EAST ARAPAHOE (SH 7) TRANSPORTATION PLAN

APPENDIX A: EXISTING CONDITIONS REPORT

June 2016

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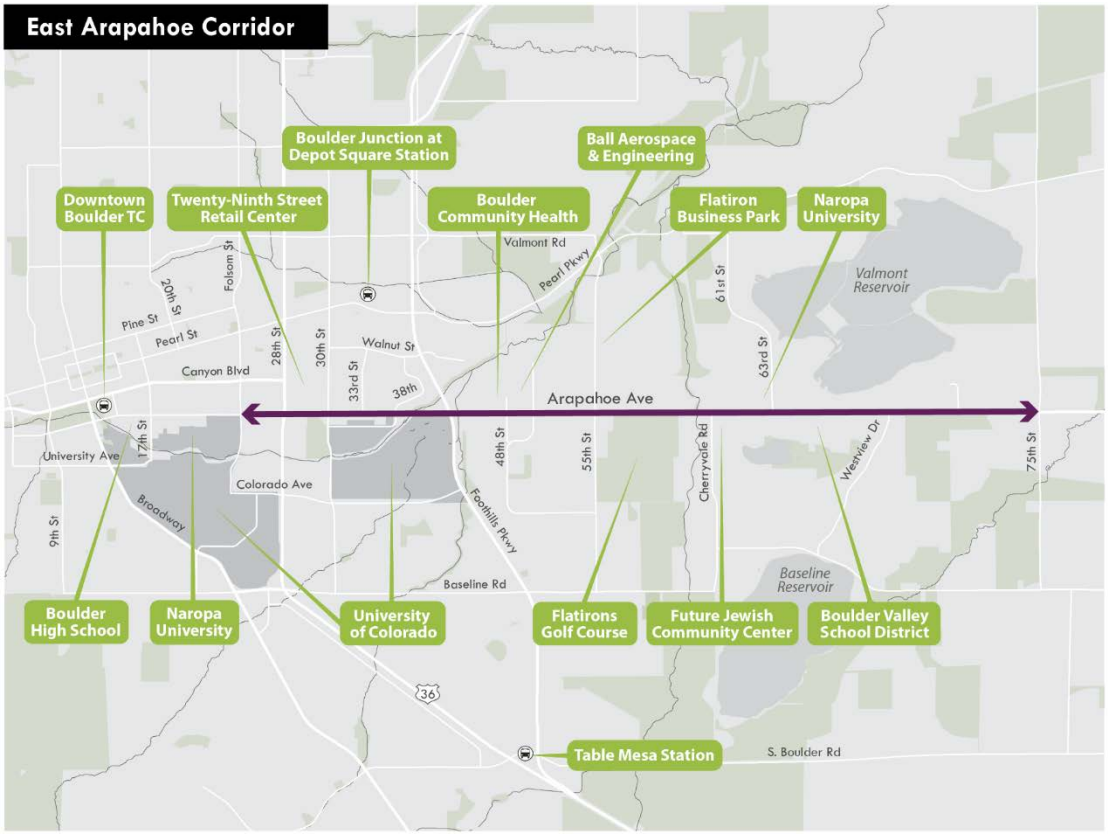
1 INTRODUCTION

PLAN & CORRIDOR OVERVIEW

The East Arapahoe Transportation Plan is a long-range plan that will consider a number of potential transportation improvements within the East Arapahoe corridor, including walking, biking, public transportation, and vehicle travel. The study area for the plan, illustrated in Figure 1-1, is primarily focused on a 4.5 mile segment of Arapahoe Avenue between Folsom Street and 75th Street.

Arapahoe Avenue is one of the city's major access corridors serving both regional commuters living or working outside Boulder and local trips by people who live and/or work along the corridor. The corridor also serves growing residential areas and major employment centers and institutions including the University of Colorado (CU) East Campus, Boulder Community Health, Ball Aerospace, Flatiron Business Park, Naropa University, and Boulder Valley School District offices. Major north-south streets that intersect with the study area include 28th Street, 30th Street, Foothills Parkway, 55th Street, Cherryvale Road, and 63rd Street.

Figure 1-1 East Arapahoe Corridor Overview

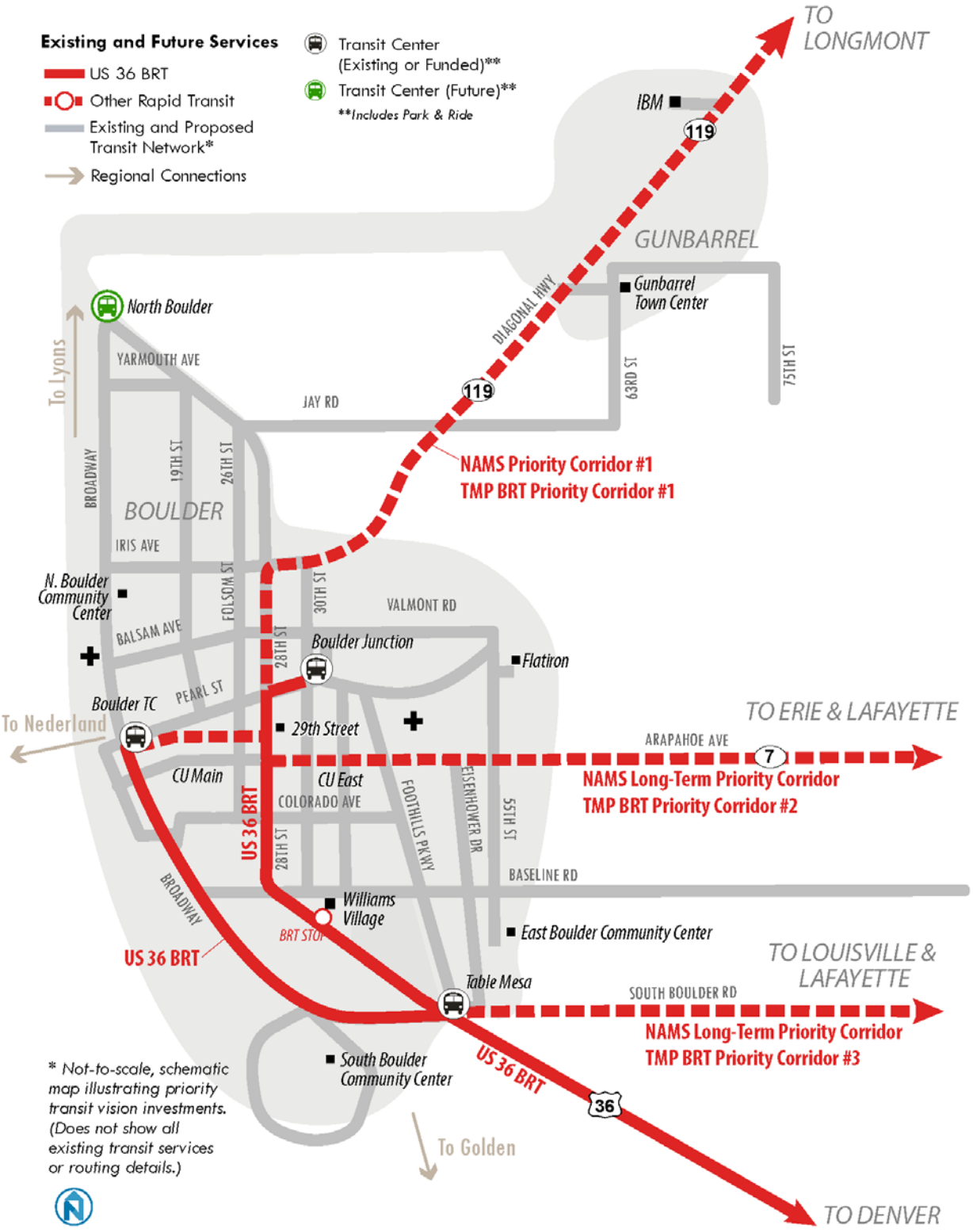


RELATED PLANS AND STUDIES

The City of Boulder and other jurisdictions and agencies have developed a series of planning documents related to the East Arapahoe Corridor. These plans include:

- **City of Boulder Transportation Master Plan (TMP).** The Transit State of the System Report, completed as part of the transit planning element of Boulder's Transit Master Plan (TMP) update in 2014, identified significant opportunities to improve access and connections to transit, serve East Boulder and other transition areas such as the East Arapahoe corridor as they redevelop, and serve the growing areas of Boulder Junction and CU East Campus. The TMP identified the East Arapahoe corridor as one of the City of Boulder's priority corridors for Bus Rapid Transit (see Figure 1-2).
- **Northwest Area Mobility Study (NAMS).** The Northwest Area Mobility Study, completed in 2014, created a prioritized list of mobility improvements for the Regional Transportation District's Northwest area. The project identified Arapahoe/SH 7 between Boulder and Brighton as a candidate arterial BRT route. The identified corridor included a 17.9 mile corridor with 46% of the route running in dedicated lanes and a 34-minute projected travel time from Boulder to Lafayette. A key characteristic of the study was a connection to I-25, and implementation of the SH 7 Planning and Environmental Linkage study. The City of Boulder and other Boulder County communities have agreed on the results of the RTD Northwest Area Mobility Study and are supporting efforts to fund the next steps of work toward implementing arterial BRT. The corridors connecting to Boulder are the Diagonal (SH 119), Arapahoe Avenue (SH 7) and South Boulder Road. The graphic in Figure 1-2 illustrates these corridors.
- **Boulder Access Management and Parking Strategy (AMPS)**. The City of Boulder is in the process of developing an Access Management and Parking Strategy to guide creation of efficient transportation networks within the city. AMPS includes edge parking along rapid transit corridors focused on commuters and transit-oriented corridors, including the East Arapahoe corridor, designed to emphasize transit oriented development (TOD) at a corridor scale. With increased development within the East Arapahoe corridor, the plan calls for a Transportation Demand Management (TDM) Access District approach combined with capital investments in multi-modal facilities and service that could significantly improve long term sustainability and reduce the impacts of new developments.
- **City of Boulder Sustainability Framework**. The framework uses seven broad categories to define community outcomes necessary to achieve Boulder's vision of a great community. It states that when the city implements the strategies outlined in the framework, then Boulder will have a Safe, Healthy & Socially Thriving, Livable, Accessible & Connected, Environmentally Sustainable, and Economically Vital Community and provide Good Governance.

Figure 1-2 City of Boulder TMP and RTD NAMS Priority BRT Corridors Serving Boulder



Source: Boulder Transportation Master Plan

- **Boulder Valley Comprehensive Plan**. The Boulder Valley Comprehensive Plan is a joint plan between the City of Boulder and Boulder County to inform and guide their shared responsibility for planning and development in the Boulder Valley. The policies and core values in the plan include using sustainability as a unifying framework to meet environmental, economic and social goals; supporting evolution to a more sustainable urban form; environmental stewardship and climate action; an all-mode transportation system to make getting around without a car easy and accessible to everyone; and physical health and well-being.
- **Boulder County Transportation Master Plan**. In 2011, the County spent nearly $1 million to improve transit service and access to transit. In 2012, the County updated its Transportation Master Plan with a focus on improving regional multimodal connections. Strategies specific to improving transit include: Increase bike capacity at transit stops; Increase the bicycle capacity on transit vehicles; Improve intersections; Collaborate with communities; Invest in new transit service; Promote regional bus rapid transit; and Enhance bus stop facilities.
- **Colorado Department of Transportation (CDOT) State Highway 7 Planning and Environmental Linkages (PEL) Study**. The Colorado Department of Transportation completed the State Highway 7 Planning and Environmental Linkages Study in 2014. The study identified improvements needed on SH 7 between US 287 and US 85 in Brighton, which is approximately 20 miles from the eastern boundary of the East Arapahoe study area. The study identified a recommended alternative for five segments between US 287 and US 85. Alternatives included changes/expansion of the existing right of way to accommodate future demand, transit lanes/queue jumps, shoulder bicycle lanes, and mixed use pedestrian paths.
- **Boulder County State Highway 7 Bus Rapid Transit Study**. In summer 2016, Boulder County is initiating the SH 7 BRT Transit Study intended to address current and future traffic issues on SH 7 and develop a BRT system before build out of the area is complete. The study will investigate recommendations from the CDOT PEL study, investigate BRT feasibility and develop an operations plan for the corridor, and conduct a connectivity analysis to other RTD services. The East Arapahoe corridor within the City of Boulder is the western segment of this study area.
- **University of Colorado (CU) East Campus Master Plan**. The CU East Campus is bound by 30th Street and Foothills Parkway (east to west) and Arapahoe Avenue and Colorado Avenue (north to south). The East Campus includes 197 acres of developable land, with the potential for over 4 million square feet of new building space. The CU East Campus Connections Project is a partnership between CU and the City of Boulder to identify mutually agreed upon projects to "move the bar forward" on important sustainable transportation connections that will be needed in the east campus area.
- **Envision East Arapahoe.** Envision East Arapahoe originated as a long-term land use scenario planning project intended to create a community-driven land use vision for the corridor. The study analyzed three alternative future land use scenarios: Current Trends, District Focus, and Housing Choices. Following community input, long-term land use planning decisions were placed on hold in 2014 and the project was refocused on planning for multimodal transportation improvements in the corridor.
- **East Arapahoe Transportation Connections Plan.** The 2004 East Arapahoe Transportation Network Plan addresses the multi-modal transportation system needs for moving to and through the Arapahoe Avenue corridor between 35th Street and Boulder's eastern city limits. The plan defines the desired future transportation network in the area for all modes of travel. The plan developed policies for connectivity to the larger Boulder transportation system, coordination with City of Boulder departments, design parameters, and near-term project implementation. This plan was not formally adopted by the City of Boulder.

- **City of Boulder Sustainable Streets and Centers.** The 2014 Sustainable Streets and Centers study analyzed strategies for integrating sustainable transportation and land use tools for developing a more sustainable street network. The study developed seven street typologies and five functional overlays to drive form-based development. The study area included five Arapahoe Avenue focus areas, and identified challenges and opportunities for focus areas to conform to sustainable design. Arapahoe Avenue corridor segments assessed in the study included 28th-29th Streets, 30th to 33rd Streets, Foothills Pkwy to 48th Street, 56th Streets to Old Tale Road, and Cherryvale Road to 63rd Streets. Consistent challenges identified throughout the corridor included difficulty in adapting it since it is a State Highway, adapting dominantly auto-oriented uses, and conflicting community values in regards to the importance of industrial sites and vibrant streets.

DOCUMENT ORGANIZATION

The remainder of this document is organized into the following sections:

- **Chapter 2: Land Use and Demographics.** Describes current land use and demographic characteristics of the corridor along with commute patterns and future projections for population and employment growth.
- **Chapter 3: Existing Modal Conditions.** Describes existing conditions for people driving, walking, biking, and using transit along the corridor, as well as an overall analysis of safety issues. The first section describes conditions for all modes in each segment of the corridor, while the remaining sections provide additional detail on particular modes or topics.

2 LAND USE AND DEMOGRAPHICS

This chapter provides an overview of land use, demographic characteristics, and commuting patterns within the corridor, all of which significantly impact people's transportation needs and choices.

Key Highlights

- The East Arapahoe corridor has a high concentration of regionally-significant employers, including six of the top ten employers in Boulder. Employment in the corridor is generally concentrated north of Arapahoe Avenue.
- Approximately 13% of the city's population lives within a half-mile of the corridor and about 40% of the city's jobs are also within a half-mile of the corridor.[1] The corridor's population is small relative to the number of jobs, meaning that most workers commute into the corridor.
- There is a higher share of minority and low-income residents and a higher share of renter-occupied households than the city overall. Although the residential population is small, it is comprised of demographic groups that typically have a relatively high propensity to travel by transit, walking, and biking.

LAND USE

This section summarizes the existing land uses along the East Arapahoe corridor. The interaction between transportation and land use determines how people access destinations, the length of trip required, and the directness of the route.

Figure 2-1 illustrates corridor land use designations. The northern section of the East Arapahoe corridor contains major retail and light industrial uses. Primary destinations include the Twenty-Ninth Street Retail Center, Boulder Community Health, Ball Aerospace, and Naropa University's Nalanda Campus. The southern section of Arapahoe Avenue features major institutions such as the University of Colorado (CU) East Campus and Boulder Valley School District (BVSD) offices, along with generally low-density residential areas. The corridor's western end is highly developed with mixed-use commercial and residential buildings; the intensity of land use decreases to the east of the corridor.

Chapter 3 provides a more detailed description of specific land uses in each segment of the corridor.

POPULATION AND EMPLOYMENT DENSITY

This section describes the existing and projected population and job densities in the East Arapahoe corridor. Population and employment density is particularly relevant to the transportation network as the location and clustering of people and jobs helps determine how and where people travel.

The East Arapahoe corridor has a high concentration of regionally-significant employers, including six of the top ten employers in Boulder, such as Ball Aerospace and Boulder Community Health.[2]

Figure 2-2 shows the density of existing population and employment within the East Arapahoe corridor. The north side of the corridor is primarily employment-oriented, with the exception of the area between 33rd Street and Foothills Parkway, which is more mixed use. Residential uses are concentrated in the

[1] Population data from American Community Survey (ACS). Employment data from US Census Bureau Longitudinal Household-Employer Dynamics (LEHD).

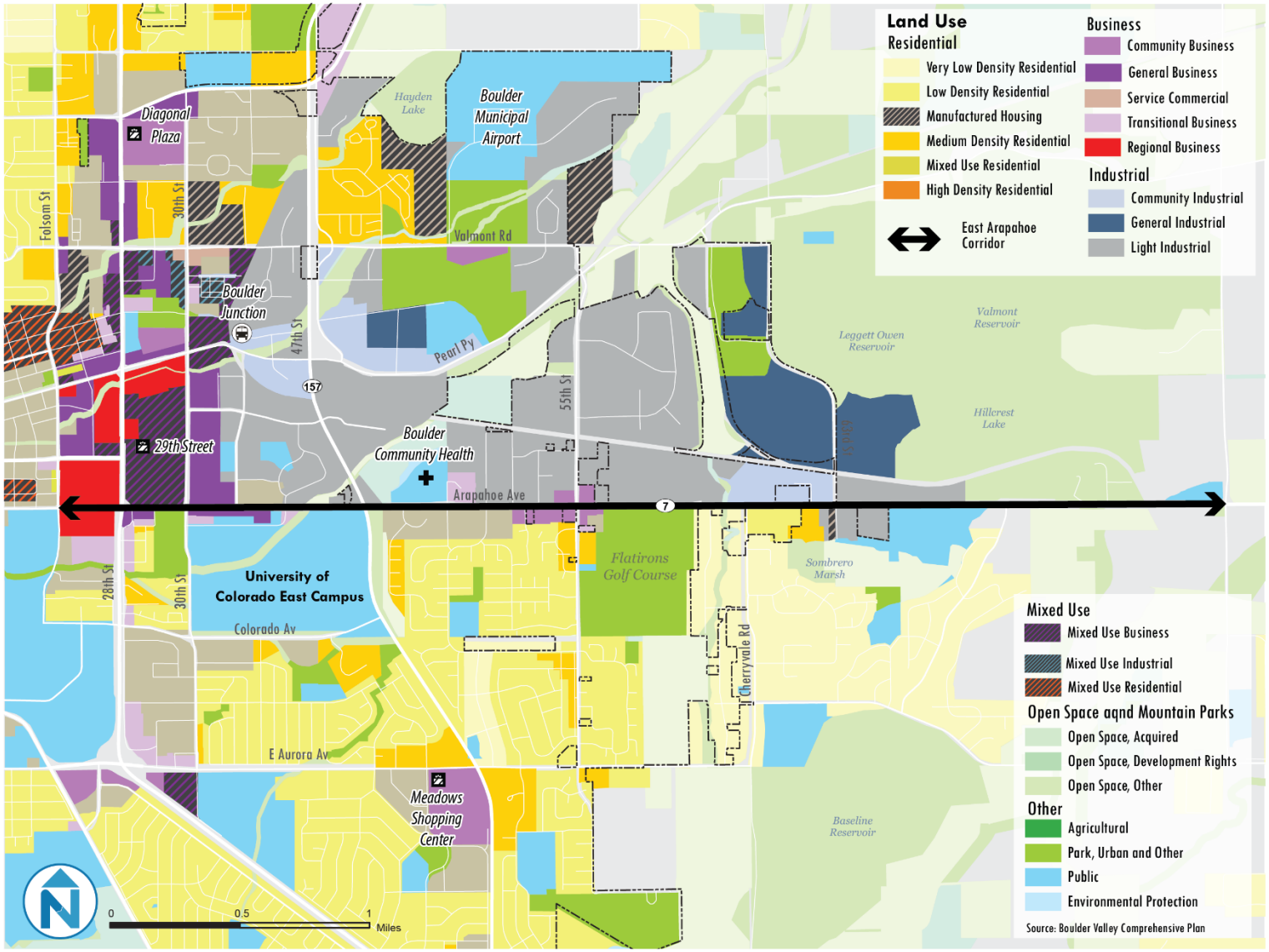
[2] https://www-static.bouldercolorado.gov/docs/2015-community-profile-update-1-201511190845.pdf

south side of the corridor between Foothills Parkway and 55th Street. East of 55th Street land use in the corridor is a mix of commercial and institutional uses and low-density residential areas.

Figure 2-3 illustrates where population and employment densities in the corridor are projected to increase by 2035 based on the Boulder Valley Comprehensive Plan.[3] The most significant changes in employment density in the corridor are projected to occur west of Foothills Parkway and east of 55th Street. Population density in the corridor is projected to intensify on the western end of the corridor, east of Foothills Parkway including the parcels adjacent to the University of Colorado.

