



CITY OF LONE TREE

2040 TRANSPORTATION PLAN

AS ADOPTED BY CITY COUNCIL ON

March 3, 2020

Submitted to

City of Lone Tree
9220 Kimmer Drive
Lone Tree, CO 80124

Submitted by

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**CITY OF LONE TREE
RESOLUTION NO. 20-09**

**A RESOLUTION ADOPTING THE CITY OF LONE TREE
2040 TRANSPORTATION PLAN
AS AN ELEMENT OF THE COMPREHENSIVE PLAN**

WHEREAS, the City Council for the City of Lone Tree (the "City") is authorized to adopt, review and amend the City's comprehensive plan pursuant to Section 4, Article XVI of the Home Rule Charter; and

WHEREAS, the City of Lone Tree comprehensive plan has been adopted and was last updated in 2019 ("Comprehensive Plan"); and

WHEREAS, one of the stated goals of the Comprehensive Plan is to create a safe, connected and efficient transportation system in harmony with the surrounding land uses and the environment, and in furtherance thereof, the Comprehensive Plan identifies the City's intention to adopt a master transportation plan as an element of the Comprehensive Plan; and

WHEREAS, the City has prepared a master transportation plan titled *The City of Lone Tree 2040 Transportation Plan* ("Transportation Plan"); and

WHEREAS, the major purpose of the Transportation Plan is to provide a guiding framework for the continued development and enhancement of the transportation network in Lone Tree consistent with the goals of the Comprehensive Plan; and

WHEREAS, the Transportation Plan, a copy of which is on file and available for public inspection in the Public Works Department, has been presented to the Planning Commission and the City Council; and

WHEREAS, the Planning Commission has recommended approval and adoption of the Transportation Plan; and

WHEREAS, the City Council conducted a public hearing on the Transportation Plan, after publishing sufficient notice of the time, place and nature of the public hearing in the Douglas County News-Press newspaper; and

WHEREAS, the City Council desires to adopt the Transportation Plan as part of the Comprehensive Plan, as proposed by the Planning Commission, with amendments, if any.

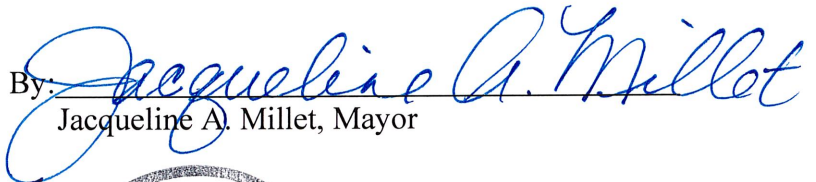
NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LONE TREE, COLORADO, THAT:

Section 1. The City Council hereby approves and adopts The City of Lone Tree 2040 Transportation Plan, attached as **Exhibit A**, and authorizes the Public Works Director to make minor, non-substantive modifications to the Plan to correct and/or update clerical, graphical and mapping information.

Section 2. The Transportation Plan adopted herein shall become effective immediately upon the adoption of this Resolution.

APPROVED AND ADOPTED THIS 3RD DAY OF MARCH, 2020.

CITY OF LONE TREE

By: 
Jacqueline A. Millet, Mayor

ATTEST:



Jay Robb, City Clerk





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LIST OF ACRONYMS AND ABBREVIATIONS

Average Daily Traffic	ADT
American Disability Act	ADA
Avenue	Ave
City of Lone Tree	City
Colorado Department of Transportation	CDOT
Colorado State Highway 470	C-470
Comprehensive Plan	CP
Denver International Airport	DEN
Denver Regional Council of Governments	DRCOG
Drive	Dr
Framework Development Plan	FDP
Highway Capacity Manual	HCM
Institute of Transportation Engineers	ITE
Interstate 25	I-25
Light Rail Transit	LRT
Level of Service	LOS
National Cooperative Highway Research Program	NCHRP
Parkway	Pkwy
Road	Rd
Regional Transportation District	RTD
Street	St
Strategic Plan	SP
Traffic Analysis Zone	TAZ
Transportation Plan	TP
Transportation Master Plan	TMP
Travel Demand Management	TDM
Transit Oriented Design	TOD



STUDY CONTEXT AND PURPOSE

The City of Lone Tree (City) is a premier community connected by great neighborhoods, vibrant public spaces, a beautiful natural environment and thriving businesses. Over the years, Lone Tree has been implementing its vision through annexation of land within its planning and growth area; careful land use planning and development review; deployment of innovative transportation strategies and investments; creation of signature cultural and recreational opportunities; attraction and growth of a diverse economy; and that is an efficient city government committed to excellence through integrity, collaboration and innovation.

The purpose of the 2040 Transportation Plan (TP) is to provide a guiding framework for the continued development and enhancement of the transportation network in Lone Tree. This TP considers a wide range of transportation network improvements necessary to continue the development of a complete transportation system that integrates all travel modes. This plan will provide a strong foundation for future transportation priorities and work plans for the City of Lone Tree and will serve as a living document to be updated in coordination with future DRCOG Model Runs.

TRANSPORTATION INNOVATION

The City of Lone Tree is a national leader in smart cities initiatives. It was one of 16 cities selected for Transportation for America and Sidewalk Labs' Smart Cities Collaborative, and is a founding member of the Colorado Smart Cities Alliance. In 2019, Lone Tree partnered with Via to re-launch an updated on-demand shuttle bus within the city limits, and is working with partners to utilize the latest technology to continually improve the ability for people and goods to safely move through the City of Lone Tree. These efforts are being applied to the local roadway system, first/last mile connections to regional transit services, as well as an overall focus upon improving safety for all members of the Lone Tree Community. The City of Lone Tree is leading the implementation of adaptive signal control technology (ASCT) for use within the signalized intersections along the Yosemite Corridor, which includes the signals on Yosemite and critical adjacent intersections in the Cities of Lone Tree, Centennial, and Greenwood Village.

MOBILITY FOR ALL

Residents and visitors to the City of Lone Tree can access cultural and recreational opportunities through our visionary transportation network without the use of an automobile. With five transit stations within the city limits, Lone Tree is a regional transportation hub that continues to heighten multimodal safety and mobility through pedestrian safety improvements, expansion of the local on-street bikeway network and improving connections and wayfinding to the robust regional trail systems within the city. The City of Lone Tree continues to grow our Link on Demand free transit service and will continue to work with and partner with our regional transit providers, such as RTD and Bustang, to encourage transit enhancements throughout the city. This is just one of the many examples of our active commitment to safety and creating a great community with exceptional places. The city will continue to help improve connections to our neighboring communities and to support regional significant projects to connect us beyond our borders.



Integrated Planning Effort

Lone Tree, Douglas County and developers of the RidgeGate West and East areas have recently completed or currently conducting studies and planning efforts that were used to inform the development of this TP.

City of Lone Tree Comprehensive Plan (2019)

Lone Tree recently completed and adopted the City of Lone Tree Comprehensive Plan. The Comprehensive Plan is not a major departure from previous plans; it builds upon the City's planning legacy and the many achievements realized in its first two decades, ensuring the City continues to be a desirable place to live, work, and play for generations to come. The Plan supports a safe, integrated, and multimodal approach to transportation planning including planning for vehicular, transit, pedestrian, and bicycle modes.

City of Lone Tree Strategic Plan (2016)

In 2015, the City administration, working in conjunction with the City Council, began developing the City's strategic plan. Along with the vision and mission statements, the City Manager committed to six big ideas. These six big ideas serve as the cornerstone of the strategic plan. The City also identified a number of objectives that further define how to achieve the big ideas. Collectively, the vision, mission, big ideas and objectives form the strategic plan. For transportation, the stated Big Idea #2 is "We will be a national model for our visionary transportation network." The primary objectives for Big Idea #2 are:

- Maintain Lone Tree's existing local transportation assets to meet our high community standards
- Advance the local transportation network to become an innovative, competitive community asset

Douglas County 2040 Transportation Master Plan (2019)

Douglas County is currently conducting the Douglas County 2040 Transportation Master Plan. The primary purpose of this Plan is to define a long-range vision for a multi-modal transportation system that offers more choices in how people travel. The plan considers the previous Douglas County 2030 Transportation Plan (adopted November 2009), the most recent local agency transportation plans, recent studies conducted by the County and local agencies, and the most recent DRCOG plan (2040). The focus of this Transportation Plan is on unincorporated Douglas County. The transportation plans of the incorporated municipalities within the County were integrated into the plan to ensure that a comprehensive transportation system is provided.

RidgeGate East and West Development Plans

Numerous development plans, sub-area plans and traffic impact studies have been prepared for the RidgeGate development over the past 15 years. Development and the roadway infrastructure within RidgeGate West is nearly completed. Within RidgeGate East, development and the associated roadway infrastructure will soon be initiated.



Transportation Plan Goal, Objectives, Policies and Implementation Strategies

The City of Lone Tree Comprehensive Plan provides a blueprint to guide the city's growth and infrastructure development based on community needs and opportunities. The transportation goal was developed as part of the Comprehensive Plan and the supporting objectives and strategies were developed and provided by Lone Tree. They are intended to provide the framework and guidance for the City as it continues to improve its multi-modal transportation system.

The Transportation Goal, Objectives, Policies and Implementation Strategies are summarized below.

Transportation Goal: A safe, connected, and efficient transportation system in harmony with surrounding land uses and the environment.

Objectives

Multimodal Transportation Objective: Enhance and expand the City's multimodal transportation network.

Multimodal Transportation Policies

- Plan, design, implement, and maintain transportation infrastructure that provides safe travel options for all users including pedestrians, bicyclists, automobiles, buses, and light rail.
- Provide safe, multimodal connections between residential, schools, recreational, and commercial areas.
- Plan for future growth and cross-connectivity when designing and constructing transportation infrastructure in developments.
- Ensure new development improvements support and complement existing infrastructure systems.
- Incorporate emerging technology and innovation into transportation infrastructure to improve safety, efficiency, and communication. Integrate regional and local transportation systems, traffic patterns, and land-use objectives in transportation planning and in the review of development applications.

Multimodal Implementation Strategies

- Integrate planned and existing regional and local transportation systems, traffic patterns, pedestrian connections, bicycle paths, and land uses in transportation planning and in the review of development applications.
- Right-size City and private infrastructure improvements in new developments to ensure they are sufficient for current and future needs.



- Investigate, test, and promote transportation technologies that can improve City traffic flow and transportation systems, including adaptive traffic controls and infrastructure to enable autonomous vehicles.

Transit Objective: Transit services and facilities that serve the travel needs of users, including commuters and transit-dependent populations.

Transit Policies

- Ensure park-n-rides, transit centers, and bus stops are easily accessible by car, bike, foot, and the disabled (ADA), and provide appropriate amenities that encourage and support the transit experience, including attractive shelters, car and bicycle-share facilities, and adequate parking for cars and bicycles.
- Support local circulator buses, regularly scheduled bus shuttles, and on-demand transit to provide choice, viable alternatives to automobile use and transportation for the disabled (ADA).
- Encourage the use of bike sharing and free or low-cost shuttles for first and last mile connections.

Transit Implementation Strategies

- Support integrated regional and local transit systems.
- Encourage and participate in mobility solutions that serve the community.

Roadway Objective: A roadway network that meets the travel needs of residents and businesses in a safe, convenient, pleasing, and efficient manner, while minimizing environmental impacts.

Roadway Policies

- Ensure that roadways are designed and constructed within developments in a logical and phased manner commensurate with expected growth.
- Implement a modified grid system of roadways with a hierarchy of through streets to accommodate demand, distribute traffic, link neighborhoods and commercial areas and offer alternative routes – Cul-de-sacs and dead-end drives are discouraged.
- Incorporate bicycle and pedestrian improvements, as well as ADA accessible routes, on all roadways throughout the City to facilitate multiple modes of transportation to meet the needs of all transportation system users.
- Improve and retrofit existing roadways as necessary to meet current and future needs and design standards for motor vehicles and bicycles.



- Minimize the environmental and visual impacts of new or improved roadways along the bluffs and drainages by avoiding steep topographic terrain, thereby reducing the need for extensive cut/fill and retaining walls.
- Incorporate streetscape elements that reinforce community character and quality such as lighting, landscaping, public art, medians, benches, and shelters.

Roadway Implementation Strategies

- Assess and make recommendations on adaptive traffic control signals to reduce congestion and improve safety.

Sidewalks, Trails and Bike Lanes Objective: A safe, connected, and robust system of sidewalks, trails, and bike lanes.

Sidewalks, Trails, and Bike Lanes Policies

- Ensure the design, construction and maintenance of safe, efficient, and ADA accessible sidewalks, trails, and bike lanes to accommodate people of all ages and abilities.
- Expand the network of sidewalks, trails, and bike lanes throughout the City, connecting neighborhoods with community facilities, employment, shopping, schools, and social nodes.
- Connect the City's network of sidewalks, trails, and bike lanes to adjoining communities, developments, and the regional trail system.
- Utilize natural drainageways as the basis for an extensive trail network within the City's Planning and Growth Area; design and construct the network with minimal slope, wildlife, and vegetative disturbance.
- Encourage pedestrian and bicycle travel by providing trails in new developments.

