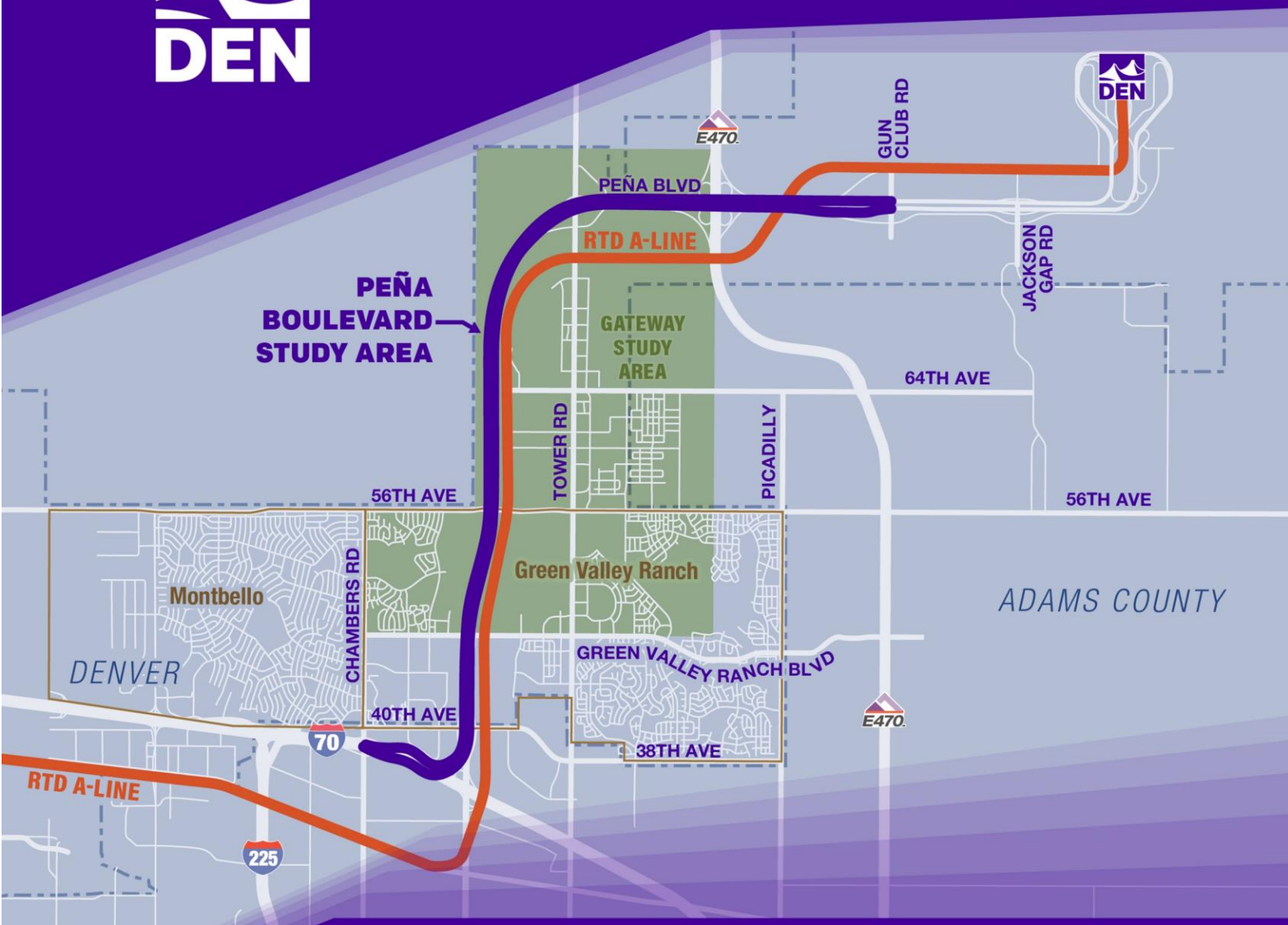


PEÑA BOULEVARD TRANSPORTATION AND MOBILITY MASTER PLAN

Attachment A

Existing Conditions Assessment Report

Contents

Tables

Figures

Executive Summary

Executive Summary

This Study, initiated in 2022, combines the Peña Boulevard Transportation and Mobility Master Plan (Peña Master Plan), and the Denver Moves Gateway Area Travel Study (Gateway Study), both described below:

The Peña Boulevard Transportation and Mobility Master Plan was originally scoped by Denver International Airport (DEN) to investigate increasing mobility for vehicles, transit, and multimodal transportation options; improving safety; enabling the efficiency of current and future bus operations; replacing aging infrastructure; expanding accessibility for passengers, employees, and visitors; furthering the movement of goods and freight; and futureproofing Peña Boulevard for DEN growth and development.

The Denver Moves Gateway Area Travel Study was originally scoped by the City and County of Denver's (CCD) Department of Transportation and Infrastructure (DOTI) to better understand the travel demands in the Gateway Area with recent developments, forecast assumptions, land usage, current/planned transit services, current/planned bike network, and updated traffic data.

DEN and DOTI recognized that there was a significant overlap between the two studies and agreed to combine them into one study co-managed by the two agencies.

This Existing Conditions Assessment Report is the first part of the Peña Boulevard Transportation and Mobility Master Plan (Master Plan), presenting the existing conditions along Peña Boulevard and within the Gateway area. This assessment will guide the development of proposed alternatives and solutions for the combined Study area.

Study Purpose

The purpose of this Study is to recommend improvements that increase mobility options, enhance safety, and manage demand on Peña Boulevard to accommodate continued/forecasted economic growth at the airport and along the Peña Boulevard corridor, while supporting the regional and state economy. In addition, the Study aims to better understand the travel demands in the Gateway Area and recommend projects to manage increasing travel demand through novel land-use and travel demand management (TDM) strategies that maximize traveller mode choices and reduce congestion in the Gateway Area. For more information on the Study purpose, needs and goals and objectives, see the *Peña Boulevard and Gateway Area Goals and Objectives Memo* from September 2022. The goals and objectives have been developed to ensure the needs for Peña Boulevard and Gateway Area are addressed in the Study. While the goals and objectives are tailored to the individual needs of Peña Boulevard and the Gateway area, the proposed solutions will be developed with a holistic view to ensure they complement each other and provide regional benefit.

The report documents the existing and anticipated future conditions for Peña Boulevard and the Gateway Area regarding land use, the transportation system, and environmental resources.

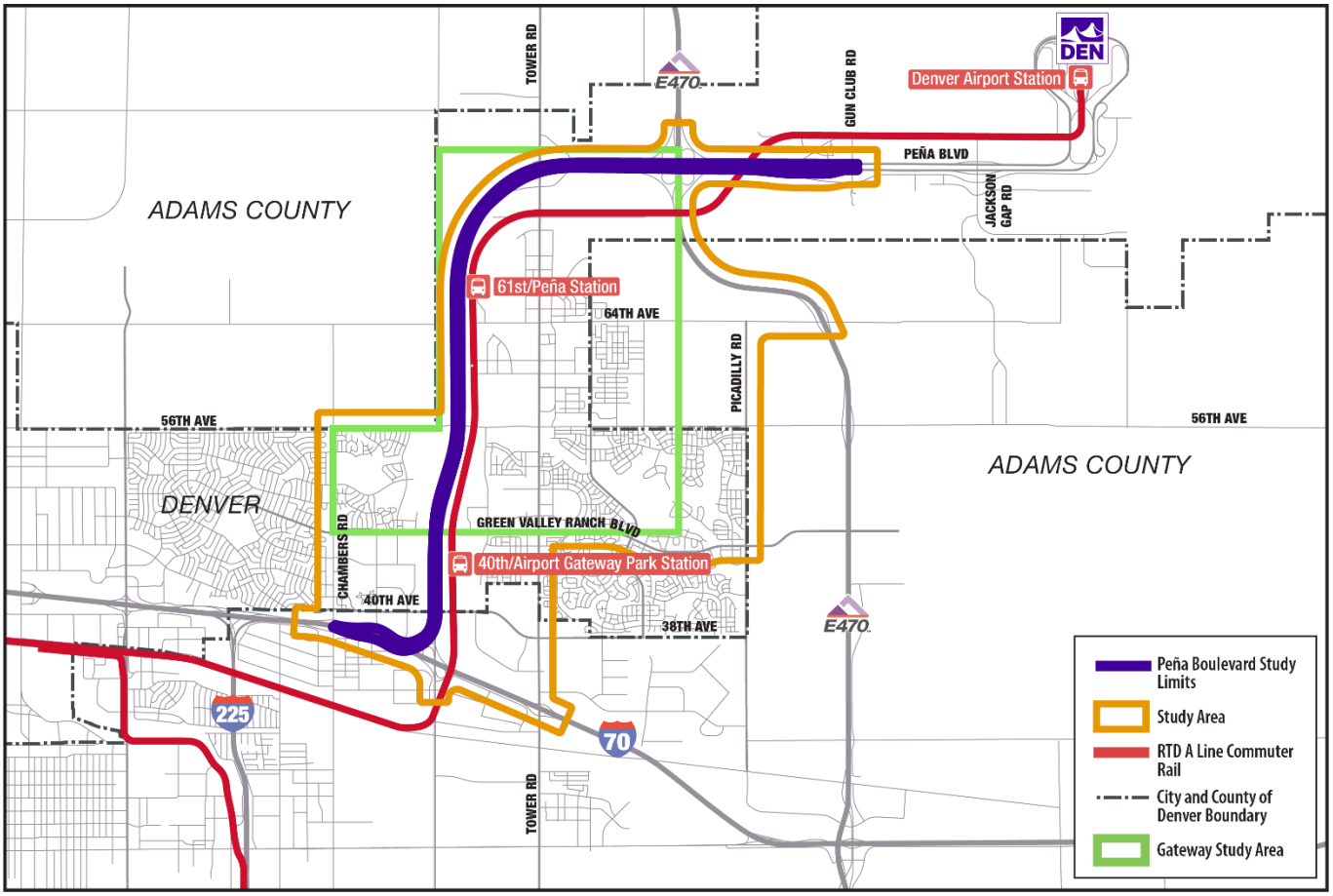
Data Collection Summary and Existing Conditions

1. Study Area Characteristics

Peña Boulevard is an 11.1-mile-long roadway that extends from Interstate 70 (I-70) to the Jeppesen Terminal at DEN and provides the only roadway access to DEN while also offering connectivity to numerous off-airport developments and communities. The study is focused on an 8-mile section of Peña Boulevard, shown in purple in Figure 1-1, from I-70 and Chambers Road to Gun Club Road.

The Gateway Travel Shed, shown in green in Figure 1-1, is loosely bordered by several streets, including Chambers Road/Peña Boulevard to the west, 78th Avenue to the north, E-470 and Himalaya Road to the east and Green Valley Ranch Boulevard to the south. The Gateway Area is experiencing unprecedented residential and commercial growth.