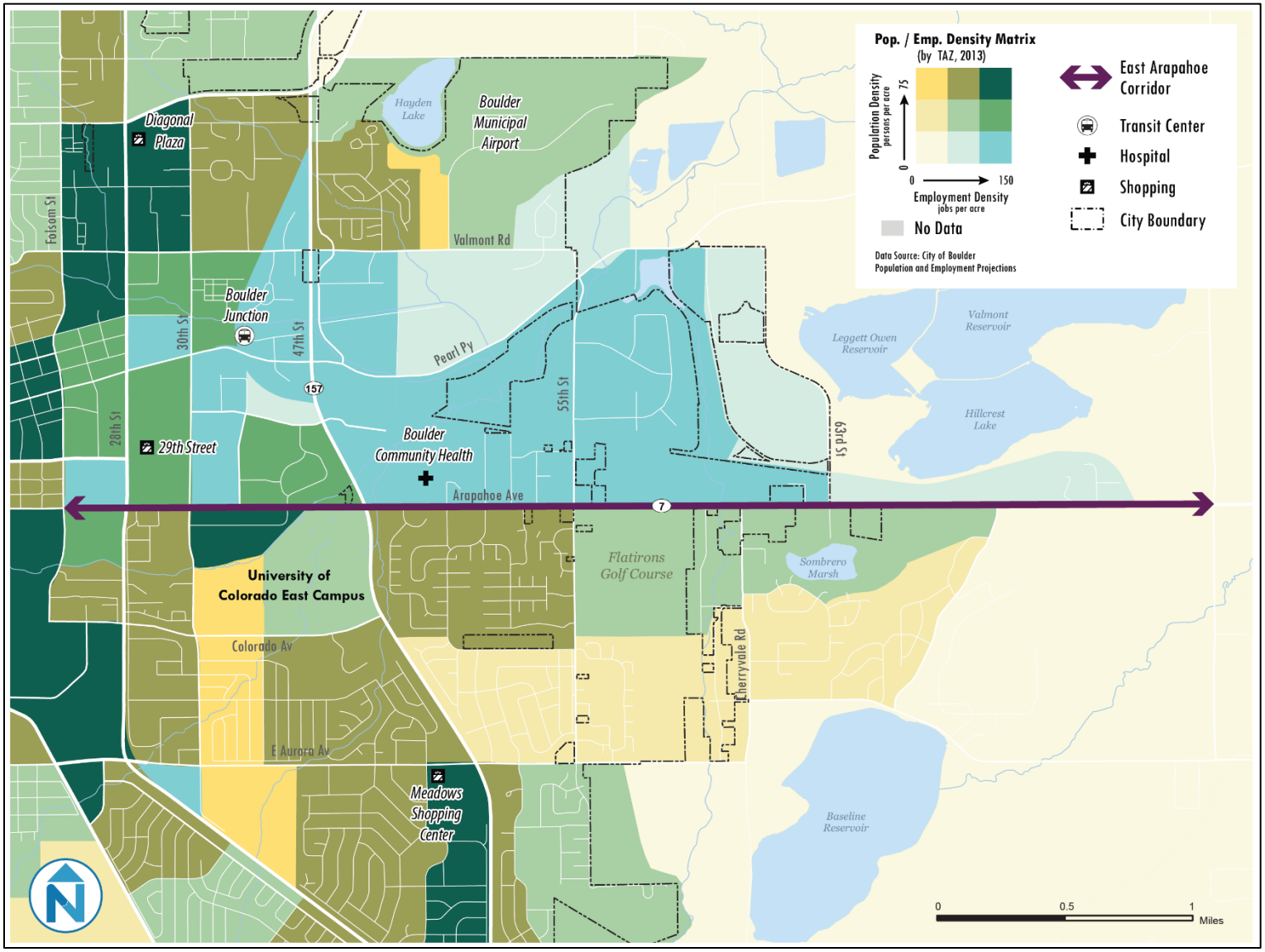
[3] The projected land use information illustrated in Figure 2-3 reflects the current Boulder Valley Comprehensive Plan (BVCP). The City of Boulder and Boulder County are currently updating the BVCP (see https://bouldercolorado.gov/bvcp for more information). This process began in summer of 2015 and is expected to be complete by the end of 2016. Transportation/GO Boulder and Comprehensive Planning staff are continuing to work with the BVCP team to review and coordinate technical data, and this data will be provided as an update at a future working group meeting.

Figure 2-1 Existing Land Use and Key Development Areas



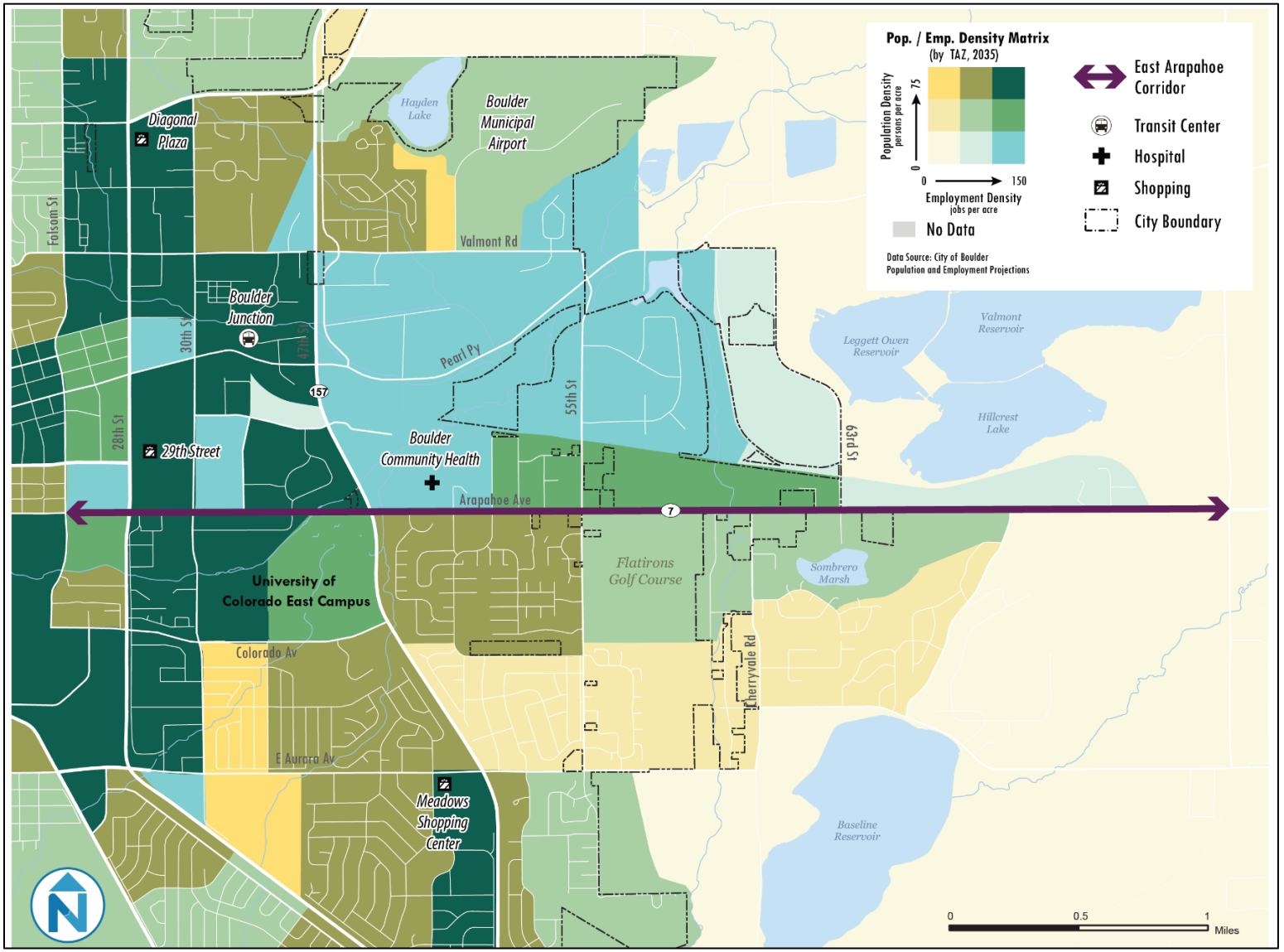
Source: City of Boulder Transportation Master Plan, State of the System Report 2014, Figure 3-9. Data from Boulder Valley Comprehensive Plan.

Figure 2-2 Existing Population and Employment Density, 2013



Source: City of Boulder Transportation Master Plan, State of the System Report 2014, Figure 3-10. Data from City of Boulder Population and Employment Projections.

Figure 2-3 Projected Population and Employment Density, 2035



Source: City of Boulder Transportation Master Plan, State of the System Report 2014, Figure 3-11. Data from City of Boulder Population and Employment Projections.

COMMUTE PATTERNS

This section describes commute patterns within a half-mile and 1.5 mile radius of the study area. The distance people live and/or work from the corridor affects their transportation needs, choices, and potential demand for active transportation modes. For example, a half-mile is typically considered to be walkable and 1.5 miles can easily be accomplished by a short bike ride. People who both live and work along the corridor may be the most likely to take advantage of transit and active transportation options along the corridor.

The analysis of commute patterns is based on data from the U.S. Census Longitudinal Employer Household Dynamics (LEHD) for 2014. Figure 2-4 identifies commute patterns for people who live and/or work within a half-mile or 1.5-mile radius of Arapahoe Avenue between Folsom Street and 75th Street.

- **Half-Mile:** Nearly 4,300 workers live within a half-mile of the corridor, compared to over 35,500 jobs. Only 1,100 people both live and work in the half-mile area; the remaining over 34,400 workers commute to the corridor from a half-mile or more away. Employment within a half-mile comprises nearly 40% of jobs citywide.
- **1.5 Miles:** Nearly 22,000 workers live within a broader 1.5-mile radius of the corridor, while there are 72,600 jobs within the 1.5-mile area. Nearly 10,200 workers both live and work within the 1.5-mile area. The remaining 62,400 workers commute from 1.5-miles or more away.

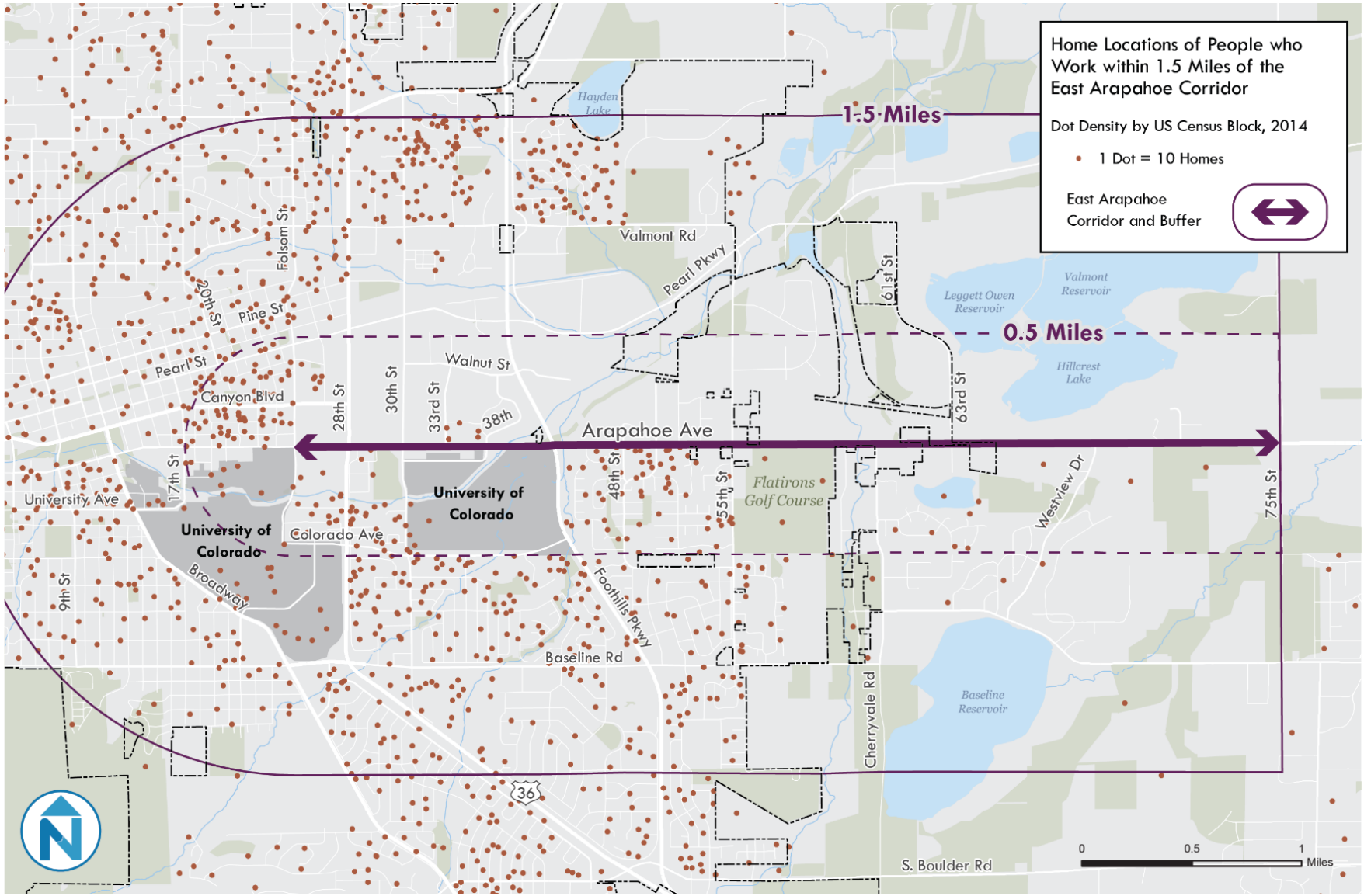
Maps of this data illustrate residential and work location patterns. Figure 2-5 displays the home locations of people that work within 1.5 miles of the corridor, west of 75th Street. Figure 2-6 displays the employment locations of people who reside within 1.5 miles of the corridor, west of 75th Street. These locations include a large concentration of workers in downtown Boulder along Broadway both north and south of downtown.

Figure 2-4 Home and Work Locations within Half-Mile and 1.5 Miles of the Corridor

Employment and Residence Status	Half-Mile	1.5 Miles
Live within 0.5 or 1.5 Miles of Corridor	4,291	21,988
Work within 0.5 or 1.5 Miles of Corridor	35,519	72,656
Live and Work within 0.5 or 1.5 Miles of Corridor	1,115	10,267
Live within 0.5 or 1.5 Miles of Corridor but Work Outside	3,176	11,721
Work within 0.5 or 1.5 Miles of Corridor but Live Outside	34,404	62,389

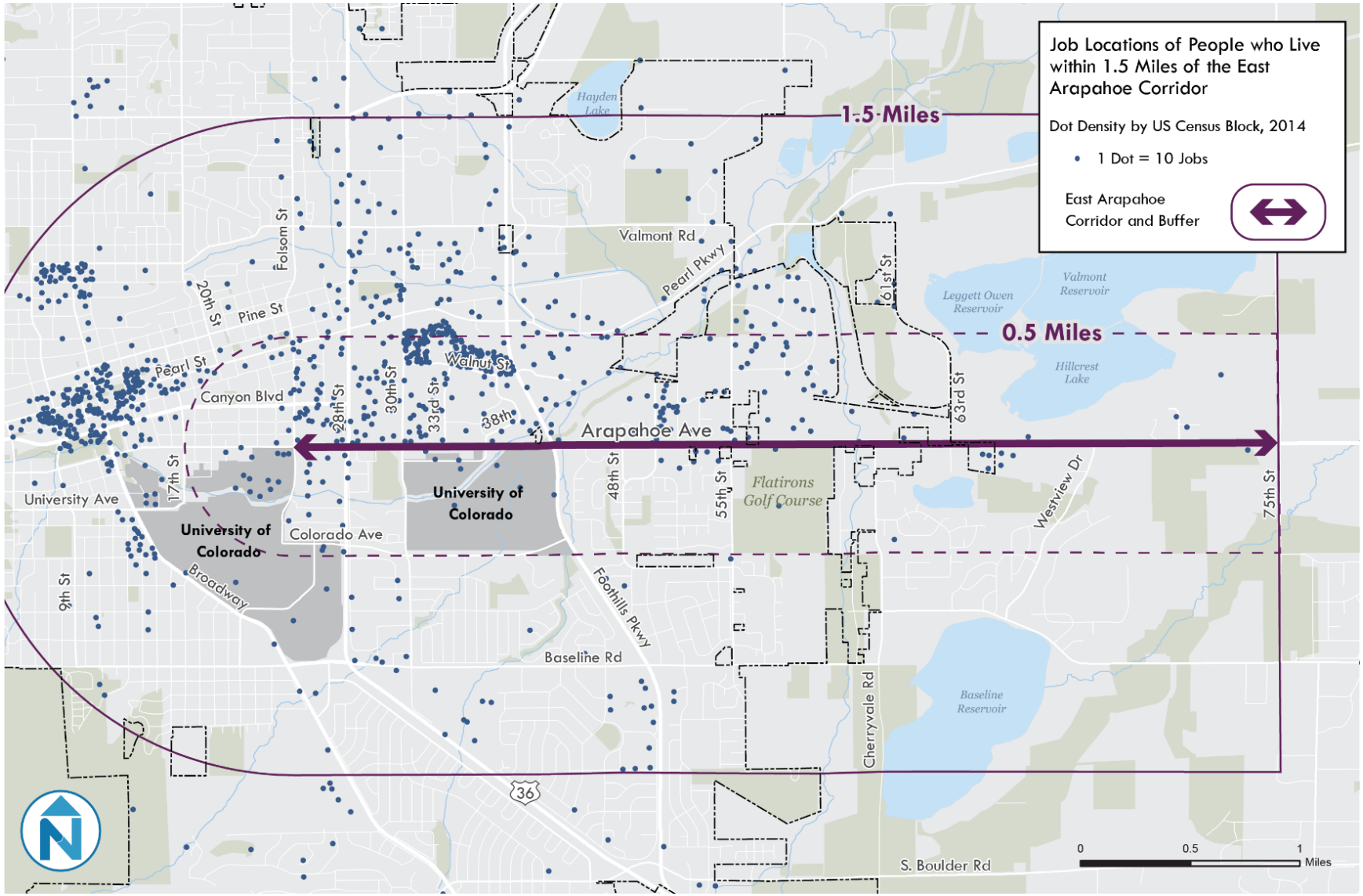
Each dot in Figure 2-5 and Figure 2-6 represents ten workers' home or work locations; the individual dots are randomly distributed within Census blocks.

Figure 2-5 Home Locations Map



Source: US Census Bureau Longitudinal Employer-Household Dynamics, 2015

Figure 2-6 Work Locations Map



Source: US Census Bureau Longitudinal Employer-Household Dynamics, 2015

DEMOGRAPHICS

This section describes demographic characteristics of study area residents, compared to the City of Boulder overall. This analysis can highlight the presence and general location of demographic groups that are more likely to use transit, walk, and bike.

Figure 2-7 summarizes the demographic characteristics for study area residents compared to Boulder overall. Key points include:

- Approximately 13% of the city's population lives within a half-mile of the corridor.
- The median age of corridor residents (37) is higher than the City as a whole (28) and the average household size is greater.
- There is a higher share of minority and low-income residents and a higher share of renter-occupied households; these demographic groups are more likely to travel by riding transit, walking, and biking.

Figure 2-7 Demographic Summary, Half-Mile of East Arapahoe Corridor

	Population	Median Age	Minority Population	Poverty (<150%)*	Households	Rent	Own	Average Household Size
East Arapahoe	13,817	37	17%	35%	6,011	68%	32%	2.35
City of Boulder	102,002	28	12%	31%	44,029	49%	51%	2.18

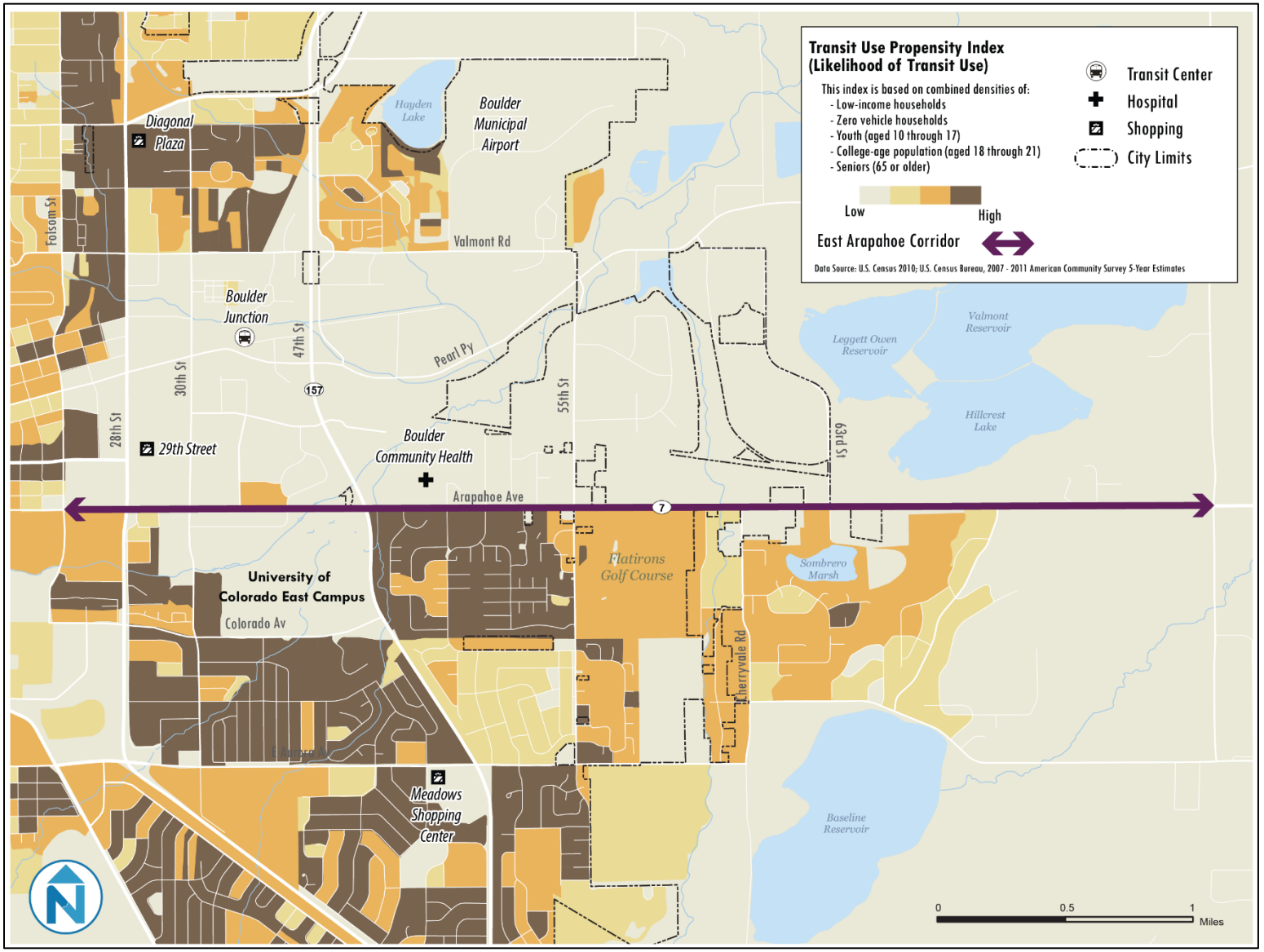
Notes: * Earning at or below 150% of the federal poverty level.

Source: American Community Survey, 2010-2014 5-Year Average

Transit Use Propensity Index

The transit use propensity (TUP) index, illustrated in Figure 2-8, combines the strongest indicators of transit demand. The TUP index is based on population and employment densities, low-income households, persons with disabilities, seniors (age 65+), and rates of access to automobiles. In the East Arapahoe corridor, TUP scores are highest in neighborhoods around the CU East Campus, and between Foothills Parkway and 55th Street south of Arapahoe Avenue. Neighborhoods east of 55th Street and south of Arapahoe Avenue also rate moderately high.

Figure 2-8 Transit Use Propensity Index Map



Source: City of Boulder Transportation Master Plan, State of the System Report 2014, Figure 3-12. Data from Census 2010 and 2007-2011 ACS 5YR Estimates.

3 EXISTING MODAL CONDITIONS

This chapter describes existing conditions for each travel mode that uses Arapahoe Avenue, and is organized into the following sections:

- **Existing Street Cross-Sections**. Describes existing street characteristics of Arapahoe Avenue by segment, including facilities for each mode and key land uses.
- **Vehicles**. Describes traffic volumes, signalized intersections, motor vehicle level of service, travel time, and other information related to motor vehicle travel along the East Arapahoe corridor.
- **Pedestrian and Bicycle**. Provides additional detail on existing and proposed facilities along Arapahoe Avenue (e.g., multi-use paths and bike lanes) and pedestrian and bicycle activity in the corridor.
- **Transit**. Describes existing service, facilities, and transit ridership in the corridor.
- **Safety**. Provides an analysis of safety in the corridor for all modes of travel.