Sidewalks, Trails, and Bike Lanes Implementation Strategies

- Promote biking, walking, running along the community's transportation network.
- Play an active role in park and recreation planning related to sidewalks, trails, ADA accessible facilities, and bike lanes through partnerships with other entities.
- Work with our partners to provide connections between commercial, institutional, residential and transit.
- Solicit nonprofits, volunteer organizations, and other partnerships to assist in the funding and maintenance of needed trail construction.
- Continue support for the Recreation Committee's efforts to promote Bike to Work Day.
- Actively seek out grants for trails and alternative transportation connections.



Travel Demand Management Objective: Maximize the public investment in infrastructure, reduce traffic congestion, conserve energy, and enhance air quality through an integrated TDM system.

TDM Policy

- Encourage employers to implement TDM programs.
- Evaluate the potential impact of changing transportation trends on parking and vehicle queuing requirements.

TDM Implementation Strategies

- Encourage employers to offer a range of TDM services and programs, including but not limited to the following:
 - Premium, reserved parking for car and vanpools
 - Staggering work hours for employees, including flextime, four-day workweeks and/or other non-typical work shifts
 - Allowing telecommuting
 - Subsidizing employees' transit costs
 - Rideshare matching
 - Providing bicycle sharing
 - Providing parking areas for bicycles that are secure from weather and theft
 - Providing showers and lockers
 - Guaranteed ride home programs for employees who walk or ride bicycles but experience breakdowns and/or inclement weather.

Maintenance Objective: Maintain Lone Tree's existing local transportation infrastructure to be safe and efficient.

Maintenance Policy

- Deliver a well-planned, timely Capital Improvement program that improves long-term City infrastructure in a thoughtful and continuous manner.

Maintenance Implementation Strategies

- Maintain streets and associated facilities including drainage facilities, striping and signage, along with a regular schedule of street sweeping.
- Replace street surfaces on regular schedules through the City's pavement preservation program.



- Provide effective snow removal operations before, during, and after inclement weather events, in accordance with snow removal plan.

Transportation Funding Objective: Adequately fund the City's transportation system and infrastructure.

Transportation Funding Policies

- Ensure that new development provides adequate transportation improvements necessary to serve the development, or, where appropriate, pay their fair-share cost of improvements.
- Partner with other jurisdictions and agencies to fund needed transportation improvements.

Transportation Implementation Strategies

- Seek new ways and revenue streams for funding transportation improvements.
- Solicit federal, state, and regional funding to maximize transportation improvements.



Regional Transportation Coordination Objective: Protect, leverage, and improve regional transportation systems through cooperative efforts.

Coordination Policies

- Foster positive, mutually-beneficial transportation planning relationships with other agencies.
- Involve applicable local and regional transportation partners in development referrals.

Coordination Implementation Strategies

- Invest in and protect staff relationships with counterparts in neighboring jurisdictions. Onboard and train new staff members carefully when we add capacity to build on earlier progress.
- Promote cooperation and strong relationships among elected officials. Orient new elected officials to transportation regional partnerships and success stories.
- Support several ongoing regional transportation projects, including:
 - RidgeGate Parkway Widening
 - Lincoln Avenue Interchange reconstruction and associated improvements
 - East-West Regional Trail
 - I-25 south corridor bike trails
 - The I-25 Gap project
 - C-470 Express Lanes project
 - Adaptive traffic signal systems
 - Intelligent transportation systems



EXISTING CONDITIONS

Today, Lone Tree's incorporated boundaries encompass around 10-square miles. It is home to many shopping, dining and entertainment opportunities, significant corporate employers, small businesses, major medical facilities, quality residential neighborhoods, and a range of recreational, arts, and cultural amenities. The transportation network includes two major highways, a hierarchy of arterial, collector, and local streets, regional light rail transit, bus service, and Centennial Airport (a general aviation and international airport). Prior to anticipating future transportation needs, it is important to gain an understanding of the current transportation system. The following sections describe the existing roadway network, bicycle and trails network, and transit services.

Roadway Network

The roadway network within the City is based on classifying facilities into functional categories, ranging from freeways to local streets. The functional classification system groups roadways in terms of design and character and provides a general designation of the type of traffic the roadway is intended to serve.

Two major characteristics for defining roadway function are mobility and access. The primary function of local streets is to provide access to business and residences. Local streets are low speed facilities that contain frequent driveways and roadway connections and are not intended for use by through traffic. Arterials, on the other hand, are designed for mobility with higher speeds and limited access points. As shown in **Figure 1**, the higher the level of roadway, the higher volumes of regional traffic and the less emphasis on access. Classifying roadways requires careful examination of the role each performs in the overall transportation system. The following are descriptions of each roadway classification.

Freeways/Interstates

Freeways and interstate highways provide the most mobility and have full access control, allowing drivers to enter and exit only at interchanges. They are designed for high speeds and large volumes of traffic, typically serving longer distance travel and

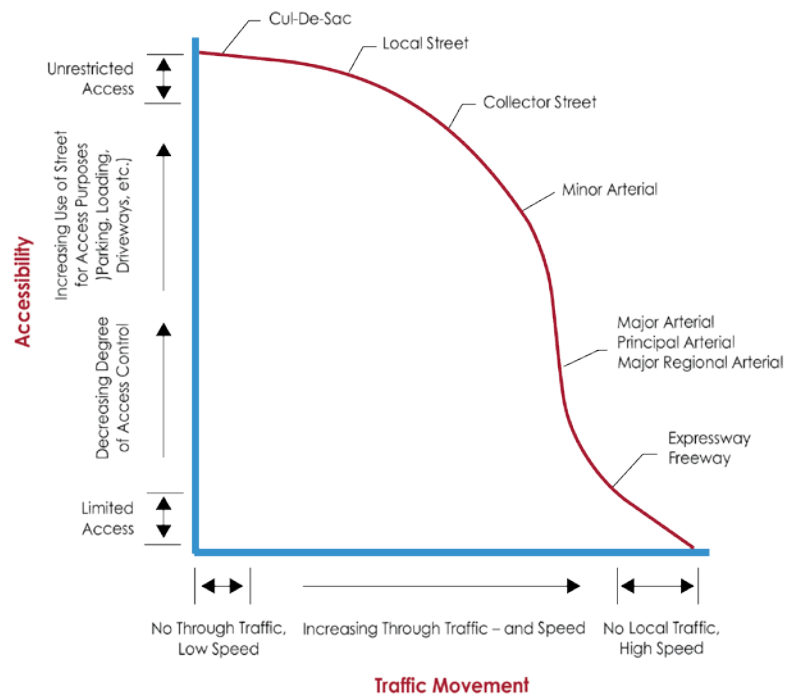


Figure 1. Roadway Accessibility versus Movement Relationship



supporting regional mobility. Owned and maintained by the Colorado Department of Transportation (CDOT), I-25 and C-470 are the only two freeways/interstates within City limits.

Major Arterials

Major arterials provide a high level of mobility at higher speeds for medium to longer distance travel. Access is generally limited with an infrequent number of intersections and little or no direct property access, depending on the surrounding land use. County Line Road, Lincoln Avenue and Yosemite Street are classified as major arterials.

Minor Arterials

Minor arterials are roads that primarily serve a mobility function but often have more closely spaced intersections and some limited direct property access. Minor arterials serve major traffic generators or large land areas and have lower speeds than major arterial roadways. Park Meadows Drive and RidgeGate Parkway are classified as minor arterials.

Collectors

Collectors provide a lower level of mobility than arterials at lower speeds. These roads connect local roads to arterials and may have direct access depending on the surrounding land use (no single-family residential driveway access in urban and suburban areas). Collectors generally provide ample facilities for pedestrians and bicyclists and are designed to limit speed and traffic. Examples of collectors include Lone Tree Parkway and Skyridge Avenue.

Locals

Local roads primarily provide access to adjacent land uses and development as needed and have the least amount of mobility. These roads are characterized by shorter trips, direct single-family residential driveway access, lower traffic volumes, and lower speeds than collectors and arterials. Local roads typically connect to one another or collector streets.

Figure 2 shows the current City roadway network. The majority of the Lone Tree roadway network has been completed primarily west of I-25. East of I-25, a framework of minor arterial and collector roadways within the RidgeGate East development has been completed for future development. Lone Tree roadway network connections to adjoining communities are shown as part of the Douglas County Transportation Master Plan.

Bicycle and Trails Network

The current bicycle and trails network in Lone Tree, is shown in **Figure 3**. The network is comprised of shared-use paths that include the defined sidewalk where bike use is allowed, on-street bike lanes, and unpaved trails. Four regional trails are the main arteries for bike travel within the City and provide access to a network of trails in Douglas County and the Greater Denver Metropolitan Area.



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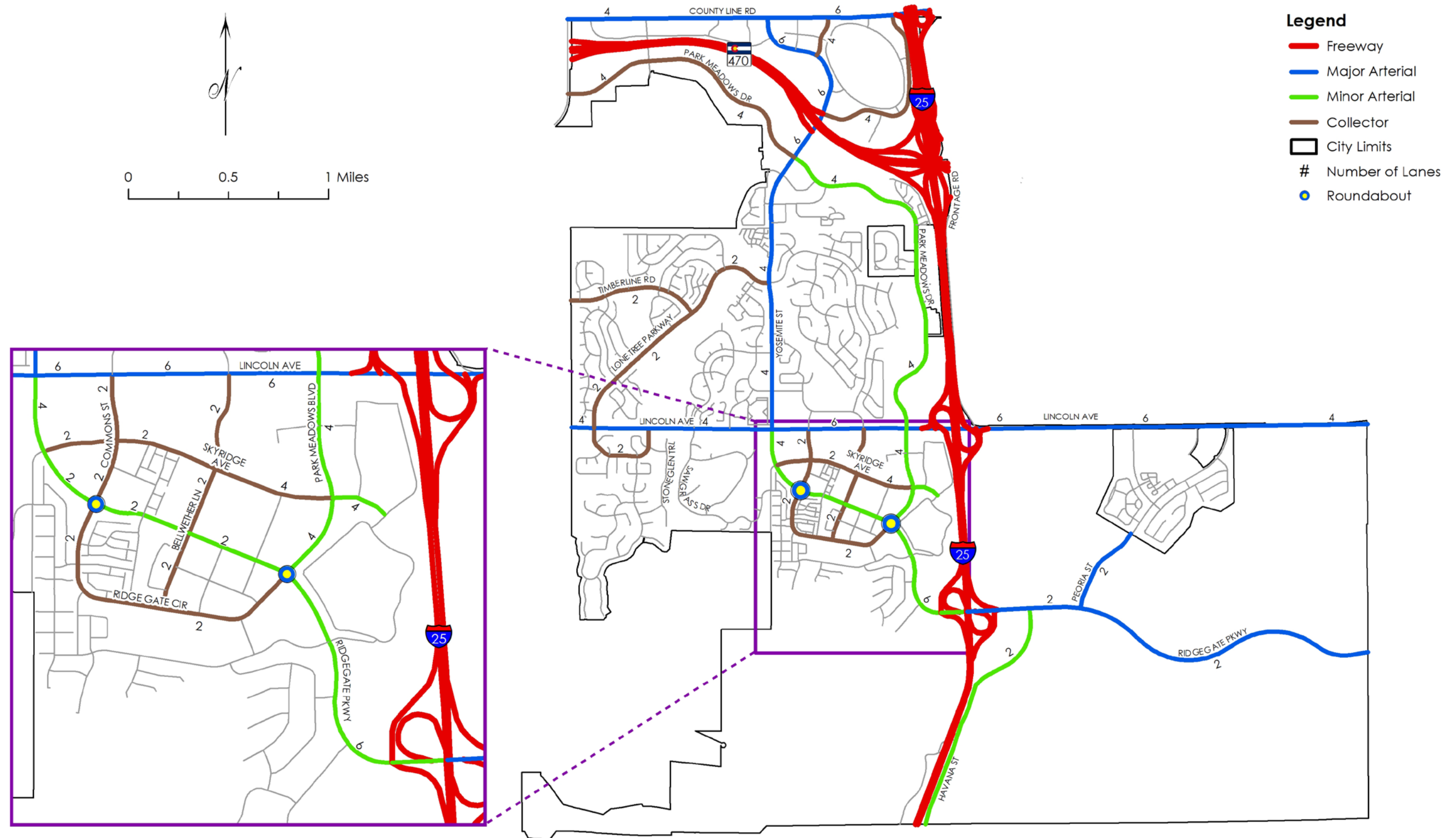


