Envision LITTLETON

Our Community. Our Future.

TRANSPORTATION MASTER PLAN

DRAFT AUGUST 2019

Littleton Colorado

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GLOSSARY OF TERMS DEFINITIONS

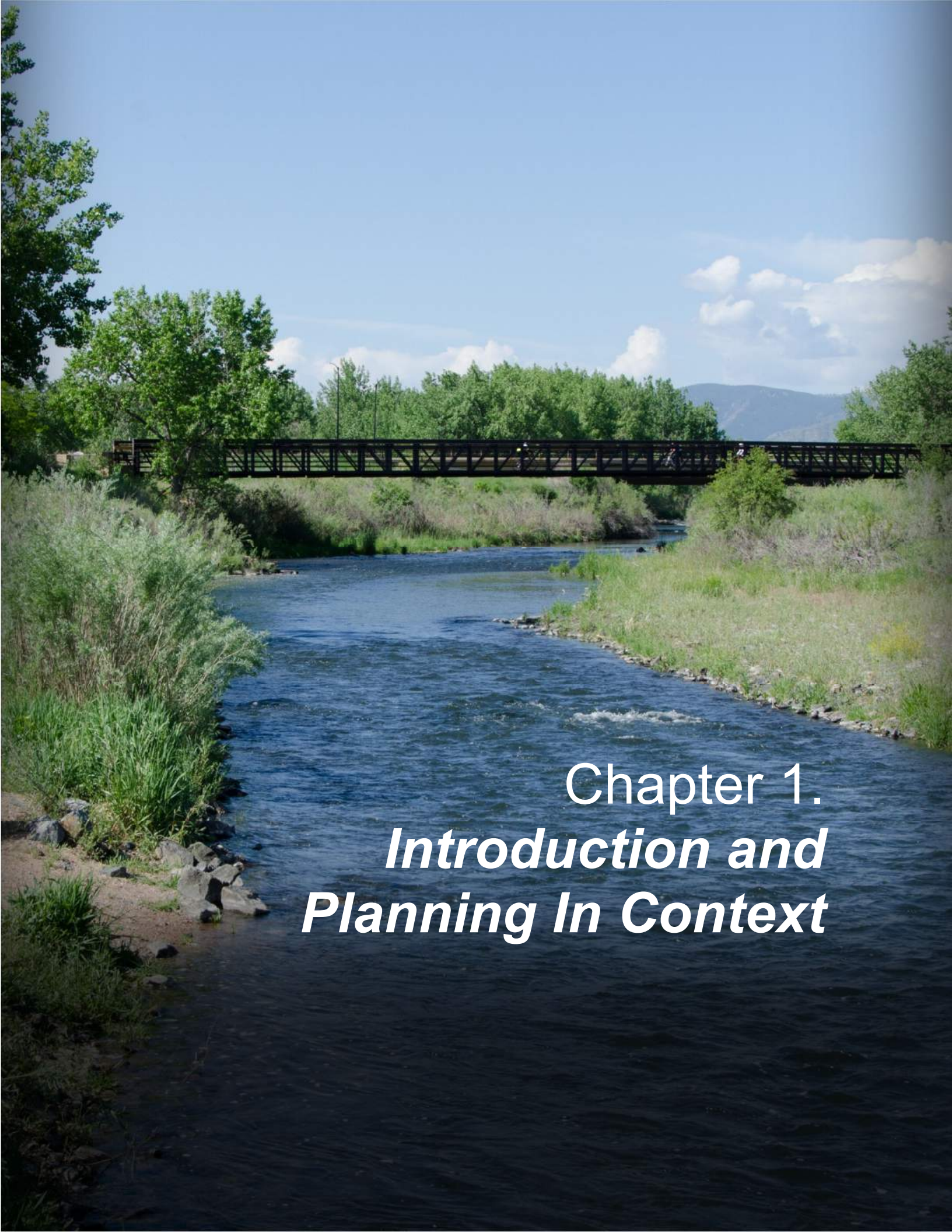
The following terms are defined for their particular use and application with this Transportation Master Plan. In some cases these terms may be defined and used differently in City Code or other City documents.

American Association of State Highway & Transportation Officials (AASHTO)	**A nonprofit, nonpartisan association representing highway and transportation departments in the 50 states, the District of Columbia and Puerto Rico. It represents all five transportation modes: air, highways, public transportation, rail and water. Its primary goal is to foster the development, operation and maintenance of an integrated national transportation system.**
Americans With Disabilities Act (ADA)	The legislation defining the responsibilities of and requirements for transportation providers to make transportation accessible to individuals with disabilities.
Arterial	A class of roads serving major traffic movements (high-speed, high volume) for travel between major points.
Autonomated Vehicles (AV)	Vehicles that incorporate technology that assist with operation of the vehicle. They perform some of the tasks to drive the vehicle, and driverless vehicles require no human operator.
Average Annual Daily Traffic (AADT)	The total volume of traffic on a highway segment for one year, divided by the number of days in the year.
Bikeway	1) Any road, path, or way which in some manner is specifically designated as being open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes. 2) A facility designed to accommodate bicycle travel for recreational or commuting purposes. Bikeways are not necessarily separated facilities; they may be designed and operated to be shared with other travel modes.
Bus Rapid Transit (BRT)	A bus-based public transit system combining the quality of rail transit and the flexibility and economics of a traditional bus system. BRT systems are usually constructed on designated multimodal corridors.
Capacity	A transportation facility's ability to accommodate a moving stream of people or vehicles in a given time period.
Carsharing	Rental cars that are available for use by the hour or mile. These can be located in one spot or able to be parked anywhere within a service area.
Collector	A class of roads that provide direct access to neighborhoods and arterials.
Comprehensive Plan	A guiding document; a framework for City policies and priorities; a long-range vision of what we want our City to become; a tool for making decisions about how that vision should be achieved; strategic steps to make the vision a reality; targeted and strategic planning of the City.
Connected Vehicles (CV)	Vehicles that incorporate technology that allows the on-board computers to communicate with other vehicles and with sensors and other infrastructure on the ground.
Corridor	A broad geographical band that follows a general directional flow connecting major sources of trips that may contain a number of streets, highways and transit route alignments. (APTA1)

Crash (Vehicular)	An event that produces injury and/or property damage, involves a motor vehicle in transport, and occurs on a trafficway or while the vehicle is still in motion after running off the trafficway.
Electric Vehicles	Vehicles that are powered by electric motors using energy from batteries that are charged at home or at charging stations.
Expressway	A controlled access, divided arterial highway for through traffic, the intersections of which are usually separated from other roadways by differing grades.
Fatality	For purposes of statistical reporting on transportation safety, a fatality is considered a death due to injuries in a transportation crash, accident, or incident that occurs within 30 days of that occurrence.
Federal Highway Administration (FHWA)	A branch of the US Department of Transportation that administers the federal-aid Highway Program, providing financial assistance to states to construct and improve highways, urban and rural roads, and bridges. The FHWA also administers the Federal Lands Highway Program. It administers the highway transportation programs of the Department of Transportation under pertinent legislation
Federal Transit Administration (FTA)	A branch of the US Department of Transportation that is the principal source of federal financial assistance to America's communities for planning, development, and improvement of public or mass transportation systems. FTA provides leadership, technical assistance, and financial resources for safe, technologically advanced public transportation to enhance mobility and accessibility, to improve the Nation's communities and natural environment, and to strengthen the national economy.
Freeway	A divided arterial highway designed for the unimpeded flow of large traffic volumes. Access to a freeway is rigorously controlled and intersection grade separations are required.
Goals	Generalized statements which broadly relate to the physical environment to values
Grants	A federal financial assistance award making payment in cash or in kind for a specified purpose. The federal government is not expected to have substantial involvement with the state or local government or other recipient while the contemplated activity is being performed. The term "grants-in-aid" is commonly restricted to grants to states and local governments.
High Occupancy Vehicle (HOV)	Vehicles carrying two or more people. The number that constitutes an HOV for the purposes of HOV highway lanes may be designated differently by different transportation agencies.
Highway	Is any road, street, parkway, or freeway/expressway that includes rights-of-way, bridges, railroad-highway crossings, tunnels, drainage structures, signs, guardrail, and protective structures in connection with highways.
Infrastructure	All the relevant elements of the environment in which a transportation system operates.

Intelligent Transportation Systems (ITS)	The application of advanced technologies to improve the efficiency and safety of transportation systems.
Intersection	Used to describe the point where two or more roadways cross or meet.
Level of Service (LOS)	A qualitative assessment of a road or intersection's operating conditions. An indicator of the extent or degree of service provided by a facility based on and related to the operational characteristics of the facility. A standard measurement used by transportation officials which reflects the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS-A and congested conditions rated as LOS-F.
Light Rail	A streetcar-type vehicle operated on city streets, semi-exclusive rights-of-way, or exclusive rights-of-way. Service may be provided by step-entry vehicles or by level boarding.
Local Street	A street intended solely for access to adjacent properties.
Long Term	In transportation planning, refers to a time span of, generally, 20 years. The transportation plan for metropolitan areas and for States should include projections for land use, population, and employment for the 20-year period.
Manual on Uniform Traffic Control Devices (MUTCD)	A document issued by the Federal Highway Administration (FHWA) of the United States Department of Transportation (USDOT) to specify the standards by which traffic signs, road surface markings, and signals are designed, installed, and used.
Measures of Effectiveness	Measures or tests which reflect the degree of attainment of particular objectives.
Micromobility	Personal shared transportation devices like bikes, mopeds, and electric scooters.
Microtransit	Privately owned and operated shared transportation system that can offer fixed routes and schedules, as well as flexible routes and on-demand scheduling.”
Mobility	The ability to move or be moved from place to place.
Mode	A specific form of transportation, such as automobile, bicycle, subway, bus, rail, or air.
Multimodal	The availability of transportation options using different modes within a system or corridor.
National Association of City Transportation Officials (NACTO)	A coalition of the Departments of Transportation in North American cities.
Objectives	Specific, measurable statements related to the attainment of goals.
Parkway	A highway that has full or partial access control, is usually located within a park or a ribbon of park-like developments, and prohibits commercial vehicles.
Public Transit	Traditional public transportation via bus and rail that usually operates on a fixed route and schedule.

Ridehailing	Uber or Lyft or other services that provide on-demand point-to-point rides in privately owned autos.
Shared Mobility	A wide range of transportation options involving fleet ownership or operation of various modes of transportation
Stakeholders	Individuals and organizations involved in or affected by the transportation planning process. Include federal/state/local officials, MPOs, transit operators, freight companies, shippers, and the general public.
Telecommuting	Communicating electronically (by telephone, computer, fax, etc.) with an office, either from home or from another site, instead of traveling to it physically.
Traffic Analysis Zone (TAZ)	A traffic analysis zone or transportation analysis zone (TAZ) is the unit of geography most commonly used in conventional transportation planning models
Transportation Systems Optimization	The systems that are emerging to better manage and optimize the transportation networks, using real-time data. Emerging technologies include adaptive signal control, transit signal priority, and the sensors and communications infrastructure to allow remote management of the systems
Vehicle Hours of Travel (VMT)	The number of hours traveled along a roadway or roadway network during a given time period.
Vehicle Miles of Travel (VMT)	The number of miles traveled along a roadway or roadway network during a given time period.



Chapter 1.
Introduction and Planning In Context

INTRODUCTION

The Transportation Master Plan (TMP) will help address the challenges of facilitating mobility and access in a strategic manner, within the reasonable fiscal constraints of the city's budget and limited state and federal funding opportunities, and in a way that is responsive to anticipated demographic and technological changes.

The TMP resulted from an 18-month planning and community engagement process. The process began with the Envision Littleton Vision Report, adopted unanimously by City Council on December 18, 2018. The Vision Report established a unifying vision and identified Littleton's core values, guiding principles, and shared priorities and concerns. With influence from the City of Littleton's Comprehensive Plan and other guiding documents, the TMP will establish the city's ultimate transportation system vision, the policies to support that system, and capital projects that are prioritized with consideration of funding constraints. The final TMP will provide a long-term transportation vision for the City of Littleton, and serve as a guiding document for improvements to roadways and multimodal transportation networks.

LITTLETON'S MOBILITY FRAMEWORK

The mobility framework for the City of Littleton has served the City for more than 100 years, connected to Denver and beyond by the Denver & Rio Grande Railroad as well as the section line road corridors that still make up the major transportation framework today. This well-conceived and planned framework hosts a City of nearly 48,000 and has contributed to the City being recognized as one of the best places to live in Colorado. Littleton has several important and highly-functional transportation assets that contribute to its economic vitality. These include the major arterial network that provides connectivity to the Denver region, light rail service through the heart of the city, and the very popular trail network that connects citizens to the natural beauty within the City and region.

Population growth within Littleton is not new, but when the City experienced similar growth starting in the late 1970's, the transportation investments were both long-lasting and proactive. Now population growth from surrounding areas has placed new burdens on the City's transportation system and will require a new approach to being both proactive and provide long-term solutions. A history of the City's major transportation initiatives is below.

1970's and 1980's	Traffic signals were added throughout the City ($$ hundreds of thousands)
Mid 1980's	W Mineral Ave extended from Southpark Lane to Platte Canyon Road ($$ hundreds of thousands)
Mid 1980's	W Bowles Ave was widened from two lanes to four lanes from Santa Fe Drive to Sheridan Boulevard ($$ hundreds of thousands)
Mid 1980's	Railroad tracks were depressed from Ridge Road on the south to the northern border of the City ($$ hundreds of thousands)
Early 1990's	Single-point urban interchange at Santa Fe and Belleview completed ($25 million)
Late 1990's	S Santa Fe Drive beautification project upgrading signal poles and street lights for a more uniform corridor
2000	Light Rail opens with two stations in Littleton; the first rail connection in the region outside Denver. The City upgraded the downtown station; adding public art and relocating the historic train station to the site.
2010	S Santa Fe Drive and C-470 east overpass built ($25 million)

The City's arterials and expressways, and often its collector streets, swell with traffic beyond their physical capacity during the daily rise and fall of regional commuting traffic. The City is also significantly impacted by the regional transit solutions that have been deployed to date. For example, the Regional Transportation District (RTD) park-n-ride lots at the Mineral Avenue and Downtown Littleton Stations fill to capacity by 7am with commuters from Highlands Ranch, Southglenn, Columbine, and Ken Caryl. The ability of RTD rail and bus services to meet the local needs of the City is compromised by the undersupply of service.

There are many plans being implemented by CDOT, RTD and adjacent municipalities that will affect traffic and mobility in Littleton over the next several years. There are also tremendous increases in regional growth south and west of Littleton that will increase pressure on the major thoroughfares and transit networks that surround and traverse the City. The implications of these changes will need to be understood and incorporated into our City's plans moving forward.

PLAN PURPOSE

The intent of planning is to set the desired course for our City. When we plan, we make a commitment to make the City a better place to live, work, and play. The purpose of Envision Littleton is to set down on paper what we want to accomplish in the near future and in the long term. That is why this plan ends with a list of recommendations for projects to accomplish in the next five years, but also includes a Mission and Goals that set the long term outlook for the city. The Mission and Goals allow us to consider different types of transportation improvements on a level playing field, and allow us to prioritize improvements. Finally, viewed through the lens of what we can afford (using existing as well as new funding sources), the projects can be sorted into an implementation plan.

The TMP will serve as the reference for elected leaders and policy makers to advocate for the regional transportation needs of the City and to articulate the City's position on regional transportation projects. The TMP will also inform the Capital Improvement Plan for streets and transportation infrastructure, setting out priorities along a logical and fiscally sound progression that fulfills the TMP over a period of years.

The TMP applies an approach to planning that focuses on providing a transportation system that works for all users. In the context of the City of Littleton and the concurrent update to the Comprehensive Plan, this means the plan maps out a complete network of streets that finds the balance where streets are vibrant, safe and promote a sense of place while providing multimodal choices for users of all ages and ability. This systematic approach emphasizes the following major themes:

- **Community**: No plan or project can truly be successful without engaging the community. This is about returning streets to the community and improving a community's quality of life.
- **Choices**: The healthiest and most vibrant communities understand that bicycling, walking and transit are critical components of the transportation system. A complete system not only addresses safety and mobility concerns, but also provides encouragement of active living, ultimately improving community health.
- **Capacity**: Although a multimodal approach can increase the overall person capacity of a roadway corridor, the impact on auto capacity is often a concern that must be addressed. A toolbox of analysis techniques and operations strategies to manage roadway capacity has been identified to help balance mobility needs across modes.
- **Calming**: Plans and designs should create context-appropriate streets that consider the needs of all potential users, encourage appropriate driving behaviors and speed, and provide welcoming environments for non-motorized users.
- **Connections**: We know that providing connections between sites, neighborhoods, modes and jurisdictions is crucial to maintaining healthy transportation systems and communities. A systematic approach to providing a complete network can facilitate key connections within the community.

PLANNING IN CONTEXT

This Transportation Master Plan represents an alignment of previous and ongoing plans, guidelines, and reports conducted by the City of Littleton and regional partners. In a review of 37 such documents, several common themes emerged (meaning they appeared in at least 3 previous planning efforts). Note that these themes, which are listed below, do not necessarily represent the top priorities for the City of Littleton's transportation policy; instead, they suggest likely starting points for the discussion.

Common Themes from Existing Plans

- Make Littleton pedestrian friendly by extending pedestrian network, adding pedestrian bridges, extending sidewalks and improve existing sidewalks.
- Improve connections between downtown/river corridor/parks/trails.
- Complete streets/road diet/traffic calming where appropriate.
- Improve traffic flow on arterials.
- Improve bike facilities.
- Decrease cut-through traffic in residential areas.
- Improve multimodal connections between commercial locations/residential developments.
- Improve trail network for transportation around and out of city.
- Improve intersection crossings.
- Improve connections to light rail.
- Improve road connections to key destinations but not through natural areas/build fewer cul-de-sacs/promote grid street network.
- Improve parking downtown, implement parking structures, consider parking restrictions.
- Implement traffic calming strategies in neighborhoods.
- This plan has a foundation in prior planning efforts, including but not limited to:

Littleton Plans & Studies

- Citywide Plan (2014)
- Belleview Avenue Corridor Vision (2018)
- Bicycle and Pedestrian Master Plan (2011)
- Broadway Corridor Study (2009)
- Downtown Neighborhood Plan (2011)
- Littleton Downtown Design Standards (2006)
- Mineral Station Area Framework (2018)
- Neighborhood Plans and Corridor Plans (2016)
- Three Mile Plan (2015)
- Amended Columbine Square Urban Renewal Plan, City of Littleton (2015)
- Arapaho Hills Historic Preservation Guidelines, City of Littleton (2016)

- Resident & Business Surveys (2018)
- City of Littleton Parks, Recreation, and Trails Master Plan (2016)
- Downtown Littleton Historic Preservation Guidelines (2011)
- Landscape Design Criteria Manual (1992)
- Louthan Heights Historic District Design Guidelines (2017)
- South Platte River Corridor Development Design Guidelines (2000)
- Mineral Station ULI Advisory Services Report (2006)
- Mineral Avenue TAP Final (2014)
- Littleton Housing Report (2017)
- Neighborhood Traffic Management Program (not dated)
- Storm Drainage Design and Technical Criteria Manual (2018)

Relevant Regional Plans and Studies

- South Platte River Corridor Vision, Arapahoe County, (2013)
- South Suburban Parks and Recreation Master Plan (2017)
- Arapahoe County Bicycle/Pedestrian Master Plan (2017)
- High Line Canal Conservancy Vision Plan (2017)
- RTD (Regional Transportation District) 2015-2020 Strategic Plan (2015)
- RTD Regional BRT Feasibility Study (2018)
- RTD Quality of Life Study (2017)
- RTD TOD Strategic Plan (2010) and Status Report (2013)
- DRCOG (Denver Regional Council of Governments) Metro Vision 2035 (2017)
- DRCOG (Denver Regional Council of Governments) Active Transportation Plan (Draft) (2018)
- DRCOG (Denver Regional Council of Governments) Regional Transportation Plan 2040 (2017)
- Arapahoe County 2035 Transportation Plan (2010)
- Jefferson County Bicycle and Pedestrian Plans (2012)
- Jefferson County Countywide Transportation Plan (1998)
- Douglas County 2030 Transportation Plan (2009)

PLAN CONTENT OVERVIEW

The TMP combines quantitative analysis of the city's existing transportation system with feedback from the Envision Littleton process. Following the Existing City report, which provides background and insights about the state of driving, walking, riding a bike, and transit service in Littleton today, the TMP introduces a strategic framework to guide decision-making about the future.

The middle sections of the plan focus on articulating a future for the transportation system and identifying a pathway toward that future. Sections on auto & freight, active transportation, transit, and mobility trends contain several common components:

Legacy of Past Planning. Plans and studies previously developed for Littleton and vicinity offer insights from the time they were prepared, and provide an essential foundation for this Plan.

Key Issues and Considerations. These reflect input and discussions from varied Envision Littleton community engagement activities, workshops with City Council and Planning Commission, and interaction with other City boards/commissions, City departments, and partner agencies and organizations.

Framework for Action. The framework is organized in three tiers: (1) Goals, (2) Policies, and (3) Actions.

The actions in each section convey tangible steps that will lead to achievement of the goals in line with the stated policies. A final section with considerations and procedures for implementation and periodic updates rounds out the plan.

Chapter 2.
Existing City

INTRODUCTION

Littleton is defined by its neighborhoods, its expansive trail and open space network, and its historic downtown. The transportation system is characterized here by mode: auto, transit, and active transportation. Existing data was collected and public input reviewed to gather information on the ability of these networks to meet the needs of the community. What follows is a data book, summarizing the major takeaways from that inventory of existing conditions.

MODE: AUTO

People who drive their private automobiles (autos) make up the majority of travelers in Littleton. As ride-hailing services have proliferated in the region, an increasing portion of auto travelers are using these services as well. In general, traffic volumes have increased and congestion in Littleton has worsened throughout its recent history as more people have moved to the City and to surrounding communities.

That said, Littleton is characterized by good access to major regional auto corridors, including Santa Fe Drive (US 85), Broadway, Belleview Avenue, County Line Road, Bowles Avenue/Littleton Boulevard, Mineral Avenue, and C-470. These routes have served the residents of Littleton well, providing convenient access to regional job and activity centers.

Internal city circulation is characterized by a network of collector streets that provide access to neighborhoods.

CONGESTION

According to INRIX (a Big Data aggregator), delay on arterials and highways within Littleton have an annual economic impact of:

$25 to $33 million per year.

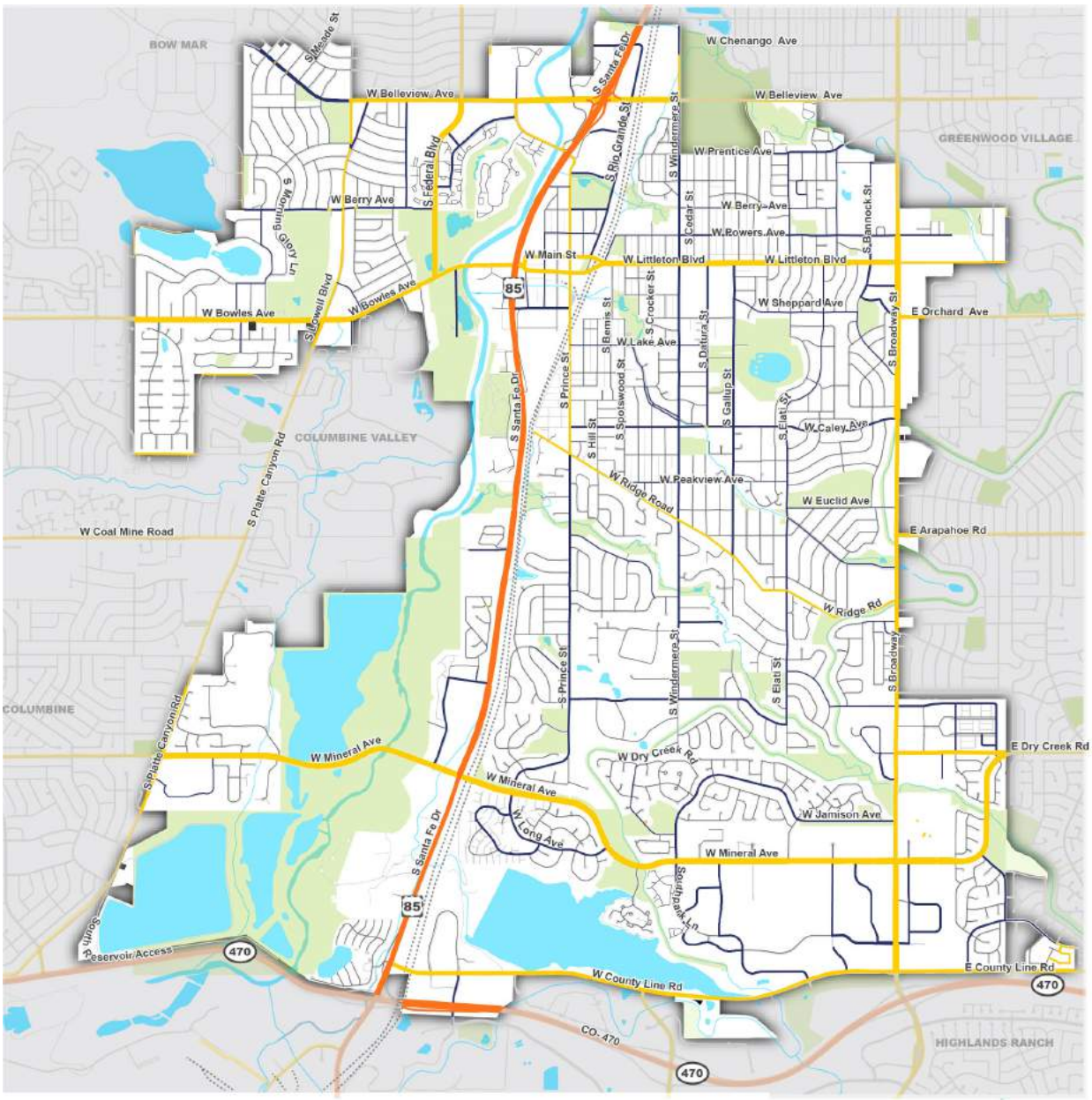
Major issues related to auto travel within the City include:

- **Congestion:** Growth within and surrounding Littleton has resulted in increased congestion on many streets.
- **Barriers:** the city is crossed by multiple barriers limiting connectivity. While some areas of the city have a strong internal grid, barriers like the South Platte River, Santa Fe Drive, the rail corridor, and even some suburban neighborhoods exist that break up the grid and force traffic to use one of only a few major connections, resulting in traffic congestion.
- **Safety:** A total of 5,089 crashes occurred in Littleton during the 5-year period from 2014 to 2018 – about three per day. The social and economic impacts of these crashes are vast.
- **Parking:** Downtown parking has been identified as a major issue, and has been cited as a reason for avoiding coming to the downtown retail and commercial district.

Congestion at Santa Fe Dr & Mineral Ave.

Parking is fully utilized on Main Street.

81.8% **Percent of Littleton residents who commute to work in a private auto (including those who drive alone as well as those who carpool; 8.4% telecommute)**



TRAILMARK NEIGHBORHOOD

Roads
- Expressway
- Ramp
- Major Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads

N

CITY OF LITTLETON
EXISTING ROADS

Traffic Congestion

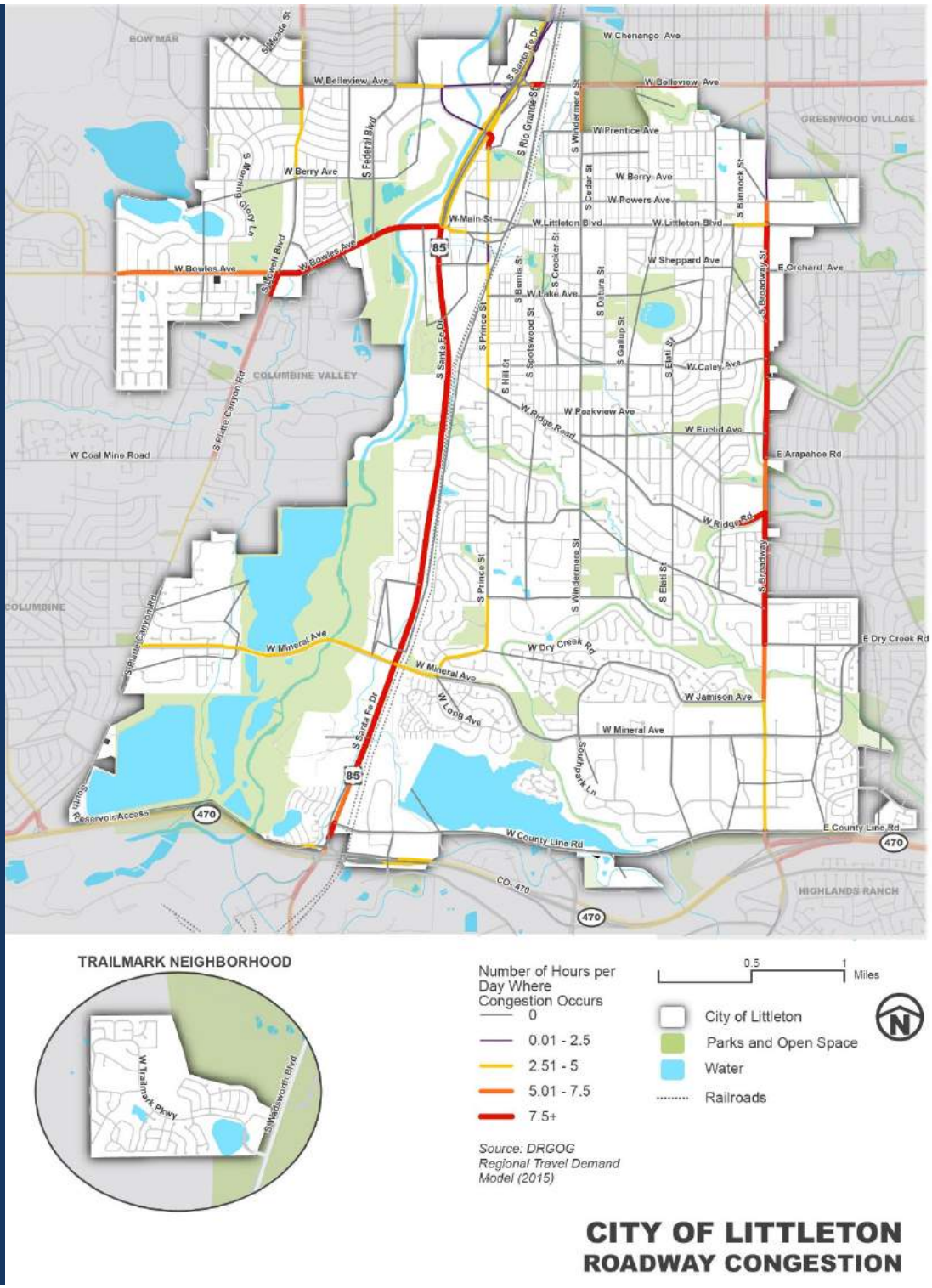
Vehicular delay is common in Littleton, with several major corridors experiencing many hours of delay each day.

The map at right depicts the average number of hours of delay per day. Of note, Santa Fe Drive, Broadway, and Bowles Avenue are congested throughout most of the day.

Other roadways are congested during peak periods, particularly Prince Street and Mineral Avenue, which can experience very severe congestion, albeit during shorter periods.

Bottlenecks occur at several intersections throughout the city as well, notably including intersections along Santa Fe Drive at Mineral Avenue, Bowles Avenue, and Prince Street.

Santa Fe Drive carries as many as 60,000 vehicles per day near Mineral Avenue, well over it's intended capacity.