EXISTING STREET DESCRIPTION AND CROSS SECTIONS

Arapahoe Avenue's streetscape varies through the study area, from a five-lane street on the west end, to a seven-lane street in the middle of the study area, and a three-lane street on the eastern end. Figure 3-1 summarizes the typical characteristics of different segments of Arapahoe Avenue for various modes. Lane configurations, such as extra turn lanes approaching intersections, may vary slightly within each segment. A more detailed discussion of each segment is provided below.

Figure 3-11 illustrates pedestrian and bicycle facilities along the corridor.

Figure 3-1 Cross Section Summary Table

Segment	# of General Purpose Lanes	Center Turn Lane	Sidewalk or Multi-Use Path [1]	Bike Lane	Transit Lane
Folsom Street to 28th Street	4	Median Separated	▪ Both sides: multi-use path	No	No
28th Street to 30th Street	6	Median Separated	▪ Both sides: multi-use path	No	No
30th Street to Foothills Pkwy	6	Median Separated	▪ North side: multi-use path ▪ South side: both sidewalk and multi-use path incomplete	No	No
Foothills Pkwy to 55th Street	6	Median Separated	▪ North side: multi-use path ▪ South side: sidewalk complete; multi-use path incomplete	No	No
55th Street to Cherryvale Road	5	Median Separated	▪ North side: both sidewalk and multi-use path incomplete ▪ South side: sidewalk incomplete; no multi-use path	Yes	No
Cherryvale Road to 63rd Street	5	Median Separated	▪ North side: multi-use path ▪ South side: multi-use path	Yes	No
63rd Street to Westview Drive	2	Continuous	▪ North side: multi-use path ▪ South side: multi-use path	Yes	Yes
Westview Drive to 75th Street	2	Continuous	▪ North side: multi-use path ▪ South side: none	Wide shoulders	No

Notes: [1] Figure 3-11 illustrates the presence of pedestrian and bicycle facilities along the corridor.

Figure 3-2 Arapahoe Avenue, with Multi-Use Path

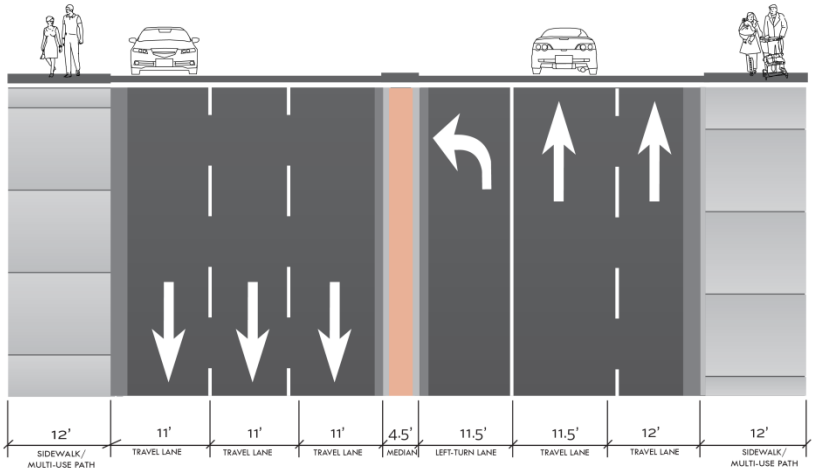
Source: City of Boulder

Folsom Street to 28th Street

The Folsom Street to 28th Street segment has four general-purpose travel lanes plus turn-lanes, with predominantly retail land uses.

Category	North	South
Key Land Uses	▪ Village Shopping Center	▪ Arapahoe Village Shopping Center, including Safeway
General-Purpose Travel Lanes	▪ Two general-purpose travel lanes in each direction with a single median-separated center-turn lane throughout, and right-turn lanes. ▪ The west side of the Arapahoe and 28th Street intersection has double left-turn lanes	
Intersections and Crossings	▪ Signalized intersections are 650 feet apart and have directional curb ramps and continental crosswalk markings on all four legs. There are no marked crosswalks provided between signalized intersections.	
Pedestrian / Off-Street Bicycle Facilities	▪ 12 foot wide multi-use paths on both sides of the roadway, separated from the roadway with vegetation at some points.	
On-Street Bicycle Facilities	▪ None	
Dedicated Bus Lanes / Queue Jumps	▪ None	

Typical Existing Cross-Section: Arapahoe Village Looking West

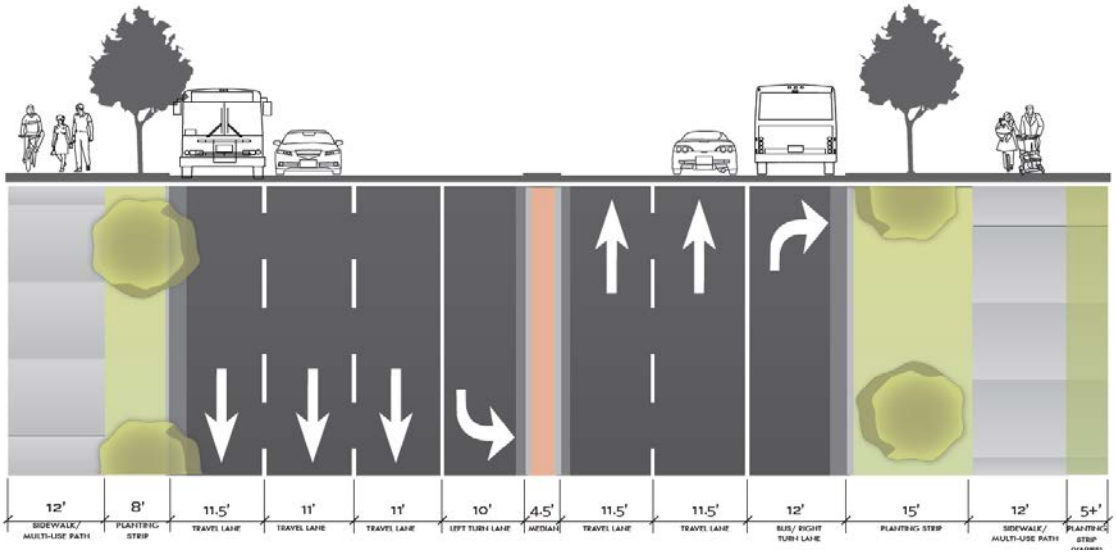


28th Street to 30th Street

This segment includes six general-purpose travel lanes plus turn-lanes, with predominantly retail land uses. The multi-use path is buffered from the roadway by trees and vegetation and signals are relatively close together (650 feet). As a result, this portion of Arapahoe Avenue provides a more comfortable environment for pedestrians than nearby segments.

Category	North	South
Key Land Uses	▪ Twenty-Ninth Street Retail Center, including Home Depot and other big-box retail with parking fronting the street. Parking lot has an internal pedestrian path leading to the front door.	▪ Scott Carpenter Park
General-Purpose Travel Lanes	▪ Three general-purpose lanes in each direction plus left-turn lanes, right-turn lanes, and a 4-5 foot median. ▪ The outside westbound through lane transitions to a westbound right-turn lane west of 29th Street and terminates at 28th Street.	
Intersections and Crossings	▪ Signalized intersections are 650 feet apart and have directional curb ramps and continental crosswalk markings on all four legs. There are no marked crosswalks provided between signalized intersections.	
Pedestrian / Off-Street Bicycle Facilities	▪ 12 foot wide multi use paths on both sides of the roadway, separated from the roadway with vegetation at some points.	
On-Street Bicycle Facilities	▪ None	
Dedicated Bus Lanes / Queue Jumps	▪ Short, westbound bus-only segment just west of 29th Street ▪ Westbound queue jump at 28th Street	

Typical Existing Cross-Section: East of 29th Street Looking West

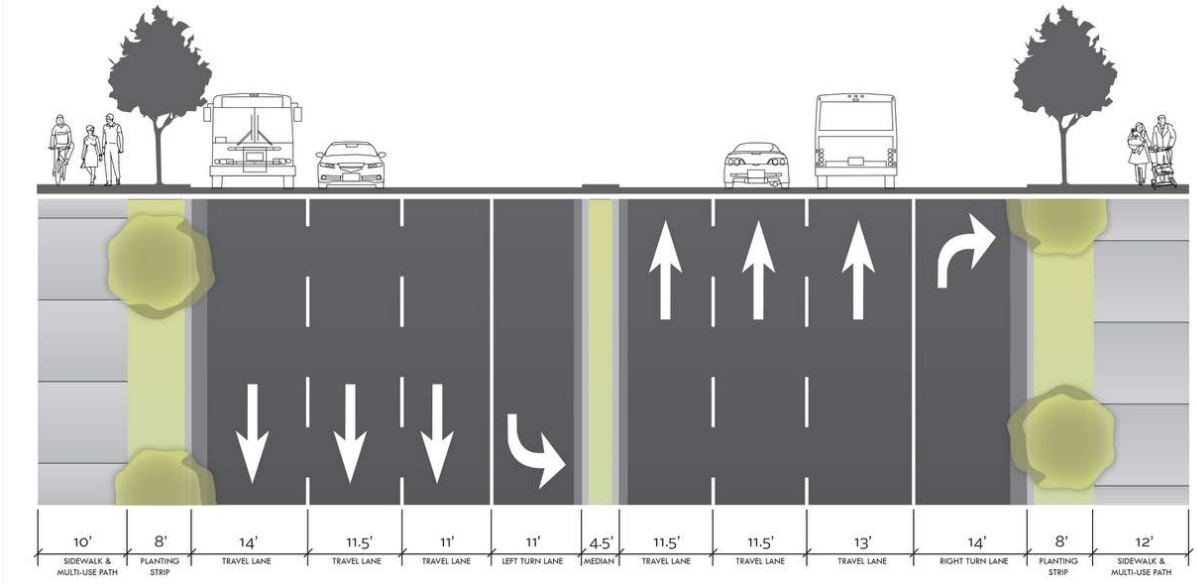


30th Street to Foothills Avenue

This portion of Arapahoe Avenue has six general-purpose lanes plus turn-lanes with a mix of retail, medium-density residential, and employment/institutional land uses.

Category	North	South
Key Land Uses	Mixed retail, employment, and institutional uses: ▪ Big box retail between 30th Street and 33rd Street with parking lots along Arapahoe ▪ Peloton high-density mixed-use residential ▪ CU Center for Innovation	▪ Small-scale retail businesses with individual parking lots and limited connections between each site. ▪ University of Colorado East Campus including buildings on both sides of Marine Street ▪ Wetlands
General-Purpose Travel Lanes	▪ Three travel lanes in both directions, with median-separated left-turn lanes at intersections and mid-block. Channelized right turn lanes are present at all intersections.	
Intersections and Crossings	▪ Signalized intersections are approximately a thousand feet apart and no marked crosswalks are provided between signalized intersections. ▪ Signalized intersections have directional curb ramps and continental crosswalk markings on all four legs, except for 33rd Street which is missing curb ramps. ▪ There is an undercrossing of Arapahoe for the Boulder Creek Path between 38th Street and Foothills Parkway.	
Pedestrian / Off-Street Bicycle Facilities	▪ The multi-use path is continuous on the north-side ▪ Between 30th Street and the Boulder Creek Path the south side pedestrian facility is designated as a sidewalk; the sidewalk is as narrow as five feet, but includes a landscaped buffer. There is a 500 foot section that lacks a pedestrian facility of any type through parking lots east and west of 33rd Street. ▪ On the south side there are no bike facilities between 30th Street and the Boulder Creek Greenway (see above). There is a multi-use path between the Boulder Creek Greenway and Foothills Parkway; west of this junction the path diverges from Arapahoe.	
On-Street Bicycle Facilities	▪ None	
Dedicated Bus Lanes / Queue Jumps	▪ There are queue jumps in both directions at Foothills Parkway.	

Typical Existing Cross-Section: West of 38th Street Looking West

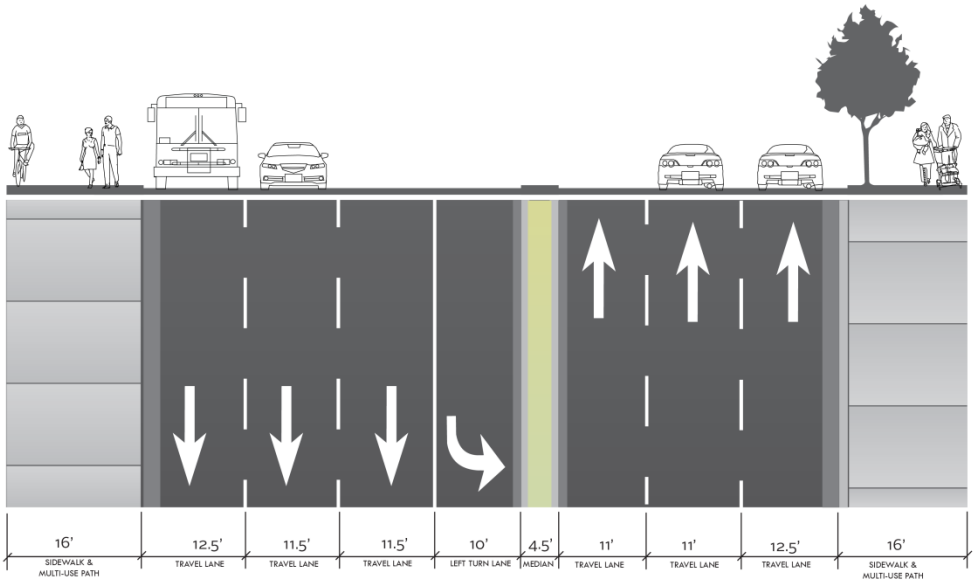


Foothills Parkway to 55th Street

East of Foothills Parkway, Arapahoe Avenue generally has six general-purpose travel lanes with a left-turn lane. Land uses transition to generally lower-density uses.

Category	North	South
Key Land Uses	Mixed institutional, employment, and light industrial. Some buildings, such as on the northwest corner of Arapahoe and 55th, front the street while others have parking frontages. ▪ Boulder Community Health ▪ Ball Aerospace (major employer) ▪ Light industrial and office uses east of Ball Aerospace, including breweries, printing press, Rocky Mountain Theater for Kids. ▪ Office and hotel uses between Foothills Pkwy, Boulder Creek, and the railroad tracks	▪ Primarily low-density, single-family residential ▪ Some medium or high density residential, e.g., between Foothills Parkway and Eisenhower Drive ▪ Several one and two-story office buildings are transitioning to medical offices for the personnel using the hospital facility ▪ Isolated office (east of Foothills) and auto-oriented retail/service (west of 55th)
General-Purpose Travel Lanes	▪ At Foothills Parkway, there are three westbound through travel lanes, a right-turn lane, and three left-turn lanes. Eastbound, there are three travel lanes, a right-turn lane, and two left-turn lanes. In both directions, the right-turn lanes become bus queue jumps through the intersection. On the opposite side of the intersection, the queue jump lane transitions to a merging lane for traffic turning right onto Arapahoe. ▪ East of Foothills, there are generally three lanes per direction with a median. Median-separated left-turn lanes occur at intersections and mid-block.	
Intersections and Crossings	▪ There is an undercrossing of Arapahoe east of Foothills Parkway. ▪ Foothills Parkway and 48th Street are over 1600 feet (over 1/4 mile) apart. ▪ Average intersection spacing between signalized intersections is over 850 feet between 48th Street and 55th Street. These intersections have directional curb ramps and continental crosswalk markings on all four legs. ▪ No marked crosswalks are provided between signalized intersections. Signalized intersections have directional curb ramps and continental crosswalk markings on all four legs, except for missing crosswalks on the south leg of Conestoga Street.	
Pedestrian / Off-Street Bicycle Facilities	▪ The north side has a continuous 12 foot multi-use path. ▪ Pedestrian access on the south side changes between a 12 foot multi-use path and 5 foot sidewalk multiple times; there is no path or bike lane between MacArthur Drive and 48th Street or between Eisenhower Drive and 55th Street. ▪ There is not always a buffer between the sidewalk and the street. Businesses typically do not have pedestrian paths to their front doors.	
On-Street Bicycle Facilities	▪ None	
Dedicated Bus Lanes / Queue Jumps	▪ There are queue jumps in both directions at Foothills Parkway.	

Typical Existing Cross-Section: Range Street Looking West

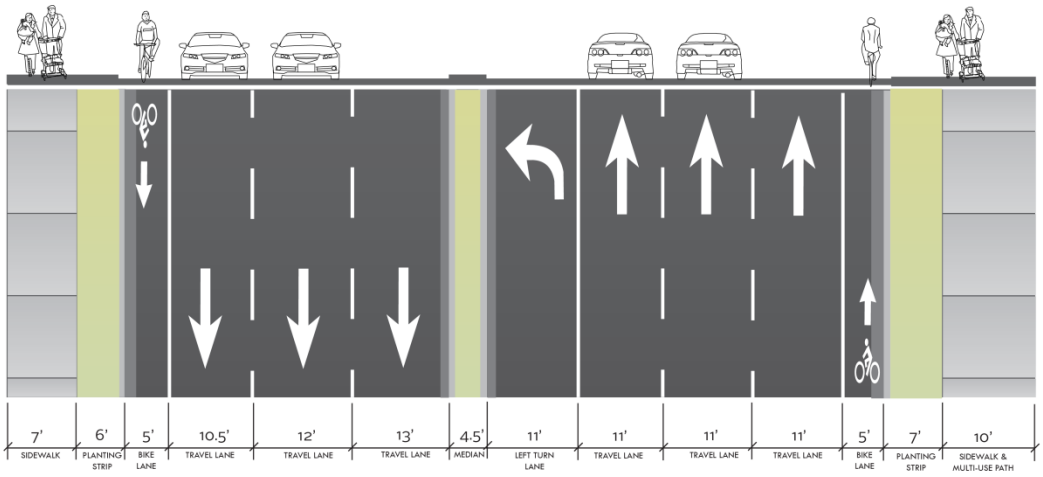


55th Street to Cherryvale Road

Arapahoe Avenue transitions to two eastbound travel lanes east of 55th Street, and has five to six total general-purpose travel lanes between 55th Street and Cherryvale Road. The north side multi-use path intersects the South Boulder Creek Greenway approximately 400 feet west of Cherryvale, where Arapahoe Avenue crosses over South Boulder Creek. The Flatirons Golf Course is the dominant land use on the south side.

Category	North	South
Key Land Uses	▪ Accessed from 55th Street, Flatiron Business Park is north of the railroad tracks ▪ Office and light industrial uses south of the railroad tracks, accessed from Arapahoe	▪ Retail/services and office uses between 55th and the golf course ▪ Flatirons Municipal Golf Course ▪ Very low density, single-family residential along Old Tale Road
General-Purpose Travel Lanes	▪ Three travel lanes in each direction, transitioning to two eastbound lanes approx. 800 feet east of 55th.	
Intersections and Crossings	▪ No marked crosswalks between the signalized intersections at 55th and Cherryvale, nearly 0.7 miles apart. These intersections have directional curb ramps and continental crosswalk markings on all four legs, except for missing crosswalks on the south and west legs of Cherryvale. ▪ Pedestrian/bicycle undercrossing of Arapahoe that connects the South Boulder Creek Greenway to Old Tale Road (approx. 400 feet west of Cherryvale).	
Pedestrian / Off-Street Bicycle Facilities	▪ On the north side, the multi-use path is continuous except for an approx. 650 foot gap west of the South Boulder Creek Greenway undercrossing that connects the path to Old Tale Road on the south side of Arapahoe. ▪ On the south side, there is no sidewalk or multi-use path next to the Flatirons Golf Course. The multi-use path resumes east of Cherryvale Road. There is a short segment near Old Tale Road where there are no sidewalks or multi-use paths on either side of the street.	
On-Street Bicycle Facilities	▪ There are bike lanes on both sides of Arapahoe east of 55th	
Transit Lanes or Queue Jumps	▪ None	

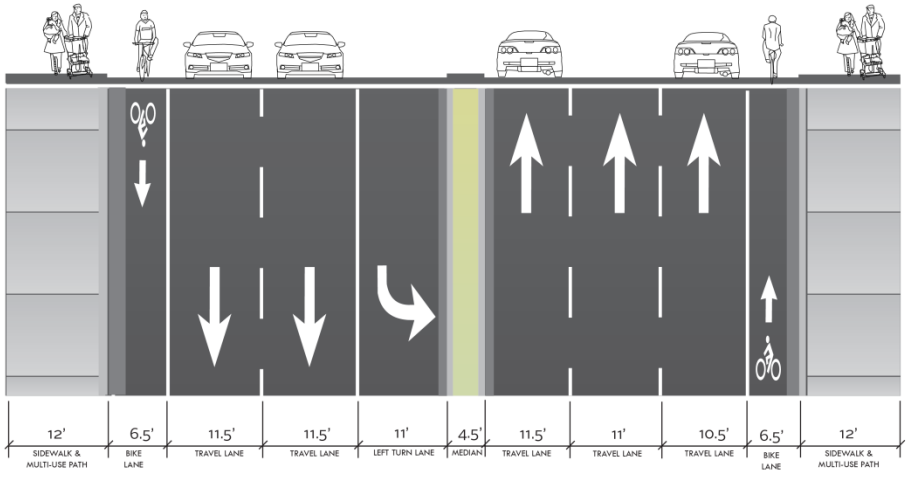
Typical Existing Cross-Section: 55th Street Looking West



Cherryvale Road to 63rd Street

Arapahoe Avenue between Cherryvale Road and 63rd Street has a similar roadway configuration to the 55th – Cherryvale segment—five total general-purpose travel lanes with bike lanes in both directions. A new Jewish Community Center is being constructed on the southeast corner of Cherryvale Road and Arapahoe Avenue.

