional signage.	Programmatic CatEx
Park Ridge Ave/Main St	RTD has an agreement with the property owner to convert an existing parking lot to an RTD Park-n-Ride by 2022. The conceptual plans show that the Park-n-Ride will have about 325 spaces and would not be directly adjacent to Main St but rather access would be provided by a proposed east/west avenue from Main St and another proposed access point on a north/south street connecting to Park Ridge Ave.	If there are no improvements to SH 66 to the north or impact to Main St (which is US 287), a NEPA study will not be required as there will be no federal or state nexus. Should these state highways be affected, a Programmatic CatEx would likely need to be completed.
Stations and Stops	There are both stops and stations within the SH 119 MMCV. Stops are locations where passengers load and unload from buses. Stations perform this function and also have dwell times for the buses. They also typically have limited amenities such as restrooms, ticket counters, and seating. Additionally, some stations are at Park-n-Rides. For the purposes of this document, all stations and stops will be referred to as stations.	Programmatic CatEx(s)

MMCV Element	Description	Future Level of NEPA Study Anticipated
Boulder Stations		
■ CU East - Colorado Ave/Discovery Dr or CU Main - Colorado Ave/18th St (termini will be determined based on CU's update of their transportation plan, which is underway) ■ 30th St/Arapahoe Ave ■ 14th St/Canyon Blvd (Downtown Boulder Station) ■ 19th St/Canyon Blvd ■ 30th St/Colorado Ave ■ 28th St/Canyon Blvd ■ 28th St/Pearl St ■ 30th St/Pearl St (Boulder Junction Transit Center) ■ 28th St/Valmont Rd ■ 28th St/Iris Ave		Programmatic CatEx(s)
Longmont Stations		
■ Hover St/SH 119 (northbound stop only near existing pedestrian underpass) ■ Hover St/Clover Basin Dr ■ Hover St/Nelson Rd ■ Nelson Rd/Airport Rd ■ Airport Rd/Pike Rd ■ 1st Ave/Coffman St ■ 8th Ave/Coffman St (also a Park-n-Ride) ■ Hover St/Mountain View Ave ■ 17th Ave/Main St ■ Park Ridge Ave/Main St (also a Park-n-Ride)		Programmatic CatEx(s)
BRT/Managed Inside Lanes (including BRT, High-Occupancy Vehicles 3+, and tolled vehicles)	This MMCV element would construct a new lane to the inside of SH 119, into the median. The new lane would be used by BRT, cars with three or more passengers, and drivers willing to pay a toll. CDOT is currently completing a Traffic and Revenue Study for SH 119; although results are not yet known, it is assumed that the new lanes would be "congestion priced". This means that the amount of the toll will vary, depending on the level of congestion. Higher tolls will be charged at more congested times of day to serve as a managed lane that operates continuously at free flow conditions.	CatEx, Documented CatEx, or Template EA
Longmont - Coffman St Dedicated BRT Lanes	Longmont plans to reconstruct Coffman St between 1st Ave and 9th Ave to include center-running BRT dedicated lanes.	Programmatic CatEx; this project has received a grant that includes federal funds, triggering the need for a NEPA study.

MMCV Element	Description	Future Level of NEPA Study Anticipated
Boulder Business and Transit (BAT) Lanes		
Iris Ave: 28th St to Foothills Pkwy	Boulder plans to convert one travel lane on each of the streets listed in the column to the left from mixed-use traffic to be BRT only.	Programmatic CatEx; note that 28th St and Canyon Blvd are also part of SH 119 while Foothills Pkwy is also SH 157.
28thSt: Iris Ave to Valmont Rd		
28th St: Pearl St to Canyon Blvd		
BRT queue jump lanes at SH 52/SH 119	The BRT bypass lanes at SH 52/SH 119 would be constructed on SH 119 at the north and southbound approaches of the SH 52 intersection and would address the substantial AM and PM peak period congestion. They are extended intersection queue jump lanes providing buses only a dedicated transit lane to pass traffic queues that can extend over a mile in each direction. In addition to transit riders, the BRT bypass lanes at SH 52/SH 119 also benefit general purpose traffic by removing transit vehicles from the general-purpose lanes. It is unlikely that both the BRT/managed lanes and the BRT bypass lanes at SH52/SH 119 would be built.	Programmatic CatEx
Separated Bikeway Corridor	CDOT is completing a study for the location and design of a separated bikeway corridor that would travel within SH 119 ROW between Boulder and Longmont. Currently bicyclists use the shoulder of SH 119. The recommendations include a 12-foot shared-use path along SH 119 between Foothills Pkwy in Boulder and Hover St in Longmont. CDOT is evaluating alignment alternatives for this future bikeway that could travel on the northwest side, center median, or the southeast side of the corridor. CDOT is addressing connectivity of the shared-use path in the local communities, intersection crossings, and Park-n-Ride/BRT station access.	Programmatic CatEx
Boulder Intersection Improvements	Preliminary traffic analyses indicate that congestion at these intersections is increasing. In addition to the Boulder BAT lanes, there are two intersection improvements planned that will provide right-curb, bus-only left turns. The bus-only left-turns will be coordinated with the existing double-left turn signal phasing to ensure safe operation. Improvements are planned for the 28th St/Iris Ave intersection and the 28th St/Canyon Blvd intersection.	Programmatic CatEx
28th St/Iris Ave		
28th St/Canyon Blvd		
Longmont Intersection Improvements	Longmont is studying potential improvements at two intersections – Hover St/SH 119 and Hover St/Nelson Rd. Further steps, including advanced design and identification of funding, are required to implement	Programmatic CatEx; if there is no federal or CDOT funding for the Hover St/Nelson Rd
Hover St/SH 119		

MMCV Element	Description	Future Level of NEPA Study Anticipated
Hover St/Nelson Rd	these improvements. Improvements will include lane reconfigurations for improved operations, transit signal priority (TSP) for buses, transit lanes, and grade separation.	intersection improvements, a NEPA study will not be required.

1.1 Study Area

SH 119 runs between and within Boulder and Longmont in Boulder County. The SH 119 Multi-Modal PEL Study Area is shown on Figure 1-1; it encompasses the physical boundaries of the MMCV. Figure 1-1 also shows the location of the two BRT routes that are a part of the MMCV as well as the location of the stations, stops, and Park-n-Rides that are a part of the MMCV. For the purposes of the environmental analyses, resource-specific study areas were developed, if appropriate, to capture impacts that could extend outside of the operational ROW. The FHWA defines operational ROW as follows: "Existing operational ROW refers to ROW that has been disturbed for an existing transportation facility or is maintained for a transportation purpose." (FHWA, 2012).

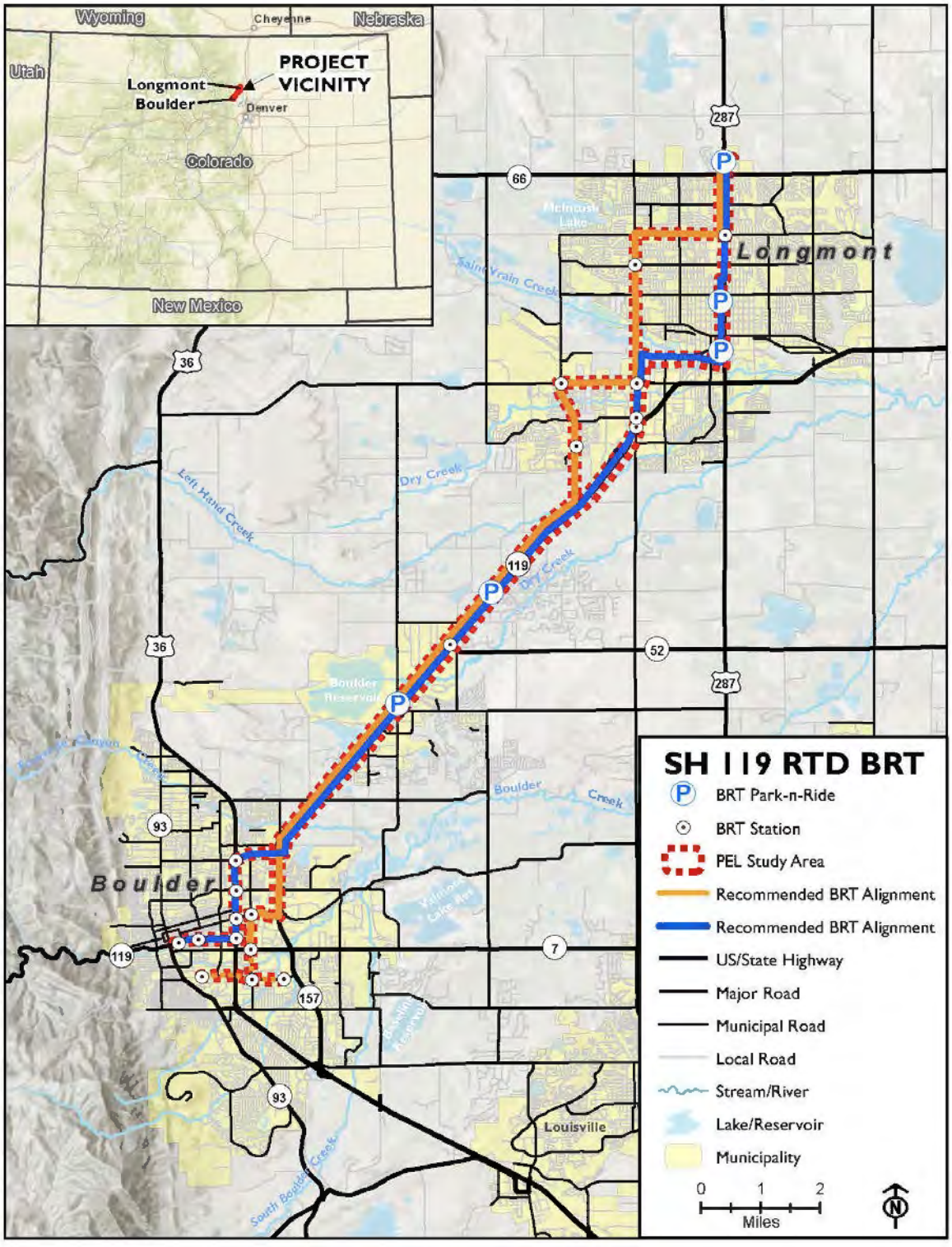


Figure 1-1. SH 119 Multi-Modal PEL Study Area

1.2 Study Process

1.2.1 PREVIOUS STUDIES

RTD established a comprehensive program, known as FasTracks, in 2004 to build 122 miles of new commuter rail and light rail; 18 miles of BRT; 21,000 new parking spaces at light rail and bus stations; and enhanced bus service for easy, convenient bus/rail connections across its eight-county district. This voter-approved program has successfully implemented many aspects of FasTracks including construction of numerous light rail lines; commuter rail between Denver Union Station and Denver International Airport; US 36 BRT; dozens of new Park-n-Rides; thousands of new parking spaces at bus and rail stations; and enhancements to safety, convenience, and transit travel-time information. However, several components have encountered delays due to lack of funding and private ownership by railroad companies of track that RTD would like to utilize as a part of the rail routes.

The Northwest Rail is a component of FasTracks and includes construction of commuter or heavy rail from the City of Westminster to downtown Longmont. RTD does not have monies to complete the study and construction of this rail line in the near term. RTD has coordinated with the Burlington Northern and Santa Fe Railway (BNSF) Railway, owner of the rail corridor and operator of the existing freight service in the corridor, to identify conditions for their further engagement to allow for the necessary rail infrastructure to provide commuter rail service on the BNSF alignment to Longmont. Considering the costs of the proposed project, RTD's current lack of immediately available FasTracks funds, ridership projections, BNSF's conditions, and other challenges within the corridor, the completion of Northwest Rail is considered to be a long-term FasTracks goal. It should be noted that implementation of the MMCV recommended by this SH 119 PEL Study does not preclude future implementation of the Northwest Rail nor would its implementation require FasTracks funding.

RTD began the NAMS in 2013 to collaboratively develop a consensus agreement with local and state agencies on near-term mobility improvements that would not preclude future implementation of Northwest Rail. The NAMS concluded that the construction of BRT on SH 119 is a viable, cost-effective way to increase mobility within the Northwest Area based on two key components. The first of which is technology and capital that enable transit to take priority in heavily traveled corridors. This would demonstrate the interest, demand, and willingness of area residents to consider alternative modes of transportation other than private vehicles to access employment, recreation, and other needs. The second is that more frequent bus service would establish reliable, timely service which provide users with confidence and certainty when choosing this mode of travel. The study recommended that all six arterial BRT routes examined as a part of NAMS be implemented. The consensus reached during the NAMS process identified SH 119 corridor as the top priority corridor to advance, requiring more detailed planning and environmental review.

NAMS recommended a SH 119 BRT route starting at the Downtown Boulder Station that would run eastward on Canyon Boulevard, north on Folsom Street than east on Pearl Parkway to Foothills Parkway, and north to SH 119. The recommended route would follow SH 119 through Boulder County between the cities of Boulder and Longmont. In Longmont, the proposed NAMS

route would travel on Main Street between SH 119 Boulevard and 1st Avenue and then on Coffman Street between 1st and 8th Avenues before turning east on Main Street to its northern terminus at Park Ridge Avenue/Main Street (Figure 1-2).

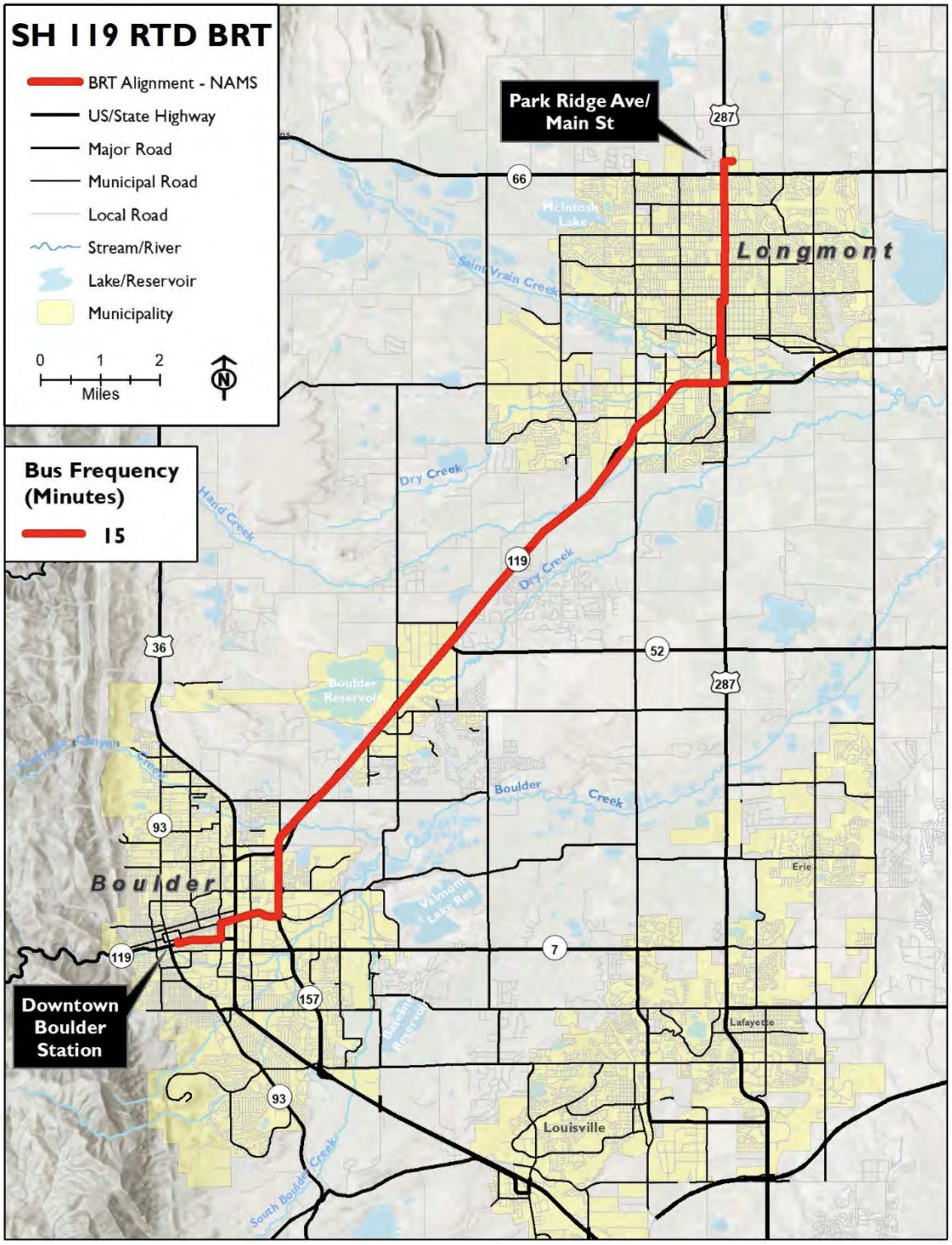


Figure 1-2. NAMS Recommendation for SH 119 BRT Route

1.2.2 SH 119 MULTI-MODAL CORRIDOR VISION STUDY PROCESS

As discussed above, this PEL Study was started as a NEPA study with the anticipation of completing either an Environmental Assessment (EA), Environmental Evaluation (EE), or CatEx. As such, the amount of technical analyses and level of detail completed as a part of this PEL Study is greater than what is typically required for a PEL Study. The process included development of the purposes and needs; an alternatives analysis and refinement; preliminary engineering; environmental analyses; and financial analysis/phased funding strategy for project implementation. Extensive stakeholder and public involvement have been conducted throughout the iterative, interactive process; this involvement and collaboration has resulted in the identification and recommendation of the MMCV.

Figure 1-3 below depicts the PEL Study process pathway activities that include the alternatives evaluation, environmental process, and preliminary engineering work.

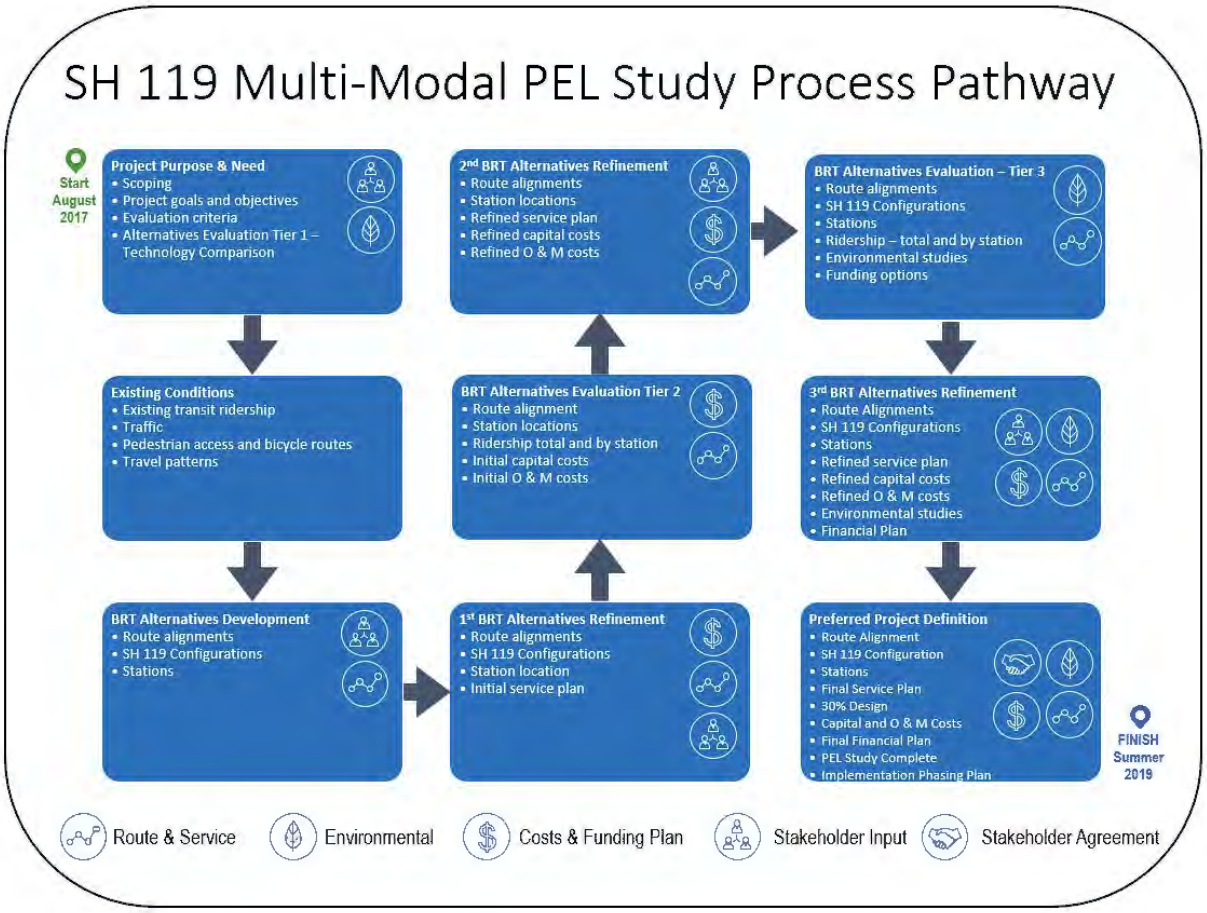


Figure 1-3. SH 119 Multi-Modal Corridor Vision PEL Study Process

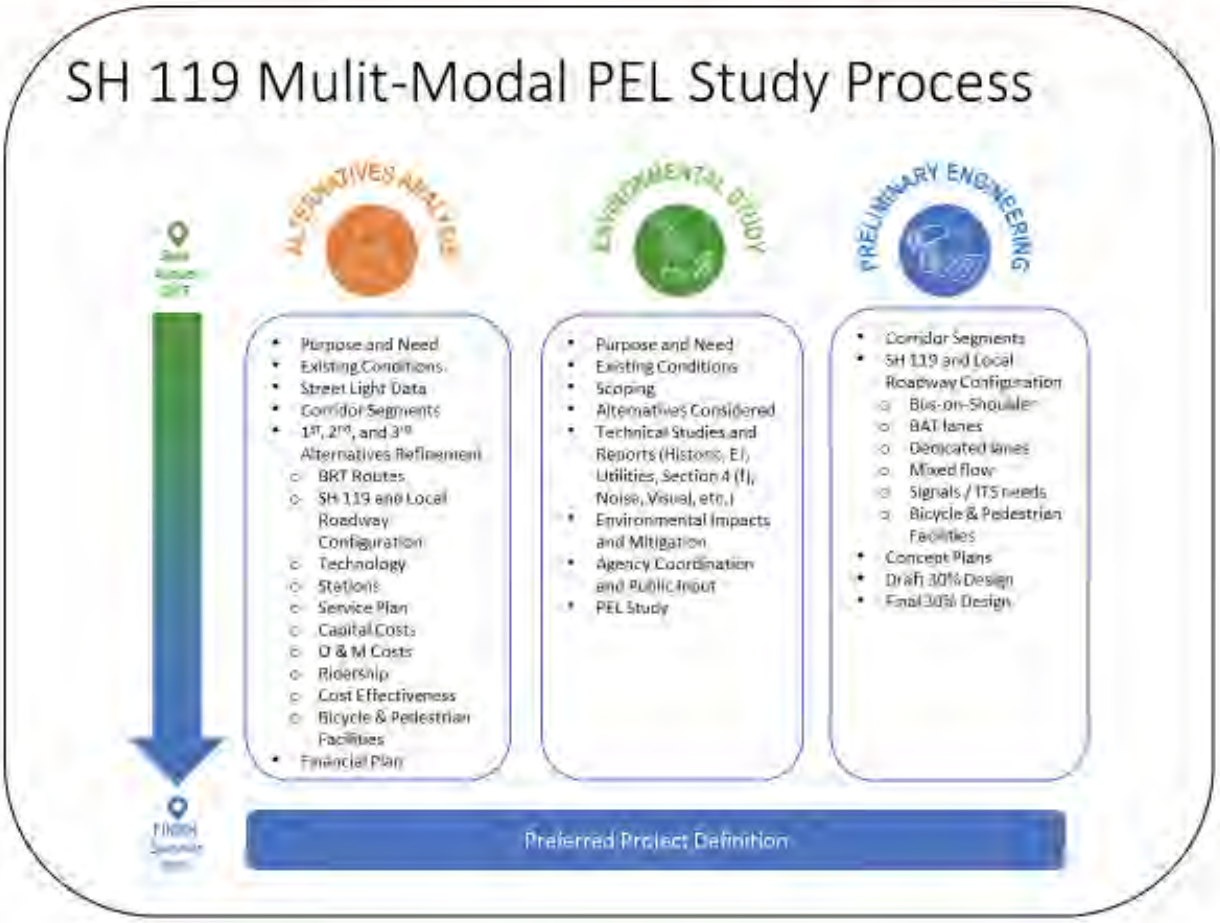


Figure 1-4. SH 119 Multi-Modal PEL Study Process

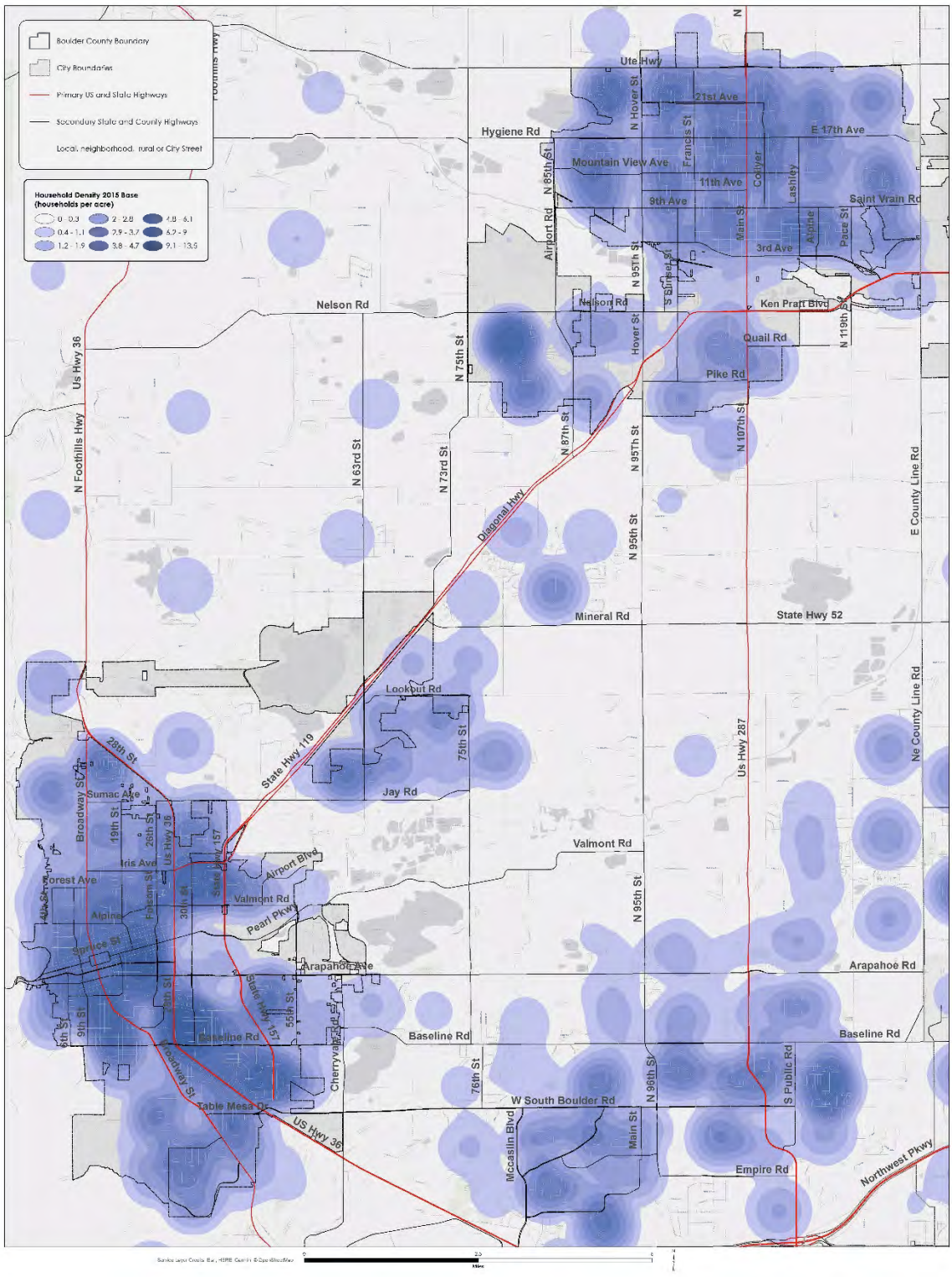
As the SH 119 Study progressed through extensive collaboration between local, state, and federal agencies, as well as the public, the focus shifted from BRT toward a MMCV (Figure 1-4). Understanding that not all MMCV elements have secured funding and that some elements, such as the managed lane and the southern termini of one of the BRT routes that would serve the University of Colorado (CU) campus, require additional analyses, a NEPA study could not be completed for the MMCV. This is because a NEPA study requires that the project be in a fiscally constrained plan and also that details, such as the terminus, be clearly identified. Through the realization that not all MMCV Elements could advance through NEPA to design and construction, the study team determined that completion of a PEL Study would be appropriate. Completion of a PEL Study enables each MMCV element to be documented, next steps defined for implementation of each MMCV element, and for discrete elements to move forward through the NEPA process as funding becomes available and as additional studies are completed. As each MMCV elements advances, the agency that sponsors their implementation will be able to use the alternatives analyses, affected environment, mitigation strategies, and steps for implementation from this PEL to complete NEPA studies, if required. Basically, this PEL Study provides the framework for implementing the MMCV.

1.3 SH 119 Corridor Existing and Future Conditions

The PEL Study process began with data collection of existing transportation facilities including SH 119 between Boulder and Longmont as well as the city streets upon which the BRT would operate. This included research on travel patterns; roadway and traffic conditions; bicycle facilities; and transit services and ridership, as described in further detail below. It is important to examine these factors as they provide valuable data on the project's purpose and needs, which are used to aid in the development and evaluation of alternatives.

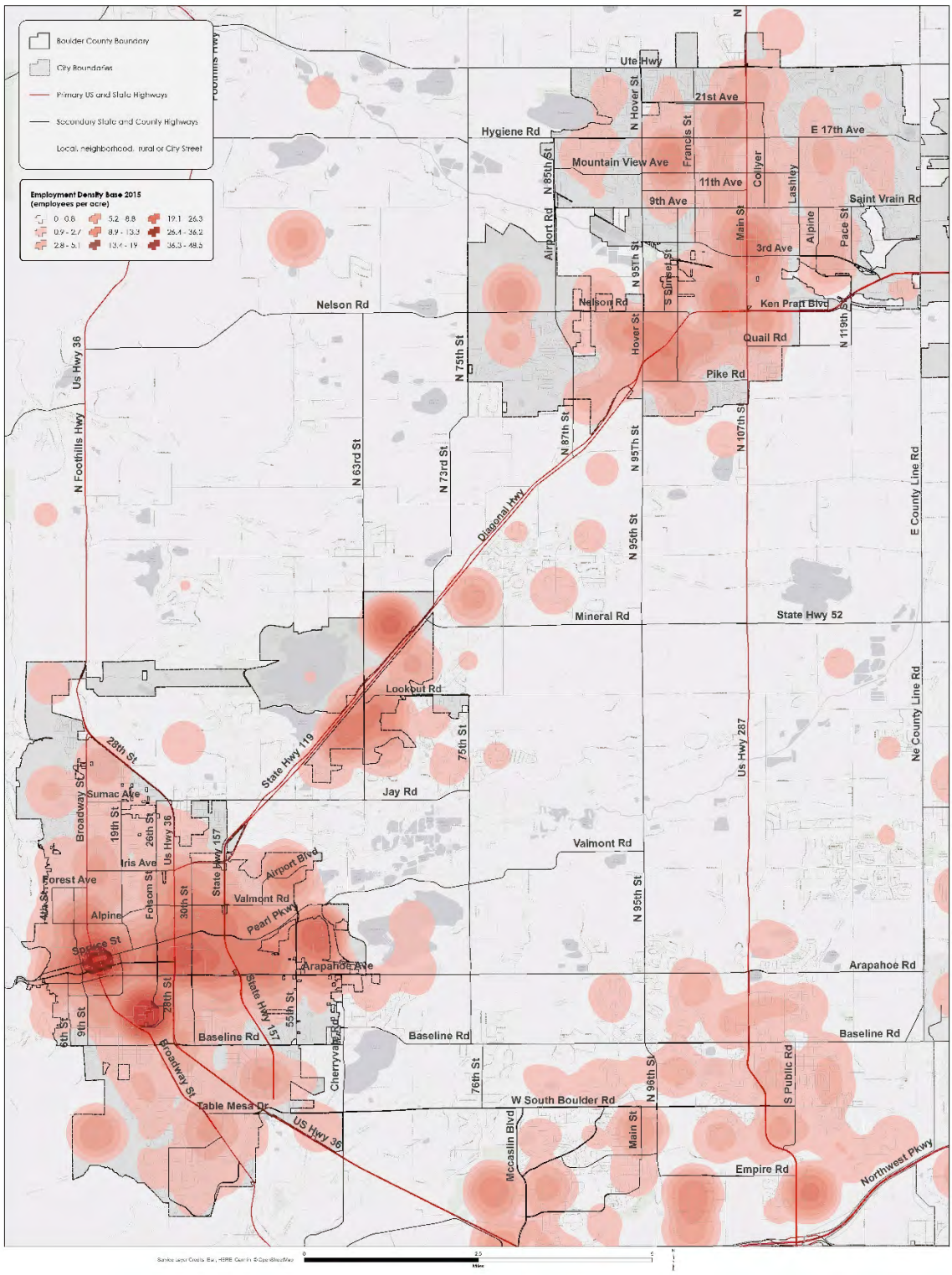
Similar to the data gathered on the existing transportation system, land uses, including the density of both employment and population inform the needs, and ultimately the screening of alternatives as they show where people are traveling to and from. A wide range of land uses exist along the proposed BRT routes within Boulder and Longmont and adjacent to SH 119 between the cities. This includes residential, commercial, retail, industrial, public, and recreational uses. For transportation demand purposes, the land uses are summarized in terms of population and employment by traffic analysis zones (TAZs), which are a key element of the regional travel demand model maintained by the Denver Regional Council of Governments (DRCOG) (DRCOG, 2016). Figure 1-5 illustrates the concentrations of population; Figure 1-6 shows employment concentrations in the vicinity of the SH 119 PEL Study Area based on data from the year 2015.

These figures clearly show that the population is most concentrated in central and east Boulder as well as downtown Longmont. The concentration of employment closely mimics that of the population although there is a lower density of jobs in east Boulder when compared to central Boulder or Longmont. As shown in Figure 1-5 and Figure 1-6, the cities of both Boulder and Longmont include substantial population centers as well as employment centers. Boulder has a higher employment base than Longmont; this results in higher inbound travel from Longmont and areas further to the north into Boulder during the AM peak hours by commuters traveling from home to work. The opposite travel pattern of higher northbound travel from Boulder to Longmont occurs during the PM peak hours by commuters returning home from work.



Source: ArLand, 2018.

Figure 1-5. SH 119 Population Concentrations (2015)



Source: Source: ArLand, 2018.

Figure 1-6. SH 119 Employment Concentrations (2015)

1.3.1 2040 POPULATION AND EMPLOYMENT FORECASTS

Table 1-2 provides a summary of forecasted population and employment growth by zone in Boulder, Longmont, and along SH 119 between Boulder and Longmont for the year 2040. The forecasted growth in these areas provides an understanding of whether, and how, travel patterns can be expected to change between 2015 and 2040. The forecasts are shown in terms of expected population and employment numbers as well as the percent growth; this growth will continue to put pressure on SH 119 as well as the street network within both cities in the form of increased travel demand.

Boulder is projected to experience growth in population ranging between 3 percent and 51 percent by 2040, adding more than 11,000 new residents to the City. Along SH 119 between Boulder the Longmont, the population of the Gunbarrel area is projected to increase by 26 percent increasing its population by approximately 4,460 people by the year 2040. Additionally, Niwot's population is forecasted to increase by 11 percent, which equates to 490 new residents. In Longmont, population is also projected to increase by 2040 with those increases ranging from 4 percent to 35 percent representing more than 20,000 new residents within City limits.

Table 1-2. 2015-2040 Forecast Population and Employment Growth by Zone

Zone #	Zone Name	Forecast Population Growth	Percent Population Growth	Forecast Employment Growth	Percent Employment Growth
1	Downtown Boulder	810	8%	1,260	8%
2	CU Main Campus	650	5%	320	2%
3	CU East Campus	520	5%	2,320	46%
4	28th St/Canyon Blvd	700	46%	2,370	27%
5	Boulder Junction	900	51%	3,250	27%
6	28th St/Iris Ave	1,930	11%	2,130	36%
7	East Arapahoe	930	3%	780	9%
8	North Boulder	1,650	8%	630	8%
9	South Boulder	80	3%	3,330	20%
10	Northeast Boulder	3,000	47%	5,140	42%
11	Gunbarrel	4,460	26%	3,610	27%
12	IBM Campus	130	19%	1,230	19%
13	Niwot	490	11%	290	21%
14	Hover St/SH 119	720	33%	1,330	15%
15	1st St/Coffman St	100	4%	580	17%
16	8thAve/Coffman St	860	12%	190	4%
17	17th Ave/Main St	6,290	35%	1,060	24%
18	East Longmont	3,330	15%	690	14%
19	Airport Rd Corridor	450	5%	140	2%
20	Hover Rd Corridor	4,730	14%	410	8%
21	South Longmont	5,150	20%	3,070	24%

Source: DRCOG, 2016

In terms of future employment, Boulder is projecting an additional 21,510 jobs by the year 2040. Similarly, employment growth is expected in the communities of both Gunbarrel and Niwot (27 percent and 21 percent, equating to about 4,000 additional jobs respectively) as well as just over 1,00 new jobs at the IBM campus. In Longmont, employment growth is expected to range between 2 percent along the Airport Road Corridor to 24 percent near 17th Avenue and Main Street resulting in the addition of nearly 7,500 new jobs within the City limits.

1.3.2 EXISTING TRANSPORTATION AND INFRASTRUCTURE NETWORK

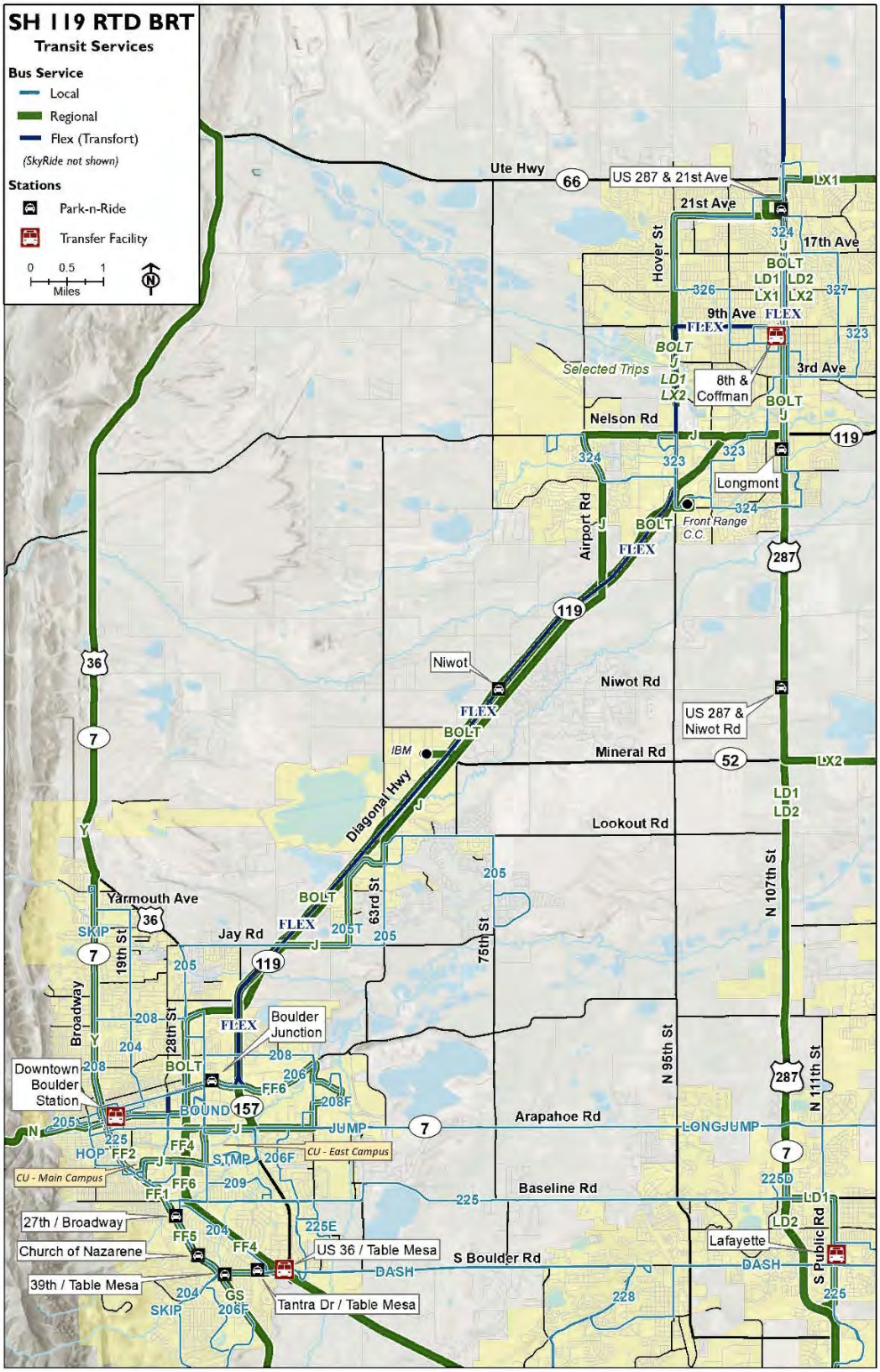
Existing Lane and Intersection Configuration

SH 119 stretches over 60 miles between US 6 in Clear Creek Canyon to I-25, to the east of Longmont. Between the cities of Boulder and Longmont, SH 119 is a divided state highway with 4 to 6 travel lanes plus shoulders and a wide center median within a 200 to 250-foot-wide ROW. The posted speed limit on SH 119 is 45 miles per hour (mph) between 28th Street and Foothills Parkway in Boulder and between Hover Street and Sunset Street in Longmont; 55 mph between Foothills Parkway and Niwot Road; and 65 mph between Niwot Road and Airport Road. The pavement in each direction of the state highway is 40-60-foot wide totaling 80-120 feet of pavement, which leads to a large amount of additional ROW in the corridor that diverges between the median and the sides of the corridor. The SH 119 cross section varies between Boulder and Longmont; in some locations it includes auxiliary lanes; right- and left-turn lanes; queue jump lanes for buses (at 63rd Street and Jay Road); and other features. The pavement condition is generally very good and well-maintained although the roadway shoulders are not built to the same width and full depth strength as the general-purpose traffic lanes.

The proposed SH 119 BRT routes travel along state highways and city-owned streets in Boulder and Longmont. In Boulder, these roadways have 4 to 6 lanes of travel and some routes include bicycle lanes, BAT lanes, and TSP at intersections. The streets in Longmont are all-mixed flow traffic and range from 2 lanes (one in each direction) with parking to a 5-lane roadway that is approximately 74-feet wide. Along the proposed routes in Longmont, the streets do not have bicycle lanes, nor do the intersections have TSP. Buses are currently operating on the proposed BRT routes within both cities along with automobile traffic.

1.3.3 EXISTING TRANSIT SERVICES AND FACILITIES

Figure 1-7 shows that the SH 119 corridor is currently served by the BOLT and J routes, with connections to the following regional and local routes in Boulder: AB, Flatiron Flyer (FF 1, 2, 3, 4, 5, 6, 7), 204, 205, 206, 208, 209, 225, 236, BOUND, DASH, JUMP, SKIP, HOP, STAMPEDE; and with connections to the following regional and local routes in Longmont: LD, LX, 323, 324, 326, 327. These routes vary in terms of days and hours of service, with some operating only during peak periods to serve commuter trips. A review of the 31 routes and branches indicates that 14 routes have frequencies of 15 minutes or better (45 percent), 7 routes have 30-minute headways (23 percent), and 10 routes have 30- to 60-minute frequencies (32 percent) during peak hour(s) of service.