Figure 2. Current Roadway Network

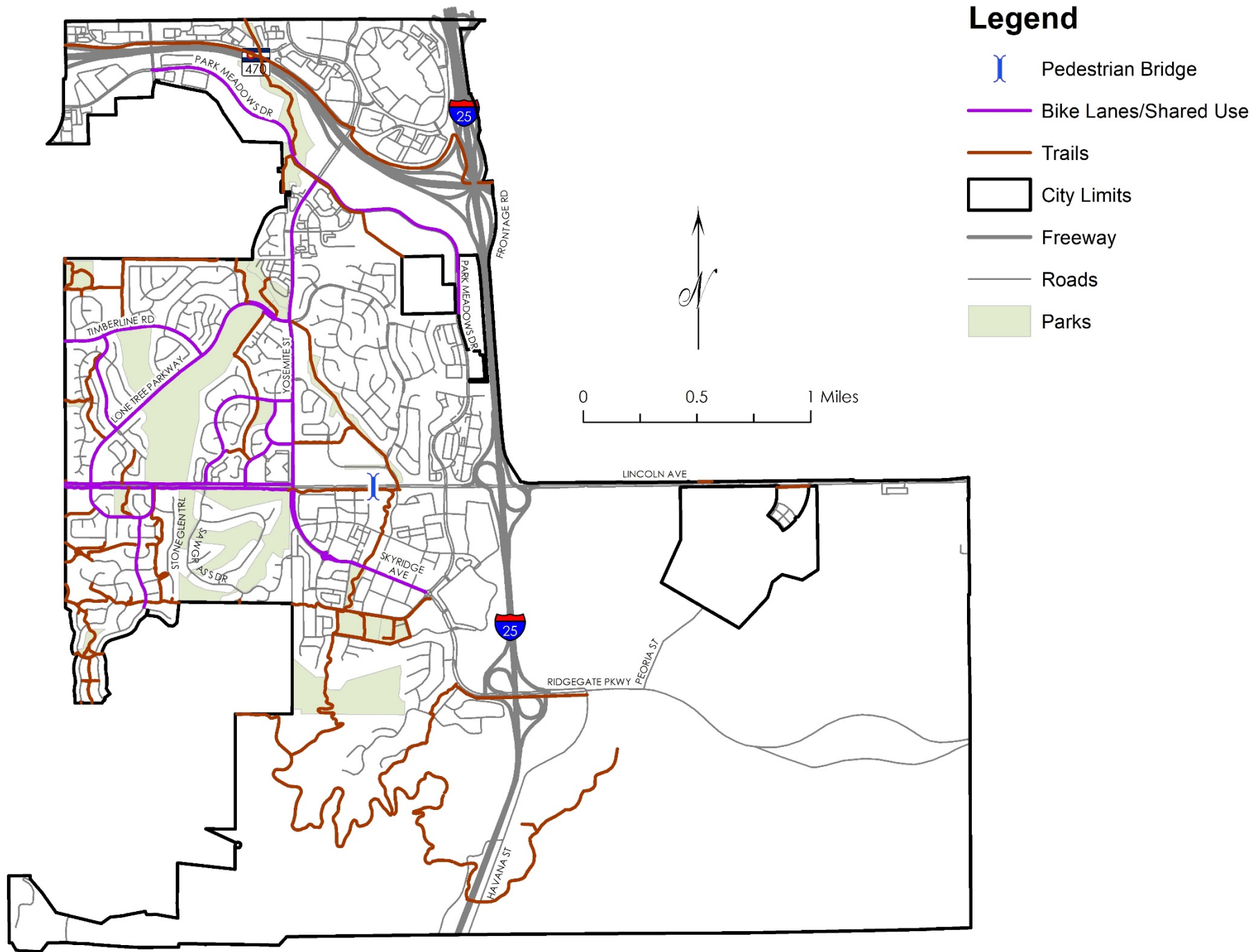


Figure 3. Current Bike Lanes and Trails



The Centennial Trail is a shared use path that runs east-west along Colorado State Highway 470 and connects to both the Highline Canal Trail and the Cherry Creek Trail outside the City boundary. The Willow Creek Trail runs north-south through the center of Lone Tree with portions of shared use path and unpaved trail. The Willow Creek Trail provides connections to the Highline Canal Trail, the Lone Tree Recreation Center and the East/West Trail. The Wildcat Trail is an unpaved trail that extends north-south along Lone Tree's western boundary while the East/West Trail is an unpaved trail that runs through the southern portion of the City.

Numerous community and local shared use paths and trails connect to the four main regional trails, commercial centers, employment centers, schools, parks, and open space throughout the City. All of the transit stations in Lone Tree along the Southeast Light Rail Line have pedestrian access, including pedestrian overpasses of I-25 serving the County Line and Lone Tree Stations not owned by the City of Lone Tree.

Bike lanes are portions of the roadway that are designated by striping, signage, and pavement markings for the preferential or exclusive use of cyclists. Several streets in Lone Tree have dedicated bike lanes, including Lone Tree Parkway, Park Meadows Drive, RidgeGate Parkway, Yosemite Street, Timberline Road, Ptarmigan Trail and Fairview Drive.

Transit Services

The Regional Transportation District (RTD) serves the community by providing a full menu of rapid transit services, including the FlexRide system and bus services within Lone Tree and connecting to surrounding communities and the regional light rail system.

The Southeast Light Rail Transit (LRT) line was opened in 2006 and connects Lone Tree to major employment areas in the southeast I-25 business corridor, Downtown Denver, and Denver International Airport. Two transit stations with Park-n-Ride facilities serve the City and surrounding area: County Line Station and Lincoln Station. Local fixed route bus service provides connections to the transit stations.

RTD recently extended the Southeast Rail Line. The extension carries LRT lines E, F and R past the Lincoln Station to the RidgeGate Station. The extension added an additional 2.3 miles of rail and three new stations to bring service south into Lone Tree. The RidgeGate station provides 1,300 parking spaces.

Lone Tree and other stakeholders contributed \$25 million to support the new rail line, and an additional \$3 million of in-kind contributions was contributed to pay for the \$233 million project. RTD also received \$92 million from a Federal Administration program.

Construction on the extension began in 2016 and was open for passenger service May 19, 2019. Passengers boarding at the end-of-line RidgeGate Station will be able to reach Union Station via the E-Line; 18th and California in Downtown Denver via the F-Line; and Denver International Airport via the R-Line, with a transfer to the University of Colorado A-Line at the Peoria Station.



The Lone Tree Link is a service funded through a public-private partnership that provides free on-demand transit. In 2014, the Link Circulator was established as a fixed route shuttle, connecting key employment centers along Park Meadows Drive with restaurants, retail, and the RTD transit system via the Lincoln Station. In 2017, the Link On Demand transit program established a partnership with Uber, providing door-to-door on-demand shuttle service anywhere within City limits, residents and visitors would request service through the Uber app by selecting the Link On Demand option. Following a successful pilot, the Link On Demand service began a partnership with VIA Mobility, featuring a new smart phone application for requesting service as well as a call-in dispatch service.

RTD also provides both FlexRide service and Access-a-Ride service. FlexRide is a personalized destination-to-destination bus service that travels within select RTD service areas, while Access-a-Ride provides transportation assistance to passengers with disabilities who are unable to use regular buses and qualify under American Disability Act (ADA) guidelines.

Current and future transit services provided by RTD are identified in **Figure 4**.

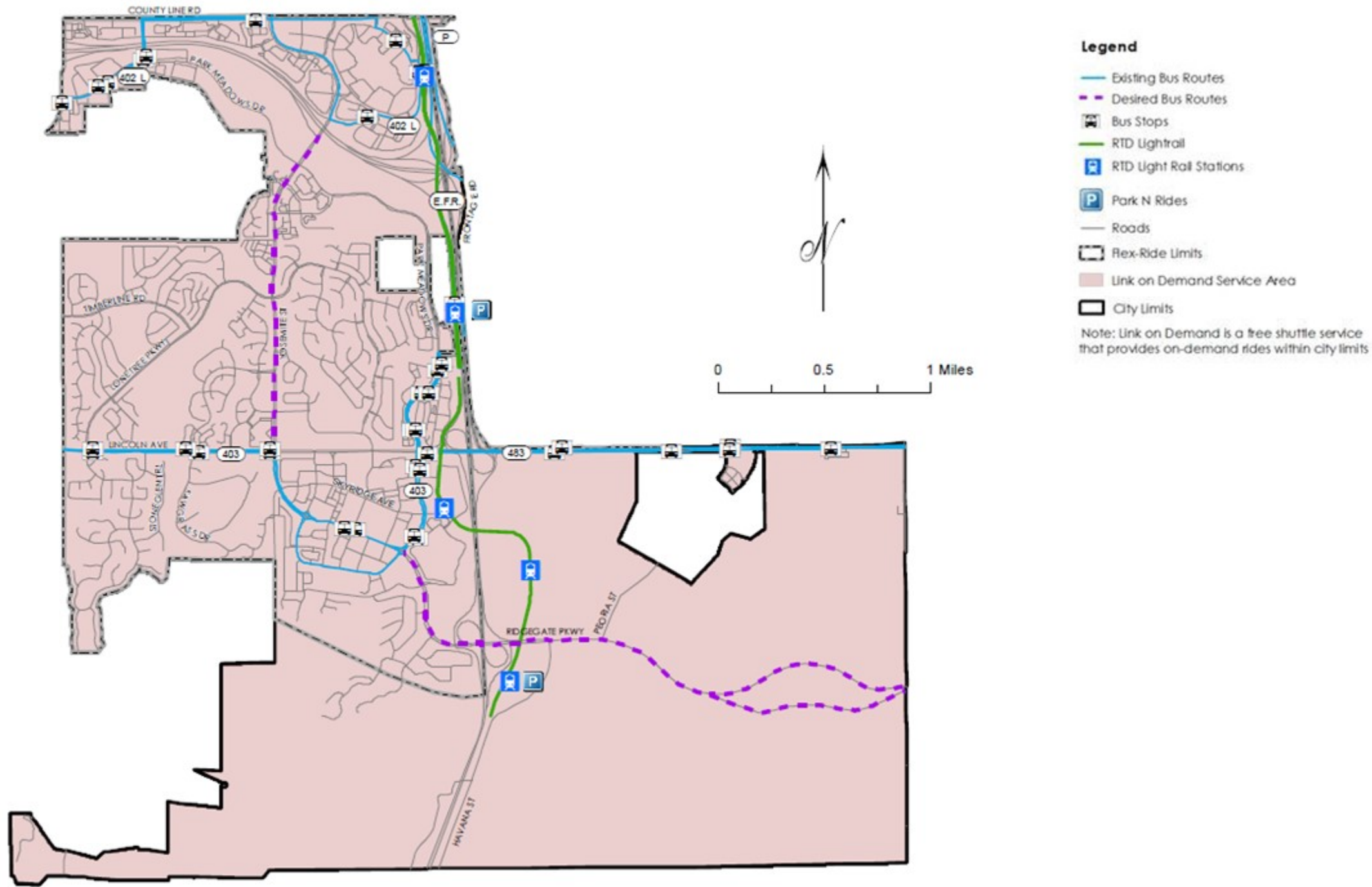


Figure 4. Current and Desired Transit Services



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Crash Data

The crash analysis for the 2040 TP focused on the most frequent crash locations. Crash data provided by Lone Tree were reviewed for the top 10 intersections that experienced the greatest number of crashes for the five-year period of 2014-2018 and are shown in **Table 1**.

Table 1.
Top 10 Intersection Crash Locations

RANK	INTERSECTION	NUMBER OF CRASHES (2014-2018)	PREDOMINANT CRASH TYPES
1	Lincoln Ave & I-25	112	Rear end, Sideswipe same direction
2	Park Meadows Center Dr & County Line Rd	82	Rear end
3	Lincoln Ave & Park Meadows Dr	72	Rear end, Broad side, Sideswipe same direction
4	Lincoln Ave & RidgeGate Pkwy/Yosemite St	69	Rear end, Approach turn
5	Yosemite St & Park Meadows Center Dr	58	Rear end, Sideswipe same direction
6	Lincoln Ave & Peoria St	57	Rear end, Broad side, Sideswipe same direction
7	Lincoln Ave & Commons St	50	Rear end, Broad side, Sideswipe same direction
8	Lincoln Ave & Oswego St	48	Rear end, Approach turn
9	County Line Rd & Chester St	45	Rear end
10	Lincoln Ave & Havana St	41	Rear end

The I-25 interchange area experienced the highest number of total crashes (112), excluding accidents occurring on I-25, followed by the Park Meadows Center Dr & County Line Rd (82) and Lincoln Ave & Park Meadows Dr (72) intersections. Rear end crashes were the most prominent crash type at each intersection. Other predominant crash types reported at the intersections included approach turn, broad side and sideswipe same direction.

While this Transportation Plan (TP) cannot, in and of itself, reduce crashes, it provides a framework for systematically building, maintaining, operating and monitoring a safe transportation system for all users.



TRAVEL DEMAND

Methodology Overview

The Lone Tree TP is being developed concurrently with the Douglas County 2040 Transportation Master Plan. To maintain consistency of the 2040 traffic forecasts for both Lone Tree and Douglas County and provide study efficiency it was agreed to by Lone Tree that the Travel Demand Model, land use and traffic forecasts developed for the Douglas County 2040 TMP would be utilized for the Lone Tree TP.

The traffic forecast modeling for the Douglas County TMP makes use of the DRCOG Focus 2.1 activity-based model for the Denver region, which also encompasses the entire Douglas County area. The DRCOG Focus 2.1 roadway network and Douglas County socio-economic forecasts for 2040 were used to develop 2040 traffic forecasts for the entire County as well as the primary roadways within Lone Tree.