TRAFFIC: *#1 public concern* **$25m to $33m annual economic impact**

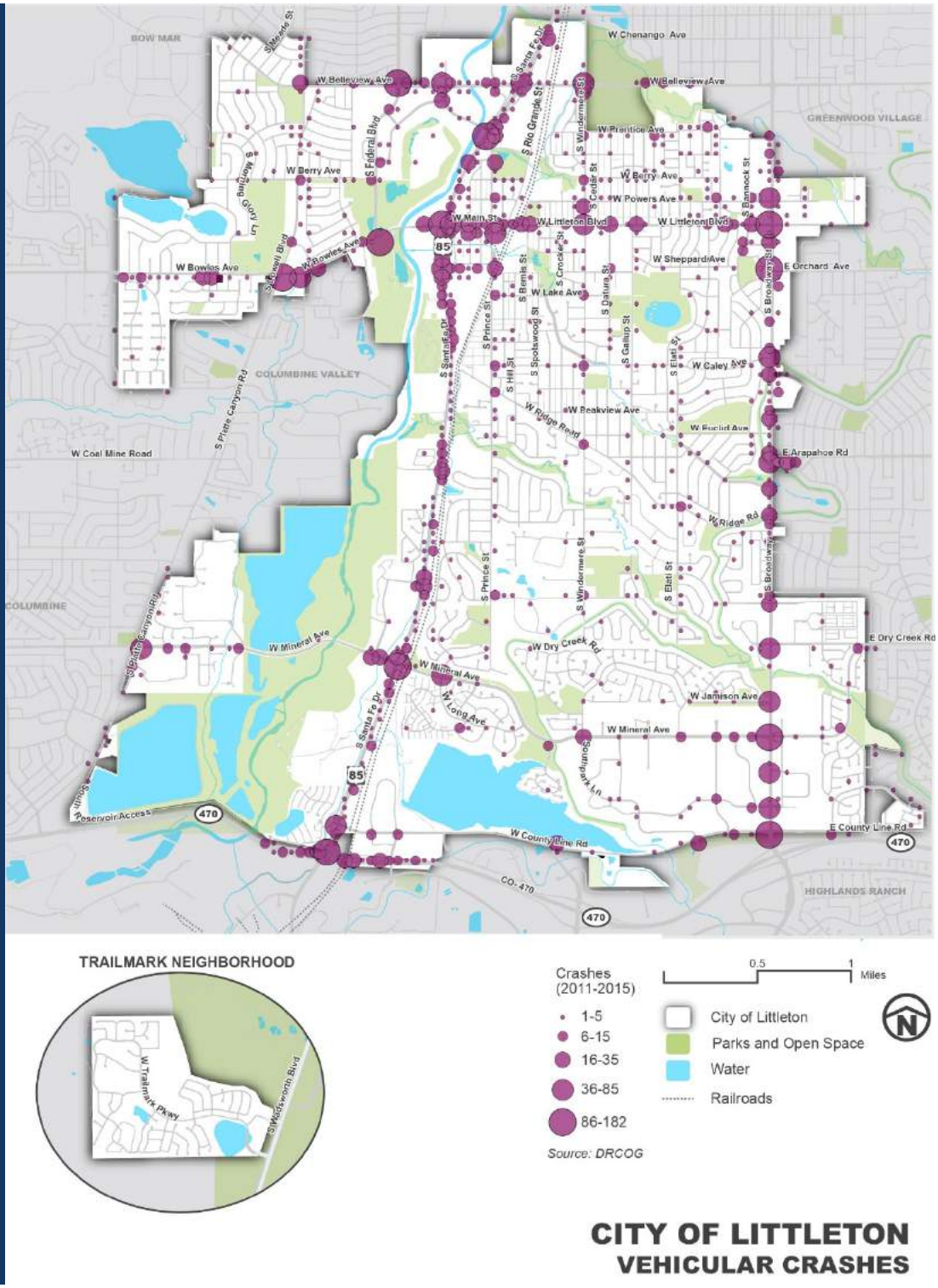
Auto Safety

Over a 5-year period from 2014 through 2018, 5,089 crashes occurred in Littleton. During that same time period, 418 people were injured in automobile crashes.

Crash concentrations exist at the following locations:

- The length of the Broadway corridor
- Santa Fe & Mineral
- Santa Fe & Church
- Santa Fe & Bowles
- Santa Fe & Prince
- Federal and Bowles
- Bowles and Platte Canyon

In general, where congestion occurs, crashes follow. Congestion-related crashes (such as rear-ends) make up by far the highest proportion of crashes in the city. Between 2014 and 2018, rear-ends accounted for 42% of all crashes.



SAFETY: *#4 public concern* **1,000+ CRASHES PER YEAR**

MODE: TRANSIT

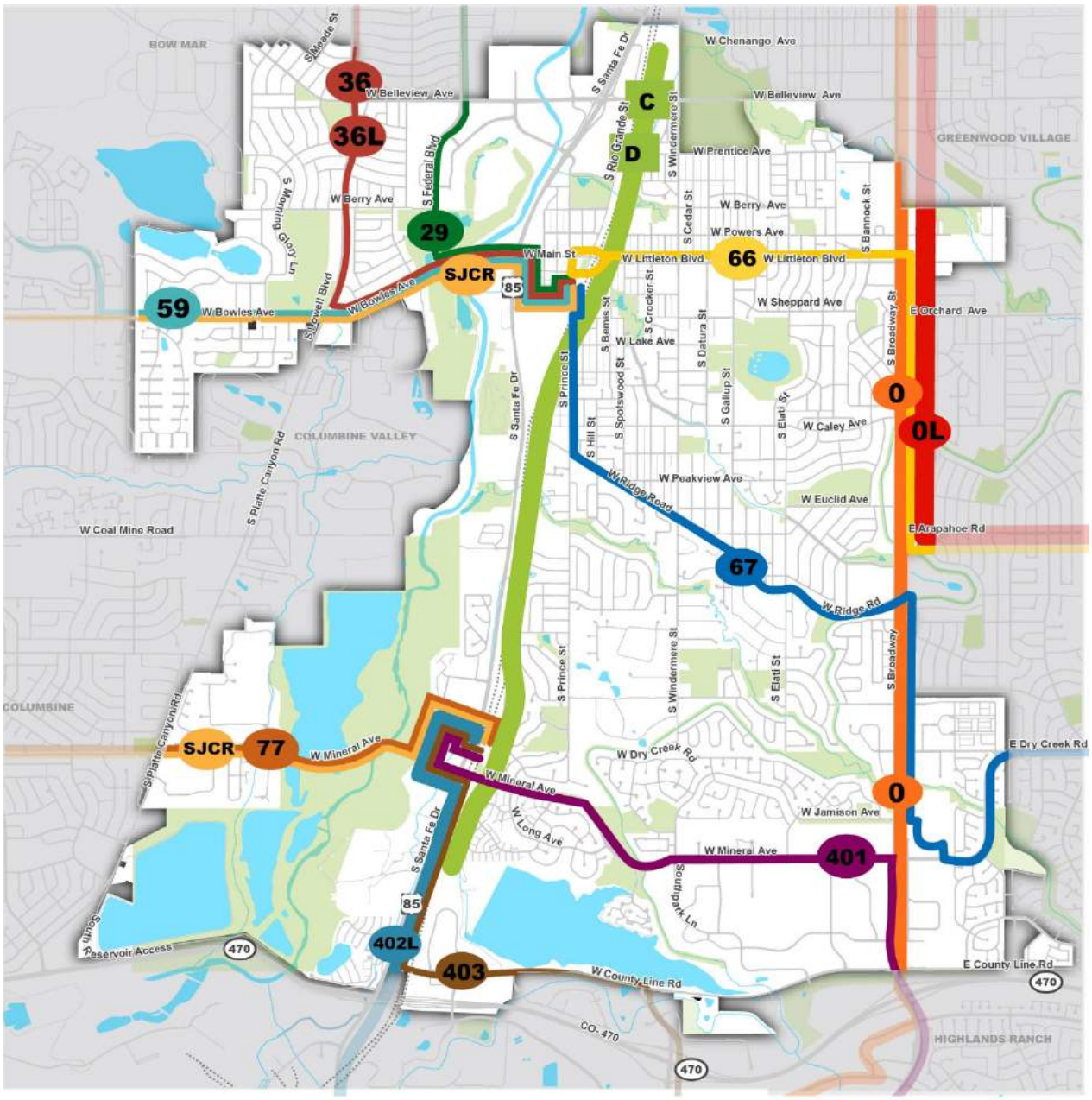
Littleton is within the Regional Transportation District (RTD) service area. RTD operates fixed route and demand-response service in Littleton. Major transit routes include:

- C-line and D-line Light Rail: These two routes interline through Littleton but serve different destinations in Downtown Denver, with the C-line terminating at Denver Union Station and the D-line terminating in Central Downtown at the 18th & California Station.
- Bus routes serving the following corridors:
    - Broadway
    - Federal Boulevard
    - Lowell Boulevard
    - Bowles Avenue/Littleton Boulevard
    - Ridge Road
    - Mineral Avenue
    - South Santa Fe Drive
    - County Line Road
- Littleton's Shopping Cart service: Shopping Cart is a scheduled fixed-route service shuttling passengers to/from area grocery stores and the Streets of Southglenn Monday-Saturday. The service is provided for disabled residents or residents age 55 or older and serves approximately 8,000 rides per year
- Demand-response services in Littleton include:
    - RTD's FlexRide
    - Littleton's OmniBus: OmniBus service is scheduled by appointment only, Monday-Friday, with ride priority given to medical trips (top priority), grocery shopping, and hair/barber trips. The service is provided for disabled residents or residents age 55 or older and serves approximately 6,000 rides per year

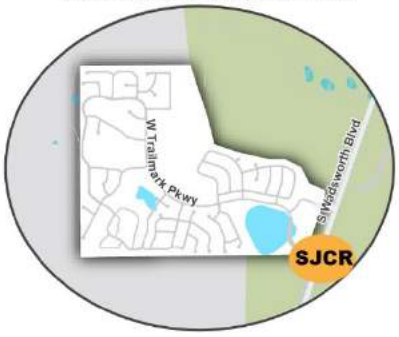
While 72% of respondents to the city's recent traveler survey perceive transit service positively, several challenges have been identified:

- Parking: The Littleton Downtown and Mineral Park-n-Rides fill to capacity early in the morning and demand for parking at these stations exceeds their capacity.
- Connectivity: Auto, pedestrian, and bicycle connectivity is poor at the Mineral station.
- 30-minute peak period service for most bus routes does not meet a typical Level of Service standard that makes taking transit attractive to "choice riders" – those who can choose another mode of travel.

6.4% **Percent of Littleton residents who commute to work via transit**



TRAILMARK NEIGHBORHOOD



Approximate Frequency

- 30 - 60 minutes
- 15 - 30 minutes
- 15 or better

Light Rail Station

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads
- Bus Line Number
- Light Rail Route

CITY OF LITTLETON
EXISTING TRANSIT FACILITIES

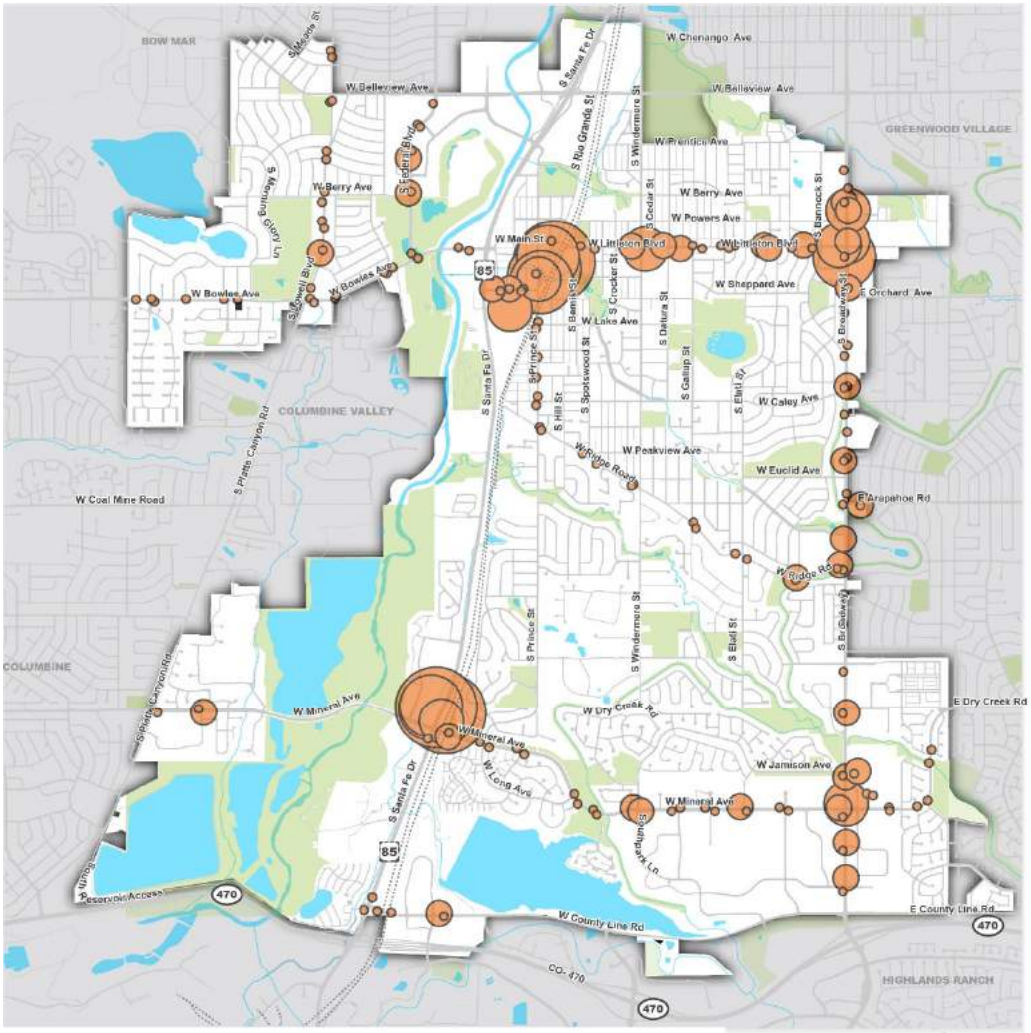
Transit Usage

Transit ridership in Littleton is highest on bus service along Broadway and Littleton Blvd (especially downtown) as well as light rail. The map at right depicts the average number of boardings at each transit stop each day. Average weekday ridership for each route:

Route	Ridership
0	340
0L	170
29	170
36	420
36L	360
59	160
66	570
67	150
77	90
401	150
402L	120
403	110
C (light rail)	2000
D (light rail)	2300

According to RTD and INRIX, it can take anywhere from 33 to 57 minutes to drive from the Mineral Station to downtown Denver, depending on traffic. By comparison, the same trip using light rail service takes between 29 and 33 minutes.

Route 67 along Ridge Road has been identified by RTD as struggling to meet ridership standards. This route remains in service because of the lack of transit alternatives in the area.



Transit Stop Boardings
- 0 - 4.8
- 4.9 - 28
- 28 - 81.9
- 82 - 181.2
- 181.2 - 3,038

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads

CITY OF LITTLETON
TRANSIT STATISTICS

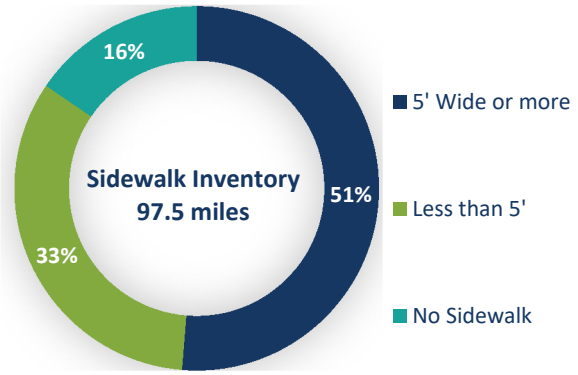
TRANSIT: *2 Light Rail Lines* **1,800+ DAILY BUS RIDERS**

MODE: WALK

Adopted in November 2011, Littleton's Bicycle & Pedestrian Master Plan was developed through a grant from tri-county health and focuses on short term, implementable improvements to the on-street system for walking and biking in Littleton.

Littleton is a diverse city when it comes to pedestrian activity and infrastructure. On one hand, Littleton has active pedestrian-friendly areas like downtown Littleton, and the city is home to an extensive trail system. On the other hand, Littleton is crisscrossed by auto-oriented arterials that prioritize motorized travel modes. This dichotomy means that the City faces challenges and has real opportunities to address pedestrian comfort, convenience, and safety. Major challenges identified through the inventory of the pedestrian system include:

- Safety: Over the 5-year period from 2011 to 2015, 121 crashes that involved pedestrians occurred, a rate of about 2 per month. People walking are vulnerable to serious injury when involved in a crash with an auto. Of particular concern is the Broadway corridor, where 17 such auto-pedestrian collisions occurred during the study period.
- Connectivity: The freight and RTD rail corridor represents a major pedestrian barrier. The rail corridor and the Santa Fe Drive corridor stand between the majority of Littleton residents and the South Platte River and adjacent trails – a wonderful pedestrian amenity. Another challenge identified is pedestrian connectivity to neighborhood parks.
- Transit Access: While walking to the Littleton Downtown station is possible, access to the Mineral Station is difficult for pedestrians. In addition, many of Littleton's bus stops are not well served by pedestrian facilities.
- Accessibility: People with disabilities encounter challenges throughout Littleton. The city has nearly 4,000 locations that have been identified in a self-assessment as needing improvements for accessibility. These upgrades will take place as community improvements are constructed over forthcoming years.



Streets designated as collector or arterial

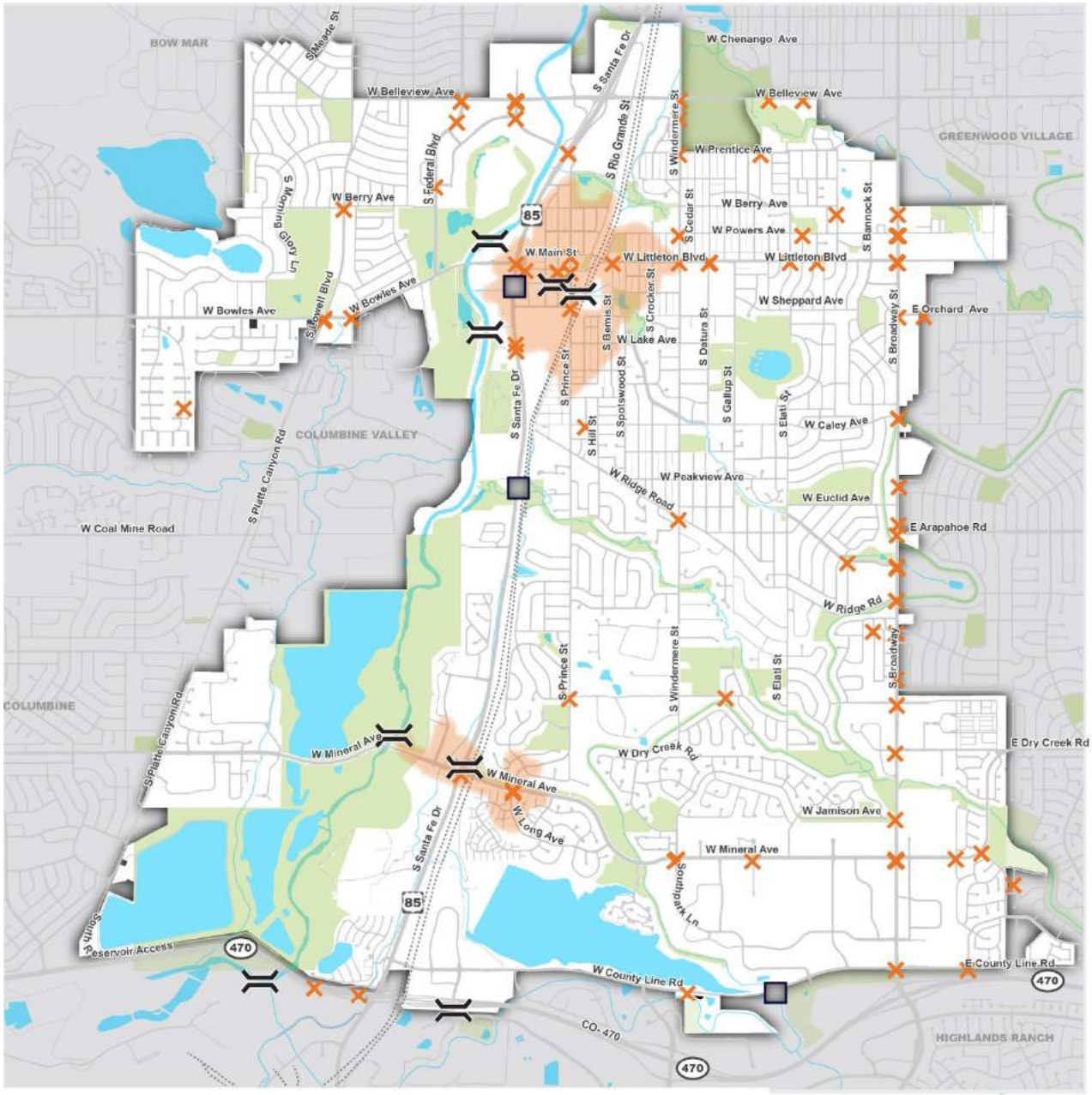
Littleton can build upon the following amenities:

- Trail Network: 51 miles of regional and local trails provide excellent pedestrian facilities throughout Littleton.
- Downtown Littleton: Walking in and around Downtown Littleton is generally comfortable and convenient. The Downtown Littleton station can be accessed from the surrounding neighborhood.

Littleton contains 51 miles of trails.

Typical auto-oriented neighborhood street with narrow sidewalk.

49% **Percent of Littleton sidewalks that are missing or too narrow on mobility-focused streets**



Bike/Pedestrian Bridge

Pedestrian Related Crash (2011-2015)

Bike/Pedestrian Underpass

½ Mile Transit Station Walkshed

City of Littleton

Parks and Open Space

Water

Railroads

0.5 1 Miles

CITY OF LITTLETON
PEDESTRIAN CHALLENGES AND OPPORTUNITIES

MODE: BIKE

As with walking in Littleton, biking is well-served by the regional facilities, but can be impeded by barriers and the design of infrastructure. Major challenges include:

- Safety: Over the 5-year period from 2011 to 2015, 77 crashes that involved bicyclists occurred. People biking are vulnerable to injury when involved in a crash with an auto. Again, the Broadway corridor has been a hazardous place to bike, with 17 bicycle related crashes in that period
- Connectivity: The freight and RTD rail corridor represents a major barrier. The rail corridor and the Santa Fe Drive corridor stand between the majority of Littleton residents and the South Platte River and adjacent trails – a wonderful amenity for bicycling.
- Transit Access: Access to the Mineral Station is difficult for bicyclists, and the station itself represents a barrier for access to the Mary Carter Greenway.

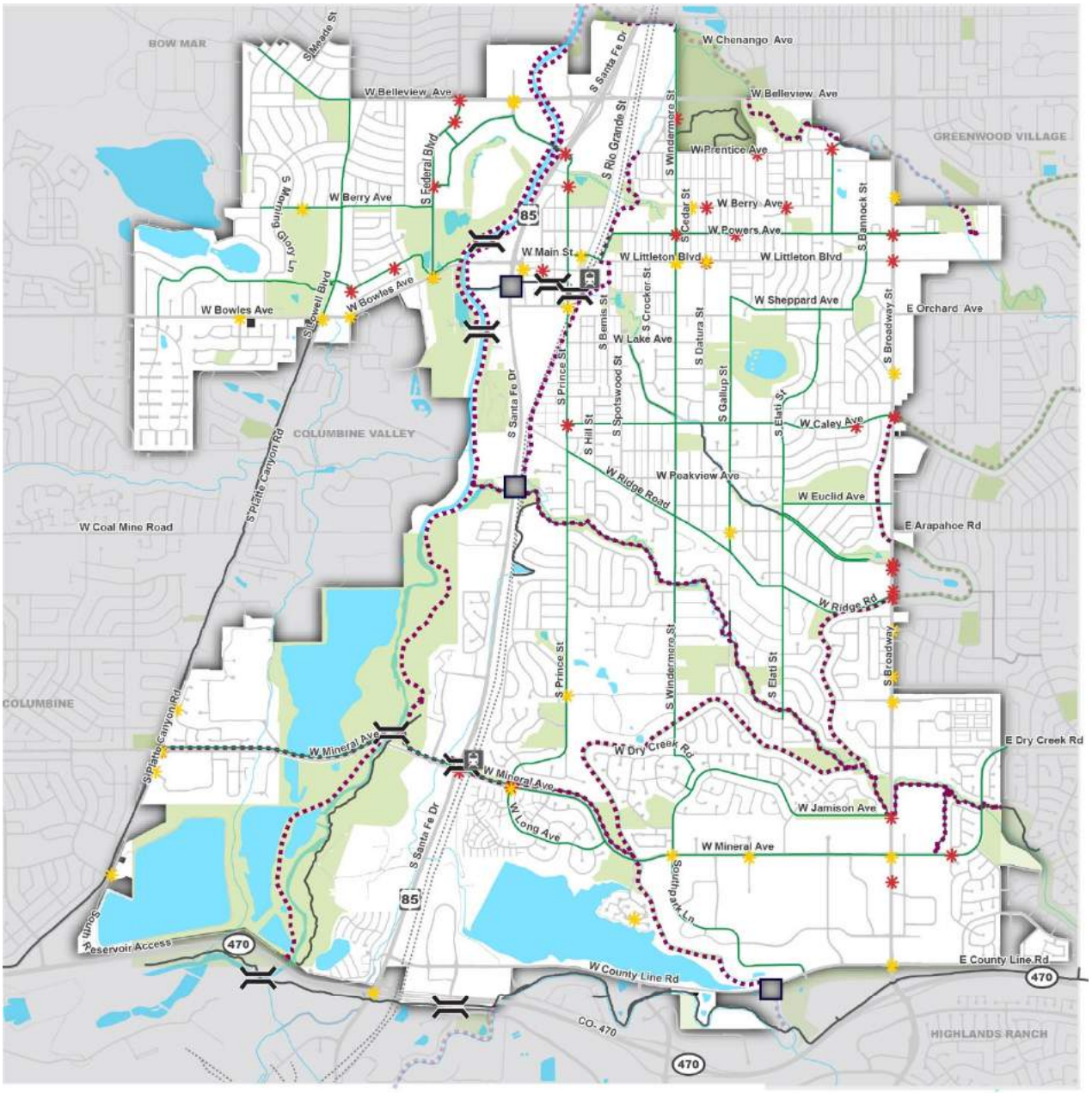
Littleton can build upon the following amenities:

- Trail Network: 51 miles of regional and local trails provide excellent bicycle facilities throughout Littleton.
- On-street Bike Facilities: Littleton has 24 miles of on-street bike facilities, covering 15% of the city's roads. These facilities include sharrows, signed bike routes, shared parking/bike lanes, and separate marked bike lanes. On most minor arterial and collector streets, these bike facilities provide convenient access for most of the city. Improvements to the design of these lanes and expansion of the network could enhance the utility of these facilities.

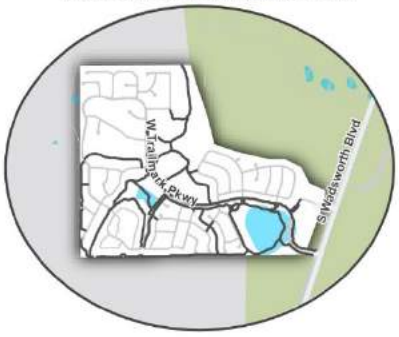
Many of Littleton's trails are bike-friendly.

Typical bike lane, striped and signed, but no markings.

0.4% **Percent of Littleton residents who bike to work**



TRAILMARK NEIGHBORHOOD



- Regional Trail
- Local Trail
- Bike Facilities
- Bike/Pedestrian Bridge
- Bike/Pedestrian Underpass
- Bicycle Related Crash (2011-2015)
- Bicycle Related Crash (Injury) (2011-2015)

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads

CITY OF LITTLETON
BIKE CHALLENGES AND OPPORTUNITIES

FUNDING SOURCES

Littleton spends the vast majority of its annual transportation budget on maintenance and operations of the existing system. Significant improvements to the system will require securing additional funding.

Littleton funds its transportation projects through a mix of revenue generated at the local, state, regional, and federal levels. The primary source of this revenue is Colorado's Highway Users Tax Fund (HUTF), which currently disperses approximately $1.4 million to Littleton each year. Statutorily, HUTF funds must be spent only on transportation improvements, and Littleton has dedicated the entirety of these funds to maintenance.

The growth of the city and aging infrastructure has placed an increased burden on street maintenance in recent years. The available funds are currently inadequate to support ongoing maintenance needs, and no funding exists for capacity improvements.

As of today, no funding for capital improvements is available through the budget process. Typically, the only way the City has been able to fund capacity improvements, bicycle facilities, pedestrian enhancements, or other projects has been through saving funds allocated for other means and re-allocating them to transportation needs. This is not a sustainable funding plan.

A complete funding analysis is to be provided in the Implementation section, which will be included in the packet materials for the September 10, 2019 Joint Leadership study session, provided on www.envisionlittleton.org on September 9, 2019, and in the final draft of this Transportation Master Plan.

Chapter 3.
Mission and Goals

MISSION AND GOALS

HOW DID WE GET HERE?

Littleton's Transportation Master Plan (TMP) is a tactical approach to achieving the community's vision for a transportation network that moves people and goods while enhancing Littleton's unique character and identity. The goals, objectives and strategies introduced here are a response to more than a year of listening to citizens and stakeholders through a series of surveys, workshops, events, newsletters, and conversations.

The Envision Littleton process created a foundation to describe what gives Littleton its identity and what is important to those who live and work here, and who enjoy all the city has to offer. Building on the adopted set of guiding principles, values, and other guidance in that plan, the TMP's strategic framework was developed through a lengthy refinement process involving listening sessions and workshops with City staff, Joint Leadership (City Council and Planning Commission), community representatives including a Community Coordinating Committee (CCC), and other stakeholders.

City Departments engaged through workshops and listening sessions:

- Finance
- Police
- Community Development
- Economic Development
- Communications
- Information Technology (IT)
- Public Works

Ongoing Outreach

- **5** Community Coordinating Committee workshops
- **852** online survey responses
- **2,959** conversations
- **35** pop-up events
- **51,941 reached through partner newsletters**

"I would like people to be nice when they're going someplace."

"We know we're going to have big expenses coming up, and we don't have the funding sources for those."

"The traffic, as is, is unsustainable, in 20 years it will be worse. It has to be addressed."

"We can't just solve today's problems - we have to solve tomorrow's problems."

"Happier

"I could think of no other city where I would wish to live."

"The goal is a transportation system that supports a community where people want to live, work, and play. That's an enabler for quality of life and it's an enabler of job creation in the city."

"Change is going on around us. Do we want it to happen to us, or do we want to participate? It's about time -- we need to be proactive and not reactive"

"I'm pretty patient, but sometimes I get a little crazy when I'm sitting in traffic."

STRATEGIC FRAMEWORK

The Envision Littleton guiding principles, values, shared priorities, and shared concerns form the basis for the TMP. The strategic framework shown here explains how the TMP is structured. The rest of this section explains each of the five goals in detail, shows how the objectives support the goals, and introduces key policy points.

Envision Littleton Vision Report
A unifying vision and summary of Littleton's core values, guiding principles, and shared priorities and concerns

Transportation Master Plan Mission
What we are doing, for whom and why? The purpose of the Transportation Master Plan

Goals
Broad, qualitative statements regarding what we are trying to achieve

Objectives
Specific, measurable, time limited, quantifiable desired achievements in support of the goals

Policies, Strategies, and Investments
Actions we will be taking

Measures
How we will measure our progress toward our plan and a way for us to assess the need to adjust the plan

What are the City's Mission and Goals?