Source: RTD, 2017

Figure 1-7. SH 119 Corridor Transit Services – As of January 2019

To supplement on-time performance data, RTD's TriTAPT data was reviewed in order to develop an understanding of existing (January 2017) transit travel conditions on three routes in Boulder County – the BOLT, J, and Bound. TriTAPT data is detailed information based on RTD's Automatic Vehicle Location system.

The average delay experienced per bus trip between each stop, referred to as control delay, was reviewed for each of these routes. Control delay is made up of time that buses are delayed due to traffic signals and congestion. From this information, estimates can be made regarding which signalized intersections along the routes are causing the most control delay. Based on this analysis, there are 15 intersections: 7 in Boulder, 4 in Longmont, and 4 on SH 119 that experience control delay of 30 seconds or greater. The majority, 13 of the 15 of the intersections, experience more than 30 seconds of control delay in the PM peak hour. Only two intersections, both in Boulder, have greater than 30 seconds of delay in the AM peak period. Another way to examine the data is to understand the delay by direction. Nine of the 15 instances where delay is greater than 30 seconds is when the bus is headed northbound leaving 5 intersections with 30 or more seconds of delay in the southbound direction (Table 1-3).

Table 1-3. Intersections with Control Delay Greater than 30 Seconds

Intersection	15 Highest Estimated Bus Delays (seconds)	Bus Route	Direction	Peak Hour
Broadway/Baseline Rd	86	Bound	Southbound	am
Main St/SH 119	80	J	Northbound	pm
SH 52/SH 119	78	J	Northbound	pm
Canyon Blvd/Folsom St	58	BOLT	Northbound	pm
Colorado Ave/30th St	56	J	Northbound	pm
Arapahoe Ave/30th St	54	J	Southbound	am
30th St/Baseline Rd	48	Bound	Northbound	pm
S Hover St/SH 119	37	BOLT	Southbound	pm
Hover St/Pike Rd	37	BOLT	Southbound	pm
Airport Rd/Clover Basin Dr	34	J	Northbound	pm
Hover St/Nelson Rd	33	J	Northbound	pm
S. Pratt Pkwy/SH 119	33	J	Northbound	pm
28th St/SH 119	33	BOLT	Southbound	pm
Airport Rd/SH 119	31	J	Northbound	pm
30th St/Valmont Rd	30	Bound	Southbound	pm

Source: RTD, 2017

1.3.4 TRAFFIC CONDITIONS

Understanding the existing and forecasted traffic conditions along SH 119 as well as within Boulder and Longmont is helpful when reviewing route alternatives and physical improvements needed to improve transit operations on the roadways. Specific analysis was completed to evaluate traffic conditions at key intersections in the AM peak hour and PM peak hour for a typical weekday; please see the *SH 119 Traffic Report,* Appendix C for the full report (Apex, 2019).

Synchro and Vissim software packages were used for the traffic analysis along SH 119 and existing transit routes within the cities. Synchro was used for the larger study area to get a general sense of the traffic conditions and Vissim was used to provide a more detailed, micro-simulation traffic analysis for a better comparison between transit specific alternatives at key study area intersections. As part of the Vissim traffic analysis, 15 intersections were chosen to be included in the models.

Using the Highway Capacity Manual (HCM) methodology, the performance of signalized intersections based on average delay can be calculated for individual movements, approaches, or entire intersections (HCM, 2010). This average delay is then assigned a Level of Service (LOS) ranging from A to F, with LOS A being ideal operational conditions and F being an intersection that is failing. Table 1-4 provides a brief description of the criteria determining LOS at traffic signals. While the HCM typically identifies poorly operating intersections acurrately, the scale of the issue can easily be understated or overstated due to the inflexible nature of the method. Meaning that HCM methodologies are considered very reliable when the LOS for an intersection remains LOS D or better; however, if an intersection experiences conditions where vehicular demand meets or exceeds capacity, the estimated average delay may be unreliable. In those cases, a calibrated micro-simulation model, such as VISSIM, can often provide results that are more consistent with real world conditions.

Table 1-4. Highway Capacity Manual Level of Service (LOS)

Level of Service (LOS)	Average Control Delay (sec)	Expected Conditions
A	0-10	Free flow traffic conditions
B	10-20	Reasonably free flow conditions
C	20-35	Stable flow of traffic
D	35-55	Approaching capacity
E	55-80	Operating at capacity
F	>80	Forced or breakdown flow

Source: TRB, 2010

Table 1-5 shows the LOS at the 15 intersections studied through the VISSIM analysis. In the AM, 11 intersections were functioning well, with LOS between A and C. In the PM, nine intersetcions were functionging well, with LOS between A and C. The intersection of SH 52/SH 119 was observed to experience the worst congestion on SH 119; it is the bottleneck for vehicles traveling between Boulder

and Longmont. Hover Street/SH 119 is the second most congested intersection on the stretch of highway between Boulder and Longmont. Along the diagonal, the intersection at 63rd Street/SH 119 performed at a LOS D southbound in the PM and the Niwot Road/SH 119 intersection performed at LOS D southbound in the AM . In Boulder, the intersection at 28th Street/Canyon Boulevard performed at a LOS D in the PM, and in Longmont, the Hover Street/Nelson Road intersection functioned at LOS D and the Hover Street/SH 119 intersection performed at LOS D in the AM and PM.

Table 1-5. Level of Service at Intersections (Existing Conditions)

Intersection	Weekday AM Peak Hour		Weekday PM Peak-Hour	
	Delay (sec.)	Level of Service	Delay (sec.)	Level of Service
Main St/11th Ave	6.6	A	7.4	A
Coffman St/9th Ave	5.6	A	15.1	B
Hover St/Boston Ave	8.4	A	13.0	B
Hover St/Nelson Rd	22.0	C	42.1	D
Hover St/SH 119	38.3	D	55.0	D
Airport Rd/Southbound SH 119	10.9	B	29.3	C
Airport Rd/Northbound SH 119	2.2	A	4.9	A
Niwot Rd/Southbound SH 119	52.8	D	18.0	B
Niwot Rd/Northbound SH 119	22.2	C	10.3	B
SH 52/SH 119	95.0	F	82.7	F
63rd St/Southbound SH 119	26.5	C	38.3	D
63rd St/Northbound SH 119	23.5	C	20.7	C
Jay Rd/Southbound SH 119	33.4	C	29.0	C
Jay Rd/Northbound SH 119	32.3	C	20.9	C
Southbound Foothills Pkwy/SH 119	2.7	A	2.5	A
Northbound Foothills Pkwy/SH 119	14.9	B	25.7	C
28th St/Walnut St	20.9	C	27.0	C
28th St/Canyon Blvd	28.6	C	36.3	D
Folsom St/Canyon Blvd	21.1	C	25.9	C
Network Total	**468.0**		**504.0**	

Source: Apex Design, 2019

Notes:

(1) Data based on the average of 15 VISSIM micro-simulation models.

1.3.5 SH 119 Corridor Delay and Travel Time Assessment

Length of delay associated with congestion was also analyzed between and within Boulder and Longmont, with an emphasis on SH 119 between the intersections at Foothills Parkway in Boulder and Hover Street in Longmont. The intent was to identify the areas of delay and where queues occur; this was used to help identify and screen potential capital improvement alternatives for the

three BRT configurations or options that were analyzed as a part of this PEL Study: BRT/bus-on-shoulder, BRT/queue jump lanes at SH 52/SH 119 intersection, or BRT/managed lanes. Three different analysis methods were used. The first method used Google Maps virtual trips to identify 'typical' AM and PM peak periods and the locations along SH 119 that regularly exhibit traffic congestion during these periods. The second method, also using Google Maps, considered a broader span of weekdays beyond just the peak periods, to identify problems that may not appear on a 'typical' single day. The final method was to physically drive SH 119 between Foothills Parkway and Hover Street to observe congestion issues and validate/refine the findings of the first two approaches.

Summary of Observations/Conclusions

Based on the three analytical methods described in the previous section, it was found that the directional splits create heavy traffic flows with substantial congestion queues on SH 119, primarily southbound in the AM and northbound in the PM, and primarily near the signalized intersections at Jay Road, 63rd Street, SH 52, and Niwot Road.

Table 1-6 provides the intersections and length of delay on the SH 119 observed southbound in the AM peak period in 2018. There are two areas, SH 52 and Niwot Road, with traffic queues over a mile long. The southbound AM peak delay lengths will likely increase in future years as traffic volumes grow. Assuming 1 percent traffic growth per year, the total southbound length of delay may increase from 13,340 feet (approximately 2.5 miles) currently to 16,100 feet (approximately 3 miles) by 2040, reflecting growth in traffic in that time period and the physical limits of the distances between intersections.

Table 1-6. 2018 AM Peak Period Southbound Length of Delay

SH 119 Intersection	Length of Delay (feet)
Jay Rd	260 feet between 63rd St and Jay Rd
63rd St	180 feet north of the intersection
SH 52	5,860 feet between Niwot Rd and SH 52
Niwot Rd	6,360 feet between Niwot Rd and 83rd St
Airport Rd	680 feet north of the intersection
Total	**13,340 feet of southbound delay**

Source: Apex Design, 2018

Table 1-7 shows that there is a total of 6,635 feet (approximately 1.3 miles) of delay in the northbound direction during the PM peak period. The PM peak northbound delay lengths will likely increase in future years as traffic volumes grow. Assuming 1 percent traffic growth per year, the total northbound length of delay may increase to approximately 1.6 miles by 2040, reflecting growth in traffic in that time period and the physical limits of the distances between intersections.

Table 1-7. 2018 PM Peak Period Northbound Length of Delay

SH 119 Intersection	Length of Delay (feet)
Jay Rd	385 feet south of the intersection
63rd St	200 feet south of the intersection
SH 52	4,750 feet between 63rd St and SH 52
Niwot Rd	670 feet between SH 52 and Niwot Rd
Hover St	630 feet south of the intersection
Total	**6,635 feet of northbound delay**

Source: Apex Design, 2018

There are lengthy delays in Boulder on Iris Avenue near the intersections of 30th Street and Foothills Parkway; on 28th Street, between Iris Avenue and Canyon Boulevard; and on Canyon Boulevard at the 28th Street and Folsom Street intersections. In Longmont there are delays on Boston Avenue, particularly near the intersections with Sunset Street and Hover Street; and on Hover Street near Nelson Road. Given the projected growth in population and employment within and between Boulder and Longmont, it can reasonably be expected that there will be increased travel demand on the transportation system between now and 2040. And that this increased demand will result in longer delays at intersections and on roadways in both cities as well as on SH 119 between them.

1.3.6 CORRIDOR TRAVEL PATTERNS

In order to characterize travel patterns to/from and on SH 119 between Boulder and Longmont, a select link analysis was prepared for SH 119 at the midpoint between the cities, at the SH 52/SH 119 intersection. This analysis identified the amount of vehicle trips being made in 2015 and 2040 as well as the number and percentage of trips going to/from various subareas to the north and south of SH 52. It determined that the number of vehicle trips on SH 119 at its intersection with SH 52 is expected to be 25 percent higher in 2040 than it was in 2015, which reflects expected growth in population, employment, and trip demand; this is supported by the anticipated growth in population and employment discussed earlier in this report.

The vast majority of vehicle trips are generated by origins and destinations within or near SH 119, including the Boulder and Longmont communities, as well as Niwot and Gunbarrel. In 2015, about 24 percent of vehicle trips on SH 119 between Boulder and Longmont were generated from Larimer and Weld Counties, and about 13 percent were generated from the greater Denver metropolitan area. By 2040, those percentages increase to 31 percent and 17 percent, respectively.

2. PURPOSE AND NEED

During transportation planning, a purpose and need statement is developed that establishes the foundation for developing and analyzing alternatives. The purpose and need statement for this PEL Study was created and refined over a ten-month period; it was used as the basis for the evaluation criteria and measures used to screen alternatives.

2.1 Project Purpose

The purpose of the SH 119 Multi-Modal PEL Study is to optimize regional connectivity and mobility between and within Boulder and Longmont by providing improvements that result in faster and more reliable transit travel in accordance with the NAMS recommendation (RTD, 2014).

2.2 Project Need

The needs of the project are listed below and discussed in more detail in the following sections:

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

2.2.1 ADDRESS FUTURE TRAVEL DEMAND IN THE SH 119 CORRIDOR WITH MULTI-MODAL IMPROVEMENTS, INCLUDING FIRST- AND LAST-MILE CONNECTIVITY

Travel demand is forecasted to increase over time within Boulder and Longmont and on SH 119 between the cities, 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, bicycles-on-shoulder, service vehicles, and trucks between the two cities, as well as providing connections further to the east and west. The annual average daily traffic on 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 people when traveling between and within Boulder and Longmont.

The overall growth of 25 percent in the number of vehicular trips on SH 119 between and within Boulder and Longmont forecasted to occur by 2040 is related to the projected increases in population and employment. 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, multi-modal improvements along SH 119 are needed to accommodate the greater anticipated travel demand.

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. Bicyclists currently utilize the outside shoulders of SH 119 between Boulder and Longmont, but there are only limited bicycle lanes on other roadways that connect to this section of SH 119. 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. Within both cities there are good networks for connecting pedestrians and bicyclists with transit (e.g., sidewalks and bicycle lanes), but this infrastructure is lacking along SH 119.

2.2.2 OPTIMIZE TRANSIT SERVICES, CONNECTIONS, AND RIDERSHIP ON THE SH 119 CORRIDOR BETWEEN BOULDER AND LONGMONT

RTD operates the J and the BOLT routes on SH 119; Transfort operates the FLEX bus route between Fort Collins, Loveland, Boulder, and Longmont, which utilizes SH 119 for a portion of its route. The average weekday ridership for the BOLT and J routes is 1,430 and 230, respectively (RTD, 2017). The J Route provides bus service between 18th Street/Euclid Avenue (CU Boulder's main campus) and the Hover Street/Boston Avenue intersection in Longmont. There are over 30 stops along this route. The BOLT provides bus service between Downtown Boulder and 23rd Avenue/Main Street in Longmont, with more 50 stops between these destinations. Congestion on this stretch of SH 119, particularly at signalized intersections, results in delays and increased travel times, which ultimately reduces transit reliability. Additionally, the high number of existing transit stops combined with constrained roadway capacity, particularly on city streets within Boulder and Longmont, further contributes to reduced reliability and increased travel time.

2.2.3 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 as travel demand and congestion increase. There are two intersections on SH 119 (SH 52 and Hover Street) that currently operate at a LOS E or F, meaning an average vehicle (and therefore, all the passengers in those vehicles) experiences congestion and delay of 55 seconds or greater at the intersection, during at least one peak period (Apex, 2019).

In addition to the delays at the intersections by LOS, the buses that serve the Bolt line experience delay at intersections that range from 0 to 58 seconds. 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). Without transit-specific operational improvements, poor LOS will continue to result in high delay for transit vehicles at intersections.

2.2.4 ADVANCE THE RECOMMENDATION FROM THE NORTHWEST AREA MOBILITY STUDY (NAMS)

As discussed in Section 1.2.1, RTD conducted a study of transit opportunities for the northwest area of the district. Completed and adopted by the RTD Board in June 2014, the NAMS prioritized transit routes and improvements for near-term implementation.

Implementation of BRT on SH 119 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), without precluding future implementation of a commuter rail line (Northwest Rail), which is a part of the FasTracks Program. The NAMS contained a consensus statement by the participating stakeholders 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 Boulder and Longmont, which is not part of the FasTracks Program.

3. ALTERNATIVES DEVELOPMENT AND EVALUATION

A three-tiered evaluation process was used to screen BRT alternatives. The first two tiers of screening (Tier 1 and Tier 2) were deliberately focused on the transit technology and routing options in order to set those parameters. This was important as the route that would be used between Boulder and Longmont was established as SH 119 as a part of NAMS, it was the routing within the cities that was unknown. Once the transit technology and routing alignments were known the physical configuration of BRT operation was examined in Tier 3. This included evaluation of BRT/bus-on-shoulder; BRT/queue jump lanes at SH 52/SH 119 on SH 119 between Boulder and Longmont; and BRT/managed lanes. The three levels of evaluation of alternatives, which are discussed in more detail below included:

Alternatives Evaluation Tier 1 – Screening of Technologies provided a high-level evaluation of conceptual alternative technologies and identified BRT as the recommended mode to advance into Tier 2 evaluation.

Alternatives Evaluation Tier 2 – Service Level and BRT Route Pattern Alternatives analyzed the benefits of different BRT route patterns, branches, and service operations alternatives that resulted in several options progressing into the Tier 3 evaluation. The alternatives developed for this evaluation were derived from the modeling analysis.

Alternatives Evaluation Tier 3 – Screening of Refined BRT Alternatives (routes, frequency, and physical improvements) provided a detailed analysis of the most promising BRT route pattern(s), physical configuration options, and operational alternatives. The focus of the Tier 3 alternatives evaluation exercise built on the Tier 2 evaluation, including factors related to the physical configuration of the proposed options, while continuing to address the purpose and need for the SH 119 Multi-Modal PEL Study. Tier 3 evaluation identified the two-route pattern as the recommended alternative.

3.1 Tier 1

3.1.1 TECHNOLOGY COMPARISON

During development of the 2004 FasTracks plan, which included the Northwest Corridor Rail and its extension along SH 119 from Boulder to Longmont, RTD considered BRT, streetcar/light rail, monorail, and commuter rail with rail being the recommended option. These technologies (BRT, streetcar/light rail, and commuter rail) were also investigated as a part of this SH 119 Multi-Modal PEL Study. During initiation of this PEL Study, a suggestion was made to consider personal rapid transit (PRT) which is an elevated system of guideways and stations using small, 4-6 person "personal" vehicles for the corridor. However, PRT is still in the early research and development stages with no system currently in proven, revenue operation anywhere in the world. Consequently, PRT would not be available as a viable technology in the near term, so it was eliminated from further consideration within this PEL Study.

The Tier 1 screening evaluated the technologies against the criteria listed in Table 3-1. Based on those criteria, BRT emerged as the best transit technology option for near-term implementation between and within Boulder and Longmont, with long-term benefits as well. Commuter rail is still the preferred technology in the long-term and is expected to be implemented once funding becomes available.

Table 3-1. Tier 1 Screening of Technologies

Evaluation Criteria	BRT		Streetcar/ Light Rail		Monorail		Commuter Rail		Personal Rapid Transit	
	Evaluation Criteria									
	Near-Term	Long-Term	Near-Term	Long-Term	Near-Term	Long-Term	Near-Term	Long-Term	Near-Term	Long Term
Included in NAMS Recommendation	+	+	-	-	-	-	-	+	-	-
Proven revenue service/no research and development required	+	+	+	+	+	+	+	+	-	-
Improve transit travel time and reliability	+	+	+	+	+	+	+	+	-	-
Increase person throughput	+	+	+	+	+	+	+	+	-	-
Lower Capital cost (typical per mile)	+	+	-	-	-	-	-	+	-	-
Lower Operational and maintenance (O&M) costs (typical per hour)	+	+	-	-	-	-	-	+	-	-
Funding availability	+	+	-	-	-	-	-	+	-	-

Legend:
+ = Meets this criterion
- = Does not meet this criterion

3.2 Tier 2

3.2.1 Service Level and BRT Route Pattern Alternatives Development

Between October 2017 and March 2018, 10 different modeling exercises were completed to evaluate BRT scenarios that included different route patterns and transit service levels. The scenario options analyzed were tested by using a transportation model and details of the inputs into each modeling scenario are shown on Table 3-2. The purpose of these modeling iterations was to provide 2040 transit ridership forecasts, hours of service, and cost impact of operations to recommend routes and station locations to be carried forward for additional analyses in Tier 3.

SH 119 BRT ALTERNATIVES DEVELOPMENT, SCENARIOS 1 TO 6

The 10 modeling exercises completed in Tier 2, and shown in Table 3-2, began with the 1 route as defined in the NAMS (BRT Scenario #1). After reviewing the results of the first scenario (#1), stakeholders, the public, and policy advisors added three additional routes, for a total of four BRT routes that were tested with different termini in Boulder and Longmont and varying service levels; these are BRT Scenarios #2, #3a, #3b, #4, #5, and #6 (note that there are two variations of the #3 modeling scenario). The routes in this stage of analysis were differentiated by their colors: ***Blue, Orange, Green, and Purple*** and are shown on Figure 3-1. It should be noted that these four colored alternatives were refined during the study in response to modeling results, stakeholder input meaning that the first blue route is not exactly the same as the blue route that is recommended as a part of the MMCV.

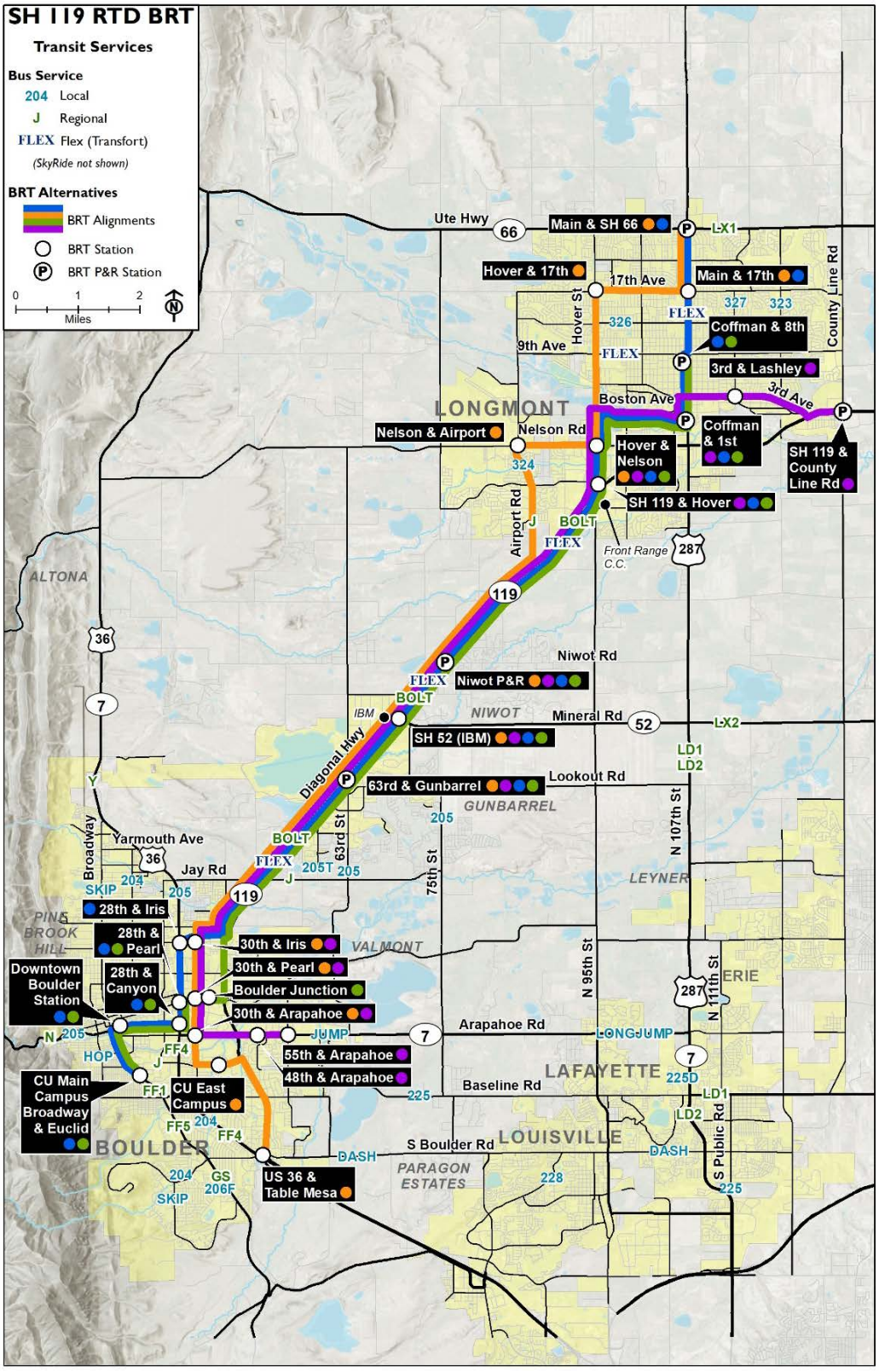


Figure 3-1. Tier 2 Alternatives Development and Evaluation – Scenarios #21 to #6

SH 119 BRT ALTERNATIVES DEVELOPMENT, SCENARIOS NUMBERS 7 TO 9

For these three BRT Alternatives Scenarios (#7 to #9), the routes (***Blue, Orange, Green***, and ***Purple)*** were split into eight branches (different terminus) and mixed and matched for different route options; each of the eight branches was assigned a letter for easy identification (Figure 3-2). These modeling scenarios were completed to gain an understanding of travel time, service levels, boardings, and the effect of different beginning and end points of routes in Longmont and Boulder and results are shown in Table 3-3.

Through the modeling exercise, the ***Orange, Green,*** and ***Purple*** routes were modified. Additionally, the stakeholders wanted to test two more options of the ***Blue*** and ***Purple*** routes in Boulder, resulting in two additional routes been modeled and analyzed in the BRT Scenarios #7 to #9.

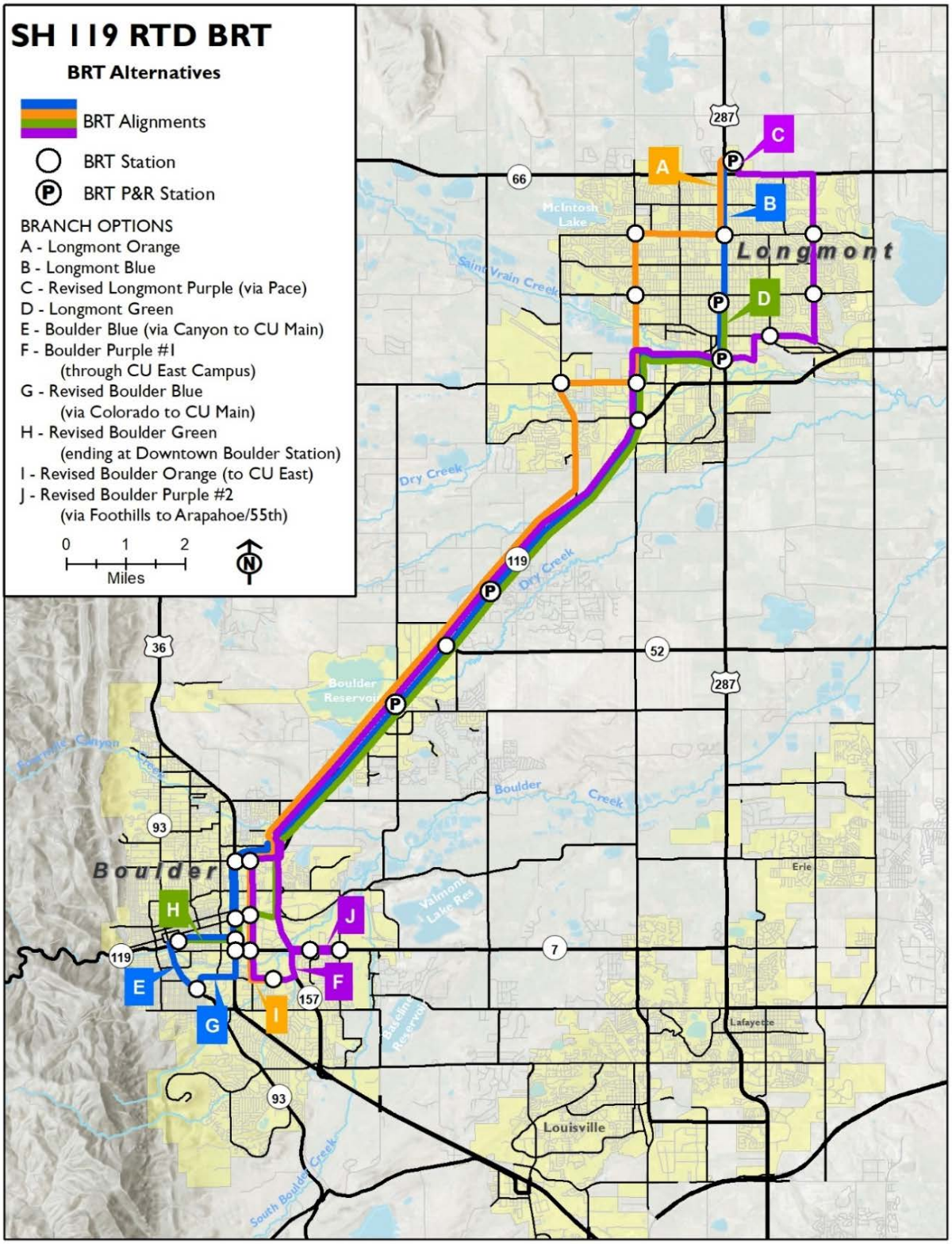


Figure 3-2. Tier 2 Alternatives Development and Evaluation – Scenarios #7 to # 9

As was completed for the previously modeled scenarios, each branch was assigned a letter, and then routes were created mixing and matching the different beginning and end points. Scenario #7 analyzed ridership for six different routes and modeled each independently. Both Scenario #8 and #9 packaged 4 distinct BRT routes with different levels of service and then assessed the ridership and amount of service hours needed. The routes and branches for BRT Scenario iterations #7 to #9 are outlined in Table 3-2.

Table 3-2. Branch Route Options used in Model Scenario #7 to #9

Branch Lines for BRT Scenarios #7 to #9	BRT Scenario #7
A – Longmont Orange	AE – Longmont Orange/Boulder Blue
B – Longmont Blue	AF – Longmont Orange/Revised Boulder Purple #1
C – Revised Longmont Purple (via Pace St)	BE – Longmont Blue/Boulder Blue
D – Longmont Green	BF – Longmont Blue/Revised Boulder Purple #1
E – Boulder Blue (via Canyon Blvd to CU Main Campus)	CE – Revised Longmont Purple/Boulder Blue
F – Revised Boulder Purple #1 (through CU East Campus)	CF – Revised Longmont Purple/Revised Boulder Purple #1
G – Revised Boulder Blue (via Colorado Ave to CU Main Campus)	**BRT Scenario #8**
H – Revised Boulder Green (via Colorado Ave to CU Main Campus)	BG – Longmont Blue/Revised Boulder Blue
I – Revised Boulder Orange (to CU East Campus)	DH – Longmont Green/Revised Boulder Green
J – Revised Boulder Purple #2 (via Foothills Pkwy to Arapahoe Rd/55th St)	AI – Longmont Orange/Revised Boulder Orange
	CJ – Revised Longmont Purple/Revised Boulder Purple #2
	BRT Scenario #9
	BG – Longmont Blue/Revised Boulder Blue
	DH – Longmont Green/Revised Boulder Green
	AI – Longmont Orange/Revised Boulder Orange
	CJ – Revised Longmont Purple/Revised Boulder Purple #2

Table 3-3. SH 119 Bus Rapid Transit Alternatives Analysis Scenario Development Summary

	Model Scenario #1 Oct. 30, 2017	Model Scenario #2 Dec. 7, 2017	Model Scenario #3-A Dec. 21, 2017	Model Scenario #3-B Dec. 21, 2017	Model Scenario #4 Jan. 11, 2018	Model Scenario #5 Jan. 11, 2018	Model Scenario #6 Jan. 30, 2018	Model Scenario #7 Feb. 23, 2018	Model Scenario #8 March 9, 2018	Model Scenario #9 March 28, 2018
BRT Routes Included	Red	Green Blue Orange Alt. Orange	Green Blue Orange Purple	Blue	Green Blue Orange Purple	Blue Orange	Green Blue Orange Purple	AE - Longmont Orange/Boulder Blue AF - Longmont Orange/Boulder Purple BE - Longmont Blue/Boulder Blue BF - Longmont Blue/Boulder Purple CE - Rev. Longmont Purple/Boulder Blue CF - Rev. Longmont Purple/Boulder Orange	BG -Longmont Blue/Rev. Boulder Blue DH - Longmont Green/Rev. Boulder Green AI - Longmont Orange/Rev. Boulder Orange CJ - Rev. Longmont Purple/Rev. Boulder Purple	BG -Longmont Blue/Rev. Boulder Blue DH - Longmont Green/Rev. Boulder Green AI - Longmont Orange/Rev. Boulder Orange CJ - Rev. Longmont Purple/Rev. Boulder Purple
BRT Routes Modeled Combined or Independent?	Independent	Independent	Combined	Independent	Combined	Combined	Combined	Independent	Combined	Combined
# of Stations Per Route	12	11-13	11-14	14	11-14	13-14	11-14	14-16 (per route)	10-14	10-14
BRT Configuration on SH 119 between Boulder and Longmont	BRT/Bus-on-Shoulder @ 40 mph	BRT/Bus-on-Shoulder @ 40 mph	BRT/Bus-on-Shoulder @ 40 mph	BRT/Bus-on-Shoulder @ 40 mph and Exclusive Lanes @55 mph	BRT/Bus-on-Shoulder @ 40 mph	BRT/Bus-on-Shoulder @ 40 mph	BRT/Bus-on-Shoulder @ 40 mph	BRT/Bus-on-Shoulder @ 40 mph	BRT/Bus-on-Shoulder @ 40 mph	BRT/Bus-on-Shoulder during peak period in peak direction at 15mph speed differential compared to general purpose lane speeds (averaged speed of 30mph on entire corridor for all links combined). BRT operates in general purpose lanes during off-peak period and off-peak direction in peak period.
BRT Configuration in Cities	BRT in mixed traffic	BRT in mixed traffic	BRT in mixed traffic	BRT in mixed traffic	BRT in mixed traffic	BRT in mixed traffic	With and without all BAT Lanes	BRT in mixed traffic	BRT in mixed traffic	BRT in mixed traffic
Was Bolt and J included?	Yes	Yes	Yes and No	Yes	Yes and No	No	No	No	No	No

	Model Scenario #1 Oct. 30, 2017	Model Scenario #2 Dec. 7, 2017	Model Scenario #3-A Dec. 21, 2017	Model Scenario #3-B Dec. 21, 2017	Model Scenario #4 Jan. 11, 2018	Model Scenario #5 Jan. 11, 2018	Model Scenario #6 Jan. 30, 2018	Model Scenario #7 Feb. 23, 2018	Model Scenario #8 March 9, 2018	Model Scenario #9 March 28, 2018
Service Level Plans: (minutes)	Peak: 10 Off Peak: 15	Peak: 10 Off Peak: 15	Blue: 15-min. all day Green, Orange, and Purple: 30-min. all day	Peak: 10 Off Peak: 15	20 - min. all day	20 - min. all day	Blue: 15-min. all day Green: 15-min. peak Orange & Purple: 30-min peak only	15-min. all day (run separately)	BG -Longmont Blue/Rev. Boulder Blue: 15-min. all day DH - Longmont Green/Rev. Boulder Green: 30-min. all day AI - Longmont Orange/Rev. Boulder Orange: 15-min. peak, 30-min. off peak CJ - Rev. Longmont Purple/Rev. Boulder Purple, 30-min. all day	BG -Longmont Blue/Rev. Boulder Blue: 15-min. all day DH - Longmont Green/Rev. Boulder Green: 30-min. all day AI - Longmont Orange/Rev. Boulder Orange: 15-min. peak, 30-min. off peak CJ - Rev. Longmont Purple/Rev. Boulder Purple, 30-min. all day
BRT Boardings	1,200	Green: 2,160 Blue: 2,620 Orange: 1,490 Alt. Orange: 1,470	With the BOLT and J: 2,850 Without the BOLT and J: 3,050	Bus on Shoulder: 2,620 Exclusive: 2,820	With the BOLT and J: 3,760 Without the BOLT and J: 4,020	3,020	Without BAT Lanes: 3,040 With all BAT Lanes: 3,130 (Net gain - 90 boardings with BAT lanes on all local streets)	AE - Longmont Orange/Boulder Blue: 2,380 AF - Longmont Orange/Boulder Purple: 2,310 BE - Longmont Blue/Boulder Blue: 2,260 BF - Longmont Blue/Boulder Purple: 2,160 CE - Rev. Longmont Purple/Boulder Blue: 2,440 CF - Rev. Longmont Purple/Boulder Orange: 2,350	BG -Longmont Blue/Rev. Boulder Blue: 1,730 DH - Longmont Green/Rev. Boulder Green: 260 AI - Longmont Orange/Rev. Boulder Orange: 900 CJ - Rev. Longmont Purple/Rev. Boulder Purple: 520	BG -Longmont Blue/Rev. Boulder Blue: 1,670 DH - Longmont Green/Rev. Boulder Green: 260 AI - Longmont Orange/Rev. Boulder Orange: 890 CJ - Rev. Longmont Purple/Rev. Boulder Purple: 500
Bolt & J Boardings	2,250	970 - 1,380	1,080	Bus on Shoulder: 970 Exclusive: 990	1,085	0	0	0	0	0

	Model Scenario #1 Oct. 30, 2017	Model Scenario #2 Dec. 7, 2017	Model Scenario #3-A Dec. 21, 2017	Model Scenario #3-B Dec. 21, 2017	Model Scenario #4 Jan. 11, 2018	Model Scenario #5 Jan. 11, 2018	Model Scenario #6 Jan. 30, 2018	Model Scenario #7 Feb. 23, 2018	Model Scenario #8 March 9, 2018	Model Scenario #9 March 28, 2018
Total Boardings	3,450	Green: 3,280 Blue: 3,590 Orange: 2,850 Alt. Orange: 2,850	With the BOLT and J: 3,930 Without the BOLT and J: 3,050	Bus on Shoulder: 3,590 Exclusive: 3,810 (Net gain - 220 boardings with exclusive lane on SH119)	With the BOLT and J: 4,845 Without the BOLT and J: 4,020	3,020	Without BAT Lanes: 3,040 With all BAT Lanes: 3,130 (Net gain - 90 boardings with BAT lanes on all local streets)	AE - Longmont Orange/Boulder Blue: 2,380 AF - Longmont Orange/Boulder Purple: 2,310 BE - Longmont Blue/Boulder Blue: 2,260 BF - Longmont Blue/Boulder Purple: 2,160 CE - Rev. Longmont Purple/Boulder Blue: 2,440 CF - Rev. Longmont Purple/Boulder Orange: 2,350	3,410	3,320
Service Hours	With the BOLT and J = 37,900 + 34,700 = 72,600. Without BOLT and J = 37,900	With the BOLT and J = 74,200 - 82,700. Without the BOLT and J = 39,500 to 48,000	With the BOLT and J = 71,600 + 34,700 = 106,300. Without BOLT and J = 71,600	With the BOLT and J = 46,400 + 34,700 = 81,100. Without BOLT and J = 46,400	With the BOLT and J = 91,800 + 34,700 = 126,500. Without BOLT and J = 91,800	57,400	64,500 (4 BRT lines only without BAT lanes)	41,400 - 52,900 (Individual Routes)	84,200	84,200

SCENARIO DEVELOPMENT RESULTS: PROJECTED 2040 BRT RIDERSHIP AND SERVICE HOURS

The scenario development exercises provided information on what routes and patterns serve the community to the greatest potential, by way of the projected BRT ridership in 2040. Between the different model runs, the projected 2040 BRT ridership ranges between 1,200 and 4,020 boardings per average weekday depending on the number of BRT routes offered and frequency of that service. The annual service hours needed to generate these ridership levels range from 37,900 to 91,800 service hours. The modeling results demonstrate that ridership generally falls between 2,440 and 3,410 boardings per average weekday with annual service hours between 46,100 and 84,200, as shown in Table 3-4. This analysis determined that an increase in transit-service hours does not result in a proportional increase in transit ridership, instead there is an effect of diminishing returns as service hours are increased.

Table 3-4. Scenario Development Summary Table

BRT Scenario Development	# of Different BRT Routes Evaluated per Scenario	Peak Frequency (Minutes)						How Many Routes Included in the Ridership Forecast?	2040 BRT Daily Ridership Forecast	Annual BRT Service Hours
		5	10	15	20	25	30			
1	1							1	1,200	37,900
2	2							1	2,620	39,500
3-A	2							4	3,050	71,600
3-B	1							1	2,820	46,400
4	2							4	4,020	91,800
5	1							2	3,020	57,400
6	2							4	3,040	64,500
7	3							1	2,440	46,100
8	2	2 routes						4	3,410	84,200
		2 routes								
9	2	2 routes						4	3,320	84,200
		2 routes								

3.2.2 TIER 2 – SERVICE LEVEL AND BRT ROUTE PATTERN ALTERNATIVES EVALUATION

Using the information from the scenario development exercise, Tier 2 analyzed five transit options that included the Existing BOLT/J, Enhanced BOLT/J, 1 BRT Route, 2 BRT Routes, and 4 BRT Routes. Tier 2 analyzed the benefits of these different BRT route patterns, branches, and service operations alternatives. This evaluation did not include the physical configuration (where transit would operate on SH 119) of the project, rather, it focused on the service levels of the different branches, the routes, connectivity to local service, and station locations.

TIER 2 – BRT ALTERNATIVES DESCRIPTION

Existing BOLT/J: The existing ridership, hours of operation, frequency, and routes of the BOLT and J routes provided a baseline understanding of how transit users are traveling to and from Boulder and Longmont.

Enhanced BOLT/J: A second bus option was developed for assessment that utilizes the current BOLT and J routes, and increases service to be every half hour, bi-directional, all day. This option was developed to examine the impact of increased service without any additional capital improvements.

1 BRT Route Alternative: The 1 BRT Route alternative was derived from the NAMS recommendation, and includes 15-minute, bi-directional, all day service. This route is shown in Figure 3-3.

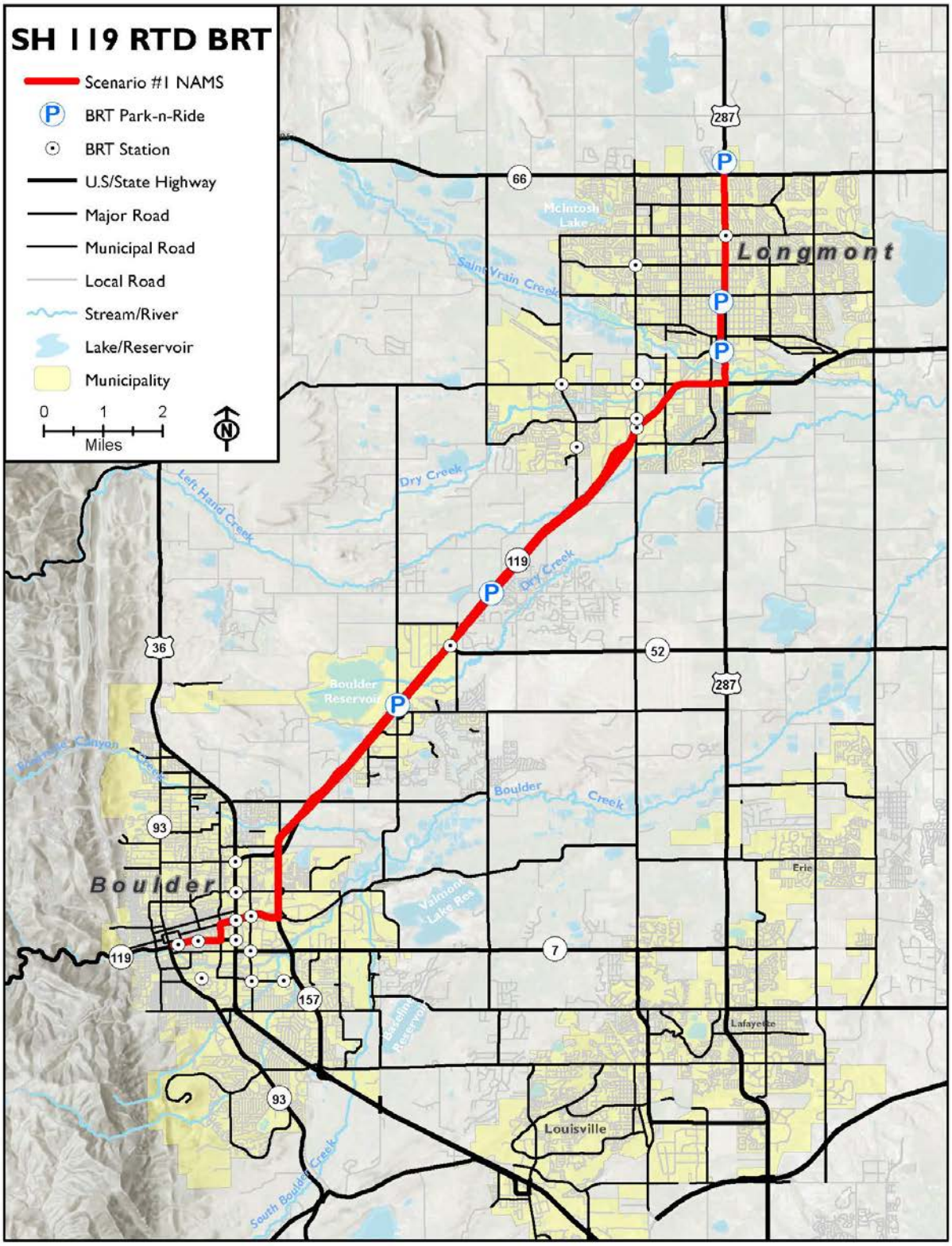


Figure 3-3. Map of 1 Route BRT Alternative (NAMS Recommendation)

2 BRT Route Alternative: This option includes the 1 BRT route plus a second route that was influenced by the J route. The first route is the same as the single-route option for the 1 BRT Route section but with service that would run all day at a 15-minute frequency. Additionally, a second route was added that would runs 30 minute all day, bi-directional, and is shown in Figure 3-4. Please note that the routes evolved over the course of the Tier 2 analyses, resulting in variations on the colored routes. This can be seen when comparing the blue and orange routes on Figures 3-1, 3-4, and 3-5.