Land Use

The 2040 Douglas County socio-economic forecasts utilized for the Douglas County 2040 TMP were developed and provided by Douglas County. The forecasts included all incorporated and unincorporated areas of the County. The household and employment information was allocated by the Denver Regional Council of Governments (DRCOG) traffic analysis zone (TAZ) structure identified for the County. The 2040 total households and employment for the Lone Tree area are as follows:

- 23,308 Households
- 46,856 Employees

Appendix A provides a tabular summary of the 2040 socio-economic forecasts for Lone Tree with a map displaying the traffic analysis zone structure. The DRCOG 2040 socio-economic forecasts for the rest of the Denver metropolitan region were utilized as inputs into the travel demand model.

It should be noted the Douglas County and DRCOG 2040 socio-economic forecasts do not reflect potential buildout of the associated TAZ areas. Buildout is generally defined as the completion of all planned development according to approved Framework Development Plans (FDP) and development of additional lands outside the FDPs based on present day zoning. Master plan traffic impact studies such as those completed for the RidgeGate area assess the maximum allowable (buildout) land use within each development area. Therefore, traffic impact studies inherently incorporate a greater amount of development than the regional land use forecasts that are developed by Douglas County and DRCOG. These differences in land use forecasts are one of the reasons traffic forecasts differ between those prepared for traffic impact studies and those resulting from regional travel demand models. This is further discussed below.



Traffic Forecasts

As noted previously, the 2040 future traffic forecasts for Lone Tree were developed using the Douglas County socio-economic forecasts and the enhanced DRCOG 2040 roadway network as inputs. The resultant forecasts shown in **Figure 5** have been prepared using procedures documented in the National Cooperative Highway Research Program (NCHRP) Report 765, which details procedures for adjusting raw model outputs to account for inaccuracies into travel demand models. The procedure adjusts future travel model volumes based on the inaccuracies of the travel model witnessed in base year model volumes compared to known traffic counts. Based on the difference, the future year model outputs were adjusted accordingly, resulting in the final daily traffic volume forecasts.

The resulting TP traffic forecasts have been compared to several master plan traffic impact studies prepared for the RidgeGate planned area developments, revealing traffic impact study estimates that are higher than the Lone Tree TP forecasted volumes. The following summarizes the causes of these differences:

- **Land Use Quantities.** The 2040 land use quantities (households and employment) incorporated into the Douglas County 2040 TMP model are the result of a combined balance of master developers' plans, market potential/absorption, and Douglas County and DRCOG growth projections. The results reflect a realistic development scenario likely to occur by 2040.

The master plan traffic impact studies assess the maximum allowed land use within each development area. These studies consider a "absolute maximum" scenario that assess the greatest number of homes and the greatest amount of non-residential building square footage allowable within a master plan proposal. As such, the traffic impact studies inherently incorporate a greater amount of development than the regional travel model.

- **Trip-Making Methodologies.** The Douglas County 2040 study model calculates trip generation from land use information based on predicted activity of the traveling public. Trip estimates are the results of "tour" trip generation inherent in the model's algorithms.

By contrast, development traffic impact studies make use of Institute of Transportation Engineers (ITE) trip generation rate data (per the city's traffic impact study guidelines), and the regional travel model is used to estimate background traffic and to develop key assumptions and parameters in conducting the study. Adjustments are also made to the trip generation rates to account for internal trip making within a master plan as well as for pass-by traffic associated with retail uses. Often, these adjustments are kept conservatively low so potential impacts are understood, resulting in an overestimation of traffic, which is compounded for master plans of significant size.

Trip generation rates from traffic impact studies are consistently higher than those from travel demand models generally ranging from 20 percent higher to nearly double. These two reasons collectively explain why the traffic projections in the RidgeGate traffic impact studies exceed the Lone Tree TP traffic forecasting results.



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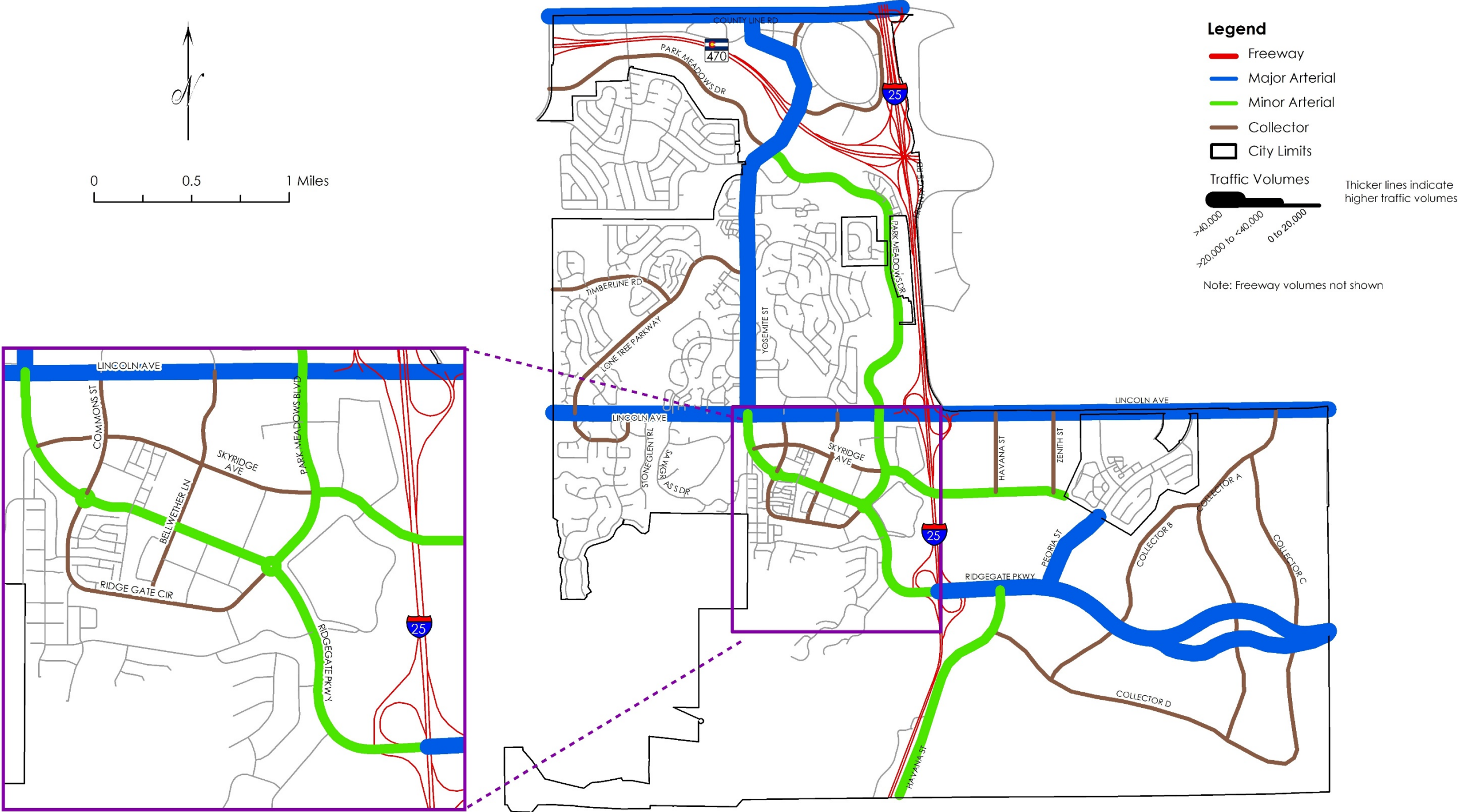


Figure 5. Forecasted 2040 ADT Volumes



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Roadway Classification and Laneage Evaluation

To provide context to the 2040 traffic forecast information, the volumes on the primary roadways within Lone Tree were compared to generalized daily capacities of the associated roadways. This process allows the analysis of the roadway network to define the future functional classification of the roadway and the required number of through lanes. Level of Service (LOS) is a qualitative measure describing traffic operations within a transportation facility that is generally defined in terms of factors such as speed, travel time, and freedom to maneuver. LOS is scored using letters from A to F, where A represents the best conditions and F represents failure of the system with excessive delay.

Douglas County has established a LOS D threshold for arterial and collector roadways in urban and semi-urban areas. Corridors operating at LOS D are roadways where drivers can generally travel in free-flow conditions during the off-peak hours, but might experience having to wait more than one signal cycle at a signalized intersection during the peak hours, or may experience difficulty changing lanes while traveling between intersections. Because these corridors are approaching capacity, there can be substantial variations in congestion from day to day, fluctuating between acceptable and congested.

Facility classification and laneages for the primary roadways within Lone Tree were determined by providing acceptable performance (LOS D) for the year 2040.



RECOMMENDED TRANSPORTATION SYSTEM

A primary Lone Tree transportation goal is to provide a safe, integrated, and multi-modal transportation system for its residents. The Lone Tree 2040 Transportation Plan recommendations are consistent with the transportation vision, objectives, and strategies previously outlined in this report. The recommended plan includes recommendations for the roadway network and multimodal corridors, connections and services.

Future Roadway Network

The roadway network forms the backbone of the Lone Tree transportation system. The majority of the Lone Tree roadway network has been completed, primarily west of I-25. East of I-25, the RidgeGate East development will soon start and the long range planning for the roadway system within this development has been completed.

The recommended roadway network essentially confirms the current Lone Tree roadway laneage and long range planning road network for the RidgeGate East area is sufficient to reasonably accommodate the 2040 traffic demand. There are some laneage improvements identified for Lincoln Avenue, RidgeGate Parkway, Peoria Street and the I-25 Frontage Road that are discussed in the next section.

Figure 6 shows the recommended 2040 roadway plan, the roadway classifications and the number of travel lanes of the primary Lone Tree roadway facilities.

Future Multi-Modal Network and Services

To meet all the transportation demands and expectations of the residents of Lone Tree, the city continues to enhance their multi-modal layered network through continued partnerships and ongoing development, ensuring mobility for all modes of transportation with the roadway network.

Bike and Trail Network

In order for the bike and trail system to achieve its role as a useful transportation option the system requires interconnectivity to the roadway network. Additionally, a well-planned and utilized bicycle and trail system can encourage people to walk or use their bicycles instead of their automobiles for commuting, shopping and other trips. This can improve air quality and promote a healthy lifestyle. The expansion of the bicycle and trail network for transportation and commuting purposes will increase connectivity between homes and employment areas, schools, and activity centers. To further enhance the bike and trail network, additional connections between off-street and on-street facilities should be increased including more connections through existing and planned developments.

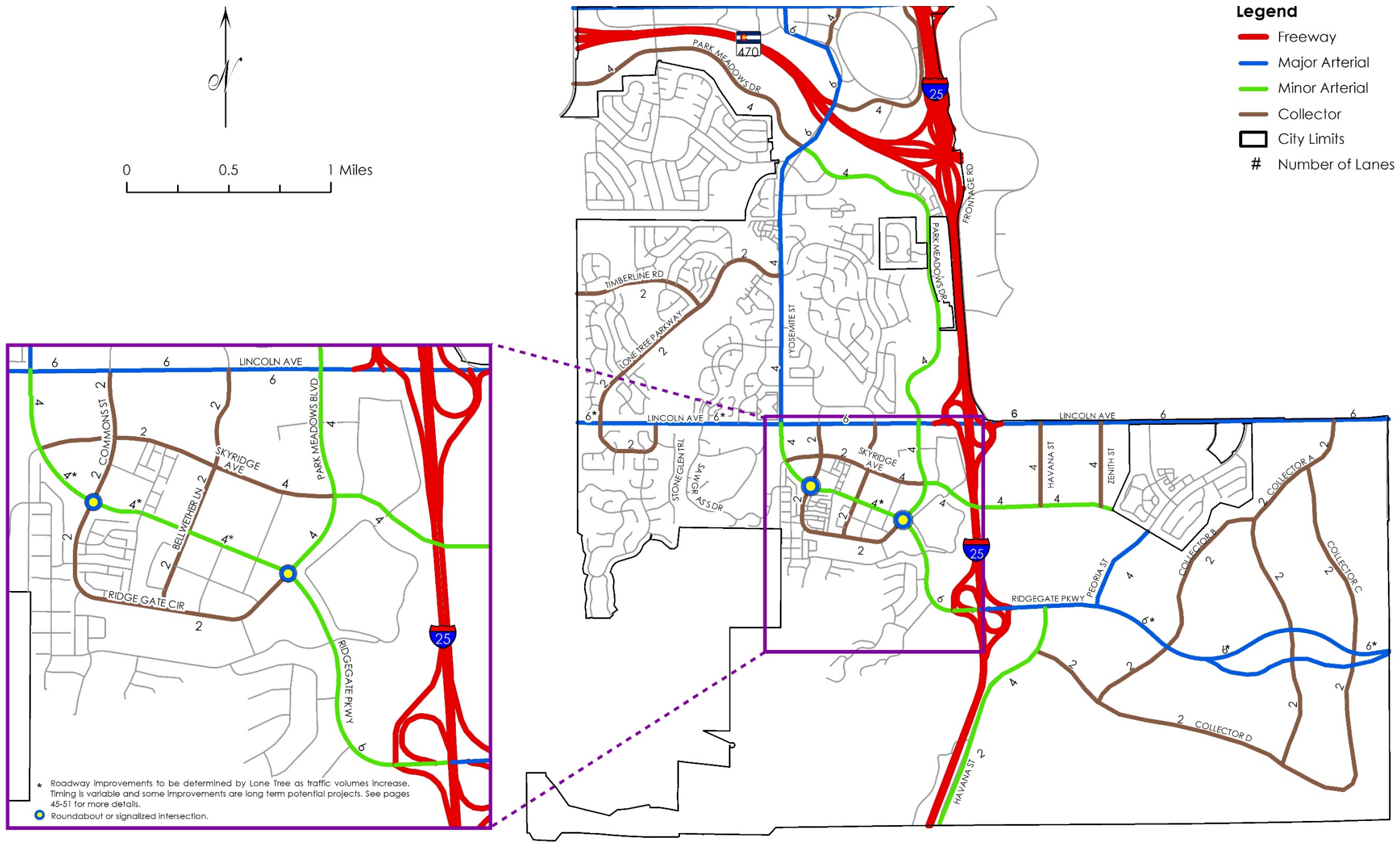


Figure 6. Recommended Roadway Plan



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Recognizing the importance of a complete, connected, and comprehensive network of trails, bikeways, and walkways, the City completed a Walk & Wheel Study in 2014. Recommendations from the study were developed through the evaluation of existing facilities, bicycling and walking demand analysis, and public input. A proposed future bicycle and pedestrian network was developed along with Goals and Strategies for implementation.