Figure 1-1 - Study Area

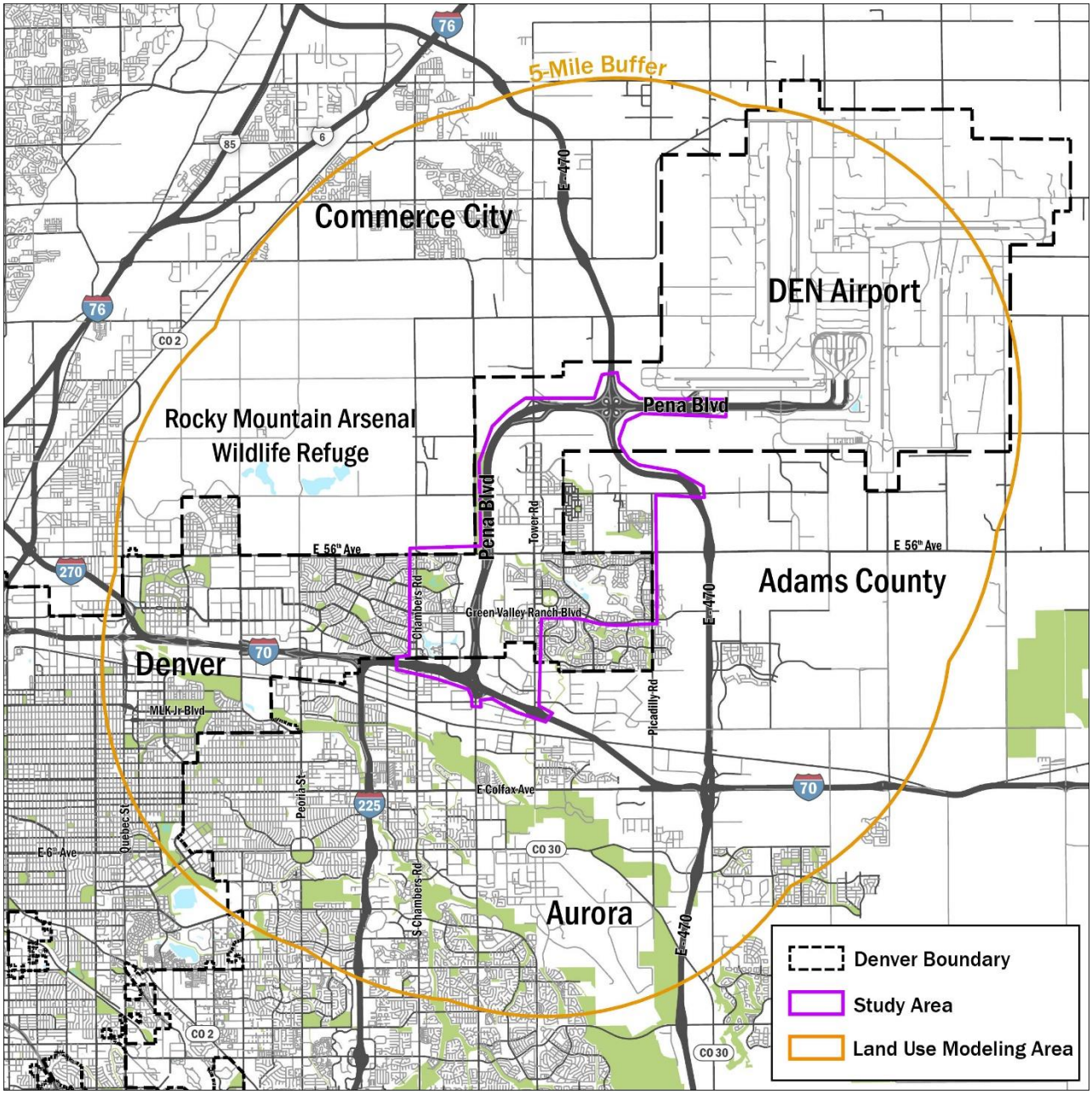


Following is a discussion of the land-use, employment and socio-economic characteristics of the Study area.

1.1. Land-use

As the Far Northeast portion of Metropolitan Denver continues to grow, the land-use and associated traffic patterns are evolving. To best understand influencing growth factors outside of the Study area, a Traffic and Land Use Model Area was designed, representing a five-mile buffer around the Study area (or traffic modeling area), as shown in Figure 1-2.

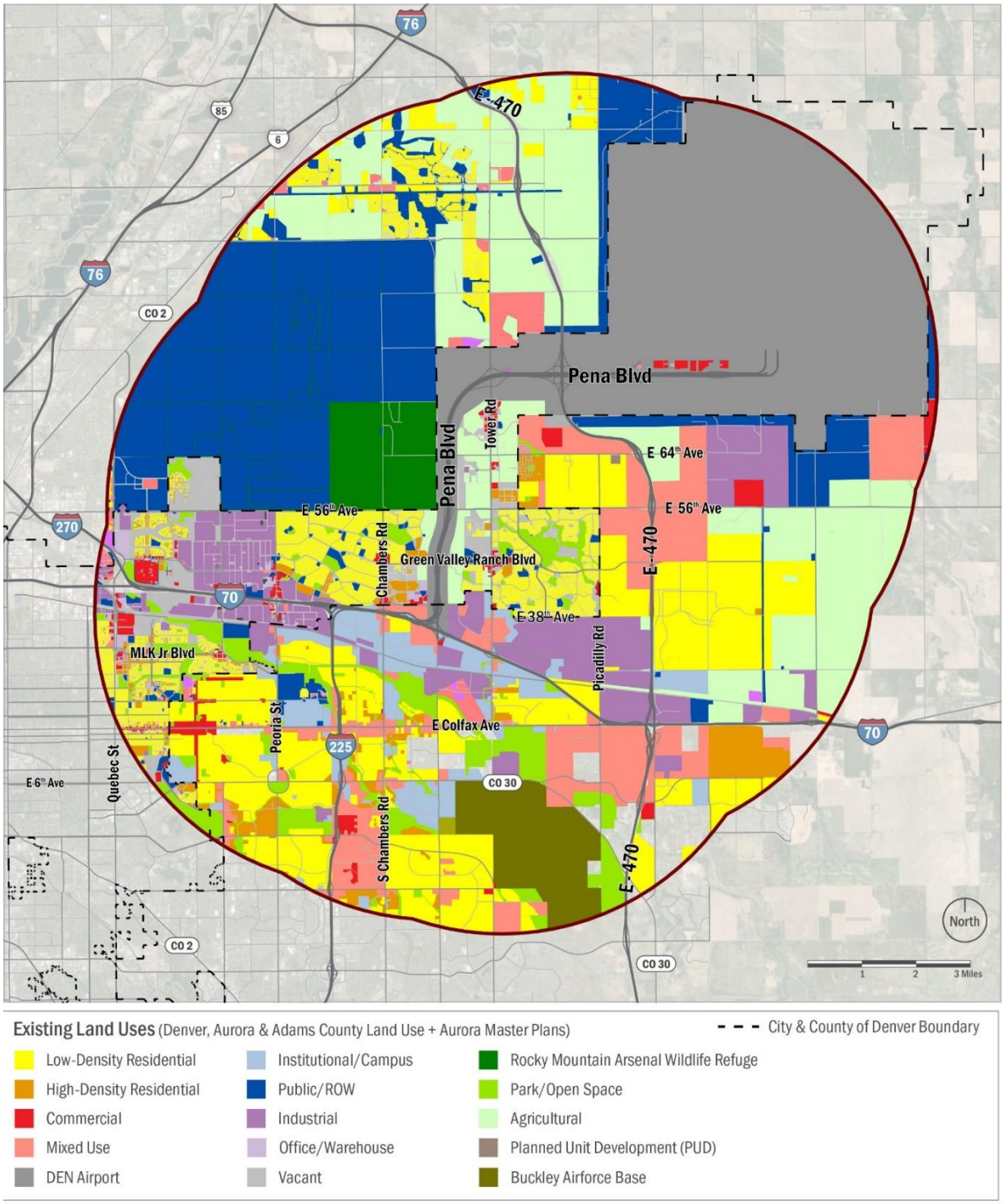
Figure 1-2 - Land Use Study Area



1.1.1. Existing Land-use

The existing land uses within the five-mile buffer of the Study area (land-use modeling area), shown in Figure 1-3, vary by their distance to city centers and by jurisdiction. The buffer includes Adams County, Commerce City, City of Denver, and City of Aurora. The western side of the buffer features the nearly 16,000-acre Rocky Mountain Arsenal National Wildlife Refuge. On the northern portion of the buffer, Commerce City is made up of low-density residential development surrounded by agricultural uses and mixed-use development along Colorado State Highway 44 and Tower Road. South of the airport along the E-470 highway in Aurora, the land-use modeling area features mixed-use development as well as low-density residential development. This development intersects with significant industrial uses along I-70 and institutional uses spanning along I-70 through Adams County, City of Aurora and City of Denver. The southwest portion of the land-use modeling area features a variety of established single-unit neighborhoods as well as mixed-use development along major collector roads and arterials.

Figure 1-3 - Existing Land-use



1.1.2. Future Land-use

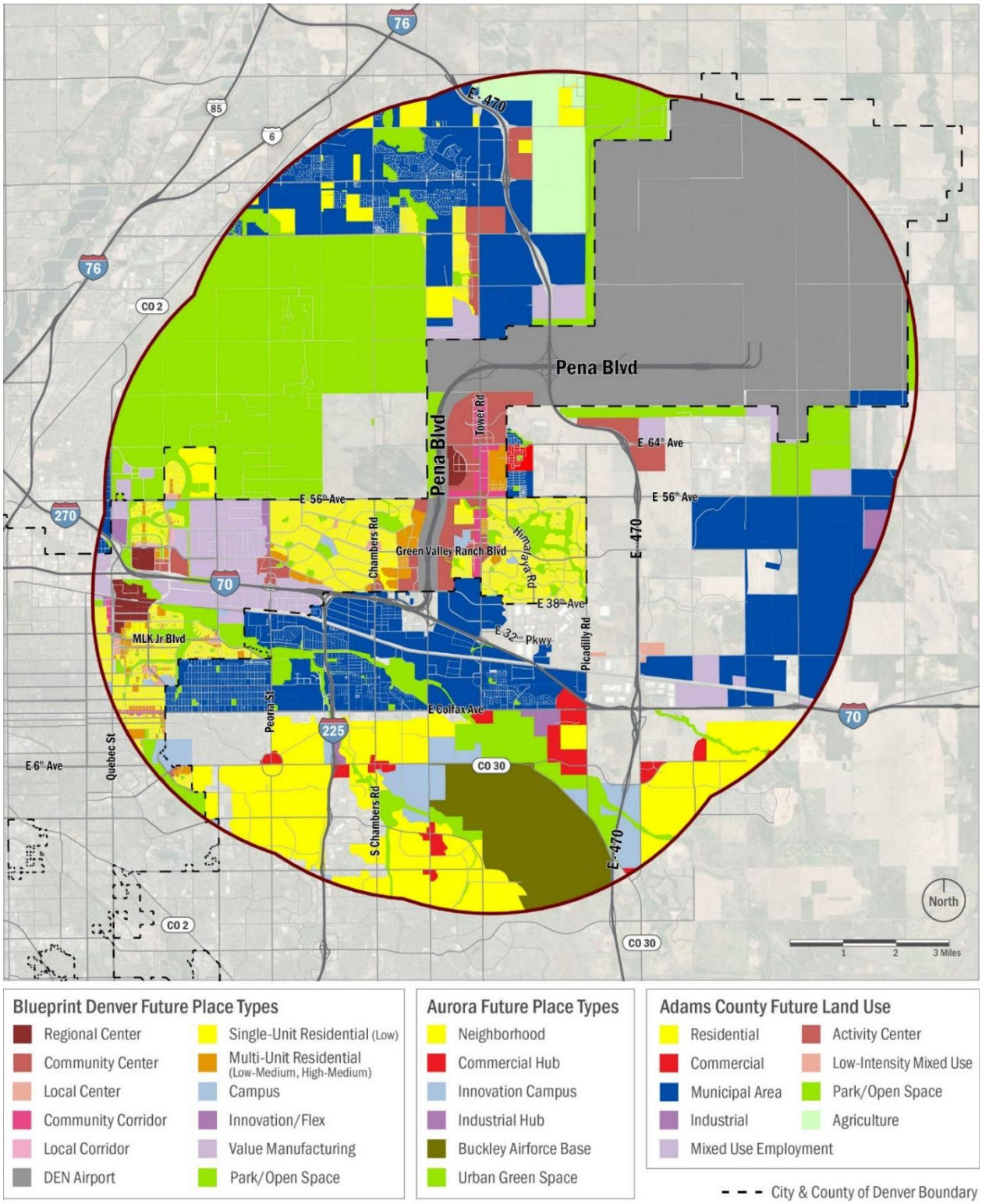
Future land-use designations, shown below in Figure 1-4, are a combination of designations from Blueprint Denver, Aurora's Comprehensive Plan, and Adams County's Comprehensive Plan. These future designations indicate that the land-use modeling area will accommodate an array of uses in the near future. The area north of E 56^{t}th Avenue is expected to see mixed-use development in the visionary commuter rail Peña Station NEXT area which surrounds Tower Road and connects to the 61st and Peña Station. Nearby multi-unit residential developments are expected to settle east of Tower Road between E 56th Avenue and E 64th Avenue. Future land-use at the outskirts of the 5-mile boundary is expected to accommodate large development of single-unit residential homes, light industrial uses such as warehouses and distribution centers, and regional centers. The Rocky Mountain Arsenal National Wildlife Refuge to the west, Buckley Airforce Base to the south and interspersed urban green space constitute a significant portion of land in the land-use modeling area and are planned to be maintained in the future. The dark blue areas located toward the outskirts of the land-use modeling area are designated as 'Municipal Areas' in Adams County Future Land-use plan and should be studied further to understand how this could impact the regional transportation network.