Category	North	South
Key Land Uses	▪ Auto dealerships, light industrial, and service uses ▪ North of railroad tracks along 63rd, Boulder County Resource Center, Western Disposal's main facility, Stazio Softball Fields, Via Mobility ▪ West of 63rd, Naropa University Nalanda Campus	▪ Future Boulder Jewish Commons east of Cherryvale ▪ Open space / wetlands ▪ Auto repair business ▪ Mobile home park
General-Purpose Travel Lanes	▪ Three westbound and two eastbound general-purpose lanes. ▪ Median-separated left-turn lanes at intersections and mid-block.	
Intersections and Crossings	▪ No marked crosswalks between the signalized intersections at Cherryvale and 63rd, which are approximately 1,800 feet (1/3 mile) apart. ▪ These intersections have directional curb ramps and continental crosswalk markings on all four legs, except for missing crosswalks on the south and west legs of Cherryvale.	
Pedestrian / Off-Street Bicycle Facilities	▪ There are multi-use paths on both sides of Arapahoe.	
On-Street Bicycle Facilities	▪ There are 6.5-foot bike lanes in both directions.	
Transit Lanes or Queue Jumps	▪ None	
Typical Existing Cross-Section: West of 62nd Street looking West		

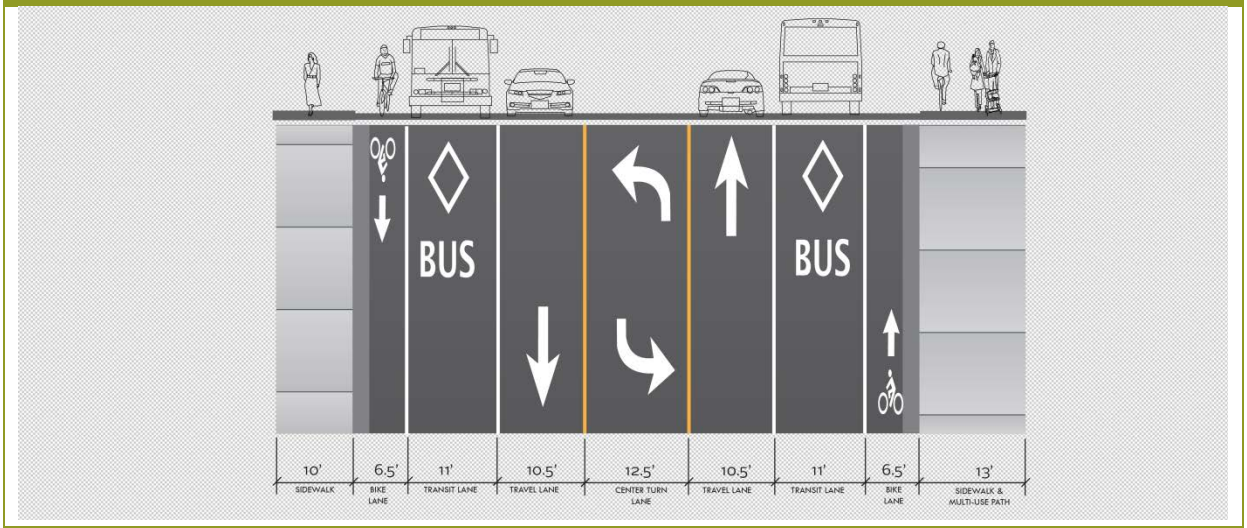


63rd Street to Westview Drive

Between 63rd Street and Westview Drive, Arapahoe Avenue has two general purpose travel lanes with a two-way center-turn lane and a transit lane in each direction. The Boulder Valley School District offices and Arapahoe Ridge High School are major land uses.

Category	North	South
Key Land Uses	▪ Self-storage facilities and retail/service businesses south of the railroad tracks ▪ Xcel Energy Valmont Power Station north of railroad tracks	▪ Self-storage facilities ▪ Eco-Cycle and ReSource ▪ Boulder Valley School District (BVSD) Arapahoe Campus ▪ Arapahoe Ridge Alternative Technical High School
General-Purpose Travel Lanes	▪ One travel lane in each direction with a two-way center turn lane.	
Intersections and Crossings	▪ Directional curb ramps and continental crosswalk markings on all four legs of the signalized intersections at 63rd and 65th. ▪ Approximately 1,600 foot spacing between 63rd and 65th	
Pedestrian / Off-Street Bicycle Facilities	▪ Multi-use path on the north side; the south side sidewalk is narrower and does not continue east of Westview Drive.	
On-Street Bicycle Facilities	▪ On-street bike lanes on both sides.	
Transit Lanes or Queue Jumps	▪ Transit-only lane in both directions between 63rd Street and approximately Arapahoe Ridge High School.	

Typical Existing Cross-Section: West of 65th Looking West



Westview Drive to 75th Street

Between Westview Drive and 75th Street, Arapahoe Avenue has three total lanes and is mostly bordered by open space, with a cluster of light industrial businesses at Valtec Lane.

Category	North	South
Key Land Uses	▪ Open space between Westview Drive and Valtec Lane ▪ Light industrial at Valtec Lane ▪ City on the Hill Church east of 75th	▪ Open space between Westview Dr and Valtec Lane ▪ Convenience store and gas station at 75th
General-Purpose Travel Lanes	▪ One travel lane in each direction and a two-way center turn lane.	
Intersections and Crossings	▪ T-intersection of Westview Drive and Arapahoe only has a curb ramp on the southwest corner; there are no marked crossings or connecting facilities on the south side east of Westview. Westview Drive also lacks sidewalks. ▪ Approx 1.2 mile spacing between 65th Street and 75th Street; there is no marked crossing at the bus stops at Valtec Lane. ▪ There is an above-grade double-track railroad overcrossing of Arapahoe east of Valtec Lane. ▪ Curb ramps and continental crosswalk markings at 75th Street except for a missing curb ramp on the northeast corner.	
Pedestrian / Off-Street Bicycle Facilities	▪ Multi-use path on the north side only, with a landscaped buffer west of Valtec Lane; the south side has no pedestrian facility.	
On-Street Bicycle Facilities	▪ Wide shoulders or striped bike lanes on both sides.	
Transit Lanes or Queue Jumps	▪ None	

VEHICLES

This section describes existing conditions for vehicles using Arapahoe Avenue in the study area. Arapahoe Avenue is an important roadway for local motor vehicle trips within Boulder and is one of the primary commuter corridors between Boulder and Lafayette, Erie, and I-25.

Key Highlights

- Traffic volumes at the west end of the corridor have remained fairly stable over the past 30 years, while volumes on the east end have nearly doubled.
- Travel time between Folsom Street and 65th Street ranges from 5.9 to 9.5 minutes eastbound and from 6.8 to 8.4 minutes westbound during the morning and afternoon peak hours, respectively. An "unimpeded" auto trip (with no traffic signals or other stops) would take 4.75 minutes to travel between Folsom and 65th Streets at the posted speed limits.

Average Daily Traffic

The map provided in Figure 3-5 shows the location of traffic counts along the corridor. Average Daily Traffic (ADT) was recorded at the locations marked in blue on each end of the corridor (west of 23rd Street and east of 75th Street).

In 2015, an average of approximately 19,000 vehicles per day (vpd) were counted at both traffic count locations. In the vicinity of the intersection of Foothills Parkway and Arapahoe Avenue, one of the busiest intersections in the city, Arapahoe Avenue carries approximately 32,000 vehicles per day. This busy intersection was reconstructed in 2006 to address roadway design issues including safety and the addition of a new multi-use path underpass. Traffic volumes at the west end of the corridor have remained fairly stable (typically between 20,000 and 25,000 vpd) since the initial count in 1983, while volumes on the east end have nearly doubled.

Figure 3-3 Average Daily Traffic, Arapahoe Avenue, 2015

	West of Folsom	East of 75th
First year of data	22,500 (1983)	10,500 (1982)
2015 Average Daily Traffic	19,500	19,000

Source: 2015 Boulder Arterial Count Program, and Boulder Valley Count Program.

Figure 3-4 provides current traffic volumes at several locations along Arapahoe Avenue. Additional details on current traffic volumes are provided in Figure 3-10.

Figure 3-4 Average Daily Traffic Volumes, Arapahoe Avenue, 2015

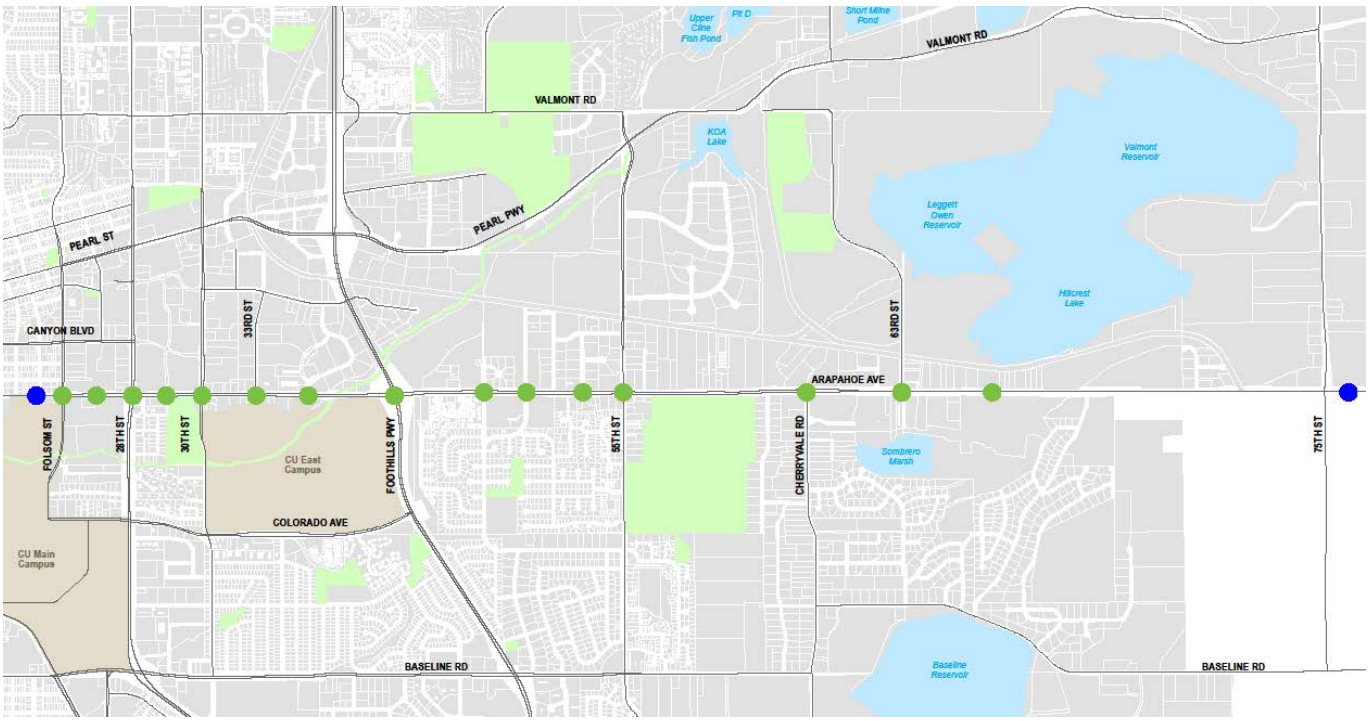
Intersection	Existing 2015
Arapahoe Avenue and W. of 28th Street	27,500
Arapahoe Avenue and E. of 30th Street	28,300
Arapahoe Avenue and E. of Foothills Parkway	31,300
Arapahoe Avenue and E. of 55th Street	26,200

Source: Travel Forecasts based on Regional Travel Demand Model, 2040

Signalized and Non-Signalized Intersections

The corridor includes 16 signalized intersections and nine non-signalized intersections. Figure 3-5 illustrates the signalized intersections and Figure 3-6 provides a table of all intersections with public streets along the Arapahoe Avenue in the study area, listed from west to east.

Figure 3-5 Traffic Count Locations and Signalized Intersections along Arapahoe Avenue



Source: 2015 Boulder Arterial Count Program, and Boulder Valley Count Program

Figure 3-6 Intersection Type

Cross Street	Intersection Type
Folsom Street	Fully Signalized Intersection
26th Street	Fully Signalized Intersection
28th Street	Fully Signalized Intersection
Culver Court	Right Turn In, Right Turn Out
29th Street	Fully Signalized Intersection
30th Street	Fully Signalized Intersection
33rd Street	Fully Signalized Intersection
38th Street	Fully Signalized Intersection
Foothills Parkway	Fully Signalized Intersection
Riverbend Drive	Right Turn In, Right Turn Out
MacArthur Drive	Non Signalized, Turns Allowed Both Ways
48th Street	Fully Signalized Intersection
Eisenhower Drive / Commerce Street	Fully Signalized Intersection

Cross Street	Intersection Type
Range Street	Non Signalized, Turns Allowed Both Ways
Patton Drive	Right Turn In, Right Turn Out
Conestoga Street	Fully Signalized Intersection
55th Street	Fully Signalized Intersection
56th Street	Right Turn In, Right Turn Out
Old Tale Road	Non Signalized, Turns Allowed Both Ways
Cherryvale Road	Fully Signalized Intersection
62nd Street	Non Signalized, Turns Allowed Both Ways
63rd Street	Fully Signalized Intersection
65th Street	Fully Signalized Intersection
Westview Drive	Non Signalized, Turns Allowed Both Ways
Valtec Lane	Non Signalized, Turns Allowed Both Ways
75th Street	Fully Signalized Intersection

Source: City of Boulder

Vehicle Turning Movement Counts

Vehicle turning movement counts are tracked at signalized intersections every three years during the morning, midday, and afternoon peak hours (starting at 7:45 am, noon, and 4:45 pm, respectively). These locations are indicated by green dots in Figure 3-5, and are one-day snapshots of every vehicle counted over each one-hour period. Traffic volumes are typically highest on weekdays during the morning and afternoon peak hours when employees are traveling to and from work. Figure 3-10 shows the morning and afternoon peak hour vehicle counts at four of the busiest intersections in the corridor. Detailed counts at all of the signalized intersections in the corridor are available on the City of Boulder's website.[4]

Intersection Level of Service

Intersection level of service (LOS) is a qualitative measure of the quality of roadway operations at signalized intersections. LOS measures the effect of increased peak hour traffic volumes on vehicle travel time. LOS is calculated as the average time that vehicles are delayed at an intersection, and is reported as A through F letter grades:

- **LOS A** indicates very good operation (free flow) and equates to average delay of 10 seconds or less per vehicle
- **LOS F** indicates poor operation (congested traffic), with an average delay of 80 seconds or more

Figure 3-7 lists the existing LOS at the four busiest and most congested intersections in the corridor in the morning (AM) and afternoon (PM) peak hours. The smaller intersections (with less side street traffic) typically experience LOS in the A through C range.

[4] Boulder Turning Movement Count Program.

Figure 3-7 Intersection Level of Service, Arapahoe Avenue, 2015

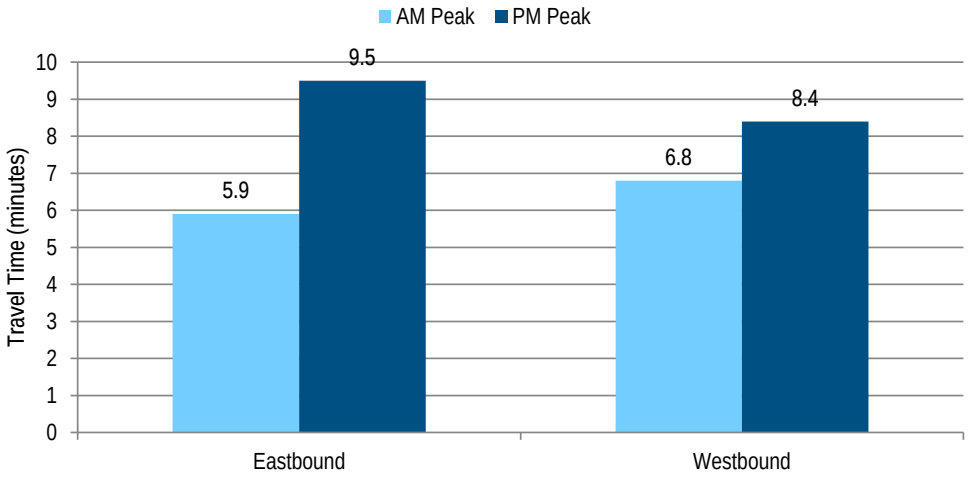
Intersection	Existing AM Peak	Existing PM Peak
Arapahoe Avenue and 28th Street	C	D
Arapahoe Avenue and 30th Street	C	C
Arapahoe Avenue and Foothills Parkway	C	D
Arapahoe Avenue and 55th Street	C	C

Source: Travel Forecasts based on Regional Travel Demand Model, 2040

Travel Time

The City of Boulder monitors vehicle travel times in key arterial corridors, including Arapahoe Avenue. Travel time on the Arapahoe Avenue corridor has held reasonably steady since 1987. Most recently (2014), in the segment between Folsom Street and 65th Street the travel time averaged 6.3 minutes in the morning peak hour and 8.8 minutes in the afternoon peak hour. If there were no impediments or stops on Arapahoe Avenue (e.g., no traffic signals), an "unimpeded auto trip" would take 4.75 minutes to travel between Folsom and 65th Streets at the posted speed limits. The relatively constant travel time indicates that the City of Boulder's transportation management policies and programs have been effective in maintaining efficient vehicle travel, even as the city's population and vehicle traffic has grown. Existing travel times in the corridor between Folsom and 65th Streets vary depending on direction, and are shown in Figure 3-8. Eastbound travel time ranges from 5.9 minutes during the morning peak hour to 9.5 minutes during the afternoon peak hour. Westbound travel time ranges from 6.8 minutes during the morning peak hour to 8.4 minutes during the afternoon peak hour.

Figure 3-8 Existing Vehicle Travel Times (Folsom Street to 65th Street)



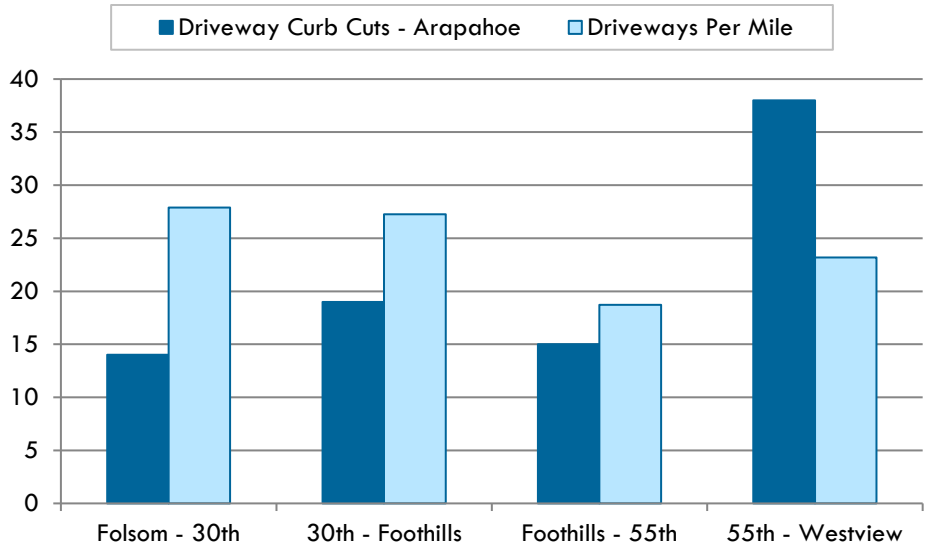
Source: City of Boulder

Driveways and Business Access

Between Folsom Street and Westview Drive on Arapahoe Avenue there are 86 driveway curb cuts. Over 3.6 miles, this averages to approximately 24 driveways per mile along the corridor, not including side streets. Figure 3-9 compares the number of driveways and curb cuts for several segments of the corridor.

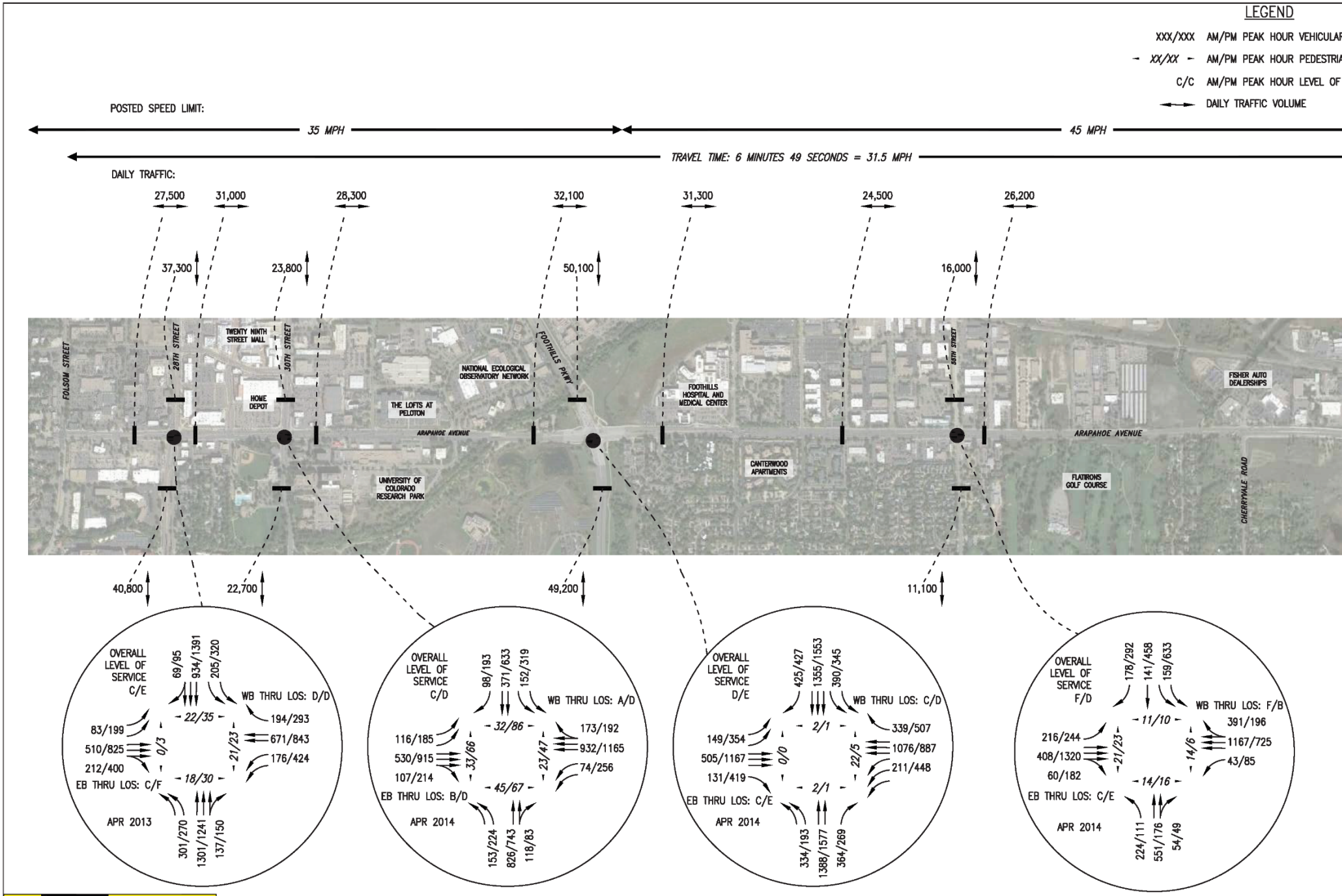
The highest number of curb cuts in the corridor is the segment from 55th Street to Westview Drive, with 38 driveways intersecting Arapahoe Avenue.

Figure 3-9 Driveway and Business Access, Total and Per-Mile



Source: City of Boulder Inventory

Figure 3-16 Existing Traffic Volumes and Level of Service, 2015



FOX TUTTLE HERNANDEZ
TRANSPORTATION GROUP

EAST ARAPAHOE AVENUE TRANSPORTATION PLAN

2015 EXISTING TRAFFIC VOLUME

PEDESTRIANS AND BICYLISTS

This section describes existing conditions for people walking and traveling by bicycle in the study area. Walking is a part of every trip, including parking and walking to the front door of a business or walking from home to a bus stop and from a bus stop to a final destination. Bicycling can be an efficient and healthy way to complete a variety of short- to medium-length trips. Both walking and biking are common travel modes in the City of Boulder. According to the 2012 Boulder Travel Diary, over 20% of all trips are made by foot and almost 19% of all trips are made by bike.[5]

Pedestrian and bicycle facilities along the East Arapahoe corridor are part of a citywide network of on-street and off-street facilities. Figure 3-11 illustrates the existing network of pedestrian and bicycle facilities in the study area. Figure 3-12 illustrates existing *and proposed* facilities. Pedestrian and bicycle facilities and travel are summarized below.