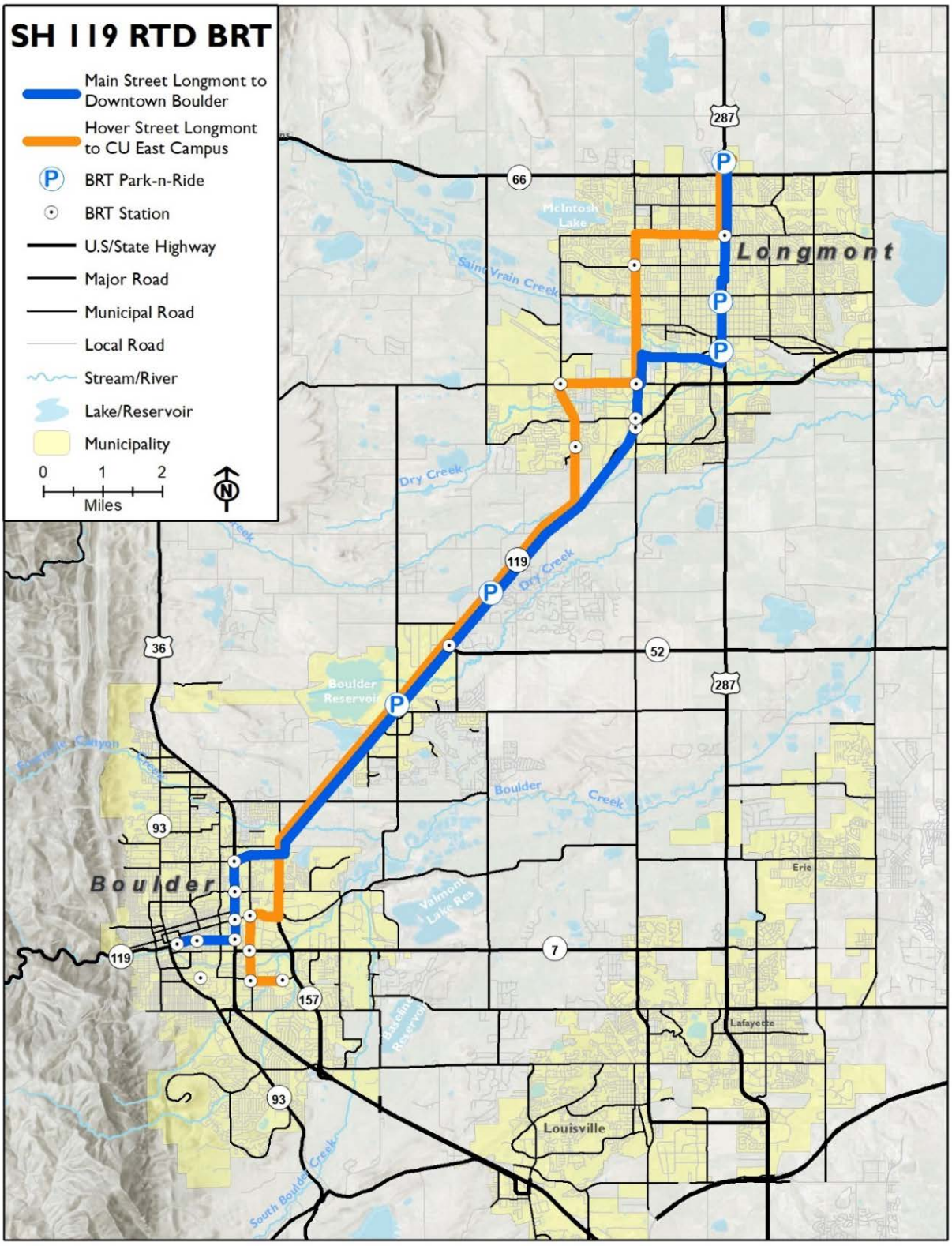


Figure 3-4. Map of 2 Route BRT Alternative

4 BRT Route Alternative: This alternative builds off the 2 BRT Route option and pairs each beginning and endpoint with each other. All routes run 30 minutes all day, bi-directional, and are shown in Figure 3-5. Figure 3-5 illustrates the final variation of the 4 BRT Route alternative analyzed in Tier 2.

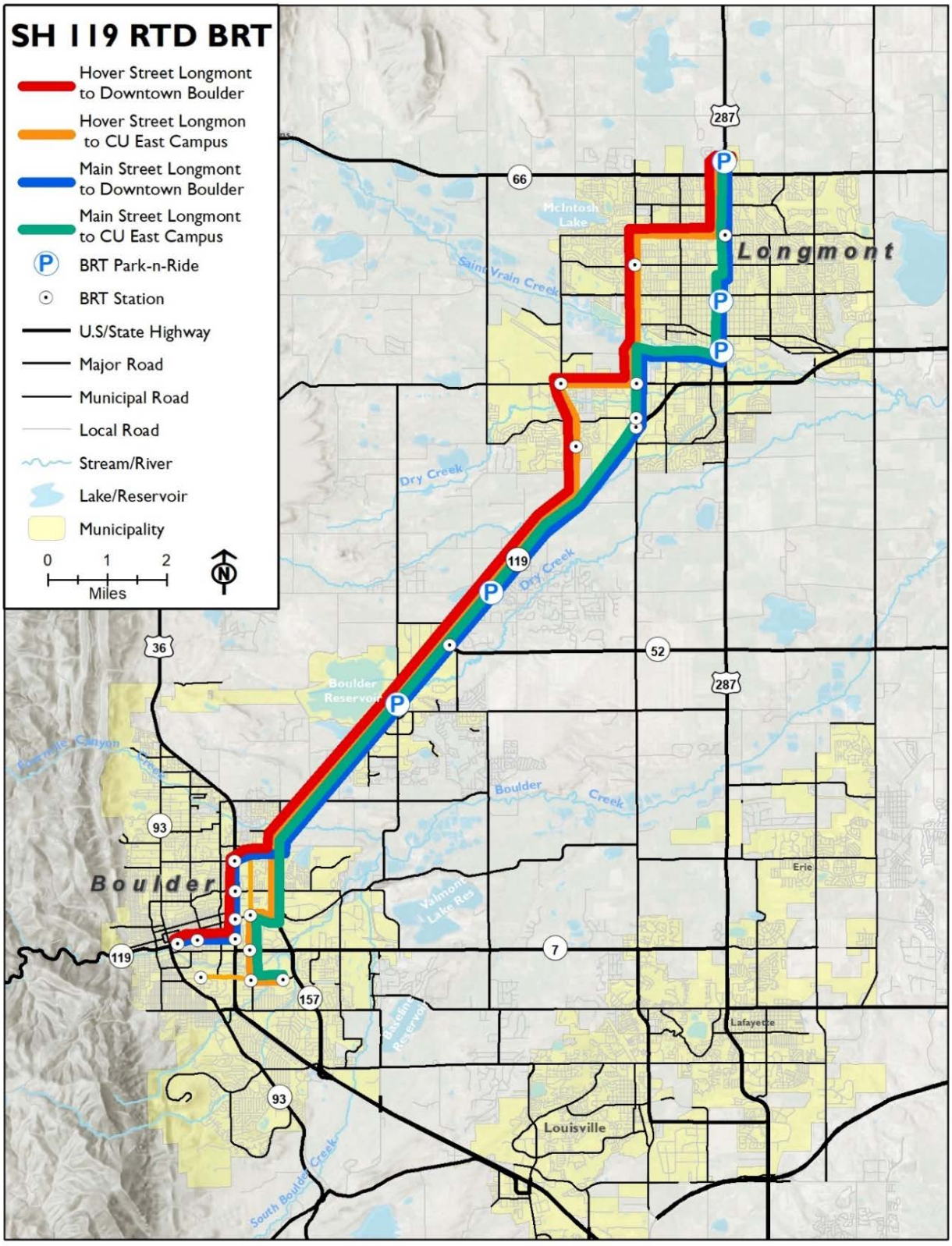


Figure 3-5. Map of 4 Route BRT Alternative

3.2.2.1 *Improvements Supporting the BRT Alternatives*

For the 1 and 2 BRT-Route alternatives, refinements to the local and regional bus network were included in the transportation models. These refinements include increased local bus service that focuses on the 300-series routes in Longmont, and multiple adjustments of local and regional routes in Boulder that are explained in Table 3-5. This set of transit improvements became the Transportation System Management (TSM) alternative that was evaluated as a standalone option as well as being included as a part of the BRT alternatives.

Table 3-5. Local Bus Service Adjustments/Refinement Included in the 1 BRT-Route and 2 BRT-Route Alternatives

Longmont	Boulder
Route 323 N – 15/30/60, split at 1st St/ Main St	Adjust STAMPEDE to operate between Euclid St/18th Ave and Discovery Dr/Innovation at 10 min all way (peak of the peak at 5 min), bi-directional
Route 323 S – 15/30/60, split at 1st St/ Main St	Remove Route 209
Route 327 – 30/30/-, Longs Peak rather than 3rd St; Alpine Ave/ 21st St rather than 17th St/Collyer St, extend southern terminus to 1st St/Main St	Increase Route 225 to 15 min, bi-directional, between Downtown Boulder Station and Mohawk Dr/Talbot Dr
	Remove Route 206 between Boulder Junction at Depot Square and Arapahoe Ave/55th St; change to 30/60 south of Arapahoe Ave to Fairview High School
Route 324 S – 15/30/60, split at 1st St/ Main St	Increase Route 236 to 15 min between current service span (10am – 3pm)
	HOP pattern adjustments: 1) Euclid Ave/18th St to DBS, 2) Euclid Ave/18th St to Canyon Blvd/Folsom Pkwy, 3) Euclid Ave/18th St to Boulder Junction at Depot Square, 4) Downtown Boulder Station to Boulder Junction at Depot Square
Route 326 – 30/30/-, extend southern terminus to 1st St/ Main St	Reduce JUMP frequency east of 63rd St to hourly mid-day
	Reduce SKIP frequency to 10 min all day
Route 324 N – 15/30/60, split at 1st St/ Main St	'Fixed Route' to simulate a 'Call-and-Ride' for Niwot/ Gunbarrel/IBM
	US 287/SH 52, via SH 52 to SH 119, to 63rd St (new Station location), to Lookout Rd

Additional physical improvements were included in the model network that was used in both the Tier 2 and Tier 3 analyses: Park-n-Rides; improvements to the local street network, operations, and the bicycle network; local transit improvements; and more than 20 transit stations. These items are explained in Table 3-6.

Table 3-6. Additional MMCV Elements that Support BRT

Elements Included	
Park-n-Ride Facilities	RTD anticipates the following Park-n-Ride facilities would serve the SH 119 BRT: ■ 63rd St/SH 119, which initial studies show that the lot could accommodate approximately 100 spaces. ■ Niwot Rd/SH 119 which currently exists as a 28-space parking lot. Initial studies show that the lot could be expanded to accommodate roughly 140 parking spaces. ■ 1st Ave/Main St in Longmont, which is planned to be built as a transit hub as a part of the FasTracks Program that would also serve the SH 119 BRT service and the future commuter rail station that is a part of the Northwest Rail; it is anticipated to have approximately 375 spaces. ■ 8th Ave/Coffman St in Longmont, which currently exists as a major transit hub and has about 175 parking spaces. ■ Park Ridge Ave/Main St just north of SH 66 in Longmont, which is planned to be built as a transit hub and 325-space lot.
Transit Stations	
Local Street Improvements	Dedicated BRT lanes on Coffman St in Longmont. BAT Lanes in Boulder on Iris Ave; between 28th St and Foothills Pkwy; 28th St between Iris Ave and Valmont Rd; and 28th St between Pearl St and Canyon Blvd.
Operational Improvements	
Local Transit Improvements	Please see Table 3-5 for details.
Bicycle Improvements	A separated bikeway corridor within the SH 119 ROW between Foothills Pkwy in

3.2.3 TIER 2 EVALUATION CRITERIA

Working with the stakeholders including the local and state agencies; PAC; and TAC 10 criteria were identified to screen the alternatives during the Tier 2 Evaluation. The criteria are consistent with the purpose and need statement and included travel time savings; BRT and local transit service hours; ridership; BRT boardings per service hour; estimates of BRT operations and maintenance costs; and cost-effectiveness criteria. These criteria are further defined in Table 3-7. Once the criteria were established, available data from the travel demand model, a transit operations-based model, and other sources were used to evaluate the alternatives.

Table 3-7. Tier 2 Evaluation Criteria Measurement Definitions

Criteria and Measurement Definitions	
1.	**Travel Time Savings:** One-way transit travel time savings of the BRT alternatives compared to BOLT and J.
2.	**Annual BRT Service Hours:** Calculated BRT (or BOLT/J) service hours.
3.	**Annual Local Transit Service Hours:** Calculated local transit service hours.
4.	**Daily BRT Ridership:** Projected BRT (or BOLT/J) average daily ridership for 2040.
5.	**Local Transit Ridership:** Projected local transit ridership for 2040 in Longmont and Boulder.
6.	**Total Transit Ridership:** Projected ridership for all transit operations for 2040.
7.	**BRT (or BOLT/J) Boardings per Service Hour:** Average weekday boardings are multiplied by a 300-day annualization factor to calculate annual boardings which are divided by annual service hours.
8.	**BRT O&M Cost:** Estimated annual operations and maintenance costs for BRT (or BOLT/J) service.
9.	**BRT Cost Effectiveness:** Annual O&M costs divided by annual boardings for BRT (or BOLT/J) service.
10	**Transit Cost Effectiveness:** Annual O&M costs divided by annual boardings for BRT (or BOLT/J) and local fixed route service.

The transportation model provided information for criteria #4, #5, and #6, while the transit operations model provided information for criteria #1, #2, #3, and #8. Results from criteria #2, #4, and #8 were used to calculate the results for the application of criteria #7, #9, and #10. The results for the Alternatives Evaluation Tier 2 – Service Level and BRT Route Pattern Alternatives are shown in Table 3-8. A No-Action Scenario, under which only existing transit operations would continue and the TSM alternative, under which improvements to the existing transit system operations were made without the addition of BRT were also evaluated as a part of the Tier 2 analyses.

Table 3-8. Tier 2 Evaluation Results

Evaluation Criteria		No-Action	Transportation System Management (TSM)	1 BRT Route	2 BRT Routes	4 BRT Routes
1.	Travel Time Savings	0	0	25.8 minutes saved	25.8 minutes saved	25.8 minutes saved
2.	Annual BRT Service Hours	46,600	64,000	40,900	56,200	65,500
3.	Annual Local Transit Service Hours	310,035	338,735	338,735	338,735	328,635
4.	Daily BRT Ridership	1,480	2,160	2,000	2,250	2,780
5.	Local Transit Ridership	Longmont: 2,040 Boulder: 24,200 TOTAL: 26,240	Longmont: 3,510 Boulder: 23,700 TOTAL: 27,210	Longmont: 4,130 Boulder: 24,200 TOTAL: 28,330	Longmont: 3,960 Boulder: 24,100 TOTAL: 28,060	Longmont: 2,980 Boulder: 23,900 TOTAL: 26,880
6.	Total Transit Ridership	27,720	29,370	30,330	30,310	29,660
7.	BRT (or BOLT/J) Boardings per Service Hour	9.5	10.1	14.7	12.0	12.7

Evaluation Criteria		No-Action	Transportation System Management (TSM)	1 BRT Route	2 BRT Routes	4 BRT Routes
8.	BRT O&M Cost	$5,138,100	$7,056,600	$5,411,600	$7,435,900	$8,666,400
9.	BRT Cost Effectiveness	$11.57	$10.89	$9.02	$11.02	$10.39
10.	Total Transit Cost Effectiveness	$3.98	$4.27	$3.96	$4.18	$4.31

Using the model results presented in Table 3-8, the five alternatives were evaluated against each other across a 5-point score system (1 being the lowest score and 5 being the highest) to quantitatively score the alternatives, with the exception of criterion #3 that had a range between 3 and 1-points. The highest score an alternative could achieve was 48 points and the lowest amount of points is 10. The scores are noted in Table 3-9. No alternatives were eliminated as a result of Tier 2 evaluation; all alternatives advanced into Tier 3 for further evaluation.

Table 3-9. Tier 2 Evaluation Scored Results

Scoring Results						
Bus and BRT Alternatives						
Evaluation Criteria		Existing BOLT/J	Enhanced BOLT/J	1 BRT Route	2 BRT Route	4 BRT Route
1.	Travel Time Savings	1	1	5	5	5
2.	Annual BRT Service Hours	4	2	5	3	1
3.	Annual Local Transit Service Hours	3	1	1	1	2
4.	BRT Ridership	1	3	2	4	5
5.	Local Transit Ridership	1	3	5	4	2
6.	Total Transit Ridership	1	2	5	4	3
7.	BRT (or BOLT/J) Boardings per Service Hour	1	2	5	3	4
Total Score		12	14	28	24	22

Legend:

- High
- Medium-High
- Medium
- Medium-Low
- Low

3.3 Tier 3

3.3.1 SCREENING OF REFINED BRT ALTERNATIVES

All five bus and BRT service/routing alternatives were carried forward from Tier 2 to the Tier 3 alternatives evaluation. Tier 3 of the SH 119 Multi-Modal PEL Study introduced three different physical configurations to the BRT routing alternatives: the BRT/bus-on-shoulder, BRT/queue jump lanes at the SH 52/SH 119 intersection, and BRT/managed lanes options. In total, the Tier 3 Evaluation included 11 permutations shown below in Table 3-10.

Table 3-10. BRT Routing Alternatives and Physical Improvement Options for Tier 3 Evaluation

Bus and BRT Alternatives		Physical Improvement Options
1.	Existing BOLT and J	None
2.	Expanded BOLT and J	None
3.	1 BRT Route	BRT/Bus-on-Shoulder
		BRT/Queue Jump Lanes at SH 52/SH 119
		BRT/Managed Lanes
4.	2 BRT Routes	BRT/Bus-on-Shoulder
		BRT/Queue Jump Lanes at SH 52/SH 119
		BRT/Managed Lanes
5.	4 BRT Routes	BRT/Bus-on-Shoulder
		BRT/Queue Jump Lanes at SH 52/SH 119
		BRT/Managed Lanes

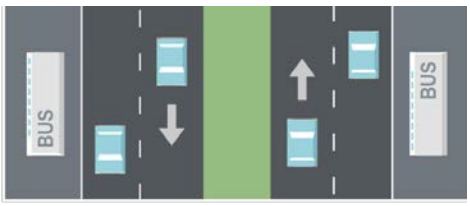
3.3.1.1 SH 119 BRT Physical Configuration Options

The three physical configuration options are specific to BRT operations on SH 119 between Boulder and Longmont. The local network is just as important as the state highway for improved transit connectivity and reliability; as such additional capital improvements to the streets within Boulder and Longmont were analyzed as a part of the Tier 3 evaluation.

BRT/BUS-ON-SHOULDER OPTION

The BRT/bus-on-shoulder option, as recommended in the NAMS, includes reconstructing the existing outside roadway shoulder on SH 119 for about 9 miles between Foothills Parkway in Boulder and Hover Street in Longmont, to make the shoulder suitable for use by BRT. This would include appropriate signage and related features that indicate BRT vehicles may operate on the shoulder to bypass the current and expected future (2040) traffic congestion and reach the head of the traffic queue at each signalized intersection. TSP at the signalized intersections would permit the buses to travel through the intersections before general-purpose traffic.

Buses would be allowed to travel on the shoulders at the discretion of the bus operator (Figure 3-6). Shoulder use for emergency responders and broken-down vehicles would continue to be permitted.



Buses would be driven on the shoulder under the following conditions:

- The traffic speed in the adjacent general-purpose lanes is less than 35 mph, any time of day.
- The bus cannot exceed the speed of traffic in adjacent general-purpose lanes by more than 15 mph, with the maximum bus speed set at 35 mph.

Figure 3-6. BRT/Bus on Shoulder

BRT station platforms would be located on the far side of the intersection at SH 52. However, at Niwot Road and 63rd Street, the southbound and northbound station platforms would both be located on the north side of the intersection with access to the Park-n-Ride facilities. These station platforms would be placed adjacent to the outside shoulders.

BRT/QUEUE JUMP LANES AT THE SH 52/SH 119 INTERSECTION OPTION

The BRT/queue jump lanes at SH 52/SH 119 includes construction of either new outside or inside lanes and either new outside or inside shoulders on SH 119 in both the northbound and southbound direction at each intersection along the corridor trunk – 63rd Street, Niwot Road and SH 52. The inside option would allow the transition from queue jump lanes to inside BRT/managed lanes, if and when appropriate.

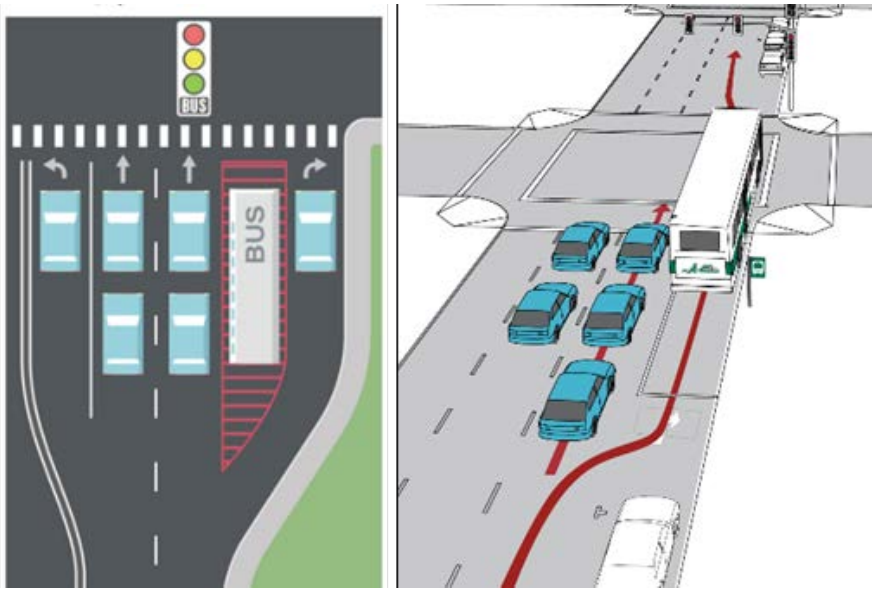


Figure 3-7. BRT/Queue Jump Lanes

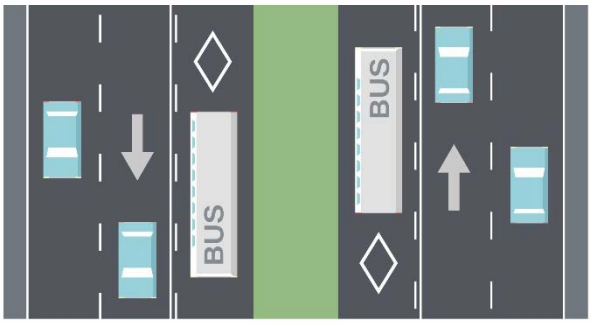
Corridor delay and travel time analysis identified the need for 5.0 total miles of BRT/queue jump lanes at SH 52 on SH 119 northbound and 5.6 total miles of BRT/queue jump lanes at SH 52 on

SH 119 southbound to allow buses to bypass the current and expected future (2040) traffic congestion to reach the head of the traffic queue at this signalized intersection. There would be a 4-foot-wide buffer between the BRT/queue jump lanes and the adjacent general-purpose travel lanes. This buffer will allow the BRT vehicles to travel at 40 mph, without the limitations associated with the BRT/bus-on-shoulder configuration Option. TSP at the signalized intersections would allow priority for the bus through the intersections. The BRT/queue jump lanes at SH 52/SH 119 represent a mid-level improvement between the BRT/bus-on-shoulder operations recommended in the NAMS and the BRT/managed lanes option evaluated in this PEL Study.

BRT station platforms would be located on the far side of the intersection at SH 52. However, at Niwot Road and 63rd Street, the northbound and southbound station platforms would both be located on the north side of the intersection with access to the Park-n-Ride facilities. These station platforms would be placed adjacent to the outside or inside BRT/queue jump lanes at SH 52/SH 119 with right-door access.

BRT/Managed Lane Option

The BRT/managed lane option includes widening of SH 119 for about 9 miles between Foothills Parkway in Boulder and Hover Street in Longmont. This includes the addition of one travel lane in each direction using available ROW in the existing median plus new inside shoulders. TSP would be implemented at the signalized intersections on this stretch of SH 119. The managed lanes would be available for use by BRT vehicles, HOV-3 vehicles, and tolled vehicles. BRT vehicles and HOV-3 vehicles would be able to access the managed lanes free of charge. Motorists would have a choice to either use the general-purpose lanes free of charge or use the managed lanes for a variable toll, similar to the facilities on I-25 and US 36 (Figure 3-8).



The variable toll, also called dynamic or congestion pricing, would be applied so that tolls would be a higher rate during peak travel times and lower during non-peak times to maintain free-flowing lanes and good LOS. There will be a 4-foot wide buffer between the BRT/managed lanes and the adjacent general-purpose travel lanes. This buffer and the variable toll will allow all vehicles in the managed lanes to travel at the posted 55/65 mph speed limits along SH 119 between Boulder and Longmont. The managed lanes and TSP at the signalized intersections would allow faster travel through the intersections for the vehicles using the BRT/managed lanes. The additional capacity of the managed lanes is expected to improve travel times for all SH 119 lanes, meaning travel time would likely be

Figure 3-8. BRT/Managed Lane Alternative

improved for general-purpose travel lanes as well. This is because the BRT/managed lane would add capacity to the state highway.

BRT station platforms would be located on the far side of the intersection at SH 52. However, at Niwot Road and 63rd Street, the northbound and southbound station platforms would be located on the north side of the intersection with access to the Park-n-Ride facilities. These station platforms would be placed in the median adjacent to a bus-only lane, separated from the managed lanes, in order to allow right-side access.

3.3.2 TIER 3 EVALUATION APPROACH

The approach used for the Tier 3 Evaluation was influenced by stakeholder involvement as well as quantitative factors from the transportation model, the Policy Options Evaluation Tool for Managed Lanes (POET-ML) evaluation, cost estimations, and transit operations model and qualitative criteria. There was a total of 15 different criteria that were used in the Tier 3 Analysis, which are listed and defined in Table 3-11. Input from the stakeholders and community members helped shape the criteria that address multi-modal needs to help identify the alternatives that would benefit all travelers including those using transit, riding bicycles, walking, driving cars, or that are willing to pay tolls. Table 3-11 also notes if the criterion was used solely for informational purpose or to score the alternatives.

Table 3-11. Tier 3 Alternatives Evaluation Criteria

Evaluation Criteria		Information OR Scored
1.	**Travel Time Savings:** One-way transit travel time savings of the BRT alternatives compared to BOLT and J.	Scored
2.	**Total Person Trip Throughput on SH 119:** Compare the difference between the existing transportation network and the alternative transportation networks for total person trip throughput in peak hour.	Scored
3.	**Improve Transit Travel Time Reliability:** The three physical configurations of the SH 119 were measured, including travel time differences: BRT/managed lanes—high; BRT/ bus-on-shoulder, BRT/queue jump lanes at SH 52/SH 119 intersection, —medium; no action (existing, mixed-flow lanes) - low.	Scored
4.	**Annual BRT Service Hours:** Calculated BRT (or BOLT/J) service hours for 2040 service.	Information
5.	**Annual Local Transit Service Hours:** Calculated local transit service hours for 2040.	Information
6.	**BRT Ridership:** Projected BRT (or BOLT/J) average annual boardings in 2040. Average weekday boardings are multiplied by a 300-day annualization factor to calculate annual boarding.	Scored
7.	**Local Transit Ridership:** Projected average annual boardings for 2040 in Boulder and Longmont. Average weekday boardings are multiplied by a 300-day annualization factor to calculate annual boarding.	Information

Evaluation Criteria		Information OR Scored
8.	**Total Transit Ridership**: Projected average annual boardings for all transit available for 2040. Average weekday boardings are multiplied by a 300-day annualization factor to calculate annual boarding.	Information
9.	**BRT (or BOLT/J) Boardings per Service Hour:** Average weekday boardings (2040) are multiplied by a 300-day annualization factor to calculate annual boardings which are divided by annual service hours.	Scored
10.	**BRT O&M Cost:** Estimated annual operations and maintenance costs (2018 dollars) for BRT (or BOLT/J) service in 2040.	Information
11.	**Capital cost:** Estimated capital cost, including fleet, of each BRT (or BOLT/J) alternative. Costs in 2018 dollars.	Information
12.	**BRT Cost Effectiveness:** Annual O&M divided by annual boardings for BRT (or BOLT/J). Costs in 2018 dollars.	Information
13.	**Funding Availability:** Amount of funding available through project partners meets the needs of the capital and O&M costs of the proposed project.	Information
14.	**Opportunity for Future Mobility Options:** At what level does this alternative support future mobility options, like autonomous vehicles.	Information
15.	**Travel Time Comparison:** Information about the difference of travel time between Vehicles and BRT Patterns from a point-to-point analysis.	Information

3.3.3 TIER 3 EVALUATION RESULTS

Of the 15 evaluation factors, 6 were used to score the 11 alternatives, while the other 9 were used for information. Capital cost was not used as a screening factor, it is provided for informational purposes and to inform the *SH 119 Funding Plan* (Economic & Planning Services, 2019). Table 3-12 conveys the detailed results of the scored criteria, which included: travel time savings, total person trip throughput, improved transit-travel time reliability, BRT ridership, and BRT boardings per service hour. Both capital costs and BRT cost effectiveness are for informational purposes only.

Table 3-12. Tier 3 Evaluation Criteria Results

Evaluation Criteria		Existing BOLT and J	Enhanced BOLT and J	1 BRT Route/ Bus on Shoulder	1 BRT Route /Queue Jump Lanes	1 BRT Route /Managed Lanes	2 BRT Routes Bus on Shoulder	2 BRT Routes /Queue Jump Lanes	2 BRT Routes /Managed Lanes	4 BRT Routes/ Bus on Shoulder	4 BRT Routes /Queue Jump Lanes	4 BRT Routes /Managed Lanes
1.	Total Travel Time (minutes)	66	66	40	38	37	40	38	37	40	38	37
2.	Total Person Trip Throughput	5,760	5,740	5,820	5,840	7,620	5,840	5,860	7,630	5,860	5,880	7,640
3.	Improve Transit Travel Time Reliability	1	1	2	3	4	2	3	4	2	3	4
4.	BRT Ridership	444,000	648,000	600,000	627,000	612,000	675,000	702,000	687,000	834,000	867,000	846,000
5.	BRT (or BOLT/J) Boardings per Service Hour	9.5	10.1	14.7	15.3	15.0	12.0	12.5	12.2	12.7	13.2	12.9
6.	Capital Cost (for informational purposes only)	$11,000,000	$13,000,000	$98,690,083	$93,905,275	$159,054,427	$123,253,029	$118,446,804	$182,389,983	$126,445,885	$121,376,499	$185,422,277
7.	BRT Cost Effectiveness (for informational purposes only)	$11.57	$10.89	$9.02	$8.63	$8.84	$11.02	$10.59	$10.82	$10.39	$10.00	$10.24

Travel Time Savings: The travel time for the existing and enhanced bus options both total 66 minutes. Regardless if the BRT alternative is the 1, 2, or 4 route option, the travel time improves as the level of capital improvement increases. For BRT/bus-on-shoulder, the travel time is reduced to 40 minutes (26 minutes saved), for the BRT queue jump lanes the travel time is 38 minutes (28 minutes saved), and if BRT/managed lanes are implemented, travel time on transit is reduced to 37 minutes (29 minutes saved).

Total Person Throughput: Similar to the travel time measure, the total person trip throughput is related to the level of capital improvements. The total person trip throughput was measured using the POET-ML analysis and includes the 2040 projected number of people traveling through the corridor in all modes: buses, vehicles, people paying express tolls, bicyclists, and carpoolers. The total person-trip throughput varies slightly, 2 percent, between the BRT/bus-on-shoulder and BRT/queue jump lanes options. The most substantial difference is when the BRT/managed lanes are introduced to any BRT pattern; this alternative increases the total person throughput in 2040 by 33 percent as shown in Figure 3-9 below.

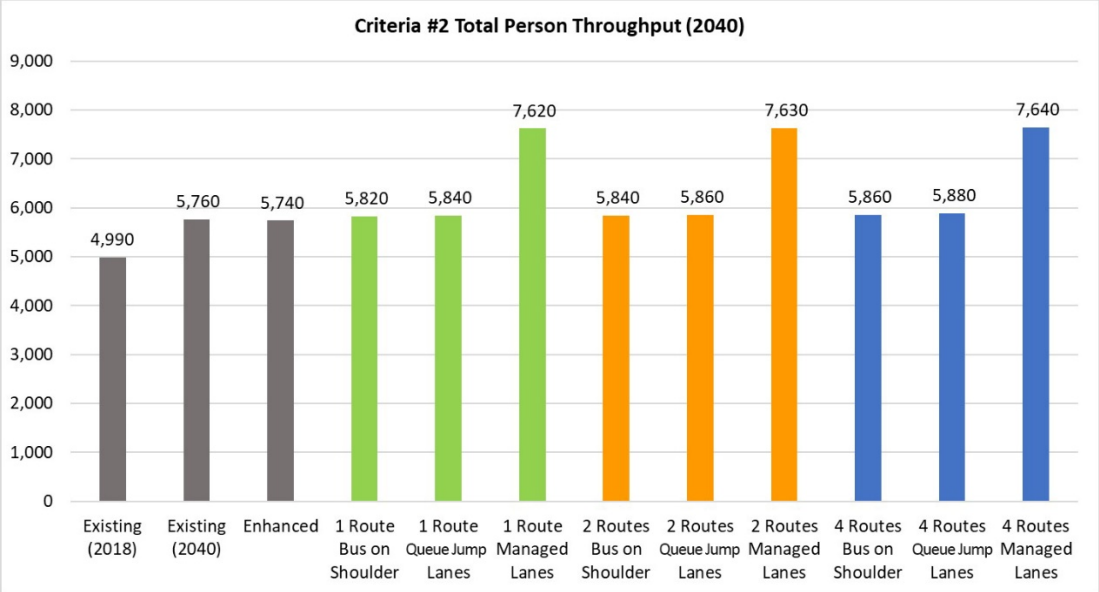


Figure 3-9. Criteria #2: Total Person Throughout (2040)

Transit Travel Time Reliability: The transit-travel time reliability is directly correlated to whether the transit option is a bus in mixed traffic, BRT/bus-on-shoulder, BRT/queue jump lanes at SH the 52/SH 119 intersection or BRT/managed lanes. The reliability increases from the current to the expanded bus option (TSM) to BRT. Reliability then continues to increase depending on the physical configuration of BRT on SH 119 between Boulder and Longmont; the BRT/managed lane option would provide the best reliability for transit riders along the SH 119 corridor.

BRT Ridership: The projected BRT and bus average annual boardings for 2040 show an increase in the number of riders depending on the amount of service available. The enhanced BOLT/J

alternative attracts more riders than any of the 1 BRT pattern options. Ridership increases with the 2 and 4 BRT-Route alternatives with the 4 BRT-Route/queue jump lanes attracting the most riders. This is because the inclusion of a managed lanes provides additional vehicular capacity and may be more appealing for people to drive HOV 3+ or pay a toll. See Figure 3-10 below.

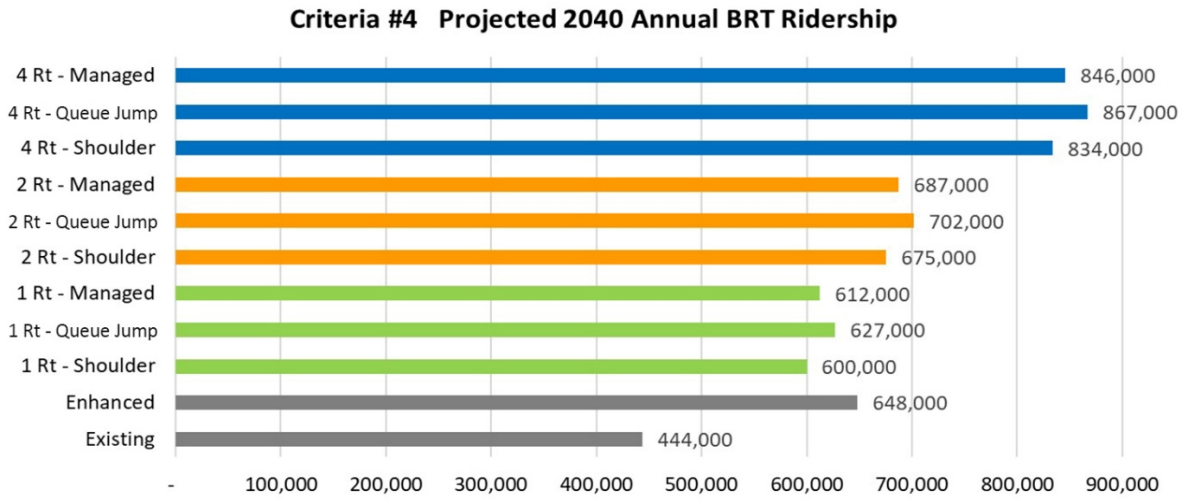


Figure 3-10. Project 2040 Annual BRT Ridership Results

BRT Boardings per Service Hour: The boardings per service hour calculation is widely used by service providers to measure the average number of people riding the bus per service hour. The higher the number, the better. The 1 BRT-Route and 4 BRT-Route alternatives provide the highest ridership per service hour in 2040. A key factor contributing to the 1 BRT-Route alternative ranking highly is the fewer service hours needed for the single BRT route. See Figure 3-11 below.

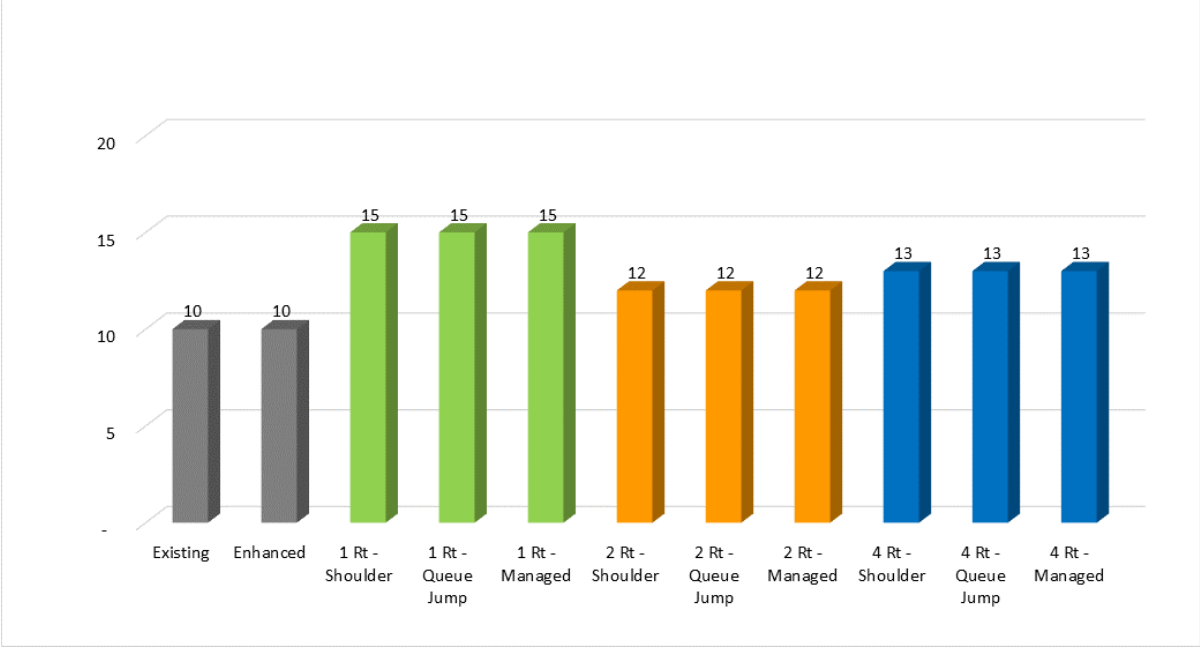


Figure 3-11. Boardings per Service Hour Results (2040)

Cost Effectiveness: Evaluating the Tier 3 alternatives from a cost effectiveness standpoint, annual operations and maintenance costs are divided by annual boardings. For this measure, the lower cost is optimal, which results in the 1 BRT-Route and BRT/queue jump lanes option as being the most cost effective. See Figure 3-12 below.

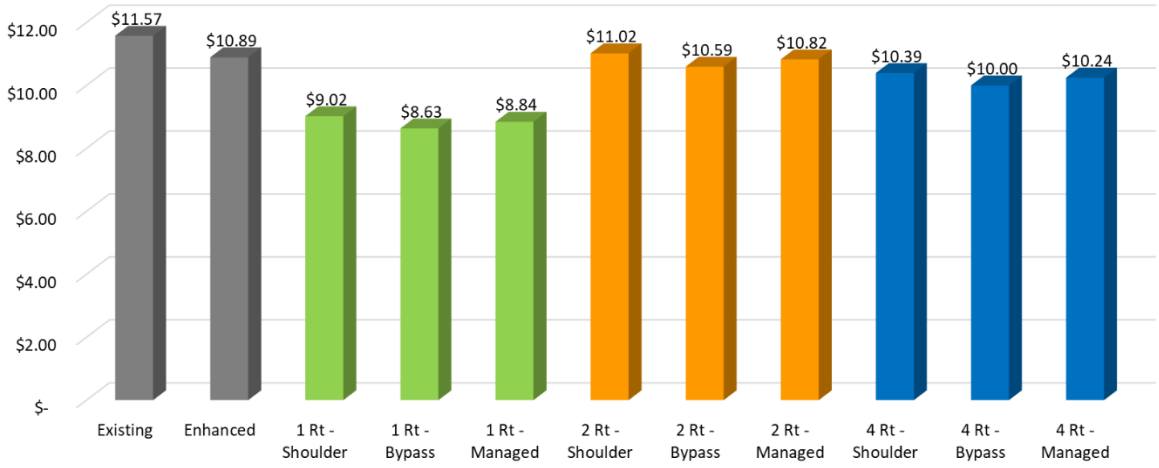


Figure 3-12. BRT Cost Effectiveness Results

3.3.4 Tier 3 Evaluation Scored Results

Error! Reference source not found. shows the results of applying the criteria to the alternatives; Table 3-13 shows how the alternatives were scored based on these results.

Table 3-12. Tier 3 Rating Comparison

Evaluation Criteria		Existing BOLT and J	Enhanced BOLT and J	1 BRT Pattern/ Bus on Shoulder	1 BRT Pattern BRT/Queue Jump Lanes	1 BRT Pattern BRT/Managed Lanes	2 BRT Patterns/ Bus on Shoulder	2 BRT Patterns BRT/Queue Jump Lanes	2 BRT Patterns BRT/Managed Lanes	4 BRT Patterns/ Bus on Shoulder	4 BRT Patterns BRT/Queue Jump Lanes	4 BRT Patterns BRT/Managed Lanes
1	Travel Time Savings	1.00	1.00	1.65	1.74	1.78	1.65	1.74	1.78	1.65	1.74	1.78
2	Total Person Throughput	1.00	1.00	1.01	1.02	1.33	1.02	1.02	1.33	1.02	1.02	1.33
3	Improved Travel Time Reliability	1.00	1.00	2.00	3.00	4.00	2.00	3.00	4.00	2.00	3.00	4.00
4	BRT Ridership	1.00	1.46	1.35	1.41	1.38	1.52	1.58	1.55	1.88	1.95	1.91
5	BRT (or Bolt/J) Boardings per Service Hour	1.00	1.06	1.54	1.61	1.57	1.26	1.31	1.28	1.34	1.39	1.36
	Total	**9.00**	**9.58**	**10.72**	**12.09**	**12.53**	**10.00**	**11.31**	**12.03**	**10.47**	**11.79**	**12.51**

Note: For informational purposes only.