TRANSPORTATION MASTER PLAN **MISSION STATEMENT:**

Littleton will enable connection and accessibility for all through regional leadership and responsible stewardship of the city's transportation systems, policies, programs and services.

GOALS

- **Connected** — Connect people conveniently to the community, resources, and opportunities.
- **Healthy** — Promote safety and support efforts to maintain a healthy and active lifestyle.
- **Inclusive** — Allocate services and facilities so that all people have transportation options that are best suited for their needs and lifestyle.
- **Prosperous** — Contribute to our economic prosperity while maintaining and enhancing our community's character.
- **Sustainable** — Build and operate a financially and environmentally sustainable transportation system.

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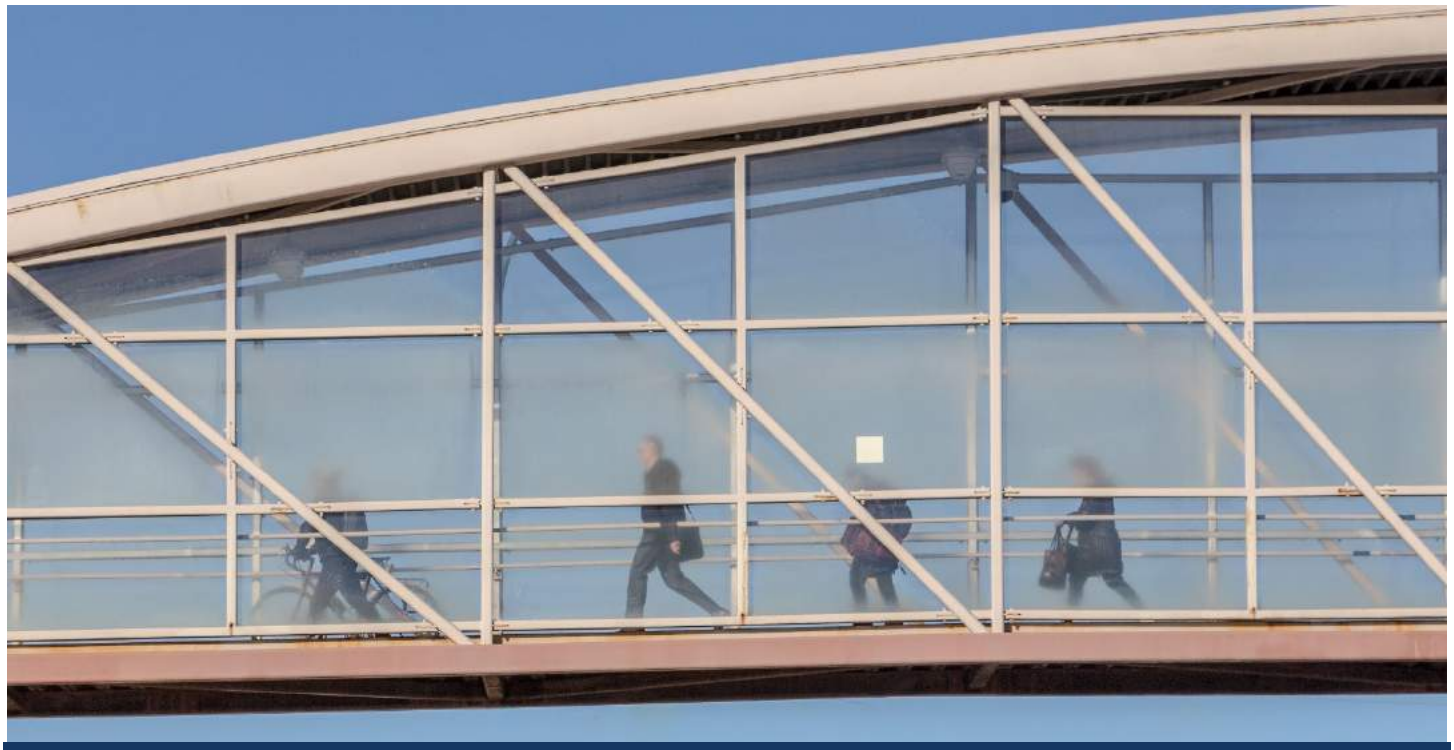

GOAL: **CONNECTED**

Connect people conveniently to the community, resources, and opportunities.

What are we trying to achieve with the "connected" goal?

A connected Littleton is one where people have convenient ways to get from home to school, work, and popular destinations such as downtown and the Mary Carter Greenway. Achieving this goal will require creative approaches to crossing existing barriers and closing existing gaps in the transportation network, with a focus on comfortable and convenient networks as well as improved connections for all travelers.

.

"East to west connection is an issue for bikes and pedestrians as well as cars. There are significant barriers."

" We have a desire and need to improve connections with regional systems."

"The trail network is a huge benefit for the city."

"Our transportation system needs to balance moving people through and encouraging them to stay."

ALIGNMENT WITH ENVISION LITTLETON:

- Connected *(Guiding Principle)*
- Anchored *(Guiding Principle)*
- Being a Model Community *(Values)*
- Accessibility *(Shared Priorities)*
- Small town feel and community *(Shared Priorities)*
- Traffic *(Shared Concerns)*

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GOAL: HEALTHY

Promote safety and support efforts to maintain a healthy and active lifestyle.

What are we trying to achieve with the "healthy" goal?

In a healthy Littleton, the transportation network minimizes the safety risks of travel by any mode, and citizens have plenty of opportunities to maintain an active lifestyle. Achieving this goal requires a holistic, ongoing effort to identify and mitigate transportation network deficiencies. Success will also mean ensuring easy access to the city's abundant open spaces for all citizens.

"The trails are great for bicyclists and people who want to run or walk to get some exercise."

"Safety, safety, safety, safety ."

"Certain intersections don't feel safe for pedestrians."

ALIGNMENT WITH ENVISION LITTLETON:

- Active *(Guiding Principle)*
- The Outdoors *(Values)*
- Integrity *(Values)*
- Safety *(Values, Shared Priorities)*
- Park, trails, and open space *(Shared Priorities)*

GOAL: **INCLUSIVE**

Allocate services and facilities so that all people have transportation options that are best suited for their needs and lifestyle.

What are we trying to achieve with the "inclusive" goal?

An inclusive Littleton allows people an intuitive way to travel, regardless of ability, age, or socioeconomic status. Success will require a human-scale approach to adapting the transportation network – one that finds practical solutions to the mobility challenges of all people in Littleton.

"The cost of transportation shouldn't prevent people from getting to work."

"Community partners can continue to teach us how to create an accessible system that's practical for people, not just compliant. "

"The light rail is a huge strength of the transportation system, but connections to the stations could be better."

ALIGNMENT WITH ENVISION LITTLETON:

- Anchored *(Guiding Principle)*
- Being Inclusive *(Values)*
- Civic Involvement *(Values)*
- Accessibility *(Shared Priorities)*
- Affordability *(Shared Concerns)*

GOAL: **PROSPEROUS**

Contribute to our economic prosperity while maintaining and enhancing our community's character

What are we trying to achieve with the "prosperous" goal?

A prosperous Littleton is one where services and facilities provide a cohesive civic identity and are the backbone for prosperity. Achieving this goal requires a coordinated approach to land use, transportation, and other infrastructure development. Success will mean thriving neighborhoods throughout the city.

"Improved mobility for pedestrians, bicyclists, motorists, and transit riders would encourage more people to live here and do business here."

"The truth is people think there's a parking problem, so we have a parking problem."

"Downtown is a huge strength. It's a place where people want to be, want to walk around."

ALIGNMENT WITH ENVISION LITTLETON:

- Authentic *(Guiding Principle)*
- Local History *(Values*
- Quality *(Values)*
- Downtown Littleton *(Shared Priorities)*
- Compatibility of redevelopment *(Shared Concerns)*
- Growth impacts *(Shared Concerns)*
- Small town feel and community *(Shared Priorities)*

GOAL: **SUSTAINABLE**

Build and operate a financially and environmentally sustainable transportation system.

What are we trying to achieve with the "sustainable" goal?

For Littleton, sustainability means taking a long-term view of the city's financial and environmental resources. This includes establishing a prioritized set of transportation improvements that allows for adaptability as technology and demographics change. These improvements should include a focus on improving air and water quality. The city will work toward both aspects of its sustainability goal by maintaining a strong presence in regional planning efforts.

"The way the budget is currently, structured, it would be hard to keep up with transportation needs if the economy changes."

"We can't just solve today's problems - we have to solve tomorrow's problems."

"Colorado is a place where people want to be out in nature -- being tied up your car for an hour runs antithetical to that goal."

ALIGNMENT WITH ENVISION LITTLETON:

- Active *(Guiding Principle)*
- Anchored *(Guiding Principle)*
- Being a Model Community *(Values)*
- The Outdoors *(Values)*
- Quality *(Values)*
- Parks, trails, and open space *(Shared Priorities)*
- Contentious local politics *(Shared Concerns)*

OBJECTIVES

Building from the goals, a series of workshops involving the Community Coordinating Committee, Joint Leadership Team, and TMP technical staff worked to develop a tactical approach to planning for the future of Littleton's transportation system. Those efforts produced the list of 36 objectives below, spread across seven topic areas: Quality of Life, Community, Mobility, Active, Auto, Transit, and Freight.

How the objectives are used: The objectives are statements about the direction the City wants to take its transportation system. Each objective is associated with one or more performance measures, which include a baseline and a target for 2040. These measures informed the project prioritization effort found in the TMP. In addition, they provide a system of accountability for tracking progress over time.

The TMP is designed to be a living document that can be revisited at regular intervals. The objectives offer a benchmark to evaluate how effectively the City is achieving its goals as well as a record of the community's priorities as of 2019.

No.	Topic	Objective	Related Goals				
			Connected	Healthy	Inclusive	Prosperous	Sustainable
1	Quality of Life	Achieve high resident satisfaction rates with transportation services	●		●	●	●
2	Quality of Life	Provide spaces that people can enjoy within the public right-of-way		●		●	
3	Quality of Life	Provide people with a sense of personal safety while traveling		●	●		
4	Quality of Life	Provide transportation infrastructure that meets local business needs				●	●
5	Community	Provide transportation facilities that are well integrated with land use and character				●	
6	Community	Minimize transportation-related air quality degradation					●
7	Community	Minimize transportation-related water quality degradation					●
8	Community	Minimize transportation-related noise impacts				●	●
9	Community	Provide a flexible transportation work plan					●
10	Community	Provide transparency about the transportation plan					●
11	Community	Provide a transportation system the City can afford to maintain					●
12	Mobility	Provide a reliable transportation system	●			●	
13	Mobility	Achieve a balanced mode share	●	●	●	●	●
14	Mobility	Provide high-quality transportation people can afford	●			●	
15	Mobility	Provide human-scale infrastructure			●	●	●

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No.	Topic	Objective	Related Goals				
			Connected	Healthy	Inclusive	Prosperous	Sustainable
16	Mobility	Provide travelers with relevant, timely information	●	●	●		
17	Active	Provide a well-connected bicycling network	●	●			
18	Active	Provide a comfortable bicycling network	●	●			
19	Active	Provide a safe biking environment	●	●	●		
20	Active	Achieve a Sliver Bicycle Friendly Community designation	●	●			
21	Active	Provide high-quality end-of-trip bicycle facilities	●	●			
22	Active	Provide a well-connected pedestrian network	●	●			
23	Active	Provide a comfortable walking experience	●	●			●
24	Active	Provide a safe walking environment	●	●	●		
25	Active	Provide excellent pedestrian and bike access to schools	●	●			
26	Active	Provide high quality access to recreational facilities		●			●
27	Active	Provide healthy transportation choices		●			●
28	Auto	Provide a well-connected automotive network	●			●	
29	Auto	Provide for safe automobile travel		●		●	
30	Auto	Provide a resilient and responsive traffic operations system	●				●
31	Transit	Provide a well-connected transit network	●			●	
32	Transit	Provide comfortable transit service	●		●		
33	Transit	Provide high-quality demand response services for at-need populations			●	●	
34	Freight	Provide a reliable freight network	●			●	
35	Freight	Provide a well-connected freight network	●			●	
36	Freight	Provide a safe freight network		●		●	
		Totals	***21***	***18***	***11***	***17***	***18***

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WHAT IT MEANS TO PROVIDE A COMPLETE NETWORK

A complete multimodal transportation network in the city that provides connections, choice, calming, and capacity while meeting the needs of the community will be the result of implementing the projects defined in subsequent sections. These projects and strategies, combined, will allow the City to realize its Transportation Goals, and ultimately deliver upon the Mission defined by the community. Not every street has the room or capacity to serve every mode, nor do they all have the demand for each mode, so priorities have been determined based on the adjacent land uses, network needs, ability of the right-of-way to accommodate various modes and major destinations. Many of these priorities have evolved over time already, and are in place today, in the form of transit service on some streets, wider sidewalks, and bicycle facilities. The complete networks presented here will build upon this foundation and are intended to present a path to completion of networks so that all people can choose the mode that best suits their travel needs and lifestyles.

LEVEL OF SERVICE

The City is using the term “Level of Service” (LOS) to define appropriate facility types and widths of facilities for the various transportation modes. These criteria are described in depth in the mode-specific chapters that follow. In Littleton, Level of Service allows us to judge how well our transportation networks are performing. Maintaining LOS standards allows the City to better manage the impacts of development and forms the foundation for how we can manage our transportation networks in a way that is responsive to growth pressures from within and from surrounding communities. The LOS standards or thresholds are defined within each mode-specific chapter.

- **Auto LOS:** for auto and freight networks, LOS refers to the relation between the number of vehicles that are using a specific roadway or intersection and the traffic capacity of those roadways or intersections. It is generally provided as a letter-grade that easily communicates the level of congestion that exists in a location on a scale from A to F. See The Auto and Freight Chapter for details.
- **Transit LOS:** for transit, LOS refers to the availability, frequency, comfort, and convenience of transit for people who make trips via transit on either bus or rail. The percentage of citizens with convenient access to high-quality transit is used to measure how well transit services are meeting Littleton’s needs. It must be acknowledged that Littleton is but a part of RTD and does not provide the majority of transit service in the City. See the Transit Chapter for details.
- **Active Transportation LOS:** for pedestrians and bicyclists, LOS refers to the level of stress that pedestrians and bicyclists feel from adjacent auto and freight traffic. In order to provide a complete network, comfortable and safe (low-stress) facilities must be provided. In order to provide such facilities, bicycle and pedestrian facilities require different levels of protection from autos and trucks to feel safe. See the Active Transportation Chapter for details.

Provision of a complete transportation network that meets the needs of the citizens of Littleton requires that these criteria, combined with the other objectives outlined in this plan are met. In order to meet our goals, we will need to re-think the way we have designed our streets. In order to lay that groundwork, the types of streets that we provide as a service have been reconsidered below.

STREET TYPES

Littleton has a diverse set of street types, from local residential streets to wide commercial streets. The City has long used a standard functional classification approach to define the street network in the past. The City’s classification system consisted of local, collector, and arterial street classes. However, this functional classification system does not adequately account for the way the surrounding land use intensity and character affect the street’s operation and design.

The Envision Littleton plan has established a method to better account for these distinct issues when designing and operating our streets. The street types listed herein allow the City to address typical challenges encountered and develop

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future street type maps that will set the table for updated design standards. In addition to street types, this plan also incorporates modal priorities for active transportation, transit, and auto/freight, as well as overlays for character classes, consistent with those identified in the Comprehensive Plan. The Complete Network and Overlay maps can be found in the Recommendations Chapter following the mode chapters.

Local Street

Typical Right-of-Way	60-80 feet
Target Design Speed	20-25 mph
Average Daily Traffic Range (vpd)	<3,000
Lanes	2 (no lane markings)
Primary Purpose	Local access

A local street can exist in any context and is used primarily for access to adjacent properties. The cross-section should encourage slow speeds and inherently multimodal operations, serving pedestrians, bicyclists, autos, and even infrequent freight traffic (i.e., deliveries, trash services, etc.). These streets provide the least through movement connectivity. On-street parking is allowed on these streets, and landscaping is provided by property owners.

Neighborhood Connector

Typical Right-of-Way	60-100 feet
Target Design Speed	25-35 mph
Average Daily Traffic Range (vpd)	3,000-18,000
Lanes	2, plus turn lanes where warranted
Primary Purpose	Local mobility

Neighborhood connector streets are typically found in areas with almost exclusively adjacent residential land use. These streets are intended to serve short to medium length trips, and are slow speed. They include some local access to properties and are characterized by modest setbacks. These streets are good candidates for active transportation connections, as they will typically have less auto and truck traffic. Traffic calming may be desired to keep speeds slow and promote safety for all users. Some of these streets would have bicycle facilities and on-street parking, depending on priority and available width. Street trees are encouraged.

Suburban Connector

Typical Right-of-Way	80-120 feet
Target Design Speed	30-40 mph
Average Daily Traffic Range (vpd)	18,000-40,000
Lanes	4, plus turn lanes where warranted
Primary Purpose	Local and regional mobility

Suburban connector streets are typically found in areas with adjacent residential land use and some suburban retail and commercial. These streets are intended to serve medium length trips, and are medium speed. They include minimal local access to properties and are characterized by modest setbacks. These streets are good candidates for active transportation connections including bicycle facilities, but should provide adequate separation. On-street parking is not usually permitted. Street trees are encouraged.

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Mixed Use / Downtown Connector

Typical Right-of-Way	60-100 feet
Target Design Speed	20-30 mph
Average Daily Traffic Range (vpd)	6,000-24,000
Lanes	2 or 4, plus turn lanes where warranted
Primary Purpose	Local access, business access

Mixed Use / Downtown Connectors are found in areas that have a combination of retail, commercial, office, restaurant and residential uses. These streets are typically slower speed, and may have driveways and on-street vehicle parking. They are intended to be multimodal, with wide sidewalks and sometimes with facilities for biking. Street trees and other plantings are encouraged on these streets.

Mixed Use / Downtown Main Street

Typical Right-of-Way	60-110 feet
Target Design Speed	20-25 mph
Average Daily Traffic Range (vpd)	6,000-40,000
Lanes	2 or 4, plus turn lanes where warranted
Primary Purpose	Business access, placemaking

The buildings along these streets should have little to no setback, pedestrian-oriented frontages, and activated main floor uses. The right-of-way should provide ample space for walking and green infrastructure including planters and street trees. Auto speeds should be slow and driveways should be limited. On-street parking may be incorporated, but due consideration to better uses of valuable public right-of-way should be given. Pedestrians are the priority on these streets, but people on bicycles or other soft vehicles should be provided a safe environment.

Commercial Corridor

Typical Right-of-Way	80-150 feet
Target Design Speed	30-55 mph
Average Daily Traffic Range (vpd)	>20,000
Lanes	4 or 6, plus turn lanes where warranted
Primary Purpose	Regional mobility

Commercial corridors serve mostly commercial uses, including shopping centers, industrial uses, offices, and other commercial activity. Commercial corridors typically serve both through trips and provide property access, although direct access should be discouraged. Commercial corridors in Littleton have typically been focused on automobile travel, but should transition to include better pedestrian and transit facilities, with shared use paths for bicycles where appropriate. These streets will have two or three lanes of automotive travel in each direction. Speed limits should only exceed 40 mph on highly controlled facilities.

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OVERLAYS

The following overlays identify areas or corridors within the City that should provide streets that cater to certain modes. These overlays will allow the City to provide complete networks for each mode, and will affect the design of the street and guide the City to make decisions about types of facilities to provide within the right-of-way.

Modal Priorities:

Pedestrian

The City is focused on the safe and efficient movement of pedestrians (people walking or using mobility devices such as wheelchairs). All city streets should provide safe spaces to move along and across the street. Pedestrians are our most vulnerable travelers, and prioritizing their safety is of utmost importance. This plan focuses the City's future pedestrian enhancements on these areas of greatest need:

- First and last mile connections to transit including Mineral Station, Littleton Downtown Station, and the Broadway Transit Corridor.
- Safe Routes to Schools
- Park connections
- Regional trail connections

Sacrifice: As pedestrian enhancements are considered, it must be acknowledged that in many instances, this priority will require sacrificing space for some other mode. Most often in Littleton, this will result in sacrificing space or mobility for the private automobile. Sometimes this will take the form of slower speeds due to narrower lanes or longer delays due to fewer lanes for auto capacity, while other times this will mean the reduction of space for on-street parking.

Bicycle

Bicycle priority streets aim to provide low-stress bicycle options to reach destinations. The treatments used on these streets may include striped bike lanes, protected bike lanes, cycle tracks, or separate off-street facilities, such as parallel trails. The City will phase out the use of "sharrows" in the future, upgrading these facilities where feasible to a safer design. As with the pedestrian network, the City will focus on upgrades to the bicycle network where the need is greatest:

- First and final mile connections to transit including Mineral Station, Littleton Downtown Station, and the Broadway Transit Corridor.
- Safe Routes to Schools
- Park connections
- Regional trail connections

Sacrifice: As bicycle enhancements are considered, it must be acknowledged that in many instances, this priority will require sacrificing space for some other mode. Most often in Littleton, this will result in sacrificing space or mobility for the private automobile. Sometimes this will take the form of slower speeds due to narrower lanes or longer delays due to fewer lanes for auto capacity, while other times this will mean the reduction of space for on-street parking.

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Transit

Transit corridors should be enhanced to meet the City's objectives to provide competitive and attractive transit service as an alternative to the private auto. The future Transit priority streets in the City, in addition to maintaining light rail operations along Santa Fe Drive, are:

- Broadway
- Littleton Boulevard
- Mineral Avenue
- Church Avenue
- Bowles Avenue
- Ridge Road

Treatments to enhance transit on these streets include, but are not limited to:

- Speed and reliability: queue jumps, transit signal priority, exclusive lanes
- Amenities: enhanced stops to include benches, lighting, shelters, fare payment systems, real-time information, or other means developed and recommended by the Regional Transportation District (RTD).
- Connectivity: future transit streets should ensure that stops are accessible to users, through sidewalk connections, ramps, and crossing treatments that enhance safety.

Sacrifice: As transit enhancements are considered, it must be acknowledged that in many instances, this priority will require sacrificing space for some other mode. Most often in Littleton, this will result in sacrificing space or mobility for the private automobile. Sometimes this will mean that buses make stops within the travel lane to increase speeds, while other times this will mean the reduction of space for on-street parking, or even the reduction of auto capacity.

Truck

The City maintains designated truck routes intended to funnel freight movement onto corridors that are designed to handle heavy vehicles. As goods delivery evolves, it will be important for the City to remain flexible, and adapt to changes in the types and numbers of freight vehicles on our streets. Given these shifting trends, the truck route map and related policies should be reviewed annually.

Sacrifice: As freight movement enhancements are considered, it must be acknowledged that in many instances, this priority will require sacrificing space for some other mode. In many instances, truck design standards require that pedestrian and bicycle facilities are not as direct or comfortable. Proper consideration for these modes must be taken into account as designs proceed.

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Character

The character of the adjacent land use should affect the design of the street. The major character contexts listed below have been identified in Littleton.

Estate or Natural

On streets in the estate or natural character areas, the separation between active and auto transportation users is generally less defined. Many streets in these areas are shared streets where different user groups mingle in the same space. Detached sidewalks are rare and the natural or landscaped setting generally comes right up to the edge of the street. On-street parking is generally discouraged and off-street parking facilities are common.

Suburban

On streets in the suburban character areas, the City envisions detached or wider attached sidewalks, with street trees. The mix of users includes all modes on many streets in these character areas. Green space should be prioritized as part of the streetscape. Building setbacks in these areas are larger, meaning that the building frontage is less important for activation, and landscaping plays a more prominent role. On-street parking is typically permitted where appropriate on lower mobility street types.

Urban

On streets in the urban character areas, the urban building forms interact with the streetscape to create a street wall. Sidewalks can be wide and attached with planters or trees, or can be detached with a tree lawn separating pedestrians from autos. Generally, urban areas will have more pedestrian activity and streets should dedicate more space to active transportation. Curb space management may become a priority, as ride-hailing and valet services become more popular. On-street parking is typically permitted, although due consideration should be given to using that space for other modes.

POLICIES, STRATEGIES & PROJECTS

The goals and objectives describe the community's desired future for its transportation system. In order to move toward that future while protecting existing values, the City must develop a detailed work plan consisting of capital improvement projects, and organizational strategies.

The following chapters detail the specific needs related to active transportation (such as bike, pedestrian, and micromobility), transit (bus and rail), and auto (including freight). This analysis results in a set of strategies and projects that would help Littleton work toward its transportation objectives, in the short term as well as over the next several decades.

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Chapter 4.
Auto and Freight

Because Littleton was developed in a time of rapid auto adoption and in times in which most people have access to a private auto, the city has a strong auto and freight network with few gaps. The City's network includes the full hierarchy of auto streets, from freeway (C-470) down to local streets.

The geography of the city has determined much of this network, particularly the location of the South Platte River and the freight and light rail tracks. These major linear assets also act as barriers and mean that crossing from west to east is limited. Another asset that determines the connectivity of the city is the Highline Canal, which meanders through the city and limits some connectivity.

The city is characterized by these and other features, and the way people move in and through the city is shaped by the way the city has been built. The primary auto-oriented corridors exist mainly along the city's edges:

- North-South Corridors:
  - Platte Canyon Road
  - Santa Fe Drive (US 85)
  - Broadway
- East-West Corridors:
  - Belleview Avenue
  - Bowles Avenue / Main Street / Alamo Avenue / Littleton Blvd
  - Mineral Avenue
  - County Line Road

Meanwhile, the interior of the city is defined by its neighborhood character and slower moving traffic on narrower streets.

Auto traffic on the main auto-oriented corridors has been increasing in the recent past, spurred primarily by growth outside the city. Major developments have been built south and west of the city and have resulted in traffic congestion on Littleton streets.

LEGACY OF PAST PLANNING

The following plans previously developed for Littleton and vicinity offer insights from the time they were prepared and provided an essential foundation for preparing this Auto and Freight element of the Transportation Master Plan.

- Citywide Plan (2014)
- Belleview Avenue Corridor Vision (2018)
- Broadway Corridor Study (2009)
- Downtown Neighborhood Plan (2011)
- South Platte River Corridor Development Design Guidelines (2000)
- South Platte River Corridor Vision, Arapahoe County, (2013)
- DRCOG (Denver Regional Council of Governments) Metro Vision 2040 (2017)
- Arapahoe County 2035 Transportation Plan (2010)

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Key takeaways from past planning efforts include:

- Improve connections between downtown/river corridor/parks/trails.
- Complete streets/road diet/traffic calming where appropriate.
- Improve traffic flow on arterials.
- Decrease cut-through traffic in residential areas.
- Improve multimodal connections between commercial locations/residential developments.
- Improve connections to light rail.
- Improve road connections to key destinations but not through natural areas/build fewer cul-de-sacs/promote grid street network.

KEY ISSUES AND CONSIDERATIONS

Input and discussions for this Transportation Master Plan, through varied *Envision Littleton* community engagement activities, workshops with City Council and Planning Commission, and interaction with other City boards/commissions, City departments, and partner agencies and organizations, yielded the following list of key items that relate to the auto and freight transportation network:

- **Congestion**: Growth within and surrounding Littleton has resulted in increased congestion on many streets.
- **Barriers**: the city is crossed by multiple barriers limiting connectivity. While some areas of the city have a strong internal grid, barriers like the South Platte River, Santa Fe Drive, the rail corridor, and even some suburban neighborhoods exist that break up the grid and force traffic to use one of only a few major connections, resulting in traffic congestion.
- **Safety**: A total of 5,089 crashes occurred in Littleton during the 5-year period from 2014 to 2018 – about three per day. The social and economic impacts of these crashes are vast.
- **Parking**: Downtown parking has been identified as a major issue, and has been cited as a reason for avoiding coming to the downtown retail and commercial district.

More information on each of these key issues is provided below.

CONGESTION

Congestions is a term used to describe traffic conditions where motorists experience delay and the volume of traffic on a street is at or near its capacity. Congestion, also referred to as poor Level of Service, in Littleton is primarily concentrated on its major regional corridors. In urban areas, most congestion occurs at intersections. This is the case in Littleton, with congestion occurring at major bottleneck locations throughout the city where arterials intersect.

Level of Service

A key method of evaluating the need for improvement is to examine roadway capacities. Through goal-setting, the City has set a desired Level of Service threshold for its roadways. Level of Service (LOS) refers to a letter grade system of gauging a road's ability to serve travel demand. The grades range from A to F, where A represents free-flow traffic conditions with almost no delay, and LOS F represents gridlock or severe congestion with high levels of delay.

The City's desired Level of Service is LOS E or better for Commercial Corridors and Suburban Connectors and LOS D or better for all other streets. LOS is a tool that allows the City to identify the appropriate improvement types for streets within

its borders, and to require roadway improvements as mitigation from development that may increase the demand on the existing system.

The table below shows the planning level bi-directional (total of both directions) daily traffic capacities for typical roadways in Littleton based on these LOS thresholds.

Facility Type and lanes	Capacity*
2-lane Local Street (LOS D)	3,000
2-lane Mixed Use/Downtown or Neighborhood Connector or Main Street (LOS D)	10,000
3-lane Mixed Use/Downtown or Neighborhood Connector or Main Street (LOS D)	18,000
4-lane Suburban Connector or Commercial Corridor (LOS E)**	40,000
6-lane Suburban Connector or Commercial Corridor (LOS E)**	60,000
* 2-way total vehicles per day ** Assumes turn lanes are provided as needed at intersections	

The capacity indicates the maximum number of vehicles per day (vpd) that can be served by a typical roadway before exceeding the LOS threshold. While the theoretical maximum number of vehicles served is higher, as traffic increases beyond these capacities, congestion occurs and travelers experience delay. Many factors can raise or lower these capacities, including but not limited to the number of intersections or access points, provision of turn lanes or other operational improvements, level of peak hour traffic, and even driver behavior. These capacities are widely-accepted typical capacities and traffic behavior and roadway characteristics in Littleton are generally consistent with the typical roadways on which these capacities are based.

In addition to corridor Level of Service, the City should also monitor intersection LOS, which is based on the typical average delay experienced by all of the motorists traveling through an intersection. Due to the number of intersections in the city, a thorough analysis of intersection LOS with traffic engineering software was not feasible for this plan. However, other tools allow the use of cell phone and GPS data to identify where poor LOS is occurring at intersections throughout the city.

An analysis of bottlenecks through use of INRIX data identifies those locations that cause the most traveler delay and frustration. INRIX is a Big Data aggregation company that compiles GPS and cell phone data all over the world. This data can be used to determine typical free-flow traffic conditions on major roads and subsequently when and where delay is occurring compared to free-flow conditions.

Analyzing the data in Littleton, it is apparent that the most severe bottlenecks in the city occur at intersections along the Santa Fe Drive, Broadway, Belleview Avenue, and Mineral Avenue corridors. The table at right shows the 25 worst bottlenecks in the city ranked by the total delay (in minutes per day) experienced by motorists during the course of driving in 2018. These locations currently experience poor LOS at some point during a typical day.