Future land-use in all three municipalities will result in increased traffic impacts from today. Those land-use designations are expected to result in more single-occupancy vehicle (SOV) trips on arterial and collector streets throughout the study area. Tower Road, E 64th Avenue, E 60th Avenue, and Green Valley Ranch Boulevard currently serve as the main arterials. However, the planned construction of streets such as Telluride Way, and Yampa St will help disperse north/south traffic in the future.

Future industrial hubs (shown in purple) are expected to grow towards the northern and eastern outskirts of the 5-mile radius Study area. Major employers including PepsiCo and Amazon are planning to locate facilities in these areas resulting in more freight traveling on the regional transportation network around the Study area. Future transportation planning efforts should account for increased industrial traffic on Peña Boulevard, E-470, I-70, Tower Road, and E 56th Avenue.

No major gaps exist in the roadway network that future land-use patterns would severely impact. However, completing minor gaps just outside the southeastern boundary of the Study area could improve connectivity and reduce the strain on Tower Road. Currently, Himalaya Road terminates at E 38th Avenue, then begins again in the industrial area to the south. E 38th Avenue serves as an east-west collector but does not connect to Picadilly Road preventing residential and industrial traffic from easily traveling eastbound on I-70. Furthermore, a large concentration of warehouses and other employment centers draw industrial and commuter traffic to this area. Enhancing connectivity in this area should be explored to improve accessibility and relieve traffic impacts on Tower Road.

Figure 1-4 - Future Land-use

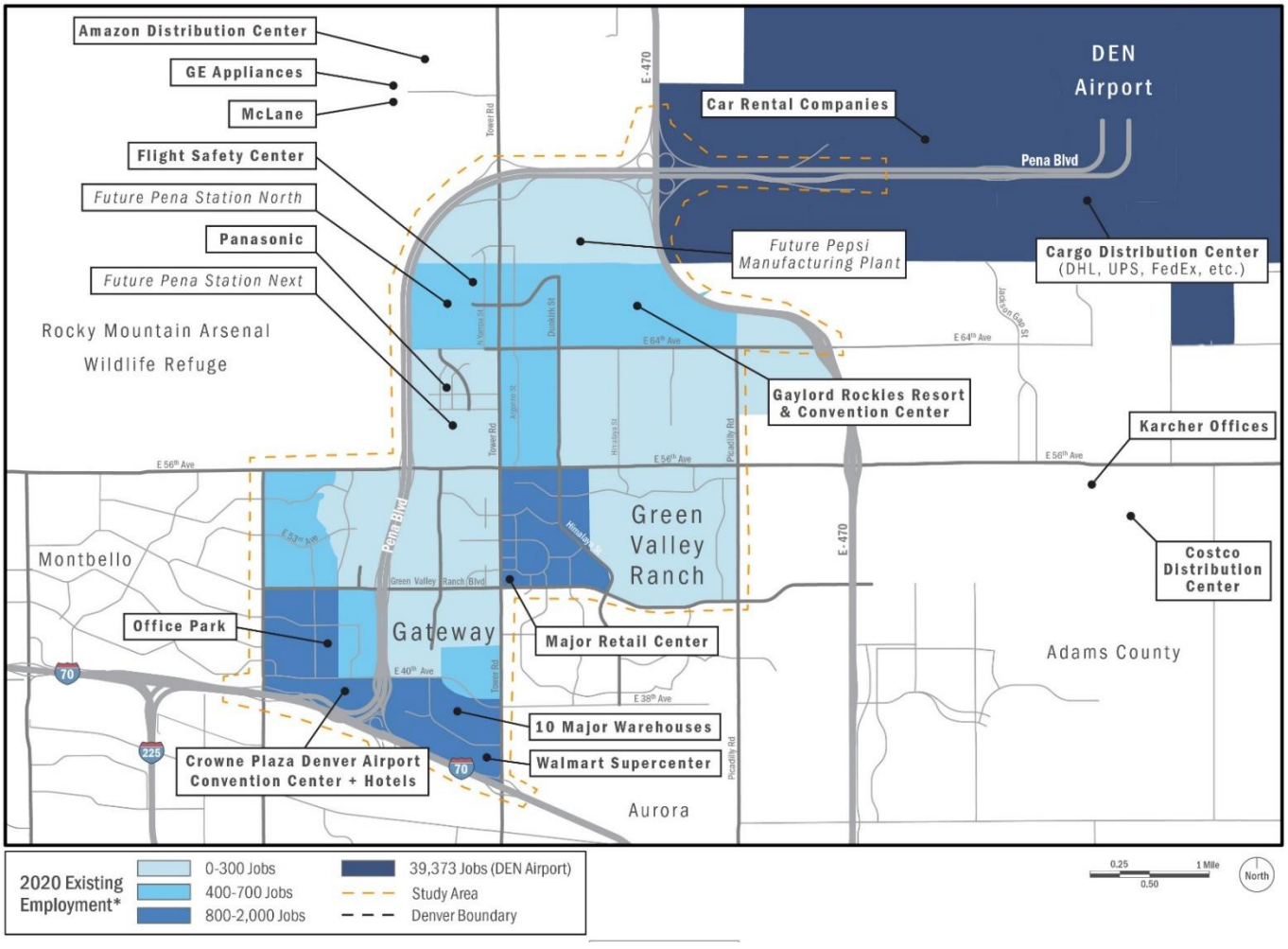


1.2. Employment

Employment, shown in Figure 1-5, was evaluated using Denver Regional Council of Governments' (DRCOG) 2020 employment data and is analyzed by traffic analysis zones (TAZs). Employment centers in the Study area are mainly located on I-70 or Tower Road. Common employers include convention centers and adjacent hotels or resorts as well as retail/service centers, which feature a variety of smaller businesses (i.e., fast casual or drive-thru). The highest concentration of jobs is currently found at the intersection of Peña Boulevard and Green Valley Ranch Boulevard, but additional mixed-use growth is anticipated along the eastern border of Peña Boulevard. Additionally, the PepsiCO Manufacturing Plant, southwest of the intersection of E-470 and Peña Boulevard, will open in 2023 and is expected to create nearly 250 new jobs in the Denver area in addition to retaining 250 current employees.

A traffic analysis zone (TAZ) is a special area delineated by state and/or local transportation officials for tabulating traffic-related data–especially journey-to-work and place-of-work statistics. A TAZ usually consists of one or more census blocks, groups, or census tracts.

Figure 1-5 - Employment Hubs & Major Employers



1.2.1. Employment and Economic Growth at DEN

Denver International Airport was the 3rd-busiest airport in the world in 2021. The facility is undergoing a multi-billion-dollar expansion, adding 39 new gates, improving the Great Hall within the Jeppesen Terminal, and planning for the seventh runway to accommodate the anticipated future growth in travel. DEN is the primary economic engine for the state of Colorado, generating more than $33.5 billion in revenue for the region and state annually. DEN is home to more than 1,000 individual companies, 25 air carriers, with more than 900 contractors/tenants/vendors, and 15 federal agencies. As of 2020, DEN provides more than 30,000 on-airport jobs and a total of 260,000 direct and indirect jobs. Peña Boulevard is critical to the movement of passengers, employees, visitors, and goods to/from the airport and surrounding communities and, is therefore, of critical importance to the Denver Metro area and the state. Table 1-1 and Table 1-2 quantify the direct and the total economic benefit of DEN on Colorado's economy.

Table 1-1 - Direct Annual Economic Impacts of DEN on Colorado's Economy

Category	Jobs	Payroll	Value Added	Business Revenues
On-Airport Activity	36,455	$2,918,784,000	$4,877,687,000	$8,754,263,000
Visitor Spending	110,955	$3,321,201,000	$5,580,405,000	$9,107,331,000
Total	**147,410**	**$6,239,985,000**	**$10,458,092,000**	**$17,861,594,000**

Source: Colorado Aviation System Plan and Economic Impact Study, 2020

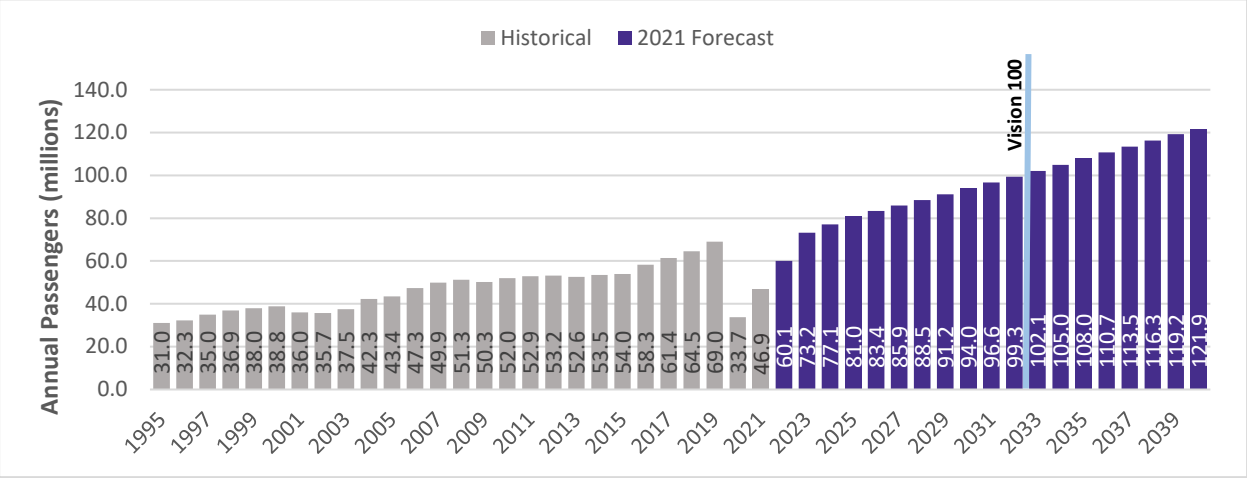
Table 1-2 - Total Annual Economic Impacts of DEN

Category	Jobs	Payroll	Value Added	Business Revenues
Direct	147,410	$ 6,239,985,000	$ 10,458,092,000	$ 17,861,594,000
Supplier Sales	50,652	$ 2,431,689,000	$ 3,766,312,000	$ 7,342,057,000
Income Re-spending	61,022	$ 2,439,240,000	$ 4,500,051,000	$ 8,305,501,000
Total	**259,084**	**$ 11,110,914,000**	**$ 18,724,455,000**	**$ 33,509,152,000**

Source: Colorado Aviation System Plan and Economic Impact Study, 2020

DEN recently launched the Vision 100 plan to prepare for 100 million annual passengers within 10 years. The Vision 100 Strategic Plan is a blueprint to align decision-making and enable accountability so DEN can thoughtfully prepare to serve 100 million passengers. Figure 1-6, below, outlines the current Aviation Forecast (DEN Aviation Forecast Update, August 2020) growth of annual air passengers at DEN for the next 20 years.

Figure 1-6 - DEN Passenger Growth Forecast (August 2020)



1.3. Socio-economic

This section examines the socio-economic characteristics of the Study area, comparing them to the entire City of Denver to provide the reader with context. Specifically, this section examines the household structure and age, race, education, employment, means of transportation, and equity characteristics of the Study area per the American Communities Survey (2020).

1.3.1. Household Structure & Age

Within the Study area, residents under the age of 18 account for 28.4% of the population, which is nearly 10 percentage points greater than the City of Denver as a whole. Per the United States Census Bureau, a family household includes a group of two people or more (one of whom is the householder) related by birth, marriage, or adoption and residing together, whereas a nonfamily household consists of a householder living alone (a one-person household) or where the householder shares the home exclusively with people to whom he/she is not related. The Study area is composed of 73% family households as opposed to 48% family households in the City of Denver, although the proportion of single to married-couple family households is comparable to that found in the City of Denver.