The results of the Tier 3 evaluation indicate that the 1, 2, and 4 BRT-Route alternatives with the BRT/managed lane configuration provide the greatest benefit to transit riders; this is the recommended BRT alternative for inclusion in the MMCV. While the 1 BRT-Route alternative performs best overall, the 2 or 4 BRT-Route alternatives also provide:

- more coverage in both cities (similar to the BOLT/J);
- more direct, one-seat rides than single route; and
- the increase in service hours with operation and maintenance cost can be phased over time as warranted and as funding becomes available.

Related to the capital improvement aspect of the project, the BRT/managed lane alternative further provides:

- the highest travel time savings: 37-minute travel time (29 minutes saved in comparison to the BOLT);
- the best transit service reliability;
- higher transit ridership than other capital improvement options;
- the greatest number of travel options and benefits for all users: vehicles, transit, carpool, express tolls, and bicyclists while reducing congestion; and
- 7,620 – 7,640 people traveling through the corridor, a 33 percent increase compared to existing conditions with BOLT/J.
- the option of phased implementation over time as funding becomes available. If needed and approved by CDOT, the BRT/queue jump lanes could be built as an interim solution prior to constructing the BRT/managed lanes.

Working with the Agency Working Group as well as the PAC and TAC, the 2 BRT-Route alternative, operating as BRT/managed lane facility on the SH 119 between Boulder and Longmont, gained consensus as the recommendation for transit. This configuration has been presented as the recommended transit element of the MMCV to the stakeholders by way of support from the Agency Working Group and the PAC/TAC as well as extensive outreach via three public meetings, online materials, telephone townhalls, and continuous opportunities for the public to provide input and comments through the project website.

4. Recommendation Multi-Modal Corridor Vision

4.1 Vision Elements

Through the course of the SH 119 Multi-Modal PEL Study, many different types of transit and transportation improvements were discussed and analyzed with the stakeholders. While RTD has led the BRT/transit aspects of the PEL Study, it is recognized that Boulder, Boulder County, Longmont, and CDOT all have vested interests and needs for transportation improvements in the Study Area that complement and support the MMCV. Table 4-1 outlines the different project elements and agency that is anticipated to lead the implementation of the MMCV; elements are discussed in more detail below the table.

Table 4-1. MMCV Project Elements

MMCV Elements by Funding Source	Agency to Advance through Project Development
RTD-Funded Elements	
Station Enhancements (including 8th St/Coffman Park-n-Ride)	RTD
Park-n-Ride Facilities (63rd St/SH 119, SH 52/SH 119, and Niwot)	
Park-n-Ride Facility and Transit Hub (Park Ridge Ave/Main St)	
Transit Hub at 1st St/Main St that is a part of FasTracks	
DRCOG Transportation Improvement Program (TIP) Grant Funded Project Elements	
Coffman St Dedicated BRT Lanes	Longmont/CDOT
Boulder BAT Lanes (28th St: Iris Ave to Valmont Rd)	Boulder/CDOT
BRT/ Queue Jump Lanes at the SH 52/SH 119 Intersection (If needed prior to implementation of BRT/managed lanes)	Boulder County/CDOT
Unfunded Project Elements	
Boulder BAT Lanes (28th St: Pearl St to Canyon Blvd)	Boulder/CDOT
Boulder BAT Lanes (Iris Ave: 28th St to Foothills Pkwy; EB only)	Boulder/CDOT
Boulder Intersection Improvements (28th St/Iris Ave and 28th St/ Canyon Blvd)	Boulder/CDOT
Longmont Intersection Improvements (Hover St/SH 119 and Hover St/ Nelson Rd*) * CDOT will only be involved if DOT funding is involved in this intersection improvement project	Longmont/CDOT
BRT/Managed Lanes (including BRT, HOV3+, and toll; systems costs)	CDOT
Separated Bikeway Corridor	CDOT

4.1.1 Transit-Related Elements

4.1.1.1 BRT Service

BRT service is flexible and can be scaled (increased/decreased) and adjusted as corridor demands change. The proposed BRT transit service resulting from the in-depth analysis discussed in Section 3

is the 2 BRT-Route alternative with limited stop service. The blue route would run 15 minutes all day on weekdays and 15 to 30-minutes on weekends in both directions. The orange route would run 30 minutes all day on weekdays in both directions with no weekend service. Refinements to local and regional network service connections in Boulder, Gunbarrel, and Longmont are planned to improve connectivity to the BRT and mobility. Table 4-2 below lists which stations/stops are serviced by each BRT route and Figure 4-1 below depicts the routing, frequency, stations, and Park-n-Rides for the BRT service.

Table 4-2. Station/Stop Locations in 2 BRT-Route Alternative

Station/Stop Location	Blue Pattern	Orange Pattern
Boulder Stops		
CU East – Colorado Ave/Discovery Dr *or* CU Main – Colorado Ave/18th St *Orange line terminus to be determined in conjunction with CU Transportation Master Plan		X
19th St/Canyon Blvd	X	
30th St/Arapahoe Ave		X
14th St/Canyon Blvd (Downtown Boulder Station)	X	
30th St/Colorado Ave		X
28th St/Canyon Blvd	X	
28th St/Pearl St	X	
30th St/Pearl St (Boulder Junction Transit Center)		X
28th St/Valmont Rd	X	
28th St/Iris Ave	X	
SH 119 Stations		
63rd St/SH 119 (Park-n-Ride)	X	X
SH 52/SH 119 (IBM)	X	X
Niwot Rd/SH 119 (Park-n-Ride)	X	X
Longmont Stations		
Hover St/SH 119 *Northbound stop only near existing pedestrian underpass	X	
Hover St/Clover Basin Dr	X	
Hover St/Nelson Rd	X	X
Nelson Rd/Airport Rd		X
Airport Rd/Pike Rd		X
1st St/Main St (also a Park-n-Ride that is a part of RTD's FasTracks Program)		
1st Ave/Coffman St	X	
8th Ave/Coffman St (also a Park-n-Ride)	X	
Hover St/Mountain View Ave		X
Main St/17th Ave	X	X
Park Ridge Ave/Main St (Park-n-Ride)	X	X

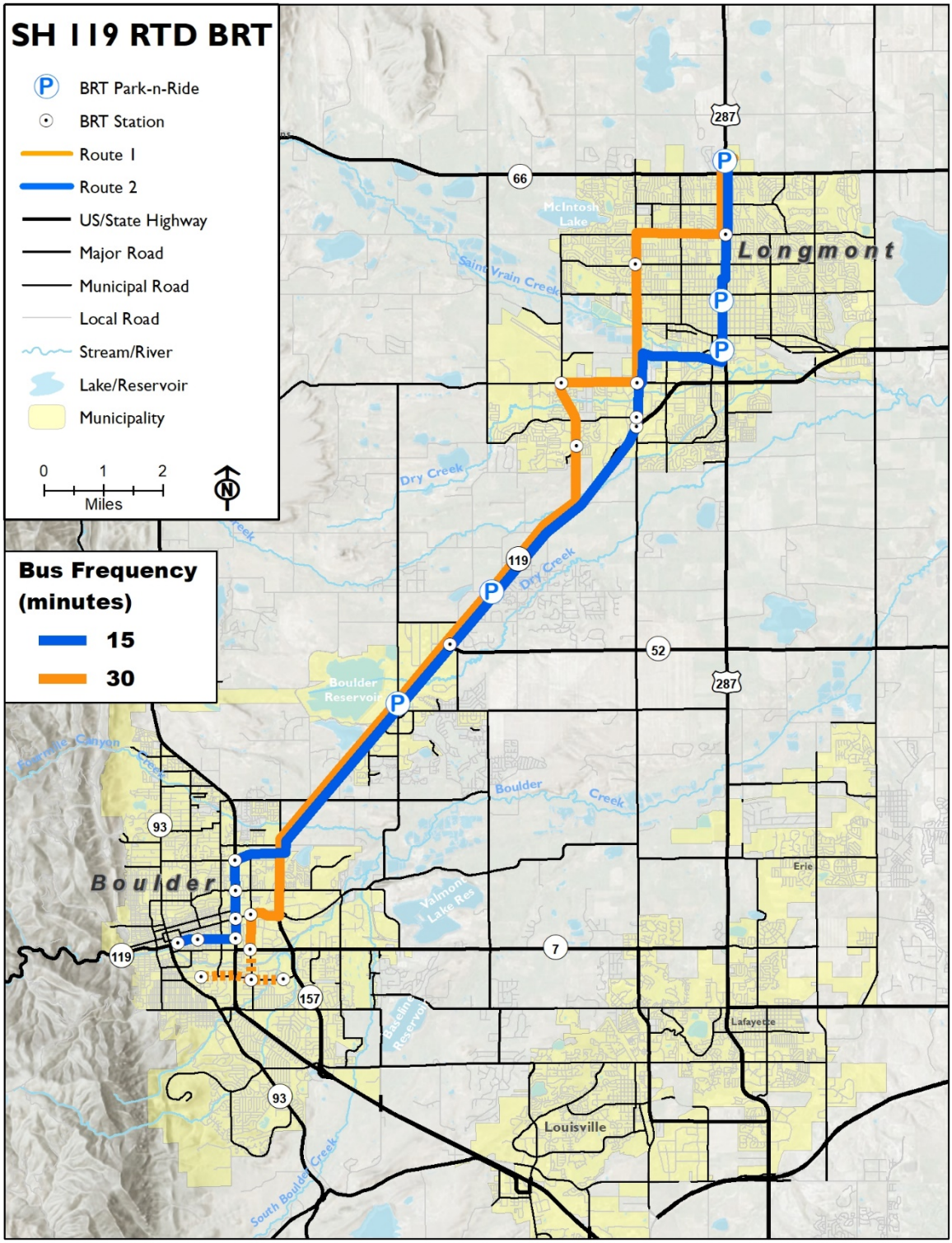


Figure 4-1. 2 BRT Routes, Station Locations, and Park-n-Rides

4.1.1.2 *BRT Stations*

Enhanced (northbound and southbound) station platforms have been developed at 23 locations along SH 119 as well as within Boulder and Longmont; this includes the 1st Street/Main Street Park-n-Ride in Longmont that is a part of RTD's FasTracks Program. The data used to determine the locations of the limited number of BRT stations includes existing BOLT/J ridership volumes by station; connectivity to local and regional bus routes; forecasted population and employment growth data; and representative coverage of service within Boulder and Longmont. The station locations were collaboratively established and refined with the stakeholders and the public.

Factors that contributed to the placement of each station in terms of whether it is located on the near-side or far-side of each intersection included available ROW; existing bus facilities/service; residential; business and commercial access; bus acceleration and deceleration requirements; RTD and local jurisdiction operational requirements; bus turning movements; and potential impacts to adjacent properties. Unless otherwise noted, each station platform is anticipated to be 60-feet long and 10-feet wide; in final design the platforms may be refined to meet site-specific constraints and needs. To address safety, security, and comfort, the stations will be well-lit with protection from weather elements by means of station shelter/canopy elements that will be further identified and defined during the final design phase collaboratively with stakeholders. Station design elements include the station envelope, roof, structure, seating, walls, and transparency. BRT branding, real time passenger information, off-board fare collection, and improved loading and unloading options will also be further refined during final design. Figure 4-2 depicts elements of a typical station that are anticipated to be incorporated in the BRT stations.

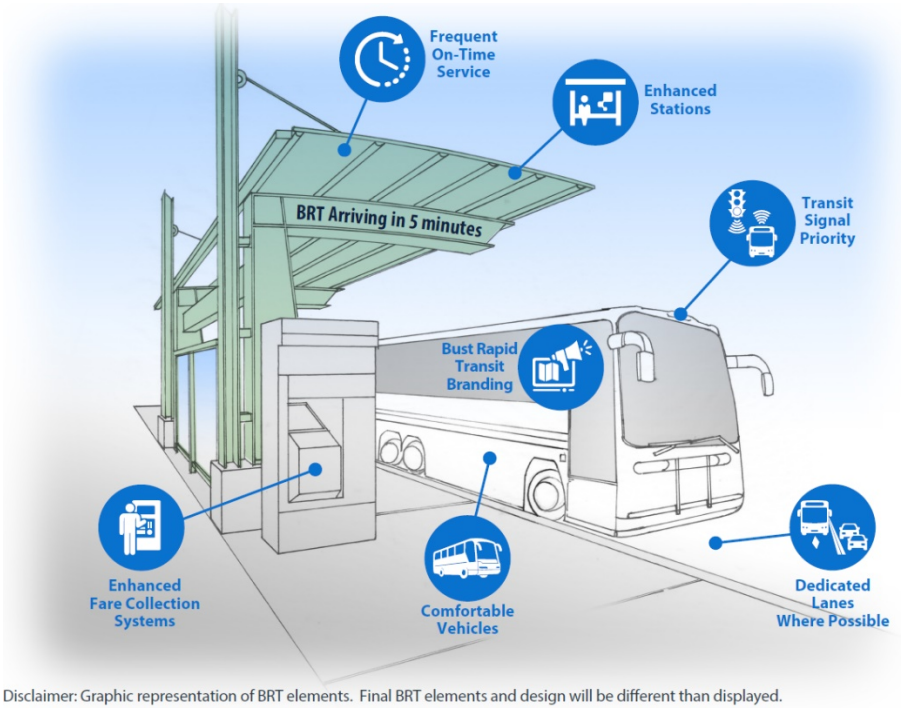


Figure 4-2. 2 Typical BRT Station Elements

4.1.1.3 BRT Vehicles

Two types of vehicles, 60' articulated buses or 45' over-the-road coaches, are currently in consideration to serve the proposed SH 119 BRT routing. MCI D4500 over-the-road coaches are currently used for operation of the BOLT/J routes in the SH 119 corridor. Electric and autonomous vehicles may also be a consideration as these technologies continue to advance. In coordination with the stakeholders, RTD will determine the BRT vehicle type during final design.

4.1.1.4 BRT/Managed Lanes Option

The recommended capital improvements to the roadway configuration include inside-running BRT/managed lanes along SH 119 between Boulder and Longmont, with one lane constructed for the northbound direction and one lane constructed for the southbound direction as shown in Figure 4-3. BRT/managed lane users include BRT riders, HOV of three or more people, and toll-paying drivers. The three stations along SH 119 between Boulder and Longmont shown in Table 4-2 will be placed in the center median of SH 119 adjacent to the BRT/managed lanes and the corresponding Park-n-Ride facilities.

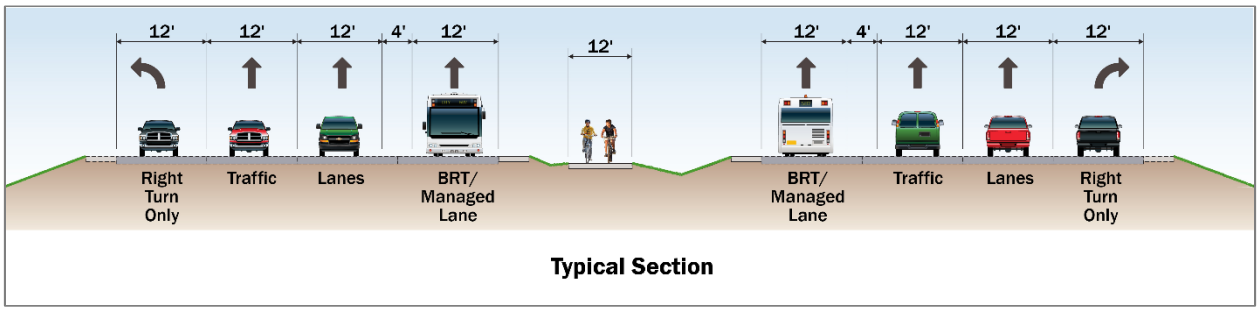


Figure 4-3. 2 SH 119 BRT/Managed Lane Cross Section

4.1.2 Separated Bikeway Corridor

Bicyclists traveling in Boulder and Longmont currently utilize intermittent off-street trails and on-street bicycle facilities where available. For those traveling between the cities the most routes are on the outside shoulders of SH 119. Due to increasing safety concerns of bicyclists traveling on the shoulder next to vehicles traveling up to 65 mph, CDOT is conducting the *Diagonal Highway Bicycle and Pedestrian Connectivity Study*. The recommendations include a separated proposed 12-foot shared-use path along SH 119 between Foothills Parkway in Boulder and Hover Street in Longmont. CDOT is evaluating alignment alternatives of this future bikeway that could travel on the northwest side, center median, or the southeast side within the SH 119 ROW. Figure 4-4 depicts a typical section of the shared-use path along SH 119 between Boulder and Longmont.

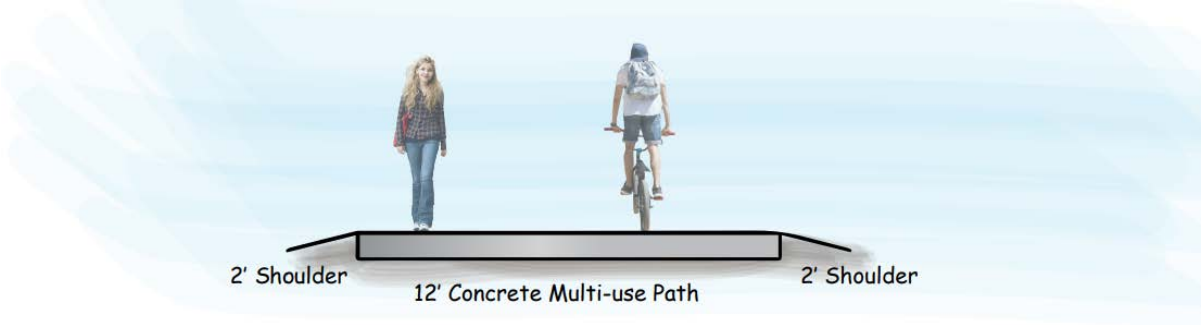
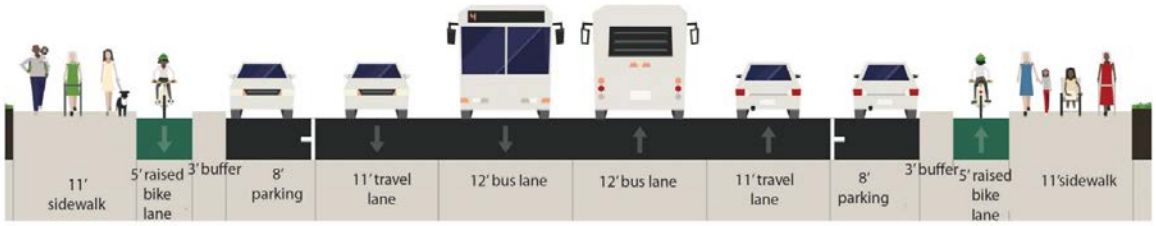


Figure 4-4. 2 Shared-Use Path Typical Section

4.1.3 COFFMAN STREET DEDICATED BRT LANES

The Coffman Street Dedicated BRT Lanes would be dedicated, center-running bus-only lanes on Coffman Street between 1st and 9th Avenues in Longmont. The BRT service would utilize the dedicated lanes to bypass general-purpose traffic and congestion. The conceptual design was developed in the Longmont Enhanced Multi-use Corridor Plan (Longmont, 2018). Funding for the Dedicated BRT Lanes was included as part of Boulder County's SH 119 Bus Rapid Transit Enhancements Regional Share Project Application for the DRCOG fiscal year (FY) 2020-2023 TIP call for projects. Improvements would be made to pedestrian crossings and the access to the BRT station at 8th Avenue/Coffman Street. See Figure 4-5 for a concept rendering of the Coffman Street Dedicated BRT Lanes.



Source: Longmont Enhanced Multi-use Corridor Plan, 2018

Figure 4-5. 2 Coffman Street Dedicated BRT Concept

4.1.4 BOULDER BAT LANES

28th Street – between Iris Avenue and Valmont Road

Continuous BAT lanes are planned in Boulder on 28th Street between Iris Avenue and Valmont Road. They would be located on the outside curb lanes and would be designated for transit-only use and right-turning vehicles. The BAT lanes would function as a transit-only lane where there are no driveways or intersections. BAT lanes allow buses to bypass queuing in the general traffic lanes. Funding for these BAT lanes was included as part of Boulder County's SH 119 Bus Rapid Transit Enhancements Regional Share Project Application for the DRCOG FY 2020-2023 TIP call for projects. There are portions of the BAT lanes that are already constructed on 28th Street.

Iris Avenue – between 28th Street and Foothills Parkway eastbound only; between Pearl Street and Canyon Boulevard

With the same configuration and access requirements as the BAT lanes on 28thStreet, BAT lanes are anticipated on Iris Avenue between 28th Street and Foothills Parkway (eastbound direction only) and on Iris Avenue between Peral Street and Canyon Boulevard to improve BRT travel time and reliability.

4.1.5 Boulder Intersection Improvements

In addition to the Boulder BAT lanes, improvements would be made at the 28th Street/Iris Avenue as well as 28th Street/Canyon Drive intersections to provide right-curb, bus-only left turns. The bus-only left-turns would be coordinated with the existing double-left turn signal phasing to ensure safe operation.

4.1.6 Longmont Intersection Improvements

Intersection improvements in Longmont are in the planning stages at Hover Street/SH 119 as well as at Hover Street/Nelson Road. Improvements under evaluation include lane reconfigurations for improved operations, TSP for buses, transit lanes, and grade separation.

4.1.7 BRT/Queue Jump Lanes at SH 52/SH 119

The BRT/queue jump lanes at the SH 52/SH 119 intersection are anticipated to be constructed, if needed, prior to implementation of BRT/managed lanes. They would be constructed on SH 119 at the northbound and southbound approaches of the SH 52 intersection and would address the significant AM and PM peak period congestion. They would be extended intersection queue jump lanes providing buses a dedicated transit lane to pass traffic queues that can extend over a mile in each direction as noted in the *SH 119 Traffic Report* in Appendix C (Apex, 2019). If constructed, the queue jumps are expected to be between 2500 feet and 1 mile in length. In addition to transit riders, the BRT/queue jump lanes at SH 52/SH 119 also benefit general-purpose traffic by removing transit vehicles from them. Funding for this project was included as part of Boulder County's SH 119 Bus Rapid Transit Enhancements Regional Share Project Application for the DRCOG FY 2020-2023 TIP call for projects.

It should be noted that a grade separated interchange at SH 52/SH 119 was included in the DRCOG 2040 Metro Vision Regional Transportation Plan adopted on April 18, 2018; it is intended to significantly improve traffic and transit operations through the intersection. If constructed, it would preclude the need for BRT/queue jump lanes at SH 52/SH 119 at this location. However, the SH 52/SH 119 interchange has not advanced into final design.

4.2 Cost Estimates for MMCV Elements

The capital cost estimates are based on conceptual design (

Table 4-3). It is expected that these costs will be refined as the elements advance further into NEPA studies and design. The projected cost for implementing the entire MMCV in 2023 dollars is just over $246 million. However, a contingency was added to account for the uncertainty in timing of each element's implementation and what the costs for labor and materials will be at that time. The contingency raised the capital cost estimate to $270 million; this is the amount that was used to identify funding needs and funding sources that may be used to meet this need. Funding scenarios are discussed in Section 7 of this PEL Study.

Table 4-3. SH 119 MMCV Capital Cost Estimate (in 2023 dollars)

Project Elements	Cost*
Dedicated BRT/Managed Inside Lanes	$104,000,000
Station Platforms	$37,800,000
Coffman St Dedicated BRT Lanes (including TSP)	$7,200,000
Boulder BAT Lanes (Iris Ave to Valmont Rd; including TSP)	$6,300,000
Boulder BAT Lanes (28th St between Pearl St and Canyon Blvd eastbound only; Iris Ave between 28th St and Foothills Pkwy)	$5,600,000
Boulder Intersection Improvements (28th St/Iris Ave and 28th St/Canyon Blvd)	$700,000
Park-n-Ride Facilities (63rd St/SH 119, Niwot Rd/SH 119, Park Ridge Ave/Main St)	$5,900,000
Longmont Intersection Improvements (Hover St/SH 119 and Hover St/Nelson Rd)	$29,000,000
Separated Bikeway Corridor	$32,500,000
BRT Vehicles (six additional)	$8,800,000
BRT/queue jump lanes at SH 52/SH 119 (if needed)	$8,400,000
Contingency	$23,800,000
Total Project Costs	**$246,200,000**

Source: Parsons, 2019

Notes:

*2018 cost estimates were escalated 3.0% per year to 2023 (year of expenditure)

**CDOT Regional Priority Project funds will likely be directed toward roadway or operational improvements in the corridor

As noted previously in this PEL Study, the cost of implementing all of the MMCV exceeds the funding that has been secured. The shortfall will need to be addressed before NEPA studies, if required, can be completed for the unfunded elements. Funding options are discussed in Section 7 of this PEL Study.

5. AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION STRATEGIES

This section summarizes the affected environment or the environmental context of the SH 119 Multi-Modal PEL Study Area as well as the potential impacts that would occur with the implementation of the MMCV. Additionally, it identifies potential mitigation strategies and next steps for advancing the MMCV.

While each MMCV element is being addressed in the SH 119 Multi-Modal PEL Study, their implementation, including NEPA studies (if required), will be completed by different agencies including RTD, CDOT, Boulder, Boulder County, and Longmont. NEPA studies will be required for MMCV elements that have CDOT involvement either due to funding or if the action affects a state-owned facility, such as SH 119, 28th Street, Canyon Boulevard, Foothills Parkway, or Main Street. If elements are advanced without CDOT oversight, then a NEPA study will not be required assuming federal funding is not utilized.

The overall environmental context of the SH 119 Multi-Modal PEL Study Area varies from urban within both cities to rural along SH 119 between them. Within Boulder, the primary land uses within the SH 119 Multi-Modal PEL Study are commercial and residential. The proposed BRT routes within Boulder already have buses operating on them. The area along SH 119 between Boulder and Longmont is under Boulder County jurisdiction; the dominant land uses are agriculture and residential with some industrial and open space/parkland. In southwest Longmont, where SH 119 enters the city, the area is largely industrial. Along the proposed BRT routes within Longmont the nearby land uses are mostly residential and commercial with some open spaces/parks. Niwot, a small town, lies between Boulder and Longmont, slightly closer to Longmont, along SH 119.

5.1 Resources Not Present or Not Likely to be Affected

The implementation of the MMCV Elements is expected to be within the transportation operational ROW. This ROW has been previously disturbed during the construction of the existing transportation system and dedicated for transportation uses. Below is a list of the resources either not present and/or not likely to be present along with the rationale for dismissal from further analyses (Table 5-1).

Table 5-1. Resources Not Present and/or Not Likely Impacted

Resource Dismissed from Further Analyses	Rationale for Dismissal
Archaeology	Archaeological resources are unlikely to be present due to the past construction of the existing transportation facilities.
Paleontology	Paleontology resources are unlikely to be present due to the past construction of the existing transportation facilities.
Energy	There are no energy resources within the SH 119 Multi-Modal PEL Study Area and there are already buses and other vehicles operating on the existing transportation system.
Farmlands	The operational ROW is dedicated to transportation uses; therefore, no prime or unique farmlands are present within the SH 119 Multi-Modal PEL Study Area.

5.2 Summary Tables of Affected Environment, Permanent/Temporary Impacts, and Next Steps for NEPA study (if required)

Tables 5-2 through 5-8 below include a summary of the affected environment; anticipated permanent and temporary (or construction-related) impacts; and the next steps that are expected to be required for implementation of each MMCV element. The 1st Avenue/Main Street Park-n-Ride is part of RTD's FasTracks Program and is not expected to require NEPA study. It has been grouped with the Coffman Street Dedicated BRT Lanes due to geographic proximity. Tables contain the following:

- **Table 5-2a:** Park-n-Rides located at 63rd Street/SH 119, Niwot Road/SH 119, 8th Avenue/ Coffman Street, Park Ridge Avenue/Main Street, and the stations in Boulder and Longmont
- **Table 5-2b:** BRT/Managed Lanes
- **Table 5-2c:** Coffman Street Dedicated BRT Lanes and 1st Avenue/Main Street Park-n-Ride
- **Table 5-2d:** Longmont Intersection Improvements
- **Table 5-2e:** Boulder BAT Lanes and Intersection Improvements
- **Table 5-2f:** BRT/queue jump lanes at SH 52/SH 119
- **Table 5-2g:** Separated Bikeway Corridor

Additional detail can be found in Appendix B – *SH 119 Corridor Conditions and Environmental Impacts/Mitigation Strategies/Next Steps Report* (Pinyon, 2019).

Table 5-2a. Resources that May be Impacted by BRT Stations and Park-n-Ride Facilities, those that May Require Additional Analyses, and Those That Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Threatened, Endangered, or Special-Status Species	Migratory bird and/or raptor nests were not observed to be present during site visits in 2017 completed for the SH 119 Multi-Modal PEL Study; however, suitable habitat (i.e., large trees, open space, and man-made structures) is located within a half-mile of all these elements. The Colorado Division of Parks and Wildlife (CPW) requires a half-mile buffer radius be examined for migratory bird nests. In addition, all these MMCV elements are within Bald Eagle's winter range and may contain habitat for threatened, endangered, or special-status species. **Park-n-Rides** **63rd St/SH 119:** A black-tailed prairie dog colony and several riparian areas, that may provide suitable habitat for threatened, endangered, or special-status species, are near this MMCV element in the median of SH 119 where the Park-n-Ride would be constructed. **Niwot Rd/SH 119:** There are trees that could provide habitat for migratory birds near this MMCV element. There may be suitable habitat for threatened, endangered, or special-status species in the median of SH 119 where the Park-n-Ride would be constructed. **8th Ave/Coffman St:** There are trees that could provide habitat for migratory birds near this MMCV element. **Park Ridge Ave/Main St:** The Rough and Ready Ditch flows south of the proposed Park-n-Ride facility, which may provide suitable habitat for threatened, endangered, or special-status species. **Stations** **Boulder Stations:** Several ditches, including the Boulder and White Rock Ditch; Boulder and Lefthand Ditch; and the Wellman Ditch are located near these MMCV elements in Boulder and may provide suitable habitat for threatened, endangered, or special-status species. There are trees that could provide habitat for migratory birds near this MMCV element. **Longmont Stations:** Several riparian areas and the South Peck Lateral are located near some of these MMCV elements in Longmont and may provide suitable habitat for threatened, endangered, or special-status species. There are trees that could provide habitat for migratory birds near this MMCV element.	**Permanent Impacts:** Impacts to prairie dog colonies will be analyzed in more detail during the NEPA study, along with impacts to migratory birds including Burrowing Owls and Bald Eagles. Habitat suitable for special-status species could be affected due to conversion of undeveloped lands to a transportation use. **Temporary Impacts:** There is a potential for construction including noise, light, and increased human activity to impact any migratory birds, raptors, and special-status species that may use the Study Area.	As these elements progress into further design, a biologist will need to complete surveys to identify habitat that may be suitable for threatened, endangered, or special-status species. Presence or lack of suitable habitat will need to be documented. Impacts to the habitat, if present, will be assessed to determine how these MMCV elements could affect threatened, endangered, or special-status species. Applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements during NEPA study. CDOT may require concurrence from the US Fish and Wildlife Service (USFWS) on the affected environment and potential impacts if suitable habitat is present. Pre-construction surveys for nesting migratory birds protected by the Migratory Bird Treaty Act (MBTA) will be completed if construction activities occur during the nesting season following methods set forth by the USFWS and CPW.

Table 5-2a (Cont.). Resources that May be Impacted by BRT Stations and Park-n-Ride Facilities, That May Require Additional Analyses, and Those That Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Riparian/ Senate Bill 40 (SB 40) Resources	**Park-n-Rides** **63rd St/SH 119:** No potential SB 40 resources are located at this Park-n-Ride. **Niwot Rd/SH 119:** No potential SB 40 resources are located at this Park-n-Ride. **8th Ave/Coffman St:** There are no SB 40 resources adjacent to the MMCV element. **Park Ridge Ave/Main St:** The Rough and Ready Ditch flows south of the proposed Park-n-Ride. **Stations** **Boulder Stations:** Several ditches, including the Boulder and White Rock Ditch; Boulder and Lefthand Ditch; and the Wellman Ditch that may be SB 40 Resources are located near these MMCV elements in Boulder. **Longmont Stations:** The South Peck Lateral which may be a SB 40 Resource is located near some of the Longmont stations.	**Permanent Impacts:** Impacts need to be evaluated during NEPA study once SB 40 resources are mapped. **Temporary Impacts:** Temporary impacts to riparian areas may include clearing and grubbing and removal of vegetation necessary to complete construction.	As these MMCV elements progress into further design, a biologist will need to survey SB 40 resources. Based on the design, impacts to these resources will be quantified and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. If there will be permanent impacts to SB 40 resources, a formal or informal certification from the CPW will be required. Riparian trees and shrubs two inches or greater in breast-height diameter will need to be mitigated on a one-to-one basis.

Table 5-2a (Cont.). Resources that May be Impacted by BRT Stations and Park-n-Ride Facilities, That May Require Additional Analyses, and Those That Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Fish/Wildlife	**Park-n-Rides** **63rd St/SH 119:** A black-tailed prairie dog colony and several riparian areas that could provide habitat are near this MMCV element in the median of SH 119. **Niwot Rd/SH 119:** There are large trees that could provide habitat within 0.25 miles of this MMCV element. **8th Ave/Coffman St:** There are large trees that could provide habitat within 0.25 miles of this MMCV element. **Park Ridge Ave/Main St:** The Rough and Ready Ditch flows south of the proposed Park-n-Ride facility but is likely outside the area of impact. **Stations** **Boulder Stations:** Several ditches, including the Boulder and White Rock Ditch; Boulder and Lefthand Ditch; and the Wellman Ditch that could provide habitat are located near these MMCV elements in Boulder. **Longmont Stations:** Several riparian areas and the South Peck Lateral are located near some of these MMCV elements in Longmont. These resources provide fish and wildlife habitat.	**Permanent Impacts:** Impacts need to be evaluated during the NEPA study. There may be permanent impacts to prairie dog colony and potentially other wildlife or fish including Burrowing Owls if these MMCV elements were to be constructed. **Temporary Impacts:** There may be temporary impacts to a prairie dog town and potentially other fish or wildlife if these MMCV elements were to be constructed. Temporary impacts may include clearing and grubbing and removal of vegetation necessary to complete construction.	As this project element progresses into further design, a biologist will need to determine if there have been changes in the context of the PEL Study Area. CDOT may require a Biological Resources Report or Memorandum documenting the biological resources present and impacted, or lack thereof to them. Impacts to biological resources will be assessed and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements.

Table 5-2a (Cont.). Resources that May be Impacted by BRT Stations and Park-n-Ride Facilities, That May Require Additional Analyses, and Those That Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Historic Resources/ Section 4(f)	A COMPASS database search and review of assessor's data was completed in 2018 as a part of the SH 119 Multi-Modal PEL Study for potentially historic resources 45 years old or older. There are historic and potentially historic resources located adjacent to these MMCV elements. State Highway 119 was found to be significant in CDOT's 2016 statewide historic highway inventory; the segment in this study will need to be evaluated once a project has been defined. **Park-n-Rides** Based on current Compass data, there are no known NRHP-eligible or listed resources within 100 feet of the 63rd St/SH 119, Niwot Rd/SH 119, or Park Ridge Ave/Main St Park-n-Rides. **8th Ave/Coffman St:** Based on current Compass data, there are six known NRHP-eligible or listed resources within 100 feet of this MMCV element with a determination of Not Eligible – Field. **Stations** **Boulder Stations:** Based on current Compass data, there is one known NRHP-eligible or listed resource adjacent to proposed Boulder station locations with a determination of Eligible – Field. There is potential for resources older than 45 years to be present adjacent to the station locations in Boulder. **Longmont Stations:** Based on current Compass data, there are two known NRHP-eligible or listed resources adjacent to proposed stations in Longmont. One resource was determined Eligible – Field and one resource is listed on the NRHP. There is potential for resources older than 45 years to be present adjacent to station locations in Longmont.	**Permanent Impacts:** **Park-n-Rides** Effects are unknown at this time; they will need to be evaluated during the NEPA Study. **Stations** Effects are unknown at this time; they will need to be evaluated during the NEPA Study. **Temporary Impacts:** Effects are unknown at this time; they will need to be evaluated during the NEPA Study.	The database search does not account for new properties that may be documented in a field survey or resources that have not yet been entered into the database, so there is potential for additional resources to be identified once a project has been defined. A new database search should be completed upon project initiation and a field survey may be required to determine if there are additional properties that could be eligible for listing. Also, an effects determination will be required including an evaluation of the effects to SH 119. RTD will need to coordinate with CDOT upon project initiation to determine next steps with regard to Section 106 consultation. If required, the Section 106 process can be initiated once a project is defined.

Table 5-2a (Cont.). Resources that May be Impacted by BRT Stations and Park-n-Ride Facilities, That May Require Additional Analyses, and Those That Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Water Resources	**Park-n-Rides** **63rd St/SH 119:** An unnamed drainage from Boulder Reservoir, the Boulder Feeder Canal, and Dry Creek (south) are in the vicinity, although no floodplains occur at this location. **Niwot Rd/SH 119:** The Hinman Ditch is in the vicinity of this MMCV element, although no floodplains occur at this location. **8th Ave/Coffman St:** There are no water resources or floodplains at this location. **Park Ridge Ave/Main St** The Rough Ready Ditch crosses Main St at this location, although no floodplains occur here. **Stations** Several water resources and floodplains cross these MMCV elements at the proposed station locations in Boulder and Longmont.	**Permanent Impacts:** **Park-n-Rides** **63rd St/SH 119:** This MMCV element would result in the addition of approximately 1.2 acres of new impervious surfaces that could cause an increase in runoff and stormwater discharge to nearby water resources. There would be no impacts to floodplains. **Niwot Rd/SH 119:** This MMCV element would result in the addition of approximately 1.6 acres of new impervious surfaces that could cause an increase in runoff and stormwater discharge to nearby water resources. There would be no impacts to floodplains. **8th Ave/Coffman St:** These improvements are not expected to increase impervious surface. There would be no impacts to floodplains. **Park Ridge Ave/Main St:** These improvements are not expected to increase impervious surface as the project is within operational ROW that is already paved/hard surface. There would be no impacts to floodplains. **Stations** Project improvements are not expected to increase impervious surface as they are within operational ROW that is already paved/hard surface. Development within the floodplains could cause a change in flood elevations; however, it is unlikely due to the limited ground disturbance expected by these MMCV elements and that the areas are currently paved/hard surfaces. **Temporary Impacts:** Potential temporary direct impacts on water quality during construction could be caused by soil erosion from stormwater runoff. Also, soil excavation and grading during construction could increase the risk of erosion and sedimentation of nearby water bodies.	The following permits and/or actions related to water quality and floodplains may be required as part of the proposed project: ■ Compliance with Multiple Separate Storm Sewer System (MS4) permit for CDOT, Boulder, and Longmont; ■ Construction Dewatering Operations Permit if groundwater is discharged from excavation to any waters of the State; ■ Erosion Control permit for Colorado Department of Public Health and Environment (CDPHE); ■ Storm Water Quality Control Permit (SWQCP) from Boulder County; ■ Boulder Groundwater Discharge Permit and Erosion Control Permit; ■ General Permit for Stormwater Discharges Associated with Construction Activities (the Stormwater Construction Permit) under the Colorado Discharge Permit System (CDPS) from CDPHE; ■ Sewer Use and Drainage Permits from local municipalities.

Table 5-2a (Cont.). Resources that May be Impacted by BRT Stations and Park-n-Ride Facilities, That May Require Additional Analyses, and Those That Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Wetland Resources and Waters of the US (WUS)	**Park-n-Rides** **63rd St/SH 119:** There are approximately 0.2 acres of wetland resources within the PEL Study Area. **Niwot Rd/SH 119:** There are no wetland resources located at this site. **8th Ave/Coffman St:** There are no wetland resources located at this site. **Park Ridge Ave/Main St:** There are no wetland resources located at this site. **Stations** Wetland resources are found throughout Boulder and Longmont; however, there are no impacts expected to wetland resources as a result of the proposed stations as the sites are within operational ROW.	**Permanent Impacts:** **Park-n-Rides** **63rd St/SH 119:** Roughly 0.2 acres of wetland resources and/or WUS may be permanently impacted due to the construction of the Park-n-Ride. **Niwot Rd/SH 119:** There would be no impacts to wetland resources and/or WUS. **8th Ave/Coffman St:** There would be no impacts to wetland resources and/or WUS. **Park Ridge Ave/Main St:** There would be no impacts to wetland resources and/or WUS. **Stations** Although wetland resources and WUS are found throughout Boulder and Longmont, there are no impacts expected to wetland resources as a result of the proposed stations as the sites are within operational ROW. **Temporary Impacts:** Temporary impacts during construction of the 63rd St/SH 119 Park-n-Ride may include impacts to wetland resources and/or open waters. Temporary impacts may include clearing and grubbing and removal of vegetation necessary to complete construction.	As the Park-n-Ride at 63rd St/SH 119 progresses into further design, a biologist will need to determine if there have been changes in the context of the Wetlands Study Area. Based on the design, impacts will need to be calculated and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. CDOT requires 1 to 1 mitigation of wetland resources regardless of jurisdiction. In most circumstances the U.S. Army Corps of Engineers (USACE) allows nationwide permits (NWP) to be authorized if the impacted WUS is less than 0.5 acre. A NWP typically requires 45 days to receive verification from the USACE. Should the impacts exceed 0.5 acre, an individual permit (IP) will likely be required; an IP could trigger the need to complete the NEPA 404 Merger process. Additionally, impacts exceeding 300 linear feet of a non-wetland WUS would likely require an IP. Efforts to avoid and minimize wetland and WUS impacts should be incorporated into the design of these MMCV elements.
Section 6(f) Resources	Scott Carpenter Park, a Section 6(f) resource, is located near one of the Boulder stations. Section 6(f) resources are those that have received funds from the Land and Water Conservation Fund (LWCF) and are meant to be maintained for recreational use in perpetuity.	**Permanent Impacts:** It needs to be determined during the NEPA phase whether Scott Carpenter Park would be permanently impacted by these MMCV elements, which is highly discouraged. Current concepts would not affect the Park. **Temporary Impacts:** It needs to be determined during the NEPA phase whether Scott Carpenter Park would be temporarily impacted by these MMCV elements.	Further coordination will be required during NEPA study if these MMCV will impact any Section 6(f) resource, regardless of the level of NEPA study required. It is recommended that MMCV elements avoid any Section 6(f) resource; if impacts to Section 6(f) resources are unavoidable, coordination with CPW and the National Park Service (NPS) will be required.