Rank	Location	Total Delay (minutes per day)
1	NB Santa Fe at Mineral	77,973
2	NB Santa Fe at Bowles	48,762
3	SB Santa Fe at Mineral	48,328
4	WB Mineral at Santa Fe	39,703
5	EB Main at Santa Fe	34,776
6	SB Santa Fe at Bowles	27,757
7	SB Broadway at Littleton Blvd	21,591
8	EB Bowles at Platte Canyon	20,120
9	EB Mineral at Santa Fe	17,380
10	NB Broadway at Mineral	16,019
11	NB Broadway at Dry Creek	14,538
12	EB Belleview at Santa Fe	14,498
13	NB Broadway at Littleton Blvd	14,049
14	WB Bowles at Santa Fe	12,877
15	SB Broadway at Mineral	11,323
16	SB Santa Fe at Belleview	10,582
17	NB Broadway at Arapahoe	10,562
18	WB Bowles at Platte Canyon	9,735
19	NB Platte Canyon at Mineral	9,496
20	SB Broadway at Dry Creek	7,659
21	WB Dry Creek at Broadway	7,310
22	WB Arapahoe at Broadway	6,953
23	EB Mineral at Platte Canyon	5,984
24	WB Mineral at Platte Canyon	5,751
25	WB Bowles at S Federal	5,672

Future Travel Demand

The Denver Regional Council of Governments (DRCOG) maintains a regional Travel Demand Model that is federally-mandated and used for transportation planning purposes. The current DRCOG TDM is referred to as the FOCUS model and is a tour-based TDM capable of projecting travel demand based on socio-economic data (land use), traveler behavior (where and when people make trips), mode choice (how people choose to make those trips), and network analysis (the most convenient ways to move around).

The DRCOG TDM was used to forecast future traffic volumes In Littleton to assess future needs and how they may differ from the needs of today. The model results were compared to real-world observations of traffic to make sure the model is accurately representing traffic in Littleton and adjusted where necessary.

In general, traffic in Littleton is expected to increase, as a result of increases in population in the region, including some in Littleton. Socio-economic data for Traffic Analysis Zones (TAZ's, which are geographic areas within the region) that are within or directly adjacent to Littleton are presented below. Note that these forecasts differ slightly from those presented in the Comprehensive Plan Update, due to the differences in geographic area and the source. The differences are minor between the two forecasts and are not expected to have an impact on the forecasted travel demand. The growth percentages are the total percent change in population expected by DRCOG in and around Littleton. These equate to about 1% to 1.5% growth per year.

	2020 Model	2040 Model	+/- Growth	% Growth
Population	61,249	73,208	11,959	20%
Households	27,017	32,610	5,593	21%
Employment	37,199	47,628	10,429	28%

As a result of this increase in nearby population, the TDM projects that overall vehicle miles traveled (distance traveled in a car, VMT) and vehicle hours traveled (time spent traveling in a car, VHT) are projected to increase in Littleton if no other measures are implemented to reduce them. Correspondingly, because the City has few programmed increases to

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roadway capacity, the amount of congestion is expected to increase as well. The table below illustrates this increase, which means that Littleton residents are likely to spend a much greater percentage of their travel time in congested conditions.

	2020 Model	2040 Model	+/- Growth	% Growth
VMT	1,109,785	1,222,104	112,319	10%
VHT	34,781	39,986	5,205	15%
Congested VMT	215,583	322,786	107,203	50%
Congested VHT	9,036	13,550	4,514	50%

The map below shows traffic counts – existing year traffic (vehicles per day) – and forecasted volumes – future year 2040 traffic (vehicles per day) – for the street network in Littleton. A process consistent with industry practice to produce these forecasts was followed to adjust the travel demand model's output. This allows us to forecast which streets are likely to be operating at a LOS that does not meet the standard set by the City. These locations are indicated on the map. In general, the segments that are projected to be over capacity are consistent with existing conditions where bottlenecks occur today.

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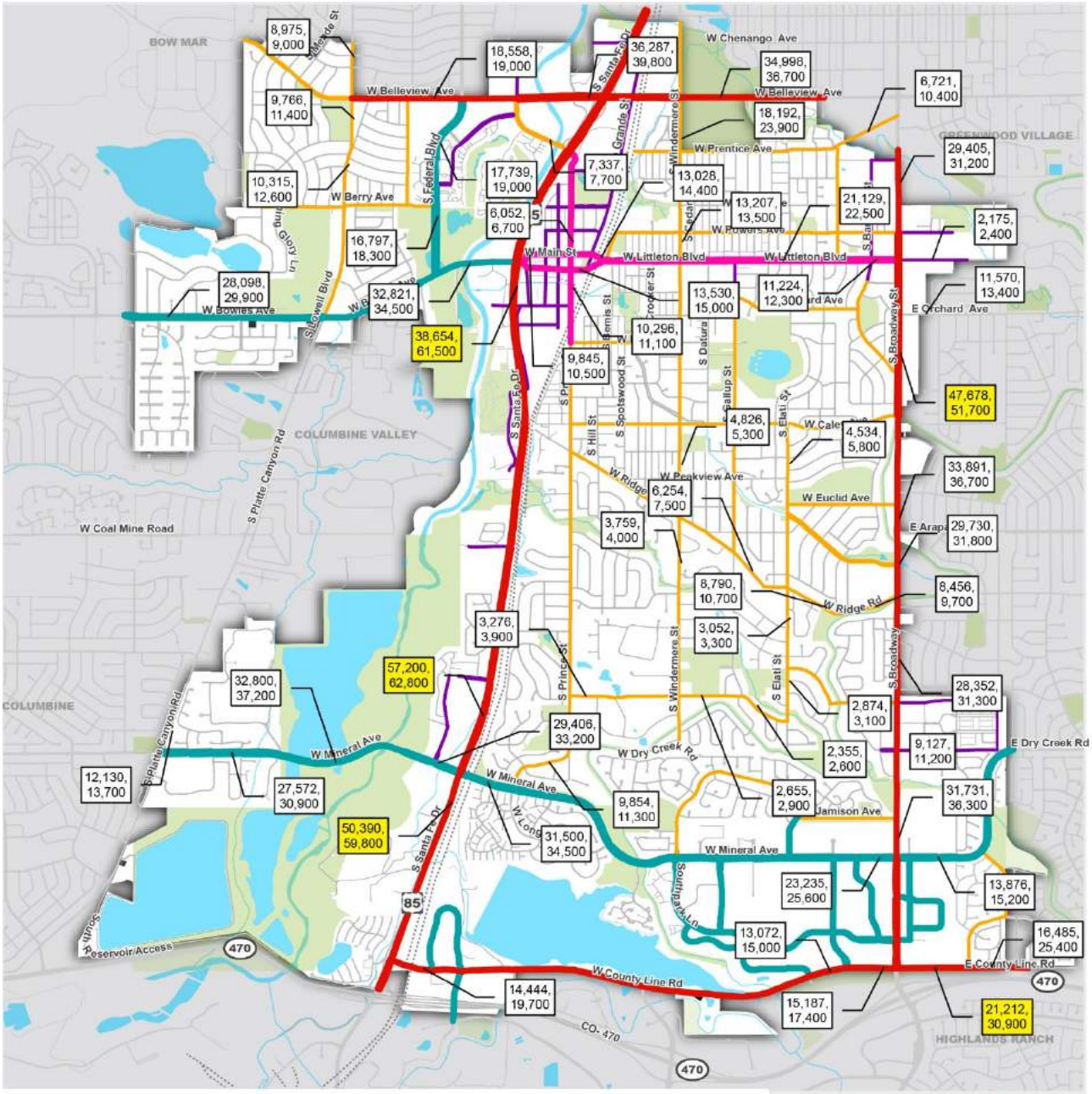
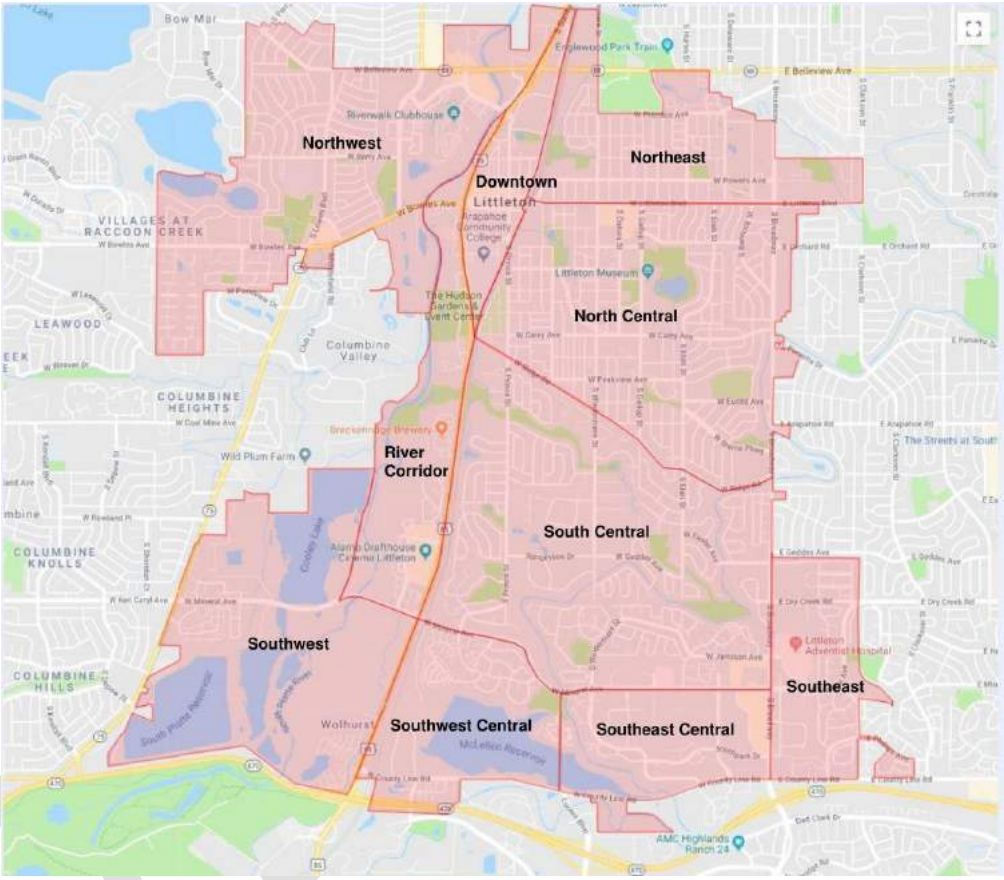


CITY OF LITTLETON
PROPOSED STREET TYPES WITH CURRENT AND FUTURE VOLUMES

Origin-Destination Analysis

Because Littleton is experiencing so many regional pressures, an origin-destination analysis was undertaken to better understand how traffic from the greater region is impacting Littleton's streets. A tool developed by Streetlight Data, Inc. was used to determine where traffic entering or exiting the city or moving within the city is going. In general, the analysis indicates that the public and stakeholder perception of through traffic contributing to the majority of the congestion along major corridors is supported by the data. Indeed, 43% of all trips that use a Littleton street at some point in their journey are what are referred to External-to-External or Pass-Through trips, having neither an origin nor a destination within the city. The graphics below summarize this data.



The city was divided into these districts for the analysis (note these are different than TAZs)

The key takeaways from this analysis are:

- Nearly half of all traffic entering the city on Broadway from the south heads east into Centennial. However, more than 11% continues through the city to the north while another 10% traverses the city to the west.
- People coming to Littleton from outside the city are generally destined for northern areas of the city.
- People leaving Littleton for other areas of the region are generally heading either north or east, with a slightly larger portion of travelers heading east.
- Eleven percent of people entering downtown at Bowles are destined for someplace within downtown. Other major origins/destinations include areas west and east of the city, accounting for 34% of traffic on Bowles/Alamo/Main east of Santa Fe.
- People on Littleton Blvd just east of downtown are generally headed in northern areas of the city or outside of the city, with even splits north, west, and east.
- The perception that Santa Fe Drive serves as a pass-through corridor seems to be confirmed by the data. Only 23% of people coming into the city along Santa Fe Drive from the south have a destination within the city.
- Though not as pronounced as the NB direction, SB Santa Fe still serves as a pass-through corridor. Only 42% of people coming into the city along Santa Fe Drive from the north have a destination within the city.

Freight

The City maintains a truck route map that identifies corridors that are appropriate for heavy vehicle use. This map is posted on the City website and is available for reference for freight haulers.

A review of the map was conducted for this plan. No changes are proposed to the Truck Route Map at this time. The map can be found in the Recommendations chapter as the Truck Overlay.

BARRIERS

The major physical barriers to auto and freight travel in Littleton are the South Platte River, Santa Fe Drive/Rail corridor, and some suburban neighborhoods that lack connectivity.

South Platte River: In Littleton, the only four roadways offering bridged crossings of the South Platte River include Mineral Avenue, Bowles Avenue, Prince Street, and Belleview Avenue. Particularly, the over two mile separation between the Bowles Avenue and Mineral Avenue crossings results in a funnelling of a great deal of traffic on to those two east-west corridors.

Santa Fe Drive/Rail Corridor: Again, between Mineral Avenue and Bowles Avenue/Main Street, crossings of the rail corridor and intersections with Santa Fe Drive are limited. This means that Prince Street serves as the only other viable route between the southern parts of the city and Downtown. When Santa Fe Drive is congested or an incident occurs, Prince Street is the alternate route and experiences traffic flows that are inconsistent with the classification and design.

Suburban Neighborhoods: Some neighborhoods in the southern part of the city have circuitous streets that lack connectivity to the roadway grid network and to each other. This results in additional traffic being forced onto neighborhood connector streets that are intended to serve a minimal local area.

SAFETY

As the City's roadway network carries more traffic due to regional and local growth, the safety of those traveling within the City will continue to be a top priority. The major current crash locations are shown in the Existing City chapter, and are generally in locations that are congested. Between 2014 and 2018, a total of 5,089 crashes occurred in the city, with 418 resulting in injuries. Locations where a high number of crashes result in injuries have been identified as the High Injury Network (HIN). Any intersection where 5 or more injury crashes occurred in the 5-year analysis period qualifies. The HIN list of intersections is shown in the table below.

A map summarizing the HIN and Bottleneck intersections is shown on the next page. These locations are the prime candidates for safety improvements.

High Injury Network (2014 to 2018)

Intersection	# of Crashes	Injury Crashes	% of Crashes at Intersection Resulting in Injury	# of Bike Crashes	# of Ped Crashes
Santa Fe Dr & Prince St	114	13	11%	0	0
Bowles Ave & Federal Blvd	106	12	11%	2	1
Belleview Ave & Prince St	56	11	20%	1	5
Broadway & County Line Rd	90	9	10%	0	0
Broadway & Mineral Ave	92	8	9%	0	1
Mineral Ave & Platte Canyon Rd	42	8	19%	2	0
Mineral Ave & Jackass Hill Rd	39	7	18%	7	3

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High Injury Network (2014 to 2018)					
Intersection	**# of Crashes**	**Injury Crashes**	**% of Crashes at Intersection Resulting in Injury**	**# of Bike Crashes**	**# of Ped Crashes**
Broadway & Littleton Blvd	86	6	7%	1	0
Broadway & Grant Way	43	6	14%	0	0
Belleview Ave & Federal Blvd	26	6	23%	0	0
Broadway & Jamison Ave	14	5	36%	1	0
Santa Fe Dr & Mineral Ave	161	5	3%	1	1
Santa Fe Dr & County Line Rd	59	5	8%	0	0
Santa Fe Dr & Bowles Ave	135	5	4%	1	0

PARKING

Throughout the Envision Littleton process, parking downtown is identified as an issue by stakeholders and residents. Downtown is currently served by a combination of on-street parking, off-street private parking lots, some off-street public parking lots, and a few privately owned valet parking services. This plan is not focused on parking but recognizes the importance of parking to the community from an economic standpoint and expectation for convenience and viability. It is recommended that parking be addressed in an upcoming Downtown Mobility Plan.

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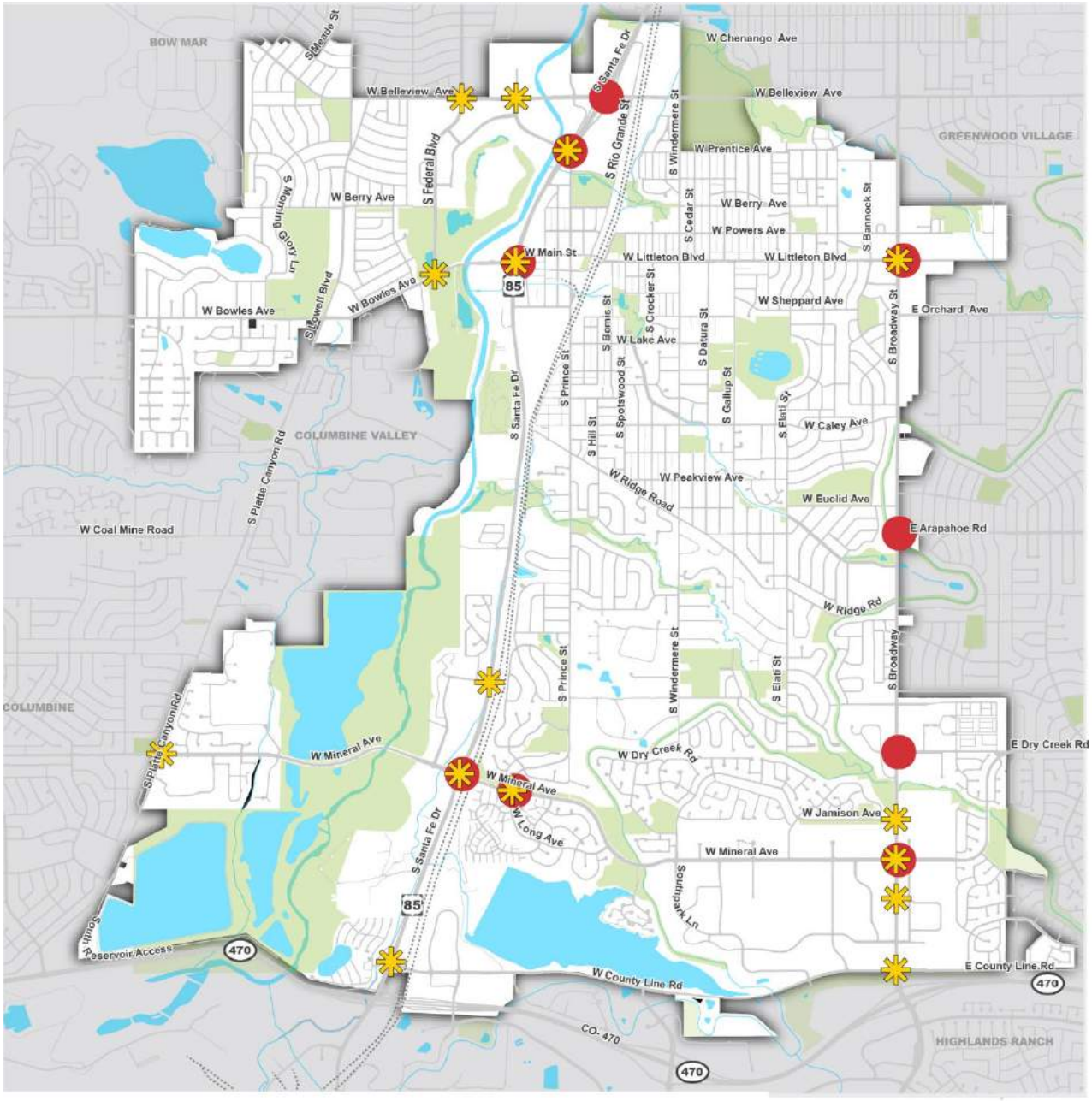

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads
- High Injury Network
- Bottleneck Locations

CITY OF LITTLETON
HIN AND BOTTLENECK INTERSECTIONS

FRAMEWORK FOR ACTION

The framework for action below is organized in three tiers: (1) Goals, (2) Policies, and (3) Actions. All are intended to mesh with and support the other aspects of this Transportation Master Plan.

GOALS

- Consistent with the Connected and Inclusive Guiding Principles, automobile (auto) and freight mobility is also important to the City's transportation goals. These modes of travel serve needs that are difficult to serve with other modes. Auto trips can be longer and more convenient than trips by active transportation modes or transit. Freight movements allow us to conduct commerce efficiently. Complete Auto and Freight networks support the City's goals:
- **Connected:** Auto and Freight networks provide connectivity that is otherwise difficult to provide through other modes, providing point-to-point access to jobs and destinations throughout the region..
- **Healthy:** It is increasingly important that people are connected to health care services in a reliable and convenient manner, particularly as our population ages.
- **Inclusive:** People who are unable to walk, bike, or otherwise use an active or transit mode should have access to transportation options that give them freedom of mobility for their daily needs.
- **Prosperous:** Our auto and freight networks provide the point-to-point long-haul and local service needed to conduct commerce and are the backbone for economic development.
- **Sustainable:** the auto and freight networks in the city are already mostly built and generally require only maintenance and operations to continue to serve their purpose. Improvements to these networks can be accomplished with incremental steps. The City should advocate for measures that encourage autos and trucks to transition to technology that does not harm the environment.

Improving the city's auto and freight networks is consistent with the following goals and objectives:

No.	Topic	Objective	Related Goals				
			Connected	Healthy	Inclusive	Prosperous	Sustainable
1	Quality of Life	Achieve high resident satisfaction rates with transportation services	●		●	●	●
4	Quality of Life	Provide transportation infrastructure that meets local business needs				●	●
5	Community	Provide transportation facilities that are well integrated with land use and character				●	
12	Mobility	Provide a reliable transportation system	●			●	
16	Mobility	Provide travelers with relevant, timely information	●	●	●		
28	Auto	Provide a well-connected automotive network	●			●	
29	Auto	Provide for safe automobile travel		●		●	

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No.	Topic	Objective	Related Goals				
			Connected	Healthy	Inclusive	Prosperous	Sustainable
30	Auto	Provide a resilient and responsive traffic operations system	●				●
34	Freight	Provide a reliable freight network	●			●	
35	Freight	Provide a well-connected freight network	●			●	
36	Freight	Provide a safe freight network		●		●	

The community has consistently identified traffic congestion as the most important issue facing the city from a transportation perspective. Traffic volumes on major roadways have increased dramatically in the last two decades as development pressures to the south have mounted. This has impacted not only those major roadways but also local streets and neighborhood connector streets, as drivers search for alternate routes to avoid congestion. These pressures are expected to continue to increase as more regional development and growth occurs. Major developments like Sterling Ranch, expected to consist of more than 12,000 additional homes south of C-470 in Douglas County, have already started to influence traffic in Littleton.

POLICIES

In making decisions that involve public resource allocation, regulatory matters, and physical improvements, among others, Littleton will:

1. Focus on developing safe auto and freight networks.
2. Advance regional partnerships to build consensus and leverage funding toward significant transportation projects.
3. Provide automobile Level of Service (LOS) E or better on Suburban Connectors and Commercial Corridors and LOS D or better on all other streets .
4. Prioritize auto and freight network projects that lead to operational and safety improvements.
5. Prioritize the safety of vulnerable user groups on streets and trails.
6. Support connections to employment, retail, and entertainment/recreation land uses given the opportunity.
7. Develop street design and construction standards that prioritize safety and mobility, not speed.
8. Develop a Transportation Demand Management policy as a tool to help reduce congestion.
9. Maintain and periodically update the truck route map.

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ACTIONS

The actions below convey tangible steps that will lead to achievement of the goals in line with the stated Policies.

Capital Investments

Capital investments are under development and will be included in the packet materials for the September 10, 2019 Joint Leadership study session, provided on www.envisionlittleton.org on September 9, 2019, and in the final draft of this Transportation Master Plan.

Programs and Initiatives

1. Develop and utilize a traffic operations and safety checklist of inexpensive operational and safety improvements that can be implemented as part of other infrastructure investments.
2. Develop a Transportation Demand Management program focused on reducing peak hour congestion through Littleton.
3. Create and maintain an Incident Management Plan.
4. Explore the feasibility of a Traffic Management Center, ideally partnering with adjacent municipalities and other agencies.

A strategic **Action** priority is aimed at seizing a special opportunity or addressing a particular challenge one faces, given limited resources – financial and otherwise – and recognizing that a broader agenda of new or ongoing activities will also be pursued in the meantime.

Regulations and Standards

5. Develop new street design standards for the new street classifications consistent with current industry best practices.

Partnerships and Coordination

6. Maintain partnerships with adjacent municipalities for the US 85 (Santa Fe Drive) Planning and Environmental Linkages (PEL) study.
7. Pursue partnering with Douglas County, Arapahoe County, and Jefferson County on improvements in their jurisdictions that will benefit Littleton residents and businesses.

More Targeted Planning / Study

8. Additional planning for the following corridors:
    a. Santa Fe Drive – the US 85 PEL is expected to kick off in 2019 or 2020, in coordination with CDOT and other regional partners. Littleton should take a leadership role in that study.
    b. Littleton Boulevard – building on past planning and the vision of the corridor outlined in the Comprehensive Plan, a Littleton Boulevard study should be conducted to evaluate opportunities for multimodal improvements.
    c. Broadway – partnering with Centennial and RTD
    d. Prince Street
    e. Windermere Street
    f. Ridge Road
    g. Bowles Avenue
    h. Belleview Avenue – building on past planning including the recently completed framework study
9. Additional planning for the intersections identified as having safety and operational issues. These should be evaluated in detail to identify cost-effective and implementable solutions.

POTENTIAL PARTNERS

Partners for implementation of plan priorities related to Land Use and Community Character include:

- Area real estate and development community
- Denver Regional Council of Governments
- Regional Transportation District
- SouthPark Owners Association
- South Platte Working Group
- South Suburban Parks and Recreation District
- Tri-County Health Department
- Arapahoe, Douglas, and Jefferson Counties
- Colorado Department of Transportation (CDOT)

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STATE OF THE PRACTICE

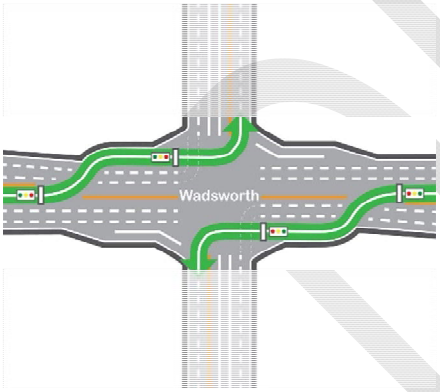
Many municipalities and agencies are encountering increased traffic congestion on their streets. Our cities continue to grow and mobility is seen as an essential freedom. Because cars take up a lot of space on our streets, compared to other modes, cities have begun to look for ways to provide the additional auto capacity needed through innovative operations and management, as well as through innovative, non-traditional engineering solutions. These innovations have been taking the place of traditional capacity expansions in many cities and will continue to be improved upon. As Littleton searches for ways to optimize the use of limited right-of-way and time, while providing a system that we can afford to maintain, it will be incumbent upon the City to utilize these new strategies. A short sampling of these strategies is provided below, as a start to a toolkit for the City moving forward. Other resources for these solutions are available.

NON-TRADITIONAL INTERSECTIONS

The following non-traditional intersection improvements and reconfigurations should be considered to improve operations.

Roundabouts: roundabouts can improve operations in many locations where un-due delay is caused by either stop-controlled intersections or traffic signals. Roundabouts can improve traffic flow by nearly eliminating delay when no opposing traffic is present. They also have major safety benefits, reducing the occurrence of crashes that result in injury by 51%.

Typical cost: $1 million to $2 million



Continuous Flow Intersection (CFI): CFI's, or Displaced Left Turn Intersections (DLTI), are a way for cities to expand capacity at an intersection without greatly increasing the intersection footprint. These intersections require additional signals to allow left turns to move to the opposite side of the road prior to the intersection, and then travel through the intersection at the same time as through traffic. These intersections are generally less expensive than massive reconstruction projects, and can work in situations where major corridors intersect.

Typical Cost: $10 million to $15 million

Quadrant Roadway Intersection: a Quadrant Roadway can facilitate left turn movements in locations where heavy left turns cause congestion. These intersections route some or all left turn traffic to a separate roadway and allow the main intersection to simplify signal timing and increase traffic flow.

Typical Cost: $5 million to $15 million

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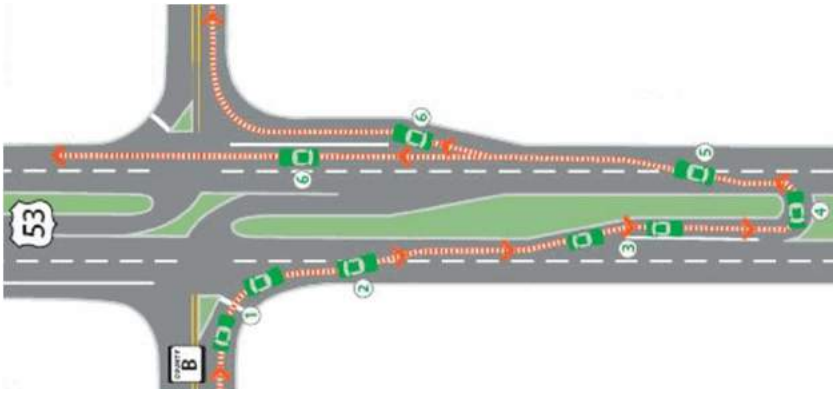

Median U-turn Intersection, Restricted Crossing U-turn Intersection, and others

There are other non-traditional intersection types that the City should consider where appropriate, which have varying costs and applications. Many of these simplify operations at the main intersection while providing turn movements via new routes.

Typical cost: $5 million to $15 million

OPERATIONAL IMPROVEMENTS

More efficiently operating the current system can allow the City to squeeze every bit of capacity out of the roadway network it has, at low cost. Strategies, some of which the City already implements, include:

- Traffic signal re-timing: adjusting the timing and phasing of signals and providing better coordination between signals so they operate in sync with each other should be performed periodically. Typical cost: $5,000 per signal.
- Adaptive signal control: install signal detection and communications technology to allow signal timing software to continuously adjust signal timings based on real-time conditions. Typical cost: $20,000 to $50,000 per signal (USDOT).
- Planned Special Event Traffic Management: implement a traffic management program for special events.
- Road Weather Management: implement a management program to handle weather events.
- Incident Management: implement a management program to respond to traffic incidents, including crashes.
- Active Traffic Management: actively manage traffic control devices during periods of congestion through the use of communications technology and Traffic Operations Center.

SAFETY IMPROVEMENTS

Safety innovations are focused on vulnerable users (pedestrians and bicyclists), as well as addressing issues like distracted driving and aggressive driving. In general, to improve safety, projects are focused on ways to reduce vehicle speeds, and increase driver awareness of people on foot and on bikes.

Vulnerable user safety improvements are discussed in the Active Transportation section.

Operational improvements can also improve safety by decreasing speed differentials and reducing the occurrence of congestion-related crashes.

Geometric improvements, such as improving curves, adding turn lanes, traffic calming, and other treatments can improve safety by reducing the occurrence of and severity of crashes. Signal timing adjustments can also be used to improve safety where congestion or poor signal coordination contributes to crash frequency.

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Chapter 5.
Active transportation

Developing safe and comfortable walking and bicycling networks has become a much higher priority in many U.S. cities in the past decade. There is a new emphasis on creating “low-stress” walking and bicycling networks in U.S. cities. Low-stress means that people of all ages and abilities feel comfortable walking or bicycling. Because of this new emphasis, the best practices for evaluating and designing walking and bicycling networks have changed with an emphasis on quality in addition to connections to destinations. Historically, walking networks have been built to design minimums resulting in less-than ideal sidewalks and crossings and often challenging conditions for people using wheelchairs or other mobility aids. Likewise, bicycle networks have also been built with minimal resources resulting in bike facilities that only work for the small percentage of people who are comfortable bicycling on almost any type of street with or without dedicated space for bicyclists. Most recently, micromobility devices have become more popular including electric scooters, electric bikes, hoverboards, and electric skateboards. This chapter is focused on considering the needs of people walking, biking, and rolling in the City of Littleton.

LEGACY OF PAST PLANNING

A number of recent plans have made recommendations for improving Active transportation in the City of Littleton. Below are some common themes and the studies that presented them.

Common Themes from Existing Plans

- Make Littleton pedestrian friendly by extending pedestrian network, adding pedestrian bridges, extending sidewalks and improve existing sidewalks.
- Improve connections between downtown/river corridor/parks/trails.
- Complete streets/road diet/traffic calming where appropriate.
- Improve bike facilities.
- Improve multimodal connections between commercial locations/residential developments.
- Improve trail network for transportation around and out of city.
- Improve intersection crossings.
- Improve connections to light rail.
- Implement traffic calming strategies in neighborhoods.