1.3.2. Race/Ethnicity

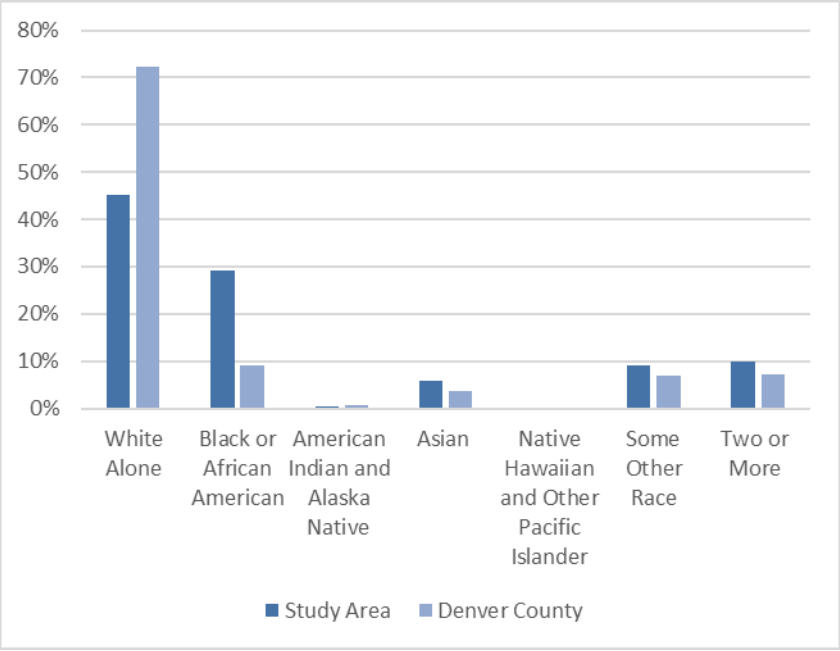
The Study area differs significantly from the City of Denver in terms of race, see Table 1-3 and Figure 1-7. The table shows that 29% of the Study area population identifies as Black or African American, whereas only 9% of the City of Denver identifies as Black or African American. While the table below demonstrates the distribution of race within the Study area as a whole, each census tract within the Study area has a distinct racial makeup. For example, 44.61% of residents living north of E 56th Avenue in the Study area identify as Black or African American compared to 29.1% of residents in the Study area as a whole. Additionally, 41.5% of residents in the Study area identify as Hispanic/Latino ethnicity.

Table 1-3 - Study Area Race

Race	Study Area Total	Study Area %	Denver Total	Denver %
White Alone	21,715	45.1%	517,163	72.2%
Black or African American Alone	14,007	29.1%	65,745	9.2%
American Indian and Alaska Native Alone	218	0.5%	5,550	0.8%
Asian Alone	2,818	5.9%	25,873	3.6%
Native Hawaiian and Other Pacific Islander Alone	109	0.2%	1,157	0.2%
Some Other Race Alone	4,449	9.2%	49,727	7.0%
Two or More Races	4,813	10.0%	50,663	7.1%

Source: American Community Survey (2020)

Figure 1-7 - Study Area vs. Denver Race Percentages



Source: American Community Survey (2020)

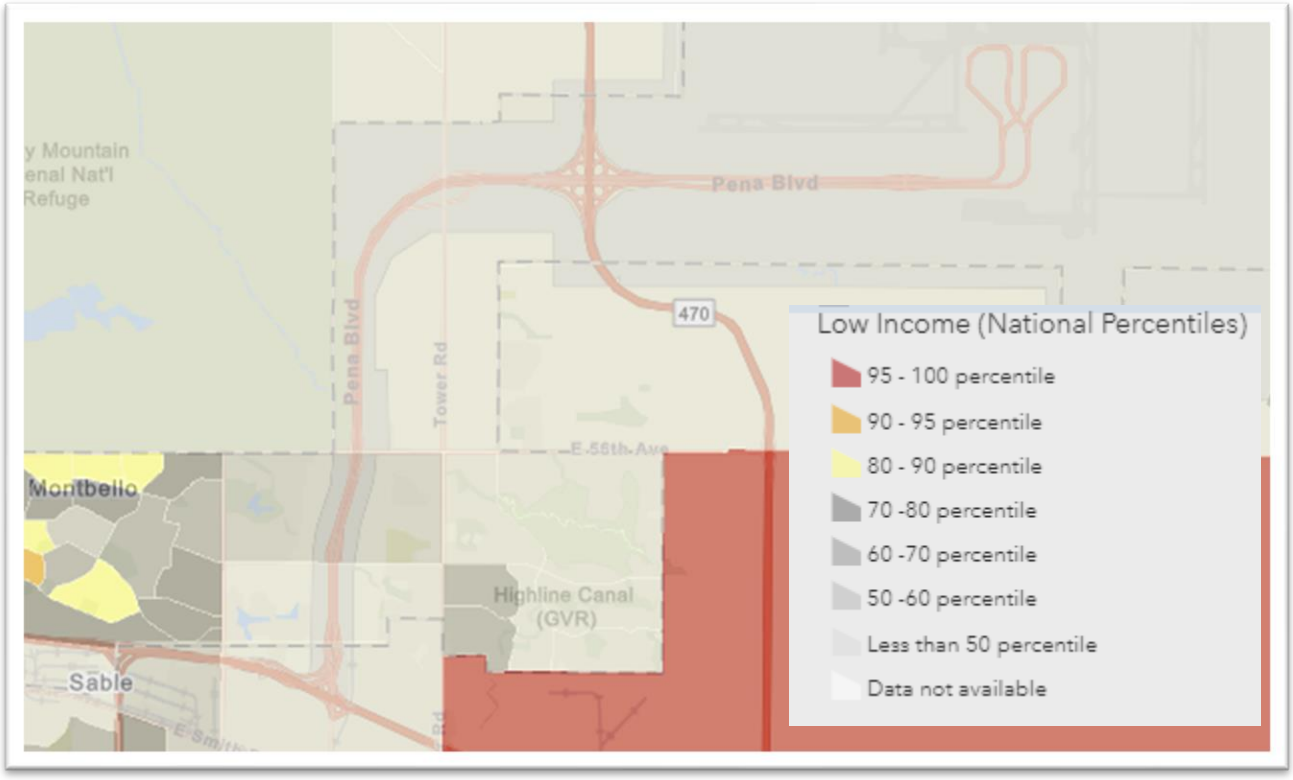
1.3.3. Income & Education

The Study area has comparable median household income to the City of Denver, $77,474 to $72,661 respectively, with 0.4% of residents living at 50% or less of the federal poverty line and 69% of residents living at 200% or more of the federal poverty line. However, the educational attainment for the population 25 years and older is much lower than the City of Denver. Only 28.2% of residents 25 years and older have obtained a Bachelor's degree or greater, compared to 50.3% in the City of Denver. Additionally, 16.8% of the Study area population 25 years and over does not have a high school diploma.

There are no low-income communities adjacent to Peña Boulevard, however, there are low-income communities in Adams and Denver Counties surrounding the study area, as shown in the map below. They are the Montbello neighborhood in Denver and Green Valley Ranch neighborhood in Aurora.

The U.S. federal poverty level is a measure of income the U.S. government uses to determine who is eligible for subsidies, programs, and benefits. The Department of Health and Human Services (HHS) updates the poverty guidelines each January to account for inflation.

Figure 1-8 - Low Income Communities in the Study Area



Source: Environmental Protection Agency (EPA) Environmental Justice (EJ) Screen

1.3.4. Means of Transportation

Within the Study area, a majority of residents either drive alone to work (75.9%) or carpool to work (10.3%), and 13% more residents utilize these modes than do in the City of Denver, as shown in Table 1-4. The remaining residents either work from home (8.5%) or use alternative modes of transportation to get to work, representing a lower proportion than is found in the City of Denver. The average commute time to work for residents in the Study area is thirty minutes.

Table 1-4 - The Study Area Means of Transportation to Work

Means of Transportation to Work for Workers 16 Years and Over	Study Area Total	Study Area %	Denver Total	Denver %
Car, Truck, or Van	20,559	86.2%	294,018	73.3%
Drove Alone	18,110	75.9%	264,908	66.1%
Carpool	2,449	10.3%	29,110	7.3%
Public Transportation (Includes Taxicab and Uber/Lyft)	721	3.0%	26,153	6.5%
Motorcycle	22	0.1%	557	0.1%
Bicycle	30	0.1%	8,262	2.1%
Walked	151	0.6%	18,849	4.7%
Other Means	323	1.4%	3,511	0.9%
Worked At Home	2,053	8.6%	49,588	12.4%

Source: American Community Survey (2020)

Overall, the Study area has several key differences from the City of Denver, highlighted in Table 1-5 below. Relative to the City of Denver, the population of the Study area includes 9% more residents under the age of 18, 20% more residents who are Black or African American alone, and 25% more residents organized in family households, whether single parent or married couples. The Study area also has a slightly higher area median income, $77,474 but only 28% of residents hold a Bachelor's degree, compared to 50% in the City of Denver. Additionally, nearly 17% of residents 25 years and over do not hold a high school diploma.

Table 1-5 - Summary of Key Socio-Economic Facts

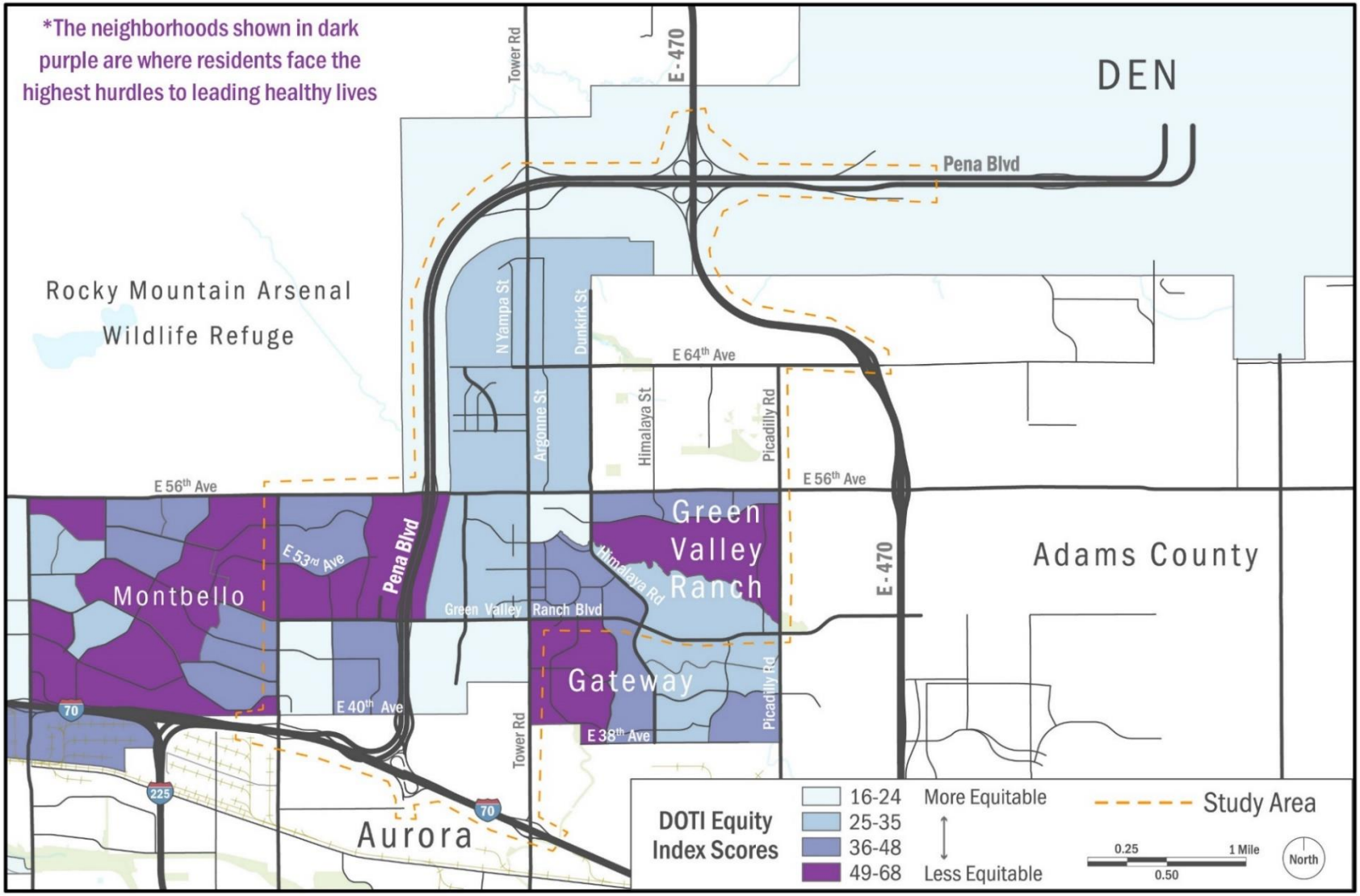
	Study Area	Denver
Residents Under 18 Years of Age	28%	19%
Family Households	73%	48%
Race: Black or African American alone	29%	9%
Median Household Income	$77,474	$72,661
Education Attainment: Bachelor's Degree or higher (for Population 25 years and over)	28%	50%

Source: American Community Survey (2020)

1.3.5. Equity

DOTI developed an equity index to visually represent some of the socioeconomic, built environment, health care, and health barriers that residents of Denver neighborhoods face in accessing opportunities to lead healthy, productive lives. Figure 1-9 below shows the equity scores for census block groups within and around the Study area. The neighborhoods shown in dark purple are where residents face the highest hurdles to living healthy lives based on a composite score of minority status, income, age, vehicle ownership, female householder status and persons with disabilities. Figure 1-9 shows dark purple scattered throughout the Montbello, Green Valley Ranch and Gateway neighborhoods. Most of the Montbello Neighborhood falls outside the Study area; however, it should be noted that this neighborhood is more impacted by equity issues on average than the Study area itself as indicated by the dark purple areas in Figure 1-8. Future investments in the Study area should be prioritized in these dark purple areas to raise the quality of life for residents that have been traditionally underserved.