Table 5-2a (Cont.). Resources that May be Impacted by BRT Stations and Park-n-Ride Facilities, That May Require Additional Analyses, and Those That Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Hazardous Materials	**Park-n-Rides** **63rd St/SH 119:** There are two low-potential sites within a 0.25-mile radius of this MMCV element based on a GeoSearch database search conducted in 2018 as a part of the SH 119 Multi-Modal PEL Study (GeoSearch, 2018). **Niwot Rd/SH 119:** There are three low-potential sites and one high potential site within a 0.25-mile radius of this MMCV element based on a GeoSearch database search conducted in 2018 as a part of the SH 119 Multi-Modal PEL Study (GeoSearch, 2018). **8th Ave/Coffman St:** A GeoSearch database search was not conducted for areas within Longmont. **Park Ridge Ave/Main St:** A GeoSearch database search was not conducted for areas within Longmont. **Stations** **Boulder Stations:** A GeoSearch database search was not conducted for areas within Boulder. **Longmont Stations:** A GeoSearch database search was not conducted for Longmont.	**Permanent Impacts:** Depending on depths of construction necessary, there is moderate potential for impacts during construction. The likelihood of permanent impacts from hazardous materials are dependent on the type of facility impacted. Soil or surface contamination could be present based on past land uses. **Temporary Impacts:** There is potential for construction to encounter hazardous materials adjacent (within a 0.25-mile radius) to these MMCV elements; however, this depends on ground disturbance depths during construction. Because of the limited ground disturbance expected, temporary impacts from hazardous materials are anticipated to be minimal.	CDOT Form 881 and potentially a Phase I Initial Site Assessment (ISA) will be required for these MMCV elements. A current database of known Recognized Environmental Conditions (RECs) will need to be obtained within 180 days of CDOT's approval of the first/top part of the CatEx Form 128. If facilities of concern are identified adjacent to the elements and depths of construction may impact these facilities, a Phase I Investigation and a Materials Management Plan (MMP) should be completed.
Air Quality	These MMCV elements fall within the following nonattainment and maintenance areas: Denver-Boulder carbon monoxide (CO) maintenance area; Denver Metro particulate matter (PM)10 maintenance area; the Longmont CO maintenance area; and Denver-Boulder-Greeley-Ft. Collins-Loveland ozone (O3) nonattainment area (CDPHE, 2005a, CDPHE, 2005b, CDPHE, 2005c, CDPHE, 2008).	**Permanent Impacts:** These MMCV elements are not a significant source of emissions; no permanent impacts are expected. **Temporary Impacts:** Neighboring areas could be exposed to construction-related and fugitive dust emissions during the construction phase.	Federal funding can only be used for projects that comply with the conformity provision of the Clean Air Act and the Environmental Protection Agency's (EPA's) transportation air quality conformity regulations (40 CFR 51 Subpart T, and 40 CFR 93 Subpart A). The project must be included in a conforming Transportation Improvement Program (TIP) and the Regional Transportation Plan (RTP). For MMCV elements within a nonattainment or maintenance area will need to be evaluated to determine if they are a project of air-quality concern requiring modeling of PM10 or if current and/or projected future conditions meet any of the four criteria for modeling of CO during the NEPA study.
Noise	The SH 119 Multi-Modal PEL Noise Study Area includes residences, trails, parks, and commercial facilities that are considered sensitive noise receptors. The Noise Study Area for this PEL has been defined as a 500-foot buffer around the existing edge of pavement for SH 119 between Boulder and Longmont; this is a preliminary study area. During future NEPA studies, the noise study area will be modified to be 500-feet from the proposed edge of pavement.	**Permanent Impacts:** Potential noise impacts are unknown at this time and will need to be assessed during the NEPA study. **Temporary Impacts:** There is potential for temporary noise impacts during construction, for example there could be temporary noise impacts due to the use of construction equipment.	FHWA Guidance states that "construction or expansion of an existing ride-share lot and access roads to a ride-share lot are a Type I project (FHWA, 2011)." Therefore, the Park-n-Ride facilities meet CDOT's criteria that classify them as a Type I Project that requires a noise analysis. As such the future NEPA study will require a noise analysis, including noise modeling for the Park-n-Ride facilities as this is a Type I project.

Table 5-2a (Cont.). Resources that May be Impacted by BRT Stations and Park-n-Ride Facilities, That May Require Additional Analyses, and Those That Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Environmental Justice (EJ)	There are EJ populations adjacent to the Park-n-Rides and stations. EJ populations are those that have a higher percentage of low-income and/or minority residences than the local jurisdictions.	**Permanent Impacts:** The project is anticipated to directly benefit EJ populations as well as the general population by providing enhanced transit access contributing to increased transportation choices and greater overall mobility. **Temporary Impacts:** Temporary impacts to EJ populations due to construction of these MMCV elements may occur in the form of detours, construction dust, and/or construction noise. In areas where there are EJ populations, and they make up the majority of the census tract or block groups that would be affected, they could be disproportionally affected by construction. These areas are primarily along parts of the BRT routes and stops/stations in both Boulder and Longmont.	CatExes do not typically require EJ analyses unless it is identified as a sensitive resource. As there are concentrations of low-income and/or minority populations present around these MMCV elements, an updated technical memorandum may be requested to reflect future updates to US Census data. As project-specific studies are undertaken, they will build upon the EJ outreach conducted during the PEL study. Outreach efforts during the PEL study included meeting with five organizations serving the Hispanic and low-income populations in Boulder and Longmont and translating project materials into Spanish, which is the second most commonly used language in these cities.

* The resources impacted and the level of effort to document them is based on analyses from the SH 119 Multi-Modal PEL Study. The agency sponsoring the improvements will need to scope the project with CDOT and other jurisdictional agencies upon initiation of the NEPA study.

Table 5-2b. Resources that Are Not Expected to be Impacted by the RTD MMCV Elements— BRT Stations and Park-n-Ride Facilities, and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Context	Anticipated Environmental Impact	Next Steps for NEPA Study
Vegetation/ Noxious Weeds	The vegetation present within the SH 119 Multi-Modal PEL Study Area mainly consists of mowed grasses, shrubs, and trees. Noxious weeds may be present.	**Permanent Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources. **Temporary Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources.	The presence of noxious weeds would be evaluated during future field visits. Best Management Practices (BMPs) will need to be included in the plan set to limit the risk of spreading noxious weeds during construction.
Social and Community Resources/Parks and Trails/ Section 4(f)/ Non-Historic Resources	**Park-n-Rides** **63rd St/SH 119:** There is a multi-use trail on the west side of 63rd St. **Niwot Rd/SH 119:** No social and community resources are located at this facility. A bicycle route/lane is located east of northbound SH 119; however, it would not be impacted by this MMCV element. **8th Ave/Coffman St:** This existing Park-n-Ride facility is near several social and community resources including Roosevelt Park, the St. Vrain Memorial Building, and a church on the west side of Coffman St. Roosevelt Park is considered a Section 4(f) resource. **Park Ridge Ave/Main St:** On-street bike routes are located near this Park-n-Ride along both Park Ridge Ave and Main St. A church is located near the northwest corner of this intersection. **Stations** **Boulder Stations:** Social and community resources at or near the Boulder stations include multi-use paths, bike lanes, and transit centers. Scott Carpenter Park, a Section 4(f) resource, is also located near one of the stations. **Longmont Stations:** Several social and community resources exist near the proposed stations in Longmont. These include sidewalks, off-street side paths, and on-street bike lanes. The Boulder County Fairgrounds is located directly east of the Hover St/Nelson Rd station, while Roosevelt Park [a Section 4(f) Resource] is located west of the Coffman St/8th Ave station.	**Permanent Impacts:** **Park-n-Rides** **63rd St/SH 119:** The multi-use trail would not be permanently impacted by construction. **Niwot Rd/SH 119:** There would be no permanent impacts to social/community resources at this location. **8th Ave/Coffman St:** No permanent impacts likely would occur to these resources including Roosevelt Park, but this needs to be evaluated during the NEPA phase. **Park Ridge Ave/Main St:** These resources would not be permanently impacted by the Park-n-Ride, which is currently a paved parking lot. **Stations** **Boulder Stations:** No permanent impacts likely would occur to the multi-use paths, bike lanes, transit centers, or Scott Carpenter Park, but this needs to be evaluated during the NEPA phase. **Longmont Stations:** The sidewalks, off-street side paths, and on-street bike lanes, Boulder County Fairgrounds, and Roosevelt Park would incur no permanent impacts from the Longmont stations. **Temporary Impacts:** **Park-n-Rides** **63rd St/SH 119:** The multi-use trail may be temporarily impacted during construction. Detours should be put in place during construction to maintain access, if access is likely to be disrupted. **Niwot Rd/SH 119:** There would be no temporary impacts. **8th Ave/Coffman St:** It is unlikely that Roosevelt Park would be temporarily impacted by the MMCV element, but this needs to be evaluated during the NEPA phase. **Park Ridge Ave/Main St:** The on-street bike routes may be temporarily impacted during construction activities.	Further coordination will be required during the NEPA study if these MMCV elements will impact any Section 4(f) resource, regardless of the level of NEPA study required. If impacts are temporary and/or beneficial to the resource, coordination will consist of documentation and notification/coordination with the Official with Jurisdiction. Detours during construction may be required to maintain access to recreational Section 4(f) resources.

Table 5-2b (Cont.). Resources that Are Not Expected to be Impacted by the RTD MMCV Elements— BRT Stations and Park-n-Ride Facilities, and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Context	Anticipated Environmental Impact	Next Steps for NEPA Study
		Stations **Boulder Stations:** The multi-use paths, bike lanes, and transit centers may have minor disturbances during construction. It is unlikely that Scott Carpenter Park would be impacted by these MMCV elements. **Longmont Stations:** The sidewalks and bike lanes may experience minor disturbances during construction. The Boulder County Fairgrounds most likely would not be impacted by these MMCV elements. Some improvements may be made inside Roosevelt Park, temporarily impacting this Section 4(f) resource.	
Visual Resources/ Aesthetics	These MMCV elements are located in multi-modal transportation corridors surrounded by commercial, industrial, and residential uses, along with open spaces, parks, and trails.	**Permanent Impacts:** **Park-n-Rides** **63rd St/SH 119:** This MMCV element would have a neutral visual impact as it would convert a small amount of undeveloped land located between the northbound and southbound lanes of SH 119 that is within operational ROW to a Park-n-Ride and at a location where there already is a parking lot. **Niwot Rd/SH 119:** This MMCV element would have a neutral visual impact as it would convert a small amount of undeveloped land located between the northbound and southbound lanes of SH 119 that is within operational ROW to a Park-n-Ride. **Park Ridge Ave/Main St:** This MMCV element would have a positive visual impact as it would convert a current parking lot to a Park-n-Ride facility. This would upgrade the safety and aesthetics of the current parking lot, would not substantially change the visual setting or context of PEL Study Area, and it is compatible with local and regional plans. **8th Ave/Coffman St:** This MMCV element would have a positive visual impact as it would convert a current parking lot to a Park-n-Ride facility. This would upgrade the safety and aesthetics of the current parking lot and would not substantially change the visual setting or context of the SH 119 Multi-Modal PEL Study Area and is compatible with local and regional plans. **Stations** These MMCV elements would have a positive visual impact as they would update signage, accessibility, and branding at the stations to be consistent. This would not significantly change the visual setting or context of PEL Study Area and is compatible with local and regional plans. **Temporary Impacts:** Minor, temporary impacts may occur to visual resources if these MMCV elements are constructed, primarily due to the presence of construction equipment.	Visual resources/aesthetics are not typically evaluated as part of a CatEx unless there is a sensitive viewshed nearby or large change in the visual context due to the proposed improvements. At the time of the NEPA study, coordination with CDOT will be required to determine if there is a need to complete a Visual Impact Assessment (VIA). CDOT may require completion of a Visual Impact Checklist to determine the need for a VIA.

Table 5-2b (Cont.). Resources that Are Not Expected to be Impacted by the RTD MMCV Elements— BRT Stations and Park-n-Ride Facilities, and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Context	Anticipated Environmental Impact	Next Steps for NEPA Study
Soils and Geology	These MMCV elements are not located within sensitive or unique soils/geology.	**Permanent Impacts:** Excavation within existing operational ROW may be required. There would be no impact to mineral of geological resources as the areas have already been designated for transportation uses. **Temporary Impacts:** The potential for temporary soil erosion during construction will be minimized by use of BMPs including soil wetting and use of soil erosion blankets.	Data has been collected as a part of the SH 119 Multi-Modal PEL Study. No further study is anticipated to be required for soils or geology regardless of whether a NEPA study is completed. This resource is not typically evaluated during a CatEx, which is the expected level of NEPA study, unless there is a sensitive soil/geologic unit present of concern.
Land Use	The land use adjacent to these MMCV elements is a mix of residential, commercial, recreational/open space, and industrial uses.	**Permanent Impacts:** The Park-n-Rides and stations are anticipated to be within existing operational ROW and are compatible with regional and local land use policies and plans. There is no anticipated effect to land use from implementation of these MMCV elements. **Temporary Impacts:** No temporary impacts to land use would occur if the Park-n-Rides and stations are implemented as the construction would be within operational ROW.	No further analyses are anticipated to be required for land use if these elements remain with the operational ROW.
Socio-economics	A variety of socio-economic classes, households, and employment opportunities exist in the vicinity of the Park-n-Rides and stations.	**Permanent Impacts:** The Park-n-Rides and stations would benefit local neighborhoods and communities by improving access, mobility, safety, and enhancing multi-modal transportation connectivity. **Temporary Impacts:** Temporary impacts during construction could occur as residents and business patrons could be temporarily affected by limited access, traffic congestion, dust, and noise.	Data has been collected for socio-economic resources as part of the SH 119 Multi-Modal PEL Study. Additional studies are not expected to be necessary during the NEPA study. However, if there are changes in the preliminary design of these MMCV elements updates could be required.
Transportation Resources	The SH 119 Multi-Modal Study Area is used by personal vehicles, trucks, pedestrians, and bicyclists as well as bus routes.	**Permanent Impacts:** Constructing the Park-n-Ride facilities and stations would reduce congestion; improve safety and traffic operations; improve multi-modal connectivity; and improve signage for multi-modal users. **Temporary Impacts:** Temporary impacts during construction activities could impact transportation facilities through roadway and lane closures; detours; increased congestion; and increased travel time.	Traffic analyses completed during the SH 119 Multi-Modal PEL study were based on a planning, or horizon, year of 2040. Should the planning year be 2045 or later when the NEPA study for these elements are undertaken, additional study or a sensitivity analyses could be required to confirm/modify the conceptual design to meet the needs of traffic forecasted for that year.
Utilities	There are numerous utilities including water lines, wastewater, electric, and gas lines.	**Permanent Impacts:** Utilities may need to be relocated if these MMCV elements are implemented, with no permanent loss of service. Impacts will need to be assessed during future NEPA study. **Temporary Impacts:** Relocation of underground utilities within the ROW may be required as part of the construction activities. There may be a temporary loss of service during utility relocations. In addition, there may be a temporary impact to traffic signals during construction.	Utilities would need to be surveyed and avoidance or relocation measures incorporated into the plan set, as appropriate.
ROW	The operational ROW is bordered by a variety of land uses including residential, commercial, and industrial uses. The current conceptual designs would not require ROW acquisition or easements.	**Permanent Impacts:** No permanent ROW impacts would occur if these MMCV elements are implemented as currently designed. **Temporary Impacts:** No temporary ROW impacts are anticipated to occur if these MMCV elements are implemented.	During final design ROW impacts, or the lack thereof, would need to be confirmed.

Table 5-2b (Cont.). Resources that Are Not Expected to be Impacted by the RTD MMCV Elements— BRT Stations and Park-n-Ride Facilities, and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Context	Anticipated Environmental Impact	Next Steps for NEPA Study
Paleontological Resources	These MMCV elements would be constructed within previously disturbed ROW that is currently used for transportation purposes. Paleontological resources are unlikely to be present due to the past construction of the existing transportation facility.	**Permanent Impacts:** No permanent impacts to paleontological resources are anticipated if these MMCV elements are implemented. **Temporary Impacts:** No temporary impacts to paleontological resources are anticipated if these MMCV elements are implemented.	No further analysis is anticipated to be required if these MMCV elements are implemented as currently designed due to the previously disturbed nature of the area. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set.
Archaeological Resources	A COMPASS database search was completed as a part of the PEL for known archaeological resources in the Study Area. There are no known or previously surveyed archaeological resources within 100 feet of these MMCV elements. However, the entire Study Area has not been surveyed for archaeological resources. There may be unknown archaeological resources within 100 feet of these MMCV elements, though because of the previously disturbed nature of the Study Area there is a low probability of uncovering unknown archaeological resources.	**Permanent Impacts:** No permanent impacts to archaeological resources are anticipated to occur if these MMCV elements are constructed. However, it is unknown whether archaeological resources are present underground. If archaeological resources are present, they could be impacted during construction. **Temporary Impacts:** Temporary impacts to archaeological resources are not anticipated to occur if these MMCV elements are constructed. However, it is unknown whether archaeological resources are present underground. If archaeological resources are present, they could be impacted during construction.	It is not anticipated that additional analyses related to archaeological resources would be required for theses MMCV elements. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set.

* The resources impacted and the level of effort to document them is based on analyses from the SH 119 Multi-Modal PEL Study. The agency sponsoring the improvements will need to scope the project with CDOT and other jurisdictional agencies upon initiation of the NEPA study.

Note: Please refer to the Longmont Elements table for a discussion on the 1st St/Main St Park-n-Ride, which is part of the FasTracks Program.

Table 5-3a. Resources that May be Impacted by the BRT/Managed Lanes along SH 119 between Boulder and Longmont, those that May Require Additional Analyses, and Those that Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx, Documented CatEx, or Templated EA)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Threatened, Endangered, or Special-Status Species	This MMCV element is near multiple streams, wetland resources, and riparian areas, some of which may provide habitat for various threatened, endangered, and special status species. Migratory bird and/or raptor nests were not observed to be present during sites visits in 2017 for the SH 119 Multi-Modal PEL Study; however, suitable habitat (i.e., large trees, open space, and man-made structures) is located within a half-mile of this element. The CPW requires a half-mile buffer radius be examined for migratory bird nests. Multiple prairie dog towns, which serve as suitable habitat for Burrowing Owls, are located southwest of this intersection as well. This MMCV element is within Bald Eagle's winter range.	**Permanent Impacts:** Impacts to protected species, migratory birds, and Bald Eagles need to be further evaluated during the NEPA Study required to implement the BRT/managed lanes. **Temporary Impacts:** There is a potential for construction to impact migratory birds or raptors that may use the Study Area for nesting or foraging. Burrowing Owls may be temporarily impacted. Although no migratory bird or raptor nests were observed at the time of the site visit, they could be present during construction and therefore impacted.	As this element progresses into further design, a biologist will need to determine if there have been changes in the context of the PEL Study Area. Based on the design, impacts to biological resources will be assessed to determine whether this MMCV element will affect threatened, endangered, or special-status species and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. Pre-construction surveys for nesting migratory birds protected by the MBTA will be completed if construction activities occur during the nesting season following methods set forth by the USFWS and CPW.
Riparian/SB 40 Resources	Multiple waterways and riparian areas exist near SH 119, including unnamed ditches and field laterals; Boulder and White Rock Ditch; Holland Ditch; Williamson Ditch; Dry Creek; Fourmile Canyon Creek; and Lefthand Creek. These features may also be SB 40 Resources.	**Permanent Impacts:** Impacts to waterways are anticipated due to implementation of this MMCV element. Given the numerous waterways that are crossed, it is expected that SB 40 resources would be affected. **Temporary Impacts:** Temporary impacts during construction may include impacts to SB 40 resources. Temporary impacts may include clearing and grubbing and removal of vegetation necessary to complete construction.	As this MMCV element progresses into further design, a biologist needs to survey SB 40 resources that could be affected by its implementation. Based on the design, impacts to SB 40 resources will be quantified and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. An SB 40 certification from CPW will be required. Riparian trees and shrubs two inches or greater in breast-height diameter will need to be mitigated on a one-to-one basis. The level of certification (formal or informal) will be dependent on the amount of impact.
Vegetation/ Noxious Weeds	The vegetation present within the Study Area mainly consists of mowed grasses, shrubs, and trees. Noxious weeds may be present.	**Permanent Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources. **Temporary Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources.	The presence of noxious weeds would be evaluated during future field visits that are undertaken as design progresses during a NEPA study. Best Management Practices (BMPs) will need to be included in the plan set to limit the risk of spreading noxious weeds during construction.
Fish/Wildlife	Boulder and White Rock Ditch; Holland Ditch; Williamson Ditch; Dry Creek; Fourmile Canyon Creek; and Lefthand Creek; along with unnamed ditches and field laterals and undeveloped lands, may provide habitat for fish and wildlife. Multiple prairie dog towns are located adjacent to SH 119.	**Permanent Impacts:** There may be permanent impacts to prairie dog towns and potentially other wildlife or fish if this MMCV element were to be constructed due to the conversion of undeveloped land in the SH 119 ROW surrounding the existing highway to transportation use. **Temporary Impacts:** There would be temporary impacts to prairie dog towns and potentially other fish or wildlife, including Burrowing Owls, if this MMCV element were to be constructed. Temporary impacts may include clearing and grubbing and removal of vegetation necessary to complete construction.	As the BRT/managed lanes progress into further design, a biologist will need to determine if there have been changes in the context of the PEL Study Area. Based on the design, impacts to fish and wildlife will be assessed and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. CDOT will likely require documentation `in the form of a Biological Resources Report or Memorandum.

Table 5-3a (Cont.). Resources that May be Impacted by the BRT/Managed Lanes along SH 119 between Boulder and Longmont, those that May Require Additional Analyses, and Those that Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx, Documented CatEx, or Templated EA)

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Historic Resources/ Section 4(f)	In 2018, a Compass database file search and review of county assessor's data was completed as part of the SH 119 Multi-Modal PEL study, with an emphasis on resources 45 years or older. The Compass search indicated that there are five previously documented resources with field determinations adjacent to the BRT/managed lanes. State Highway 119 was identified as significant in CDOT's 2016 statewide historic highway inventory and the segment in the future project area will need to be evaluated.	**Permanent Impacts:** SH 119 between Boulder and Longmont would be permanently affected by construction of the BRT/managed lane; it is unknown at this time whether this would be an adverse or non-adverse effect. **Temporary Impacts:** Effects are unknown at this time; they will need to be evaluated during the NEPA Study.	Once a project is identified, the Section 106 process can be initiated to identify historic properties and evaluate effects. The database search does not account for new properties that may be documented in a field survey or resources that have not yet been entered into the database, so there is potential for additional resources to be identified. A new database search should be completed upon project initiation and a field survey may be required to determine if there are additional properties that could be eligible for listing. This MMCV element will need to be evaluated for effects in accordance with Section 106 of the NHPA, including an evaluation of the impact on SH 119. Additionally, once a project is defined, previously documented resources with field determinations will need to be re-evaluated and there is potential to identify additional historic resources during field surveys.

Table 5-3a (Cont.). Resources that May be Impacted by the BRT/Managed Lanes along SH 119 between Boulder and Longmont, those that May Require Additional Analyses, and Those that Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx, Documented CatEx, or Templated EA)

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Water Resources	A total of 20 water resources are crossed by the proposed BRT/managed lanes. Floodplains occur at several locations along this MMCV element.	**Permanent Impacts:** The estimated amount of new impervious surface is approximately 18 acres of new pavement for the addition of BRT/managed lanes on the inside of SH 119. Development within the floodplains could cause a change in flood elevations depending on the hydrology of the area. **Temporary Impacts:** Potential temporary direct impacts during construction on water quality could be caused by soil erosion from stormwater runoff. Also, soil excavation and grading during construction could increase the risk of erosion and sedimentation of nearby water bodies.	Construction within the identified floodplains could result in a change in current floodplain and floodway boundaries. Coordination with local jurisdictions including the Federal Emergency Management Agency (FEMA), Urban Drainage and Flood Control Division, Boulder County, Boulder, and Longmont should be conducted throughout the design process for potential impacts and permitting for work within floodplains and floodways. Floodplain modeling could likely be required to assess impacts at floodplain crossings and may require a Conditional Letter or Map Revision and Letter or Map Revision as well as permitting from local jurisdictions. The following permits and/or actions related to water quality and floodplains may be required as part of the proposed project: ■ Compliance with MS4 permit for CDOT and Boulder, Longmont, and Boulder County; ■ Construction Dewatering Operations Permit if groundwater is discharged from excavation to any waters of the State; ■ Erosion Control permit from CDPHE; ■ SWQCP from Boulder County; ■ Boulder Groundwater Discharge Permit and Erosion Control Permit; ■ General Permit for Stormwater Discharges Associated with Construction Activities (the Stormwater Construction Permit) under the CDPS from CDPHE; ■ Sewer Use and Drainage Permits from local municipalities; ■ Boulder Floodplain Development Permits

Table 5-3a (Cont.). Resources that May be Impacted by the BRT/Managed Lanes along SH 119 between Boulder and Longmont, those that May Require Additional Analyses, and Those that Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx, Documented CatEx, or Templated EA)

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Wetland Resources and WUS	There are roughly 2.6 acres of wetland resources and/or WUS within the PEL Study Area.	**Permanent Impacts:** Approximately 1.45 acres of wetland resources or WUS may be permanently impacted during construction of this MMCV element. **Temporary Impacts:** Temporary impacts during construction may include impacts to wetland resources or WUS. Temporary impacts may include clearing and grubbing or removal of vegetation necessary to complete construction.	As this MMCV element progresses into further design, a biologist will need to determine if there have been changes in the context of the Wetland Study Area. Based on the design, applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. CDOT requires 1 to 1 mitigation regardless of jurisdiction. The USACE allows for a series of NWPs to be issued—one for each impacted area as long as the impacted area(s) of WUS are less than 0.5 acres and the impacts are to different drainages or wetland complexes. If the BRT/managed lanes are permitted through a series of permits or the impacts are less than 0.5 acres, it may qualify as a NWP 14 for transportation resources. A NWP typically requires 45 days to receive verification from the USACE. However, if the impacted areas are close to each other, the agency may require one permit for the areas affected. If impacts to WUS are calculated to be over the 0.5 acre threshold at a single area of impact or areas (if the USACE requires 1 permit for multiple areas that are close to each other) triggering the need for an IP, it is recommended that coordination with CDOT and the USACE occur early in the NEPA process to ensure the Section 404 permit is completed within the project schedule. If an IP is required, the process may take up to a year to receive verification from the USACE and may trigger the need to complete the NEPA 404 Merger process.
Social and Community Resources/Parks and Trails/ Section 4(f) Non-Historic	There are 20 social and community facilities within the Social and Community Resources Study Area of the proposed BRT/managed lanes. These resources include: Open Space and Mountain Parks (OSMP) and Boulder County Open Space parcels and conservation easements; the Fourmile Canyon Creek Trail; the IBM Connector Trail; various bike lanes/routes; and the Longmont to Boulder (LOBO) Regional Trail (which is considered a transportation resource). The Fourmile Canyon Creek Trail and the IBM Connector Trail are considered Section 4(f) resources. The open spaces, bike routes, and the LOBO Regional Trail are not considered Section 4(f) resources as they are not designated solely for recreational use.	**Permanent Impacts:** This MMCV element is not expected to permanently impact social and community resources including the trails. **Temporary Impacts:** Some of the bike lanes/routes may be temporarily impacted during construction activities. The Fourmile Canyon Creek Trail and the IBM Connector Trail, both of which are Section 4(f) resources, may be temporarily impacted during construction activities, but the trails would remain open, through detours if necessary.	Detours will be provided as appropriate. Further coordination will be required during the NEPA Study if the project elements impact any Section 4(f) resource regardless of the level of NEPA study required. If impacts are temporary and/or beneficial to the resource, coordination will consist of documentation and notification/coordination with the Official with Jurisdiction as well as determining detours during construction. However, if this MMCV element permanently incorporates a Section 4(f) resource into a transportation facility, a Section 4(f) evaluation is required.
Section 6(f) Resources	Section 6(f) resources are those that have received funds from the LWCF and are intended to be dedicated to recreational purposes in perpetuity. The Boulder Reservoir, located approximately 250 feet northwest of SH 119, is considered a Section 6(f) resource.	**Permanent Impacts:** The Boulder Reservoir would not be impacted by this project element. **Temporary Impacts:** Temporary impacts to the Boulder Reservoir should not occur during the construction of this project element.	As design progresses during the NEPA study, a review of the Section 6(f) database should be completed to determine if additional facilities have received LWCF. CPW maintains this file for the state of Colorado.

Table 5-3a (Cont.). Resources that May be Impacted by the BRT/Managed Lanes along SH 119 between Boulder and Longmont, those that May Require Additional Analyses, and Those that Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx, Documented CatEx, or Templated EA)

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Hazardous Materials	There are three high-potential sites and 14 low-potential sites found adjacent to this MMCV element based on a GeoSearch database search conducted in 2018 as a part of the SH 119 Multi-Modal PEL Study (GeoSearch, 2018).	**Permanent Impacts:** Depending on depths of construction necessary, there is moderate potential for impacts during construction. The likelihood of permanent impacts from hazardous materials are dependent on the type of facility impacted. Soil or surface contamination could be present based on past land uses. **Temporary Impacts:** There is potential for construction to encounter hazardous materials adjacent (within a 0.25-mile radius) to the project element; however, this depends on ground disturbance depths during construction.	CDOT Form 881 and potentially a Phase I ISA will be required for these MMCV elements. A current database of known RECs will need to be obtained within 180 days of CDOT's approval of the first/top part of the CatEx Form 128. If facilities of concern are identified adjacent to the elements and depths of construction may impact these facilities, an MMP should be completed.
Air Quality	This MMCV element falls within the following nonattainment and maintenance areas: Denver-Boulder CO maintenance area; Denver Metro PM_{10} maintenance area; the Longmont CO maintenance area; and Denver-Boulder-Greeley-Ft. Collins-Loveland O_3 nonattainment area (CDPHE, 2005a, CDPHE, 2005b, CDPHE, 2005c, CDPHE, 2008).	**Permanent Impacts:** Increased emissions of particulates and CO may result in localized elevated concentrations as a result of the project element. A reduction in congestion along SH 119 may make it a more attractive route, resulting in an increase in vehicles miles traveled on it that could potentially result in impacts to air quality. **Temporary Impacts:** Neighboring areas could be exposed to construction-related and fugitive dust emissions during the construction phase.	Federal funding can only be used for projects that comply with the conformity provision of the Clean Air Act and the US Environmental Protection Agency (EPA) transportation air quality conformity regulations (40 CFR 51 Subpart T, and 40 CFR 93 Subpart A). The project must be included in a conforming TIP and the Regional Transportation Plan (RTP). The project design concept must be sufficiently defined to determine emissions at the time of the conformity determination. As there are intersections currently operating at LOS D or worse on SH 119 between Boulder and Longmont, "Hot Spot Modeling" will be required. Additionally, a determination will need to be made as to whether this is a project of air-quality concern necessitating a PM10 analyses; this will be based on whether there is a significant increase in diesel-vehicle volumes as a result of the project. The current planning year horizon at the time that the NEPA study is initiated will need to be used for any modeling. At the time of the SH 119 Multi-Modal PEL Study, the planning year was 2040. If this MMCV were to be evaluated as an EA, the air quality reports would need to include Mobile Source Air Toxic (MSAT) and greenhouse gas analyses. Because the traffic levels are expected to be below 140,000, the MSAT analysis would be qualitative.
Noise	Noise sensitive areas in the Noise Study Area, which is currently defined as a 500-foot buffer from the edge of pavement of the existing SH 119 between Boulder and Longmont, includes residences, trails, parks, and commercial facilities, including outdoor patios and balconies that are considered sensitive noise receptors. During future NEPA studies, the noise study area will be modified to be 500-feet from the proposed edge of pavement.	**Permanent Impacts:** Potential noise impacts are unknown at this time and will need to be assessed during the NEPA study. **Temporary Impacts:** There is potential for temporary noise impacts during construction; for example, there could be temporary noise impacts due to the use of construction equipment.	During the NEPA study that will need to be completed for the BRT/managed lanes, it will qualify as a "Type 1 Project" per CDOT's noise guidelines and it will require noise modeling for the current planning year horizon as well as the existing year of the NEPA study. At the time of the completion of the SH 119 Multi-Modal PEL Study, the planning year is 2040; however, it is expected that a different planning year horizon will be in place at the time that will need to be used in the modeling.

Table 5-3a (Cont.). Resources that May be Impacted by the BRT/Managed Lanes along SH 119 between Boulder and Longmont, those that May Require Additional Analyses, and Those that Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx, Documented CatEx, or Templated EA)

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Visual Resources/ Aesthetics	SH 119 between Boulder and Longmont is a multi-modal transportation corridor surrounded by commercial, industrial, and residential uses, along with open spaces, parks, and trails.	**Permanent Impacts:** This element would have a neutral visual impact as it would include additional lanes, signage, and tolls within existing CDOT operational ROW. This MMCV element would upgrade the facilities per CDOT visual guidelines. This would not substantially change the visual setting or context of the PEL Study Area and is compatible with local and regional plans. **Temporary Impacts:** Minor, temporary impacts may occur to visual resources if this MMCV element is constructed. These would be due to the presence of construction equipment.	The appropriate level of Visual Impact Assessment (VIA) will need to be determined during the NEPA study using the CDOT VIA Checklist. Given that the BRT/managed lanes are within a heavily used multi-modal transportation corridor, an abbreviated VIA may be appropriate, however, CDOT will need to provide confirmation of the appropriate level of analysis for potential visual impacts and would likely be required during the NEPA study.
Land Use	The land use near this MMCV element is a mix of agricultural, recreational, residential, commercial, and industrial uses.	**Permanent Impacts:** The proposed BRT/managed lanes are within existing operational ROW and are compatible with regional and local land use policies and plans. **Temporary Impacts:** No temporary impacts to land use would occur if this MMCV element is implemented as the construction would be within operational ROW. The improvements are consistent with currently adopted land use plans.	If an EA is the future level of environmental review, additional documentation and analysis may be required for the BRT/managed lanes to incorporate any updates from Boulder, Longmont, and Boulder County land use and zoning data sets.
Socio-economics	A variety of socio-economic classes, households, and employment opportunities exist near the project element.	**Permanent Impacts:** This MMCV element would benefit local neighborhoods and communities by improving access, mobility, safety, and enhancing multi-modal transportation connectivity. **Temporary Impacts:** Temporary impacts during construction could occur as residents and business patrons could be temporarily affected by limited access, traffic congestion, dust, and noise.	Data has been collected for socio-economic resources within the SH 119 Multi-Modal PEL Study Area. Additional studies may be necessary to update socio-economic data in the future if more recent data becomes available during the future NEPA study or there are changes in the preliminary design of this MMCV element.
EJ	EJ populations are areas that contain a higher than average percentage of low-income and/or minority resident. There are EJ populations adjacent to the proposed BRT/managed lanes element.	**Permanent Impacts:** This MMCV element is anticipated to directly benefit EJ populations as well as the general population by providing enhanced transit access contributing to increased transportation choices and greater overall mobility. **Temporary Impacts:** Temporary impacts to EJ populations due to construction of this MMCV element may occur in the form of detours, construction dust, and/or construction noise. In areas where there are EJ populations, and they make up the majority of the census tract or block groups that would be affected, they could be disproportionally affected by construction. These areas are primarily along parts of the BRT routes and stops/stations in both Boulder and Longmont.	An updated technical memorandum may be requested to reflect future updates to US Census data. As project-specific studies are undertaken, they will build upon the EJ outreach conducted during the PEL study. Outreach efforts during the PEL study included meeting with five organizations serving the Hispanic and low-income populations in Boulder and Longmont and translating project materials into Spanish, which is the second most commonly used language in these cities.
Transportation Resources	SH 119 is used by personal vehicles, trucks, pedestrians, and bicyclists as well as serving as bus routes.	**Permanent Impacts:** Implementing this element would reduce congestion and improve traffic operations including transit travel time and person delays. **Temporary Impacts:** Temporary impacts during construction activities could affect transportation facilities through roadway and lane closures; detours; increased congestion; and increased travel time.	Traffic analyses completed during the SH 119 Multi-Modal PEL Study were based on a planning year of 2040. It is expected that a different planning year horizon will be in place at the time of the NEPA study that will need to be completed for this MMCV element. Additional study or a sensitivity analyses will be required to confirm/modify the conceptual design to meet the needs of traffic forecasted for that planning year in place at the time of the NEPA study.

Table 5-3a (Cont.). Resources that May be Impacted by the BRT/Managed Lanes along SH 119 between Boulder and Longmont, those that May Require Additional Analyses, and Those that Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx, Documented CatEx, or Templated EA)

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Utilities	There are numerous utilities including water lines, wastewater, electric, and gas lines.	**Permanent Impacts:** Utilities may need to be relocated if this MMCV element is implemented, with no permanent loss of service. Impacts should be evaluated during future NEPA study. **Temporary Impacts:** Relocation of underground utilities within the ROW may be required as part of the construction activities. There may be a temporary loss of service during utility relocations. In addition, there may be a temporary impact to traffic signals during construction.	Utilities will need to be surveyed and avoidance or relocation measures incorporated into the plan set, as appropriate.

Table 5-3b. Resources that Are Not Expected to be Impacted by the BRT/Managed Lanes along SH 119 between Boulder and Longmont and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
ROW	SH 119 is bordered by developed mix of land uses, including designated open space, commercial, residential, industrial, and residential uses.	**Permanent Impacts:** No permanent ROW impacts would occur if this MMCV element is implemented as the BRT/managed lanes are within the operational ROW of SH 119, based on the current design concept. **Temporary Impacts:** No temporary ROW impacts are anticipated to occur if this MMCV element is implemented.	During final design ROW impacts, or the lack thereof, would need to be confirmed.
Soils and Geology	These MMCV elements are not located within sensitive or unique soils/geology.	**Permanent Impacts:** Excavation within existing operational ROW may be required. There would be no impact to mineral of geological resources as the areas have already been designated for transportation use(s). **Temporary Impacts:** The potential for temporary soil erosion during construction will be minimized by use of BMPs including soil wetting and use of soil erosion blankets.	Data has been collected as a part of the SH 119 Multi-Modal PEL Study. No further study is anticipated to be required for soils or geology regardless of whether a NEPA study is completed. This resource is not typically evaluated during a CatEx, which is the expected level of NEPA study for BRT/managed lanes, unless there is a sensitive soil/geologic unit present of concern.
Paleontological Resources	This MMCV element would be constructed within a previously disturbed ROW that is currently used for transportation purposes. Paleontological resources are unlikely to be present due to the past construction of the existing transportation facility.	**Permanent Impacts:** No permanent impacts to paleontological resources are anticipated if this MMCV element is implemented. **Temporary Impacts:** No temporary impacts to paleontological resources are anticipated if this MMCV element is implemented.	No further analysis is anticipated to be required if this MMCV element is implemented due to the previously disturbed nature of the Study Area. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set.
Archaeological Resources	A COMPASS database search was completed in 2018 as a part of the SH 119 Multi-Modal PEL Study for known archaeological resources in the Study Area. There are no known or previously surveyed archaeological resources within 100 feet of BRT/managed lanes' alignment. However, the entire Study Area has not been surveyed for archaeological resources. There may be unknown archaeological resources present that could be affected by this MMCV element, although this is unlikely due to the previously disturbed nature of the operational ROW of SH 119.	**Permanent Impacts:** No permanent impacts to archaeological resources are anticipated to occur if this MMCV element is constructed. However, it is unknown whether previously unidentified archaeological resources are present. If archaeological resources are present, they could be impacted during construction. **Temporary Impacts:** Temporary impacts to archaeological resources are not anticipated to occur if this MMCV element is constructed. However, it is unknown whether archaeological resources are present underground. If archaeological resources are present, they could be impacted during construction.	It is not anticipated that additional analyses would be required for this MMCV element related to archaeological resources as it is within the SH 119 operational ROW, which is previously disturbed. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set.

* The resources impacted and the level of effort to document them is based on analyses from the SH 119 Multi-Modal PEL Study. The agency sponsoring the improvements will need to scope the project with CDOT and other jurisdictional agencies upon initiation of the NEPA study.

Table 5-4a. Resources that may be Impacted by the Coffman Street Dedicated BRT Lanes and/or the 1st Avenue/Main Street Park-n-Ride, those that may require Additional Analyses, and those that need to be Documented in a Future NEPA Study (Anticipated to be a CatEx* for the Coffman Street Dedicated BRT Lanes; NEPA Study is not expected to be required for the 1st Avenue/Main Street Park-n-Ride, which is a part of RTD's FasTrack Program)

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Threatened, Endangered, or Special-Status Species	Suitable habitat for federally listed threatened, endangered, or candidate species is not present at the location of either MMCV element. Both elements are within Bald Eagle's winter range. Migratory bird and/or raptor nests were not observed to be present during site visits in 2017 completed for the SH 119 Multi-Modal PEL Study; however, suitable habitat (i.e., large trees, open space, and man-made structures) is located within a half-mile of all these elements. The CPW requires a half-mile buffer radius be examined for migratory bird nests. In addition, all these MMCV elements are within Bald Eagle's winter range.	**Permanent Impacts:** There are no anticipated permanent effects to federally listed threatened, endangered, or candidate species; migratory birds are also not expected to be permanently impacted by the improvements. **Temporary Impacts:** There is a potential for construction to impact any migratory birds or raptors that may use the Study Area for nesting or foraging. Although no migratory bird or raptor nests were observed at the time of the site visit, they could be present during construction and therefore impacted temporarily.	Given the developed nature of the areas, it is unlikely that threatened, endangered, or special-status species would be affected. CDOT will provide project oversight for the Coffman St Dedicated BRT Lanes and will likely require a Biological Resources Report or Memorandum as part of a NEPA study. The Biological Resources Report or Memorandum would document the anticipated impact, or lack thereof, to threatened, endangered, or special status species. As these elements progress into further design, a biologist will need to determine if there have been changes in the context of the Study Area. Based on final design, impacts to biological resources will need to be evaluated and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. Pre-construction surveys for nesting migratory birds protected by the MBTA will be required if construction activities occur during the nesting season following methods set forth by the USFWS and CPW. This survey will be required regardless of whether a NEPA study is required.
Historic Resources/ Section 4(f)	A COMPASS database search and review of assessor's data was completed as a part of the SH 119 Multi-Modal PEL Study for potentially historic resources 45 years old or older in 2018. There are four previously recorded Office of Archaeology and Historic Preservation (OAHP) resources near the Coffman St Dedicated BRT Lanes with a determination of Eligible – Field, including one historic district. There is low potential for newly identified historic resources adjacent to this MMCV element because most age-eligible properties on Coffman St have already been evaluated for NRHP eligibility. There are no NRHP Eligible sites within 100 feet of the 1st Ave/Main St Park-n-Ride.	**Permanent Impacts:** Effects are unknown at this time; they will need to be evaluated during the NEPA Study. **Temporary Impacts:** Effects are unknown at this time; they will need to be evaluated during the NEPA Study.	Longmont will need to coordinate with CDOT upon project initiation for the Coffman St Dedicated BRT Lanes to determine next steps related to historic resources The database search does not account for new properties that may be documented in a field survey or resources that have not yet been entered into the database, so there is potential for additional resources to be identified. A new database search should be completed upon project initiation and a field survey may be required to determine if there are additional properties that could be eligible for listing. Also, an effects determination will be required.

Table 5-4a (Cont.). Resources that may be Impacted by the Coffman Street Dedicated BRT Lanes and/or the 1st Avenue/Main Street Park-n-Ride, those that may require Additional Analyses, and those that need to be Documented in a Future NEPA Study (Anticipated to be a CatEx for the Coffman Street Dedicated BRT Lanes; NEPA Study is not expected to be required for the 1st Avenue/Main Street Park-n-Ride, which is a part of RTD's FasTrack Program)

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Water Resources	The Coffman St Dedicated BRT Lanes cross over the Slough 500-year floodplain. There are no water resources at the 1st Ave/Main St intersection.	**Permanent Impacts:** Reconstruction of Coffman St between 1st Ave and 9th Ave to include center-running BRT dedicated lanes would not permanently affect water resources. 1st Ave/Main St park-Ride is not expected to increase impervious surface as it is already a paved parking lot. **Temporary Impacts:** Potential temporary direct impacts from either element during construction on water quality could be caused by soil erosion from stormwater runoff. Also, soil excavation and grading during construction could increase the risk of erosion and sedimentation of nearby water bodies.	Neither element is expected to result in a change in current floodplain boundaries as they are already paved/hard surfaces. Coordination with local jurisdictions should be conducted throughout the design process for potential impacts and permitting for work within floodplains and floodways. The following permits and/or actions related to water quality and floodplains may be required as part of the proposed project: ■ Compliance with MS4 permit for Longmont; ■ Construction Dewatering Operations Permit if groundwater is discharged from excavation to any waters of the State; ■ Erosion Control permit for CDPHE; ■ SWQCP from Boulder County; ■ Longmont Groundwater Discharge Permit and Erosion Control Permit; ■ General Permit for Stormwater Discharges Associated with Construction Activities (the Stormwater Construction Permit) under the CDPS from CDPHE; ■ Sewer Use and Drainage Permits from Longmont.
Social and Community Resources/Parks and Trails (Section 4(f))	There are two social and community resources near the proposed Coffman St Dedicated BRT Lanes: Roosevelt Park and Boulder County Human Services, along with an existing bus route. Roosevelt Park is considered a Section 4(f) resource. There is an existing bus route near the 1st Ave/Main St Park-n-Ride.	**Permanent Impacts:** The Coffman St Dedicated BRT Lanes would not directly impact community resources as they are within the operational ROW. The 1st Ave/Main St Park-n-Ride is also within operational ROW and would not permanently affect community resources, although the impacts to Roosevelt Park need to be evaluated in the NEPA study. **Temporary Impacts:** Temporary impacts may occur in the form of detours, construction dust, and/or construction noise for either MMCV element. Temporary impacts to Roosevelt Park are possible during construction of the Coffman St Dedicate BRT Lanes.	Detours will be provided as appropriate to maintain access to these resources during construction of either MMCV element. Additional studies are not expected to be required regardless of whether a NEPA study is required as a CatEx does not typically require evaluation of community resources unless there is a sensitive resource that could be affected. Temporary impacts to Roosevelt Park are possible during construction of the Coffman St Dedicate BRT Lanes, which would require Section 4(f) documentation. Section 4(f) documentation would likely be a temporary occupancy notification to the Official with Jurisdiction.
Wetland Resources and WUS	There are no wetland resources or WUS adjacent to the 1st Ave/Main St Park-n-Ride nor the Coffman St Dedicated BRT Lanes.	NA – resource not present.	Given the developed nature of the areas around these elements, it is highly unlikely that "new" wetland resources or WUS will be present in the future. However, as these elements progress into further design, a biologist will need to determine if there have been changes in the context of the Wetland Study Area or design of these MMCV elements.