Littleton Plans & Studies

- Citywide Plan (2014)
- Belleview Avenue Corridor Vision (2018)
- Bicycle and Pedestrian Master Plan (2011)
- Broadway Corridor Study (2009)
- Downtown Neighborhood Plan (2011)
- City of Littleton Parks, Recreation, and Trails Master Plan (2016)
- Neighborhood Traffic Management Program (not dated)

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2011 BICYCLE AND PEDESTRIAN MASTER PLAN

The most relevant past plan to Active transportation is the 2011 *City of Littleton Bicycle and Pedestrian Master Plan*. This plan conducted extensive outreach, inventoried existing bicycle and pedestrian facilities, and made project and program recommendations for improving walking and bicycling in the City of Littleton. Progress on key recommendations is shown below:

Sample list of 2011 Pedestrian Recommendations:

Recommendation	Progress
Pedestrian intersection improvements at Federal/Bowles intersection	Planned for fall of 2019
Pedestrian signals at Federal and Berry Ave	Curb ramps installed in 2015, full signal installation planned for Spring 2020
Actuated crossing (RRFB) at Prince St/Jackass Hill and High Line canal trail spur crossing (south of Sunset Drive)	RRFB planned for installation in 2020; in-street yield to pedestrian sign installed.
Actuated crossing (RRFB) at Prince St and Lee Gulch Trail crossing (near Briarwood Ave)	Complete
Install stairs connecting Mineral Ave elevated sidewalk on east side of LRT tracks up to social path on Jackass Hill behind subdivision	Planned, year to be determined

Sample list of 2011 Bicycle Recommendations

Recommendation	Progress
Install “L” bicycle routes throughout City of Littleton	Complete
Online bike route mapping	Complete
Coordinate with SRTS to create a back-to-school packets giving info on biking to and from school	Incomplete
Create an educational video about bicycling in Littleton	Complete
Install bicycle route wayfinding signage including destinations	Incomplete
Add more bicycle parking downtown	Complete

KEY ISSUES AND CONSIDERATIONS

Input and discussions for this Transportation Master Plan, through varied *Envision Littleton* community engagement activities, workshops with City Council and Planning Commission, and interaction with other City boards/commissions, City departments, and partner agencies and organizations, yielded the following list of key items that relate to the active transportation network:

- **Existing Pedestrian Infrastructure**: Currently the City of Littleton has great walking infrastructure downtown and along the Mary Carter Greenway but some challenges exist walking along and crossing arterial streets.
- **Existing Bicycle Infrastructure**: There is a strong trail system that connects the City of Littleton to the rest of the region, however, there is a lack of low-stress bicycle facilities to make local connections.

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- **Complete Bicycle and Pedestrian Networks**: There is a strong desire to improve bicycle and pedestrian networks to make it easier to cross Santa Fe Drive and to connect to downtown Littleton.

LEVEL OF SERVICE

Multiple level of service measures are documented in this Active transportation chapter. Moving forward, the City of Littleton should continue to update measures of serving pedestrians and bicyclists. The key measurements to update are:

1. Pedestrian Level of Traffic Stress (for sidewalks and crossings)
2. Walksheds to high-frequency transit stops and schools
3. Bikesheds to high-frequency transit stops and schools

EXISTING NETWORK EVALUATION

In order to understand how existing walking and bicycling facilities are serving the Littleton community two quality analyses were conducted: *Pedestrian Level of Traffic Stress* and *Bicycle Level of Traffic Stress*. Additionally, multiple network coverage analyses were conducted for walking and bicycling to and from schools and RTD light rail stations. These analyses were conducted based on guidance from the 2018 *FHWA Guidebook for Measuring Multimodal Network Connectivity*.

Pedestrian Analysis

Pedestrian Level of Traffic Stress
In order to quantify the experience of walking along streets in different parts of the city of Littleton, a Pedestrian Level of Traffic Stress analysis was conducted. The Pedestrian Level of Traffic Stress (PLTS) method was developed by the Oregon Department of Transportation. This method uses up to 14 data inputs about sidewalks, streets, and intersections to determine how stressful it typically is for someone to use a sidewalk or street crossing. A simplified PLTS network analysis was completed using the sidewalk network layer. Due to data limitations, segments and intersections were assigned a PLTS score using sidewalk width, adjacent land use, and presence of a traffic control device at a crossing of a collector or arterial street. The PLTS method helps decision-makers understand the experience of walking along individual street segments and determines whether the experience is low-stress enough for anyone to use or so high-stress that people will likely avoid walking along a street in that area unless it is the only way to go from point “a” to point “b”. Definitions of each PLTS level are shown below.

Oregon DOT Pedestrian Levels of Traffic Stress (PLTS)

PLTS 1: Represents little to no traffic stress and requires little attention to the traffic situation. This is suitable for all users including children 10 years or younger, groups of people and people using a wheeled mobility device (WhMD). The facility is a sidewalk or shared-use path with a buffer between the pedestrian and motor vehicle facility. Pedestrians feel safe and comfortable on the pedestrian facility. Motor vehicles are either far from the pedestrian facility and/or traveling at a low speed and volume. All users are willing to use this facility.

PLTS 2: Represents little traffic stress but requires more attention to the traffic situation than of which young children may be capable. This would be suitable for children over 10, teens and adults. All users should be able to use the facility but, some factors may limit people using WhMDs. Sidewalk condition should be good with limited areas of fair condition. Roadways may have higher speeds and/or higher volumes. Most users are willing to use this facility.

PLTS 3: Represents moderate stress and is suitable for adults. An able-bodied adult would feel uncomfortable but safe using this facility. This includes higher speed roadways with smaller buffers. Small areas in the facility may be impassable for a person using a WhMD and/or requires the user to travel on the shoulder/bike lane/street. Some users are willing to use this facility.

PLTS 4: Represents high traffic stress. Only able-bodied adults with limited route choices would use this facility. Traffic speeds are moderate to high with narrow or no pedestrian facilities provided. Typical locations include high speed, multilane roadways with narrow sidewalks and buffers. This also includes facilities with no sidewalk. This could include evident trails next to roads or ‘cut through’ trails. Only the most confident or trip-purpose driven users will use this facility.

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In the City of Littleton, the majority of sidewalks are PLTS 3 or 4 (See table at right).

PLTS	Miles	Percent
1	64	20%
2	48	15%
3	61	19%
4	145	46%

Most of the sidewalks that are PLTS 3 or PLTS 4 are located in residential areas and were given that score because they are 4 feet wide or narrower. In the downtown area many of the sidewalks are PLTS 1 or PLTS 2 but some are PLTS 3 or PLTS 4 further away from Main Street. The majority of sidewalks along collector and arterial streets are PLTS 1 or PLTS 2. A map showing results of the PLTS analysis is shown on the next page.

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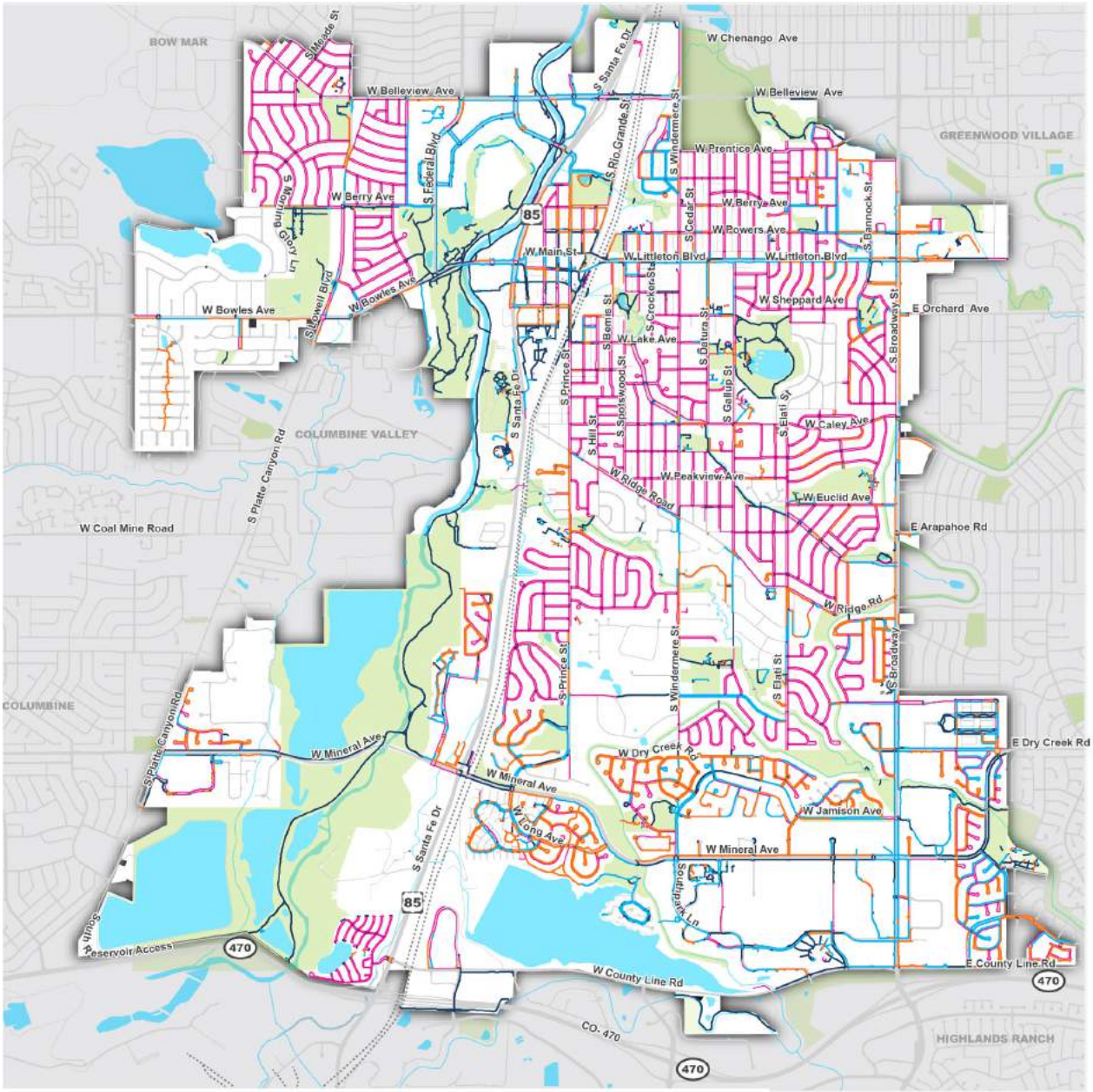

TRAILMARK NEIGHBORHOOD

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads
- PLTS - 1/Little to No Traffic Stress
- PLTS - 2/Little Traffic Stress
- PLTS - 3/Moderate Traffic Stress
- PLTS - 4/High Traffic Stress

CITY OF LITTLETON
PEDESTRIAN LEVEL OF TRAFFIC STRESS

Walksheds

A walkshed analysis was completed to understand the current walking connections to schools and RTD light rail stations. In this case, the sidewalks and trails within the City of Littleton were used as a network along which to route trips of specific distances. Currently 33% of Littleton households are within a half-mile walk of a primary, secondary, or higher education facility. A half-mile walkshed roughly equates to a 10-15 minute walk depending on the walking speed. This distance is used as a standard in determining the walkability of an area (sometimes a 5 minute or ¼ mile walkshed is used – most commonly for measuring connections to bus service). The walkshed coverage map below shows the results of this analysis. The existing walkshed coverage is quite good, though dead-end streets or missing sidewalks reduce the full potential walkshed coverage in some areas.

Currently, 6% of Littleton households are within a half-mile walk of the Mineral or Littleton Downtown RTD Light Rail stations, which are the only high frequency transit stops in the City. Walkshed coverage to the Littleton Downtown station is quite good, though the rail lines create a barrier for neighborhoods to the southeast of the station resulting in walking out of direction along Prince Street or Littleton Boulevard to get to the station. The Mineral Station walkshed coverage is poor in comparison due to its placement adjacent to the Santa Fe and Mineral Ave intersection and the lack of a traditional street grid in the vicinity of the station. Walking to the Mineral station also requires out of direction travel for many households within a half-mile.

Maps of the walksheds are shown on the following two pages.

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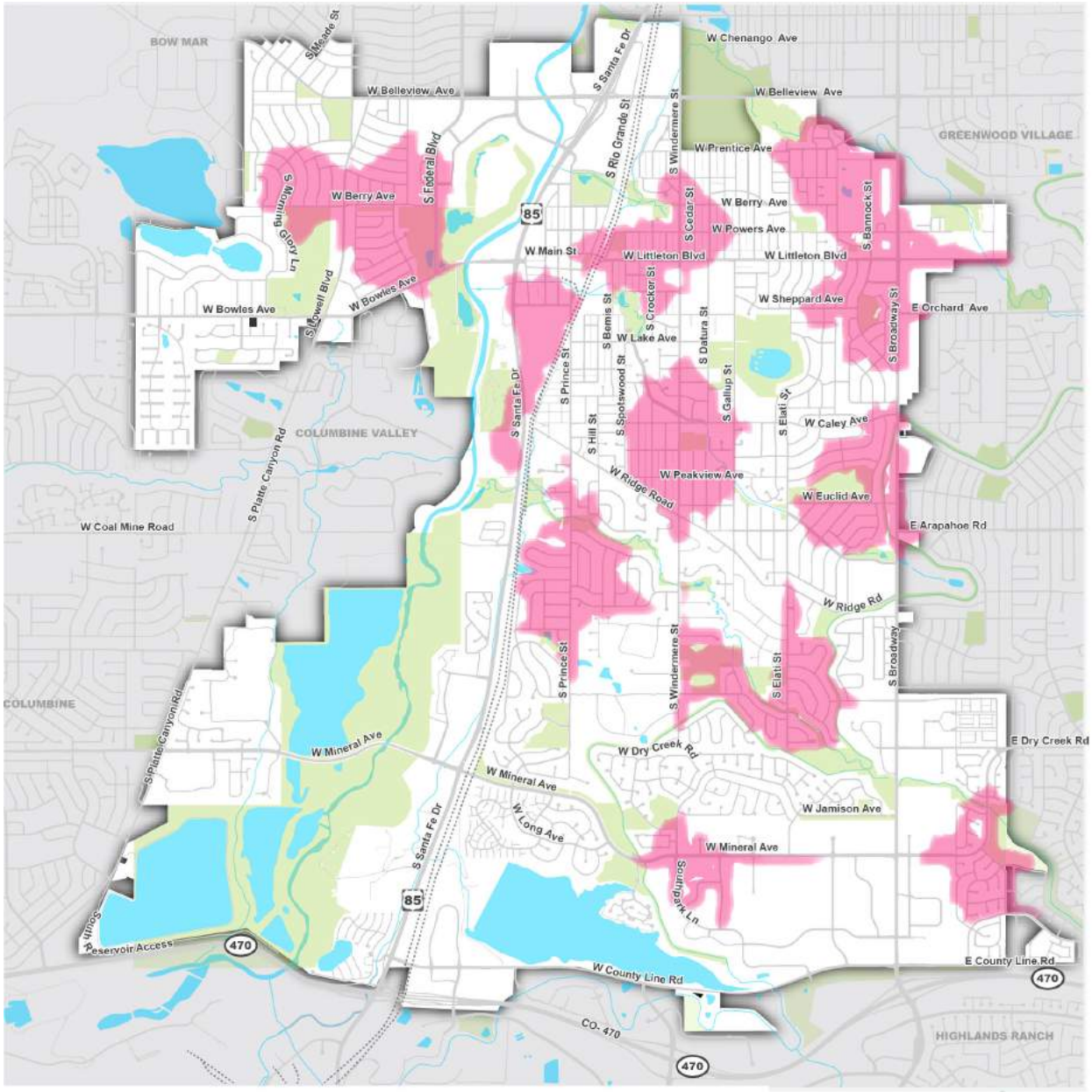


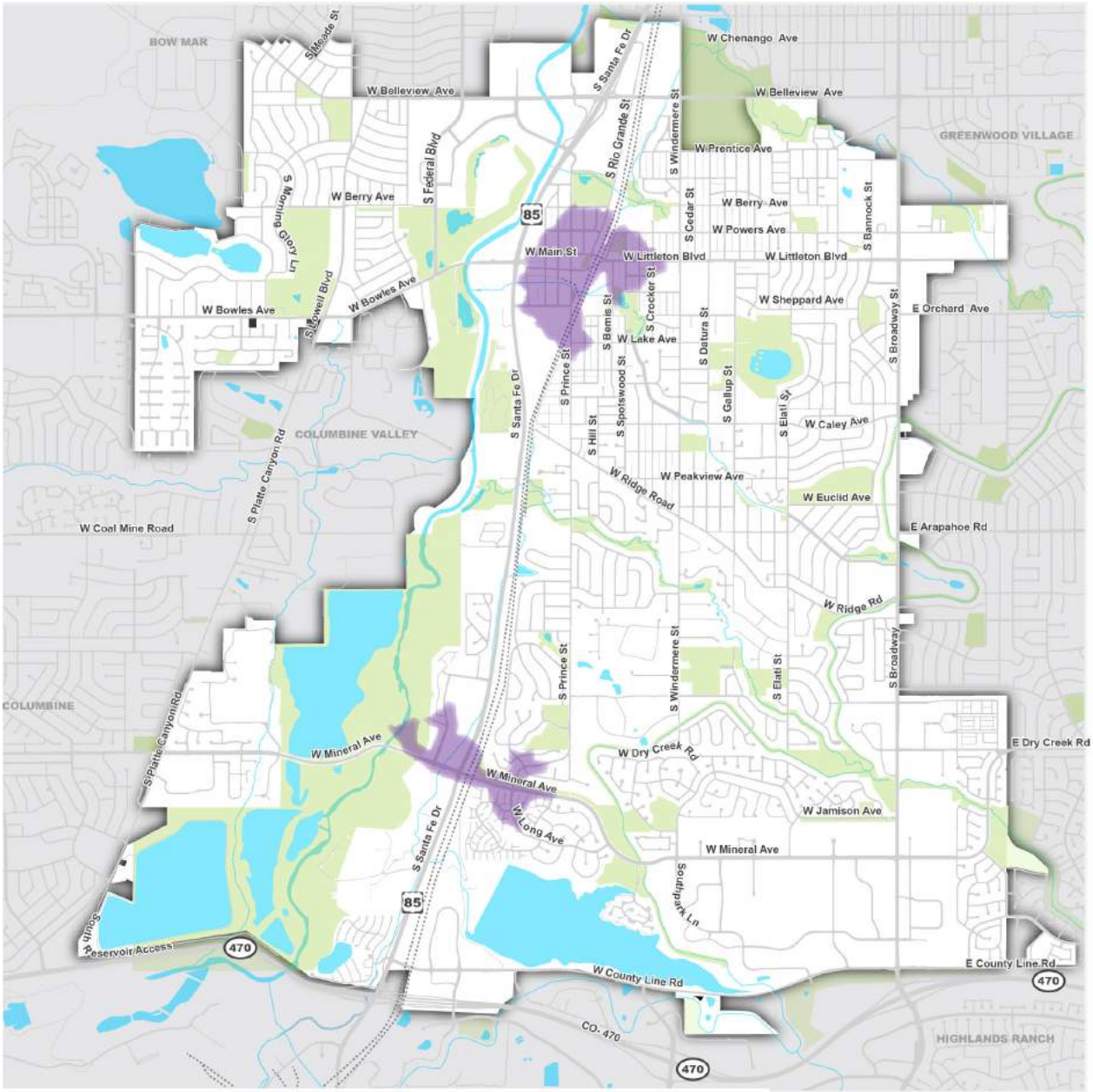
TRAILMARK NEIGHBORHOOD

33% of Littleton households are within a half-mile walk of a primary, secondary, or higher education facility.

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads
- ½ Mile Walkshed to Education Facility

CITY OF LITTLETON
½ MILE EDUCATION FACILITY WALKSHEDS



TRAILMARK NEIGHBORHOOD

6% of Littleton households are within a half-mile walk of the Mineral or Littleton Downtown RTD Light Rail stations, which are the only high frequency transit stops in the City

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads
- ½ Mile Walkshed LRT Station

CITY OF LITTLETON
½ MILE LRT STATION WALKSHEDS

Bicycle Analysis

Bicycle Level of Traffic Stress

The Bicycle Level of Traffic Stress (BLTS) method was developed in the 2012 Mineta Transportation Institute report *Low Stress Bicycling and Network Connectivity*. The inputs for this method are bicycle facility type, such as sharrows, bike lanes, protected bike lanes, and separated paths, and other street data such as traffic speed, volume, and curbside use. The analysis is intended to help determine whether a child, an average person, or only the most confident bicyclists would bicycle along a street. A simplified Level of Traffic Stress analysis was completed for streets and trails in the City of Littleton. In this case, the analysis was simplified to “low-stress” or “not low-stress" due to data limitations. Low-stress bicycle facilities were defined as:

- Off-street trails (paved or unpaved)
- Local streets, or
- Shared lanes or bike lanes on streets with a speed limit of 25 or 20 miles per hour and with less than 4,000 ADT

There are currently 60 miles of low-stress bicycle facilities in the City of Littleton.

Existing Low-Stress Bicycle Facilities

Type	Miles
Bike Lane	2
Bike Shoulder	1
Local Street	2
Trails	50
Shared Lane	3
Shared Parking/ Bike Lane	2
Total	**60**

The results of the analysis below show the existing low-stress bicycle network, and identification of key gaps in the network. There is a strong existing trail system and plenty of low traffic volume streets in the city, but collector and arterial streets pose a barrier both to cross and to travel along for bicyclists. The most direct routes to travel for bicyclists currently tend not to be low-stress facilities. There are 28 miles of projects proposed to complete the low-stress bicycle network in the City of Littleton. These are summarized in the table below and shown in the map on the following page.

Proposed New Low-Stress Bicycle Facilities

Type	Miles
Advisory Bike Lane	2
Bike Lane	1
Buffered Bike Lane & Traffic Calming	2
Protected Bike Lane	14
Shared Use Path	8
Total	**28**

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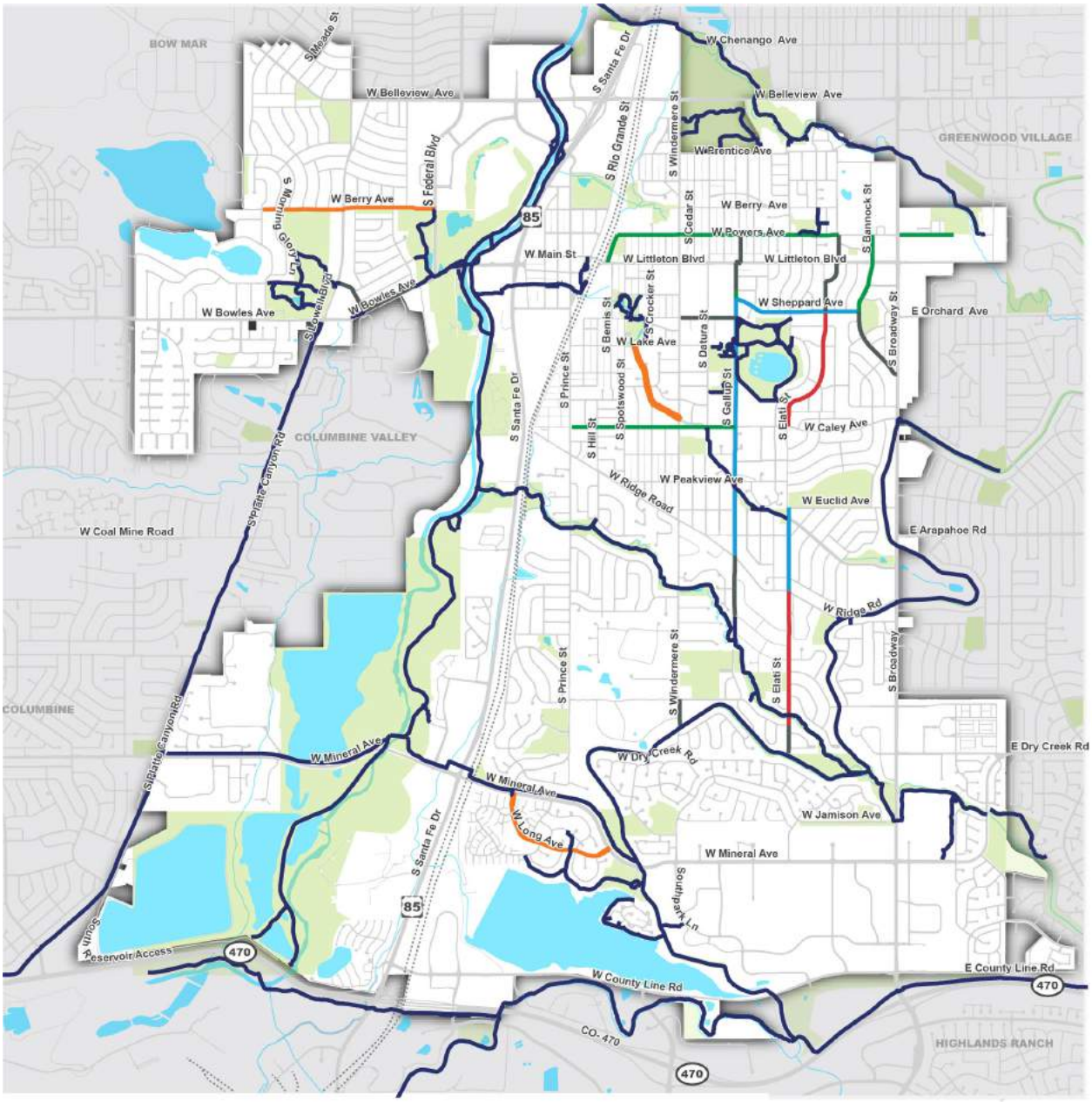

TRAILMARK NEIGHBORHOOD

0.5 1 Miles

- Bike Trail
- Local Street Connection
- Bike Lane
- Shared Lane
- Bike Trail
- Bike Shoulder

- City of Littleton
- Parks and Open Space
- Water
- Railroads

CITY OF LITTLETON
LOW STRESS BIKE NETWORK

Bikesheds

Using the low-stress bicycling network identified above, bikeshed analyses were completed for access to schools and the RTD light rail stations. Currently, 21% of Littleton households are within a half-mile low-stress bike ride of primary, secondary, or higher education facilities. This is relatively low, especially compared to the walkshed analysis shown previously. This number is low because of the lack of low-stress bicycle facilities on collector and arterial streets which pose a barrier to bicycling.

Currently, 15% of Littleton households are within a 2-mile low-stress bike to the Mineral or Littleton Downtown RTD Light Rail stations. A 2-mile bike ride is a typical bicycle shed distance as it takes the average rider roughly 10 minutes which is the same amount of time as the ½ mile walkshed discussed previously. The existing bikeshed coverage is primarily routed along existing trails, and a lack of on-street low-stress bicycle facilities to connect to the stations reduces the potential bikeshed coverage.

Maps of the walksheds are shown on the following two pages.

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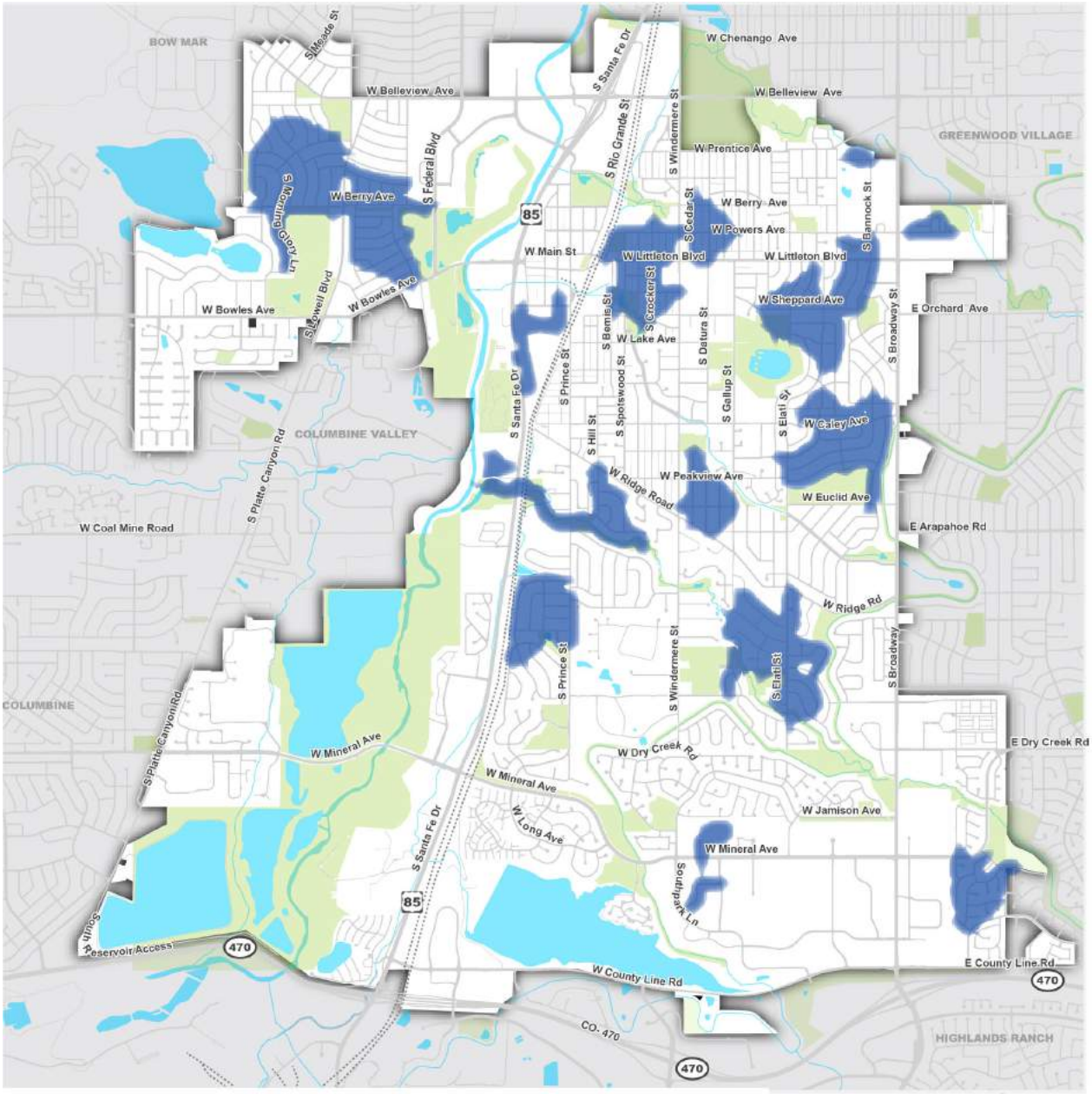


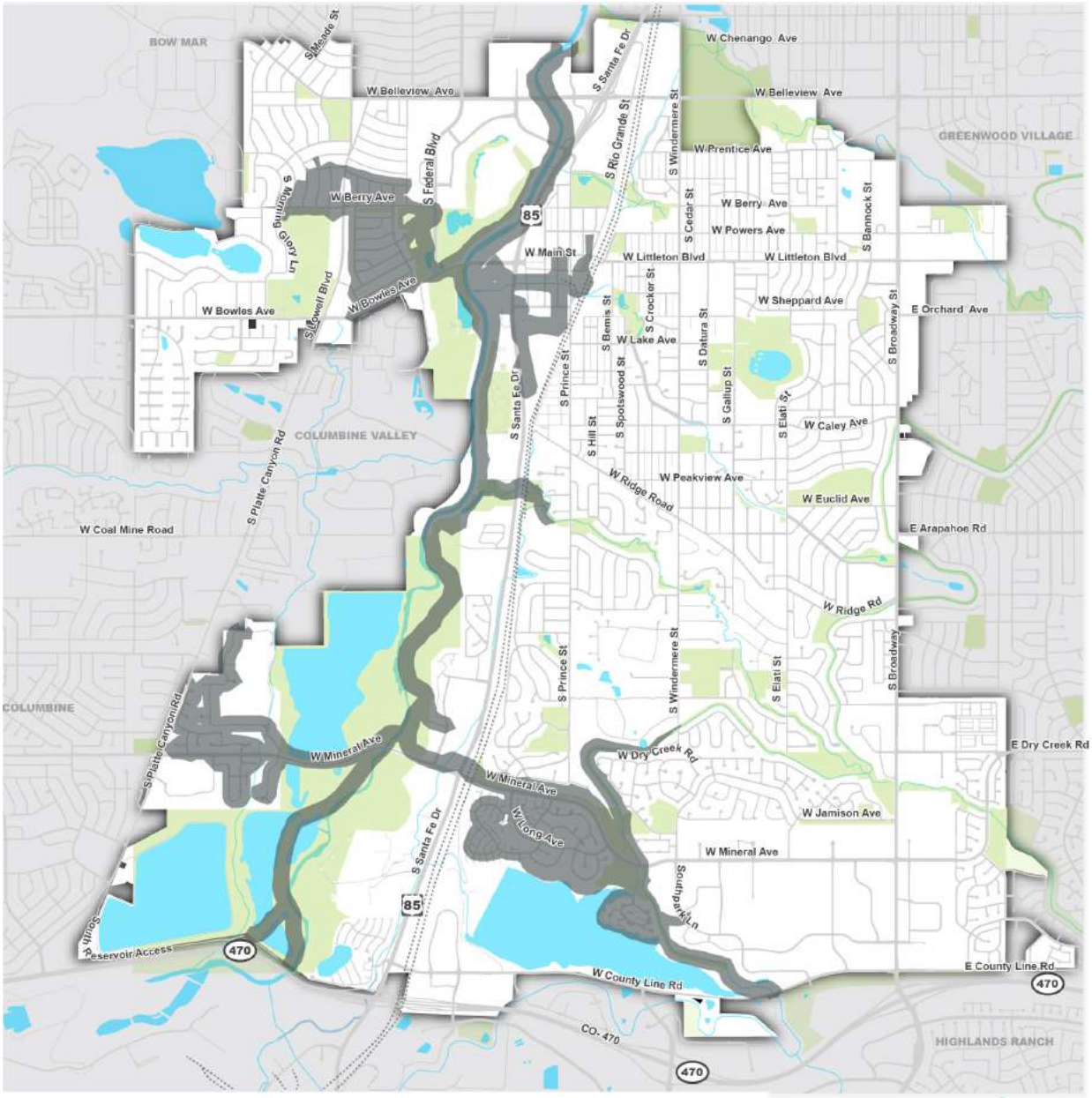
TRAILMARK NEIGHBORHOOD

21% of Littleton households are within a half-mile low-stress bike ride of primary, secondary, or higher education facilities

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads
- ½ Mile Low Stress Bikeshed

CITY OF LITTLETON
½ MILE LOW STRESS BIKESHED TO EDUCATIONAL FACILITIES



TRAILMARK NEIGHBORHOOD

15% of Littleton households are within a 2-mile low-stress bike ride to the Mineral or Littleton Downtown RTD Light Rail stations

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads
- ½ Mile Low Stress Bikeshed

CITY OF LITTLETON
½ MILE LOW STRESS BIKESHED TO LRT STATIONS

COMPLETE BICYCLE AND PEDESTRIAN NETWORKS

In order to connect people in the City of Littleton with more destinations more easily by walking and biking, a vision for complete bicycle and pedestrian networks was developed. The vision was developed by examining the existing network, conducting a gaps assessment, and making recommendations for completing the bicycle and pedestrian networks.