Figure 1-9 - Equity Index within Study Area

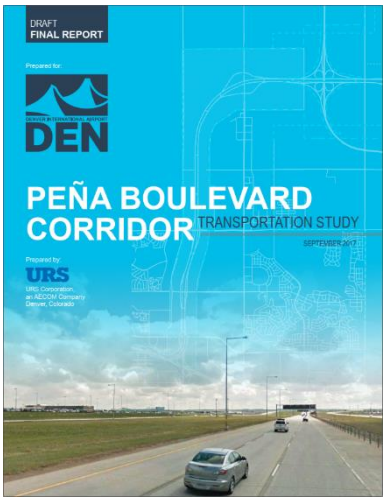


2. Previous Studies

Within the Study area, there have been numerous studies conducted in the past years. The findings of these studies will inform and influence proposed solutions for Peña Boulevard and the Gateway area. This section summarizes previous studies and planning efforts relevant to the Study area.

2.1. Peña Boulevard Corridor Transportation Study (2017)

In 2017, DEN completed a Corridor Transportation Study that evaluated vehicle operations on Peña Boulevard in response to the continued growth and development in the vicinity of the airport. With Peña Boulevard becoming more congested, DEN wanted to assess the potential expansion of Peña Boulevard and/or other surrounding roadways in the foreseeable future to accommodate the increasing vehicular traffic demand. The Federal Aviation Administration (FAA) also expressed concern to DEN about the increasing volume of non-airport traffic that is using Peña Boulevard. Expenditures for capital improvements and maintenance necessitated by non-airport traffic created a "diversion of Airport revenue" from aviation related activities and could potentially put DEN in non-compliance with FAA grant assurances.



The 2017 traffic study showed that the majority of segments along the corridor were operating at a Level of Service (LOS) C during the peak periods, with some segments operating at LOS D. The Peña Boulevard Corridor Transportation Study was tasked with identifying alternatives and solutions to the FAA compliance problem for Peña Boulevard – now and in the future.

The study and subsequent coordination with the FAA resulted in a determination that, of the total traffic on Peña Boulevard, 73% is on-airport-generated traffic and 27% is non-airport traffic. In 2018, the FAA determined a 73%/27% airport/non-airport traffic split for all construction and maintenance of Peña Boulevard is necessary. Therefore, DEN must find non-airport sources of revenue to contribute to maintaining this critical roadway.

2.2. Denver Strategic Transportation Plan (STP) – Gateway Travel Shed Evaluation (2007)

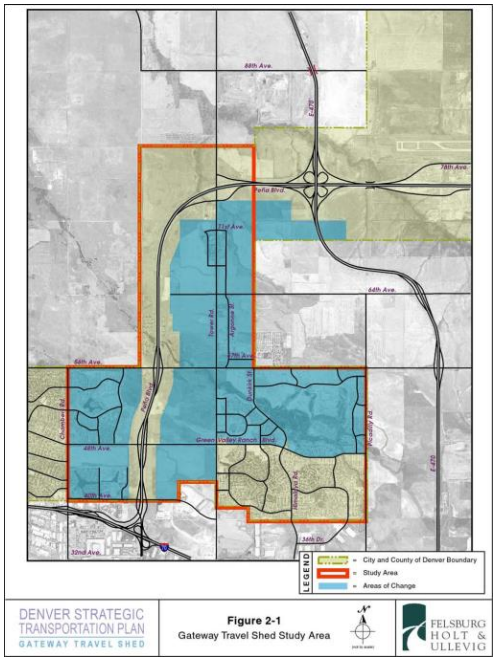
The Gateway Travel Shed Evaluation was prepared for the City of Denver's Public Works Department in 2007 and documents the data collection and inventory, future growth projections, identification of future transportation network needs, and public participation process for the Gateway travel shed.

The memo assesses roadway operations of Peña the major area arterials in a future condition with a baseline future roadway network (no major infrastructure changes) and a condition including build-out of the RTD A Line commuter rail; grade separated crossings at 45th and 51st Avenue; as well as capacity changes to all the major arterials. The study recommended that Peña Boulevard be expanded to 8 lanes in certain sections AND that 2-lane one way frontage roads be constructed alongside Peña Boulevard including an access point at 64th Avenue. It also recommended the arterials all be expanded to a six-lane cross section. Even with all these improvements, based on the buildout land use forecasts and the buildout roadway plan, the following roadway segments were still forecast to operate at above capacity:

- Tower Road throughout the travel shed
- 56th Avenue throughout the travel shed
- Green Valley Ranch Boulevard from Peña Boulevard to Picadilly Road
- Picadilly Road from 56th Avenue to the south
- Sections of Peña Boulevard and the collector-distributor roads

The study also specifically evaluated a comparison of including the 64th Avenue interchange as part of the recommended capacity changes and not including it. Compared to forecasts with a 64th Avenue interchange, the study found that traffic volumes on 56th Avenue would double and that similar volume changes would also be seen on Tower Road and Telluride Street. Even with the 64th Avenue interchange, 56th Avenue and Tower Road are projected to operate at near or above capacity conditions in 2030. The exclusion of a 64th Avenue interchange onto the Peña Boulevard corridor collector-distributor roads would further exacerbate this condition.

The study briefly mentions consideration of an alternative interchange at 67th Avenue, which would better serve the Commuter Rail station but would be worse for 56th Avenue capacity. These over-capacity roadway segments indicate a need for additional improvements to the transportation network or demand management measures.



These over-capacity roadway segments also demonstrate the need for developing multi-modal transportation solutions in the travel shed and re-evaluating the intensity of future land use and development plans. Multi-modal improvements recommended included: operation of a circulator bus system; land use plans focused around transit stations; introducing parking costs and transit incentives in the high-density areas; add bus routes and increase frequencies along heavily traveled corridors such as Tower Road and 56th Avenue.

The report included many assumptions in its forecasting that have subsequently been realized, including the RTD A Line and Gateway area stations, station area transit-oriented development (TOD), airport expansion, and new commercial and residential development. Several major changes have occurred, however, that were not included in the forecast:

- Construction of a westbound on-ramp at Tower Road and Peña Boulevard. This may eliminate some traffic from utilizing 56th Avenue to access SB Peña Boulevard.
- Adoption of the Far Northeast Area Neighborhood Plan, which calls for slightly lower assumed densities in the Gateway area. This may lower some traffic demands throughout the area.
- Design of 56th Avenue with a four-lane cross-section, although current designs still allow for eventual expansion to a six-lane cross-section with the removal of a bike lane. This further expansion would have a negative impact on multi-modal connectivity in the area. With the current design, 56th Avenue capacity may ultimately not meet the capacity assumed previous models, worsening overall congestion on this and surrounding arterials.
- Adoption of the Commerce City Transportation Plan which identifies a high priority project to build the High Plains Parkway which will re-align Tower Road and add to it capacity north of the City of Denver. While this would increase the capacity of Tower Road, it may ultimately induce demand on Tower Road, therefore resulting in the section through Denver experiencing more traffic congestion.
- Adoption of the 2018 E-470 Master Plan, which no longer includes an interchange of E-470 and Green Valley Ranch Boulevard.

2.3. 64th & Peña Boulevard Infrastructure Recommended Approach Memo

DOTI prepared this memo to develop recommendations and considerations for future development and infrastructure assumptions around a 64th and Peña Boulevard interchange. Given that an interchange at 64th Avenue and Peña Boulevard is unlikely to be approved by the FAA, alterative options and implications for travel in the Gateway Travel shed needed to be revisited.

To better understand the effects of precluding construction of the 64th and Peña Boulevard interchange, the memo recommended that DOTI conduct modeling of the transportation network that incorporates more recent planned and implemented changes to the transportation network and land uses. This modeling should also more comprehensively evaluate potential effects of alternative multi-modal or transportation demand management options as key components of the future Gateway area transportation network. If such alternatives can become part of the planned network, next steps should be identified to achieve these alternatives.

The three options below are heavily based on the conclusions of the 2008 Strategic Transportation Plan (STP). New modeling would provide a more accurate picture of considerations and trade-offs for each option. Considerations about the effects on the transportation network are highlighted below.

Option 1: Retain Plan for Future Interchange

This would be a continuation of the status quo. In this option, DOTI would retain the necessary right-of-way (ROW) to build the interchange at a future date.

Option 2: Plan for Termination of 64th at Richfield Drive

Would allow for the preclusion of an interchange and 64th and Peña Boulevard by revising Gateway District Plans and regulations. In this case, 64th would be built out at-grade with final connection to Richfield Drive and allow for land use development within the remaining ROW currently reserved.

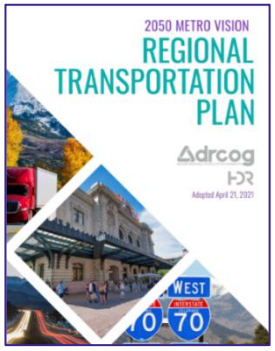
Option 3: Do not preclude Future Interchange

Would not preclude the ultimate build-out of an interchange at 64th and Peña Boulevard but allow for [temporary] roadway infrastructure to be built in the reserved ROW while limiting land use development. In this case, 64th would be built out at-grade with final connection to Richfield Dr, but not allow for additional land use development within the reserved ROW as this would, practically speaking, preclude future construction of the interchange.

Recommendation

It was recommended that DOTI pursue Option 3. This option would allow for development to proceed in the vicinity with greater clarity while additional modeling and study is completed to determine if the interchange is necessary in the next decade or if alternative transportation options that replace the need can be viable.

2.4. DRCOG 2050 Metro Vision Regional Transportation Plan (2021)



Denver Regional Council of Governments' (DRCOG) 2050 Metro Vision Regional Transportation Plan (2050 MV RTP) sets the vision for the Denver region's multimodal transportation system and guides investment in the projects and programs to achieve that vision. As the federally designated transportation planning agency for the Denver region, the Denver Regional Council of Governments prepared the 2050 RTP in partnership with the Colorado Department of Transportation, the Regional Transportation District, local governments and other transportation stakeholders. The 2050 MV RTP includes two projects to add a managed lane to Peña Boulevard in each direction between I-70 and 64th Avenue and between 64th Avenue and E-470.

2.5. Aurora Northeast Area Transportation Study (NEATS) (2018)

Transportation studies of the northeast area of Aurora have been conducted since 1999. Existing and planned development in this area continues to evolve, and it is important for transportation infrastructure plans to reflect the projected area needs. The city of Aurora uses the NEATS to provide more insight into systems level multimodal transportation facility needs now and into the future. NEATS recommendations support Aurora's comprehensive planning efforts.

The study area was principally focused in two areas: 1) the area between DIA's southern boundary, I-70, Picadilly Road and Schumaker Road and bounded by 70th Avenue, 56th Avenue, Picadilly Road and Dunkirk Road, and 2) the area situated to the south between I-70, Jewell Avenue, Picadilly Road and Watkins Road.

In 2017, the city began a comprehensive and detailed update to the 2007 NEATS transportation plan. This effort:

- Defined/refined the general corridor alignments identified in the existing Aurora Comprehensive Plan (2009) to more specific roadway alignments, cross sections, phasing needs, interchange and grade separations with I-70 and E-470, transit components and trail systems;

- Accounted for approved development plans, pending and expected development proposals, and overall transportation needs;
- Identified near, mid-, and long-term needed transportation facilities and programs; and
- Included a stakeholder outreach process.

The Aurora NEATS study includes several recommended capacity improvements to 64th Avenue within Aurora. It describes 64th Avenue as an ultimate 6-lane facility. However, the plan does not address whether an interchange was assumed or not.