Table 5-4a (Cont.). Resources that may be Impacted by the Coffman Street Dedicated BRT Lanes and/or the 1st Avenue/Main Street Park-n-Ride, those that may require Additional Analyses, and those that need to be Documented in a Future NEPA Study (Anticipated to be a CatEx for the Coffman Street Dedicated BRT Lanes; NEPA Study is not expected to be required for the 1st Avenue/Main Street Park-n-Ride, which is a part of RTD's FasTrack Program)

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Hazardous Materials	A database search for hazardous materials (RECs) was not conducted for MMCV elements within Longmont. Based on review of the nearby land uses and aerial mapping, there are likely high- and low-potential facilities adjacent to the both elements.	**Permanent Impacts:** The likelihood of permanent impacts from hazardous materials are dependent on the type of facility impacted. The construction depth for the Coffman St Dedicated BRT Lanes is not expected to be more than a couple feet and may not reach groundwater. Soil or surface contamination could be present based on past land uses. Repaving the area at 1st Ave/Main St would also likely have limited depth of ground disturbance, reducing the potential for the project to encounter contaminated groundwater. Soil or surface contamination could be present based on past land uses. **Temporary Impacts:** There is potential for construction to encounter hazardous materials adjacent (within a 0.25-mile radius) to the MMCV elements; however, this depends on ground disturbance depths during construction. Because of the limited ground disturbance expected, impacts from hazardous materials are expected to be minimal.	CDOT Form 881 and potentially a Phase I ISA will be required for the Dedicated BRT Lanes on Coffman St. A current database of known RECs will need to be obtained within 180 days of CDOT's approval of the first/top part of the CatEx Form 128. If facilities of concern are identified adjacent to either elements and depths of construction may impact these facilities, a Phase II Investigation and MMP should be completed.
Air Quality	The elements fall within the following: the Longmont CO Maintenance area and Denver-Boulder-Greeley-Ft. Collins-Loveland O3 nonattainment area (CDPHE, 2005a, CDPHE, 2005b, CDPHE, 2005c, CDPHE, 2008).	**Permanent Impacts:** Increased emissions of particulates and/or CO may result in localized elevated concentrations as a result of the Coffman St Dedicated BRT Lanes. A reduction in congestion on roads that are to be improved will make them more attractive routes that can result in an increase in vehicle miles travelled that could potentially result in impacts to air quality. The 1st Ave/Main St Park-n-Ride will need to be evaluated to determine if it is substantial source of either PM10 or CO. **Temporary Impacts:** Neighboring areas could be exposed to construction-related and fugitive dust emissions during the construction phase.	Federal funding can only be used for projects that comply with the conformity provision of the Clean Air Act and the EPA's transportation air quality conformity regulations (40 CFR 51 Subpart T, and 40 CFR 93 Subpart A). The project must be included in a conforming TIP and the RTP. The project design concept must be sufficiently defined to determine emissions at the time of the conformity determination. The Coffman St Dedicated BRT Lanes will require modeling for CO if any of the four criteria established by the conformity rule are met. Additionally, modeling for PM10 will be required if there is a significant increase in diesel vehicle volumes as a result of the project. As there is no federal oversight associated with the Park Ridge Rd/Main St Park-n-Ride a determination as to whether is qualifies as a project of air-quality concern that would require "Hot Spot Modeling" will need to be made at the time of implementation. The current planning year horizon will need to be used for this modeling. At the time of the SH 119 Multi-Modal PEL Study, the planning year was 2040; however, the BRT Lanes on Coffman St is expected to be implemented during a different planning year that will need to be used for its hot-spot modeling.
Noise	Noise sensitive areas near both of these MMCV elements include residential locations, trails, parks, commercial facilities, and a health care facility.	**Permanent Impacts:** Potential noise impacts are unknown at this time and will need to be assessed during the NEPA study. **Temporary Impacts:** There could be temporary noise impacts due to the use of construction equipment.	The Coffman St. BRT Lanes may meet any of the Type I criteria established by CDOT's Noise Analysis and Abatement Guidelines; they may require noise modeling during the NEPA study. The 1st Ave/ Main St Park-n-Ride is not expected to have CDOT or FTA involvement; however, if the scope of the project changes such that CDOT or FTA oversight is included it will meet the definition of a Type I project that requires a noise analysis. The need for noise modeling will need to be evaluated at the time of this element's implementation based on whether a NEPA study would is required due to CDOT or FTA involvement.
Transportation Resources	Coffman St Dedicated BRT Lanes and the 1st Ave/ Main St Park-n-Ride areas are used by personal vehicles, trucks, pedestrians, and bicyclists as well as bus routes.	**Permanent Impacts:**	Traffic analyses completed during the SH 119 Multi-Modal PEL Study were based on a planning or horizon year of 2040. A different planning year is expected to be in place when the NEPA study for the Coffman

Table 5-4a (Cont.). Resources that may be Impacted by the Coffman Street Dedicated BRT Lanes and/or the 1st Avenue/Main Street Park-n-Ride, those that may require Additional Analyses, and those that need to be Documented in a Future NEPA Study (Anticipated to be a CatEx for the Coffman Street Dedicated BRT Lanes; NEPA Study is not expected to be required for the 1st Avenue/Main Street Park-n-Ride, which is a part of RTD's FasTrack Program)

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
		Implementing these MMCV elements would reduce congestion; improve safety and traffic operations; and improve multi-modal connectivity in Longmont. Temporary Impacts: Temporary impacts during construction activities could impact transportation facilities through roadway and lane closures; detours; increased congestion; and increased travel time.	St Dedicated BRT Lanes element is undertaken. This may result in the need to complete additional study or a sensitivity analyses could be required to confirm/modify the conceptual design to meet the needs of traffic forecasted for that year.
EJ	There are EJ populations adjacent to both proposed MMCV elements.	Permanent Impacts: These MMCV elements are anticipated to directly benefit EJ populations as well as the general population by providing enhanced transit access contributing to increased transportation choices and greater overall mobility. Temporary Impacts: Temporary impacts to EJ populations due to construction of the 1st Ave/Main St Park-n-Ride and Coffman St Dedicated BRT Lanes may occur in the form of detours, construction dust, and/or construction noise. In areas where there are EJ populations, and they make up the majority of the census tract or block groups that would be affected, they could be disproportionally affected by construction. The Coffman St Dedicated BRT Lanes has areas that are comprised of primarily EJ populations.	CatExes do not typically require EJ analyses unless it is identified as a sensitive resource. As there are concentrations of low-income and/or minority populations present around the Coffman St Dedicated BRT Lanes, an updated technical memorandum may be requested to reflect future updates to US Census data. As project-specific studies are undertaken, they will build upon the EJ outreach conducted during the PEL study. Outreach efforts during the PEL study included meeting with five organizations serving the Hispanic and low-income populations in Boulder and Longmont and translating project materials into Spanish, which is the second most commonly used language in these cities.

Table 5-4b. Resources that Are Not Expected to be Impacted by the Coffman Street BRT Lanes and Park-n-Ride at 1st Avenue/Main Street and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Riparian/SB 40	There are no SB 40 resources adjacent to the Coffman St Dedicated BRT Lanes or 1st Ave/ Main St Park-n-Ride.	NA – SB 40 resources are not present at either element.	During the NEPA Study, reassessment of the presence, or lack thereof, of SB 40 resources should be completed.
Vegetation/ Noxious Weeds	The vegetation present within the Study Area mainly consists of mowed grasses, shrubs, and trees. Noxious weeds may be present.	**Permanent Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources. **Temporary Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources.	During the NEPA Study, reassessment of the vegetation should be completed.
Fish/Wildlife	Dry Creek and the St Vrain Creek flow under the 1st Ave/ Main St Park-n-Ride, while the Coffman St Dedicated BRT Lanes cross over an additional waterway. Fish may be present in these waterways and there is a potential for wildlife in the area as well.	**Permanent Impacts:** No permanent impacts to fish or wildlife would occur if these MMCV elements are constructed as they are within the existing operational ROW. **Temporary Impacts:** There may be minor temporary impacts to fish or wildlife from clearing and grubbing as well as general construction activities if these MMCV elements are constructed.	During the NEPA Study, reassessment of presence, or lack thereof, of fish and wildlife should be completed.
Section 6(f)	There are no Section 6(f) resources present adjacent to the Coffman St Dedicated BRT Lanes or the 1st Ave/Main St Park-n-Ride.	NA – no resources present.	During the NEPA Study, the CPW database listing properties that have received Section 6(f) should be reviewed to determine if there are any Section 6(f) properties adjacent to nearby these MMCV elements that could be affected.
Visual Resources/ Aesthetics	The MMCV elements are located in urbanized, multi-modal transportation areas surrounded by commercial and residential uses.	**Permanent Impacts:** The Coffman St Dedicated BRT Lanes would have a positive visual impact as it would update signage, accessibility, and branding of the lanes to be consistent. This would not significantly change the visual setting or context of the area and is compatible with local and regional plans. The proposed 1st Ave/Main St Park-n-Ride would have a positive visual impact as it would convert a current parking lot to a Park-n-Ride facility. This would upgrade the safety and aesthetics of the current parking lot and would not significantly change the visual setting or context of the area and is compatible with local and regional plans. **Temporary Impacts:** Minor, temporary impacts may occur to visual resources if the MMCV elements are constructed. These would be due to the presence of construction equipment.	No further analyses are anticipated to be required for visual resources/aesthetics unless there is a substantial change in the proposed design. Visual resources/aesthetics are not typically evaluated as part of a CatEx (which is the anticipated level of NEPA study that will be required for the Coffman St Dedicated BRT Lanes) unless there is a sensitive viewshed nearby or large change in the visual context due to the proposed improvements. However, CDOT may require completion of a Visual Impact Checklist as documentation that a VIA is not required.
Soils and Geology	These MMCV elements are not located within sensitive or unique soils/geology.	**Permanent Impacts:** Excavation within existing operational ROW may be required. There would be no impact to mineral of geological resources as the areas have already been designated for transportation use(s). **Temporary Impacts:** The potential for temporary soil erosion during construction will be minimized by use of BMPs including soil wetting and use of soil erosion blankets.	Data has been collected as a part of the SH 119 Multi-Modal PEL Study. No further study is anticipated to be required for soils or geology regardless of whether a NEPA study is completed. This resource is not typically evaluated during a CatEx, which is the expected level of NEPA study for the Coffman St Dedicated BRT Lanes, unless there is a sensitive soil/geologic unit present of concern.

Table 5-4b (Cont.). Resources that Are Not Expected to be Impacted by the Coffman Street BRT Lanes and Park-n-Ride at 1st Avenue/Main Street and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Land Use	The land use surrounding both MMCV elements is developed primarily for commercial and residential uses.	**Permanent Impacts:** These proposed MMCV elements are anticipated to be within existing operational ROW; therefore, there would be no permanent impacts to land use. The project is compatible with regional and local land use policies and plans. **Temporary Impacts:** No temporary impacts to land use would occur if the MMCV elements are implemented as the construction would be within operational ROW. The improvements are consistent with currently adopted land use plans.	No further analyses are anticipated to be required for land use regardless of whether a NEPA study is completed.
Socio-economics	A variety of socio-economic classes, households, and employment opportunities exist near both MMCV elements.	**Permanent Impacts:** These MMCV elements would benefit local neighborhoods and communities by improving access, mobility, safety, and enhancing multi-modal transportation connectivity. **Temporary Impacts:** Temporary impacts during construction could occur as residents and business patrons could be temporarily affected by limited access, traffic congestion, dust, and noise.	Data has been collected for socio-economic resources as part of the SH 119 Multi-Modal PEL Study. Additional studies are not expected to be required regardless of whether there is a federal nexus. The level of NEPA study expected to be required for the Coffman St Dedicate BRT Lanes is a CatEx, which does not require evaluation of socio-economics unless there is a sensitive resource that could be affected.
Utilities	There are numerous utilities including water lines, wastewater, electric, and gas lines.	**Permanent Impacts:** Utilities may need to be relocated if the MMCV elements are implemented, with no permanent loss of service. **Temporary Impacts:** Relocation of underground utilities within the ROW may be required as part of the construction activities. There may be a temporary loss of service during utility relocations. In addition, there may be a temporary impact to traffic signals during construction.	Utilities would need to be surveyed and avoidance or relocation measures incorporated into the plan set, as appropriate.
ROW	The operational ROW is bordered by developed, urban land uses. The current conceptual designs would not require ROW acquisition.	**Permanent Impacts:** No permanent ROW impacts would occur if these MMCV elements are implemented. **Temporary Impacts:** No temporary ROW impacts are anticipated to occur if these MMCV elements are implemented.	During final design ROW impacts, or the lack thereof, would need to be confirmed.
Paleontological Resources	These MMCV elements would be constructed within a previously disturbed ROW that is currently used for transportation purposes. Paleontological resources are unlikely to be present due to the past construction of the existing transportation facility.	**Permanent Impacts:** No permanent impacts to paleontological resources are anticipated if the Coffman St Dedicated BRT Lanes and/or 1st Ave/Main St Park-n-Ride MMCV elements are implemented. **Temporary Impacts:** No temporary impacts to paleontological resources are anticipated if the Coffman St Dedicated BRT Lanes and 1st Ave/Main St Park-n-Ride MMCV elements are implemented.	No further analysis is anticipated to be required if the Coffman St Dedicated BRT Lanes and 1st Ave/ Main St Park-n-Ride are implemented due to the previously disturbed nature of the Study Area. CDOT's Standard Specification to halt work if resources are encountered during construction will be included in the plan set regardless of whether there is a federal nexus triggering the need for a NEPA study.
Archaeological Resources	A COMPASS database search was completed in 2018 as a part of the SH 119 Multi-Modal PEL Study for archaeological resources. Based on this information and review of the study areas, which are previously disturbed, there are no known archaeological sites within 100 feet of either element. However, it is unknown whether archaeological resources are present underground.	**Permanent Impacts:** No permanent impacts to archaeological resources are anticipated to occur if the Coffman St Dedicated BRT Lanes and 1st Ave/Main St Park-n-Ride are constructed. However, it is unknown whether archaeological resources are present underground. If archaeological resources are present, they could be impacted during construction. **Temporary Impacts:** Temporary impacts to archaeological resources are not anticipated to occur if the Coffman St Dedicated BRT Lanes and 1st Ave/ Main St Park-n-Ride are constructed. However, it is unknown whether archaeological resources are present underground. If archaeological resources are present, they could be impacted during construction.	It is not anticipated that additional analyses would be required for either element related to archaeological resources. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set.

* The resources impacted and the level of effort to document them is based on analyses from the SH 119 Multi-Modal PEL Study. The agency sponsoring the improvements will need to scope the project with CDOT and other jurisdictional agencies upon initiation of the NEPA study.

Table 5-5a. Resources that May be Impacted by the Hover Street/Nelson Road and Hover Street/SH 119 Intersection Improvements, those that May Require Additional Analyses, and Those that Need to be Documented in a Future NEPA Study (Anticipated to be CatExes, Documented CatExes, or Templated EA)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Threatened, Endangered, or Special-Status Species	Suitable habitat for federally listed threatened, endangered, or special-status species is not present at these MMCV elements. However, the MMCV elements are within Bald Eagle's winter range. Migratory bird and/or raptor nests were not observed to be present during site visits for the SH 119 Multi-Modal PEL Study in 2017; however, suitable habitat (i.e., large trees, open space, and man-made structures) is located within a half-mile of the elements. A half-mile buffer is the radius that CPW requires be examined for migratory bird nests.	**Permanent Impacts:** There are no anticipated permanent effects to federally listed threatened, endangered, or special species; migratory birds are also not expected to be permanently impacted by the improvements. **Temporary Impacts:** There is a potential for construction to impact migratory birds or raptors that may use the Study Area for nesting or foraging. Although no migratory bird or raptor nests were observed at the time of the site visit, they could be present during construction and therefore impacted.	Given the developed nature of the areas as well as land use and zoning, it is unlikely that threatened, endangered, or special-status species would be affected by the implementation of these MMCV elements. It is expected that CDOT would provide project oversight and would require a Biological Resources Report or Memorandum as part of a NEPA study. The Biological Resources Report or Memorandum would document the anticipated impact, or lack thereof, to special status species. As these elements progress into further design, a biologist will need to determine if there have been changes in the context of the Study Area. Based on final design, impacts to biological resources will need to be evaluated and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. Pre-construction surveys for nesting migratory birds protected by the MBTA will be required if construction activities occur during the nesting season following methods set forth by the USFWS and CPW.
Historic Resources/ Section 4(f)	A COMPASS database search and review of assessor's data was completed as a part of the SH 119 Multi-Modal PEL Study for potentially historic resources 45 years old or older in 2018. No documented historic or potentially historic sites were found to be adjacent to these intersections. Because of the recent construction of most buildings in these areas, there is very low potential for newly identified historic resources.	**Permanent Impacts:** Effects are unknown at this time; they will need to be evaluated during the NEPA Study. **Temporary Impacts:** Effects are unknown at this time; they will need to be evaluated during the NEPA Study.	The agency implementing the However St/SH 119 intersection improvement will need to coordinate with CDOT upon project initiation to determine next steps related to historic resources. The database search does not account for new properties that may be documented in a field survey or resources that have not yet been entered into the database, so there is potential for additional resources to be identified. A new database search should be completed upon project initiation and a field survey may be required to determine if there are additional properties that could be eligible for listing. Also, an effects determination will be required including an evaluation of the effects to SH 119. If there is no federal nexus for the Hover St/Nelson Rd intersection improvement, no further study is anticipated for this resource as a NEPA study would not be required.

Table 5-5a (Cont.). Resources that May be Impacted by the Hover Street/Nelson Road and Hover Street/SH 119 Intersection Improvements, those that May Require Additional Analyses, and Those that Need to be Documented in a Future NEPA Study

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	
Water Resources	**Hover St/SH 119:** There are no water resources or floodplains at this intersection. **Hover St/Nelson Rd:** Dry Creek (north), along with its 500-year floodplain, crosses just south of this intersection. Dry Creek (north) is a 303(d)-listed stream. Niwot Ditch crosses Hover St near the Hover St/Nelson Rd intersection. South Flat Ditch crosses Hover St just north of the Hover St/Nelson Rd intersection.	**Permanent Impacts:** **Hover St/SH 119:** Changes in impervious surface need to be calculated during the NEPA study. **Hover St/Nelson Rd:** Changes in impervious surface need to be calculated during the design. Development within the floodplain could cause a change in flood elevations. **Temporary Impacts:** Potential temporary direct impacts during construction on water quality of the intersection improvements could be caused by soil erosion from stormwater runoff. Also, soil excavation and grading during construction could increase the risk of erosion and sedimentation of nearby water bodies.	Changes in impervious surface will need to be calculated during design. Construction within the identified floodplains could result in a change in current floodplain boundaries. Coordination with local jurisdictions including FEMA, Urban Drainage and Flood Control Division, Boulder County, Boulder, and Longmont should be conducted throughout the design process for potential impacts and permitting for work within floodplains and floodways. Floodplain modeling may be required to assess impacts at floodplain crossings and may require a Conditional Letter of Map Revision and a Letter of Map Revision as well as permitting from local jurisdictions. The following permits and/or actions related to water quality and floodplains may be required as part of the proposed project: ■ Compliance with MS4 permit for both CDOT and Longmont; ■ Construction Dewatering Operations Permit if groundwater is discharged from excavation to any waters of the State; ■ Erosion Control permit for CDPHE; ■ SWQCP from Boulder County; ■ Groundwater Discharge Permit and Erosion Control Permit; ■ General Permit for Stormwater Discharges Associated with Construction Activities (the Stormwater Construction Permit) under the CDPS from CDPHE; ■ Sewer Use and Drainage Permits from local municipalities; ■ Boulder Floodplain Development Permits
Wetland Resources and WUS	**Hover St/SH 119:** There are no wetland resources or WUS at this intersection. **Hover St/Nelson Rd:** There are wetland resources or WUS adjacent to this intersection.	NA – resource not present.	As these MMCV elements progress into further design, a biologist will need to determine if there have been changes in the context of the Wetland Resource Study Area.

Table 5-5a (Cont.). Resources that May be Impacted by the Hover Street/Nelson Road and Hover Street/SH 119 Intersection Improvements, those that May Require Additional Analyses, and Those that Need to be Documented in a Future NEPA Study

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	
Social and Community Resources/Parks and Trails/ Section 4(f)/ Non-Historic Resources	**Hover St/SH 119:** There are existing bicycle routes/lanes along both Hover St and SH 119. **Hover St/Nelson Rd:** The Boulder County Fairgrounds are located at the northeast corner of this intersection. Bicycle routes/lanes run along both Nelson Rd and Hover St at this intersection.	**Permanent Impacts:** **Hover St/SH 119:** A barrier-separated pedestrian path through a new grade-separated tunnel under Hover St would allow bicyclists and pedestrians to cross the north leg of Hover St safely, resulting in a positive permanent impact. **Hover St/Nelson Rd:** Continuous bicycle lanes are proposed along Nelson Rd, as well as curb-separated bicycle lanes on the northwest and southeast corners, resulting in a positive permanent impact. It is unlikely the fairgrounds would be directly affected by the MMCV element. **Temporary Impacts:** **Hover St/SH 119:** These existing bicycle routes/lanes would be temporarily impacted by the MMCV element; detours should be put in place if access to the resources is affected by the MMCV element. **Hover St/Nelson Rd:** The bicycle routes/lanes would be temporarily impacted, but it is unlikely the fairgrounds would be directly affected by the MMCV element.	During the NEPA study for the Hover St/SH 119 intersection improvements the Study Area should be reviewed to determine if there have been changes to the setting resulting in new or different potential impacts. If there is no federal nexus for the Hover St/Nelson Rd intersection improvement, no further study is anticipated for this resource as a NEPA study would not be required.
Hazardous Materials	The intersection improvements are in commercially developed parts of Longmont. A database search for RECs was not conducted within Longmont. Based on review of the nearby land uses and aerial mapping, there are likely high- and/or low-potential facilities adjacent to the both elements.	**Permanent Impacts:** **Hover St/SH 119:** The proposed westbound through movement is planned to be a grade-separated tunnel under Hover St. Soil or surface contamination could be present based on past land uses especially due to the depth of disturbance. Further evaluation is required during the NEPA study. **Hover St/Nelson Rd:** The likelihood of permanent impacts from hazardous materials are dependent on the type of facility impacted. Soil or surface contamination could be present based on past land uses. Repaving areas would also likely have limited depth of ground disturbance, reducing the potential for the project to encounter contaminated groundwater. **Temporary Impacts:** **Hover St/SH 119:** There is potential for construction to encounter hazardous materials adjacent (within a 0.25-mile radius) to this intersection especially considering the depth of disturbance of this MMCV element and hazardous materials may be temporarily impacted during construction. Further evaluation is required during the NEPA study. **Hover St/Nelson Rd:** There is potential for construction to encounter hazardous materials adjacent (within a 0.25-mile radius) to this intersection; however, this depends on ground disturbance depths during construction. Because of the limited ground disturbance expected, impacts from hazardous materials are anticipated to be minimal.	CDOT Form 881 and a Phase I ISA will be required for the Hover St/SH 119 intersection. A current database of known RECs will need to be obtained within 180 days of CDOT's approval of the first/top part of the CatEx Form 128. If RECs are identified adjacent to the elements and depths of construction may impact these facilities, a Phase II Investigation and MMP should be completed. If there is no federal nexus for the Hover St/Nelson Rd intersection improvement, no further study is anticipated for this resource as a NEPA study would not be required. However, it is recommended that an evaluation of the potential to encounter RECs during construction be completed regardless of CDOT involvement.

Table 5-5a (Cont.). Resources that May be Impacted by the Hover Street/Nelson Road and Hover Street/SH 119 Intersection Improvements, those that May Require Additional Analyses, and Those that Need to be Documented in a Future NEPA Study

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	
Air Quality	The elements fall within the Longmont CO maintenance area; Denver Metro PM10 maintenance area, and Denver-Boulder-Greeley-Ft. Collins-Loveland O3 nonattainment area (CDPHE, 2005a, CDPHE, 2005b, CDPHE, 2005, CDPHE, 2008).	**Permanent Impacts:** **Hover St/SH 119:** Currently, the intersection is at LOS F and therefore elevated concentrations of CO may be present. This MMCV element is likely to improve air quality at the intersection by reducing congestion. However, a reduction in congestion on roads that are to be improved will make them more attractive routes that can result in an increase in vehicle miles travelled that could potentially result in impacts to air quality. **Hover St/Nelson Rd:** Currently, the intersection is at LOS E and therefore elevated concentrations of CO may be present; this MMCV element is likely to improve air quality at the intersection by reducing congestion. However, a reduction in congestion on roads that are to be improved will make them more attractive routes that can result in an increase in vehicle miles travelled that could potentially result in impacts to air quality. **Temporary Impacts:** Neighboring areas could be exposed to construction-related and fugitive dust emissions during the construction phase.	Federal funding can only be used for projects that comply with the conformity provision of the Clean Air Act and the EPA transportation air quality conformity regulations (40 CFR 51 Subpart T, and 40 CFR 93 Subpart A). The project must be included in a conforming TIP and the RTP. The project design concept must be sufficiently defined to determine emissions at the time of the conformity determination. As part of the NEPA process, "Hot Spot Modeling" is required for intersections currently operating at an LOS of D or worse or if the intersection is predicted to operate at an LOS of D or worse after project implementation. It is anticipated that these intersection improvements will require "Hot Spot Modeling" for their reconfiguration during future NEPA study, if applicable. Additionally, a determination will need to be made as to whether this is a project of air-quality concern necessitating a PM10 analyses; this will be based on whether there will be a significant increase in diesel-vehicle volumes as a result of project implementation. If there is no federal nexus for the Hover Rd/Nelson intersection improvement, air quality may not be required for the Hover St/Nelson Rd intersection project as a NEPA study would not be required.
Noise	Noise sensitive areas in the Noise Study Area, which is a 500-foot buffer around each MMCV element, include residences, trails, parks, and commercial facilities that are also considered sensitive noise receptors. This is a preliminary study area for which noise measurements have not been taken nor have noise levels been predicted.	**Permanent Impacts:** **Hover St/SH 119:** Potential noise impacts are unknown at this time and will need to be assessed during the NEPA study. **Hover St/Nelson Rd:** Additional left-turn lanes and an additional through lane are proposed for northbound and southbound approaches in order to relieve traffic congestion. These improvements are considered a Type I Project per CDOT Noise Guidelines and further analysis is required, if there is CDOT oversight of the project. **Temporary Impacts:** There is potential for temporary noise impacts during construction due to use of construction equipment.	These MMCV elements will qualify as "Type 1 Projects" per CDOT's noise guidelines and will require noise modeling for the current planning year. At the time of the completion of the SH 119 Multi-Modal PEL Study, the planning year is 2040; however, these MMCV elements will be implemented when a different planning year is in place. The current planning year, at the time of NEPA study will need to be used for modeling. If there is no federal nexus for the Hover St/Nelson Rd intersection improvement, a noise study may not be required; the need for noise modeling will need to be evaluated at the time of this element's implementation based on whether a NEPA study would is required due to CDOT oversight.
EJ	There are EJ populations adjacent to both proposed MMCV elements.	**Permanent Impacts:** These MMCV elements are anticipated to directly benefit EJ populations as well as the general population by providing enhanced transit access contributing to increased transportation choices and greater overall mobility. **Temporary Impacts:** Temporary impacts to EJ populations due to construction of the intersection improvements may occur in the form of detours, construction dust, and/or construction noise. In areas where there are EJ populations, and they make up the majority of the census tract or block groups that would be affected, they could be disproportionally affected by construction. The Hover St/Nelson Rd intersection has areas that are comprised of primarily EJ populations on both the southeast and the northeast quadrants	CatExes do not typically require EJ analyses unless it is identified as a sensitive resource. As there are concentrations of low-income and/or minority populations present around the Hover St/Nelson Rd intersection, an updated technical memorandum may be requested to reflect future updates to US Census data. As project-specific studies are undertaken, they will build upon the EJ outreach conducted during the PEL study. Outreach efforts during the PEL study included meeting with five organizations serving the Hispanic and low-income populations in Boulder and Longmont and translating project materials into Spanish, which is the second most commonly used language in these cities.

Table 5-5b. Resources that are Not Expected to be Impacted by the Hover St/Nelson Rd or Hover St/SH 119 Intersection Improvements and May Not Need to be Documented in a Future NEPA Study

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Riparian/SB 40	**Hover St/SH 119:** There are no water resources at this intersection. **Hover St/Nelson Rd:** Dry Creek (north) crosses just south of this intersection, along which SB 40 resources may be located.	**Permanent Impacts:** Impacts to Dry Creek are not anticipated from the Hover St/Nelson Rd intersection improvements project. **Temporary Impacts:** Temporary impacts may include clearing and grubbing as well as removal of vegetation necessary to complete construction.	Given the lack of anticipated impact to SB 40 resources it is expected that no further analyses during a NEPA study will be required. As the elements progress further into design, a biologist will need to determine if there have been changes in the design that could affect SB 40 resources.
Vegetation/ Noxious Weeds	The vegetation present within the SH 119 Multi-Modal PEL Study Area mainly consists of mowed grasses, shrubs, and trees. Noxious weeds may be present.	**Permanent Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources. **Temporary Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources.	The presence of noxious weeds would be evaluated during future field visits. BMPs will need to be included in the plan set to limit the risk of spreading noxious weeds during construction.
Fish/Wildlife	**Hover St/SH 119:** There are no water resources at this intersection and low potential for wildlife in the area. **Hover St/Nelson Rd:** Dry Creek (north), provides habitat for fish and wildlife. There may be fish and wildlife habitat along the South Flat Ditch and Niwot Ditch as well.	**Permanent Impacts:** No permanent impacts to fish or wildlife would occur if these project elements are constructed as they are within the existing operational ROW. **Temporary Impacts:** There may be minor temporary impacts to fish or wildlife from clearing and grubbing as well as general construction activities.	No further study is anticipated to be required for fish or wildlife; this resource is not typically evaluated for a CatEx unless there is a sensitive resource nearby.
Section 6(f) Resources	Section 6(f) resources are those that have received funds from the LWCF and are intended to be dedicated to recreational purposes in perpetuity. There are no Section 6(f) resources present adjacent to these intersections.	NA – no 6(f) resources present.	As design progresses during the NEPA study, a review of the Section 6(f) database should be completed to determine if additional facilities have received LWCF. CPW maintains this file for the state of Colorado.
Visual Resources/ Aesthetics	The MMCV elements are located in an urbanized, multi-modal transportation corridor surrounded by commercial and residential uses.	**Permanent Impacts:** The MMCV elements would have a neutral visual impact as they would upgrade the intersections within ROW. This would not substantially change the visual setting or context of the SH 119 Multi-Modal PEL Study Area and is compatible with local and regional plans. **Temporary Impacts:** Minor, temporary impacts may occur to visual resources if the intersection improvements are constructed due to the presence of construction equipment at the roadways and intersections.	No further analyses are anticipated to be required for visual resources/aesthetics unless there is a substantial change in the proposed design. Visual resources/aesthetics are not typically evaluated as part of a CatEx unless there is a sensitive viewshed nearby or large change in the visual context due to the proposed improvements. CDOT may require completion of a Visual Impact Checklist to confirm need, or lack thereof, for a VIA. If there is no federal nexus for the Hover St/ Nelson Rd intersection improvement, no further study is anticipated for this resource.
Soils and Geology	The MMCV elements are not located within sensitive or unique soils/geology.	**Permanent Impacts:** Excavation within existing operational ROW would be required. There would be no impact to mineral or geological resources as the areas have already been designated for transportation use(s). **Temporary Impacts:** The potential for temporary soil erosion during construction will be minimized by use of BMPs including soil wetting and use of soil erosion blankets.	No further study is anticipated to be required for soils or geology regardless of whether a NEPA study is completed. This resource is not typically evaluated during a CatEx, which is the expected level of NEPA study, unless there is a sensitive soil/geologic unit present of concern.

Table 5-5b (Cont.). Resources that Are Not Expected to be Impacted by the Hover St/Nelson Rd or Hover St/SH 119 Intersection Improvements and May Not Need to be Documented in a Future NEPA Study

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Land Use	The land use surrounding these intersections is developed primarily for commercial and residential uses.	**Permanent Impacts:** These proposed MMCV elements are anticipated to be within existing operational ROW; therefore, there would be no permanent impacts to land use. The project is compatible with regional and local land use policies and plans. **Temporary Impacts:** No temporary impacts to land use would occur if the MMCV elements are implemented as the construction would be within operational ROW.	No further analyses are anticipated to be required for land use.
Socio-economics	A variety of socio-economic classes, households, and employment opportunities exist near these MMCV elements.	**Permanent Impacts:** These MMCV elements would benefit local neighborhoods and communities by improving access, mobility, safety, and enhancing multi-modal transportation connectivity. **Temporary Impacts:** Temporary impacts during construction could occur as residents and business patrons could be temporarily affected by limited access, traffic congestion, dust, and noise.	No further analyses are anticipated to be required for socio-economics.
Transportation Resources	These roads/intersections are used by personal vehicles, trucks, pedestrians, and bicyclists as well as bus routes.	**Permanent Impacts:** Implementing these both intersection improvements would reduce congestion; improve safety and traffic operations; and improve multi-modal connectivity in Longmont. **Temporary Impacts:** Temporary impacts during construction of either intersection improvement could impact transportation facilities through roadway and lane closures; detours; increased congestion; and increased travel time.	Traffic analyses were completed during the SH 119 Multi-Modal PEL Study and the recently completed SW Traffic Study (Longmont, 2019). It is anticipated that both intersection improvements will be made under a different planning year horizon. Additional evaluation or a sensitivity analyses could be required to confirm/modify the conceptual designs to meet the needs of traffic forecasted for that year.
Utilities	There are numerous utilities including water lines, wastewater, electric, and gas lines near both intersections.	**Permanent Impacts:** Utilities may need to be relocated if the project elements are implemented, with no permanent loss of service. **Temporary Impacts:** Relocation of underground utilities within the ROW may be required as part of the construction activities. There may be a temporary loss of service during utility relocations. In addition, there may be a temporary impact to traffic signals during construction.	Utilities would need to be surveyed and avoidance or relocation measures incorporated into the plan set, as appropriate.
ROW	The transportation ROW is bordered by developed, urban land uses. The current conceptual designs would not require ROW acquisition.	**Permanent Impacts:** Impacts will need to be evaluated during design. **Temporary Impacts:** Impacts will need to be evaluated during design.	During final design ROW impacts, or the lack thereof, would need to be confirmed.
Paleontological Resources	These MMCV elements would be constructed within a previously disturbed ROW that is currently used for transportation purposes. Paleontological resources are unlikely to be present due to the past construction of the existing transportation facility.	**Permanent Impacts:** No permanent impacts to paleontological resources are anticipated if these MMCV elements are implemented. **Temporary Impacts:** No temporary impacts to paleontological resources are anticipated if these MMCV elements are implemented.	No further analysis is anticipated to be required if these MMCV elements are implemented due to the previously disturbed nature of the Study Area. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set regardless of whether there is a federal nexus triggering the need for a NEPA study.

Table 5-5b (Cont.). Resources that Are Not Expected to be Impacted by the Hover St/Nelson Rd or Hover St/SH 119 Intersection Improvements and May Not Need to be Documented in a Future NEPA Study

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Archaeological Resources	A COMPASS database search was completed in 2018 as a part of the SH 119 Multi-Modal PEL Study for known archaeological resources in the Study Area. There are no known or previously surveyed archaeological resources within 100 feet of these MMCV elements. The entire Study Area has not been surveyed for archaeological resources. There may be unknown archaeological resources within 100 feet of these MMCV elements. However, because of the previously disturbed nature of the Study Area there is a low probability of uncovering unknown archaeological resources.	**Permanent Impacts:** No permanent impacts to archaeological resources are anticipated to occur if these MMCV elements are constructed. However, it is unknown whether archaeological resources are present underground. If archaeological resources are present, they could be impacted during construction. **Temporary Impacts:** Temporary impacts to archaeological resources are not anticipated to occur if the MMCV elements are constructed. However, it is unknown whether archaeological resources are present underground. If archaeological resources are present, they could be impacted during construction.	It is not anticipated that additional analyses would be required for the MMCV elements related to archaeological resources. However, CDOT will need to determine the need for additonal survey for the Hover St/SH 119 intersection improvement; the Hover St/Nelson Rd intersection improvement will not require additional study unless there is a federal nexus. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set.

* The resources impacted and the level of effort to document them is based on analyses from the SH 119 Multi-Modal PEL Study. The agency sponsoring the improvements will need to scope the project with CDOT and other jurisdictional agencies upon initiation of the NEPA study.

Table 5-6a. Resources that may be Impacted by the Boulder BAT Lanes and Intersection Improvements; those that may require Additional Analyses; and those that need to be Documented in a Future NEPA Study (Anticipated to be CatEx[s])*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Threatened, Endangered, or Special-Status Species	Suitable habitat for federally listed threatened, endangered, or special-status species is not present at these MMCV elements. However, the MMCV elements are within Bald Eagle's winter range. Migratory bird and/or raptor nests were not observed to be present during site visits for the SH 119 Multi-Modal PEL Study in 2017; however, suitable habitat (i.e., large trees, open space, and man-made structures) is located within a half-mile of the elements. A half-mile buffer is the radius that CPW requires be examined for migratory bird nests.	**Permanent Impacts:** There are no anticipated permanent effects to federally listed threatened, endangered, or candidate species; migratory birds are also not expected to be permanently impacted by the improvements. **Temporary Impacts:** There is a potential for construction to impact migratory birds or raptors that may use the Study Area for nesting or foraging. Although no migratory bird or raptor nests were observed at the time of the site visit, they could be present during construction and therefore impacted.	Given the developed nature of the areas as well as land use and zoning, it is unlikely that threatened, endangered, or special-status species would be affected by the implementation of these MMCV elements. It is expected that CDOT would require a Biological Resources Report or Memorandum as part of a NEPA study. The Biological Resources Report or Memorandum would document the anticipated impact, or lack thereof, to threatened, endangered, or special-status species. As these elements progress into further design, a biologist will need to determine if there have been changes in the context of the Study Area. Based on final design, impacts to biological resources will need to be evaluated and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. Pre-construction surveys for nesting migratory birds protected by the MBTA will be required if construction activities occur during the nesting season following methods set forth by the USFWS and CPW.
Riparian/SB 40 Resources	**Boulder BAT Lanes** **Iris Ave – 28th St to Foothills Pkwy:** Wonderland Creek flows under Iris Ave near Bridger Trail. **28th St – Iris Ave to Valmont Rd:** The Boulder and White Rock Ditch crosses 28th St at this location. **28th St – Pearl St to Canyon Blvd:** Boulder and Left-Hand Ditch flows just south of Pearl Pkwy. **Boulder Intersection Improvements** **28th St/Iris Ave:** There are no water resources adjacent to this intersection. **28th St/Canyon Blvd:** There are no water resources adjacent to this intersection.	**Permanent Impacts:** Impacts to Wonderland Creek; Boulder and White Rock Ditch; and Boulder and Left-Hand Ditch are not anticipated from the BAT lanes. No impacts are expected from construction of the intersection improvements. **Temporary Impacts:** Temporary impacts may include clearing and grubbing as well as removal of vegetation necessary to complete construction.	Given the lack of anticipated impact to SB 40 resources it is expected that no further analyses during a NEPA study will be required. As the elements progress further into design, a biologist will need to determine if there have been changes in the design of them that could affect SB 40 resources.
Historic Resources/ Section 4(f)	A COMPASS database search and review of assessor's data was completed as a part of the PEL for potentially historic resources 45 years old or older in 2018. No documented historic or potentially historic sites were found to be adjacent to the BAT Lanes or Intersection Improvement locations. Because of the recent construction of most buildings in these areas, there is very low potential for newly identified historic resources; however, the presence of potentially eligible resources will need to be evaluated during NEPA.	**Permanent Impacts:** Effects are unknown at this time; they will need to be evaluated during the NEPA Study. **Temporary Impacts:** Effects are unknown at this time; they will need to be evaluated during the NEPA Study.	The agency implementing these MMCV elements will need to coordinate with CDOT upon project initiation to determine next steps related to historic resources. The database search does not account for new properties that may be documented in a field survey or resources that have not yet been entered into the database, so there is potential for additional resources to be identified. A new database search should be completed upon project initiation and a field survey may be required to determine if there are additional properties that could be eligible for listing. Also, an effects determination may be required.

Table 5-6a (Cont.). Resources that may be Impacted by the Boulder BAT Lanes and Intersection Improvements; those that may require Additional Analyses; and those that need to be Documented in a Future NEPA Study (Anticipated to be CatEx(s))*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Water Resources	**Boulder BAT Lanes** **Iris Ave—28th St to Foothills Pkwy:** Wonderland Creek crosses at this location along with the Wonderland Creek floodplain. **28th St—Iris Ave to Valmont Rd:** The Boulder and White Rock Ditch crosses this MMCV element. The Boulder Creek 500-year floodplain occurs at this location. **28th St—Pearl St to Canyon Blvd:** The Boulder and Left-Hand Ditch crosses the MMCV element at this location, along with Boulder Creek. The Boulder Creek 500-year floodplain occurs at this location. **Boulder Intersection Improvements** **28th St/Iris Ave:** There are no water resources or floodplains at this location. **28th St/Canyon Blvd:** There are no water resources at this location, although the Boulder Creek 500-year floodplain occurs at this location.	**Permanent Impacts:** **Boulder BAT Lanes** **Iris Ave—28th St to Foothills Pkwy:** These improvements are not expected to increase impervious surface. Development within the floodplain could cause a change in flood elevations; however, it is unlikely due to the limited ground disturbance expected by the MMCV element. **28th St—Iris Ave to Valmont Rd:** These improvements are not expected to increase impervious surface. Development within the floodplain could cause a change in flood elevations; however, it is unlikely due to the limited ground disturbance expected by the MMCV element. **28th St—Pearl St to Canyon Blvd:** These improvements are not expected to increase impervious surface. Development within the floodplain could cause a change in flood elevations; however, it is unlikely due to the limited ground disturbance expected by the MMCV element. **Boulder Intersection Improvements** **28th St/Iris Ave:** Intersection Improvements would not increase impervious surface. No floodplains occur at this location; therefore, there would be no impacts to floodplains. **28th St/Canyon Blvd:** These improvements would not increase impervious surface. Development within the floodplain could cause a change in flood elevations. **Temporary Impacts:** Potential temporary direct impacts during construction on water quality of BAT Lanes and Intersection Improvements could be caused by soil erosion from stormwater runoff. Also, soil excavation and grading during construction could increase the risk of erosion and sedimentation of nearby water bodies.	Once design is available, the amount of new impervious surface that would be added due to construction of the Intersection Improvements will need to be quantified. Water quality BMPs will need to be included in the design, as appropriate. The following permits and/or actions related to water quality and floodplains may be required as part of the proposed project: ■ Compliance with MS4 permit for both CDOT and Boulder; ■ Construction Dewatering Operations Permit if groundwater is discharged from excavation to any waters of the State; ■ Erosion Control permit for CDPHE; ■ SWQCP from Boulder County; ■ Boulder Groundwater Discharge Permit and Erosion Control Permit; ■ General Permit for Stormwater Discharges Associated with Construction Activities (the Stormwater Construction Permit) under the CDPS from CDPHE; ■ Sewer Use and Drainage Permits; ■ Boulder Floodplain Development Permits

Table 5-6a (Cont.). Resources that may be Impacted by the Boulder BAT Lanes and Intersection Improvements; those that may require Additional Analyses; and those that need to be Documented in a Future NEPA Study (Anticipated to be CatEx(s))*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Social and Community Resources/Parks and Trails/ Section 4(f)/ Non-Historic	**Boulder BAT Lanes** **Iris Ave—28th St to Foothills Pkwy:** There are four social and community resources adjacent to this MMCV element. **28th St—Iris Ave to Valmont Rd:** No social and community resources are located adjacent to this segment. **28th St—Pearl St to Canyon Blvd:** A multi-use path is located on the east side of 28th St and along the south side of Canyon Blvd. **Boulder Intersection Improvements** **28th St/Iris Ave:** Multi-use paths are located along the southeast corner and northwest corner of 28th St and Iris Ave. Existing sidewalk connections also exist along both sides of Iris Ave. **28th St/Canyon Blvd:** Multi-use paths are located along the east side of 28th St and along the south side of Canyon Blvd. None of these resources are classified as Section 4(f) resources as they are not dedicated to a recreational use.	**Permanent Impacts:** **Iris Ave—28th St to Foothills Pkwy:** Social and community resources are not expected be directly impacted by the MMCV element. **28th St—Iris Ave to Valmont Rd:** NA. **28th St—Pearl St to Canyon Blvd:** The multi-use paths would not be affected by the MMCV element as construction is expected to remain within operational ROW. **Temporary Impacts:** **28th St/Iris Ave:** The multi-use paths and sidewalks may be temporarily impacted by the MMCV elements during construction. **28th St/Canyon Blvd:** The multi-use paths and sidewalks may be temporarily impacted by the MMCV elements during construction.	Detours will be provided as appropriate to maintain access to facilities and trails during construction, if needed. Additional studies are not expected to be required; these resources, with the exception of those that are dedicated to recreational use and that qualify as Section 4(f) resources, are not typically evaluated during a CatEx unless there is a sensitive resource present.
Hazardous Materials	The intersection improvements and BAT Lanes are in commercially developed parts of the Boulder. Past and present nearby land uses include retail stores; hotels; restaurants; automotive fueling and service stations (former and current); and professional offices. Hazardous materials may be present in or around either/both intersections. A Geosearch database search was not completed for MMCV elements located in Boulder during the SH 119 Multi-Modal PEL Study.	**Permanent Impacts:** The likelihood of permanent impacts from hazardous materials are dependent on the type of facility impacted. The construction depth for these MMCV elements is not expected to be more than two feet and may not reach groundwater. Soil or surface contamination could be present based on past land uses. Repaving areas would also likely have limited depth of ground disturbance, reducing the potential for the project to encounter contaminated groundwater. **Temporary Impacts:** There is potential for construction to encounter hazardous materials adjacent (within a 0.25-mile radius) to the MMCV elements; however, this depends on ground disturbance depths during construction. Because of the limited ground disturbance expected, impacts from hazardous materials are anticipated to be minimal.	CDOT Form 881 and potentially a Phase I ISA will be required for these MMCV elements. A current database of known RECs will need to be obtained within 180 days of CDOT's approval of the first/top part of the CatEx Form 128. If facilities of concern are identified adjacent to the elements and depths of construction may impact these facilities, a Phase II Investigation and MMP should be completed.