Key Highlights

- There are key gaps in the sidewalk network along Arapahoe Avenue: north-side at Old Tale Road and south-side at 33rd Street, between 55th Street and Cherryvale Road, and east of Westview Drive.
- There are neither bike lanes nor a multi-use path on the south side of Arapahoe Avenue between 30th Street and the Boulder Creek Greenway, between MacArthur Drive and 48th Street, and between Eisenhower Drive and 55th Street.
- There are on-street bike lanes east of 55th Street, but the multi-use path has a north-side gap at Old Tale Road and south-side gaps between 55th Street and Cherryvale Road, as well as east of Westview Drive.
- There are long distances between opportunities to cross Arapahoe Avenue at crosswalks or undercrossing in some segments, and there are no marked crossings between signalized intersections.

Summary of Pedestrian Facilities and Travel

Pedestrian facilities along the corridor include sidewalks and multi-use paths. Multi-use paths are shared facilities with sufficient width to accommodate people both walking and bicycling. Figure 3-11 illustrates the existing pedestrian facilities along the East Arapahoe corridor (either sidewalk or multi-use path). These paths are part of a city-wide bicycle and pedestrian network.


Sidewalk at 63rd Street.

As described for each segment of the study area in the Existing Modal Facilities section above, there are sections of Arapahoe Avenue that lack continuous pedestrian facilities of any type (sidewalks or multi-use paths). These gaps include:

- On the north side near Old Tale Road, west of the South Boulder Creek Greenway
- On the south side east and west of 33rd Street, between 55th Street and Cherryvale Road, and east of Westview Drive

[5] National Research Center, Modal Shift in the Boulder Valley, 1990-2012

Figure 3-12 illustrates proposed pedestrian facilities that would help fill the above gaps in pedestrian connectivity along the corridor.

Pedestrian Crossing Locations

There are sections of Arapahoe Avenue where there is a significant distance between marked crosswalks, which are only at signalized intersections. Figure 3-11 illustrates marked crosswalk locations at signalized intersections, and pedestrian undercrossings that are provided at key trail intersections including the Boulder Creek Path (east of 38th Street), east of Foothills Parkway, and the South Boulder Creek Greenway (at Old Tale Road).

Pedestrian Activity along Arapahoe

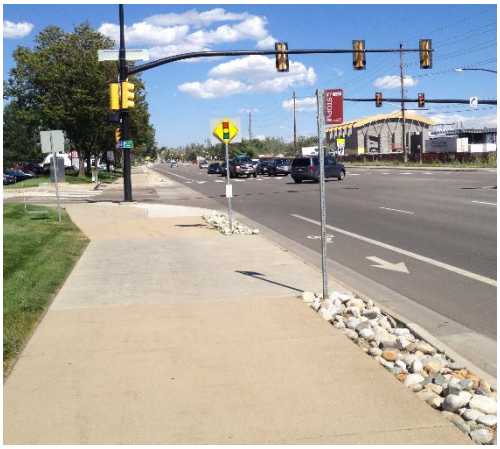
Figure 3-14 (Folsom Street to Foothills Parkway) and Figure 3-15 (48th Street to 65th Street) illustrate pedestrian counts at intersections along the corridor in the morning and afternoon peak hours.[6] These diagrams indicate that:

- The highest level of pedestrian activity was observed at the intersection of Folsom Street and Arapahoe Avenue, next to the CU West Campus.
- At 33rd and 38th Streets pedestrian volumes were highest on the north side of the street. This could be due to the gap in sidewalk connectivity on the south side at 33rd Street.
- At Foothills Parkway no pedestrians were counted crossing the intersection's north leg and most pedestrian crossings were on the south leg. This could be attributed to the pedestrian undercrossing of Arapahoe Avenue on the east side of Foothills Parkway. The Boulder Creek Greenway also runs north of Arapahoe Avenue and crosses under Foothills Parkway.
- There were few pedestrians observed crossing Arapahoe Avenue or side streets east of Cherryvale Road.

Summary of Bicycle Facilities and Travel

Bicycle facilities along the corridor include bicycle lanes and multi-use paths that are part of a city-wide bicycle and pedestrian network. These facilities include:

- **On-street bicycle lanes** between 55th Street and 63rd Street and wide shoulders east of 63rd Street. Lanes are approximately 5 to 6.5 feet wide with no buffer separating the facilities from vehicle travel lanes.
- **Off-street, detached multi-use paths** along one or both sides of Arapahoe Avenue that are typically 10 to 12 feet wide, sufficiently wide to accommodate people walking and bicycling. In some cases, there is a buffer between the path and adjacent travel lanes.



North-side (westbound) multi-use path and bike lanes at Cherryvale Road. The south-side lacks a continuous multi-use path between Cherryvale Road and 55th Street and there is a north-side gap west of the South Boulder Creek Greenway.

As shown in Figure 3-11, the multi-use paths are not continuous. Figure 3-12 illustrates proposed new or upgraded multi-use path segments (dashed green lines or dashed black lines, respectively) in the Boulder Transportation Master

[6] Pedestrian counts were collected by the City of Boulder as a part of peak hour counts at all signalized intersections in the City of Boulder. Data is collected approximately every three years on a rotational basis and includes three peak periods (AM, Noon and PM peaks). The data for this study area was collected between April 2013 and October 2014.

Plan. The north-side multi-use path is nearly continuous, except the gap west of the South Boulder Creek Greenway (near Old Tale Road). The south-side multi-use path has several gaps, including where a sidewalk is present but is not wide enough to accommodate both people walking and biking. In particular, this includes between 30th Street and the Boulder Creek Path; there is no bike lane in this segment. There is also no south-side path or bike lane between MacArthur Drive and 48th Street or between Eisenhower Drive and 55th Street. There are on-street bike lanes east of 55th Street, but the multi-use path has a north-side gap at Old Tale Road and south-side gaps between 55th Street and Cherryvale Road, as well as east of Westview Drive. These gaps are also described for each segment of the study area in the Existing Modal Facilities section above.

In addition, at intersections bicyclists using the multi-use path experience conflicts with auto traffic; there are no specialized intersection treatments. There are also frequent driveways which present additional conflict points.

Bicyclist Volumes along Arapahoe Avenue

Figure 3-16 and Figure 3-17 illustrate morning and afternoon peak-hour bicycle counts at intersections along the corridor. The volume of bicycle traffic is highest 30th Street, both along and across Arapahoe Avenue. There is also moderate bicyclist activity at Folsom Street, 38th Street, 48th Street (north-side only), and Cherryvale Road (north-side only).

Connecting Bicycle Facilities and Bicyclist Volumes

Bicyclists can connect the on- and off-street bicycle facilities along Arapahoe Avenue with the overall bicycle network to complete a variety of trips in Boulder.[7] Key facilities parallel or connecting to the East Arapahoe corridor include:

- **Boulder Creek Greenway:** Generally east-west off-street facility running roughly parallel to Arapahoe Avenue between Folsom Street and 48th Court. It is joined by the Skunk Creek Path just before it crosses under Arapahoe Avenue east of 38th Street. In 2013, average daily counts of bicyclists conducted by the City of Boulder on the Boulder Creek Path (at the Skunk Creek Path intersection) ranged from 1,200 to 1,400 per day.
- **Folsom Street**: bicycle lanes north and south of Arapahoe Avenue
- **28th Street**: multi-use path
- **29th Street**: bicycle lanes north of Arapahoe Avenue and multi-use path south of Arapahoe Avenue
- **30th Street**: bicycle lanes north and south of Arapahoe Avenue, and multi-use path north of Arapahoe Avenue. There is
- **Foothills Parkway:** multi-use path on east side
- **55th Street**: bicycle lanes
- **South Boulder Creek Greenway:** intersects Arapahoe Avenue from the north at Old Tale Road.
- **63rd Street**: bicycle lanes

[7] Bicycle counts were collected by the City of Boulder as a part of peak hour counts at all signalized intersections in the City of Boulder. Data is collected approximately every three years on a rotational basis and includes three peak periods (AM, Noon and PM peaks). The data for this study area was collected between April 2013 and October 2014. The City of Boulder also conducts bicycle counts on various key multi-use paths, including on the Boulder Creek Path in 2013.

Bicycle Sharing

Boulder B-Cycle operates the bicycle sharing system in the City of Boulder. Customers can rent and return a bike at any B-Cycle station. Figure 3-13 illustrates station locations along Arapahoe Avenue and near the corridor, including between Folsom-28th Streets, at 38th Street, and at 48th Street.

Figure 3-11 Existing Pedestrian and Bicycle Facilities

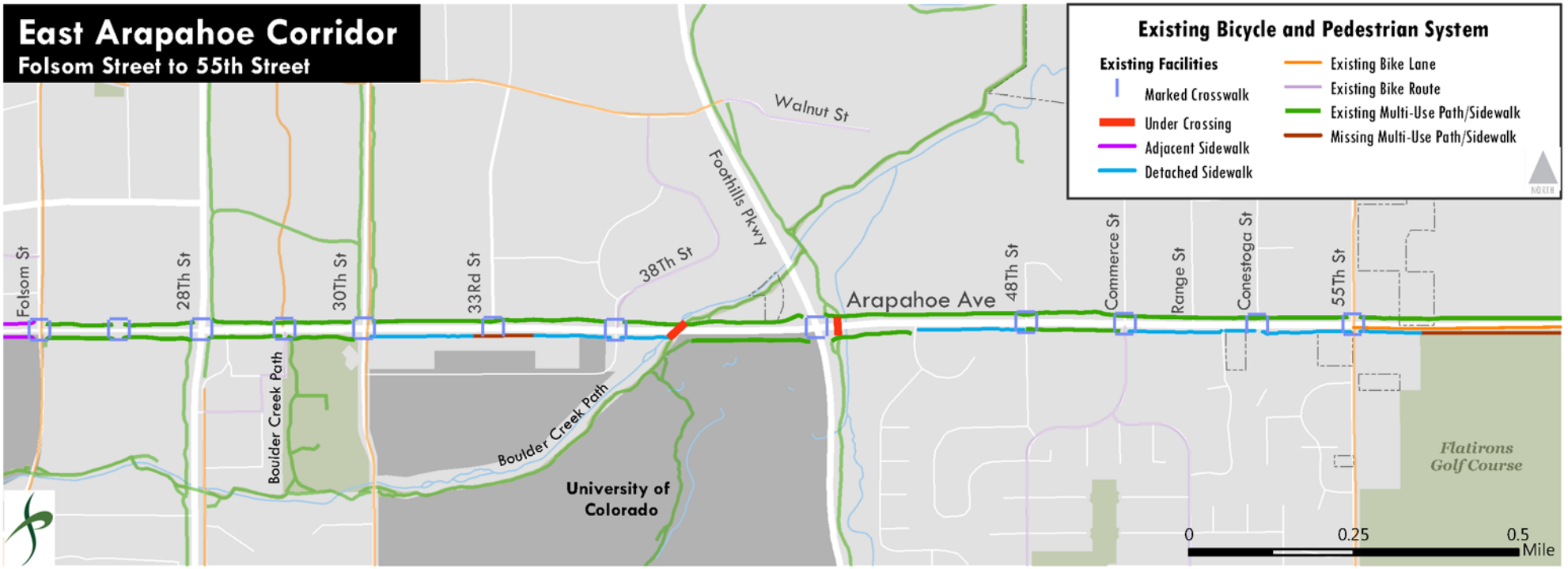


Figure 3-12 Existing and Proposed Pedestrian and Bicycle Facilities

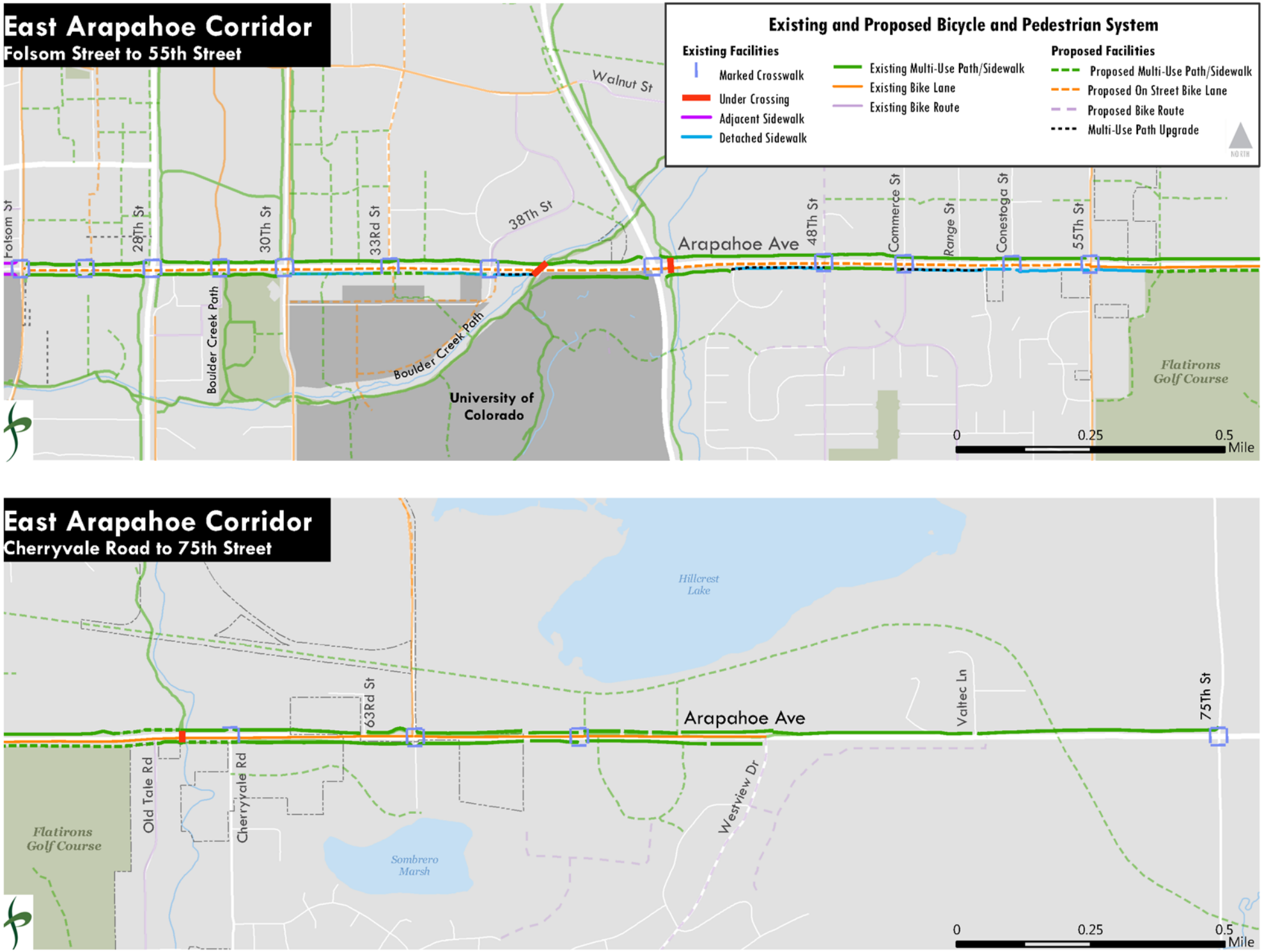


Figure 3-13 B-Cycle Stations

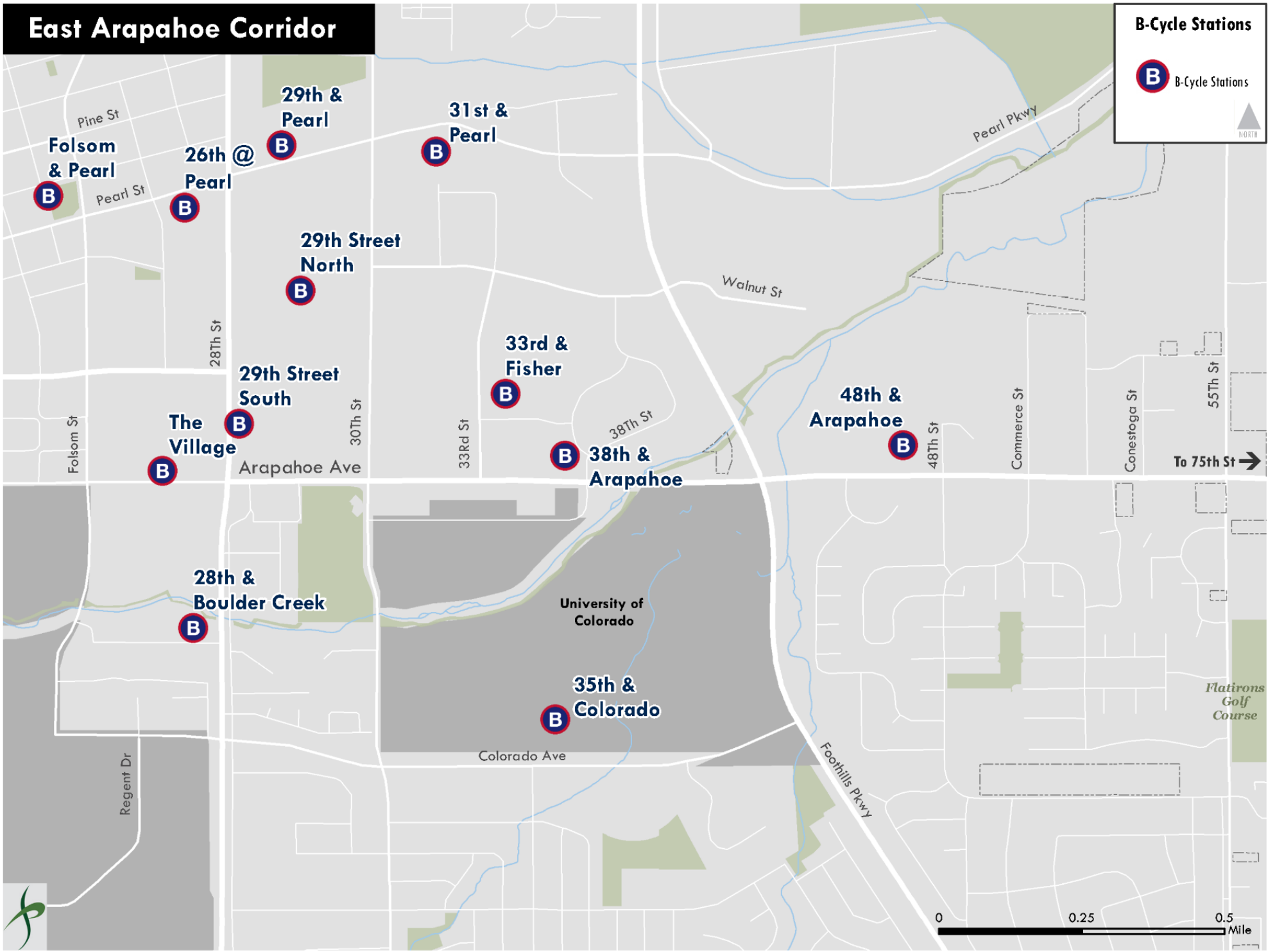
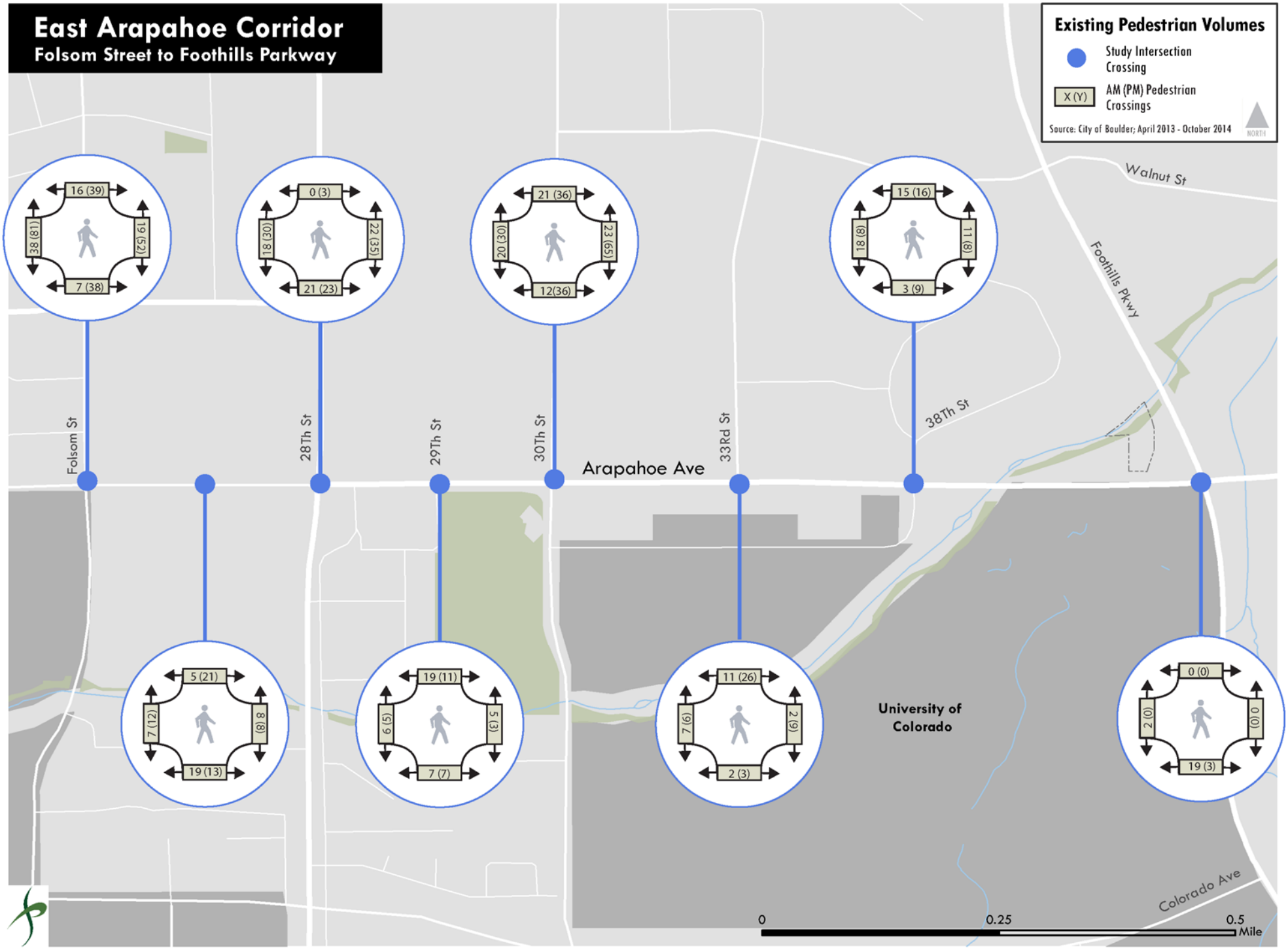
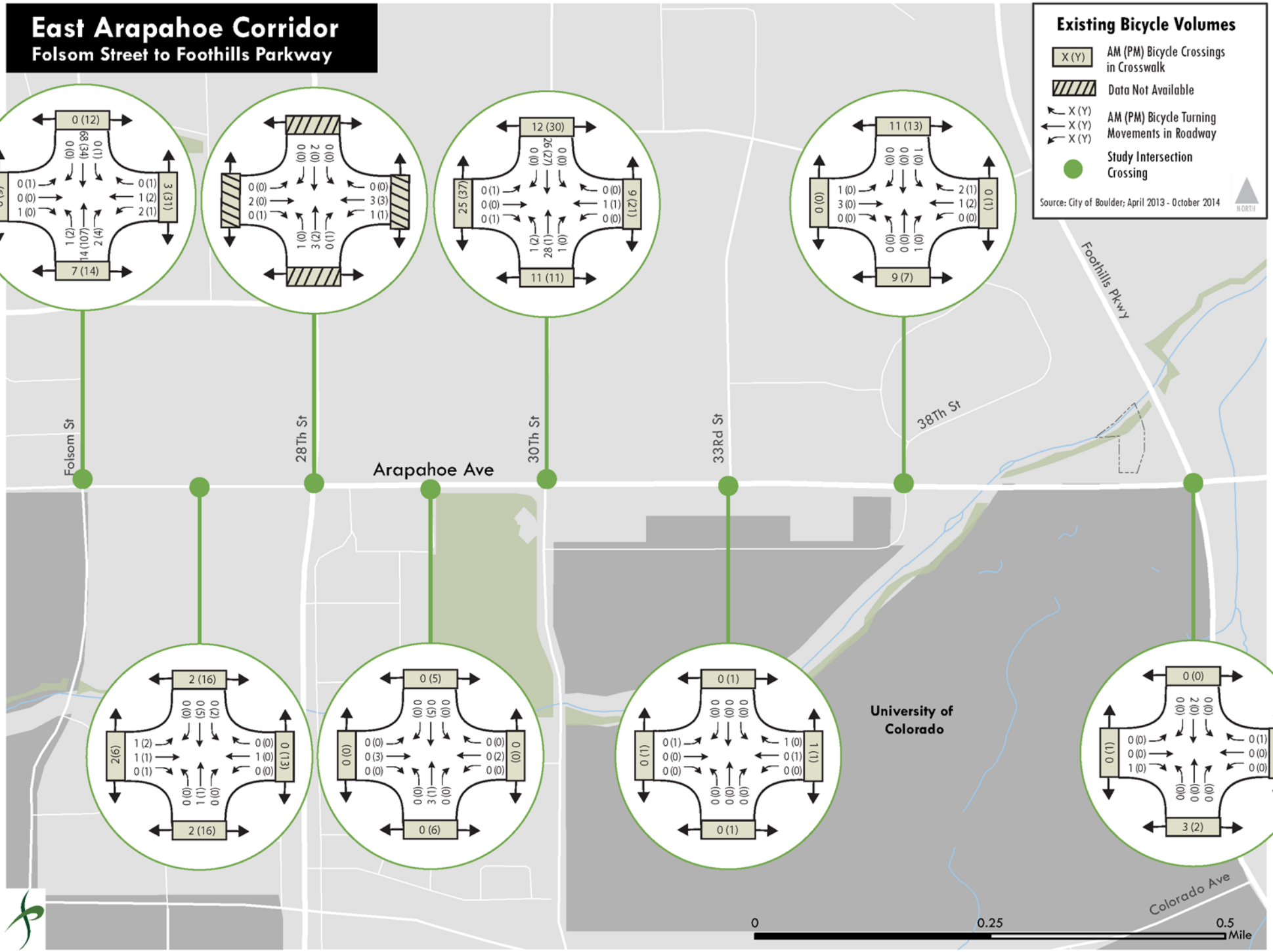