2.6. Far Northeast Area Plan (2022)

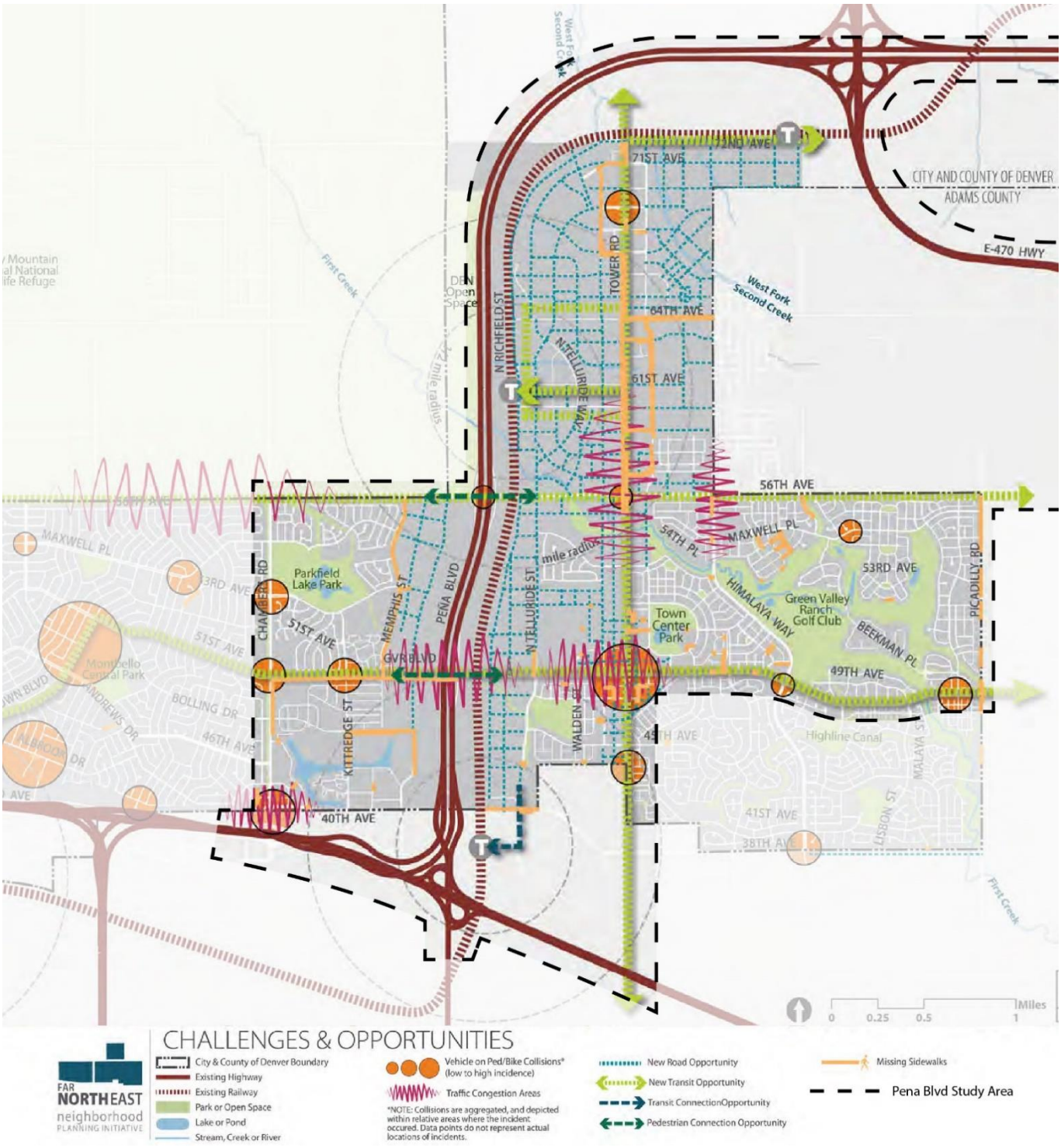
The Far Northeast Area Plan (2019) and the Far Northeast Area Plan Amendment (2022) encompasses Montbello, Gateway-Green Valley Ranch, and the southernmost portion of the Denver International Airport neighborhood. This area represents 11% of land area and population in the City and County of Denver, not including the airport itself.

Land-use in The Far Northeast Area is primarily identified as the suburban context, but the area contains land identified as the urban context due to close proximity to transit connections. The plan recommends the expansion of light industrial uses as well as intensification of existing commercial uses through mixed-use corridors. In these mixed-use corridors, the plan calls for eight-story maximum building heights with short-term, mid-term and long-term visions for retrofitting existing single story local and community centers into dense urban fabrics. The plan also identifies the need for a strategic master plan and infrastructure to accommodate high volumes of traffic. In addition to several other recommendations, the plan calls for 1,675 affordable housing units, capital investment transit corridors, 82 miles of road enhancements, 95 miles of proposed sidewalks, 29 miles of new bicycle facilities, and 19 miles of new shared-use trails. Chapter three of this report uses these recommendations to provide a holistic picture of the area's future street network.

The 2022 Far Northeast Area Plan Amendment makes use of market analysis identifying the Far Northeast Area as one of the only areas in the City and County of Denver with large remaining quantities of green fields. As a result, the plan identifies the Study area, especially sites east and west of Tower Road, as a key location for a city-wide industrial strategy. Additionally, the plan recognizes the anticipated arrival of an unnamed large manufacturing user as bringing additional jobs to the area.

The plan states that while this area was once geographically isolated, this is no longer the case due to resulting development from its proximity to DEN and I-70, a strained regional housing supply, transit and infrastructure investments, and large master planned developments occurring to the east of the Study area in Aurora. Although the area is no longer geographically isolated, it still lacks adequate transportation connectivity. Figure 2-1, taken from the Far Northeast Plan, highlights the mobility challenges and opportunities within the Gateway area. These challenges and opportunities will help the study team identify solutions to enhance mobility in the Gateway area.

Figure 2-1 - Far Northeast Mobility Challenges and Opportunities



3. Surrounding Transportation System

The existing transportation system within the Study area and along the Peña Boulevard corridor consists of roadways, transit facilities and trails. Understanding the existing transportation system and its associated challenges and opportunities will ensure proposed solutions for Peña Boulevard and the Gateway area address gaps and complement the existing infrastructure.

3.1. Existing Roadway Network

This section describes the existing characteristics of the major roadways within the Study area (or traffic modeling area). Descriptions of the major interchanges along Peña Boulevard is included in Appendix A.

3.1.1. Peña Boulevard

Peña Boulevard is an 11.1-mile-long freeway facility that starts at I-70 and ends at the Jeppesen Terminal of the DEN. It provides the only roadway access to DEN and is maintained by DEN through capital improvements and maintenance funding from the FAA grants. The freeway provides seven full or partial interchanges at 40th Avenue/Airport Boulevard, Green Valley Ranch Boulevard, 56th Avenue, Tower Road, E-470, Gun Club Road, and Jackson Gap Road. The latter two interchanges provide access to on-site long-term parking, rental car concessions, and the cell phone waiting concession. Details of individual interchanges are provided in Appendix A. Due to the nature of the surrounding roadway network and location of the interchanges, Peña Boulevard also offers connectivity to numerous off-airport developments and neighboring communities. According to the Peña Boulevard Corridor Transportation Study (2017), 73 percent of the traffic on Peña Boulevard is airport-related while the remaining 27 percent of the traffic is non-airport related. In addition to serving motorized traffic, Peña Boulevard is also signed as a bicycle corridor but sees little to no bicycle traffic.

The 7-mile stretch of Peña Boulevard between I-70 and E-470 has two lanes in each direction with a posted speed limit of 65 miles per hour (mph). Between E-470 and the Jeppesen Terminal, the roadway widens with three to five lanes in each direction. The posted speed limit reduces to 55 mph east of E-470 and reduces to a final posted speed limit of 15 mph as it approaches the terminal area of the Airport. The Traffic Modeling limits for this Study include Peña Boulevard between I-70 and Gun Club Road. The eastern end of the corridor between Gun Club Road and the Jeppesen Terminal is being analyzed through another project.

3.1.2. Interstate 70 (I-70)

Approximately three miles of the I-70 freeway between Chambers Road and Tower Road are included within the Study area. I-70 provides the primary access to Peña Boulevard through a directional, braided-ramp interchange. The directional ramps provide access only to eastbound I-70 traffic heading to Peña Boulevard and to westbound I-70 traffic from Peña Boulevard. I-70 westbound traffic accesses Peña Boulevard using Airport Road exit to 40th Avenue on-ramp. The majority of the greater Denver metropolitan airport traffic uses these ramps to access Peña Boulevard. Within the Study area, additional interchanges are provided at Chambers Road, Airport Boulevard, and Tower Road.

I-70 is a four-lane freeway between Tower Road and the Peña Boulevard ramps. West of the Peña Boulevard ramps, I-70 widens to a 6-lane freeway providing two general purpose lanes and one tolled express lane in each direction. I-70 has a 55-mph posted speed limit within the Study area. At present the tolled express lanes end between I-225 and Chambers Road. CDOT's long-range plan is for there to be a direct connection of the I-70 tolled express lanes to Peña Boulevard. The timing of this is uncertain but assumed to occur within the 2050 design year timeframe.

3.1.3. Airport Boulevard

Airport Boulevard is a six-lane, median-divided arterial street that directly south of Peña Boulevard and provides access to Peña Boulevard at 40th Avenue. The roadway also has a full access interchange with I-70 immediately south of its access to Peña Boulevard. Airport Boulevard has a posted speed limit of 40 mph. The traffic modeling limits for Airport Boulevard extend from the eastbound I-70 on-ramp to the 40th Avenue interchange with Peña Boulevard. Signalized intersections within the modeling limits are located at the I-70 ramp terminals and Peña Boulevard/40th Avenue ramp terminals.

3.1.4. 40th Avenue

40th Avenue is a four-lane east-west arterial street that extends between Chambers Road and Himalaya Road. The roadway terminates at Himalaya Road (as 38th Avenue). The roadway has a full access interchange with Peña Boulevard. The 40th Avenue and Airport Boulevard RTD Park-n-Ride is accessible from 40th Avenue at Salida Street.

The posted speed limit is 40 mph. The traffic modeling limits for 40th Avenue extend from Chambers Road to Tower Road. Signalized intersections within the modeling limits are located at Chambers Road, Kittredge Street, Peña Boulevard ramp terminals, and Tower Road.

3.1.5. Green Valley Ranch Boulevard

Green Valley Ranch Boulevard is an arterial four-lane, median-divided roadway from Chambers Road to Picadilly Road. It is one of the major east-west thoroughfares providing access across the Gateway-Green Valley Ranch neighborhoods. It has a full access interchange with Peña Boulevard. Green Valley Ranch Boulevard has a posted speed limit of 40 mph from Chambers Road to Tower Road. East of Tower Road the speed limit reduces to 35 mph. The traffic modeling limits for Green Valley Ranch Boulevard extend from Chambers Road to Himalaya Road. Signalized intersections within the modeling limits are located at Chambers Road, Peña Boulevard, Telluride Street, Tower Road, Argonne Street, and Himalaya Road.

3.1.6. 56th Avenue

56th Avenue serves as a major east-west regional thoroughfare, is a major regional freight corridor, and is a major connection to DEN and the Montbello and Parkfield neighborhoods. Currently, 56th Avenue has two lanes (one lane in each direction) between Chambers Road and Peña Boulevard. The roadway widens to a four-lane median divided facility from Peña Boulevard to Argonne Street. East of Argonne Street the roadway widens to a six-lane, media-divided road. 56th Avenue has full access interchanges with both Peña Boulevard and E-470.

In 2008, DOTI conducted a Planning and Environmental Linkages (PEL) study to identify multi-modal travel and safety improvements on East 56th Avenue from Peoria Street to Peña Boulevard. The study recommended widening 56th Avenue to a median separated four-lane roadway between Peoria Street and Peña Boulevard. As part of the Project, DOTI will install new traffic signals and pedestrian crossings along 56th Avenue and will add a multi-use path along the north side of 56th Avenue for better connections to neighborhood bike lanes and the trail system at the Rocky Mountain Arsenal National Wildlife Refuge. The project is currently under construction and projected to be complete in Fall 2024.

56th Avenue has a posted speed limit of 45 mph from Chambers Road to Imboden Road. The traffic modeling limits for 56th Avenue extend from Chambers Road to Himalaya Road/Dunkirk Street. Signalized intersections within the modeling limits are located at Peña Boulevard ramp terminals and Tower Road.