PEDESTRIAN NETWORK

At a high level, gaps in the pedestrian network were identified using sidewalk widths in the city. To better focus improvement efforts, pedestrian priority areas were identified in the City. These correspond with downtown, the area around both RTD light rail stations, and along important streets in the city including:

- Bowles Avenue/ Littleton Boulevard
- Prince Street
- Windermere Street
- Gallup Street
- Elati Street
- Broadway
- Mineral Avenue
- Ridge Road
- Caley Avenue
- Belleview Avenue

Examining these areas more closely, pedestrian network gaps were identified as any sidewalk narrower than 5 feet wide. In addition to sidewalks, key crossings were identified in the pedestrian network. These were defined as any location in a pedestrian priority area where a route crosses an arterial and any location identified as a key bicycle crossing. These locations are shown below. Most of these crossings already have a traffic signal or rectangular rapid flashing beacons (RRFBs) to aid pedestrian crossings. There are two locations which could be candidates for RRFBs and one location which could be a candidate location for a traffic signal. A map of the sidewalks and crossing locations is shown on the following page.

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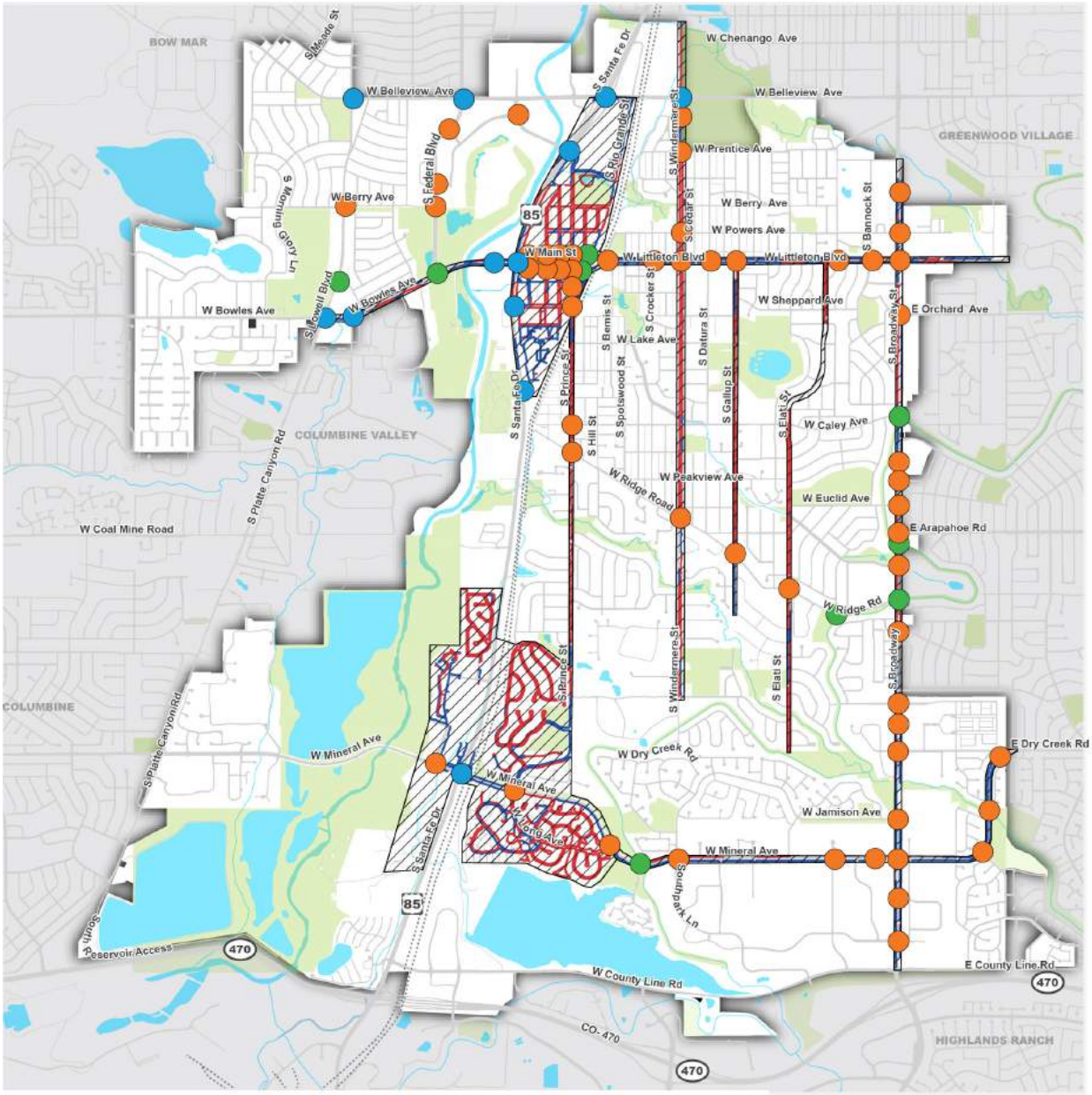

TRAILMARK NEIGHBORHOOD

0.5 1 Miles

- Trail Crossing
- State Hwy Crossing
- Intersection
- City of Littleton
- Parks and Open Space
- Water
- Railroads
- Sidewalks ≥ 5ft
- Sidewalks < 5ft
- Pedestrian Priority Area

CITY OF LITTLETON
KEY PEDESTRIAN CROSSINGS

BICYCLE NETWORK

Building off the existing low-stress bicycle network described in the Existing Network Evaluation section, key gaps in the bicycle network were identified. The NACTO *Contextual Guidance for Selecting All Ages & Abilities Bikeways* decision matrix was used to identify what type of bicycle facility would be most appropriate to create a low-stress connection given the existing number of lanes, motor vehicle speed, and motor vehicle volume. This guide recommends the following types of bicycle facilities based upon motor vehicle speed, volume, number of lanes, and operational characteristics:

- Shared Street
- Bicycle Boulevard
- Bike Lane
- Buffered Bike Lane & Traffic Calming
- Protected Bike Lane
- Shared Use Path

The results of this analysis are:

Once the Low-Stress Bicycle Network is complete...

76% of Littleton households will be within a 2-mile low-stress bike ride to the Mineral or Littleton Downtown RTD Light Rail stations or Broadway bus stops.

4.6x more people connected

53% of Littleton households will be within a half-mile low-stress bike ride of primary, secondary, or higher education facilities.

1.9x more people connected

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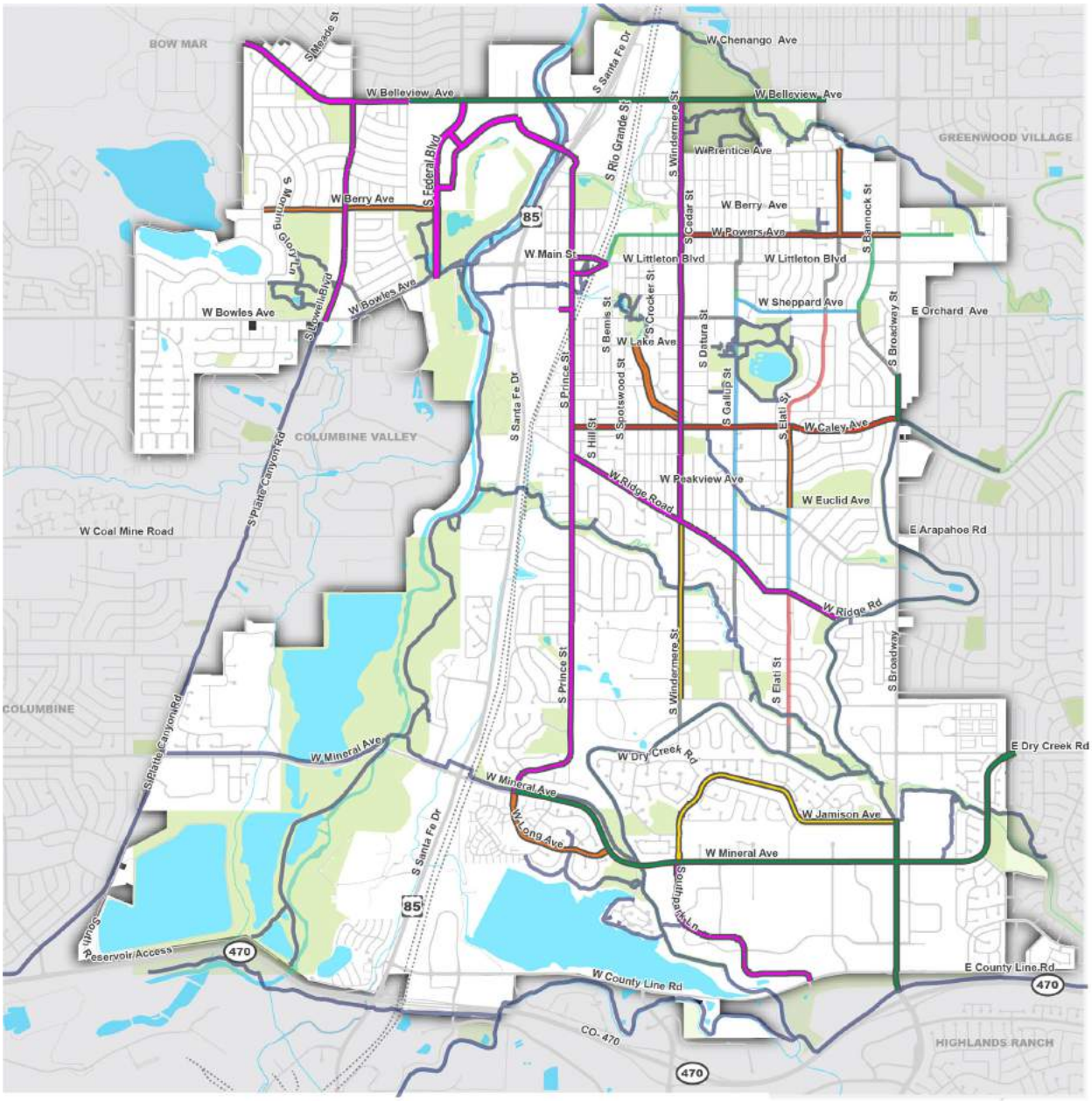

TRAILMARK NEIGHBORHOOD

Recommended Network Gap Facility Types

- Shared Use Path
- Protected Bike Lane
- Bike Lane
- Advisory Bike Lane
- Buffered Bike Lane

Existing Bike Network

- Bike Trail
- Local Street Connection
- Bike Lane
- Shared Lane
- Bike Trail
- Bike Shoulder

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads

CITY OF LITTLETON BIKE NETWORK GAP RECOMMENDATIONS

FRAMEWORK FOR ACTION

The framework for action below is organized in five tiers: (1) Goals, (2) Objectives, (3) Policies, (4) Level of Service, and (5) Actions. All are intended to mesh with and support the other aspects of this Transportation Master Plan.

GOALS

Improving Active transportation in the City of Littleton will help to achieve all five overarching goals of this Transportation Master Plan. How Active transportation help support each of the five goals is described below.

- **Connected:** By improving connections for people walking and bicycling, more people will be connected to more destinations no matter what mode they choose to use to get around.
- **Healthy:** Active transportation is the healthiest way for people to move around. If more people are able to walk and bicycle for more trips in the City of Littleton then more people will be able to achieve an active and healthy lifestyle.
- **Inclusive**: By elevating active transportation as a priority for transportation, people of all ages, abilities, and backgrounds will be able to move around the City of Littleton in ways that are best suited to their needs and lifestyle.
- **Prosperous:** People that walk or bicycle to businesses tend to visit businesses more and spend more on average than people driving past businesses. Providing Active transportation connections to businesses will support local economic prosperity.
- **Sustainable:** Walking and bicycling are both zero-emissions modes of travel which also have a very small impact on pavements in comparison to driving. With an increase in the number of people walking and bicycling, transportation and infrastructure emissions will be reduced.

OBJECTIVES

In order to achieve the overall Transportation Master Plan goals outlined above, multiple objectives have been developed. The objectives below are specific to improving Active transportation in the City of Littleton.

No.	Topic	Objective	Related Goals				
			Connected	Healthy	Inclusive	Prosperous	Sustainable
1	Quality of Life	Achieve high resident satisfaction rates with transportation services	●		●	●	●
2	Quality of Life	Provide spaces that people can enjoy within the public right-of-way		●		●	
3	Quality of Life	Provide people with a sense of personal safety while traveling		●	●		
4	Quality of Life	Provide transportation infrastructure that meets local business needs				●	●
5	Community	Provide transportation facilities that are well integrated with land use and character				●	
6	Community	Minimize transportation-related air quality degradation					●

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No.	Topic	Objective	Related Goals				
			Connected	Healthy	Inclusive	Prosperous	Sustainable
7	Community	Minimize transportation-related water quality degradation					●
8	Community	Minimize transportation-related noise impacts				●	●
10	Community	Provide transparency about the transportation plan					●
11	Community	Provide a transportation system the City can afford to maintain					●
12	Mobility	Provide a reliable transportation system	●			●	
13	Mobility	Achieve a balanced mode share	●	●	●	●	●
14	Mobility	Provide high-quality transportation people can afford	●			●	
15	Mobility	Provide human-scale infrastructure			●	●	●
17	Active	Provide a well-connected bicycling network	●	●			
18	Active	Provide a comfortable bicycling network	●	●			
19	Active	Provide a safe biking environment	●	●	●		
20	Active	Achieve a Sliver Bicycle Friendly Community designation	●	●			
21	Active	Provide high-quality end-of-trip bicycle facilities	●	●			
22	Active	Provide a well-connected pedestrian network	●	●			
23	Active	Provide a comfortable walking experience	●	●			●
24	Active	Provide a safe walking environment	●	●	●		
25	Active	Provide excellent pedestrian and bike access to schools	●	●			
26	Active	Provide high quality access to recreational facilities		●			●
27	Active	Provide healthy transportation choices		●			●

POLICIES

Existing Policies

The installation of “bikeways” is enabled by the Littleton City Code, Chapter 9 Traffic Code, Section 1-7 Bikeways. There is currently a lack of other detailed policies for implementing pedestrian and bicycle facilities.

Proposed Policies

In making decisions that involve public resource allocation, regulatory matters, and physical improvements, among others, Littleton will:

Planning

1. Develop a Complete Networks policy
2. Develop a Transportation Demand Management policy
3. Implement a comprehensive bicycle and pedestrian count program similar to the vehicle count program. Consider permanent installations.
4. Consider installing an all ages and abilities bicycle facility for every new bicycle project
5. Update City Code to address burgeoning micromobility industry. Include operating rules such as number of permits, speed limits, whether users should use sidewalks, bike lanes, or general purpose lanes depending on speeds and establish restricted areas

Maintenance

1. Consider including bicycle and pedestrian facility upgrades as part of every infrastructure project, including resurfacing projects
   a. Develop a resurfacing checklist that considers bicycle facilities - https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/resurfacing/
2. Include bicycle and pedestrian detection for signal actuation in every new traffic signal installation
3. Maintain a fleet of smaller snow removal vehicles to plow trails, shared use paths, and protected bike lanes
4. Update City Code to require residents/businesses to clear sidewalks within 24 hours; existing code states, “within a reasonable time after every snowfall”

Development

1. In development proposals, limit curb cuts along proposed planned bicycle and pedestrian routes
2. Require maintaining clear sidewalks or bicycle lanes during building or street construction or provide a detour: http://www2.oaklandnet.com/oakca1/groups/pwa/documents/memorandum/oak061424.pdf
3. Encourage new developments to provide high quality parking and other end-of-trip facilities for bicyclists
4. Encourage development to utilize grid street networks and limit the use of cul-de-sacs

ACTIONS

Capital Investments

Capital investments are under development and will be included in the packet materials for the September 10, 2019 Joint Leadership study session, provided on www.envisionlittleton.org on September 9, 2019, and in the final draft of this Transportation Master Plan.

Programs and Initiatives

1. Develop and fund a sidewalk improvement program, aimed at addressing highest need areas and facilities.
2. Create a bike map that is easy to understand and use and can be integrated into mobile mapping applications

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Regulations and Standards

1. Update street design standards to include best practices from National Association of City Transportation Officials (NACTO), Federal Highway Administration (FHWA), Manual on Uniform Traffic Control Devices (MUTCD), and American Association of State Highway and Transportation Officials (AASHTO)

Partnerships and Coordination

1. The City of Littleton should coordinate with CDOT, RTD, and adjacent municipalities where appropriate to implement Active transportation projects.
2. The City of Littleton may choose to partner with neighboring or regional agencies in applications for grant funding to implement Active transportation projects.

More Targeted Planning / Study

1. Create a bicycle wayfinding program that includes region-wide and city-specific system maps posted in key locations, as well as comprehensive, easy-to-understand signing.

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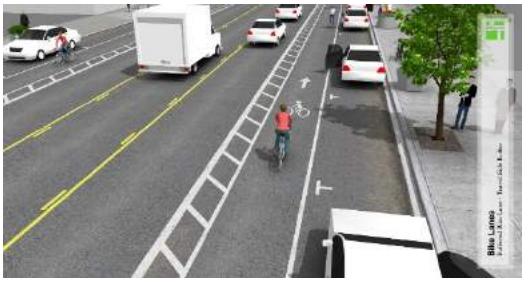
STATE OF THE PRACTICE

Since the first *City of Littleton Bicycle and Pedestrian Master Plan* was completed in 2011, there have been many new progressive design and planning guidance documents published for improving walking and bicycling facilities in cities. The National Association of City Transportation Officials (NACTO) has published very thorough and easy-to-use guidance documents that help achieve the principles of designing for all ages and abilities. For linear bicycle facilities, the NACTO *Urban Bikeway Design Guide* (2014) and *Designing for All Ages and Abilities* guide (2017) are valuable references. For bicycle design at intersections, the NACTO *Don't Give Up at the Intersection* guide (2019) is a great resource. Below are examples of best practices from these guides that the City of Littleton will consider when implementing the complete bicycle and pedestrian networks identified in this document.

BICYCLE TRAVEL LANES

Description	Photo
Protected Bike Lane/ Cycle Track: A protected bike lane is a street-level bicycle facility that are protected from motor vehicle traffic by a raised physical barrier which can include concrete curbs, bollards, planters, and/or on-street parking. Typically when the protected bike lane is raised it is referred to as a cycle track.	Source: NACTO
Two-Way Protected Bike Lane/ Cycle Track: A two-way protected bike lane is a wider protected bike lane only on one side of the street that allows for two-way bicycle travel. Typically when a two-way protected bike lane is raised it is referred to as a two-way cycle track. Because one direction of bicycle travel is running against the expected direction of traffic, special design considerations should be made to ensure the visibility and safety of bicyclists on this type of facility.	Source: NACTO
Buffered Bike Lane: Buffered bike lanes are a street-level bicycle facility that are separated from motor vehicle traffic by a painted buffer space usually two to three feet in width.	 Source: NACTO

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Conventional Bike Lane: A conventional bike lane is a street-level bicycle facility that is immediately adjacent to motor vehicle traffic.

Source: NACTO

Advisory Bike Lane: Advisory bike lanes work like a narrow two-way local street. Bicyclists travel in the advisory bike lane and motor vehicles must yield to bicyclists. If there is oncoming traffic then motor vehicles must yield to the bicyclist and the oncoming motor vehicle before passing. Centerlines are not compatible with advisory bike lanes. Oftentimes advisory bike lanes allow the installation of a bike facility without the need to remove existing on-street parking lanes.

Source: City of Alexandria, VA/Hillary Orr

Bicycle Boulevards: Streets with low automobile traffic volumes that are designed to prioritize bicyclists of all ages and abilities. Typically Bicycle Boulevards are installed on local streets with minimal design treatments except at intersections. Typical elements of a Bicycle Boulevard include: traffic calming, through-traffic diversion, pavement markings and wayfinding signage.

Source: NACTO

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BICYCLE INTERSECTION TREATMENTS

Description	Photo
Bicycle Signal: Dedicated signal for bicyclists to be provided in addition to a traffic signal when bicycle-specific traffic movements are desired such as a protected bicycle phase or a leading bicycle interval phase. A dedicated bicycle facility should be a prerequisite to installing a bicycle signal so that bicyclists are not mixed in with motor vehicle traffic and unable to make it to the front of the queue.	Source: NACTO
Bike Box: A bike box is a dedicated space for bicyclists at the front of a traffic lane at an intersection. Bike boxes allow for large volumes of bicyclists to queue at the head of an intersection and increase their visibility to adjacent motor vehicle drivers. Bike boxes must be installed with a no turn on red sign for motor vehicle drivers.	Source: NACTO
Protected Bicycle Intersection: A protected bicycle intersection involves installing physical barriers in the intersection to extend the protection for bicyclists from turning motor vehicles and allow for additional space for bicycle queuing ahead of stopped motor vehicles.	Source: bicycledutch.wordpress.com
Intersection Crossing Markings – "Crossbike": Markings that indicate to bicyclists where to travel when crossing an intersection and indicate to motor vehicle drivers where to expect crossing bicyclists.	

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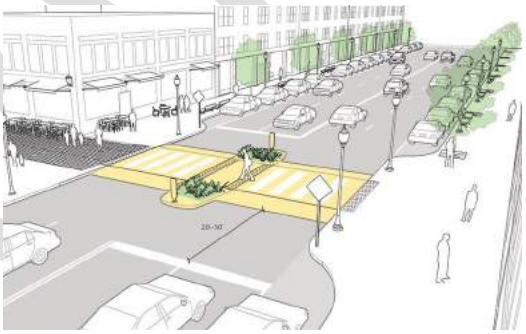
PEDESTRIAN & BICYCLE INTERSECTION TREATMENTS

Description	Photo
Median Refuge Island: A median with refuges for pedestrians and bicycles and enhanced crossing markings and signage. The refuges allow for two-stage crossings of a street—crossing one direction of traffic to reach the refuge and then crossing the other direction of traffic.	Source: NACTO
Curb Extension: A curb extension (also sometimes called a bulb-out or bump-out) is an extension of the sidewalk or curbline at an intersection that is roughly the same width as the parallel parking lane. Curb extensions reduce crossing distances for pedestrians and slow motor vehicle traffic by narrowing the roadway.	Source: NACTO
Raised Crossing: Elevating a pedestrian or bicycle crossing to the level of the sidewalk or adjacent curb. Motor vehicles must slow down to traverse the raised crossing which improves yielding compliance to crossing pedestrians or bicyclists. Raised crossings are easier for pedestrians of all ages and abilities to traverse because the flush crossing eliminates the need to travel down a ramp off of the sidewalk and back up a ramp at the other side of the street.	 Source: NACTO
Reduce Corner Radii: The design radius of intersection corners determines the speed with which someone can take a turn at that intersection. Designing intersections with small corner radii can reduce motor vehicle speeds, increase driver awareness, shorten pedestrian crossings, provide additional space for improved ADA ramp design, and improve traffic control device visibility.	Source: Dan Burden

Rectangular Rapid Flashing Beacons (RRFB): Rectangular rapid flashing beacons (RRFBs) alert drivers to the presence of a pedestrian or bicyclist crossing, and are installed along with a pedestrian, bicycle, or school crossing warning sign. RRFBs are presently installed in multiple locations in Littleton.

Source: NACTO

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Chapter 6. *Transit*

Transit plays an important role in defining Littleton's transportation system. In addition to alleviating the burden on the roadway network and providing mobility options, transit can help to anchor vibrant, people-oriented centers of activity within the city.

Transit includes all fixed-route bus and rail routes, as well as demand-response transportation available to the general public. In Littleton, these services are predominately provided by RTD, although the City operates the Shopping Cart fixed-route bus and Omnibus demand-response shuttle. The Shopping Cart and OmniBus provide transit services to disabled residents and residents age 55 or older. Shopping Cart is a scheduled fixed-route service operating Monday-Saturday, shuttling passengers to/from area grocery stores and the Streets of Southglenn. Omnibus is scheduled by appointment only, Monday-Friday, with ride priority given to medical trips (top priority), grocery shopping, and hair/barber trips. Maps summarizing the city's transit routes, frequency, and ridership can be found in the Existing City chapter on page 14.

88.6% of Littleton households are within a half-mile walk of a bus or rail stop.

The average Littleton household has **1,346** transit trips available within ½ mile per week.[1]

THE CITY'S ROLE IN PUBLIC TRANSIT

The reasons someone might choose to take a bus or train, instead of driving alone, go well beyond the service planning jurisdiction of RTD (which includes factors such as the schedule and trajectory of the route). Achieving a transportation network that optimizes transit ridership requires the participation of employers (who dictate a large percentage of overall trips), developers (who have some control over how housing, retail, and office space will incentivize certain modes of travel), municipalities like Littleton (which generally own and operate the streets, sidewalks, and trails), and the public itself.

RTD was created by the state legislature and collects tax within its borders to fund a transit system. RTD has always worked closely with the municipalities of the region, and Littleton in particular has a history of leadership when it comes to connecting its residents with opportunities through transit expansion. The city was instrumental in building the region's first suburban light rail line.

Several of the Denver region's municipalities have taken an even more proactive role in guiding transit service. In the 1990s, the City of Boulder established its own vision for transit by establishing the Community Transit Network (CTN), which has led the city to fund additional bus service beyond what RTD would typically have been able to provide in their city[2]. In a similar move, the City and County of Denver will ask voters in November 2019 to approve a change in city charter to allow the public works department to offer transportation services, essentially enabling the creation of a transit agency housed within the city.

As Littleton works toward the goals of Envision Littleton, RTD and other regional partners such as DRCOG can provide administrative resources and institutional knowledge to support the city's public transit goals. These partners can also serve as conduits for access to additional state and federal funding to bolster local investments in capital projects related to transit service (such as traffic operations or station amenities).

LEGACY OF PLANNING

The following plans previously developed for Littleton and vicinity offer insights from the time they were prepared and provided an essential foundation for preparing this Auto and Freight element of the Transportation Master Plan.

- RTD FasTracks (Southwest Corridor Extension Environmental Evaluation)
- RTD Regional BRT Feasibility Study

[1] https://alltransit.cnt.org/metrics/?addr=littleton
[2] https://www-static.bouldercolorado.gov/docs/BOULDER_TMP-SOS_Final_Rept_COMP-1-201311011558.pdf?_ga=2.112863436.956415599.1557545591-1894891957.1557437939

- City of Littleton Mineral Station Area Framework
- RTD Mobility Hub Guidelines

Key takeaways from past planning efforts include:

- Extension of light rail service along the southwest lines from Mineral & Sante Fe to a new Park n Ride station in Highlands Ranch at C-470 & Lucent Blvd. New station would include 1,000 parking spaces. Interim station (not included in original FasTracks system) is being considered at Sante Fe & C-470. This station would include 404 parking spaces.
- Broadway/Lincoln identified as top-priority BRT corridor through three tiers of screening based on ridership, travel demand, congestion/delay, and viability.
- "Community Support" identified as key criteria for successful BRT implementation.
- Enhanced safety amenities and character based design guidelines needed for light rail stations.
- Implement character-based design guidelines.
- Shift in thinking from "transit stops" to "mobility hubs" to allow for flexibility and maximize community benefit. (Four stops/stations in Littleton).

KEY ISSUES AND CONSIDERATIONS

Input and discussions for this Transportation Master Plan, through varied *Envision Littleton* community engagement activities, workshops with City Council and Planning Commission, and interaction with other City boards/commissions, City departments, and partner agencies and organizations, yielded the following list of key items that relate to the auto and freight transportation network:

- **Resident Satisfaction & Usage**: Transit services in Littleton receive generally high support from residents, but satisfaction with bus service has declined somewhat in recent years. Compared with other cities in the region, Littleton has a slightly higher rate of commuting via transit.
- **Level of Service:** Includes considerations of frequency, coverage, and reliability of bus and rail service. While nearly all households in Littleton have access to transit service of some kind, the usefulness of that service varies – in general, bus routes run infrequently and most trips within the city require a transfer.
- **Stops & Stations**: Enhancements to transit stops/stations can be a useful tool for achieving desired community character (particularly for areas among the mixed-use designations)
- **Specialized Service**: The City operates fixed-route (Shopping Cart) and demand-response (Omnibus) shuttle services targeted at providing for the mobility needs of those with disabilities as well as people over the age of 55.