Figure 7 displays the existing and future bicycle and trail system, which includes a network of bike lanes and multi-use trails designed to provide bicycle access for all types of users throughout Lone Tree.

Transit Services

As noted in the Existing Conditions Section RTD has extended the Southeast Rail Line. Open for passenger service in May 2019 the Southeast Rail Extension carries LRT lines E, F and R past the Lincoln Station to the RidgeGate Station. The extension adds an additional 2.3 miles of rail and three new stations to bring service south into Lone Tree. The RidgeGate station will have 1,300 parking spaces and both the Sky Ridge and Lone Tree center stations will be for walk up/drop off only and do not include parking.

In addition RTD reviews potential service changes three times a year, which include changes associated with frequency, routing, and stops served of all their transit services. With the opening of new service, RTD completes a thorough analysis to improve transfer opportunities and remove duplicative service. With the Southeast Rail Line Extension of the E, F, and R light rail lines to RidgeGate, RTD will review existing service and propose changes based on the light rail service.



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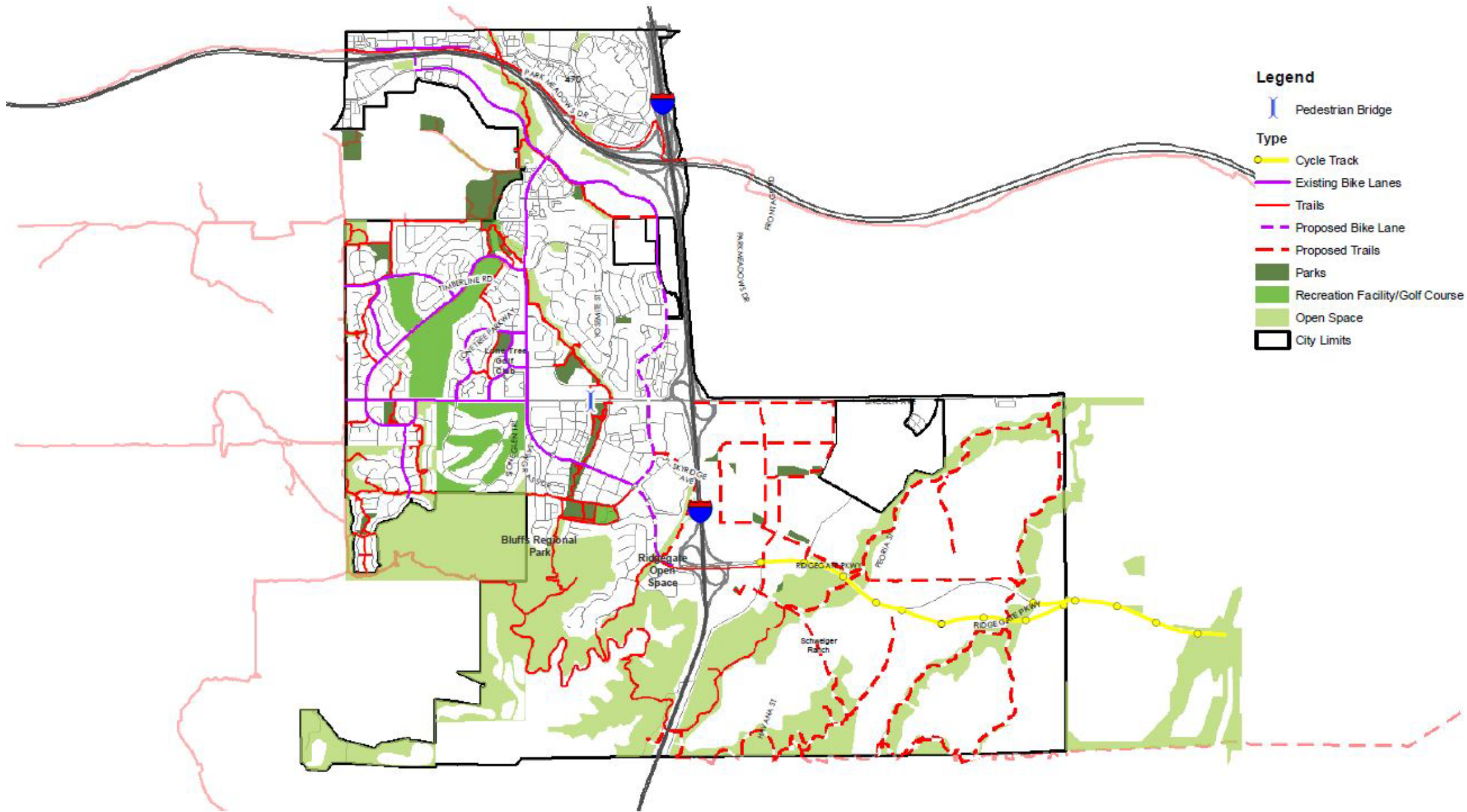


Figure 7. Recommended Bike Lanes and Trails



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FOCUS AREA EVALUATION

The following three focus area corridors were identified by the City for a more detailed evaluation of future traffic demands on the roadway network:

- Yosemite Street (Chester Street to Kimmer Drive)
- Lincoln Avenue (Yosemite Street to Park Meadows Drive)
- RidgeGate Parkway (Commons Street to Park Meadows Drive)

Intersection operational analysis of the Levels of Service (LOS) and control delay were completed at each intersection within the focus area corridors utilizing methods outlined in the latest Highway Capacity Manual (HCM 2010) with Synchro traffic analysis software for the signalized intersections and SIDRA traffic analysis software for the roundabouts. Year 2040 AM and PM peak hour intersection traffic volumes were developed, based on the 2040 travel demand forecasts, current traffic volumes and anticipated future development, and are illustrated in **Figure 8a** and **Figure 8b**.

LOS is a method of describing traffic operations in general and comparable terms based on letter grading of A through F. LOS A would describe the best operations with little or no delay, and LOS F describes over-capacity conditions with poor traffic operations and high delay. Generally, LOS D would be a reasonable expectation for peak-hour traffic operations where reasonable roadway capacity is provided. The LOS grading is applicable to the focus area intersection LOS summarized later in the report.

2040 No Action traffic operational analyses were completed, which identify anticipated traffic operations of the future traffic demand on the existing roadway network. Under the No Action alternative, only planned improvements (i.e. roadway widening) and signal timing optimization were included.

After reviewing the results of the 2040 No Action traffic operational analyses, improvements were considered at intersections, as needed, to improve the efficiency and safety of vehicles traveling along the focus area corridors. The following discusses the results of the 2040 No Action and Improved analyses. A summary of the recommended intersection improvements for each of the focus area corridors is provided in the Transportation Improvement section of this report.