Table 5-6a (Cont.). Resources that may be Impacted by the Boulder BAT Lanes and Intersection Improvements; those that may require Additional Analyses; and those that need to be Documented in a Future NEPA Study (Anticipated to be CatEx(s))*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Air Quality	The elements fall within the following nonattainment and maintenance areas: Denver-Boulder CO maintenance area; Denver Metro PM10 maintenance area; and Denver-Boulder-Greeley-Ft. Collins-Loveland O3 nonattainment area (CDPHE, 2005a, CDPHE, 2005b, CDPHE, 2008).	**Permanent Impacts:** Increased emissions of particulates may result in localized elevated concentrations as a result of the BAT Lanes. A reduction in congestion on roads that are to be improved will make them more attractive routes that can result in an increase in Vehicle Miles Travelled that could potentially result in impacts to air quality. The need to model PM10 will need to be evaluated during the future NEPA study. Currently, the 28th St/Iris Ave and 28th St/Canyon Blvd intersections are at LOS D and therefore elevated concentrations of CO may be present; the MMCV element is likely to improve air quality at the intersection by reducing congestion. The need to model PM10 will need to be evaluated during the future NEPA study. **Temporary Impacts:** Neighboring areas could be exposed to construction-related and fugitive dust emissions during the construction phase.	Federal funding can only be used for projects that comply with the conformity provision of the Clean Air Act and the EPA transportation air quality conformity regulations (40 CFR 51 Subpart T, and 40 CFR 93 Subpart A). The project must be included in a conforming TIP and the RTP. The project design concept must be sufficiently defined to determine emissions at the time of the conformity determination. As part of the NEPA process, "Hot Spot Modeling" for CO is required for intersections currently operating at an LOS of D or worse or if the intersection is forecasted to operate at an LOS of D or worse after project implementation. Additionally, modeling for PM10 is required for projects subject to conformity if there is a significant increase in the number of diesel vehicles as a result of project implementation. It is anticipated that the Intersection Improvements will require "Hot Spot" modeling for CO as there are failing intersections; at the time these MMCV elements are implemented. In the future NEPA study a determination will be made as to whether the BAT Lane is a project of air quality concern that requires modeling for PM10. The analyses will need to occur during a future NEPA study, which is anticipated to be a CatEx.
Noise	Noise sensitive areas in the Noise Study Area, which is a 500-foot buffer around the existing edge of pavement, include residences, trails, parks, and commercial facilities that are also considered sensitive noise receptors. This is a preliminary noise study area used in the PEL. In future NEPA studies the Noise Study Area may need to be modified to be a 500-foot buffer from the proposed edge of pavement.	**Permanent Impacts:** Potential noise impacts are unknown at this time and will need to be assessed during the NEPA study. **Temporary Impacts:** There is potential for temporary noise impacts during construction due to the use of construction equipment.	The BAT lanes are greater than 2,500-feet in length which classifies it as a Type I project per CDOT's Noise Analysis and Abatement Guidelines that requires a noise analysis. The Intersection Improvements in Boulder do not trigger the need for noise modeling as currently designed as it does not meet any of the Type I Project criteria.
EJ	There are EJ populations adjacent to these proposed MMCV elements. EJ populations are those that have a higher percentage of low-income and/or minority residences than the local jurisdictions.	**Permanent Impacts:** The project is anticipated to directly benefit EJ populations as well as the general population by providing enhanced transit access contributing to increased transportation choices and greater overall mobility. **Temporary Impacts:** Temporary impacts to EJ populations due to construction of the MMCV elements may occur in the form of detours, construction dust, and/or construction noise. In areas where there are EJ populations, and they make up the majority of the census tract or block groups that would be affected, they could be disproportionally affected by construction. This includes areas are along parts of the BAT lanes in Boulder.	CatExes do not typically require EJ analyses unless it is identified as a sensitive resource. As there are concentrations of low-income and/or minority populations present around BAT Lanes, an updated technical memorandum may be requested to reflect future updates to US Census data. As project-specific studies are undertaken, they will build upon the EJ outreach conducted during the PEL. Outreach efforts during the PEL included meeting with five organizations serving the Hispanic and low-income populations in Boulder and Longmont and translating project materials into Spanish, which is the second most commonly used language in these cities.

* The resources impacted and the level of effort to document them is based on analyses from the SH 119 Multi-Modal PEL Study. The agency sponsoring the improvements will need to scope the project with CDOT and other jurisdictional agencies upon initiation of the NEPA study.

Table 5-6b. Resources that are not expected to be Impacted by the Boulder BAT Lanes and Intersection Improvements and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx[s])*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Vegetation/ Noxious Weeds	The vegetation present within the Study Area mainly consists of mowed grasses, shrubs, and trees. Noxious weeds may be present.	**Permanent Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources. **Temporary Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources.	The presence of noxious weeds would be evaluated during future field visits. BMPs will need to be included in the plan set to limit the risk of spreading noxious weeds during construction.
Fish/Wildlife	Wonderland Creek; Boulder and White Rock Ditch; and the Boulder and Left-Hand Ditch may provide fish habitat. There is a potential for wildlife in the area as well.	**Permanent Impacts:** No permanent impacts to fish or wildlife would occur if these MMCV elements are constructed as they are within the existing operational ROW. **Temporary Impacts:** There may be minor temporary impacts to fish or wildlife from clearing and grubbing as well as general construction activities.	No further study is anticipated to be required for fish or wildlife; this resource is not typically evaluated for a CatEx.
Wetland Resources and WUS	No wetland resources or WUS exist at the BAT Lane locations or the Intersection Improvement locations.	NA – resource not present.	Given the developed nature of the areas around these elements, it is highly unlikely that "new" wetland resources or waters of the US will be present in the future. However, as these elements progress into further design, a biologist will need to determine if there have been changes in the context of the Wetland Resource Study Area or design of these MMCV elements.
Section 6(f) Resources	Section 6(f) resources are those that have received funds from the LWCF and are intended to be dedicated to recreational purposes in perpetuity. There are no Section 6(f) resources present adjacent to these road segments or intersections.	NA – no 6(f) resources present.	As design progresses during the NEPA study, a review of the Section 6(f) database should be completed to determine if additional facilities have received LWCF. CPW maintains this file for the state of Colorado.
Visual Resources/ Aesthetics	The MMCV elements are located in urbanized, multi-modal transportation corridors surrounded by commercial and residential uses.	**Permanent Impacts:** **Boulder BAT Lanes** The BAT Lanes would have a positive visual impact as this MMCV would update signage, accessibility, and branding of the lanes to be consistent. This would not significantly change the visual setting or context of Study Area and is compatible with local and regional land uses. **Boulder Intersection Improvements** The MMCV element would have a neutral visual impact as it would upgrade the intersection mostly within ROW. This would not significantly change the visual setting or context of PEL Study Area and is compatible with local and regional plans. **Temporary Impacts:** Minor, temporary impacts may occur to visual resources if the BAT Lanes or Intersection Improvements are constructed. These impacts would be due to the presence of construction equipment at the roadways and intersections.	No further analyses are anticipated to be required for visual resources/aesthetics unless there is a substantial change in the proposed design. Visual resources/aesthetics are not typically evaluated as part of a CatEx unless there is a sensitive viewshed nearby or large change in the visual context due to the proposed improvements. CDOT may require completion of a Visual Impact Checklist to confirm need, or lack thereof, for a Visual Impact Assessment.
Soils and Geology	These MMCV elements are not located within sensitive or unique soils/geology.	**Permanent Impacts:** Excavation within existing operational ROW would be required. There would be no impact to mineral or geological resources as the areas have already been designated for transportation use(s). **Temporary Impacts:** The potential for temporary soil erosion during construction will be minimized by use of BMPs including soil wetting and use of soil erosion blankets.	No further study is anticipated to be required for soils or geology regardless of whether a NEPA study is completed. This resource is not typically evaluated during a CatEx, which is the expected level of NEPA study, unless there is a sensitive soil/geologic unit present of concern.

Table 5-6b (Cont.). Resources that are not expected to be Impacted by the Boulder BAT Lanes and Intersection Improvements and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx[s])*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Land Use	The land use surrounding the BAT Lanes and Intersection Improvements is developed primarily for commercial and residential uses.	**Permanent Impacts:** These proposed MMCV elements are anticipated to be within existing operational ROW; therefore, there would be no permanent impacts to land use. The project is compatible with regional and local land use policies and plans. **Temporary Impacts:** No temporary impacts to land use would occur if the MMCV elements are implemented as the construction would be within operational ROW.	No further analyses are anticipated to be required for land use during a future NEPA study.
Socio-economics	A variety of socio-economic classes, households, and employment opportunities exist near these MMCV elements.	**Permanent Impacts:** These MMCV elements would benefit local neighborhoods and communities by improving access, mobility, safety, and enhancing multi-modal transportation connectivity. **Temporary Impacts:** Temporary impacts during construction could occur as residents and business patrons could be temporarily affected by limited access, traffic congestion, dust, and noise.	The level of NEPA study required for these elements is assumed to be a CatEx, which does not require evaluation of socio-economics unless there is a sensitive resource that could be affected.
Transportation Resources	These roads/intersections are used by personal vehicles, trucks, pedestrians, and bicyclists as well as bus routes.	**Permanent Impacts:** Implementing these MMCV elements would reduce congestion; improve safety and traffic operations; and improve multi-modal connectivity in Boulder. **Temporary Impacts:** Temporary impacts during construction activities could impact transportation facilities through roadway and lane closures; detours; increased congestion; and increased travel time.	Traffic analyses completed during the SH 119 Multi-Modal PEL Study were based on a planning or horizon year of 2040. It is anticipated that a different planning year will be in place when the NEPA study for these elements are undertaken; additional evaluation or a sensitivity analyses could be required to confirmed/modify the conceptual design to meet the needs of traffic forecasted for that year.
Utilities	There are numerous utilities including water lines, wastewater, electric, and gas lines.	**Permanent Impacts:** Utilities may need to be relocated if the MMCV elements are implemented, with no permanent loss of service. **Temporary Impacts:** Relocation of underground utilities within the ROW may be required as part of the construction activities. There may be a temporary loss of service during utility relocations. In addition, there may be a temporary impact to traffic signals during construction.	Utilities would need to be surveyed and avoidance or relocation measures incorporated into the plan set, as appropriate.
ROW	The transportation ROW is bordered by developed, urban land uses. The current conceptual designs would not require ROW acquisition.	**Permanent Impacts:** No permanent ROW impacts would occur if these MMCV elements are implemented. **Temporary Impacts:** No temporary ROW impacts are anticipated to occur if these MMCV elements are implemented.	During final design ROW impacts, or the lack thereof, would need to be confirmed.
Paleontological Resources	These MMCV elements would be constructed within a previously disturbed ROW that is currently used for transportation purposes. Paleontological resources are unlikely to be present due to the past construction of the existing transportation facility.	**Permanent Impacts:** No permanent impacts to paleontological resources are anticipated if these MMCV elements are implemented. **Temporary Impacts:** No temporary impacts to paleontological resources are anticipated if these MMCV elements are implemented.	No further analysis is anticipated to be required if these MMCV elements are implemented due to the previously disturbed nature of the Study Area. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set.

Table 5-6b (Cont.). Resources that are not expected to be Impacted by the Boulder BAT Lanes and Intersection Improvements and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx[s])*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Archaeological Resources	A COMPASS database search was completed in 2018 as a part of the SH 119 Multi-Modal PEL Study for known archaeological resources in the Study Area. There are no known or previously surveyed archaeological resources within 100 feet of these MMCV elements. The entire Study Area has not been surveyed for archaeological resources. There may be unknown archaeological resources within 100 feet of these MMCV elements. However, because of the previously disturbed nature of the Study Area there is a low probability of uncovering unknown archaeological resources.	**Permanent Impacts:** No permanent impacts to archaeological resources are anticipated to occur if the MMCV elements are constructed. However, it is unknown whether archaeological resources are present underground. If archaeological resources are present, they could be impacted during construction. **Temporary Impacts:** Temporary impacts to archaeological resources are not anticipated to occur if the MMCV elements are constructed. However, it is unknown whether archaeological resources are present underground. If archaeological resources are present, they could be impacted during construction.	It is not anticipated that additional analyses would be required for the MMCV elements related to archaeological resources. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set.

* The resources impacted and the level of effort to document them is based on analyses from the SH 119 Multi-Modal PEL Study. The agency sponsoring the improvements will need to scope the project with CDOT and other jurisdictional agencies upon initiation of the NEPA study.

Table 5-7a. Resources that may be Impacted by the BRT/ Queue Jump Lanes at SH 52/SH 119, those that may require Additional Analyses, and those that need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Threatened, Endangered, or Special-Status Species	This MMCV element is near several waterways (field laterals) and potentially riparian areas and undeveloped land, some of which may provide habitat for threatened, endangered, or special-status species. Migratory bird and/or raptor nests were not observed to be present during site visits in 2017 completed as a part of the SH 119 Multi-Modal PEL Study; however, suitable habitat (i.e., large trees, open space, and man-made structures) is located within a half-mile of this element. The CPW requires a half-mile buffer radius be examined for migratory bird nests. A prairie dog town, which serves as suitable habitat for Burrowing Owls, is located southwest of this intersection as well. This MMCV element is within Bald Eagle's winter range.	**Permanent Impacts:** Impacts should be assessed during the NEPA study. **Temporary Impacts:** There is a potential for construction to impact any migratory birds or raptors that may use the Study Area for nesting or foraging. Burrowing Owls may be temporarily impacted. Although no migratory bird or raptor nests were observed at the time of the site visit, they could be present during construction and therefore impacted.	As this element progresses into further design, a biologist will need to survey the Study Area for suitable habitat for threatened, endangered, or special-status species. Based on the design, impacts to these resources will be assessed and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. CDOT may require consultation with the USFWS on habitat suitability and potential affects to threatened or endangered species. Pre-construction surveys for nesting migratory birds protected by the MBTA will be completed if construction activities occur during the nesting season following methods set forth by the CPW.
Riparian/ SB 40 Resources	Two waterways (field laterals) and potentially riparian areas exist near this intersection. SB 40 resources are riparian vegetation with a diameter of two inches or more at breast height.	**Permanent Impacts:** These field laterals may contain SB 40 resources; therefore, permanent impacts to SB 40 resources are possible if the laterals are impacted. **Temporary Impacts:** Temporary impacts to riparian areas may include clearing and grubbing and removal of vegetation necessary to complete construction.	As this MMCV element progresses into further design, a biologist will need to map SB 40 resources. Based on the design, impacts to these resources will be quantified and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. If SB 40 resources are affected, certification from CPW will be required. The level of certification (informal or formal) will be dependent on the magnitude of impact.
Historic Resources/ Section 4(f)	In 2018, a Compass database file search and review of county assessor's data was completed as part of the SH 119 Multi-Modal PEL study, with an emphasis on resources 45 years or older. The Compass search resulted in one previously documented resource with a field determination. State Highway 119 was identified as significant in CDOT's 2016 statewide historic highway inventory and the segment in the future project area will need to be evaluated. Once a project is defined, previously documented resources with field determinations will need to be re-evaluated and there is potential to identify additional historic resources during field surveys.	**Permanent Impacts:** Effects are unknown at this time; they will need to be evaluated during the NEPA Study. **Temporary Impacts:** Effects are unknown at this time; they will need to be evaluated during the NEPA Study. .	Once a project is identified, the Section 106 process can be initiated to identify historic properties and evaluate effects. The database search does not account for new properties that may be documented in a field survey or resources that have not yet been entered into the database, so there is potential for additional resources to be identified. A new database search should be completed upon project initiation and a field survey may be required to determine if there are additional properties that could be eligible for listing. Also, an effects determination may be required.
Hazardous Materials	There are two high-potential sites within a 0.25-mile radius of the BRT/queue jump lanes at SH 52/SH 119 based on a GeoSearch database search conducted in 2018 as a part of the SH 119 Multi-Modal PEL Study (GeoSearch, 2018).	**Permanent Impacts:** Depending on depths of construction necessary, there is moderate potential for impacts during construction. The likelihood of permanent impacts from hazardous materials are dependent on the type of facility impacted. Soil or surface contamination could be present based on past land uses. **Temporary Impacts:** There is potential for construction to encounter hazardous materials adjacent (within a 0.25-mile radius) to the MMCV element; however, this depends on ground disturbance depths during construction. Because of the limited ground disturbance expected, temporary impacts from hazardous materials are anticipated to be minimal.	CDOT Form 881 will be required for this MMCV element. A current database of known RECs will need to be obtained within 180 days of CDOT's approval of the first/top part of the CatEx Form 128. If facilities of concern are identified adjacent to the element and depths of construction may impact these facilities, a MMP should be completed.

Table 5-7a (Cont.). Resources that may be Impacted by the BRT/ Queue Jump Lanes at SH 52/SH 119, those that may require Additional Analyses, and those that need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Noise	Noise sensitive areas in the Noise Study Area, which is a 500-foot buffer around the footprint of the BRT/queue jump lanes at SH 52/SH 119, includes residences, trails, parks, and commercial facilities that are considered sensitive noise receptors. This is a preliminary noise study area used for the PEL; it will need to be refined to reflect the proposed edge of pavement if this element is implemented.	**Permanent Impacts:** Potential noise impacts are unknown at this time and will need to be assessed during the NEPA study. **Temporary Impacts:** There is potential for temporary noise impacts during construction due to the use of construction equipment.	MMCV elements that qualify as a "Type 1 Project" per CDOT's noise guidelines will require noise modeling for the current planning horizon year as well as the year of the NEPA study. The SH 119 Multi-Modal PEL Study had a planning year of 2040; however, there will be a different planning year when this MMCV element is implemented and that year will need to be used for modeling purposes.
Transportation Resources	SH 119 is used by personal vehicles, trucks, pedestrians, and bicyclists as well as bus routes.	**Permanent Impacts:** Implementing the MMCV element would reduce congestion; improve safety and traffic operations; and improve multi-modal connectivity. **Temporary Impacts:** Temporary impacts during construction activities could impact transportation facilities through roadway and lane closures; detours; increased congestion; and increased travel time.	Traffic analyses completed during the SH 119 Multi-Modal PEL Study were based on a planning or horizon year of 2040. Should the planning year be 2045 or later when the NEPA study for this element is undertaken, additional study or a sensitivity analyses could be required to confirm/modify the conceptual design to meet the needs of traffic forecasted for that year.

* The resources impacted and the level of effort to document them is based on analyses from the SH 119 Multi-Modal PEL Study. The agency sponsoring the improvements will need to scope the project with CDOT and other jurisdictional agencies upon initiation of the NEPA study.

Table 5-7b. Resources That Are Not Expected to be Impacted by the BRT/Queue Jump Lanes, and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Vegetation/ Noxious Weeds	The vegetation present within the SH 119 Multi-Modal PEL Study Area mainly consists of mowed grasses, shrubs, and trees. Noxious weeds may be present.	**Permanent Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources. **Temporary Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources.	The presence of noxious weeds would be evaluated during future field visits. BMPs will need to be included in the plan set to limit the risk of spreading noxious weeds during construction.
Fish/Wildlife	Two field laterals are located near this intersection, which may provide fish and wildlife habitat. A prairie dog town is located southwest of this intersection.	**Permanent Impacts:** There may be permanent impacts to a prairie dog town and potentially other wildlife or fish if this MMCV element were to be constructed. **Temporary Impacts:** Temporary impacts may include clearing and grubbing and removal of vegetation necessary to complete construction.	As this MMCV element progresses into further design, a biologist will need to determine if there have been changes in the context of the PEL Study Area. Based on the design, impacts to fish and wildlife will be assessed and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements.
Water Resources	There are no water resources or floodplains at this location.	**Permanent Impacts:** The amounts of impervious surface coverage will vary depending on which BRT/queue jump lane scenario is selected. If the queue jump lanes will be inside the existing lanes, the added impervious surface coverage will be approximately 3.8 acres. If the BRT/queue jump lanes at SH 52/SH 119 are outside the existing lanes, the acreage will be approximately 10.1 acres. There would be no permanent impacts to floodplains. **Temporary Impacts:** Potential temporary direct impacts during construction on water quality could be caused by soil erosion from stormwater runoff. Also, soil excavation and grading during construction could increase the risk of erosion and sedimentation of nearby water bodies. There would be no temporary impacts to floodplains.	The following permits and/or actions related to water quality and floodplains may be required as part of the proposed project: ■ Compliance with MS4 permit for both CDOT and Boulder County; ■ Construction Dewatering Operations Permit if groundwater is discharged from excavation to any waters of the State; ■ Erosion Control permit for the CDPHE; ■ SWQCP from Boulder County; ■ General Permit for Stormwater Discharges Associated with Construction Activities (the Stormwater Construction Permit) under the CDPS from CDPHE; Sewer Use and Drainage Permits from local municipalities.
Wetland Resources and WUS	No wetland resources or WUS are present at this location.	NA – resource not present.	Given the developed nature of the areas around the BRT/queue jump lanes at SH 52/SH 119, it is highly unlikely that "new" wetland resources or WUS will be present in the future. However, as these elements progress into further design, a biologist will need to determine if there have been changes in the context of the Wetland Resource Study Area or design of this MMCV elements.
Social and Community Resources/Parks and Trails/ Section 4(f)/ Non-Historic Resources	No social and community resources exist near this intersection except open space parcels located to the east of SH 119. Section 4(f) resources are those that are dedicated for recreational use, are publicly owned, and open to the public are also not present at this intersection.	**Permanent Impacts:** The open spaces would not be permanently impacted by the MMCV element. **Temporary Impacts:** The open spaces would not be temporarily impacted by the MMCV element.	Additional studies are not expected to be required; CatExes do not typically require evaluation of community resources unless there is a sensitive resource that could be affected or there is a Section 4(f) resources that could be affected.
Section 6(f) Resources	There are no Section 6(f) resources present adjacent to this intersection.	NA – resource not present.	As design progressed during the NEPA study, a review of the Section 6(f) database should be completed to determine if additional facilities have received LWCF. CPW maintains this file for the state of Colorado.

Table 5-7b (Cont.). Resources That Are Not Expected to be Impacted by the BRT/Queue Jump Lanes at SH 52/SH 119, and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Visual Resources/ Aesthetics	This MMCV element is located in a multi-modal transportation corridor surrounded by commercial, industrial and residential uses, along with open spaces, parks, and trails.	**Permanent Impacts:** The MMCV element would have a neutral visual impact as BRT/queue jump lanes at SH 52/SH 119 would be added within CDOT ROW on an existing multi-modal transportation facility. This would not substantially change the visual setting or context of the PEL Study Area and is compatible with local and regional plans. **Temporary Impacts:** Minor, temporary impacts may occur to visual resources if this MMCV element is constructed. These would be due to the presence of construction equipment.	No further analyses are anticipated to be required for visual resources/aesthetics unless there is a substantial change in the proposed design. Visual resources/aesthetics are not typically evaluated as part of a CatEx unless there is a sensitive viewshed nearby or large change in the visual context due to the proposed improvements. However, CDOT may require completion of a Visual Impact Checklist to document visual impacts, or lack thereof, and confirm lack of need to complete a VIA.
Soils and Geology	This MMCV element is not located within sensitive or unique soils/geology.	**Permanent Impacts:** Excavation within existing operational ROW may be required. There would be no impact to mineral of geological resources as the areas have already been designated for transportation uses. **Temporary Impacts:** The potential for temporary soil erosion during construction will be minimized by use of BMPs including soil wetting and use of soil erosion blankets.	The affected environment documentation has been completed and can be included during the NEPA Study. It is not anticipated that additional work related to soils or geology will be required during the NEPA study as these resources are not usually evaluated in a CatEx unless there is a sensitive resource present.
Land Use	The land use near the SH 52/SH 119 intersection is predominantly agricultural and designated open space along with some residential and commercial uses.	**Permanent Impacts:** The proposed BRT/queue jump lanes at SH 52/SH 119 are anticipated to be within existing operational ROW and are compatible with regional and local land use policies and plans as well as the adjacent land uses. **Temporary Impacts:** No temporary impacts to land use would occur if the proposed BRT/queue jump lanes at SH 52/SH 119 are implemented as the construction would be within operational ROW. The improvements are consistent with currently adopted land use plans.	No further analyses are anticipated to be required for land use.
Socio-economics	A variety of socio-economic classes, households, and employment opportunities exist in the vicinity of the SH 52/SH 119 intersection.	**Permanent Impacts:** The proposed BRT/queue jump lanes at SH 52/SH 119 would benefit local neighborhoods and communities by improving access, mobility, safety, and enhancing multi-modal transportation connectivity. **Temporary Impacts:** Temporary impacts during construction could occur as residents and business patrons could be temporarily affected by limited access, traffic congestion, dust, and noise.	Data has been collected for socio-economic resources as a part of the SH 119 Multi-Modal PEL Study. Additional studies are not expected to be necessary during the future NEPA Study.
EJ	There are EJ populations adjacent to the SH 52/SH 119 intersection.	**Permanent Impacts:** The project is anticipated to directly benefit EJ populations as well as the general population by providing enhanced transit access contributing to increased transportation choices and greater overall mobility. **Temporary Impacts:** Temporary impacts to EJ populations due to construction of this MMCV element may occur in the form of detours, construction dust, and/or construction noise. However, these impacts would not be borne disproportionately by EJ populations as they would affect all people accessing the area and the majority of the area surrounding the BRT/queue jump lanes at SH 52/SH 119 are not EJ.	No further study is anticipated to be required for EJ resources. CatExes do not typically require EJ analyses unless it is identified as a sensitive resource during future study. However, outreach targeted for EJ populations should be conducted during project-specific studies as there are low-income and/or minority populations near and adjacent to MMCV elements that would be affected, potentially disproportionately, by construction."

Table 5-7b (Cont.). Resources That Are Not Expected to be Impacted by the BRT/Queue Jump Lanes at SH 52/SH 119, and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Utilities	There are numerous utilities including water lines, wastewater, electric, and gas lines.	**Permanent Impacts:** Utilities may need to be relocated if this MMCV element is implemented, with no permanent loss of service. **Temporary Impacts:** Relocation of underground utilities within the ROW may be required as part of the construction activities. There may be a temporary loss of service during utility relocations. In addition, there may be a temporary impact to traffic signals during construction.	Utilities would need to be surveyed and avoidance or relocation measures incorporated into the plan set, as appropriate.
ROW	The transportation ROW is bordered primarily by agricultural lands and designated open space. The current conceptual designs would not require ROW acquisition.	**Permanent Impacts:** No permanent ROW impacts would occur if this MMCV element is implemented. **Temporary Impacts:** No temporary ROW impacts are anticipated to occur if this MMCV element is implemented.	During final design ROW impacts, or the lack thereof, would need to be confirmed.
Paleontological Resources	The BRT/queue jump lanes at SH 52/SH 119 would be constructed within a previously disturbed ROW that is currently used for transportation purposes. Paleontological resources are unlikely to be present due to the past construction of the existing transportation facility.	**Permanent Impacts:** No permanent impacts to paleontological resources are anticipated if this MMCV element is implemented. **Temporary Impacts:** No temporary impacts to paleontological resources are anticipated if this MMCV element is implemented.	No further analysis is anticipated to be required if this MMCV element is implemented due to the previously disturbed nature of the Study Area. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set.
Archaeological Resources	A COMPASS database search was completed in 2018 as a part of the SH 119 Multi-Modal PEL Study for known archaeological resources in the Study Area. There are no known or previously surveyed archaeological resources within 100 feet of this MMCV element. The entire Study Area has not been surveyed for archaeological resources; there may be unknown archaeological resources present; however, due to the previously disturbed nature of the Study Area there is a low probability of uncovering unknown archaeological resources.	**Permanent Impacts:** No permanent impacts to archaeological resources are anticipated to occur if this MMCV element is constructed. However, it is unknown whether archaeological resources are present in areas that have not been previously surveyed. If archaeological resources are present, they could be impacted during construction. **Temporary Impacts:** Temporary impacts to archaeological resources are not anticipated to occur if this MMCV element is constructed. However, it is unknown whether archaeological resources are present underground. If archaeological resources are present, they could be impacted during construction.	It is not anticipated that additional analyses would be required for archaeological resources during a NEPA study; however, CDOT will determine if additional surveys are required. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set.

* The resources impacted and the level of effort to document them is based on analyses from the SH 119 Multi-Modal PEL Study. The agency sponsoring the improvements will need to scope the project with CDOT and other jurisdictional agencies upon initiation of the NEPA study.

Table 5-8a. Resources that may be Impacted by the Separated Bikeway Corridor, those that may require Additional Analyses, and those that need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Threatened, Endangered, or Special-Status Species	The proposed separated bikeway corridor crosses multiple streams, wetland resources, and riparian areas as well as undeveloped areas with SH 119 ROW some of which may provide habitat for threatened, endangered, and special-status species. Six prairie dog towns, which serve as suitable habitat for Burrowing Owls, are located within the proposed separated bikeway corridor based on field surveys completed in 2017 as part of the SH 119 Multi-Modal PEL Study. There is suitable habitat (i.e., large trees, open space, and man-made structures) for migratory birds and raptors within a half-mile of all these elements. The CPW requires a half-mile buffer radius be examined for migratory bird nests. In addition, the proposed separated bikeway corridor elements are within Bald Eagle's winter range.	**Permanent Impacts:** Impacts to protected species, migratory birds, and Bald Eagles need to be further evaluated once future project activities are determined during the NEPA phase. **Temporary Impacts:** There is a potential for construction to impact any special-status species, migratory birds, or raptors that may use the Study Area for nesting or foraging. Burrowing Owls may be temporarily impacted. Although no migratory bird or raptor nests were observed at the time of the site visit, they could be present during construction and therefore impacted.	As this element progresses into further design, a biologist will need to determine if there have been changes in the context of the PEL Study Area. Habitat surveys for special-status species should be conducted to determine if the bikeway may affect them. Based on the design, impacts to biological resources/habitat will be assessed and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. CDOT may require consultation with the USFWS to request concurrence on the findings of the habitat survey and the potential for the bikeway to affect threatened or endangered species. Pre-construction surveys for nesting migratory birds protected by the MBTA will be completed if construction activities occur during the nesting season following methods set forth by the USFWS and CPW.
Riparian/SB 40 Resources	SB 40 resources exist around the 18 streams that cross the proposed separated bikeway corridor.	**Permanent Impacts:** Permanent impacts to SB 40 resources may occur as a result of the construction of the bikeway; SB 40 resources should be mapped and impacts quantified. **Temporary Impacts:** Temporary impacts during construction may include impacts to SB 40 resources. Temporary impacts may include clearing and grubbing as well as removal of vegetation necessary to complete construction.	When the design of the bikeway progresses during a NEPA study, SB 40 resources will need to be mapped. Based on the design, impacts to SB 40 resources will be quantified and applicable mitigation strategies will be committed to in accordance with CPW requirements. An SB 40 certification from CPW will be required. Riparian trees and shrubs two inches or greater in breast-height diameter will need to be mitigated on a one-to-one basis. The level of certification (informal or formal) will be dependent on the magnitude of impact.
Historic Resources/ Section 4(f)	In 2018, a Compass database file search and review of county assessor's data was completed as part of the SH 119 Multi-Modal PEL study, with an emphasis on resources 45 years or older. Based on this file search, there is one previously documented property with a field determination; four supporting linear segments; and a single NRHP-listed property adjacent to this MMCV element. In addition, State Highway 119 was determined to be significant in CDOT's 2016 statewide historic highway inventory. Once a project is defined, all of these resources will need to be evaluated, and there is potential for additional properties to be identified through field survey. It is expected that the MMCV element will be constructed within highway ROW.	**Permanent Impacts:** Effects are unknown at this time; they will need to be evaluated during the NEPA Study. **Temporary Impacts:** Effects are unknown at this time; they will need to be evaluated during the NEPA Study.	Once a project is identified, the Section 106 process can be initiated to identify historic properties and evaluate effects. The database search does not account for new properties that may be documented in a field survey or resources that have not yet been entered into the database, so there is potential for additional resources to be identified. A new database search should be completed upon project initiation and a field survey may be required to determine if there are additional properties that could be eligible for listing. Also, an effects determination may be required.

Table 5-8a (Cont.). Resources that may be Impacted by the Separated Bikeway Corridor, those that may require Additional Analyses, and those that need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Water Resources	A total of 18 water resources are crossed by the proposed separated bikeway corridor, along with floodplains at several locations.	**Permanent Impacts:** The separated bikeway corridor would result in the addition of approximately 14 acres of new impervious surfaces, which would increase runoff and stormwater discharge to nearby water resources. Floodplains occur at several locations along the separated bikeway corridor. Development within the floodplains has the potential to cause a change in flood elevations depending on the hydrology of the area. **Temporary Impacts:** Potential temporary direct impacts during construction on water quality could be caused by soil erosion from stormwater runoff. Soil excavation and grading during construction could increase the risk of erosion and sedimentation.	As the design progresses, the amount of new impervious surface it creates will need to be calculated. Water quality impacts for the separated bikeway corridor will be mitigated during the design phase; this will include stormwater management plans and compliance with MS4 permits. BMPs, as appropriate will need to be incorporated in the design. Construction within the identified floodplains could result in a change in current floodplain and floodway boundaries. Coordination with local jurisdictions including FEMA, Urban Drainage and Flood Control Division, Boulder County, Boulder, and Longmont should be conducted throughout the design process for potential impacts and permitting for work within floodplains and floodways. Floodplain modeling may be required to assess impacts at floodplain crossings and may require a Conditional Letter of Map Revision and a Letter of Map Revision as well as permitting from local jurisdictions. The following permits and/or actions related to water quality and floodplains may be required as part of the proposed project: ■ Compliance with MS4 permit for CDOT and potentially Boulder as well as Longmont; ■ Construction Dewatering Operations Permit if groundwater is discharged from excavation to any waters of the State; ■ Erosion Control permit for CDPHE; ■ SWQCP from Boulder County; ■ Groundwater Discharge Permit and Erosion Control Permit; ■ General Permit for Stormwater Discharges Associated with Construction Activities (the Stormwater Construction Permit) under the CDPS from CDPHE; ■ Sewer Use and Drainage Permits from local municipalities; and ■ Floodplain Development Permits.

Table 5-8a (Cont.). Resources that may be Impacted by the Separated Bikeway Corridor, those that may require Additional Analyses, and those that need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Wetland Resources and WUS	The proposed separated bikeway corridor crosses 18 waterways and ditches, some of which may contain wetland resources and/or WUS.	**Permanent Impacts:** Roughly 0.2 acres of wetland resources or WUS may be permanently impacted due to the construction of the bikeway. **Temporary Impacts:** Temporary impacts during construction may include impacts to wetland resources/open waters. Temporary impacts may include clearing and grubbing and removal of vegetation necessary to complete construction.	As the bikeway progresses into further design, a biologist will need to determine if there have been changes in the context of the Wetland Resource Study Area and calculate both permanent and temporary impact to wetlands and WUS. Based on the design, applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. As the separated bikeway corridor is within the SH 119 ROW, a CatEx will be required by CDOT for its implementation. CDOT requires 1 to 1 mitigation regardless of jurisdiction. The USACE allows for a series of nationwide permits to be issued—one for each impacted area as long as the impacted area(s) of WUS are less than 0.5 acres and are across different drainage or wetland complexes. If the bikeway is permitted through a series of permits or the impacts are less than 0.5 acres, it will qualify as a NWP 14, or series of permits, for transportation resources. An NWP typically requires 45 days to receive verification from the USACE. However, if the impacted areas are close to each other, the USACE may require one permit for the bikeway. If impacts to WUS are calculated to be over the 0.5-acre threshold triggering the need for an IP, it is recommended that coordination with CDOT and the USACE occur early in the NEPA process to ensure the Section 404 permit is completed within the project schedule. If an IP is required, the process may take up to a year to receive verification from the USACE and could trigger the need to complete the NEPA 404 Merger process
Social and Community Resources/Parks and Trails/ Section 4(f) Non-Historic	Social and community resources near the proposed separated bikeway corridor include the following: Boulder OSMP as well as Boulder County Open Space parcels and conservation easements; the Fourmile Canyon Creek Trail; the IBM Connector Trail; various bike lanes/routes; and the Longmont to Boulder (LOBO) Regional Trail. Since the Fourmile Canyon Creek Trail and the IBM Connector Trail are publicly owned and dedicated for recreational use, they are both Section 4(f) resources under the Department of Transportation Act of 1966,	**Permanent Impacts:** The bikeway would enhance the multi-modal connectivity within the Study Area, including connectivity with Section 4(f) resources. **Temporary Impacts:** The Fourmile Canyon Creek Trail and the IBM Connector Trail, both of which are Section 4(f) resources, would likely be impacted by bikeway construction; appropriate detours would be put into place during construction.	Construction of the bikeway within SH 119 ROW will trigger CDOT involvement and require a NEPA study. As there are trails within the SH 119 ROW that may be affected, the agency maintaining those facilities will need to be coordinated with during the NEPA study. If impacts are temporary and/or beneficial to the resource, coordination would likely consist of documentation and notification/coordination with the Official with Jurisdiction as well as maintaining access during construction. When a MMCV element, such as the separated bikeway corridor, permanently incorporates a Section 4(f) resource into a transportation facility, a Section 4(f) evaluation is required. The need for this evaluation will be determined during

Table 5-8a (Cont.). Resources that may be Impacted by the Separated Bikeway Corridor, those that may require Additional Analyses, and those that need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Hazardous Materials	There are 3 high-potential sites and 14 low-potential hazardous materials sites found adjacent to the separated bikeway corridor based on a GeoSearch database search conducted in 2018 as a part of the SH 119 Multi-Modal PEL Study (GeoSearch, 2018).	**Permanent Impacts:** The likelihood of permanent impacts from hazardous materials are dependent on the type of facility impacted. The construction depth for the bikeway is not expected to be more than a couple feet and may not reach groundwater. Soil or surface contamination could be present based on past land uses adjacent to SH 119 and spills from vehicular crashes on SH 119. **Temporary Impacts:** There is potential for construction to encounter hazardous materials adjacent (within a 0.25-mile radius) to the separated bikeway corridor; however, this depends on ground disturbance depths during construction. Because of the limited ground disturbance expected, impacts from hazardous materials are expected to be minimal.	CDOT Form 881 and potentially a Phase I ISA will be required for these MMCV elements. A current database of known RECs will need to be obtained within 180 days of CDOT's approval of the first/top part of the CatEx Form 128. If facilities of concern are identified adjacent to the elements and depths of construction may impact these facilities, an MMP should be completed.

* The resources impacted and the level of effort to document them is based on analyses from the SH 119 Multi-Modal PEL Study. The agency sponsoring the improvements will need to scope the project with CDOT and other jurisdictional agencies upon initiation of the NEPA study.

Table 5-8b. Resources that Are Not Expected to be Impacted by the Separated Corridor Bikeway and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Vegetation/ Noxious Weeds	The vegetation present within the Study Area mainly consists of mowed grasses, shrubs, and trees. Noxious weeds may be present.	**Permanent Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources. **Temporary Impacts:** The disturbance of soils due to construction activities could contribute to the spread of noxious weed species or introduction of new weed species from outside sources.	The presence of noxious weeds would be evaluated during future field visits that are undertaken as design progresses during a NEPA study. BMPs will need to be included in the plan set to limit the risk of spreading noxious weeds during construction.
Fish/Wildlife	Eighteen waterways/ditches flow under the bikeway. Fish may be present in these waterways and there is a potential for wildlife in the area as well. The bikeway is slated to traverse six existing prairie dog towns.	**Permanent Impacts:** There would be permanent impacts to prairie dog towns, including Burrowing Owls, and potentially other wildlife or fish if the bikeway were to be constructed. **Temporary Impacts:** There would be temporary impacts to prairie dog towns and potentially other fish or wildlife, including Burrowing Owls, if the bikeway were to be constructed. Temporary impacts may include clearing and grubbing and removal of vegetation necessary to complete construction.	As the bikeway progresses into further design during the NEPA study, a biologist will need to determine if there have been changes in the context of the PEL Study Area. Based on the design, impacts to biological resources will be assessed and applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements.
Section 6(f) Resources	Section 6(f) resources are those that have received funds from the LWCF and are intended to be dedicated to recreational purposes in perpetuity. The Boulder Reservoir, located approximately 250 feet northwest of SH 119, is considered a Section 6(f) resource.	**Permanent Impacts:** The Boulder Reservoir should not be impacted by the bikeway. **Temporary Impacts:** Temporary impacts should not occur during the construction of the bikeway.	As design progresses during the NEPA study, a review of the Section 6(f) database should be completed to determine if additional facilities have received LWCF. CPW maintains this file for the state of Colorado.
Air Quality	The bikeway falls within the following nonattainment and maintenance areas: Denver-Boulder CO maintenance area; Denver Metro PM10 maintenance area; and Denver-Boulder-Greeley-Ft. Collins-Loveland O3 nonattainment area (CDPHE, 2005a, CDPHE, 2005b, CDPHE, 2008).	**Permanent Impacts:** The bikeway is not a source of emissions; no permanent impacts are expected. Additionally, bike trails are exempt from conformity under the conformity rule. **Temporary Impacts:** Neighboring areas could be exposed to construction-related and fugitive dust emissions during the construction phase.	No further analysis is required; CDOT may require a memorandum-to-file during the NEPA study.
Noise	Bikeways are a Type III project and are exempt from noise modeling.	**Permanent Impacts:** There is no potential for traffic noise impacts as a result of the bikeway. **Temporary Impacts:** There is the potential for temporary noise impacts due to use of construction equipment needed to build the bikeway.	This project is considered a Type III Project per CDOT Noise Guidelines, making it exempt from the requirement to model current and future noise levels. No further analysis is required; CDOT may require a memorandum documenting the bikeway as a Type III project.
Visual Resources/ Aesthetics	SH 119 between Boulder and Longmont has a rural visual context that is likely to transition to a more suburban context in the reasonably foreseeable future.	**Permanent Impacts:** The bikeway would have a neutral visual impact as it would add a separated bikeway within CDOT ROW, which is already a heavily used transportation corridor with cyclists using the shoulder of SH 119. Construction of a bikeway on its own alignment is not expected to substantially change the visual setting or context of the Study Area and is compatible with local and regional plans. **Temporary Impacts:** Minor, temporary impacts may occur to visual resources if the bikeway is constructed. These would be due to the presence of construction equipment.	Locating the bikeway within SH 119's ROW will trigger the need to complete a NEPA study, the level of study is assumed to be a CatEx. Visual resources/aesthetics are not typically evaluated as part of a CatEx unless there is a sensitive viewshed nearby or large change in the visual context due to the proposed improvements. At the time of the NEPA study, coordination with CDOT will be required to determine if there is a need to complete a VIA. CDOT may require completion of a Visual Impact Checklist to determine the need for a VIA.