Figure 3-14 Pedestrian Intersection Movements, Folsom Street to Foothills Parkway



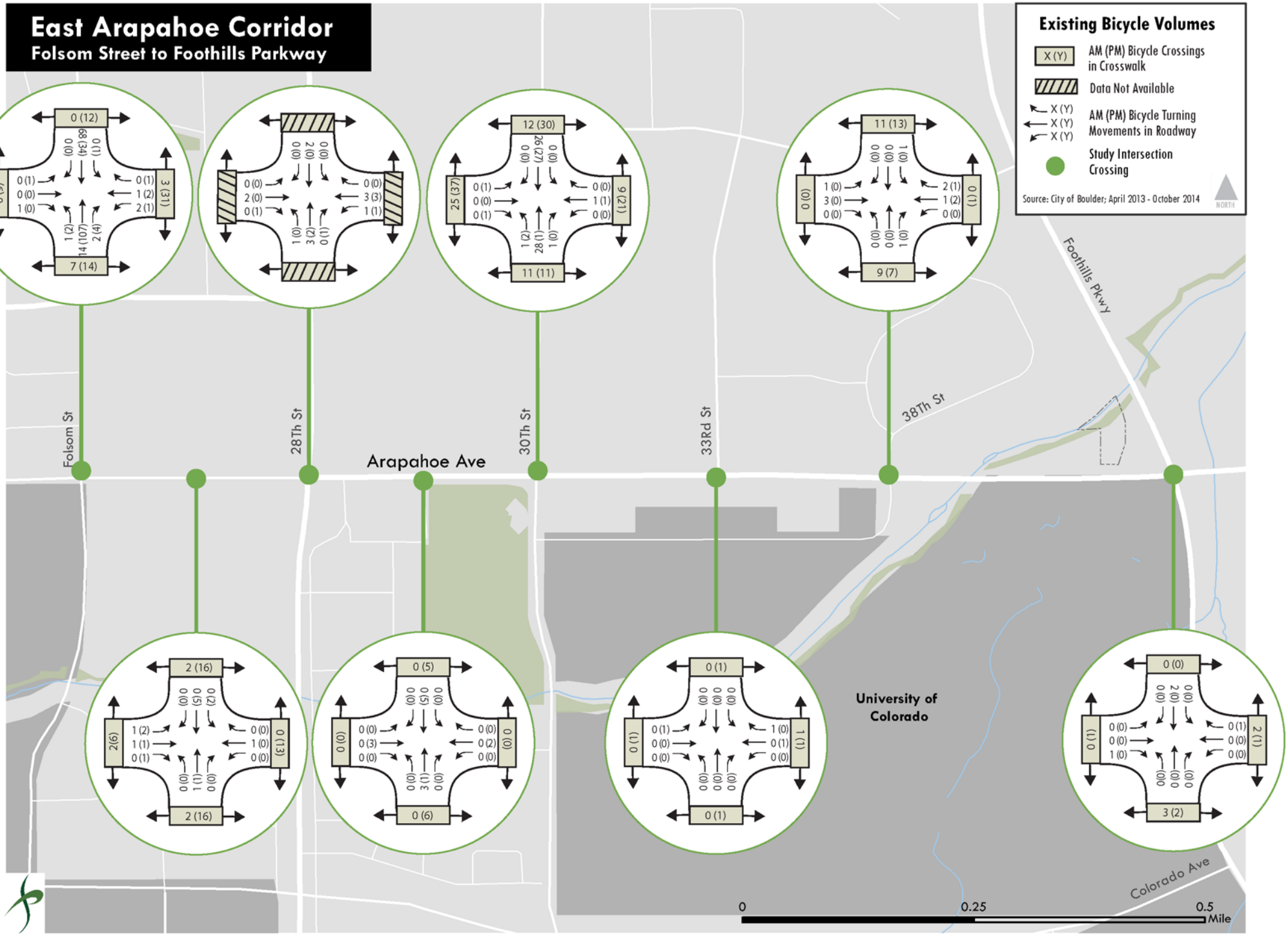
Source: City of Boulder. Data from http://gisweb.ci.boulder.co.us/agswebsites/pds/pds_traffic/

Figure 3-16 Bike Intersection Movements, Folsom Street to Foothills Parkway



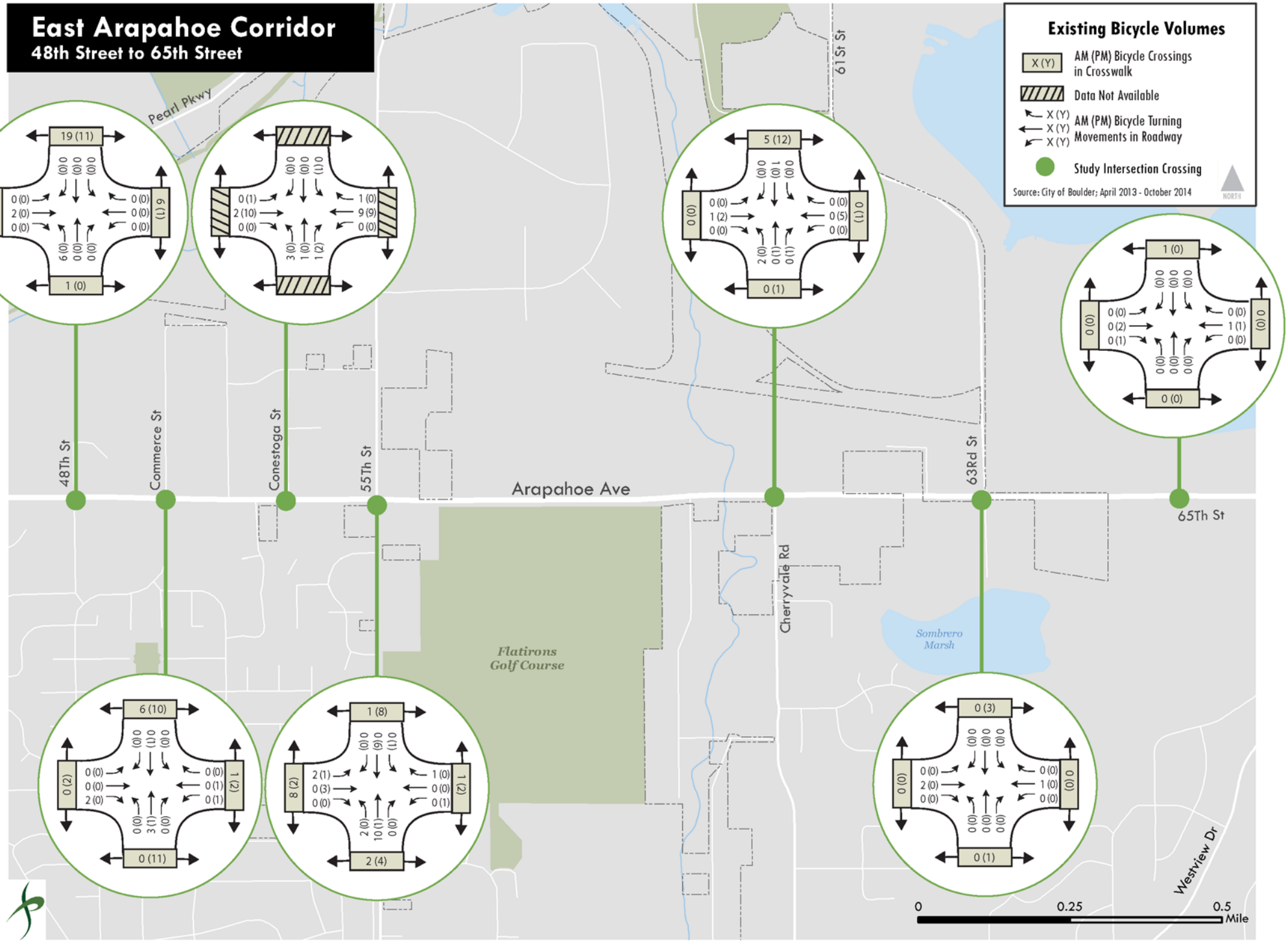
Source: City of Boulder. Data from http://gisweb.ci.boulder.co.us/agswebsites/pds/pds_traffic/

Figure 3-16 Bike Intersection Movements, Folsom Street to Foothills Parkway



Source: City of Boulder. Data from http://gisweb.ci.boulder.co.us/agswebsites/pds/pds_traffic/

Figure 3-17 Bike Intersection Movements, 48th Street to 65th Street



Source: City of Boulder. Data from http://gisweb.ci.boulder.co.us/agswebsites/pds/pds_traffic/

TRANSIT

This section describes existing transit services and facilities in the study area. Transit is an important travel option for short local trips as well as longer-distance local and regional trips. According to the 2012 Boulder Travel Diary, approximately 5% of all trips and 10% of work trips in Boulder are made by public transit.[8]

Key Highlights

- The JUMP Community Transit Network bus route operated by RTD provides frequent service along Arapahoe Avenue (up to every 10 minutes on weekdays when CU is in session) over a long span of service (19 hours on weekdays). It carries 2,400 riders per weekday.
- Transit travel time between Folsom Street and 65th Street ranges from 11 to 16 minutes eastbound and is 15 minutes westbound during the morning and afternoon peak hours, respectively. Service generally runs close to schedules, but is least reliable in the westbound direction in the afternoon peak period.
- Over three-quarters of stops for the JUMP in Boulder have a concrete bus pad, although in some cases the pad is not fully accessible to users with wheelchairs or other mobility devices. Less than half of stops include a bench or other seating, and 26% contain a shelter.

Transit Overview

The JUMP bus route serves the entire East Arapahoe corridor, though other transit lines provide service on portions of the corridor. These services are shown in Figure 3-18.

Route Characteristics

The Regional Transportation District (RTD) operates most transit services within Boulder. RTD serves the entire Denver region, operating transit service from Boulder to Denver International Airport (DIA) including bus, light rail, and bus rapid transit (BRT). Among these services, Boulder's Community Transit Network (CTN) is a set of branded bus routes that specifically operate within Boulder, offering high-frequency service and connecting residents to major destinations and regional routes. The CTN is comprised of six high-frequency bus routes: BOUND, DASH, HOP, JUMP, SKIP and Stampede. The Flatiron Flyer (FF), which opened in January 2016, is a BRT service that operates between Boulder and Denver.

Route Descriptions

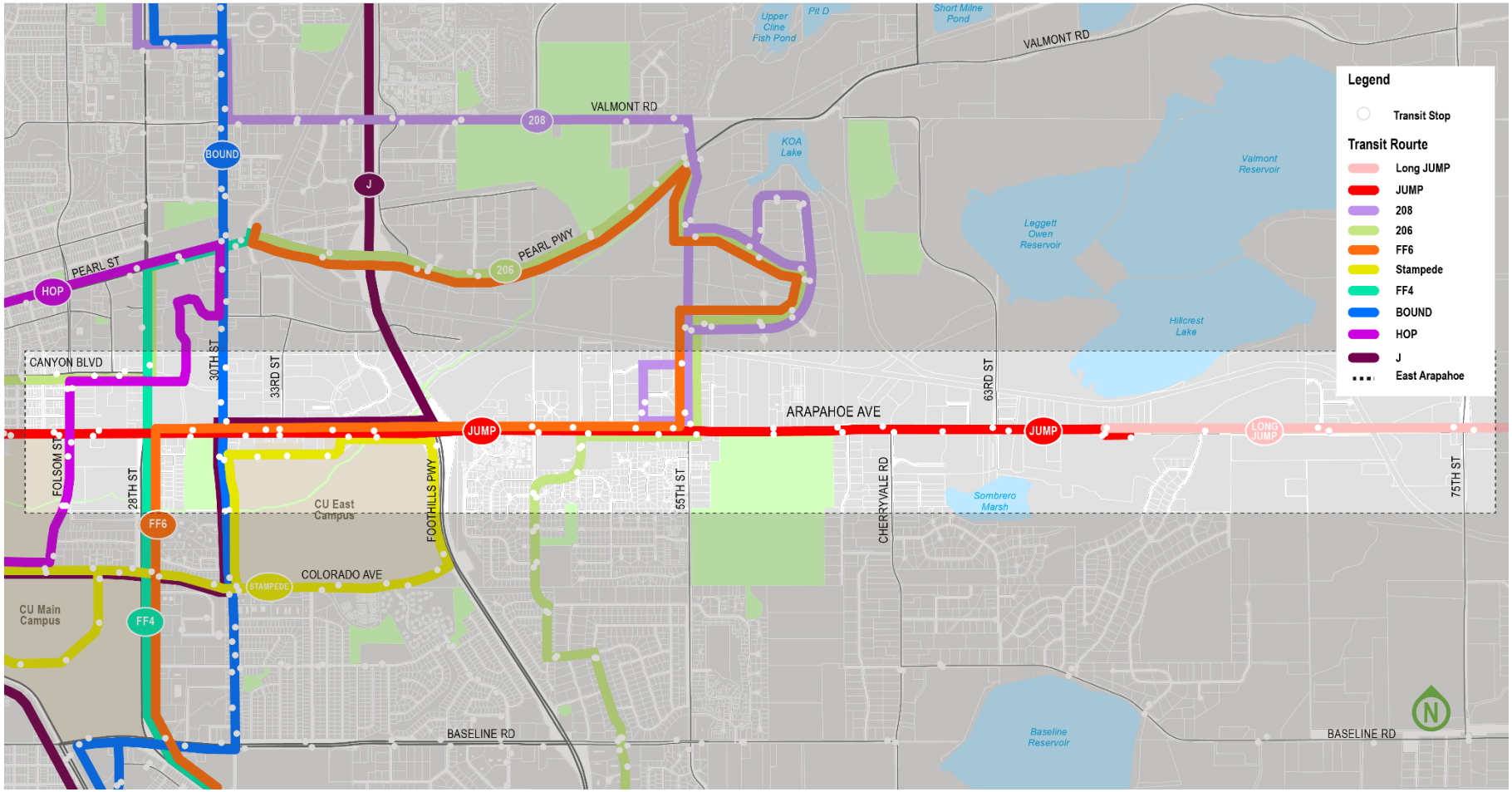
Figure 3-18 illustrates the bus routes that operate along or within the East Arapahoe Transportation Plan Study area. The JUMP route operates for the entire length of the East Arapahoe corridor, traveling between the Downtown Boulder Station and the city's eastern limits. The JUMP is also a vital regional route connecting Boulder to Lafayette and Erie. JUMP trips that travel outside of Boulder (east of 65th Street) are known as the Long JUMP. Other bus routes that operate in the corridor include:

- **Routes FF4 and FF6**: Provides regional connections between Boulder Junction at Depot Square Station and Denver Union Station. Route FF4 operates along the East Arapahoe corridor between 28th Street and 55th Street and serves the Flatiron Business Park along 55th Street. Route FF6 crosses Arapahoe Avenue at 28th Street.

[8] National Research Center, Modal Shift in the Boulder Valley, 1990-2012

- **Route J:** Offers regional connections between the University of Colorado at Boulder (CU), Niwot, and Longmont.
- **The HOP:** Operates a loop circulating between Pearl Street and the University of Colorado campus via the Twenty-Ninth Street Retail Center.
- **The Stampede:** Operates on a section of Arapahoe Avenue, and Marine Drive just south of Arapahoe Avenue, between Foothills Parkway and 30th Street, and provides circulation between the CU East Campus and CU Main Campus.
- **The BOUND:** Offers north-south connections between Diagonal Plaza, the Twenty Ninth Street Retail Center, CU East Campus and CU Main Campus, and Base-Mar Shopping Center via Baseline Road and 30th Street, crossing Arapahoe Avenue at 30th Street.
- **Route 206:** Connects several South Boulder neighborhoods to the Flatiron Business Park along 55th Street, Pearl Parkway, and Boulder Junction at Depot Square Station, where multiple transit connections are available.
- **Route 208:** Offers a connection between Downtown Boulder and the Flatiron Business Park via Broadway, Iris, and Walnut. The route accesses Arapahoe Avenue for one block, at its 55th Street terminus.

Figure 3-18 Existing Routes and Stops



Frequency

Boulder's Community Transit Network features service levels of 10 minutes or less during peak periods. Service that operates every 15 minutes or better is generally considered to be sufficiently frequent that most riders do not need to consult a schedule to plan their trips and simply show up at the bus stop.

Figure 3-19 shows existing weekday frequencies for all bus routes in the study area. The "short" JUMP operates in the midday when the "long" JUMP does not operate to Erie, and maintains frequent JUMP service in Boulder. The CTN frequencies are heavily dependent on CU's academic schedule. Overall service levels decrease when CU and BVSD are not in session during the summer months of May through August.

Figure 3-19 CTN and Other RTD Route Frequencies

Route	Frequencies (minutes) (CU Fall and Spring Semesters)			CU Summer Session Frequencies
	Peak	Midday	Weekend	
JUMP (in Boulder) [1]	10	10	30	15 min. peak and midday from May-Aug
Short Jump	None	30	None	
Long Jump to Lafayette	30	30	60	
Long Jump to Erie	30	None	60	
HOP	7-10	7-10	7-10	
Stampede	7-10	7-10	None	10 min. from May-Aug
BOUND	10	10	30	15 min. peak and midday from May-Aug
206	30	30	None	No Change
208	30	30	60	
FF4	10-15	None	None	No Change
FF6	3 trips	None	None	No Change
J	60	None	None	No Change

Notes: [1] Boulder Transit Station to 63rd and either BVSD stop (turnaround for "short" JUMP) or Arapahoe & 65th stop ("long" JUMP). [2] Short JUMP operates as far east as the BVSD –VoTech Center stop (near 65th)

Service Span (Operating Hours)

Figure 3-20 shows the service span for routes within the study area. Most of the services in the study area start around 6:00 am and end between 5:30 pm and midnight. Most regional routes that operate in the study area end service at 5:30 pm, while local routes operate later at night and enable use of transit for jobs with later evening shifts (including many service sector jobs) and non-work trips including for shopping, social, and entertainment purposes.

Figure 3-20 CTN and Other RTD Route Span

Route	Weekday Service Span (CU Fall and Spring Semester)	CU Summer Session Service Span
JUMP	4:54 AM - 11:43 PM	No Change
Short Jump	8:52 AM – 3:17 PM	No Change
Long Jump to Lafayette	4:58 AM – 11:43 PM	No Change
Long Jump to Erie	6:22 AM – 8:57 AM & 2:52 PM – 10:12 PM	No Change
HOP	7:00 AM – 10:00 PM	
Stampede	7:17 AM - 7:02 PM	No Change
BOUND	5:30 AM - 12:05 AM	No Change
206	6:24 AM - 7:50 PM	No Change
208	6:13 AM – 7:15 PM	
FF4	5:47 AM - 8:30 AM & 3:33 PM - 6:38PM	No Change
FF6	6:07 AM - 7:37 AM & 4:30 PM - 5:30 PM	No Change
J	5:40 AM - 8:40 AM & 3:10 PM - 5:30 PM	No Change

Fares

Figure 3-21 summarizes RTD fares for local and regional bus services. The JUMP requires a local fare, while the Flatiron Flyer accepts a local fare for trips between Boulder and McCaslin Park & Ride but requires a regional fare for trips further east. An EcoPass is an employer-sponsored pass that provides employees with unlimited, free transit trips. Seventy-nine businesses in the study area (within a half-mile of Arapahoe Avenue between Folsom and 75th Streets) participate in the Eco Pass program, providing transit passes for 8,762 employees. The top five of these employers that offer EcoPasses are the Boulder Valley School District, Boulder Community Health, Google, Rally Software Development, and Zayo Group, comprising 6,576 employees. CU provides faculty and staff with an EcoPass and also makes a student pass available. There are approximately 7,900 faculty and 30,000 students that use the EcoPass. Eco Pass programs are also available at the neighborhood level. Within the study area, the Peloton, Wellman Creek, Park East, and Rock Park participate in the EcoPass program, encompassing approximately 425 housing units.