3.1.7. 64th Avenue

64th Avenue extends from west of Tower Road to E-470, where there is an interchange with E-470. It is a two-lane roadway with a center turn lane and is classified as a local roadway. Signalized intersections are located at Gaylord Rockies Boulevard and at Tower Road. The E-470 ramp terminals are stop-controlled intersections. The entire length of 64th Avenue is included in the traffic modeling limits. The posted speed limit of 64th Avenue varies between 35 mph and 45 mph. The 2018 NEATS study (Section 2.5) recommended upgrading 64th Avenue between Dunkirk Street and Piccadilly Road to a six-lane major arterial facility in the future. Accordingly, the City of Aurora completed a 64th Avenue Multimodal Transportation and Urban Design Study in 2020. The 2020 study recommended a 4-lane configuration with parking and bike lanes along 64th Avenue.

3.1.8. Chambers Road

Chambers Road is a north-south arterial street extending across the City of Aurora with its north terminal at 56th Avenue. The traffic modeling limits for Chambers Road extend from 56th Avenue to I-70. Chambers Road is a six-lane, median-divided roadway from I-70 to Green Valley Ranch Boulevard. It reduces to a four-lane median-divided roadway from Green Valley Ranch Boulevard to 56th Avenue. Chambers Road has no interchange access with Peña Boulevard but serves as a commuter corridor for the Gateway area residents.

Chambers Road has a posted speed limit of 40 mph from I-70 to 56th Avenue. Signalized intersections are located at I-70 ramp terminals, 40th Avenue, Andrews Drive, 46th Avenue, Green Valley Ranch Boulevard, 53rd Avenue, Maxwell Place, and 56th Avenue.

3.1.9. Tower Road

Tower Road is an arterial street and a local freight corridor that provides north-south access across the entire length of the Study area from Smith Road to 128th Avenue. From Smith Road to 38th Avenue the roadway is a four-lane, median divided roadway. From 38th Avenue to 43rd Avenue, the roadway is a six-lane median-divided roadway. From 43rd Avenue to 45th Avenue the roadway reduces to a four-lane, median-divided roadway. From 45th Avenue to 81st Avenue the road continues as a four-lane, median-divided road. From 81st Avenue to 83rd Avenue the roadway widens to a six-lane, median-divided road. From 83rd Avenue to 103rd Avenue the roadway

reduces back to a two-lane median divided roadway. Tower Road has a full access interchange with Peña Boulevard and I-70.

Tower Road has a posted speed limit of 40 mph from Smith Road to Green Valley Ranch Boulevard. The speed limit increases to 45 mph from Green Valley Ranch Boulevard to 81st Avenue. North of 81st Avenue the speed limit increases to 50 mph. North of 120th Avenue the speed limit increases to 55 mph. The traffic modeling limits for Tower Road extend from I-70 to Peña Boulevard. Signalized intersections within the modeling area are located at I-70, 32nd Parkway, 35th Avenue, 38th Avenue, 43rd Avenue, 45th Avenue, Green Valley Ranch Boulevard, 56th Avenue, and Peña Boulevard.

3.1.10. E-470 Tollway

E-470 is a limited access tolled freeway that extends from I-25 at mile point 228 north of the Denver metro area to I-25 at mile point 194 south of the metro area. The roadway is approximately forty-seven miles in length. The majority of the corridor has a posted 75 mph speed limit, reducing to lower speeds in the vicinity of I-25 and I-70. The roadway provides access to DEN primarily for passengers north or east of Denver who use I-25, I-76 and I-70 to access DEN.

The traffic modeling limits for E-470 are limited to analyzing E-470 ramps connecting to Peña Boulevard and 64th Avenue. E-470 has a full cloverleaf interchange with Peña Boulevard directly west of DEN and a traditional diamond interchange at 64th Avenue.

3.1.11. Gun Club Road

Gun Club Road is a 0.5-mile collector roadway that runs under Peña Boulevard and connects 78th Avenue and 75th Avenue. There are two lanes in the northbound direction, and one lane in the southbound direction. The road has a posted speed limit of 45 mph.

Gun Club Road provides access to the rental car terminal and the cell phone parking lot located approximately three miles west of the Jeppesen Terminal. The traffic modeling limits for Gun Club Road extend from 75th Avenue to 78th Avenue.

3.1.12. Jackson Gap Road

Jackson Gap Road is a two-lane collector that runs under Peña Boulevard and extends from 78th Avenue to 56th Avenue. It provides access to several private parking and freight facilities south of Peña Boulevard. This road has a posted speed limit of 30 mph. This Study does not include Jackson Gap in its traffic analyses since it is being studied by another project. The recommended lane configuration and intersection improvements from the other study will be incorporated in the future year analysis for this study.

3.2. Planned Street Network in the Gateway Area

The street network within the Study area is still developing and is one of the least complete networks in the City and County of Denver. Denver has the opportunity to fully realize the future road network proposed in the Far Northeast Area Plan (FNAP). The lack of infrastructure presents the opportunity to build a safe and reliable

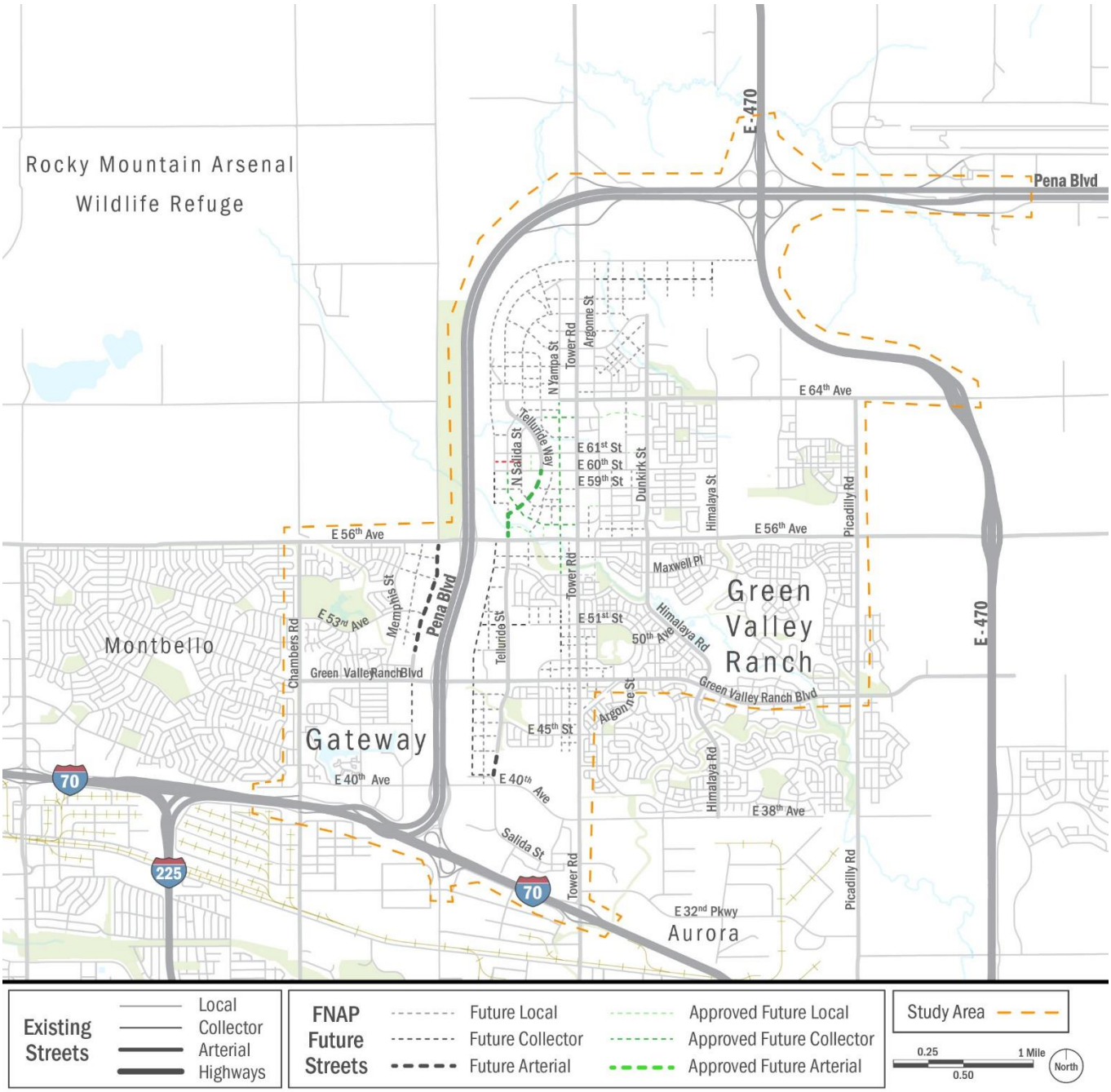
network of streets that encourage multimodal travel throughout the area. Figure 3-1 highlights existing streets as solid gray lines, recently built streets that align with the FNAP's future road network in solid green lines, the locations of FNAP approved future streets shown as dashed green lines, and FNAP future streets that have not yet been approved as gray dashed lines.

The street network in the southern portion of Green Valley Ranch, between E 38th Avenue, E 56th Avenue, Tower Road, and Picadilly Road, is fully built out with no plans for additional streets. This area consists mostly of local and collector streets that serve residents living in the immediate area, except from Himalaya Street and Green Valley Ranch Boulevard which are the two major north-south and east-west arterial streets.

The network west of Tower Road and north of E 56th Avenue have major gaps in their existing street networks. Locals, collectors, and arterial streets are identified to be complete and will serve as key connections to Tower Road and the 61st and Peña Station when fully built out.

The street network in the Gateway Neighborhood to the west of Peña Boulevard is mostly built out aside from a portion of streets connecting to Memphis Street and Airport Way. Airport Way is identified to be a future arterial street that will connect Green Valley Ranch Boulevard to E 56th Avenue when completed.

Figure 3-1 - Existing and Planned Street Network within Study Area



3.3. Transit

Transit offers an alternative to vehicle travel and represents a key alternate mode choice for users traveling both within and through the Study area. Transit service within the Study area is provided primarily by the Regional Transportation District (RTD), including rail and bus services as shown in Figure 3-3. Within the Study area there are ten bus routes and one commuter rail line all operated by RTD, see Table 3-1. Other transit services and providers include the Montbello Connector, a micro-transit service provided by the City of Denver, and private transit and shuttle providers serving the Airport.

Table 3-1 - Transit Services within Study Area

Type	DEN or Local	Route	Peak Headways	Off-peak Headways
Rail	DEN	A Line	15 mins	30 mins
Bus	DEN	AB/AB1	30 mins	60 mins
Bus	DEN	AT/ATA	30 mins	60 mins
Bus	DEN	104L	30 mins	60 mins
Bus	DEN	145X	Twice per day	Twice per day
Bus	DEN	169L	5 Buses per day	5 Buses per day
Bus	Local	37	30 mins	Peak times only
Bus	Local	42	15 mins	30 mins
Bus	Local	45	30 mins	30 mins
Bus	Local	121	15 mins	30 mins
Bus	Local	169	60 mins	60 mins

All five existing local bus routes connect the 40th Avenue & Airport Boulevard Commuter Rail Station to key destinations outside of the Study area to the south of I-70, in the Montbello Neighborhood, and to DEN. The five bus routes serving DEN pass through the study area on Peña Boulevard connecting DEN to key transit hubs in Denver, Boulder, Brighton, and Thornton.

The RTD A Line, shown in Figure 3-3, is a commuter rail line that runs from Denver's Union Station in Downtown Denver to DEN and opened in April 2016. Within the Study area there are two A Line rail stations located at 40th Avenue and Airport Boulevard and 61st Avenue and Peña Boulevard, both of which are also park-n-ride facilities. The 40th & Airport Boulevard Station has 1,079 parking spaces and it is free to park at the station for up to 24 hours for vehicles registered within RTD Boundaries. In addition to the A Line, the 40th & Airport Boulevard Station is served by the 37, 42, 45, 121, 169 and ATA bus routes as shown in Figure 3-3. The 61st & Peña Station, which is managed by DEN, has 800 spaces total, including 11 electric vehicle charging stations. At the time of writing, parking is $5 per 12 hours or $7 per day at 61st & Peña Station and the station is not serviced by any additional bus services.

Figure 3-2 shows the zip codes in which DEN's 30,000 plus employees live and from where they commute. The highest concentration of employees are located in areas to the south and west of the airport, which includes East

Denver, Commerce City, and Aurora. The areas shown in the two darkest shades of purple account for almost 11,000 employees and 6,000 employees, respectively. Figure 3-2 also outlines the Regional Transportation District (RTD) bus and rail facilities that connect to the airport. Many of the neighborhoods with high DEN employee density do not have convenient access to transit that connects to the airport, particularly those neighborhoods south of the airport.