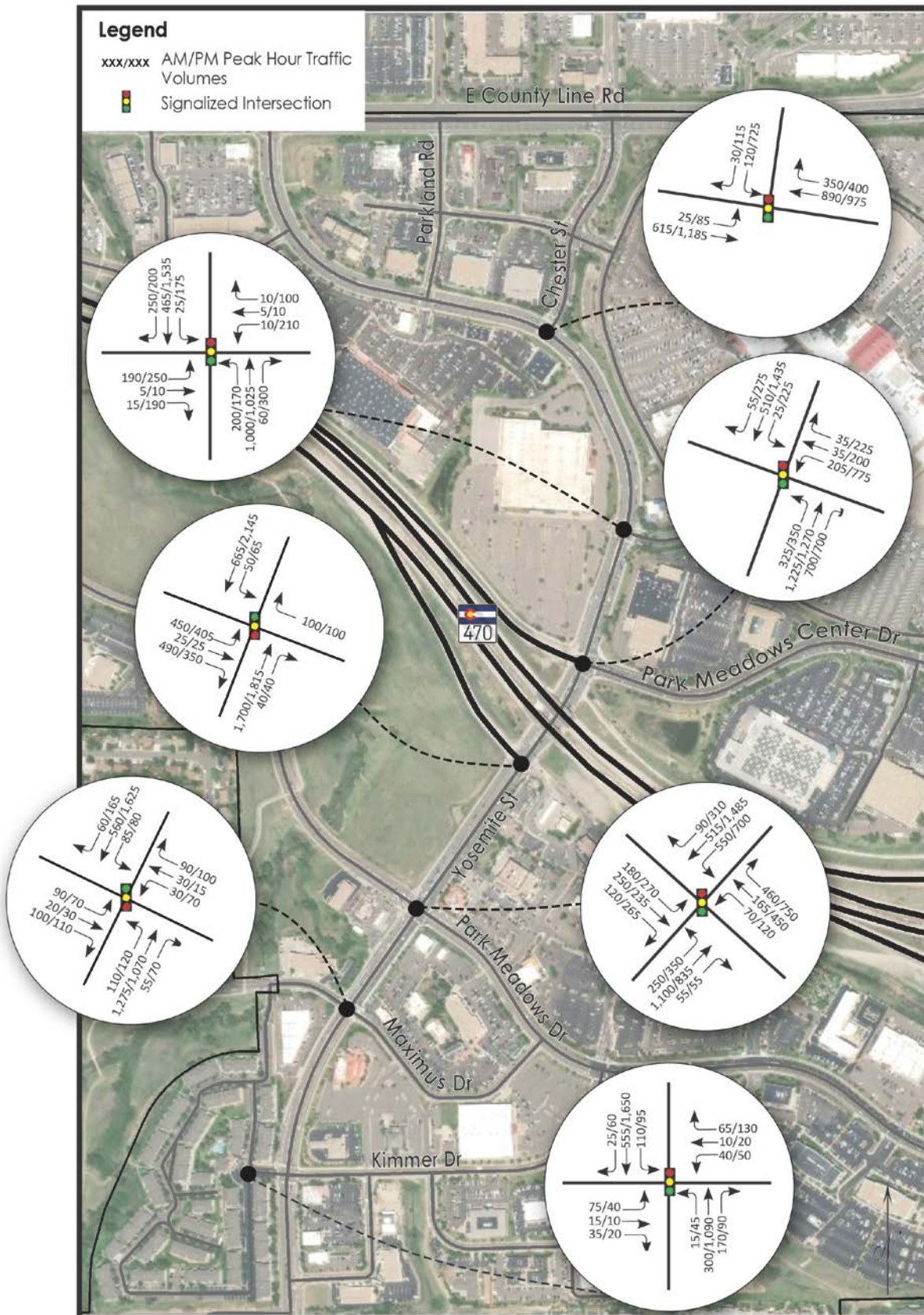


Figure 8a. Focus Area 2040 Intersection Volumes

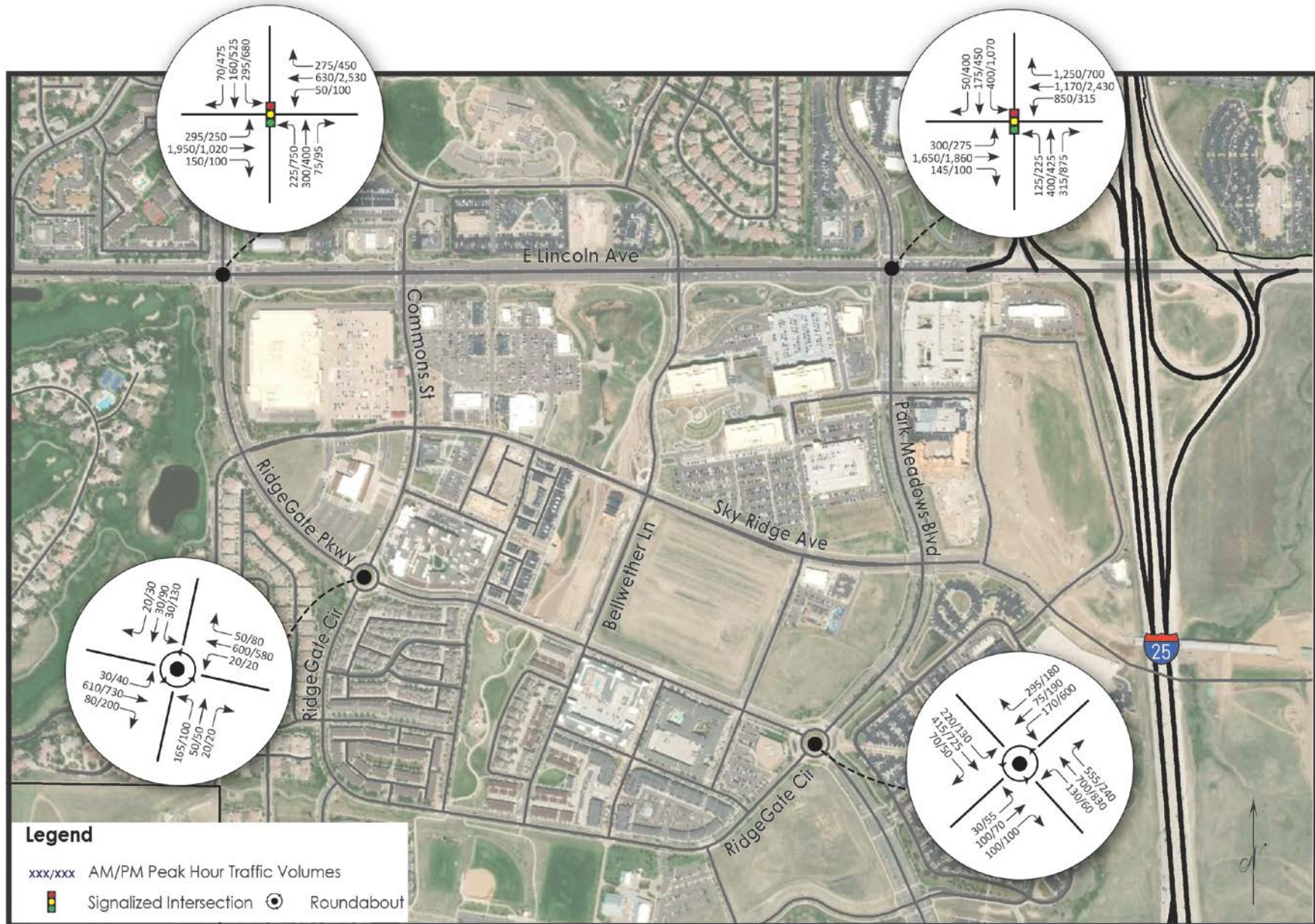


Figure 8b. Focus Area 2040 Intersection Volumes



Yosemite Street

Year 2040 AM and PM peak hour traffic operations were evaluated at each of the signalized intersections along Yosemite Street from Chester Street south to Kimmer Drive. The reported operational results are provided in **Table 2**.

Table 2.
Yosemite Street – Peak Hour Operational Results

INTERSECTION	APPROACH	2040 NO ACTION				2040 IMPROVED			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Yosemite St / Chester St	WB	61.1	E	52.4	D	61.1	E	53.1	D
	NB	2.1	A	10.7	B	2.1	A	9.3	A
	SB	1.8	A	11.3	B	1.8	A	11.6	B
	Overall	6.4	A	21.4	C	6.4	A	20.7	C
Yosemite St / West Mall Entrance	EB	62.5	E	56.6	E	62.2	E	86.4	F
	WB	65.2	E	84.1	F	45.7	D	68.9	E
	NB	21.6	C	22.5	C	20.0	B	18.3	B
	SB	15.8	B	24.5	C	14.7	B	21.3	C
	Overall	25.7	C	31.8	C	24.2	C	30.9	C
Yosemite St / Park Meadows Center Dr	WB	54.9	D	42.4	D	59.4	E	42.4	D
	NB	13.1	B	24.5	C	12.8	B	24.5	C
	SB	7.0	A	23.7	C	7.4	A	23.7	C
	Overall	15.6	B	28.2	C	15.5	B	28.2	C
Yosemite St / EB C-470 Off Ramp	EB	47.1	D	53.3	D	47.1	D	53.3	D
	WB	33.0	C	39.0	D	33.0	C	39.0	D
	NB	17.3	B	16.3	B	20.4	C	20.1	C
	SB	10.3	B	13.7	B	10.4	B	12.9	B
	Overall	24.5	C	21.4	C	26.0	C	22.5	C
Yosemite St / Park Meadows Dr	EB	59.9	E	117.6	F	60.3	E	54.3	D
	WB	69.7	E	113.2	F	53.7	D	70.7	E
	NB	29.2	C	70.6	E	30.2	C	49.5	D
	SB	36.1	D	42.1	D	36.7	D	39.4	D
	Overall	43.1	D	74.3	E	40.8	D	50.6	D
Yosemite St / Maximus Dr	EB	62.3	E	66.1	E	62.3	E	82.1	F
	WB	59.0	E	62.0	E	59.0	E	68.8	E
	NB	5.1	A	9.9	A	11.8	B	19.1	B
	SB	3.7	A	4.0	A	4.3	A	16.4	B
	Overall	12.9	B	12.9	B	16.9	B	24.0	C
Yosemite St / Kimmer Dr	EB	71.8	E	415.4	F	64.6	E	94.6	F
	WB	53.8	D	63.3	E	57.0	E	62.9	E
	NB	9.3	A	5.8	A	7.6	A	5.7	A
	SB	5.9	A	2.4	A	4.9	A	2.3	A
	Overall	13.8	B	16.1	B	12.2	B	9.2	A



As shown, overall peak hour intersection operations at each of the intersections were reported to be LOS D or better for both the No Action and Improved scenarios with the exception of the Yosemite Street/ Park Meadows Drive intersection. Congested (LOS E) operations were reported for this intersection for 2040 PM peak hour traffic conditions under the No Action scenario. Congested traffic operations for some of the intersection approaches were reported for both the No Action and Improved scenarios.

Lincoln Avenue

The 2040 peak hour No Action and Improved traffic operations for the Yosemite Street and Park Meadows Drive intersections along the Lincoln Avenue corridor are shown in

Table 3.

A summary of the No Action corridor conditions is provided below:

- Under 2040 No Action conditions, the Yosemite Street intersection operates at an overall LOS F during the PM peak hour while the Park Meadows Drive intersection operates at an overall LOS F during both the AM and PM peak hours.
- Specific congestion and queuing concerns were identified at the following locations:
 - At the Yosemite Street intersection, the left turn lane storage capacity is exceeded in westbound, northbound, and southbound directions. The westbound through movement also experiences extensive queuing.
 - At the Park Meadows Drive intersection, the westbound, northbound, and southbound movements all experience extensive queuing and spillback.

Although the intersections would still operate under congested conditions with the recommended improvements, there would be substantial reduction in overall average vehicular delay when 2040 operations with the recommended improvements are compared with the 2040 No Action scenario.

Table 3.
Lincoln Avenue – Peak Hour Operational Results

INTERSECTION	APPROACH	2040 No ACTION				2040 IMPROVED			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Lincoln Ave / Yosemite St	EB	71.4	E	50.1	D	35.7	D	47.1	D
	WB	26.5	C	275.3	F	51.7	D	167.3	F
	NB	54.4	D	261.1	F	52.7	D	167.1	F
	SB	66.8	E	245.7	F	59.2	E	156.4	F
	Overall	59.0	E	224.3	F	44.2	D	142.4	F
Lincoln Ave / Park Meadows Dr	EB	37.3	D	45.7	D	74.4	E	58.0	E
	WB	132.6	F	156.6	F	47.8	D	123.1	F
	NB	67.7	E	728.9	F	65.1	E	179.6	F
	SB	53.6	D	102.8	F	51.8	D	147.7	F
	Overall	88.2	F	214.9	F	58.4	E	122.2	F



RidgeGate West

The 2040 peak hour No Action and Improved traffic operations for the Commons Street and Park Meadows Boulevard intersections along the RidgeGate Parkway corridor are shown in **Table 4**. These two intersections are currently single lane roundabout intersections but were constructed as two lane roundabouts. RidgeGate Parkway east of Commons Street was also constructed as a four lane facility. However, Lone Tree reduced the laneage on RidgeGate Parkway and at the roundabouts to a single lane in each direction since current volumes do not warrant the additional laneage and to improve pedestrian and bicycle safety. To maintain flexibility in the future, Lone Tree requested that two improved scenarios be evaluated at the roundabout intersections; an improved roundabout scenario and a signalized intersection scenario. The Improved Roundabout scenario reflects the restriping of the existing single lane roundabouts at Commons Street and Park Meadows Boulevard to two-lane roundabouts. The Signalized scenario would replace these roundabout intersections with signalized intersections.

A summary of the No Action corridor conditions is provided below:

- Under 2040 No Action conditions, the RidgeGate Parkway at Commons Street one-lane roundabout operates at an overall LOS D during the PM peak hour, however the eastbound leg operates at an overall LOS F with excessive queuing that spillbacks through the adjacent intersection.
- Under 2040 No Action conditions, the RidgeGate Parkway at Park Meadows Boulevard one-lane roundabout operates at an overall LOS F during the PM peak hour with both the eastbound and southbound legs experiencing excessive delays and queuing.

Both of the intersection scenarios would provide improved intersection operations compared to the No Action scenario. The Improved Roundabout scenario would generally provide LOS B or better intersection operations and the Signalized scenario would provide LOS C or better traffic operations. Other factors Lone Tree will consider when determining and implementing intersection improvements at these intersections will be pedestrian, bicycle and driver safety.



Table 4.
RidgeGate West – Peak Hour Operational Results

INTERSECTION	APPROACH	2040 No ACTION				2040 IMPROVED – ROUNDABOUT				2040 IMPROVED – SIGNALIZED			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
RidgeGate Pkwy / Commons St	EB	1.4	A	53.3	F	0.7	A	2.0	A	25.0	C	30.1	C
	WB	5.7	A	3.6	A	1.7	A	1.3	A	25.0	C	25.4	C
	NB	9.7	A	12.8	B	7.4	A	7.9	A	23.2	C	23.8	C
	SB	8.5	A	10.5	B	5.5	A	7.2	A	24.3	C	24.8	C
	Overall	4.6	A	28.5	D	2.2	A	2.9	A	24.7	C	27.4	C
RidgeGate Pkwy / Park Meadows Blvd	EB	19.1	C	227.9	F	4.1	A	14.3	B	25.0	C	31.0	C
	WB	7.1	A	19.4	C	7.7	A	2.8	A	25.0	C	32.7	C
	NB	12.3	B	3.5	A	4.1	A	9.9	A	23.2	C	27.9	C
	SB	9.0	A	262.8	F	7.9	A	22.3	C	24.3	C	26.8	C
	Overall	10.9	B	145.4	F	6.5	A	12.4	B	24.7	C	29.9	C



Park Meadows Drive Access Management Plan

Access management is the practice of coordinating the location, number, spacing, and design of access points to minimize congestion, improve safety and maximize the traffic capacity of a roadway. Access management balances the flow of traffic on a critical roadway with the needs of adjacent property owners dependent upon access to the roadway. Numerous access points along an arterial or primary collector create conflicts between turning and through traffic that can cause delay and accidents. As the City continues to attract new land development, it is important to plan for access points to new sites along corridors that minimize congestion and safety impacts and provide for continued economic growth.

Park Meadows Drive from Acres Green Drive to Yosemite Street is one corridor expected to see significant development in future years as many, large, undeveloped parcels are located adjacent to the roadway. This portion of Park Meadows Drive is classified as a collector roadway in the 2040 Recommended Roadway Network. To preserve the mobility of the corridor and accommodate future development, an access management plan was developed.

There are a number of access management techniques that can be used to preserve or enhance the capacity of a roadway. Specific techniques applied when developing the Park Meadows Drive Access Management Plan include:

- Reviewing driveway alignments and spacing.
- Consolidating private driveways, either through shared cross access or reduced access.
- Limiting driveways to right-in/right-out, or $\frac{3}{4}$ turn movement accesses.
- Designating appropriate access points and types for future development.

The resulting Park Meadows Drive Access Management plan is illustrated in **Figures 9a** through **9d**. The plan features potential access points for undeveloped parcels so that land developers understand where access may or may not be permitted. Many of the current access points have been modified in the access control plan from full movement driveways to restricted movement driveways (3/4 turn movement or right-in, right-out). The conditions for change for these restrictions along with a full summary of the Park Meadows Drive Access Management Plan is provided **Table 5**.