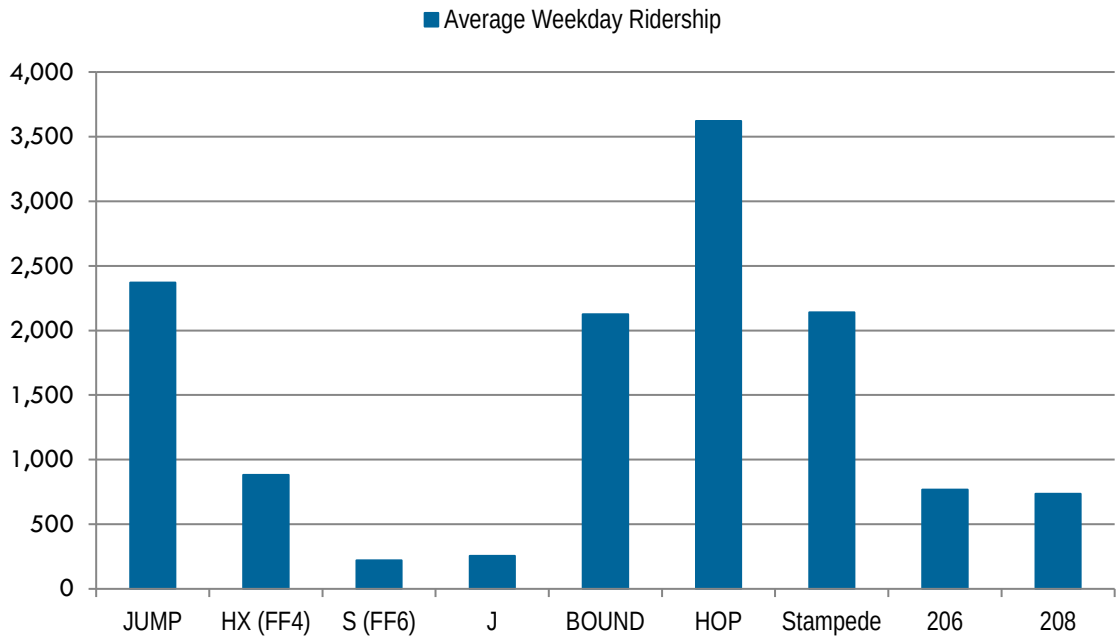
Figure 3-21 RTD Fares (January 2016)

	Local	Regional
One-Way Cash	$2.60	$4.50
Senior Medicare, Student Discount Cash	$1.30	$2.25
Eco Pass	FREE	FREE

System Ridership

Figure 3-22 displays average weekday ridership for all of the bus routes in the study area during January 2015. The JUMP is the only east-west route that provides mobility to most of the eastern area of Arapahoe Avenue and beyond, to Lafayette and Erie. Daily ridership on the BOUND and Stampede CTN routes is comparable to the JUMP.

Figure 3-22 Average Weekday Ridership Chart (East Arapahoe Study Area) (January 2015 RTD data)



Source: Regional Transportation District, January 2015

JUMP Ridership and Performance

JUMP Ridership Patterns

Figure 3-23 identifies the ten highest-ridership stops on the JUMP, which include the Downtown Boulder Station and stops at 30th Street in both directions. Of these stops, only the Lafayette Park & Ride on the east end of the route (fifth highest number of boardings) is located outside of Boulder.

Figure 3-26 illustrates JUMP ridership. Westbound boardings on the JUMP are concentrated at the eastern end of the route, in Lafayette and Erie. Most passengers remain on the bus until Foothills Parkway. West of this point, the number of passengers alighting becomes greater than the number of passengers who board. For eastbound trips, most passengers board at the very start of the route between the Downtown Boulder Station and 28th Street. The on-board load begins to drop after Foothills Parkway when most of the ridership activity becomes alightings.

Figure 3-23 Busiest JUMP Stops (January 2015))

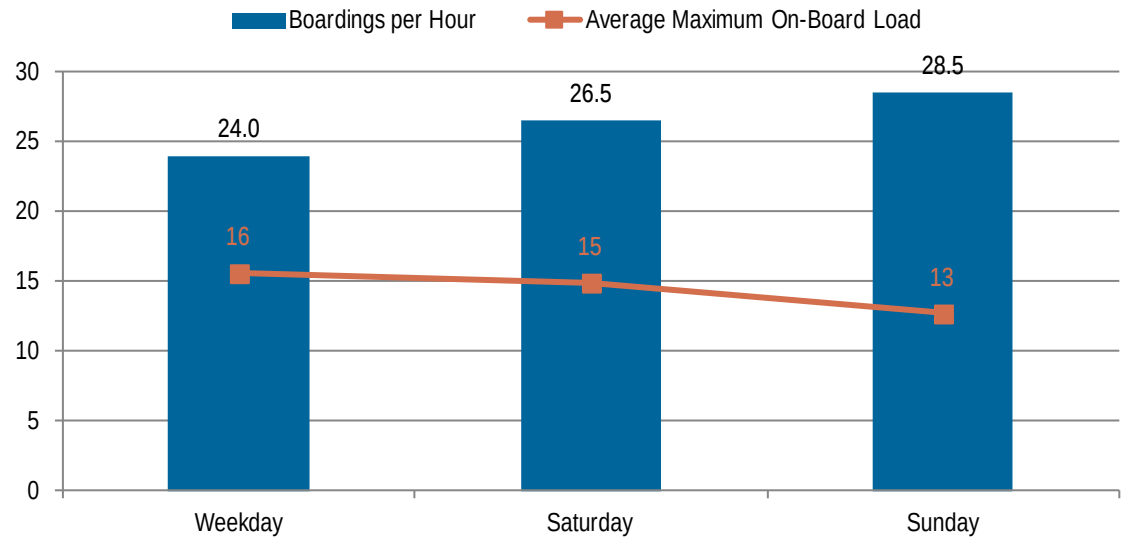
Rank	Stop ID	Stop Name	Direction	Boardings	Alightings	Total Ridership
1	33236	14th/Walnut Gate A	Eastbound	503	0	503
2	12214	Arapahoe Ave/30th St	Eastbound	127	113	240
3	12215	Arapahoe Ave/30th St	Westbound	113	121	235
4	12200	Arapahoe Ave/Broadway	Westbound	3	214	217
5	25903	Lafayette PnR Gate B	Westbound	134	1	134
6	12222	Arapahoe Ave/55th St	Westbound	94	33	127
7	12201	Arapahoe Ave/16th St	Eastbound	121	4	124
8	19386	Arapahoe Ave/Folsom St	Eastbound	76	43	119
9	12208	Arapahoe Ave/28th St	Westbound	41	65	106
10	12221	Arapahoe Ave/55th St	Eastbound	19	78	98

Source: Regional Transportation District, January 2015

Overall JUMP Productivity

Productivity measures how effectively transit performs, in terms of the number of passengers (boardings) carried per vehicle revenue hour.[9] In January 2016, RTD reported average daily boardings of 2,362 on weekdays, 972 on Saturdays, and 691 on Sundays on the JUMP. Productivity ranged from 24.0 boardings per revenue hour on weekdays, to 28.5 boardings per hour on Sundays (productivity is higher on Sundays since less service is provided). The average maximum on-board load for JUMP vehicles was greatest on weekdays—16 passengers. Figure 3-24 shows the productivity and on-board load for each of the service days in January 2016.

Figure 3-24 JUMP Productivity and On-Board Load, January 2016

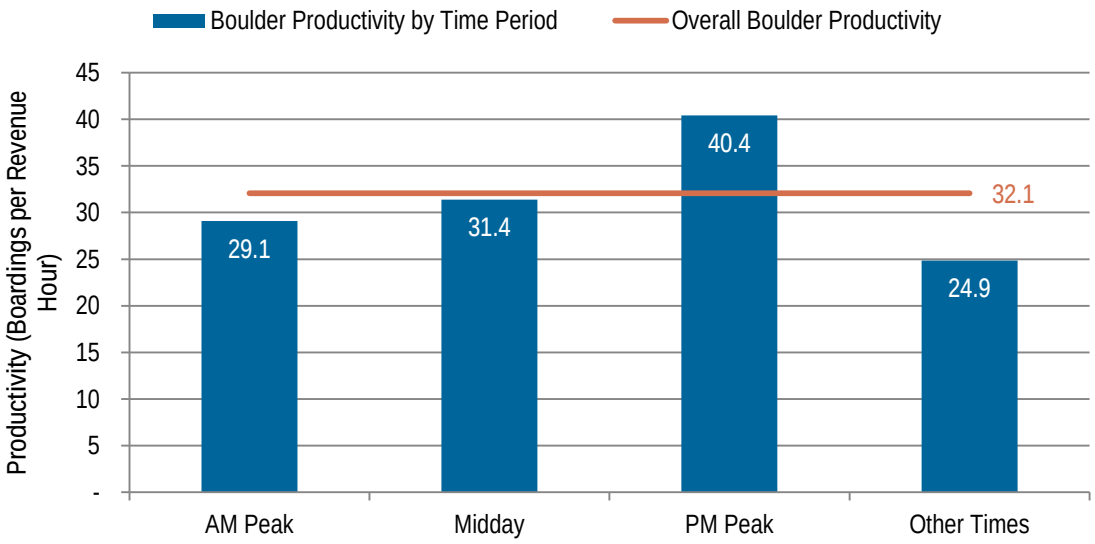


[9] Number of passenger boardings divided by the total number of hours of service provided.

JUMP Productivity in Boulder

However, if JUMP weekday ridership and service hours are broken down by segment, the portion within Boulder (from the Downtown Boulder Station to the Vocational Technical Education Center) has a higher weekday productivity of 32.1 boardings per revenue hour than the route overall. When broken down further by time period, the afternoon peak period is the route's most productive period, carrying 40.4 passengers per revenue hour.[10]

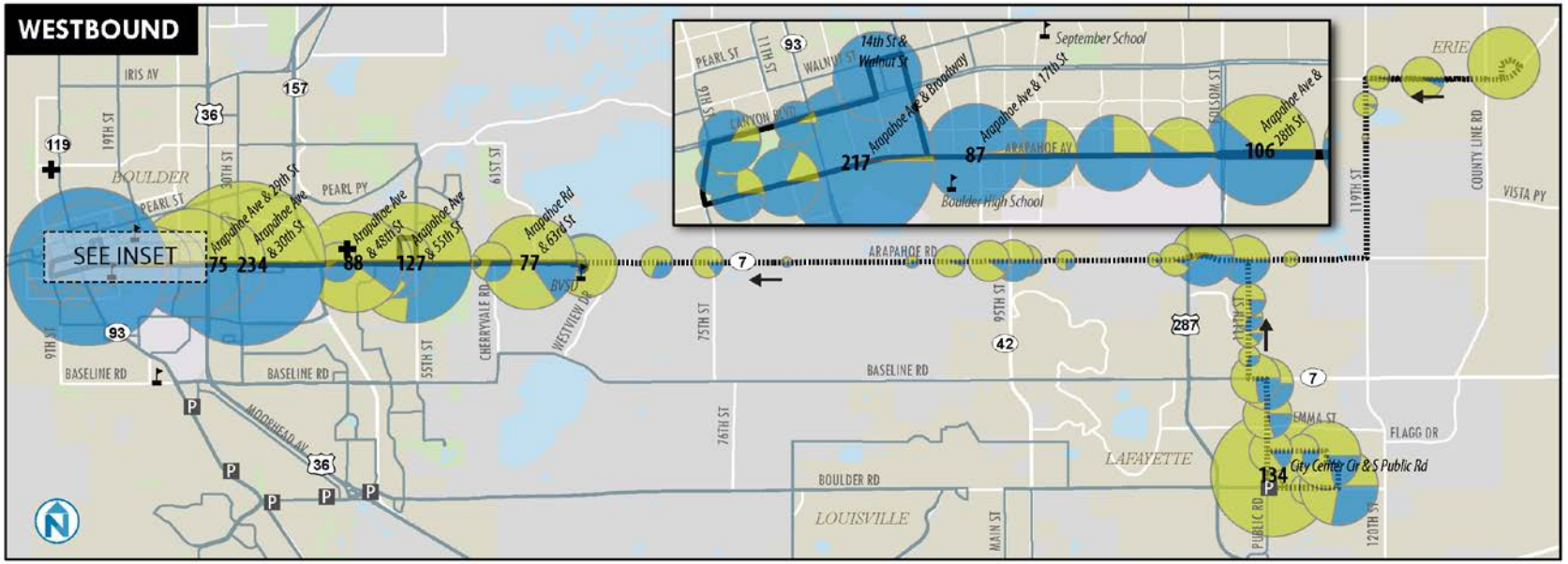
Figure 3-25 Weekday JUMP Productivity within Boulder, January 2016

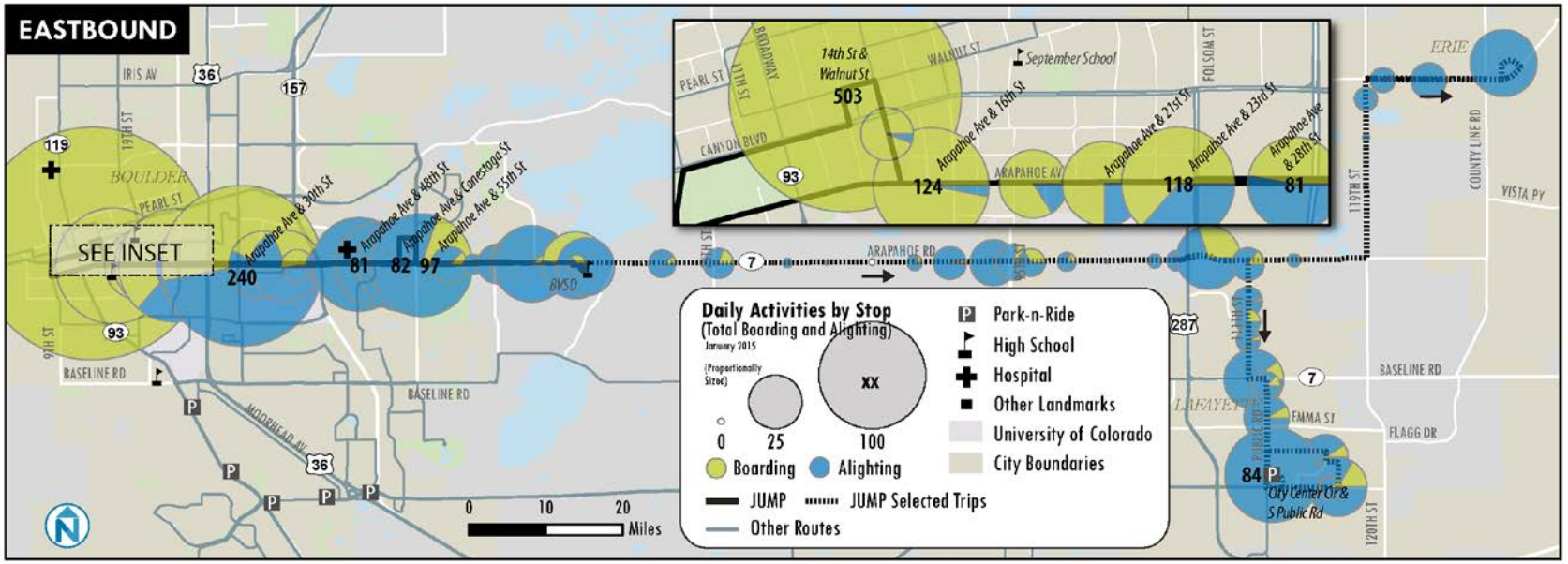


Source: Based on Data from Regional Transportation District, January 2016

[10] This data is based on ridership by stop from January 2015 and scheduled revenue hours from January 2016. Time periods analyzed are the AM Peak, Midday, PM Peak and Other Times (which includes AM Early, PM Evening, PM Late and Other).

Figure 3-26 Average Daily Boardings, JUMP, January 2015



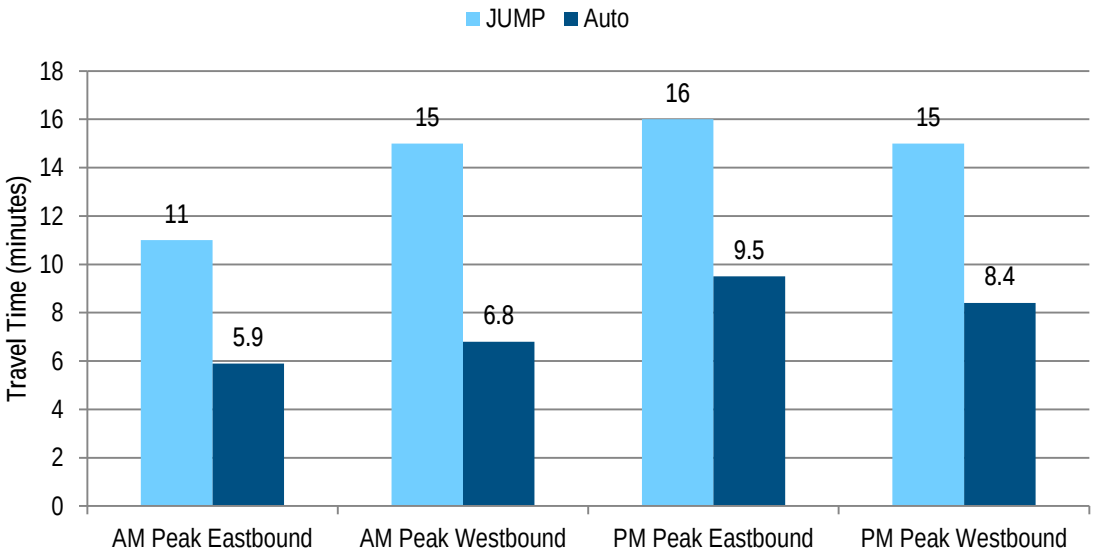


Transit Travel Times and On-Time Performance

Folsom Street - 65th Street: Comparison of Transit and Auto Travel Times

Existing transit travel times along the East Arapahoe corridor between Folsom Street and 65th Street range between 11 and 16 minutes during peak hours. Eastbound travel is quickest during the morning peak (approximately 11 minutes) when buses travel in the reverse commute direction. However, during the afternoon peak, eastbound travel times increase by five minutes. For westbound trips, travel times remain at approximately 15 minutes during the morning and afternoon peak periods. Figure 3-27 compare transit travel times based on the JUMP schedule (including stops) and with travel time estimates for autos.

Figure 3-27 Existing JUMP and Auto Travel Times (Folsom to 65th Street)



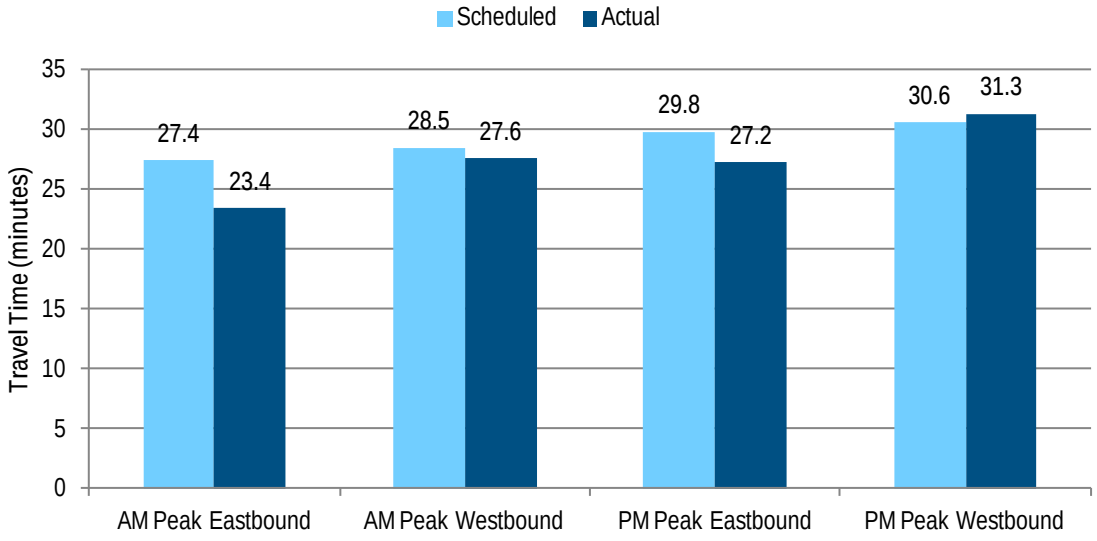
Source: Existing JUMP Schedule; Auto travel times from City of Boulder

Downtown Boulder Station – 95th Street: Comparison of Scheduled and Actual Transit Travel Times

Comparing scheduled and actual JUMP travel times for a broader segment of the JUMP route, the average daily scheduled transit travel time between the Downtown Boulder Station and 95th Street is approximately 26 minutes for eastbound trips, and 31 minutes for westbound trips. In January 2016, the actual average recorded travel times for the JUMP were 25 and 30 minutes, respectively, about 1.8 and 0.7 minutes less than the scheduled time for eastbound and westbound trips. This indicates that, on average, actual JUMP travel times are consistent with schedules.

Peak travel times for this same segment are shown in Figure 3-28. The travel times show buses travel more quickly through the corridor in both directions during the morning peak and during the afternoon peak in the eastbound direction. Only westbound trips during the peak take longer than the scheduled times (approximately 0.7 minutes longer).

Figure 3-28 Scheduled and Actual JUMP Travel Times (January 2016) between Downtown Boulder and 95th Street

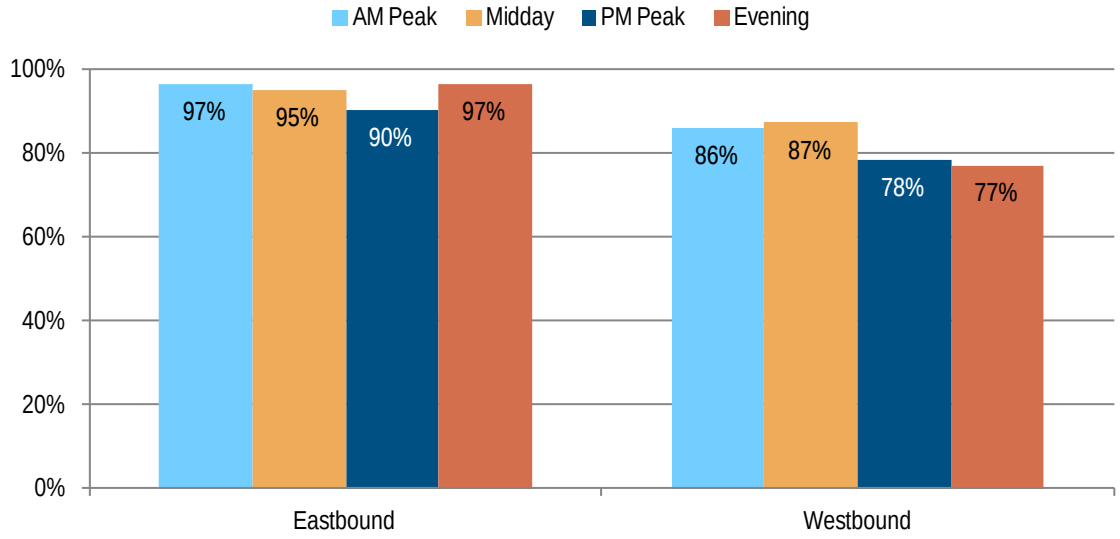


Source: Regional Transportation District

On-Time Performance

RTD classifies a bus as being on-time if it arrives at its stop between one minute early and five minutes late. According to RTD, the JUMP's on-time performance was approximately 87.4% in January 2016. Eastbound trips averaged an on-time performance of 92.5%, while westbound trips had a lower on-time performance of 83.1%. Figure 3-29 shows the on-time performance by direction and the time of day each trip starts. On-time performance is highest during the morning peak and the midday period (6 AM to 3 PM). The lowest on-time performance for eastbound trips occurs during the afternoon peak (3 PM to 8 PM). Westbound trips have the lowest on-time performance during the evening (8 PM to the end of service at 11 PM).