More information on each of these key issues is provided below.

RESIDENT SATISFACTION & USAGE

Overall, Littleton's transit network and usage compares favorably to peer cities within the region and elsewhere in the country. As shown in the table below, Littleton has a greater percentage of transit commuters than comparable cities (even those with more extensive bus and rail coverage).

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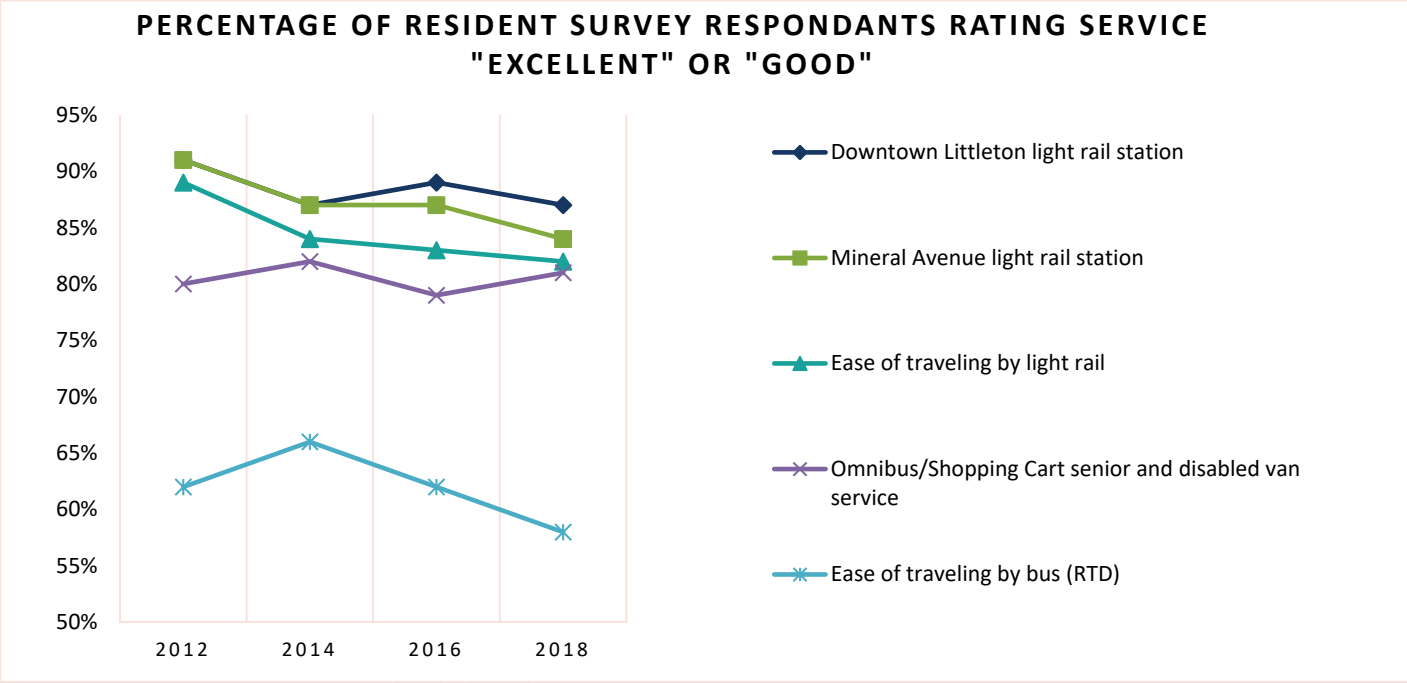
Peer Cities – Transit at a Glance		
City	**2018 Population (Estimate)**	**% of population commuting by public transit[5]**
Littleton, CO	48,007	6
Wheat Ridge, CO	31,400	5
Englewood, CO	34,690	5
Lakewood, CO	156,789	5
Broomfield, CO	69,267	4
Centennial, CO	110,831	3
Commerce City, CO	58,449	2
Arvada, CO	117,268	2

More than four out of five respondents to the Littleton Resident Survey rated light rail and Shopping Cart/Omnibus service "good" or "excellent[3]." Still, local bus routes within the city are generally underutilized, and respondents to the resident survey rate bus travel as the least convenient mode.



SERVICE QUALITY

Level of Service

For transit, LOS refers to the availability, frequency, comfort, and convenience of transit for people who make trips via transit on either bus or rail. The percentage of citizens with convenient access to high-quality transit is used to measure how well transit services are meeting Littleton's needs. It must be acknowledged that Littleton is but a part of RTD and

[3] https://www.littletongov.org/home/showdocument?id=16730

does not provide the majority of transit service in the City. Moving forward, the City of Littleton will continue to update measures of transit service. The key measurements to update are:

1. Ridership within the city (measured by boardings and alightings)
2. Households within one mile of high-frequency transit stop/station
3. Jobs within 30-minute transit ride
4. Ratio of transit travel time vs. auto travel time at peak hour on key corridors
5. Utilitzation of parking near high-frequency transit stop/station
6. Number and subject of submitted complaints or satisfactions
7. Stop/Station Environment (Percentage of stops with high quality amenities)

Transit Route Performance	
Route	**Boardings per Hour (Route-Wide)**
C	72*
D	95*
0 (0L)	34* (59)*
36 (36L)	27* (30)*
29	35*
59	14
66	23*
67	14
402L	14
403	12

Frequency

High-frequency transit service (defined as busses or trains arriving every 15-minutes or less) is among the most important factors contributing to increased ridership as well as people's satisfaction with transit service[4]. **Currently, Littleton's only high-frequency service is along the C and D light rail lines during peak commuting hours.**

RTD's service standards stipulate a minimum of 25 boardings per vehicle hour to warrant consideration for 15-minute frequency[5]. The table at right above shows 2017 boardings per hour for each bus route that serves Littleton (note that ridership figures include segments of the route outside city limits). Candidates for shorter headways include routes along Broadway, Lowell/Federal, and Littleton Boulevard.

Coverage

Nearly all Littleton residents live within a half-mile of a bus or rail stop, and ridership is relatively strong on the C and D light rail lines, as well as the bus routes along Broadway and Littleton Boulevard.

City	% of households within 1/2 mile of transit stop[6]	Available transit trips within 1/2 mile of average household[1]
Littleton, CO	89%	1,346
Wheat Ridge, CO	98%	1,259
Englewood, CO	95%	1,337
Lakewood, CO	94%	1,276
Broomfield, CO	57%	644
Centennial, CO	69%	556
Commerce City, CO	65%	726
Arvada, CO	89%	681

Reliability

Littleton can improve speed and reliability of existing transit service by prioritizing the movement of buses along key segments and at certain intersections. RTD analysis of average ridership and bus speed shows that buses generally operate adequately within Littleton[6]. However, the corridor along Littleton Boulevard and through downtown experiences

[4] http://transitcenter.org/publications/whos-on-board-2019/
[5] http://rtd-denver.com/documents/serviced/service-standards-7-2016.pdf
[6] http://www.rtd-denver.com/documents/serviced/RTD-networkAnalysis-032016.pdf

regular delay. Improvements would serve the existing strong ridership in the corridor and encourage transit growth in the future. Broadway is also a good candidate for future improvements.

Top 5 Bus Segments (by Ridership)
Church/Sante Fe/Bowles (Downtown Station to Federal Blvd)
Broadway (Arapahoe to Littleton Blvd)
Broadway (Mineral to Ridge Road)
Littleton Blvd (Broadway to Downtown Station)
Federal Blvd (Bowles to N limit)

STOPS AND STATIONS

Stops and stations can play a significant role in determining how well transit serves riders overall, and whether or not people choose to make trips via a fixed-route bus or rail network[7]. The way people access stops and stations, as well as the amenities they experience while waiting or transferring, can also have a symbiotic relationship with land use goals. For Littleton, enhancements to transit stops/stations can be a useful tool for achieving desired community character (particularly for areas among the mixed-use designations).

Top Ten Littleton Transit Stops/Stations (by Daily Boardings)
1. Downtown Light Rail
2. Sante Fe & Mineral Light Rail
3. S Broadway/W Littleton Blvd
4. Arapahoe Community College
5. W Littleton Blvd/S Broadway
6. W Littleton Blvd/S Windermere St
7. S Broadway/Arapahoe Rd
8. W Littleton Blvd/S Datura St
9. W Littleton Blvd/S Cherokee St
10. S Broadway/Mineral Ave

Littleton is home to four locations identified in RTD's 2019 Mobility Hub Guidelines report. The two light rail stations are identified as Tier 2, meaning they have more daily activity (boardings plus alightings) than 95% of stops in the region. Two additional locations, at S Broadway/W Littleton Blvd and Arapahoe Community College, are in the 90th percentile for daily activity, and therefore qualify as Tier 3 mobility hub candidates. Additional stops along Broadway and Littleton Blvd experience above-average activity, and would be good candidates for amenity improvements such as benches, shelters, lighting, and passenger information as appropriate.

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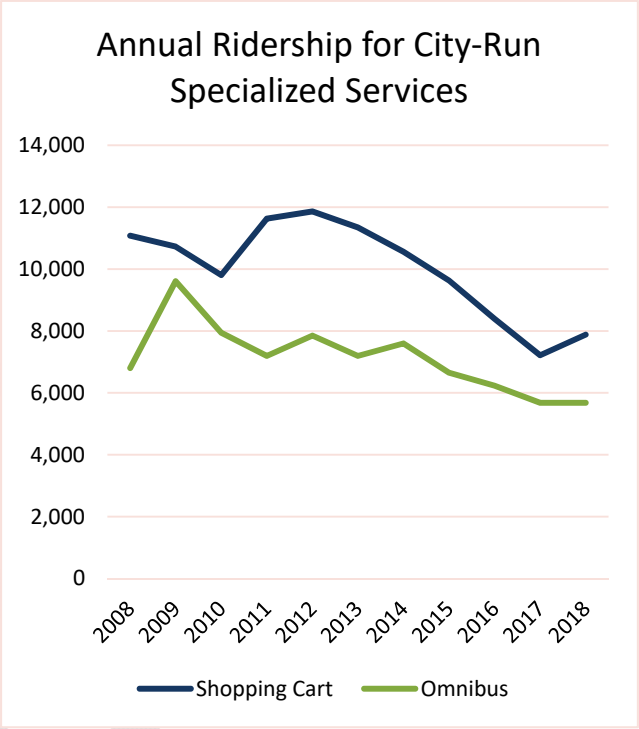
[7] https://transitcenter.org/wp-content/uploads/2018/10/BusReport_Spreads.pdf

SPECIALIZED SERVICES

The City operates fixed-route (Shopping Cart) and demand-response (Omnibus) shuttle services targeted at providing for the mobility needs of those with disabilities as well as people over the age of 55. Shopping cart connects select apartment complexes with grocery stores and other services. Omnibus is available by appointment only, and prioritizes rides for: 1) medical trips, 2) grocery shopping, 3) hair & barber, 4) other activities. Both services are donation-based.



Ridership on both Shopping Cart and Omnibus has declined somewhat in recent years. However, **Omnibus has nearly doubled its riders-per-mile since 2008**, and continues to attract new riders, becoming more efficient.

These specialized services serve a critical need, given the large elderly population in the city. The Littleton Resident Survey and the Envision Littleton outreach efforts indicate citizen support for both Shopping Cart and Omnibus, with some respondents citing them as among the things they value most about living in Littleton.

Omnibus and Shopping Cart complement existing RTD access-a-ride demand-response service coverage in the area (available to those with physical and/or cognitive disabilities for fares ranging from $5 to $20 per one-way trip).

FRAMEWORK FOR ACTION

GOALS

Littleton has its own distinct character, and the community has articulated its vision for transportation. Improving transit service (through operations and/or amenity enhancements) can play an important role helping Littleton achieve its transportation goals. Transit aligns with the City's established TMP goals as follows:

Goal 1: Connected
Transit helps decrease traffic congestion by moving more people per vehicle. It also creates activity around stops and stations, ensuring access to employment and commercial destinations.

Goal 2: Healthy
Bus and train riders have less than a tenth of the per-mile crash rate as automobile occupants. In addition, communities with higher transit riderships experience significantly fewer traffic fatalities overall.[8]

Goal 3: Inclusive
Transit service gives mobility options to people who cannot afford to own a car or who cannot drive (including the elderly and those with disabilities).

[8] https://www.apta.com/wp-content/uploads/Resources/resources/reportsandpublications/Documents/APTA-Hidden-Traffic-Safety-Solution-Public-Transportation.pdf

Goal 4: Prosperous
Transit-oriented development (TOD) can help Littleton work toward desired land-use and community character goals along key corridors such as Broadway and Littleton Boulevard.

Goal 5: Sustainable
Buses and trains offer significant reductions in greenhouse gas emissions on a per-person basis compared with cars. In addition, investments in high-capacity transit are associated with increased property values for nearby homes and businesses.[9]

Improving the city's transit network is consistent with the following goals and objectives:

No.	Topic	Objective	Related Goals				
			Connected	Healthy	Inclusive	Prosperous	Sustainable
1	Quality of Life	Achieve high resident satisfaction rates with transportation services	●		●	●	●
3	Quality of Life	Provide people with a sense of personal safety while traveling		●	●		
4	Quality of Life	Provide transportation infrastructure that meets local business needs				●	●
5	Community	Provide transportation facilities that are well integrated with land use and character				●	
6	Community	Minimize transportation-related air quality degradation					●
7	Community	Minimize transportation-related water quality degradation					●
12	Mobility	Provide a reliable transportation system	●			●	
13	Mobility	Achieve a balanced mode share	●	●	●	●	●
14	Mobility	Provide high-quality transportation people can afford	●			●	
15	Mobility	Provide human-scale infrastructure			●	●	●
16	Mobility	Provide travelers with relevant, timely information	●	●	●		
21	Active	Provide high-quality end-of-trip bicycle facilities	●	●			
31	Transit	Provide a well-connected transit network	●			●	
32	Transit	Provide comfortable transit service	●		●		
33	Transit	Provide high-quality demand response services for at-need populations			●	●	

[9]"Transit-Oriented Development in the United States - The National ...." https://www.nap.edu/catalog/23360/transit-oriented-development-in-the-united-states-experiences-challenges-and-prospects. Accessed 6 Aug. 2019.

POLICIES

In making decisions that involve public resource allocation, regulatory matters, and physical improvements, among others, Littleton will:

1. Advocate for maintenance and enhancement of existing RTD bus and rail service in Littleton.
2. Improve ADA connections and trip-planning services connecting to fixed-route transit network.
3. Pursue regional partnerships with neighboring municipalities to fund high-capacity transit improvements (including light rail and BRT).
4. Prioritize the safety of vulnerable user groups on trains, buses, and at stations.
5. Support connections to employment, retail, and entertainment/recreation opportunities
6. Develop a Transportation Demand Management policy to reduce congestion.

ACTIONS

Capital Investments

Capital investments are under development and will be included in the packet materials for the September 10, 2019 Joint Leadership study session, provided on www.envisionlittleton.org on September 9, 2019, and in the final draft of this Transportation Master Plan.

Programs and Initiatives

1. Maintain Omnibus and Shopping Cart service. Consider additional uses for City-owned shuttles (including downtown parking relief, special event access, and connections to community resources).
2. Pursue EcoPasses Programs. RTD's EcoPasses provide unlimited transit rides. They can be purchased on a per-employer, district, or development-wide basis. Littleton should consider instituting EcoPass incentives and/or recommendations for developers and employers within the city in order to improve transit ridership.

Regulations and Standards

1. Establish Standards for Stop/Station Enhancements: All stops should be connected to the pedestrian network. RTD service standards recommend shelter installation at all stops with more than 40 boardings per day. Improvements to access and wayfinding should serve populations that might otherwise rely on demand-response service.

Partnerships and Coordination

1. Support service frequency increases (especially at peak hours) on bus routes servicing Broadway (including 0, 0L, 66) and Littleton Boulevard/Downtown/Bowles corridor (including 66, 36, 36L, 29).
2. Build support from regional partners to leverage available state and federal funding pools. Developing that support starts with collaboration with neighboring municipalities (including Centennial, Highlands Ranch, and Englewood). Possible mechanisms include informal coordination, inter-governmental agreements (IGA), memoranda of understanding (MOU), and transportation management associations (TMA) or organizations (TMO).

More Targeted Planning/Study

1. Consider opportunities for stop consolidation (in partnership with RTD) to improve transit speeds and maximize investments in amenities.
2. Consider circulator shuttle service east from downtown along Littleton Boulevard corridor. Route would connect downtown with Littleton High School along future mixed-use corridor, serving vulnerable populations north of roadway and population centers throughout. Vehicles could be city-owned and operated, managed by RTD, or provided

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through partnersh*ips* with private companies. Autonomous vehicle technology has been applied in similar settings in several cities across the U.S.[10]

STATE OF THE PRACTICE

Transit is evolving. Cities across the world are recognizing the potential for optimizing existing bus service and re-thinking the relationship between rapid transit (bus and rail) and land use. The Transit Cooperative Research Program (TCRP) has published detailed guidance for bus transit improvements in the Bus Rapid Transit Practitioner's Guide (2007). The National Association of City Transportation Officials (NACTO)'s Transit Street Design Guide (2016) illustrates common transit design treatments. Below are examples of best practices from these guides that the City of Littleton will consider when implementing transit operations improvements identified in this document.

Transit Lanes: Creating dedicated bus lanes requires pavement markings (typically a solid white line and "BUS ONLY" stencil at intersections) as well as signage (overhead or curbside) to indicate lane restrictions. Can be center- or side-running, offset (to allow parking between bus lane and curb), all hour or peak-hour only

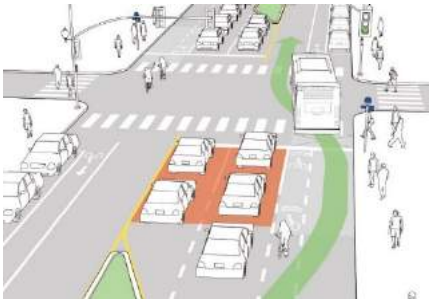
Typical Cost[11]: $100,000 per route mile (re-striping)

Transit Signal Priority (TSP): Active TSP involves modifying traffic signal timing or phasing when buses are present. Bus arrival information can be communicated to traffic systems via GPS, optical, or high-bandwidth (such as fiber) signals. TSP requires dedicated transit space at intersections to maximize benefits. Variations include transit signal *progression* (pre-timed cycles for transit), conditional (signal priority only to late vehicles), adaptive (incorporates continuous bus detection along corridors to optimize signal timing)

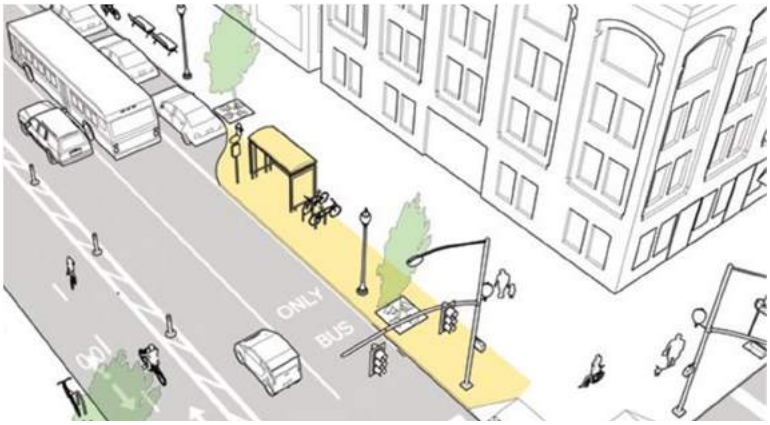
Typical Cost[7]: $30,000 per intersection

Queue bypass: Queue jump or queue bypass lanes allow buses to bypass traffic at intersections by using short dedicated lanes alongside TSP. This movement can take place in conjunction with vehicular right turns (assuming low enough traffic volumes) space formerly dedicated to parking, or a new dedicated lane.

Typical Cost: Negligible (in cases of parking removal or use of right turn lane AND TSP is already present), $300,000 per intersection (in cases where a new lane must be constructed)



[10] https://www.nlc.org/sites/default/files/2018-10/AV%20MAG%20Web.pdf
[11] TCRP-BRT Practioner's Guide, Exhibit S-1



Bus Bulb: Extending the curb allows buses to stop in-lane, eliminating a primary source of transit delay. Additionally, extended bus stops allow more space for pedestrians, reduce intersection crossing distances, and create placemaking opportunities.

Typical Cost: $60,000 per extension

Bus Rapid Transit (BRT): The Federal Transit Administration (FTA) defines BRT as a "rapid mode of transportation that can provide the quality of rail transit and the flexibility of buses." Functionally, BRT is a suite of improvements to bus service on existing roadways (including a combination of all design tactics previously discussed) that allows for the reliability and consistency of rail service. The core elements of BRT service as identified by the Institute for Transportation & Development Policy (ITDP) include dedicated right-of-way, busway alignment, off-board fare collection, intersection treatments, and platform-level boarding.

Typical Cost: Varies, but average cost for BRT in countries like the United States is approximately $16 million per mile (as opposed to $60 million per mile for light rail).

Mobility Hub: A mobility hub is a place where transit, pedestrians, bicyclists, and shared mobility options. It is designed to be a safe, attractive place where people can access the transit and/or mobility system. Amenities might include shelters, lighting, wayfinding, bike-share or parking, rideshare drop-off, and placemaking elements.

Typical Cost: Varies, but improvements range from approximately $30,000 to $250,000 per station .

Popular transit stations such as the one at Sante Fe and Mineral (which currently predominantly serves as a park n ride) offer the potential for improving multimodal connections and integrated trip planning.

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Chapter 7.
Mobility Trends

Beyond mode-specific policies, capital investments, programs, and strategies, Littleton is committed to providing excellent service to the traveling public in general. The ability to respond to citizens' mobility needs is likely to be affected by a variety of forces as this TMP takes shape. Achieving the vision for the future set forth in the Envision Littleton process will require a holistic view of mobility. Major technological advancements are occurring in the transportation industry that could change everything from how cars function to how people plan each day's travel. As these technologies evolve, the City must be prepared to remain flexible in order to ensure that these technologies serve overarching mobility and safety goals. Finally, the City must remain transparent in its efforts to plan and program improvements in order to build toward long-term goals and maintain the engagement of residents. These and other objectives will help the City stay true to the Mission laid out in this plan.

LEGACY OF PAST PLANNING

As described in the introduction to this plan, the City has a long history of planning that has resulted in many great strides forward for the mobility framework of the City. Building upon that legacy, the City will incorporate ideas and standards that have been developed but also create new, modern policies and projects for today's and tomorrow's mobility needs.

KEY ISSUES AND CONSIDERATIONS

Input and discussions for this Transportation Master Plan, through varied *Envision Littleton* community engagement activities, workshops with City Council and Planning Commission, and interaction with other City boards/commissions, City departments, and partner agencies and organizations, yielded the following list of key items that relate to general mobility trends:

- **Transparency**: the public and stakeholders have a strong desire to be involved in planning and for the City to be transparent in allocation of resources.
- **Technology**: transportation technologies are changing and advancing rapidly. There is a desire to be prepared for the impacts these technologies will have on our ability to move around the city and the region.
- **Cost-effectiveness**: there is an acknowledgment that resources are limited and that transportation infrastructure costs have increased significantly in the past several decades. Therefore, it will be important to innovate and use every dollar effectively.

TRANSPARENCY

The City of Littleton is home to a community that takes pride in its civic traditions and identity. As the city works to realize the future described by Envision Littleton and maintain its shared values, maintaining an open, inclusive process will be critical. The city will offer clear updates on its progress toward community goals, and welcome ongoing discussion with the public.

TECHNOLOGY

The City of Littleton is well-positioned to be a major regional force in helping to determine the way technology impacts the region's mobility systems. One way this has already begun is in the participation in the Mobility Choice Initiative.

The Mobility Choice Initiative, a partnership of the Denver Metro Chamber, DRCOG, RTD, and CDOT recently developed a Mobility Choice Blueprint (MCB). The MCB is an effort to document how transportation technology is impacting our daily lives and prepare for that change. The MCB states, "The disruptive forces of new transportation technologies,

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demographic changes, and shifting societal values are compelling us to change our vision of the Denver region's mobility future."[12]

The MCB categorized mobility technology into five types of established and emerging systems:

- **Shared Mobility** is defined as "a wide range of transportation options involving fleet ownership or operation of various modes of transportation." These include:
  - Micromobility – personal shared transportation devices like bikes, mopeds, and electric scooters.
  - Carsharing – rental cars that are available for use by the hour or mile. These can be located in one spot or able to be parked anywhere within a service area.
  - Ridehailing – Uber or Lyft or other services that provide on-demand point-to-point rides in privately owned autos.
  - Microtransit – "privately owned and operated shared transportation system that can offer fixed routes and schedules, as well as flexible routes and on-demand scheduling."
  - Public Transit – traditional public transportation via bus and rail that usually operates on a fixed route and schedule.
- **Vehicle Technology** refers to the emergence of Connected, Automated, and Electric Vehicles.
  - Connected Vehicles incorporate technology that allows the on-board computers to communicate with other vehicles and with sensors and other infrastructure on the ground.
  - Automated Vehicles incorporate technology that assist with operation of the vehicle. They perform some of the tasks to drive the vehicle, and driverless vehicles require no human operator.
  - Electric Vehicles are powered by electric motors using energy from batteries that are charged at home or at charging stations.
- **Transportation Systems Optimization** refers to the systems that are emerging to better manage and optimize the transportation networks, using real-time data. Emerging technologies include adaptive signal control, transit signal priority, and the sensors and communications infrastructure to allow remote management of the systems.
- **Travel Information and Payment** refers to technology that could allow for easy, quick trip planning and payment, regardless of mode. Mobile devices can unlock the universe of travel options for users in the palm of their hand.
- **Freight and Delivery Logistics** are changing rapidly as more people use online services (e-commerce) for everyday purchases. E-commerce companies will continue to push technology that allows for faster delivery at lower cost, including the incorporation of Connected, Automated, and Electric delivery vehicles.

The impact of these technologies on existing travel behaviors remains to be seen. However, early analysis is beginning to reveal some trends. While fully autonomous vehicles remain in the early pilot stages, some analysis suggests self-driving cars could be common within the next several decades (ranging from 24% to 87% adoption rate by 2045)[13]. The impact of this change on issues like traffic congestion remains to be seen, although some studies[14] suggest technology could induce additional demand for car travel and ultimately excacerbate traffic issues.

Some emerging technologies are already changing travel behavior in places like LIttleton. A report published by the University of Kentucky linked the emergence of transportation network companies (TNC) such as Uber and Lyft with a

[12] https://www.mobilitychoiceblueprintstudy.com/
[13] https://www-sciencedirect-com.aurarialibrary.idm.oclc.org/science/article/pii/S0965856415300628
[14] https://www.sciencedirect.com/science/article/pii/S0306261919305823?via%3Dihub

decrease in transit ridership – however, other services based on new technology encouraged more people to ride buses and trains[15].

COST EFFECTIVENESS

A critical aspect of the City's renewed focus on strategic planning is a commitment to data-driven decision-making and performance-based budgeting. In order to maximize taxpayer dollars and leverage funding from state, federal, and private sector sources, Littleton will work to solve short-term problems in ways that contribute to long-term goals.

The sample toolkits in each chapter of this plan outline cost-effective strategies for addressing mobility challenges. These, combined with responsible stewardship of City resources, will allow the City to use the funds available in the most efficient manner possible.

FRAMEWORK FOR ACTION

GOALS

Consistent with the Anchored, Connected, Active, and Engaged Guiding Principles, responsiveness to trends is also important to the City's transportation goals.

- **Connected:** Ability to adapt and provide services as things change and at reasonable cost will be increasingly important.
- **Healthy:** Healthy choices will be dependent on the City's ability to best utilize technology to encourage an active lifestyle.
- **Inclusive:** Technology and cost-effective improvements can be used to provide services to under-served populations with the right planning.
- **Prosperous:** Being transparent and responsive, while providing excellent overall mobility allows the City to help its citizens be prosperous.
- **Sustainable:** Constantly refining and adjusting our outlook will help us respond to environmental and fiscal pressures.

Responding to these trends is consistent with the following objectives:

[15] http://usa.streetsblog.org/wp-content/uploads/sites/5/2019/01/19-04931-Transit-Trends.pdf

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No.	Topic	Objective	Related Goals				
			Connected	Healthy	Inclusive	Prosperous	Sustainable
1	Quality of Life	Achieve high resident satisfaction rates with transportation services	●		●	●	●
2	Quality of Life	Provide spaces that people can enjoy within the public right-of-way		●		●	
3	Quality of Life	Provide people with a sense of personal safety while traveling		●	●		
4	Quality of Life	Provide transportation infrastructure that meets local business needs				●	●
5	Community	Provide transportation facilities that are well integrated with land use and character				●	
9	Community	Provide a flexible transportation work plan					●
10	Community	Provide transparency about the transportation plan					●
11	Community	Provide a transportation system the City can afford to maintain					●
14	Mobility	Provide high-quality transportation people can afford	●			●	
15	Mobility	Provide human-scale infrastructure			●	●	●
16	Mobility	Provide travelers with relevant, timely information	●	●	●		
28	Auto	Provide a well-connected automotive network	●			●	

POLICIES

In making decisions that involve public resource allocation, regulatory matters, and physical improvements, among others, Littleton will:

3. Coordinate traffic management center systems and operations with adjacent municipalities and CDOT
4. Partner with neighboring municipalities and the private sector as needed to manage the introduction of new technologies to Littleton.
5. Transition government fleets to electric and other zero-emission vehicles
6. Be transparent about prioritization and implementation of capital improvements.

ACTIONS

The actions below convey tangible steps that will lead to achievement of the Goals in line with the stated Policies.

Capital Investments

No capital investments have been identified as part of this plan for this category.

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Programs and Initiatives

5. Consider testing or piloting integrated corridor management in partnership with neighboring municipalities.

6. Develop incentives and/or improve ridehailing and ridesharing operations to serve our citizens needs and improve access to services.

    a. Implement curbside management standards and smart parking practices

    b. Pilot neighborhood-scale mobility hubs that simplify multimodal trips and create safe, inviting spaces for all residents.

A strategic **Action** priority is aimed at seizing a special opportunity or addressing a particular challenge one faces, given limited resources - financial and otherwise – and recognizing that a broader agenda of new or ongoing activities will also be pursued in the meantime.

7. Pilot smart parking technologies (including real-time information and variable payment) in busy locations such as downtown and in the vicinity of light rail stations.

8. Develop and use a traffic operations and safety checklist of inexpensive operational and safety improvements that can be implemented as part of other infrastructure investments.

Regulations and Standards

9. Participate in the development of a regional compact defining common standards for micromobility services.

Partnerships and Coordination

10. Explore the feasibility of a Traffic Management Center, ideally partnering with adjacent municipalities and other agencies.

More Targeted Planning / Study

None at this time.

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Chapter 8.
Complete Network Recommendations

RECOMMENDATIONS

A complete network of streets in the city that provides connections, choice, calming, and capacity while meeting the needs of the community will be the result of implementing the projects defined in previous sections. These projects and strategies, combined, will allow the City to realize its transportation Goals, and ultimately deliver upon the Mission defined by the community. The networks presented here are intended to present a path to completion of these networks so that all people can choose the mode that best suits their travel needs and lifestyles.

A summary of the Capital investments will be included in the packet materials for the September 10, 2019 Joint Leadership study session, provided on www.envisionlittleton.org on September 9, 2019, and in the final draft of this Transportation Master Plan.

A summary of the actions required for critical corridors is provided.