Legend

- | | | | | |
|---------------|-----------------------------|--|------------------|--|
| Access Point | 3/4 Movement | Existing Pedestrian/Bicycle Crossing | Relocated Access | Reference Post |
| Parcel | Right-in, Right-out | Existing Cross Access for Shared Access Points | Modified Access | See Park Meadows Drive Access Management Plan summary table for conditions for change. |
| Full Movement | Close Existing Access Point | Proposed Cross Access for Shared Access Points | Potential Access | |

SHEET 1 OF 4

Figure 9a. Park Meadows Drive Access Management Plan (Sheet 1 of 4)



Legend

- | | | | | |
|---------------|-----------------------------|--|---------------------------|---|
| Access Point | 3/4 Movement | Existing Pedestrian/Bicycle Crossing | R Relocated Access | Reference Post |
| Parcel | Right-in, Right-out | Existing Cross Access for Shared Access Points | M Modified Access | * See Park Meadows Drive Access Management Plan summary table for conditions for change. |
| Full Movement | Close Existing Access Point | Proposed Cross Access for Shared Access Points | P Potential Access | |

SHEET 2 OF 4

Figure 9b. Park Meadows Drive Access Management Plan (Sheet 2 of 4)



SHEET 3 OF 4

Legend

- | | | | | |
|---------------|-----------------------------|--|------------------|--|
| Access Point | 3/4 Movement | Existing Pedestrian/Bicycle Crossing | Relocated Access | Reference Post |
| Parcel | Right-in, Right-out | Existing Cross Access for Shared Access Points | Modified Access | See Park Meadows Drive Access Management Plan summary table for conditions for change. |
| Full Movement | Close Existing Access Point | Proposed Cross Access for Shared Access Points | Potential Access | |

Figure 9c. Park Meadows Drive Access Management Plan (Sheet 3 of 4)



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Access Point
- Parcel
- Full Movement

- 3/4 Movement
- Right-in, Right-out
- Close Existing Access Point

- Existing Pedestrian/Bicycle Crossing
- Existing Cross Access for Shared Access Points
- Proposed Cross Access for Shared Access Points

- Relocated Access
- Modified Access
- Potential Access

- Reference Post
- See Park Meadows Drive Access Management Plan summary table for conditions for change.

SHEET 4 OF 4

Figure 9d. Park Meadows Drive Access Management Plan (Sheet 4 of 4)



Table 5.
Park Meadows Drive (Acres Green to Yosemite) – Access Management Summary

ACCESS NUMBER	PARCEL NUMBER	REFERENCE POST	SIDE	ACCESS TYPE	EXISTING CONFIGURATION	RECOMMENDED CONFIGURATION	CONDITIONS FOR CHANGE
1	P2	0.04	Left	Private	Unsignalized Right-in, Right out	Unsignalized Right-in, Right out	■ Access to remain right-in, right-out.
2	P2	0.06	Right	Private	Unsignalized Full Movement	Unsignalized 3/4 Movement	■ Access to be restricted to 3/4 movement if property redevelops.
3	P3	0.10	Right	Private	Unsignalized Full Movement	Access to be closed	■ Access to be closed if property redevelops. ■ New access to be obtained via cross access to Parcel P2 and/or Parcel P4.
4	P4	0.14	Right	Private	Unsignalized Full Movement	Unsignalized Full Movement	■ Access to remain full movement.
5	P2	0.20	Left	Private	Unsignalized Full Movement	Unsignalized 3/4 Movement	■ Access to be restricted to 3/4 movement if property redevelops or when access # 7 is constructed. ■ New access to be obtained via cross access to Parcel P10.
6	P4	0.26	Right	Private	Unsignalized Full Movement	Unsignalized Full Movement	■ Access to remain full movement.
7	P5	0.42	Left	Private	N/A	Unsignalized Full Movement	■ This access may be constructed as a full movement access.
8	P6	0.31	Right	Private	Unsignalized Full Movement	Unsignalized Right-in, Right out	■ Access to be restricted to 3/4 movement if property redevelops or when access # 7 is constructed.
9	P8,P9	0.37	Right	Private	Unsignalized Full Movement	Unsignalized Right-in, Right out	■ Access to be restricted to right-in, right-out with redevelopment of Parcel P10 or when access # 11 is constructed. ■ New access to be obtained via cross access to Parcel P10.



Table 5 (cont.).
Park Meadows Drive (Acres Green to Yosemite) – Access Management Summary

ACCESS NUMBER	PARCEL NUMBER	REFERENCE POST	SIDE	ACCESS TYPE	EXISTING CONFIGURATION	RECOMMENDED CONFIGURATION	CONDITIONS FOR CHANGE
10	P10	0.42	Right	Private	Unsignalized Full Movement	Unsignalized Full Movement	■ Access to remain full movement.
11	P5	0.42	Left	Private	N/A	Unsignalized Full Movement	■ This access may be constructed as a full movement access.
12	P10,P11	0.49	Right	Private	Unsignalized Full Movement	Unsignalized Full Movement	■ Access to remain full movement.
13	P12	0.49	Left	Private	Unsignalized Full Movement	Unsignalized Full Movement	■ This access may be constructed as a full movement access.
14	P11,P13	0.58	Right	Private	Unsignalized Full Movement	Unsignalized Full Movement	■ Access to remain full movement.
15	P12	0.58	Left	Private	Unsignalized Full Movement	Unsignalized Full Movement	■ This access may be constructed as a full movement access.
16	P13	0.74	Right	Private	Unsignalized Right-in, Right out	Unsignalized Right-in, Right out	■ Access to remain right-in, right-out.
17	P 15	0.77	Left	Private	N/A	Signalized Full Movement	■ This access may be constructed as a signalized full movement access with relocation of the Willow Creek Trail crossing.
18	P19	0.89	Left	Private	N/A	Unsignalized Right-in, Right out	■ This access may be constructed as a right-in, right-out access.
19	P17,P18	0.90	Right	Private	Unsignalized Full Movement	Unsignalized Right-in, Right out	■ Access to be restricted to right-in, right-out with Park Meadows Drive/Yosemite Street intersection improvements. ■ Access to be restricted to right-in, right-out and relocated cross from access #18 with future redevelopment.



TRANSPORTATION SYSTEM IMPROVEMENTS

This section presents the transportation system improvements that are needed to implement the multi-modal transportation plan for Lone Tree, including Roadway System, Bicycle/Trail, Intersection and Transit improvements.

In addition to locations and identification of the improvement types, planning level costs have been developed for the roadway and bike/trail improvements. The cost estimates represent high-level construction costs, without right-of-way acquisition, for the entire project.

Roadway Improvements

The roadway improvements needed to achieve the 2040 roadway plan (see **Figure 6**) that reasonably accommodate the forecasted travel demand are listed in **Table 6** and **Table 7**. **Figure 10** displays the locations of roadway projects needed to implement the recommended plan.

The laneage needs for key roadways within Lone Tree was determined by comparing the forecasted ADT traffic volumes to the generalized ADT roadway capacity thresholds. For the section of Lincoln Avenue between Park Meadows Drive and Meridian Drive, more than six lanes are needed to reasonably accommodate the 2040 forecasted. This laneage is prohibitive in part due to existing physical and/or property constraints. Lone Tree understands more extensive improvements are needed on this section of Lincoln Avenue and plans to lead a study that would evaluate the operational needs. Future proposed improvements may include grade separation of some intersection movements and improvements to the I-25 interchange.

A majority of the roadway improvement needs identified are new roadways within the RidgeGate East development. The developer of RidgeGate East is responsible for building these roads as development occurs, and is reminded of the City's roadway policy to minimize environmental and visual impacts of new or improved roadways along bluffs and drainages by avoiding steep topographic terrain, thereby reducing the need for extensive cut/fill and retaining walls.

Bike/Trail Improvements

The bicycle and trail improvements are shown in **Figure 7**. In some cases, the identified bike lane/trail projects are part of regional projects that extend through multiple jurisdictions and will require coordination between these entities to complete the implementation of these facilities.

For those bikeway corridors that follow a roadway alignment, the on-street bikeways are bike lanes. The on-street bikeway improvements should be considered for implementation in conjunction with new roadways, roadway capital improvement projects or with roadway maintenance projects. The developer of RidgeGate East will construct the trails within the planned development as part of an agreement with the South Suburban Park and Recreation Department.



Table 6.
City Responsible Transportation Improvement Summary – Roadway

PROJECT ID No.	ROADWAY	CLASSIFICATION	LOCATION	IMPROVEMENT	PLANNING LEVEL COST ESTIMATE (IN MILLIONS)
1	Lincoln Ave	Major Arterial	Lone Tree boundary to Yosemite St	Widen from 4 to 6 lanes	\$8.8
2	Lincoln Ave	Major Arterial	Faulkner Lane to Lone Tree boundary	Widen from 4 to 6 lanes	\$4.4
3	RidgeGate Parkway	Minor Arterial	Sky Ridge Ave to Commons St	Widen from 2 to 4 lanes	\$1.8
4	RidgeGate Parkway	Minor Arterial	Commons St to Park Meadows Blvd	Widen from 2 to 4 lanes	\$4.4
5	RidgeGate Parkway	Minor Arterial	Park Meadows Blvd to Crossington Way	Widen from 4 to 6 lanes	\$1.3
6	Peoria St	Major Arterial	Lone Tree boundary to RidgeGate Parkway	Widen from 2 to 4 lanes	\$4.4

Table 7.
Developer Responsible Transportation Improvement Summary – Roadway

PROJECT ID No.	ROADWAY	CLASSIFICATION	LOCATION	IMPROVEMENT	PLANNING LEVEL COST ESTIMATE (IN MILLIONS)
7	I-25 Frontage Rd	Minor Arterial	RidgeGate Pkwy to Lone Tree boundary	Widen from 2 to 4 lanes	\$11.0
8	Havana St	Collector	Lincoln Ave to Sky Ridge Ave	New 4-lane Collector	\$4.1
9	Sky Ridge Ave	Minor Arterial	Trainstation Circle to Lone Tree boundary	New 4 lane Minor Arterial	\$8.2
10	Zenith/Meridian Dr	Collector	Lincoln Ave to Sky Ridge Ave	New 4-lane Collector	\$4.1
11	Collector A	Collector	Lincoln Ave to Collector D	New 4-lane Collector	\$19.4
12	Collector B	Collector	Collector A to Collector D	New 4-lane Collector	\$13.3
13	Collector C	Collector	Collector A to Collector D	New 4-lane Collector	\$17.3
14	Collector D	Collector	Havana St to Collector C	New 4-lane Collector	\$17.3

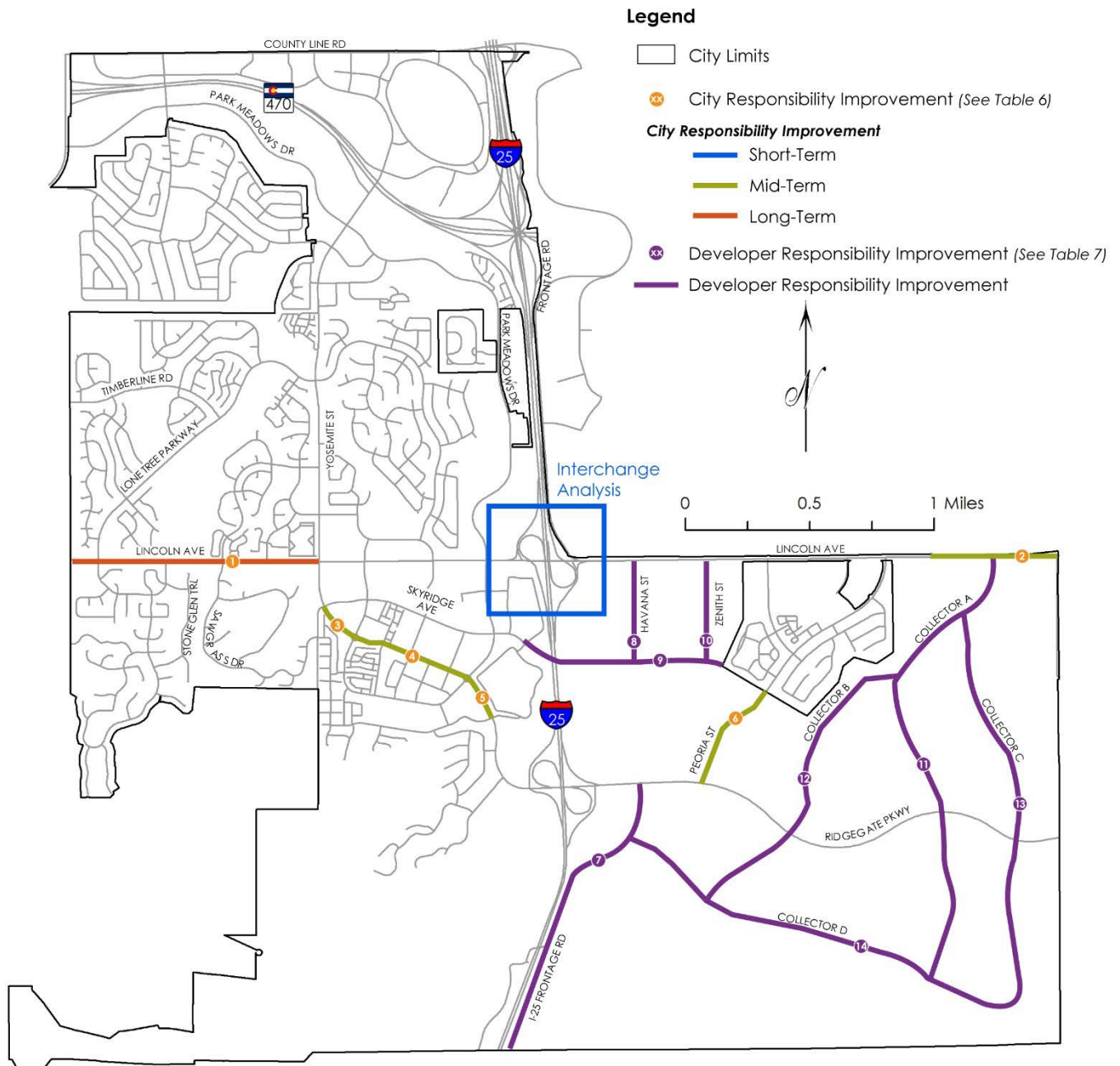


Figure 10. City of Lone Tree Roadway Improvements



Intersection Improvements

Based on the Focus Area analyses, several intersections were determined to be in need of improvements to address congestion and improve traffic operations. The following provides a description of the improvements that are also summarized in **Table 8**.