Figure 3-29 JUMP Weekday On-Time Performance (January 2016), by Direction and Time of Day



Source: Regional Transportation District

Bus Stops

The City of Boulder maintains an inventory of the 57 bus stops along the JUMP route within Boulder. Some stops have amenities such as shelters, benches, trash cans, and lighting, but many do not. Figure 3-30 provides an overview of the number and percent of stops that have seven different types of amenities. The vast majority of stops have lighting and over three-quarters have a concrete bus pad, although in some cases the pad is not fully accessible to users with wheelchairs or other mobility devices. Less than half of stops include a bench or other seating, and 26% contain a shelter.

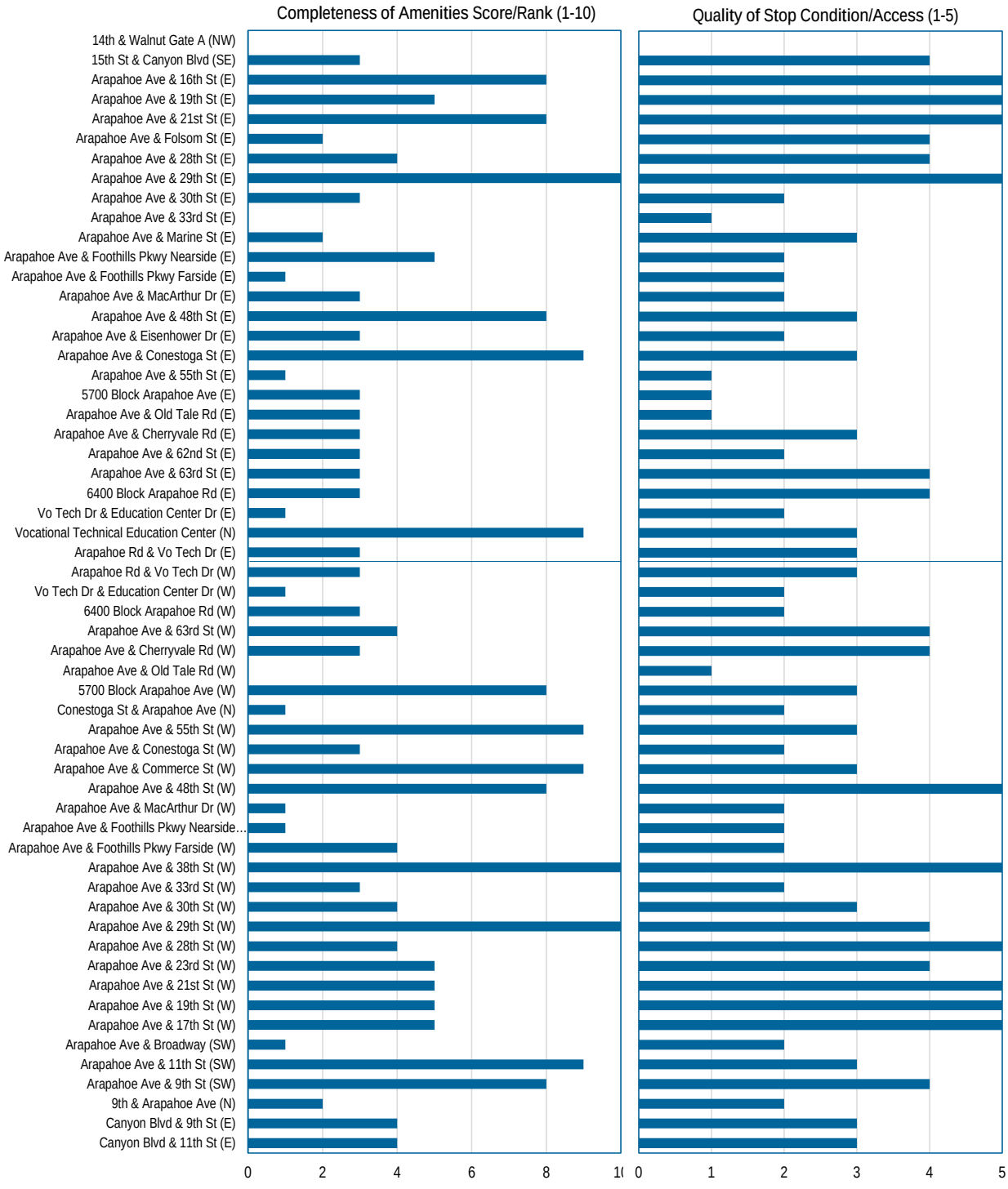
Figure 3-30 Coverage of Bus Stop Amenities

Amenity	Number of Stops	Percent of Stops
Concrete Curb	55	96%
Lighting	49	86%
Concrete Pad	44	77%
Bench	25	44%
Shelter	15	26%
Bike Rack	13	23%
Trash Can	12	21%

The City's inventory includes an assessment of completeness and quality of amenities, illustrated in Figure 3-31:

- **Score/Rank** rates completeness of stop amenities, e.g., shelters, on a scale of 1 to 10.
- **Quality** is a qualitative evaluation of stop condition and accessibility on a 1 to 5 scale.

Figure 3-31 Bus Stop Score/Rank and Quality Ratings



SAFETY ANALYSIS

This section describes safety trends in the study area for all modes. Boulder's Transportation Master Plan goal is continuously improve safety for all modes of travel and strive toward zero serious injury and fatal accidents. The City tracks total crashes, injury crashes and fatal crashes by mode to evaluate progress toward this goal.

Key Highlights

- The vast majority of the 736 crashes that occurred along Arapahoe Avenue between 2012 and 2014 (89%) occurred at intersections, including most crashes involving pedestrian and bicyclists.
- Most crashes (90%) involved only motor vehicles and the majority of crashes (55%) were rear-end collisions.
- Approximately 70% of the crashes occurred at four intersections: 28th Street, 30th Street, Foothills Pkwy, and 55th Street. These intersections also had the highest crash rates.
- Arapahoe Avenue between 30th Street and 33rd Street experienced the highest number and rate of crashes between intersections, accounting for both traffic volumes and distance.
- The highest number of crashes involving bicyclists occurred at Arapahoe Avenue and 30th Street. Thirteen of the crashes involving bicyclists (about 33%) involved conflicts between eastbound bicycles on the north-side multi-use path and vehicles turning right onto Arapahoe Avenue from driveways or side streets.

Crash Data Summary

Figure 3-32 summarizes crash data for Arapahoe Avenue within the study area between 2012 and 2014. There were a total of 736 crashes during this period. The vast majority of crashes (89%) occurred at intersections, including all eight of the pedestrian-involved crashes and 34 of the 40 the bicycle-involved crashes.

Figure 3-32 Crash Summary by Mode, 2012-2014

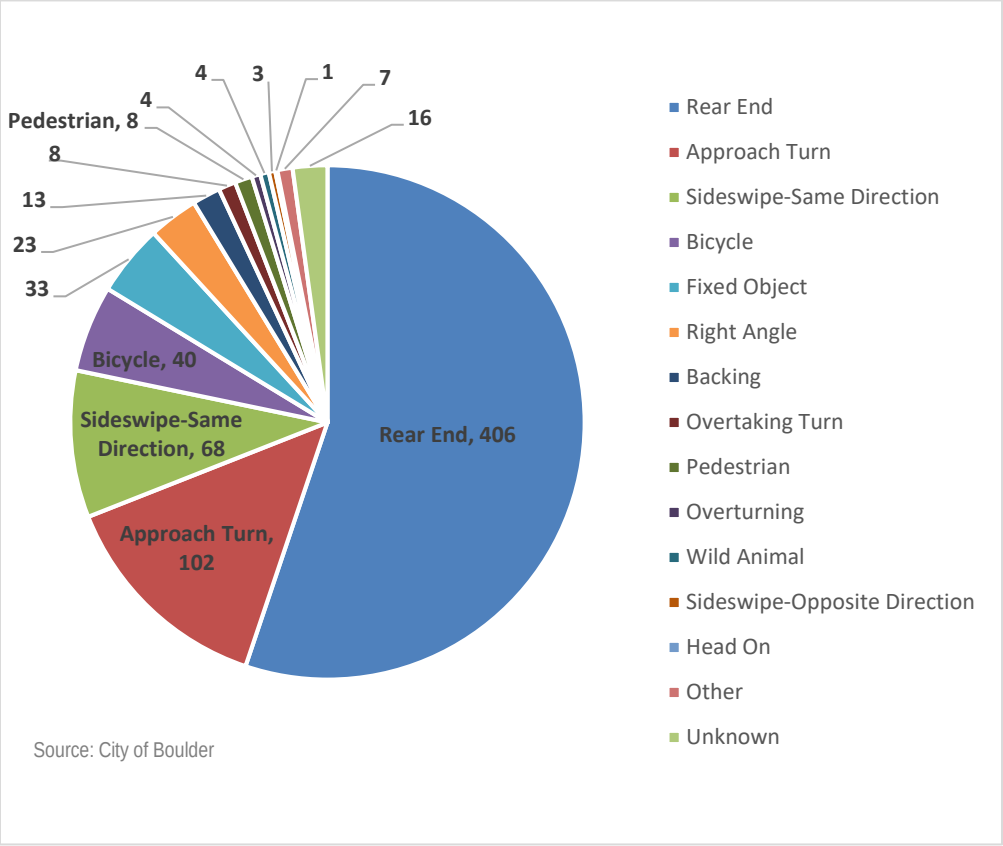
	Motor Vehicle	Bicycle	Pedestrian	Total
Intersection	616	34	8	658
Segment	72	6	0	78
Total	688	40	8	736

Source: City of Boulder

Types of Crashes

Figure 3-33 provides a breakdown of all crashes. Over 400 of the crashes (55%) were rear-end collisions, 14% were approach turn crashes, and 9% were sideswipe-same direction crashes.

Figure 3-33 Crash Summary by Crash Type, 2012-2014



Geographic Distribution of Crashes

Figure 3-34 and Figure 3-35 identify the number of crashes at intersections along Arapahoe Avenue between 2012 and 2014. Approximately 70% of crashes over the three-year period occurred at the following four intersections: 28th Street, 30th Street, Foothills Pkwy, and 55th Street. These intersections also had the highest crash rates after accounting for traffic volumes.

Figure 3-36 and Figure 3-37 identify crashes that occurred between intersections along Arapahoe Avenue during the same time period. Arapahoe Avenue between 30th Street and 33rd Street experienced the highest number of crashes and the highest crash rate, accounting for both traffic volumes and distance. The roadway segments highlighted in orange in Figure 3-36 had a relatively high number of crashes and crash rate.

Note: A more detailed discussion of trends at high-crash intersections is provided below

Figure 3-34 Crashes at Intersections by Type, 2012-2014 (Map)

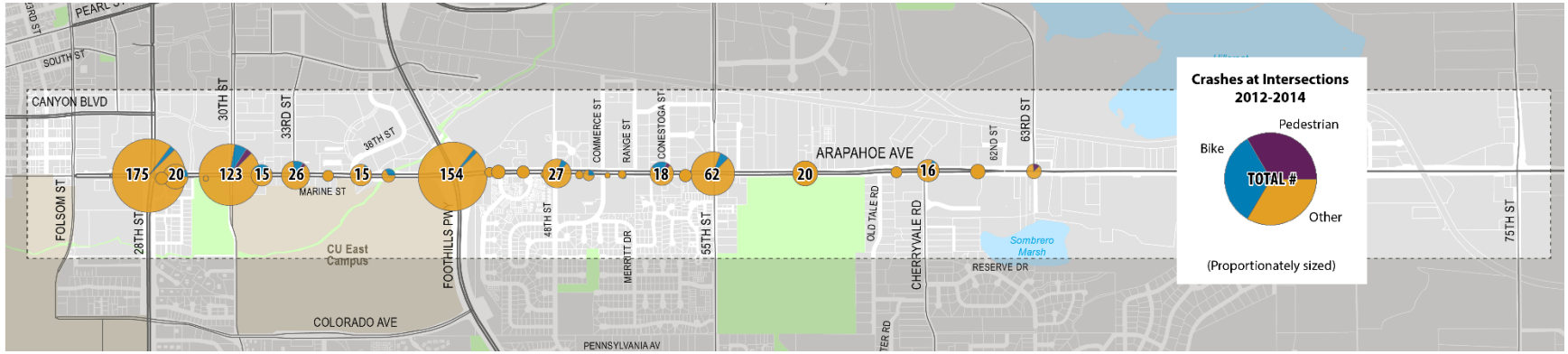


Figure 3-35 Crashes at Intersections by Type, 2012-2014 (Table)

Intersection	Motor Vehicle	Pedestrian	Bicycle	Total
Arapahoe & 28th	171		4	175
Arapahoe & Culver				
Arapahoe & 29th	18		2	20
Arapahoe & 30th	111	4	8	123
Arapahoe & 33rd	22	1	3	26
Arapahoe & 38th	14		1	15
Arapahoe & Foothills	150	1	3	154
Arapahoe & McArthur	6			6
Arapahoe & Riverbend	2			2
Arapahoe & 48th	25		2	27
Arapahoe & Commerce	3		1	4
Arapahoe & Range	2			2
Arapahoe & Patton			1	1
Arapahoe & Conestoga	13	1	4	18
Arapahoe & 55th	58		4	62
Arapahoe & 56th				
Arapahoe & Old Tale				
Arapahoe & Cherryvale	15		1	16
Arapahoe & 62nd				
Arapahoe & 63rd	6	1		7

Figure 3-36 Crashes between Intersections, 2012-1014 (Map)

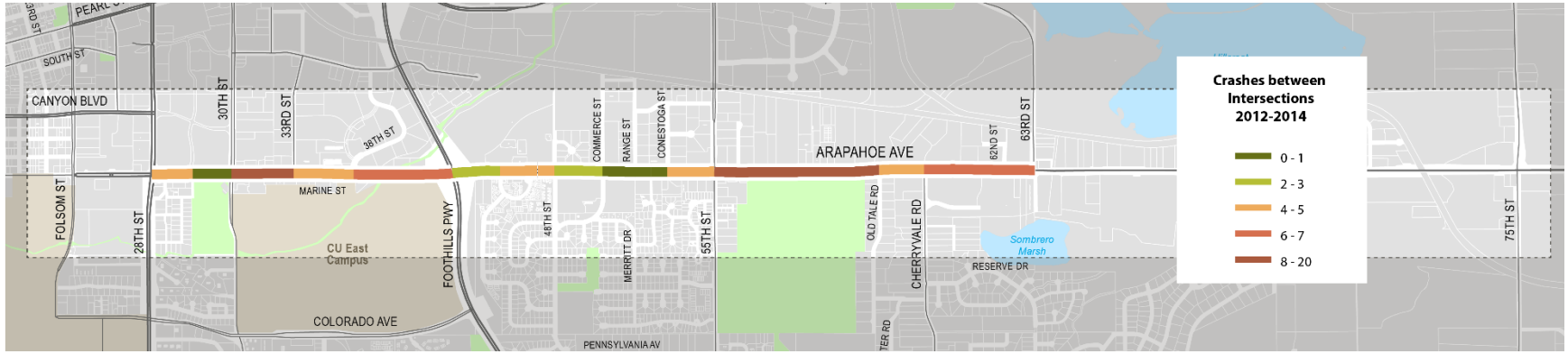


Figure 3-37 Crashes between Intersections by Type, 2012-2014 (Table)

Segment	Motor Vehicle	Pedestrian	Bicycle	Total
28th to 29th	5			5
29th to 30th	1			1
30th to 33rd	11		4	15
33rd to 38th/Marine	4			4
38th/Marine to Foothills	4		2	6
Foothills to MacArthur	3			3
MacArthur to 48th	5			5
48th to Commerce/Eisenhower	2			2
Commerce/Eisenhower to Range	1			1
Range to Patton	0			0
Patton to Conestoga	0			0
Conestoga to 55th	5			5
55th to Old Tale	20			20
Old Tale to Cherryvale	4			4
Cherryvale to 63rd	7			7

Crashes by Mode

Motor Vehicle

About 90% of crashes in the corridor between 2012 and 2014 involved motor vehicles only (not bicyclists or pedestrians). The predominant type of vehicle crash in the corridor is rear-end, which comprised more than half of the total. Approach turn and sideswipe crashes were the second and third most common type of crash overall. The three highest crash intersections along Arapahoe Avenue (28th Street, 30th Street, and Foothills Parkway) had more than 100 crashes each during the three year period.

Bicycle

There were 40 total bicycle-related crashes in the study area between 2012 and 2014. Figure 3-36 (above) illustrates the location of the 34 bicycle-related crashes that occurred at intersections. The highest number occurred at Arapahoe Avenue and 30th Street, which has on-street bike lanes, followed by the intersections of Arapahoe Avenue at 28th Street, Conestoga Street, and 55th Street.

There were an additional six bicycle-related crashes between intersections along Arapahoe Avenue within the study area. Five of these crashes were driveway-access related including four that occurred between 30th and 33rd Streets, a segment with closely spaced parking lot entrances on both sides of the street.

Thirteen of the bicycle-related crashes along the corridor (about 33%) involved conflicts between eastbound bicycles on the north-side multi-use path and vehicles turning right onto Arapahoe Avenue from side streets or driveways. Figure 3-38 summarizes crashes related to the multi-use path.

Figure 3-38 Multi-use Path-Related Bicycle Crashes

Location (West to East)	# of Crashes
Arapahoe & 29th	1
Driveways between 30th and 33rd	4
Arapahoe & 33rd	3
Arapahoe & 48th	1
Arapahoe & Commerce	1
Arapahoe & Conestoga	2
Arapahoe & 55th	1

Pedestrian

Pedestrian-related crashes in the study area are relatively uncommon. There were eight total pedestrian-involved crashes from 2012-2014, which occurred at five separate intersections (see Figure 3-36 above). Half occurred at the intersection of Arapahoe Avenue and 30th Street. There was one crash each at the intersections of Arapahoe Avenue and 33rd Street, Foothills Parkway, Conestoga Street, and 63rd Street.

Detailed Evaluation of High Crash Intersections

The four intersections and the two segments with the highest total crashes between 2012 and 2014 all had a predominant crash type of rear end, but the second most common crash type varied between locations, as did the overall distribution of different crash types. Figure 3-39 summarizes the primary crash types at these locations. Figure 3-40 to Figure 3-43 categorize the crash types at the four highest-crash intersections.

Figure 3-39 High Crash Intersections

Intersection or Segment	Total Collisions	Trip Generators	Primary Crash Types / Trends
Arapahoe Avenue and 28th Street	175	Twenty-Ninth Street Retail Center	▪ Rear end and sideswipe in same direction; see Figure 3-40
Arapahoe Avenue and Foothills Parkway	154		▪ Rear end and sideswipe in same direction; see Figure 3-41
Arapahoe Avenue and 30th Street	123	University of Colorado East Campus	▪ Rear and approach-turn. Highest number of bicycle crashes. See Figure 3-42.
Arapahoe Avenue and 55th Street	62	Flatirons Golf Course	▪ Rear end and approach-turn; see Figure 3-43
Arapahoe, 55th Street to Old Tale Road	20	Flatirons Golf Course	▪ Rear end, sideswipe and right angle
Arapahoe, 30th Street to 33rd Street	15	University of Colorado East Campus	▪ Rear end, bicycle

Figure 3-40 Arapahoe Ave & 28th St Crash Types

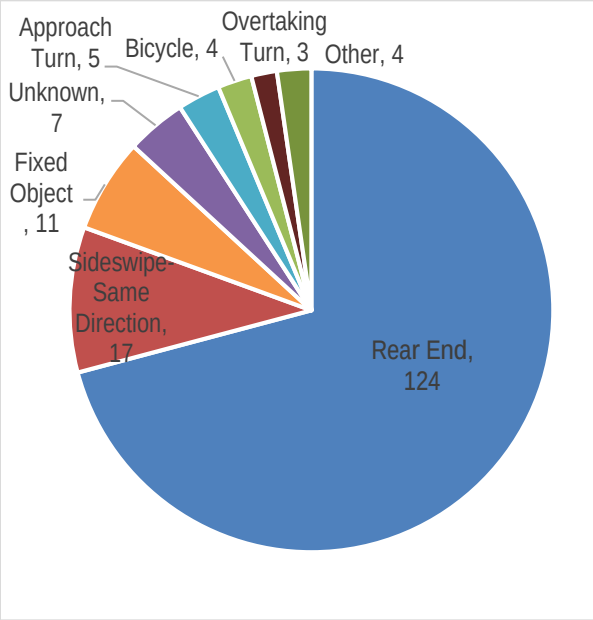


Figure 3-41 Arapahoe Ave & 30th St Crash Types

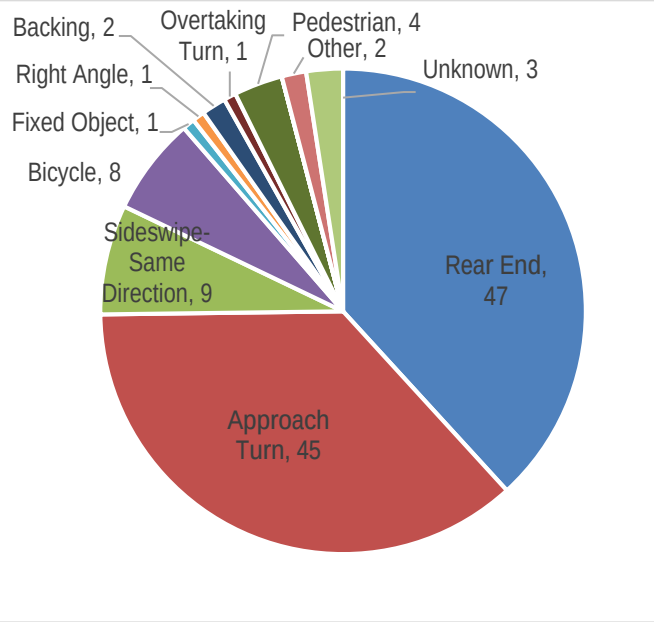


Figure 3-42 Arapahoe Ave and Foothills Pkwy Crash Types

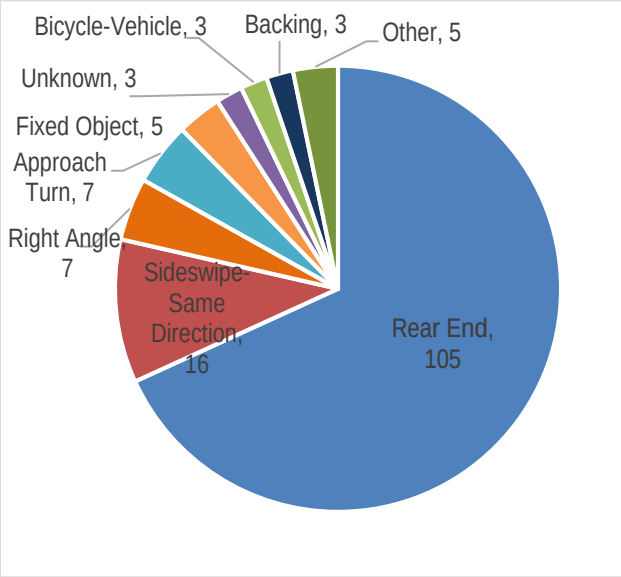


Figure 3-43 Arapahoe Ave and 55th St Crash Types