Table 5-8b (Cont.). Resources that Are Not Expected to be Impacted by the Separated Corridor Bikeway and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Soils and Geology	These MMCV elements are not located within sensitive or unique soils/geology.	**Permanent Impacts:** The bikeway would include excavation within existing operational ROW. There would be no impact to mineral or geological resources as a result of the bikeway as the area has already been designated for transportation use(s). **Temporary Impacts:** The potential for temporary soil erosion during construction will be minimized by use of BMPs including soil wetting and use of soil erosion blankets.	No further study is anticipated to be required for soils or geology regardless of whether a NEPA study is completed. This resource is not typically evaluated during a CatEx, which is the expected level of NEPA study, unless there is a sensitive soil/geologic unit present of concern.
Land Use	The land use adjacent to the bikeway is a mix of agricultural, designated open space, residential, recreational, commercial, and industrial uses.	**Permanent Impacts:** The bikeway is anticipated to be within the operational ROW of SH 119; it is compatible with regional and local land use policies and plans. **Temporary Impacts:** No temporary impacts to land use would occur if the bikeway is built as the construction would be within operational ROW. The improvements are consistent with currently adopted land use plans.	No further analyses are anticipated to be required for land use.
Socio-economics	A variety of socio-economic classes, households, and employment opportunities exist near the bikeway.	**Permanent Impacts:** The bikeway would substantially benefit local neighborhoods and communities by improving access, mobility, and enhancing multi-modal transportation connectivity. **Temporary Impacts:** Temporary impacts during construction could occur as residents and business patrons could be temporarily affected by limited access, dust, and noise.	Additional studies are not expected to be required if a CatEx is required as this level of NEPA study does not require evaluation of socio-economics unless there is a sensitive resource that could be affected.
EJ	EJ populations are areas that contain a higher than average percentage of low-income and/or minority resident. EJ populations are present adjacent to the bikeway in the areas of north Boulder, a few locations along SH 119 between Boulder and Longmont as well as southern Longmont.	**Permanent Impacts:** The bikeway is anticipated to directly benefit EJ populations by providing enhanced multi-modal access, contributing to increased transportation choices and greater overall mobility. **Temporary Impacts:** Temporary impacts to EJ populations due to construction of the bikeway may occur in the form of detours, construction dust, and/or construction noise. However, these impacts would not be borne disproportionately by EJ populations as they would affect all people accessing the area.	No further study is anticipated to be required for EJ resources. The anticipated level of NEPA study is assumed to be a CatEx. CatExes do not typically require EJ analyses unless it is identified as a sensitive resource and there is the potential for them to be disproportionally adversely affected. However, outreach targeted for EJ populations should be conducted during project-specific studies as there are low-income and/or minority populations near and adjacent to MMCV elements that would be affected, potentially disproportionately, by construction.
Transportation Resources	SH 119 is used by personal vehicles, trucks, buses, pedestrians, and bicyclists as well as serving bus routes.	**Permanent Impacts:** Implementing the bikeway would improve multi-modal connectivity throughout the SH 119 Corridor. **Temporary Impacts:** Temporary impacts during construction activities could impact transportation facilities through roadway and lane closures; detours; increased congestion; and increased travel time.	No additional study for transportation resources is expected to be required for construction and maintenance of the bikeway.

Table 5-8b (Cont.). Resources that Are Not Expected to be Impacted by the Separated Corridor Bikeway and May Not Need to be Documented in a Future NEPA Study (Anticipated to be a CatEx)*

Resource	Affected Environment/Corridor Conditions	Anticipated Environmental Impact	Next Steps for NEPA Study
Utilities	There are numerous utilities in the Study Area including water lines, wastewater, electric, and gas lines.	**Permanent Impacts:** Utilities may need to be relocated if the MMCV elements are implemented, with no permanent loss of service. **Temporary Impacts:** Relocation of underground utilities within the ROW may be required as part of the construction activities. There may be a temporary loss of service during utility relocations. In addition, there may be a temporary impact to CDOT traffic signals during construction.	Utilities will need to be surveyed and avoidance or relocation measures incorporated into the plan set, as appropriate.
ROW	The bikeway is expected to be completely within the operational transportation ROW of SH 119. No easements or ROW acquisition is expected for its construction, operation, or maintenance.	**Permanent Impacts:** No permanent ROW impacts would occur if the bikeway is implemented. **Temporary Impacts:** No temporary ROW impacts are anticipated occur if the bikeway is implemented.	During final design ROW impacts, or the lack thereof, will need to be confirmed.
Paleontological Resources	The bikeway would be constructed within a previously disturbed ROW that is currently used for transportation purposes. Paleontological resources are unlikely to be present due to the past construction of the existing transportation facility.	**Permanent Impacts:** No permanent impacts to paleontological resources are anticipated if the bikeway is implemented. **Temporary Impacts:** No temporary impacts to paleontological resources are anticipated if the bikeway is implemented.	No further analysis is anticipated to be required if the bikeway is implemented. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set.
Archaeological Resources	A COMPASS database search was completed in 2018 as a part of the SH 119 Multi-Modal PEL Study for cultural resources. Based on this information and review of the study areas, which are in previously disturbed areas, there are no known archaeological sites within the bikeway alignment, which is entirely within SH 119's operational ROW. However, it is unknown whether archaeological resources are present underground as the area has not been fully surveyed.	**Permanent Impacts:** No permanent impacts to archaeological resources are anticipated to occur if the bikeway is constructed. However, it is unknown whether archaeological resources are present underground. If archaeological resources are present, they could be impacted during construction. **Temporary Impacts:** Temporary impacts to archaeological resources are not anticipated to occur if the bikeway is constructed. However, it is unknown whether archaeological resources are present underground. If archaeological resources are present, they could be impacted during construction.	It is not anticipated that additional analyses would be required for archaeological resources; however, CDOT will make the determination as the need to complete surveys for the bikeway's alignment. CDOT's Standard Specification to halt work if resources are encountered during construction will be include in the plan set.

* The resources impacted and the level of effort to document them is based on analyses from the SH 119 Multi-Modal PEL Study. The agency sponsoring the improvements will need to scope the project with CDOT and other jurisdictional agencies upon initiation of the NEPA study.

5.3 Mitigation Strategies

Mitigation strategies are required for resources that would be affected by implementation of the MMCV and as described in Table 5-9 below.

Table 5-9. Mitigation Strategies

Resource Being Mitigated or Permitted	Mitigation Measure	Permits/Certifications that may be Required
Biological Resources	Avoidance of wetland resources, riparian areas, prairie dog towns, and other important habitat for protected species is recommended during the NEPA planning phase. Pre-construction surveys for nesting migratory birds protected by the MBTA will be completed if construction activities occur during the nesting season following methods set forth by the USFWS and CPW. Clearing and grubbing should be scheduled to avoid taking of migratory birds.	CDOT requires compliance with SB 40 for CDOT projects affecting riparian vegetation. As the BRT/managed lanes and separated bikeway corridor would cross waterways, a SB 40 Certification is anticipated to be required for these MMCV elements. If suitable habitat for threatened and endangered species is affected by construction of the BRT/managed lanes and separated bikeway corridor, formal consultation with the USFWS will be required.
Historic Resources/Section 4(f)/Historic Resources	If an NRHP-eligible resource cannot be avoided and will result in an adverse effect, mitigation will be discussed with the project stakeholders and the SHPO.	There are no required permits for historic resources.
Water Resources	During construction activities, the contractor will develop and adhere to a Stormwater Management Plan (SWMP). The SWMP will detail the seeding, plantings, and protections (e.g., silt fence, construction fence, erosion logs) and BMPs that will be implemented. ■ Stormwater Management Plan (SWMP) including BMPs that will include erosion controls that will be put in place while work is in progress to reduce erosion in the project area and to minimize impacts to aquatic resources from sedimentation. ■ A Spill Prevention, Control, and Countermeasure Plan ■ Temporary stormwater management controls	■ Compliance with the or MS4 permit(s) ■ Construction Dewatering Operations Permit ■ Erosion Control Permit from CDPHE; ■ Storm Water Quality Control Permit from Boulder County; ■ Groundwater Discharge Permit and Erosion Control Permit; ■ Stormwater Construction Activity Permit and Permanent Stormwater Control Permit;

Resource Being Mitigated or Permitted	Mitigation Measure	Permits/Certifications that may be Required
	■ Permanent water quality control may be required	■ General Permit for Stormwater Discharges Associated with Construction Activities (the Stormwater Construction Permit) under the CDPS from CDPHE; ■ Sewer Use and Drainage Permits from local municipalities; ■ Boulder County, City of Boulder, and City of Longmont Floodplain Development Permits
Wetland Resources and WUS	Mitigation measures are not yet finalized, but conservation measures and BMPs should be incorporated into project plans to minimize and mitigate impacts to wetland resources and WUS. Implementation of the MMCV will follow applicable NWP conditions.	A Clean Water Act Section 404 permit will likely be required for impacts to WUS. An IP may be required where impacts exceed 0.5 acre; this could trigger the need to complete the NEPA 404 Merger process. However, other specific components of a project could trigger an IP (e.g., disturbance of over 300 linear feet, river channel realignment, etc.).
Social and Community Resources; Parks and Recreation including Section 4(f)/Non-Historic Resources and Section 6(f) Resources	Access will be maintained to social and community resources during construction and signs indicating access points will be posted. Residents and stakeholders will be updated with information regarding the project's construction activities (i.e., schedule, traffic circulation plans, traffic signage). Additionally, construction may be phased to minimize traffic-congestion impacts.	No permits are required related to social and community resources including Section 4(f) and Section 6(f) resources.
Hazardous Materials	Consideration will be given to conduct additional investigations (i.e., soil and groundwater sampling) for properties identified as having a high potential to impact the MMCV element, in order to evaluate subsurface conditions and to identify any potential hazardous material management issues.	If construction for the MMCV elements is impacted by hazardous materials, coordination with CDPHE may be necessary.

Resource Being Mitigated or Permitted	Mitigation Measure	Permits/Certifications that may be Required
Air Quality	The construction phase could have localized diesel-emitting sources, which will temporarily affect air quality conditions during construction. While emissions from construction cannot currently be quantified, they can be mitigated by employing some of the following BMPs: ■ Cover, wet, compact, or use chemical stabilization binding agent, to control dust and excavated materials at construction sites. ■ Use wind barriers and wind screens to prevent spreading of dust from the site. ■ Have a wheel wash station and/or crushed stone apron at egress/ingress areas to prevent dirt being tracked onto public streets. ■ Use street sweepers to remove dirt tracked onto streets. ■ Cover dump trucks that are hauling material leaving sites to prevent dirt from spilling onto public streets. ■ Minimize disturbed areas—particularly in winter. ■ Prohibit unnecessary idling of construction equipment. ■ Locate construction diesel engines as far away as possible from residential areas. ■ Locate staging areas as far away as possible from residential areas. ■ Require heavy construction equipment to use the cleanest available engines or be retrofitted with diesel particulate-control technology. ■ Use alternatives to diesel engines and/or diesel fuels, such as biodiesel, liquefied natural gas, or compressed natural gas, fuel cells, and electric engines, if applicable. ■ Install engine pre-heater devices to eliminate unnecessary idling for wintertime construction.	The MMCV elements will need to follow the requirements of filing an Air Pollution Emission Notice (APEN) with the Colorado Air Pollution Control Division to fulfill EPA's concerns regarding air quality impacts. An APEN is required when over 25 acres of ground is disturbed or if project construction is greater than six months in duration.

Resource Being Mitigated or Permitted	Mitigation Measure	Permits/Certifications that may be Required
	■ Prohibit tampering with equipment to increase horsepower or to defeat an emission control device's effectiveness. ■ Require construction vehicle engines to be properly tuned and maintained. ■ Use construction vehicles and equipment with the minimum practical engine size for the intended job.	
Noise	If exceedances are identified during noise modeling, an analyze to determine if mitigation is feasible and reasonable will need to be conducted. The potential need for mitigation is unknown at this time. Construction noise impacts can be mitigated by keeping machines in good working order; particularly with respect towards mufflers and exhaust pieces of equipment. If construction is to occur during nighttime hours applicable permits should be obtained for the MMCV elements.	If project elements are to be constructed during nighttime hours, the applicable permits must be obtained from the City of Boulder pursuant to Ordinance 5-9-3 Section b(2) and City of Longmont Ordinance 10.20.110 Section D(4).
Visual Resources/Aesthetics	It is expected that conventional mitigation measures will be utilized to mitigate visual impacts.	No permits are required for visual resources.
Soils and Geology	No mitigation would be required for soils and geology.	No permits are required for soils and geology.
Land Use	Mitigation measures for land use are not required as part of the MMCV elements.	It is unlikely that permits will be required for land use.
Socio-economics	Access will be maintained to local businesses during construction and signs indicating access points will be posted. Local residents and businesses will be updated with information regarding the project's construction activities (i.e., schedule, traffic circulation plans, traffic signage). To avoid disruption to local residents and businesses during construction, new access points will be provided before the existing access points are removed. Mitigation for construction impacts will consider implementation of the following measures, as appropriate, during final engineering design and construction: Coordination with emergency-service providers to identify methods to minimize	No permits are needed for socio-economic resources.

Resource Being Mitigated or Permitted	Mitigation Measure	Permits/Certifications that may be Required
	delays and provide access to properties during construction. Provision of temporary transit shelters and of information for transit patrons about temporary changes in transit-shelter locations prior to construction.	
EJ	The impacts requiring mitigation for EJ populations are typically ROW acquisitions, relocations, and temporary construction impacts. It is unlikely that MMCV elements will require ROW acquisitions or relocations. However, outreach targeted for EJ populations should be conducted during project-specific studies as there are low-income and/or minority populations near and adjacent to MMCV elements that would be affected, potentially disproportionately, by construction.	No permits required for this resource.
Transportation Resources	During final design, access points (i.e., new, modified, or combined) will be identified in a formal access-control plan prepared for the MMCV elements. All access points will be constructed in accordance with local, regional, and state standards.	A Construction Access Permit will be required for detours and lane closures for implementation of MMCV elements that receive CDOT oversight.

5.4 Next Steps for Environmental Analyses

As described in previously in this section, additional environmental analyses will be required during NEPA studies and project implementation. The below table provides additional detail on these next steps and Appendix B discusses the next steps more thoroughly. Next steps specific to each resource are summarized in Table 5-10.

Table 5-10. Next Steps by Resource

Resource	Next Steps
Biological Resources	Preliminary mapping of biological resources has been completed and is documented in this SH 119 Multi-Modal PEL Study Appendix A of this report; however, habitat studies will likely be necessary for the 63rd St/SH 119 Park-n-Ride, the BRT/managed lane, BRT/queue jump lanes at SH 52/SH 119, and the separated bikeway corridor. CDOT may require consultation with the USFWS to request concurrence on the findings of the habitat survey and the potential for the MMCV elements to affect threatened or endangered species. SB 40 resources will need to be mapped during the NEPA study for MMCV elements that have CDOT involvement. Based on the design, impacts to SB 40 resources would

Resource	Next Steps
	be quantified and applicable mitigation strategies will be committed. An SB 40 certification from CPW may be required depending on impacts. The level of certification (informal or formal) will be dependent on the magnitude of impact. The presence of noxious weeds will need to be evaluated during future field visits that are undertaken as design progresses during a NEPA study. BMPs will need to be included in the plan set to limit the risk of spreading noxious weeds during construction. MMCV elements, regardless of funding, should comply with MBTA regulations to protect migratory birds. Depending on construction timing, MBTA bird surveys may be necessary if construction is expected to be within MBTA and/or Raptor nesting season.
Historic Resources/Section 4(f)/Historic	Data was collected for potential historic resources within the Historic Resources' Study Area. For MMCV elements that may have potential to affect historic properties, Section 106 consultation may be necessary. The database search does not account for new properties that may be documented in a field survey or resources that have not yet been entered into the database, so there is potential for additional resources to be identified. A new database search should be completed upon project initiation and a field survey may be required to determine if there are additional properties that could be eligible for listing.
Water Resources	Construction within the identified floodplains could result in a change in current floodplain and floodway boundaries. Coordination with local jurisdictions including FEMA), Urban Drainage and Flood Control District, Boulder County, Boulder, and Longmont should be conducted throughout the design process for potential impacts and permitting for work within floodplains and floodways. Floodplain modeling would likely be required to assess impacts at floodplain crossings and may require a Conditional Letter of Map Revision and Letter of Map Revision as well as permitting from local jurisdictions. MMCV elements that may require additional floodplain modeling and/or permits include: 1st Ave/Main St (US 287) Park-n-Ride, BRT/managed lanes, separated bikeway corridor, and the Boulder and Longmont Intersection Improvements (all except the 28th St/Iris Ave Intersection) within the floodplains. Water quality concerns for MMCV elements will be mitigated during the design phase; this may include stormwater management plans and/or compliance with MS4 permits.

Resource	Next Steps
Wetland Resources and WUS	Preliminary mapping of wetland resources and WUS resources has been completed and is documented in this SH 119 Multi-Modal PEL Study as Appendix A of this report. As discrete MMCV elements progress into further design, a biologist will need to determine if there have been changes in the context of the Wetland Resource Study Area. Based on the design, applicable mitigation strategies will be committed to in accordance with applicable local, state, and federal requirements. Additionally, if impacts to WUS are calculated to be over the 0.5-acre threshold for the BRT/managed lanes; it is recommended that coordination with the USACE occur early in the NEPA process to ensure the Section 404 permit is completed within the project schedule. If an IP is required, the process may take up to a year to receive a permit verification from the USACE and may trigger the need to complete the NEPA 404 Merger process. A NWP takes 45 days to receive permit verification.
Social and Community Resources; Parks and Recreation including Section 4(f)/Non-Historic Resources and Section 6(f) Resources	Further coordination will be required during NEPA studies if the MMCV will impact any Section 4(f) or Section 6(f) resource; regardless of the level of NEPA study required. If impacts are temporary and/or beneficial to the resource, coordination will consist of documentation and notification/coordination with the Official with Jurisdiction as well as determining detours during construction. The following MMCV elements are likely to require Section 4(f) documentation during the NEPA process: the Boulder intersection improvements, 63rd St/SH 119 Park-n-Ride, 8th Ave/Coffman Park-n-Ride, Longmont Stops, BRT/managed lanes, and separated bikeway corridor. It is recommended that MMCV elements avoid any Section 6(f) resource; if impacts to Section 6(f) resources are unavoidable, coordination with CPW and the NPS will be required.
Hazardous Materials	A CDOT Form 881 and/or a Phase I ISA is recommended for all MMCV elements, regardless of whether a NEPA study is required or the level of NEPA documentation required. If facilities of concern are identified adjacent to the MMCV element and depths of construction may impact these facilities, a Phase II Investigation and MMP should be conducted.
Air Quality	Federal funding can only be used for projects that comply with the conformity provision of the Clean Air Act and the EPA transportation air quality conformity regulations (40 CFR 51 Subpart T, and 40 CFR 93 Subpart A). The project must be included in a conforming TIP and the RTP. The project design concept must be sufficiently defined to determine emissions at the time of the conformity determination. An additional analysis, "Hot Spot Modeling", is required for intersections currently operating at a deficient LOS of D or worse or are forecasted to have a LOS of D or worse after project implementation. Hot spot modeling is a method of calculating the CO concentrations along roadways and near intersections. The purpose of hot spot modeling is to evaluate whether a project could cause, or contribute to, a violation of the CO National Ambient Air Quality Standards. Hot spot modeling is also required for PM_{10}. Projects of air quality concern are certain highway and transit projects that result in a significant increase in diesel vehicle traffic as a result of project implementation. Pursuant to 40 CFR 93.123(b)(2), particulate matter hot spot analyses are required for projects of air quality concern within non-attainment or attainment/maintenance areas (EPA, 2012). MMCV elements that will likely require additional air quality analysis (including Hot Spot Analysis) during NEPA study include the BRT/managed lanes, BRT/BAT Lanes, and the Boulder and Longmont Intersections Improvements that include state

Resource	Next Steps
	highways. Existing and future LOS will be evaluated to determine the need for CO modeling. Future diesel vehicle counts (what they will be after the project element is implemented) must be analyzed to determine if PM10 modeling will be required. MMCV elements such as station enhancements, Park-n-Rides, and the separated bikeway corridor are likely not a substantial source of emissions and will likely require no further analysis for air quality. However, during the NEPA study, it will need to be determined as to whether the station enhancements or Park-n-Rides will qualify as a project of air-quality concern, necessitating analyses.
Noise	When NEPA Studies are completed, MMCV elements that qualify as a "Type 1 Project" per CDOT's noise guidelines will require noise modeling for the planning year. The current planning year is 2040; however, the DRCOG model will be updated to 2045 in late 2019. This means that Type I projects undertaken after the 2045 Model is approved will need to use that plan for noise modeling and design year (2045) conditions for each MMCV element. Should some elements not be undertaken in the next 5 years, the model years would need to 2050 or later, depending on timing. MMCV elements that may require additional noise studies during the NEPA phase include: the BRT/managed lanes, the SH52/SH 119 Queue Jump Lanes, the Park-n-Rides Hover St/SH 119 intersection Improvement in Longmont, and the Hover St/Nelson Rd intersection Improvement in Longmont if there is state funding or oversight. Additionally, the new and expanded Park-n-Rides will qualify as a Type 1 project and require noise modeling. As a component of the noise analysis, mitigation will be assessed for feasibility and reasonableness and recommended as appropriate for the MMCV element.
Visual Resources/Aesthetics	Additional visual assessments may be required for specific MMCV elements during NEPA studies. Further public involvement may also be required MMCV elements. For MMCV elements that do not result in a substantial visual change (station enhancements, BAT lanes), no additional visual assessment is expected to be needed. For MMCV elements that have a greater potential to change the visual setting (BRT/managed lanes), an Abbreviated VIA may be required. Additionally, a programmatic or non-programmatic CatEx does not typically require visual resources to be reviewed unless there are extraordinary circumstances. An EA would likely require a VIA.
Soils and Geology	The affected environment documentation has been completed and can be included during the NEPA Study for MMCV elements. The next steps required for soils and geologic resources are minimal but may include updates as needed depending on SH 119 Multi-Modal PEL Study Area changes and/or preferences from project stakeholders.
Land Use	An analysis of the affected environment has been completed for land use within the SH 119 Multi-Modal PEL Study Area. Next steps for land use are minimal for the majority of the MMCV elements that are expected to be considered a CatEx. Additional documentation and analysis may be required in the future for an EA (BRT/managed lanes) to incorporate updates from Boulder County land use and zoning data.
Socio-economics	Data has been collected for socio-economic resources within the SH 119 Multi-Modal PEL Study Area. Additional studies may be required to update socio-economic data in the future if more recent data becomes available during the future NEPA planning phase or there are changes in the preliminary design of MMCV elements.

Resource	Next Steps
EJ	This SH 119 Multi-Modal PEL Study has completed a review of the affect environment for EJ populations within the EJ Study Area. The next steps for EJ will depend on the level of NEPA review required for the MMCV elements. No additional EJ analysis is typically required for CatExes, unless it is identified as a sensitive resource. MMCV elements that would require an EA (BRT/managed lanes) may request an updated technical memorandum to reflect future updates to US Census data. As project-specific studies are undertaken, they will build upon the EJ outreach conducted during the PEL. Outreach efforts during the PEL included meeting with five organizations serving the Hispanic and low-income populations in Boulder and Longmont and translating project materials into Spanish, which is the second most commonly used language in these cities.
Transportation Resources	Further analysis of different capital improvements including shoulder reinforcement/widening, BRT/queue jump lanes at SH 52/SH 119, and BRT/managed lanes along the SH 119 corridor, may be required. These analyses may be required if there is a different planning or horizon year when the elements are in the NEPA phase. The planning year for the SH 119 Multi-Modal PEL Study was 2040; it is anticipated that DRCOG will adopt a plan with a horizon year of 2045 in 2019. At the time of implementation, coordination with CDOT will be required and may including updating traffic analyses to the planning year that is current at that time or completion of sensitivity analyses to determine if the MMCV elements address planning year needs.

6. AGENCY COORDINATION AND STAKEHOLDER INVOLVEMENT

6.1 Community and Stakeholder Engagement

The SH 119 PEL Study began in August 2017 with a public involvement plan (PIP) that outlined objectives, strategies, tactics, and activities to engage members of the community and stakeholders. The goals of the PIP were to:

1. educate and engage internal and external stakeholders in the SH 119 PEL Study Area, and
2. solicit stakeholder feedback about potential transportation improvements.

The foundation for SH 119's PIP was Collaboration, Community, and Communication. These strategies were used to frame how important issues were addressed with stakeholders, and that messages were optimized and coordinated in delivery across media, distribution channels, and service areas. This three-pronged approach employed a strategic, proactive, consistent, and thoughtful stakeholder coordination and public involvement program managed by:

- Showing the stakeholders, the ***Collaborative*** value of working together toward a common mission;
- Emphasizing to residents and stakeholders that they are a ***Community*** and that this project is for their benefit; and
- ***Communicating*** consistently and honestly with internal and external stakeholders and listening to their feedback.

Public input was used during steps of the SH 119 PEL Study: development of the purpose and need statement; the alternatives development and screening; and the conceptual design. There is a separate report, *The SH 119 Multi-Modal PEL Study Community and Stakeholder Engagement Report* (Virtegic Group, 2019) found in Appendix D, that provides in depth details of the different strategies and involvement tactics the PEL Study used; includes notes and PowerPoint slides from various meetings; describes the purpose and goals of different input opportunities; and documents how the results from stakeholder involvement were used in the PEL Study. A summary of different tactics, opportunities and efforts to reach the community during the SH 119 Multi-Modal PEL Study are provided below in Table 6-1.

More than 475 comments and questions were received, mainly through the SH 119 webpage/ website and some at public meetings. Each comment was acknowledged and responded to. The comments mainly focused on:

- Rail instead of BRT 22%
- Need for a separate bikeway 18%
- Option preferences 16%
- Route suggestions 15%

Table 6-1. SH 119 PEL Study: Overview of Public Involvement Activities

Community and Stakeholder Engagement Tactic	Highlight of Activity
Agency Workshops	The purpose of the monthly and bi-monthly agency workshop meetings was to review and provide input to the Alternatives Analysis and concept plans. There were three tiers in the Alternatives Analysis process. Tier 1 focused on evaluating various transit technologies, Tier 2 analyzed different BRT routes and service levels, and Tier 3 expanded the BRT analysis to include physical improvements on the roadway. The Agency Working Group was essential in thinking through and analyzing the results derived from this process. The Agency Workshop Group met 19 times through the course of the PEL Study.
PAC and TAC Committees	Soliciting input from and making decisions with the PAC and TAC members, on each phase of the PEL Study, were vital. All of the elements of the PEL Study required the support of the corridor stakeholders. Meeting with the members of the PAC and TAC at important juncture points in the PEL Study allowed the building of consensus before moving forward. There were 11 members on the PAC representing the Boulder Chamber, Boulder County, CDOT, City of Boulder, City of Longmont, Commuting Solutions, Longmont Chamber of Commerce, North Area Transportation Alliance, RTD District I, RTD District O, and the CU – Boulder. The TAC membership consisted of elected officials and senior officials of their representative organizations.
Business Outreach	Employers and employees in the PEL Study area attended public meetings and outreach events to get information about the PEL Study and provide input. Contact was made with 19 of the major businesses/employers and business associations in the PEL Study area with limited success. The Niwot Business Association was instrumental in promoting the Niwot public meeting in February 2019. Additionally, the Northwest Chamber Alliance welcomed a presentation in September 2018 and asked to be a project partner.
Public Outreach/ Involvement	The media relations consisted of creating and writing news releases and magazine articles as well as providing requested information to news sources and being interviewed by reporters. A total of eight news releases were distributed to media during the course of the PEL Study. Comment activity from the SH 119 webpage and website always increased after a news story appeared and generated opinions, questions, or requests for further clarification. The news stories also prompted people to complete an online questionnaire.
Media Opportunities	The public involvement team will reach out to media outlets when the PEL Study concludes to allow for an in-depth understanding of the PEL Study, the BRT recommendation and the SH 119 MMCV.

Community and Stakeholder Engagement Tactic	Highlight of Activity
Visual Graphics	Photos were taken at public outreach events and used in social media posts (Facebook, Twitter, and Instagram), media releases, brochures, and reports. A variety of graphics, charts, figures, icons, and maps were created to visually tell the 'story' of the PEL Study, the process, analyses including route options, roadway physical improvements, potential impacts, and outcomes of the various work efforts. The photos, figures, graphics, tables, and maps were used to communicate information to stakeholders, the PAC/TAC, and the community; these materials were integral in gathering comments and responses to shape the alternatives analysis. Materials were also routinely posted to the website.
Website	There were two websites the public could access for information: a webpage on www.RTD-Denver.com site and an external site, www.sh119brt.com, that was linked from the RTD webpage.
Email Communications	The PEL Study maintained a comprehensive list of people and news media interested in the SH 119 project. Media included print, radio, TV, and web as well as Spanish print and electronic media in the metro area. Individuals on the list came from the Northwest Rail and NAMS database; current commenters on the SH 119 PEL Study and those who opted in at meetings; and events. There were approximately 4,200 names in the database for this project.
Use of Social Media	A series of six social media postings for Facebook, Twitter, and Instagram was created over the course of the PEL Study. These posts focused on directing people to the SH 119 website for information about the PEL Study and to solicit their feedback through completion of the online questionnaire.
Community/EJ Meetings; Business Meetings; and Transit-Rider Events	There were 11 presentations including 5 to organizations serving the Hispanic and low-income populations in the cities of Boulder and Longmont; 6 community events; and 2 transit rider events during the course of the PEL Study to provide information, answer questions, and solicit feedback. More than 1,000 people were reached.
Collateral Materials	Many communication tools were used to keep people informed about the PEL Study and to encourage feedback. A variety of materials were developed to provide Information about the PEL Study, route alternatives, roadway improvements, etc., and to direct people to the website for their feedback. These materials included brochures, fact sheets, supporting documents on various phases of the PEL Study, flyers, public meetings, PowerPoint presentations, onboard surveys, and questionnaires. All information materials were provided in both English and Spanish. All public-facing documents on the website were American Disabilities Act Section 508 compliant.
Telephone Town Halls	In spring 2018, RTD hosted telephone town halls with each of the RTD directors. In the telephone town halls with Director Judy Lubow (District I) on March 29, 2018 and Director Chuck Sisk (District O) on April 11, 2018, the SH 119 PEL Study was discussed, explaining what BRT is, what the PEL Study's purpose was, emphasizing that the BRT is not a replacement for the rail line, and that the money used for the PEL Study and the proposed BRT is not coming out of the FasTracks funds. Director Lubow had roughly 1,000 participants and Director Sisk had approximately 1,130 participants on their respective calls.

Community and Stakeholder Engagement Tactic	Highlight of Activity
Public Information Officer Briefings	Public Information Officers attended the public meetings; received all of the media releases and eblasts; and helped post information on their respective websites.
Public Meetings	There were three sets of public meetings for a total of seven individual meetings held over the course of the PEL Study: three meetings in the Boulder, three in Longmont, and one at Niwot in Boulder County. A total of 235 members of the public attended the meetings to hear about the PEL Study's goals and progress; ask questions; and provide comments.
Onboard Bus Survey and Public Questionnaire	Another important element in the community outreach was the onboard rider survey and online questionnaire used to determine BRT route preferences, which helped to inform the Tier 3 alternatives evaluation. On October 25, 2018, an onboard rider survey was conducted on the BOLT and J routes. There was a 27 percent response rate (228 surveys returned), which is slightly higher than other RTD onboard surveys. Complementing this activity, an online questionnaire was generated for the public to capture their input on the BRT route preference that was open in the fall of 2018 to January 31, 2019. There were 1,343 people that accessed the online questionnaire, which asked the same questions as the onboard survey.

7. FUNDING SCENARIOS

As a part of this PEL Study, funding and financing options related to the costs of construction and operations for the SH 119 MMCV were evaluated (Economic & Planning Systems, 2019). The following discussion summarizes the findings from the *SH 119 Multi-Modal PEL Study: Funding Plan*, found in Appendix E. In considering both funding and financing, dollars attributed to a new source (e.g., a dedicated sales tax) are evaluated as 'funding,' whereas those that convert a future revenue stream into a present value for capital expenditures (e.g. bonds) are considered 'financing.' The primary focus of this effort was on funding sources, with a general analysis of how these funding tools may be used to finance the project.

This analysis included:

- A comprehensive list of funding and financing mechanisms available at the federal, state, and local levels that may be applicable to implementation of the SH 119 MMCV.
- An application of evaluation criteria to determine the most suitable mechanisms for implementation of the SH 119 MMCV, separating the comprehensive list into Top-Tier (more promising) and Lower-Tier (less promising) Options.
- A detailed analysis of the Top Tier Options, including revenue generation estimates specific to Boulder and Longmont as well as SH 119 between Boulder and Longmont.
- An assembling of the most suitable mechanisms into three funding strategies, each addressing the needs of this project in different ways.

7.1 Cost Assumptions

The available funds committed to the SH119 MMCV totals $53.3 million, which is not enough to fully fund all the elements. The capital cost estimate for the SH 119 MMCV includes construction and indirect costs related to the MMCV Elements with the exception of the intersection improvements in Boulder or Longmont. It also does not include the SH 52/SH 119 grade-separated interchange, currently under consideration by CDOT. Capital costs are discussed above in Section 4.2 and are presented in 2023 (year of expenditure) dollars, escalated by 3.0 percent per year from 2018 to 2023 (Parsons, 2019). All costs are evaluated and escalated with the goal of a construction start in 2023. Revenues have been evaluated in constant dollars (no inflation or escalation). This avoids additional assumptions and uncertainties associated with applying growth and appreciation rates over a long-term forecast.

7.2 Evaluation Criteria

A set of four criteria was established to evaluate, compare, and screen each funding and financing option:

- **Revenue Yield** refers to the revenue generating capacity of a particular funding source. This criterion was not applied to financing mechanisms, because they require a dedicated funding source for repayment over the long term.
- **Stability** refers to whether the funding source or financing technique is subject to uncertain fluctuations that can impact the ability to project future revenue with certainty, as well as the ability to rely on the source to back revenue bonds for financing the project.
- **Legal Parameters** refers to the legal limitations and/or requirements for creating a funding source or financing technique that will dedicate the revenue stream to a MMCV Element.
- **Ease of Administration** refers to the ability of the current state, regional, or local governments to implement and administer the funding mechanisms and/or financing techniques.

7.3 Funding

7.3.1 COMMITTED EXTERNAL FUNDING SOURCES

A total of $53.3 million has been committed to the SH119 BRT project as shown in Table 7-1. Committed funding sources include:

- **RTD:** RTD has committed $30 million in capital funding for this project; this total includes a $5 million match for the County's TIP Regional Grant from DRCOG and does not include FasTracks money.
- **DRCOG:** The SH 119 BRT project received $8.15 million in federal funding from FHWA through a TIP Regional Grant, as well as $5 million through the sub-regional match.
- **CDOT:** The SH 119 MMCV has been allocated $9 million in Regional Priority Project (RPP) funding; this includes $1.7 million in matching funds for the TIP Regional Grant.
- **Boulder:** Boulder has committed $1 million in matching funds for BRT station enhancements.
- **Longmont:** Longmont has committed $150,000 in matching funds for the Coffman Street Dedicated BRT Lanes.

Table 7-1. Committed External Funding Sources

Source	Description	Amount *(Millions)*
RTD	Includes $5M match for DRCOG TIP Grant	$30.00
DRCOG	Federal – TIP Regional Grant	$8.15
DRCOG	Sub-regional match	$5.00
CDOT	Regional Priority Project – includes $1.7 M match for DRCOG TIP Grant	$9.00
Boulder	Cash match for BRT Station Enhancements	$1.00
Longmont	Cash match for Coffman St Dedicated BRT Lanes	$0.15
	Total	**$53.30**

7.3.2 POTENTIAL ADDITIONAL FUNDING SOURCES

In addition to the $53.3 million of committed funds for the SH 119 MMCV, an additional $65 million may be available through other sources listed in Table 7-2. These funding sources can be used towards the costs of implementing the MMCV. After a detailed review of FTA New and Small Starts grant criteria, the team concluded that these are not realistic sources; as such they are not listed below.

Table 7-2. Sources of Potential Additional Funding

Source	Amount *Millions*
SB 267 from CDOT Region 4	$20.00
SB 267 Transit Grant from CDOT DTR	$10.00
Federal BUILD Grant	$25.00
Federal/State Grant for Bike Path	$10.00
Total	**$65.00**

7.3.3 TOTAL CAPITAL FUNDING REQUIRED

The committed and potential funding sources available, as outlined above, were used to determine the remaining balance of additional funding required for the implementation of the SH 119 MMCV. Preliminary cost estimates indicated that approximately $246 million in 2023 dollars would be needed to fully implement the MMCV; however, for purposes of this funding analyses, that amount was increased to $270 million. The reason for this increase is that timing of when each element will be implemented is unknown, and the timing is expected to affect the cost of implementation as the price of labor and construction materials fluctuates. Increasing the estimated cost for full implementation of the MMCV provides a buffer, should projects be initiated after 2023; it also helps account for the uncertainty of the future costs of labor and materials.

As shown in Table 7-3, if the funding sources listed in Table 7-2 were obtained approximately $151.7 million in additional funding would be needed for full implementation of the MMCV. If only committed funds are available, then $216.7 million in additional funding would be required for capital costs associated with the project.

Table 7-3. SH 119 Funding Needs Summary

Source	All Available Funding *$ Millions*	Committed Funding Only *$ Millions*
RTD/DRCOG	$53.3	$53.3
Supplemental Potential for Additional Funding Sources	$65.0	--
Local Generation Required	$151.7	$216.7
Total Project Cost	**$270.0**	**$270.0**

7.4 Cost and Funding Options/Scenarios

Based on the initial evaluation of funding options, revenue potentials, the local context, and the needs of the SH 119 MMCV, funding tools were "bundled" in order to create scenarios that could meet funding needs and that are reasonably attainable. In addition to funding the SH 119 MMCV, a Boulder County-Wide BRT scenario is also included in this analysis, that would be used to fund not only the SH 119 BRT but also the other NAMS-recommended BRT routes in the County. As a final suite of options, three funding scenarios are presented:

Focused: Regional Transportation Authority (RTA) on the SH 119 MMCV. Colorado law allows cities and counties to form Regional Transportation Authorities (RTAs) to fund and build transportation infrastructure improvements and provide transportation services within a multijurisdictional area boundary. An RTA has the power to build, finance, operate, and maintain any regional transportation system. Most RTAs in Colorado provide funding for the construction and operation of transit projects.

In this scenario, an RTA of a 1.5-mile buffer around the BRT routes would be formed within which lodging, sales, and property taxes would be raised above their current levels. These revenue tools would be used to back bonds for the project. This scenario only includes capital costs.

As shown in Table 7-4, an RTA within the 1.5-mile buffer area could generate $17.5 million annually; if bonded, this revenue could generate $175 million in funding for the project. Given the range of $151.7 to $216.7 million needed to address capital costs, this shows that in order to fund all SH 119 MMCV elements, most of the potential funding sources are needed. If these funds do not materialize, some capital improvements may have to be delayed or reduced in cost through modifications such as changes in design.

Table 7-4. SH 119 Bond Proceeds

Source	All Available Funding	Committed Funding Only
	$ Millions	$ Millions
Local Generation Required	**$151.7**	**$216.7**
Regional Transportation Authority		
Lodging Tax (2.0%)	$2.12	$2.12
Sales Tax (0.10%)	$3.95	$3.95
Property Tax (3 mills)	$11.43	$11.43
Total Annual Revenue	**$17.50**	**$17.50**
Bond Capacity	**$175.0**	**$175.0**
Net Position (Surplus/Deficit)	**$23.29**	**($41.71)**

Source: Economic & Planning Systems, 2019

Broad: Countywide Bond. If Boulder County decided to move forward with the other BRT corridors identified in the NAMS, there could be justification for a county-wide tax that would generate funding for these other projects as well as the SH 119 MMCV. This scenario includes an increase in the existing county-wide sales tax as well as implementation of a new tax in Boulder – an Occupational Privilege Program. An Occupational Privilege Program (sometimes referred to as an employee tax or head tax) raises revenue through taxing businesses operating within a local jurisdiction and/or taxing the employees of the businesses.

Table 7-5 shows that this option would generate between $484 to $549 million in funding required to complete the capital construction of the SH 119 MMCV, as well as some of the BRT projects located in Boulder County that were recommended by the 2014 NAMS study. In addition to capital costs, this scenario includes $17.48 million in annual funding for ongoing O&M costs. Revenue tools would be used to service the debt for these projects.

Table 7-5. Countywide Bond Proceeds

Source	All Available Funding	Committed Funding Only
	$ Millions	$ Millions
Local Generation Required	**$483.7**	**$548.7**
Boulder County Consortium		
County Sales Tax (80% of one penny)	$50.00	$50.00
City of Boulder Occupational Privilege Program	$8.00	$8.00
Total Annual Revenue	**$58.00**	**$58.00**
Less: Annual Operations and Maintenance	**($19.48)**	**($19.48)**
Net Available Annually	**$38.52**	**$38.52**
Bond Capacity	**$385.2**	**$385.2**
Net Position (Surplus/Deficit)	**($98.50)**	**($163.50)**

Source: Economic & Planning Systems, 2019

Broad: Countywide Pay-As-You-Go. In this scenario, a countywide pay-as-you-go funding strategy uses the same revenue tools as the countywide bond strategy; however, these revenues are expended as they are collected, rather than bonded against and expended upfront. This strategy is modeled over 15 years after which time the program could be eliminated or extended to pay for other transportation needs in the County.

This option also addresses the $484 to $549 million in funding required to complete the capital construction of the SH 119 MMCV, as well as a portion of the BRT projects in Boulder County identified in the NAMS study. This scenario presents a phased strategy for project construction and includes funding for capital costs as well as ongoing O&M costs. Funding would be used in a pay-as-you-go structure, with revenue available to spend as it is collected.

7.5 Next Steps to Obtain Funding

Implementation of any of the new funding scenarios outlined above in Section 7.4 is likely to require voter approval; it is recommended that jurisdictions that would be involved in these scenarios should plan for having one or more on the November 2020 ballot. If approved by voters in 2020 this would allow tax collection to begin in 2021, which would support a construction start date of 2023.

For some of the scenarios steps to implement them have already been initiated. Specifically, recent polling by Boulder County indicates support for a county-wide sales tax. However, additional work and outreach will be needed to implement any of the other funding mechanisms discussed above. The recommended timeline is:

- Resolution of the technical basis for funding through the end of 2019,
- Community outreach occurring in January through October 2020, and
- Countywide election regarding the new funding tool(s) on the November 2020 ballot

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Appendix A. FHWA Colorado Division Planning Environmental Linkages Questionnaire (provided on separate CD)

Appendix B. Corridor Conditions and Environmental Impacts/Mitigation Strategies/Next Steps Report (provided on separate CD)

Appendix C. SH 119 MMCV PEL Study Traffic Report (provided on separate CD)

Appendix D. SH 119 MMCV PEL Study Community and Stakeholder Involvement Report (provided on separate CD)

D.1 FTA, FHWA, CDOT, RTD, Local Agencies

D.2 TAC/PAC

D.3 Agency Workshops

D.4 Stakeholder Involvement

Appendix E. SH 119 MMCV PEL Study Funding Plan