Yosemite Street

Improvements were identified at several intersections along the Yosemite Street corridor. In addition to the following geometric improvements, signal timing should be evaluated and adjusted as appropriate to optimize traffic operations. To facilitate operational improvements on Yosemite Street, the City of Lone Tree is currently leading the implementation of adaptive signal control technology (ASCT) for use within the signalized intersections along the corridor, which includes the signals on Yosemite and critical adjacent intersections in the Cities of Lone Tree, Centennial, and Greenwood Village.

The recommended geometric improvements and additional traffic operations improvements include:

- At the West Mall Entrance intersection:
 - Extend the eastbound left-turn lane when property redevelops
- At the Park Meadows Drive intersection:
 - Add a 225' southbound right-turn lane with right-turn overlap traffic signal phasing
 - Modify the two existing westbound through lanes to one westbound through lane and one shared westbound through/right-turn lane
 - Extend the westbound right-turn lane to 300'
 - Convert the northbound and southbound left-turns to protected/permissive left-turn traffic signal phasing
- At the Maximus Drive intersection:
 - Change to protected left-turn traffic signal phasing
 - Extend the eastbound left-turn lane to 150'
 - Extend the westbound left-turn lane to 150'

Lincoln Avenue

Improvements were identified at both intersections along the Lincoln Avenue corridor. In addition to the following geometric improvements, signal timing should be evaluated and adjusted as appropriate to optimize traffic operations. The recommended geometric improvements and additional traffic operations improvements include:

- At the Yosemite Street intersection:
 - Provide three eastbound through lanes and four westbound through lanes
 - Provide dual eastbound left-turn lanes with 250' storage



- Provide dual westbound left-turn lanes with 250' storage
- Extend the inside northbound left-turn lane to 200'
- Add southbound right-turn overlap traffic signal phasing
- At the Park Meadows Drive intersection:
 - Convert the westbound through lane into a shared through/right lane
 - Convert the northbound through lane into a shared through/right lane
 - Convert the southbound through lane into a shared through/right lane
 - Remove crosswalk on east leg to allow signal timing improvements and reduce conflicts with the significant volume of turning vehicles

It should be noted that a study for the Lincoln Avenue and I-25 interchange that includes the section of Lincoln Avenue between Park Meadows Drive and Oswego Street needs to be conducted to determine the best alternative.

RidgeGate West

Improvements were identified at both roundabout intersections along the RidgeGate Parkway corridor for an Improved Roundabout scenario as well as a Signalized scenario. It is recommended that the identified intersection improvements be completed concurrently with the roadway improvements identified for RidgeGate Parkway. The recommended Improvement scenarios are summarized below.

Existing Roadway Network Optimization

Prior to proceeding with more costly design and construction projects as described below, the City of Lone Tree will evaluate wayfinding and other scenarios, including the prioritization of traffic along adjacent roadways, to optimize the use of the existing transportation network, including Sky Ridge Avenue.

Improved Roundabout Scenario

- At the Commons Street intersection:
 - Convert to a two-lane roundabout
 - Provide two entering and exit lanes on RidgeGate Parkway legs
 - Provide one entering and exit lane on Commons Street/RidgeGate Circle legs
- At the Park Meadows Boulevard intersection:
 - Convert to a two-lane roundabout
 - Provide two entering and exit lanes on RidgeGate Parkway and Park Meadows Boulevard
 - Provide one entering shared northbound left/through lane, one northbound right-turn lane with 150' storage, and one exit lane on the and exit lane on RidgeGate Circle legs



RidgeGate Parkway was constructed as a four lane roadway from Lincoln Avenue to Crossington Way to accommodate future traffic as the RidgeGate East development builds out. Current traffic volumes on RidgeGate Parkway east of Commons Street however, do not warrant four travel lanes. Therefore, Lone Tree reduced the laneage on RidgeGate Parkway to a single lane in each direction. In addition, the two lane roundabouts at Commons Street and Park Meadows Drive were reduced to one lane roundabouts to improve safety for pedestrians and bicyclist. As traffic volumes on RidgeGate Parkway increase with the development of RidgeGate East, the City will have the option to reinstate the four travel lanes on RidgeGate Parkway and the two lane roundabouts.

Signalized Scenario

The Signalized scenario would replace the roundabout intersections with signalized intersections. The recommended geometric layout and traffic operations improvements for the potential signalized intersections include:

- At the Commons Street intersection:
 - Convert to a signalized intersection
 - Provide one eastbound left-turn lane with 125' storage, one eastbound through lane, and one shared eastbound through/right lane
 - Provide one westbound left-turn lane with 100' storage, one westbound through lane, and one shared westbound through/right lane
 - Provide one northbound left-turn lane with 100' storage and one shared northbound through/right lane
 - Provide one southbound left-turn lane with 125' storage and one shared southbound through/right lane
- At the Park Meadows Boulevard intersection:
 - Convert to a signalized intersection
 - Provide one eastbound left-turn lane with 225' storage, one eastbound through lane, and one shared eastbound through/right lane
 - Provide one westbound left-turn lane with 200' storage, two westbound through lanes, and one westbound free right channelized turn lane
 - Provide one northbound left-turn lane with 100' storage and one shared northbound through/right lane
 - Provide one southbound left-turn lane with 350' storage, one southbound left-turn lane, one southbound through lane, and one southbound right-turn lane with 150' storage



Table 8.
Transportation Improvement Summary - Intersections

INTERSECTION	IMPROVEMENT	PLANNING LEVEL COST	NOTE
Yosemite St / West Mall Entrance	Extend the eastbound left-turn lane when property redevelops	NA	Developer responsibility
Yosemite St / Park Meadows Dr	Add a 225' southbound right-turn lane	\$115k-\$125k	
	Modify to provide one westbound through lane and one shared westbound through/right-turn lane	\$5k-\$10k	
	Extend the westbound right-turn lane to 300'	\$115k-\$125k	
Yosemite St / Maximus Dr	Extend the eastbound left-turn lane to 150'	\$5k-\$10k	
	Extend the westbound left-turn lane to 150'	\$5k-\$10k	This section of Maximus Drive is owned by a private entity and not a City responsibility
Lincoln Ave/Yosemite Street	Provide three eastbound through lanes and four westbound through lanes		Completed as part of Lincoln Ave widening
	Provide dual eastbound left-turn lanes with 250' storage		Completed as part of Lincoln Ave widening
	Provide dual westbound left-turn lanes with 250' storage		Completed as part of Lincoln Ave widening
	Extend northbound left-turn lanes to 200'	\$45k-\$55k	
Lincoln Ave/Park Meadows Drive	Convert the westbound through lane into a shared through/right lane	\$5k-\$10k	
	Convert the northbound through lane into a shared through/right lane	\$5k-\$10k	
	Convert the southbound through lane into a shared through/right lane	\$5k-\$10k	
	Remove crosswalk on east leg	\$5k-\$10k	
RidgeGate Parkway/Commons Street	Improve to two-lane roundabout	\$500k-\$750k	
	Convert to signalized intersection	\$1.5M-\$2.0M	
RidgeGate Parkway/Park Meadows Blvd	Improve to two-lane roundabout	\$300k-\$500k	
	Convert to signalized intersection	\$1.5M-\$2.0M	



Transit Improvements

As noted previously the recent transit improvements for the Lone Tree area are associated with the LRT extension of the RTD Southeast Rail Line. As discussed, the extension added an additional 2.3 miles of rail and three new stations to bring service south into Lone Tree. With the Southeast Rail Line Extension of the E, F, and R light rail lines to RidgeGate, RTD will review existing transit services and propose changes based on the light rail service. The City of Lone Tree continues to grow our Link on Demand free transit service and will continue to work with and partner with our regional transit providers, such as RTD and Bustang, to encourage transit enhancements throughout the city.



Appendix A. Land Use Forecasts



TableA-1.
Lone Tree 2040 Land Use Forecasts

TAZ	HOUSEHOLDS	EMPLOYMENT
2411	446	1405
2412	0	4,817
2413	400	2,266
2414	0	1,219
2415 ¹	994	1,259
2416	2,072	1,335
2417	792	462
2418 ¹	1,920	4,633
2419	2,000	6,965
2420	1,216	257
2421	717	192
2422	37	10
2423	325	81
2430 ¹	252	1,138
2450 ¹	200	3,742
2451	221	1,189
2453 ²	11,716	15,886
2454 ²		
2459 ²		
2460 ²		
2461 ²		
Total	23,308	46,856

¹⁾ Only small portion of TAZ within City Limits.

²⁾ RidgeGate east area.

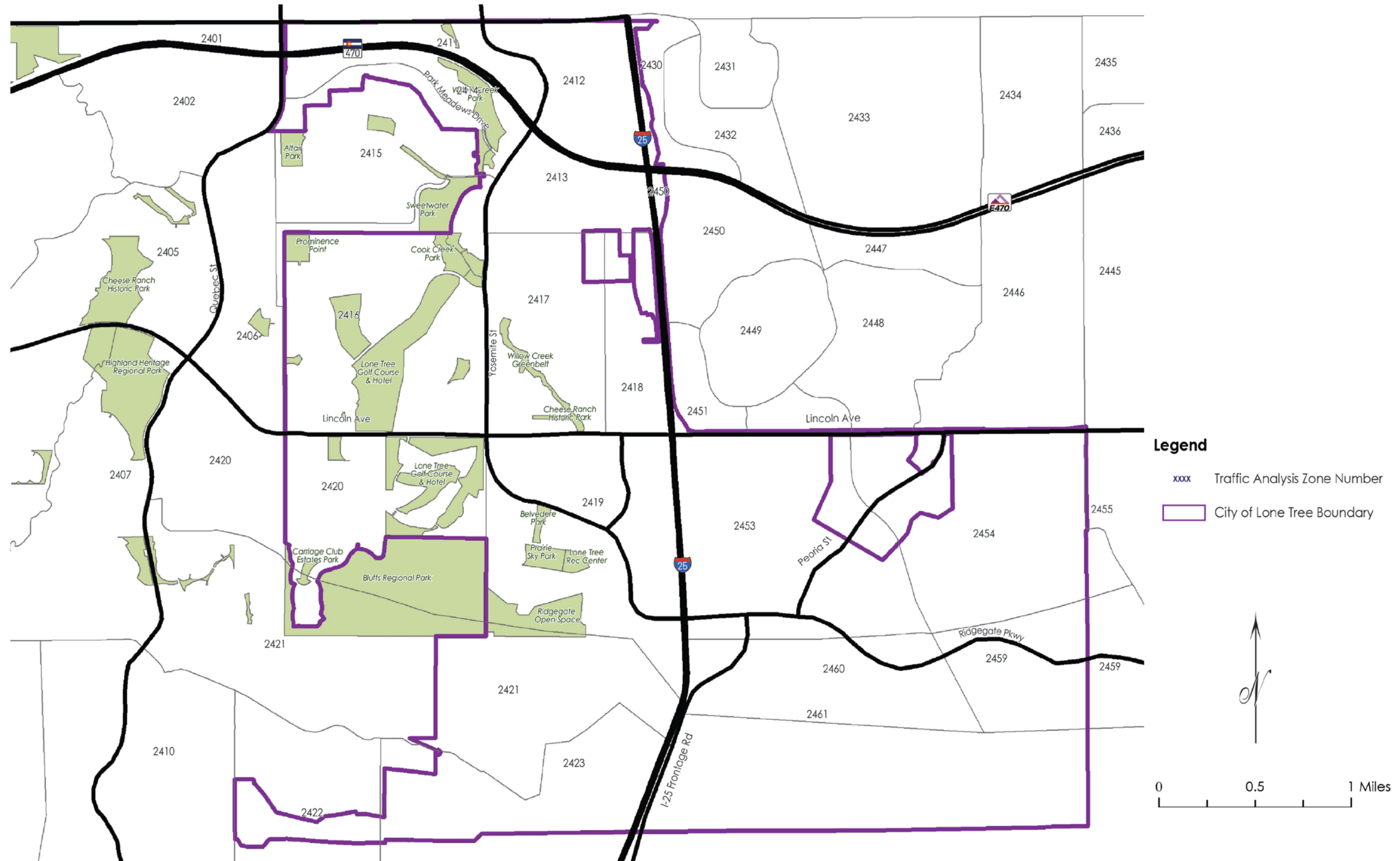


Figure A-1. Traffic Analysis Zones