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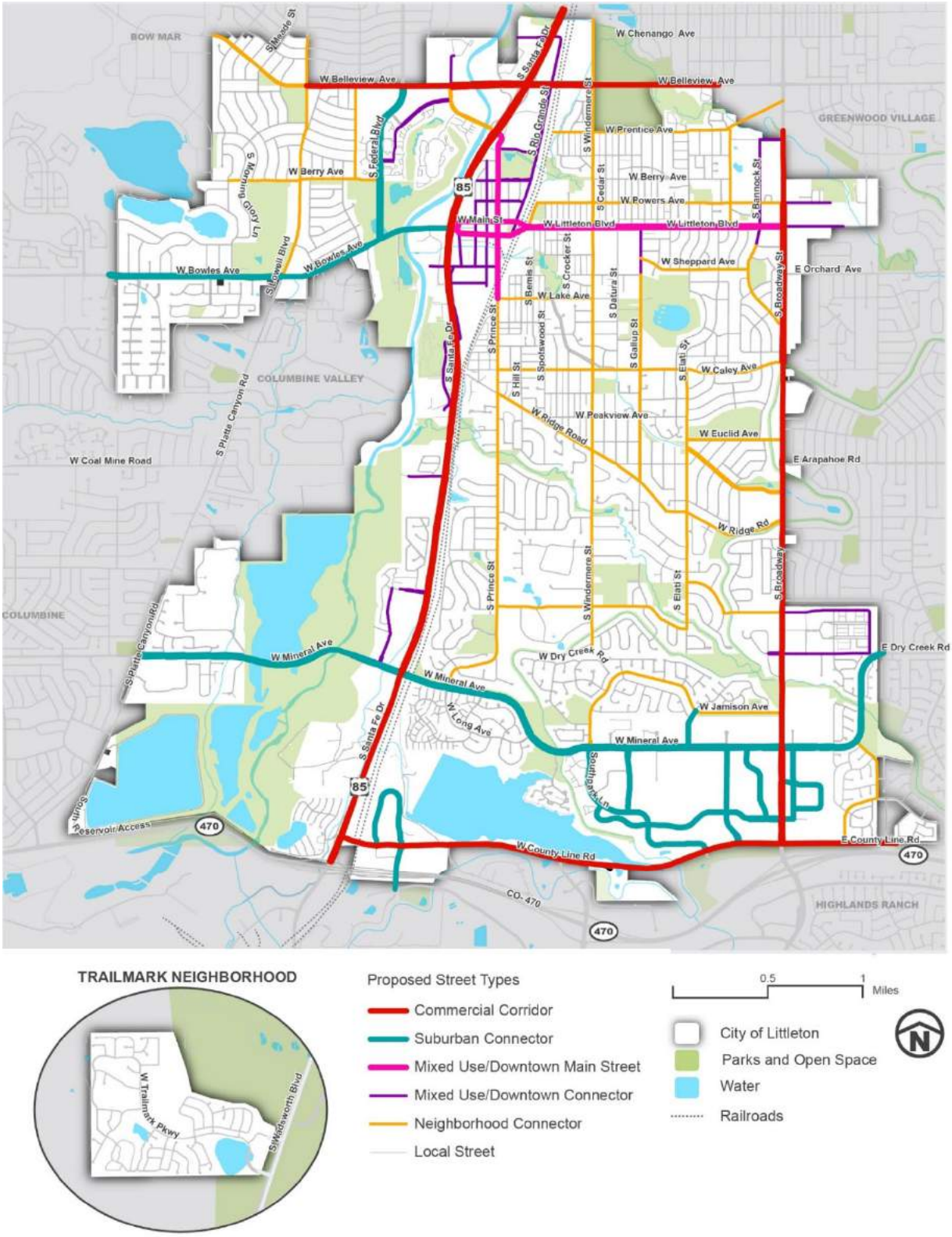


Proposed Street Types

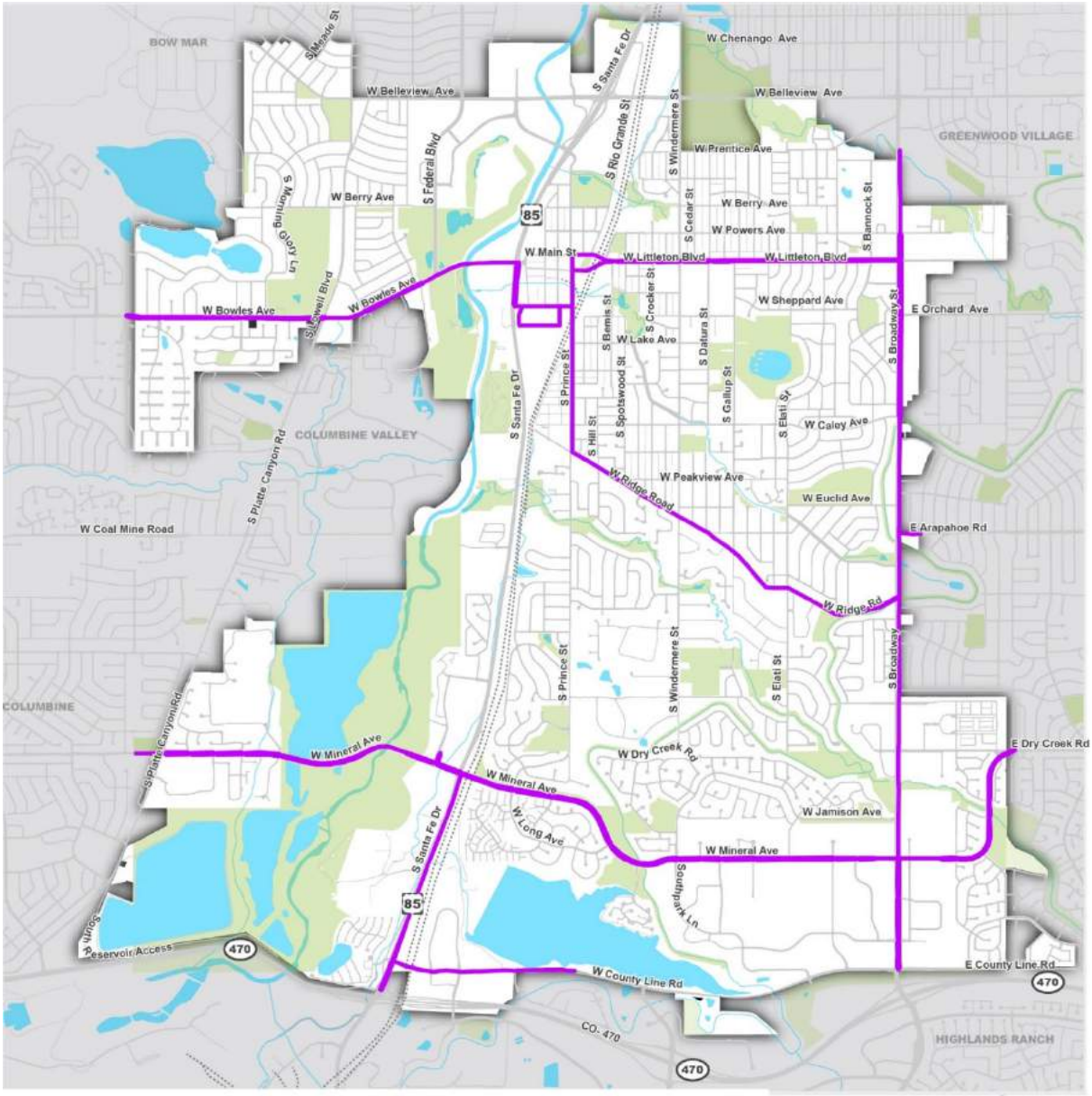
- Commercial Corridor
- Suburban Connector
- Mixed Use/Downtown Main Street
- Mixed Use/Downtown Connector
- Neighborhood Connector
- Local Street

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads

N

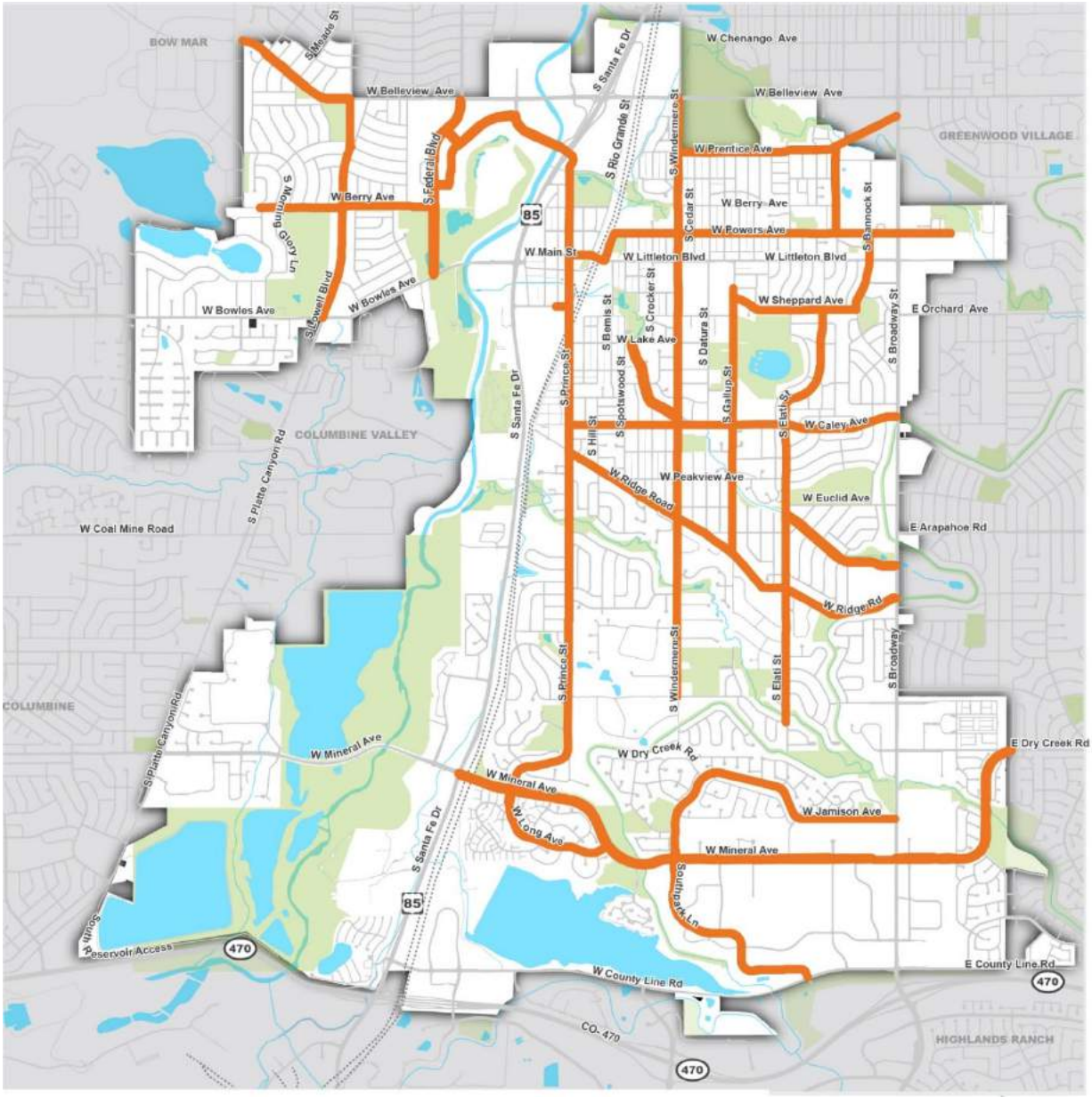
CITY OF LITTLETON
PROPOSED STREET TYPES



0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads
- Pedestrian Priority Street

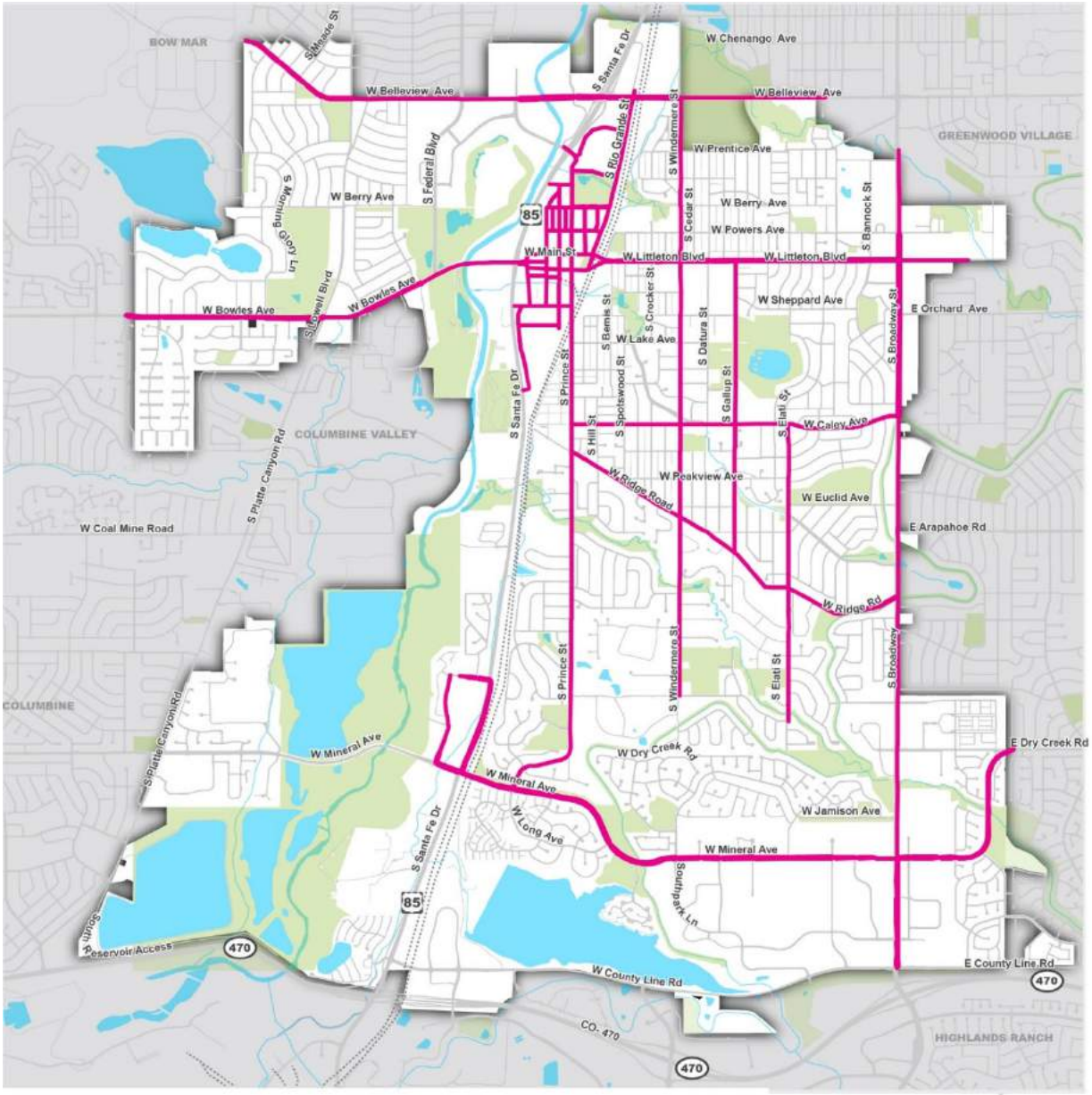
CITY OF LITTLETON
TRANSIT PRIORITY STREETS



0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads
- Bike Priority Street

CITY OF LITTLETON
BIKE PRIORITY STREETS

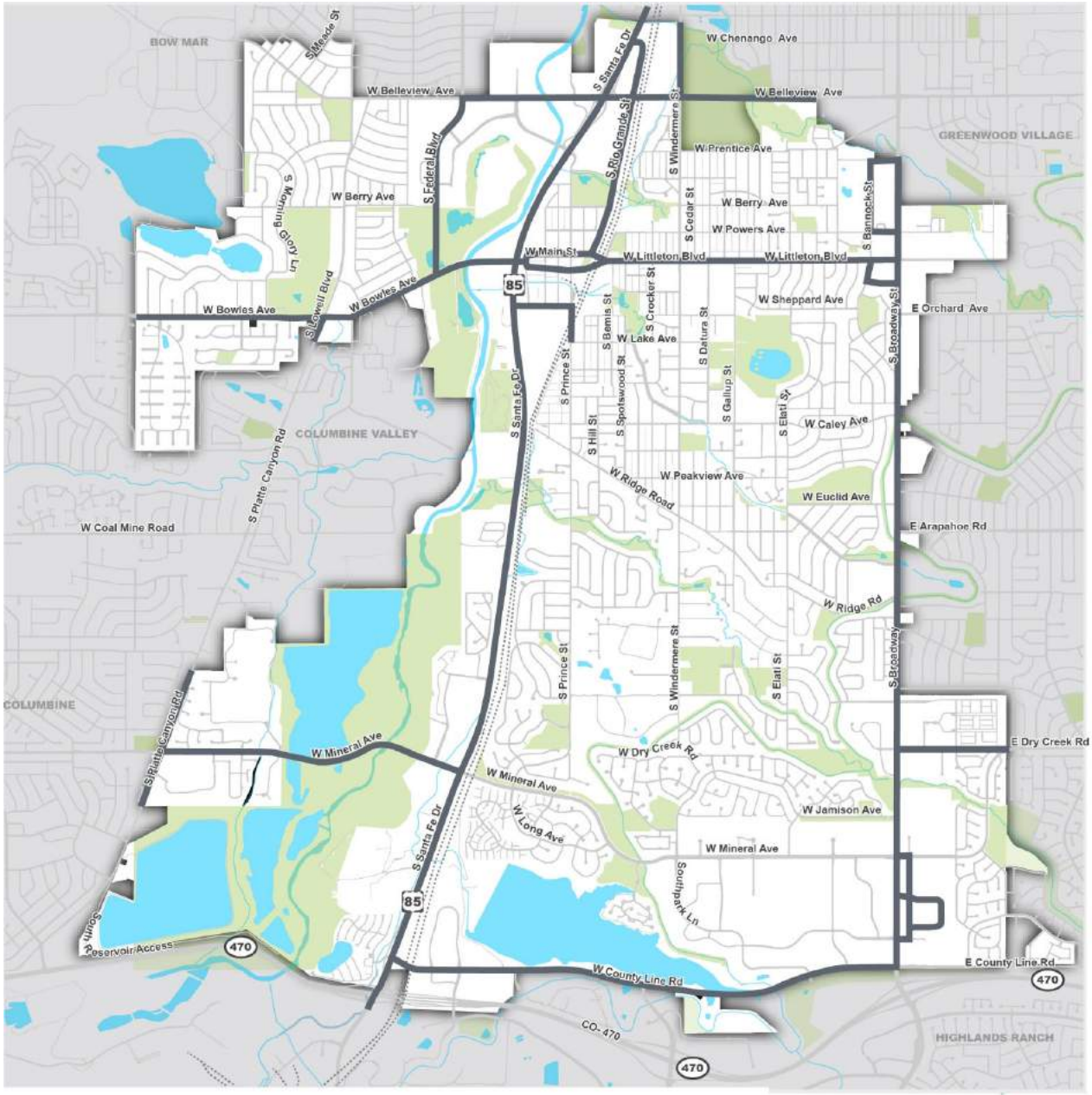


TRAILMARK NEIGHBORHOOD

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads
- Pedestrian Priority Street

CITY OF LITTLETON
PEDESTRIAN PRIORITY STREETS



TRAILMARK NEIGHBORHOOD

0.5 1 Miles

- City of Littleton
- Parks and Open Space
- Water
- Railroads
- Truck Routes

CITY OF LITTLETON
TRUCK ROUTES

CRITICAL CORRIDOR MAPS

Summaries of the actions to be taken on critical corridors are provided on the next pages.

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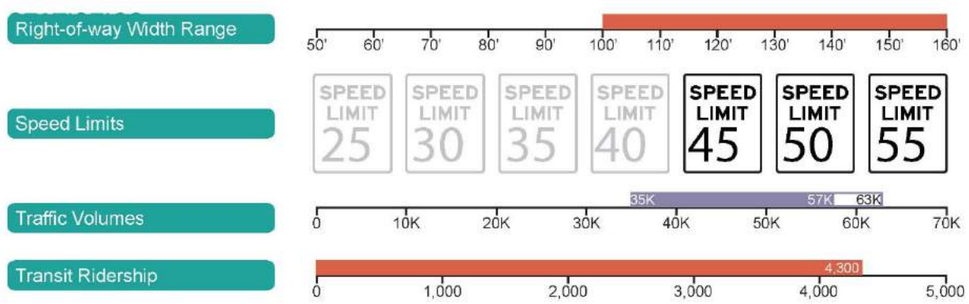
Critical Corridor: Santa Fe Drive (US 85)

Santa Fe Drive is a state and federal highway that has long served as Littleton's connection to the rest of the region. Today, it is a mix of limited access expressway and commercial arterial. It carries a massive amount of traffic through the city and serves not just Littleton's north-south travel needs, but also as a primary route for traffic moving through the City. It will continue to serve this function in the future as a state highway.

The future of Santa Fe Drive is as the City's main north-south auto and freight route. Santa Fe Drive is unique in that the corridor is flanked on either side by premium transit (LRT) or active transportation (Mary Carter Greenway) facilities. These adjacent multimodal corridors allow Santa Fe Drive to be an auto and freight mover.



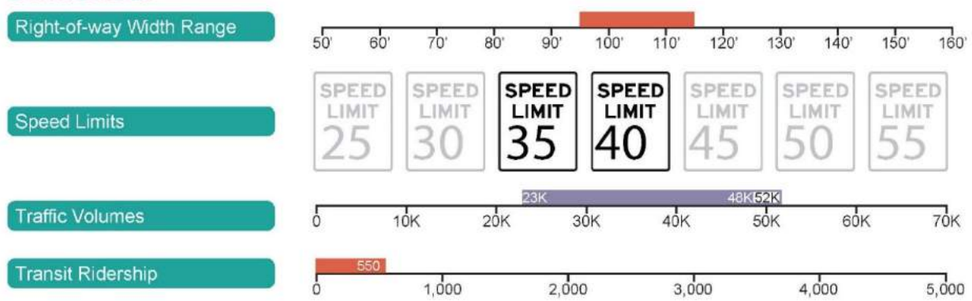
STRATEGIES AND PROJECTS:

- Implement near-term operational improvement projects:
  - Alternative intersection at Mineral Avenue
  - Safety and operational improvements at Bowles
  - Safety and operational improvements at S Prince St
  - Pursue grade-separated interchange at Mineral Avenue
- Improve downtown connections at north and south ends of downtown to alleviate congestion at Bowles Ave
- Create a downtown mobility and land use plan that identifies a vision for connecting downtown to the river, and establishes the desired Santa Fe Drive alignment (both horizontal and vertical)
- Potential visions could include:
  - Grade-separation of Bowles and Santa Fe (no interchange)
  - Grade-separation of Bowles and Santa Fe (with interchange)
  - Reconfigure downtown circulation to provide access to downtown via Prince and Rio Grande, and potential future connections
- Pursue regional partners to proceed with the extension of LRT to Highlands Ranch, or a shorter segment.
- Study the feasibility of connecting South Platte River Parkway, west of Santa Fe, into the downtown area to serve local traffic.
- Work with CDOT to create a plan for access management as part of the Planning and Environmental Linkages Study (PEL).

Critical Corridor: S Broadway

Broadway currently serves a number of uses. It is the most traveled transit corridor (beside the LRT lines), it serves as a regional automotive and truck route, and it provides direct property access to a mix of general commercial uses and even some single-family residential uses. Broadway is one of the most dangerous places to be as a pedestrian or bicyclist in the City, and its wide footprint and fast speeds mean that those who attempt to cross it are vulnerable to being struck by autos.

STATISTICS:



STRATEGIES AND PROJECTS:

The future of Broadway is as the City's eastern transit Boulevard. Because the right-of-way is wide, Broadway is a prime candidate for exclusive transit lanes with Bus Rapid Transit service. Repurposing underutilized road space for transit will allow Broadway to evolve into an asset for Littleton, and will generate economic activity. Broadway has been identified as a Tier 1 BRT corridor by RTD and the City should dedicate resources to working with partner municipalities to take transit service on the corridor to the next level.

As the transit vision evolves, other modes, particularly auto and freight, must be accommodated. Broadway currently carries as many as 48,ooo vehicles per day on some segments and experiences a significant amount of congestion.

Sacrificing space for transit vehicles will likely mean providing for auto mobility in other, innovative ways, which could include alternative intersection treatments, adaptive signal controls, or other applications of new technology.

Special attention must be paid to the residential land uses on the corridor.

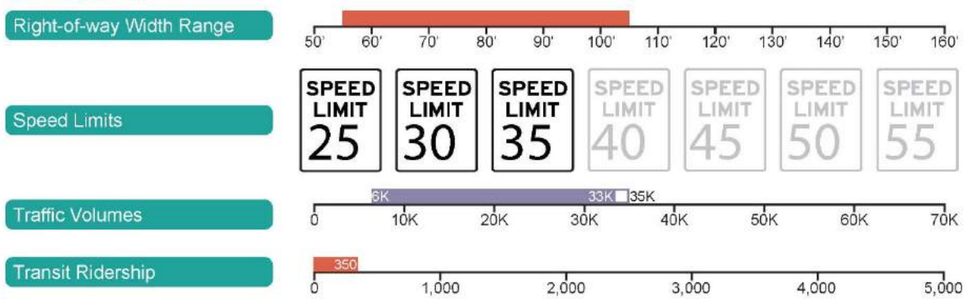
Specific actions include:
1. Partner with RTD, Centennial, and Arapahoe County to study the future of the corridor.
2. Implement quick action projects to enhance transit speeds and reliability.
3. Implement quick action safety projects for pedestrians, bicyclists, and motorists.

Critical Corridor: Littleton Blvd / Main St / Alamo Dr / Bowles Ave

This corridor, which passes directly through downtown Littleton, currently serves as the main east-west route through the northern part of the City. At the heart of the City, Littleton Blvd and Main Street have a rich history as a place to go, a place to do business, and a place to be with the community.

The Comprehensive Plan envisions Littleton Boulevard transitioning to a mixed use corridor and extension of downtown, while respecting its history.

STATISTICS:



STRATEGIES AND PROJECTS:

The future of this corridor is as Littleton's Main Street. This corridor is many things to many people, but at its core it is the identity of Littleton. Extending the positive aspects of Downtown Littleton and Main Street to the east along Littleton Boulevard and reconnecting civic uses east of the railroad tracks will bring a better sense of connection with the downtown area and the rest of the community. With Littleton High School anchoring the east end of the corridor, the transformation of Littleton Blvd into a mixed use urban arterial will create a place that generates activity and contributes to the City's prosperity.

The corridor has the potential to serve as a true place, not just a place to move cars.

Specific Actions include:

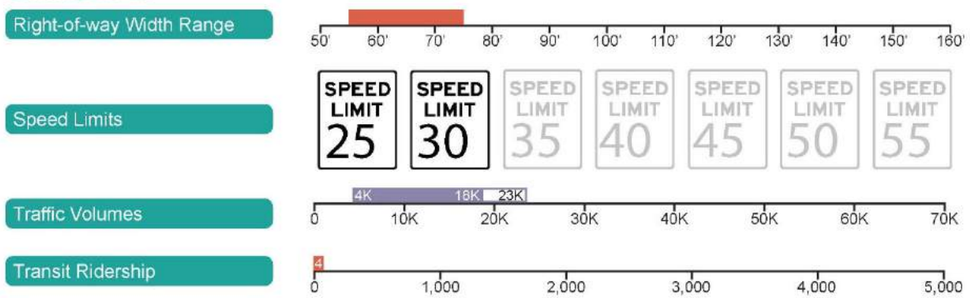
1. Conduct a corridor study that builds upon the foundation in this TMP.
    a. Create an access control plan to address redevelopment concerns.
2. Implement quick action projects to enhance transit speeds and reliability.
3. Implement quick action safety projects for pedestrians, bicyclists, and motorists.
4. Advocate for increased transit frequency along the corridor with RTD.
5. Enhance bicycle connections to the Powers Avenue bicycle priority street to the north.
6. Enhance the pedestrian environment, particularly on the east end.
7. Conduct a Downtown Mobility Plan and Streetscape Plan

Critical Corridor: Prince St/ Windermere St

Prince St and Windermere St are parallel north-south roadways, extending through the majority of the City. These roadways serve the primarily residential communities to the south and the mixed uses to the north, including the downtown area. The roadways are generally two-lane connector facilities providing access to local roadways and direct access to residential and commercial uses.

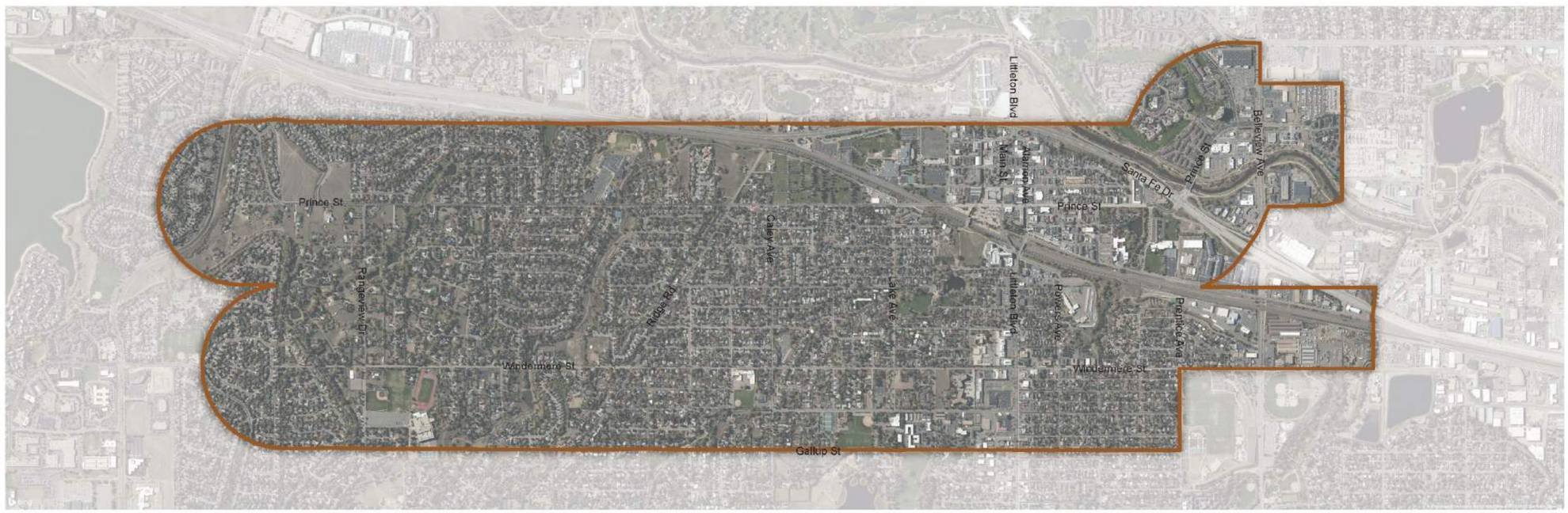
The future of these facilities are as complete streets that continue to provide local access to residents and businesses of Littleton. Both Prince St and Winderwere are identified as pedestrian priority streets where widening narrow sidewalks will better serve the community. Both roadways are also recommended for bicycle improvements along the majority of their extents, including protected bike lanes along Prince St and protected or buffered bike lanes along Windermere.

STATISTICS:



STRATEGIES AND PROJECTS:

- Widening narrow sidewalks and bridging sidewalk gaps
- Installing protected bike lanes along Prince St
- Installing protected or buffered bike lanes along Windermere
- Implementing safety and operational improvements at designated intersections along both facilities
- Implementing traffic calming along Windermere from Ridge Rod to Rangeview Dr
- Others under development



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