Figure 3-2 - Badged Employee Count by Zip Code

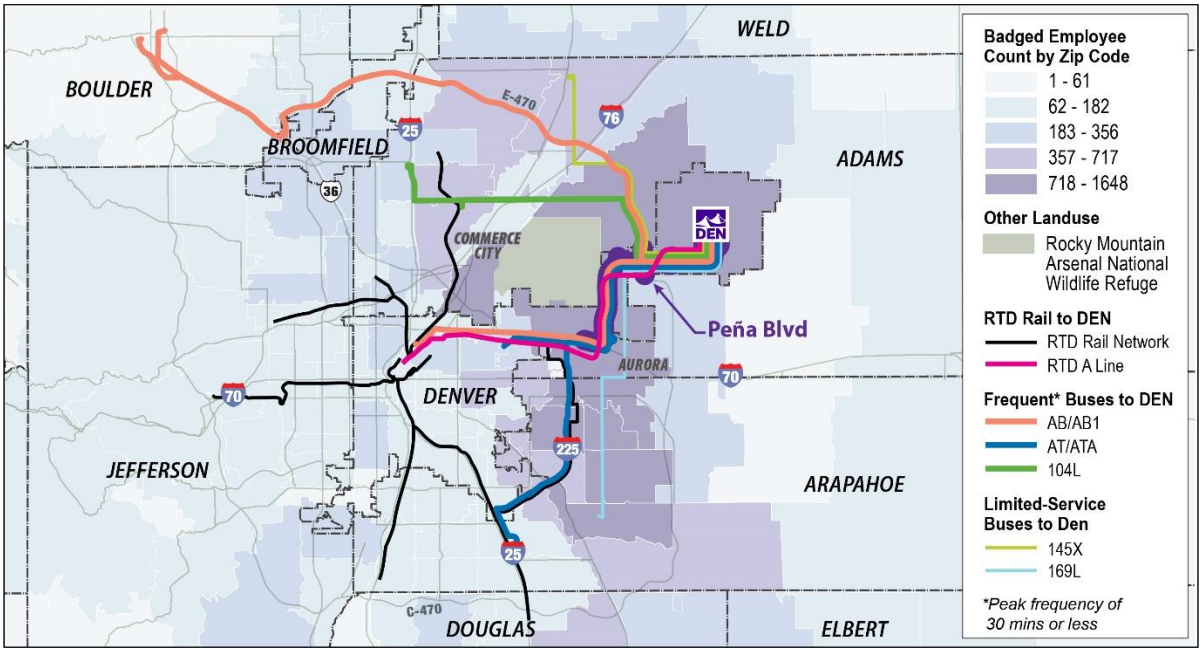


Figure 3-4 and Figure 3-5 show how existing multimodal access is currently disjointed within walking and biking distance of each station, and how access will improve when the surrounding street networks and multimodal facilities are built out.

At the time of writing, RTD is embarking on a comprehensive, systemwide study of its fares and a fare equity analysis. Recognizing that its fare structure is one of the most expensive in the transit industry, RTD wants to ensure that the agency is doing all it can to make its services more accessible. As part of this study, DEN is working with RTD to try and better synchronize transit schedules with employee shifts. More details on transit ridership to DEN can be found in Appendix A.

Figure 3-3 - Transit Services within Study Area

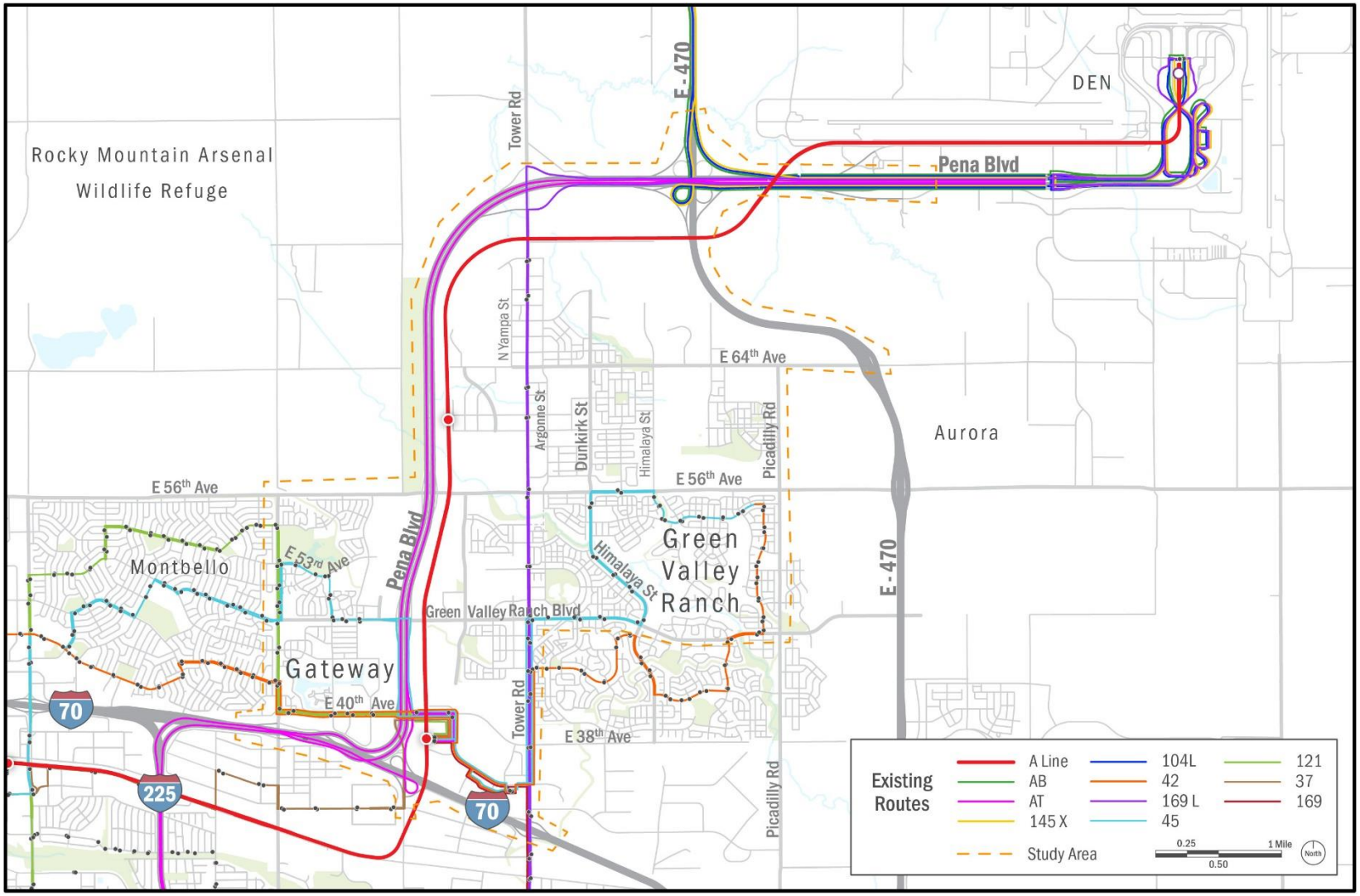
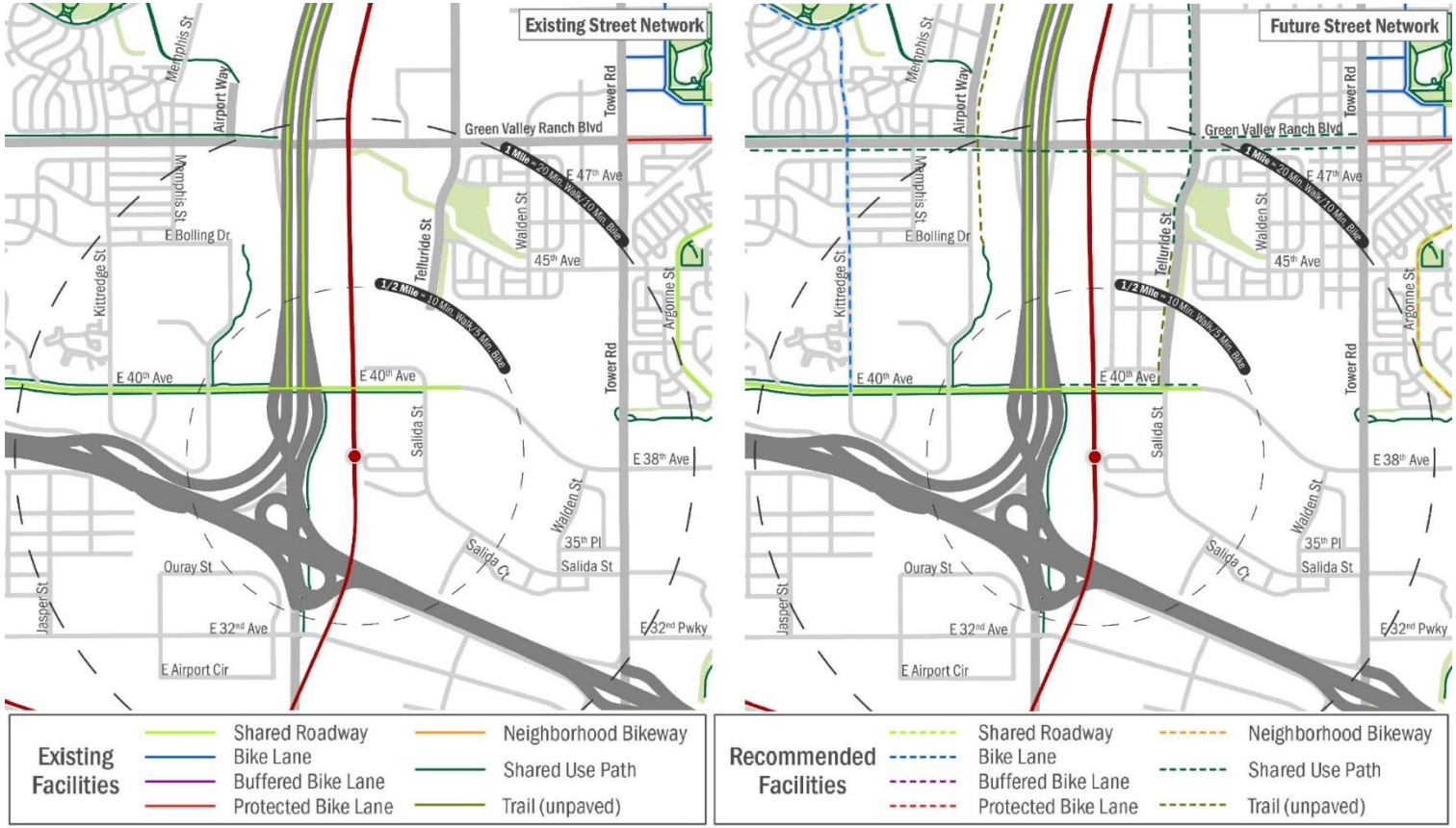


Figure 3-4 - 61st and Peña Station Existing and Future Accessibility

The street network surrounding the 61st and Peña Boulevard Station will see the largest transformation when the surrounding network is fully built. Currently, N Telluride Way, E 61st Avenue, and E 60th Avenue are the only streets that connect the station to the rest of the neighborhood. These streets only connect to the north and east which presents accessibility challenges for station users needing to travel south towards Green Valley Ranch or Montbello. However, the planned extension of N Telluride Way and Yampa Street will provide more direct options that connect to E 56th Avenue. Buffered bike lanes are identified to be included on N Telluride Way and a bike line to be included on N Yampa Street which will greatly increase multimodal access to Green Valley Ranch and Montbello.

Figure 3-5 - 40th and Airport Boulevard Station Existing and Future Accessibility



The street network surrounding the 40th and Airport Boulevard Station also presents connectivity issues for the surrounding neighborhoods. Light industrial uses located between the station and the Green Valley Ranch Neighborhood create barriers for station users traveling from the northeast. Residents living in this neighborhood must travel on N Telluride Street or Tower Road which have high traffic volumes and speeds. These conditions may cause station users to feel unsafe and deter ridership. Residents in Montbello would travel along E 40th Avenue to access the 40th and Airport Boulevard Station. A shared use path has recently been built on the southern side of E 40th Avenue giving pedestrians and cyclists a safe, separated facility to use. The largest gaps for Montbello and Green Valley Ranch include a lack of facilities along Telluride Street and Salida Street which are the only north/south connections to the station and should be enhanced.

3.4. Bicycle and Shared-use Infrastructure

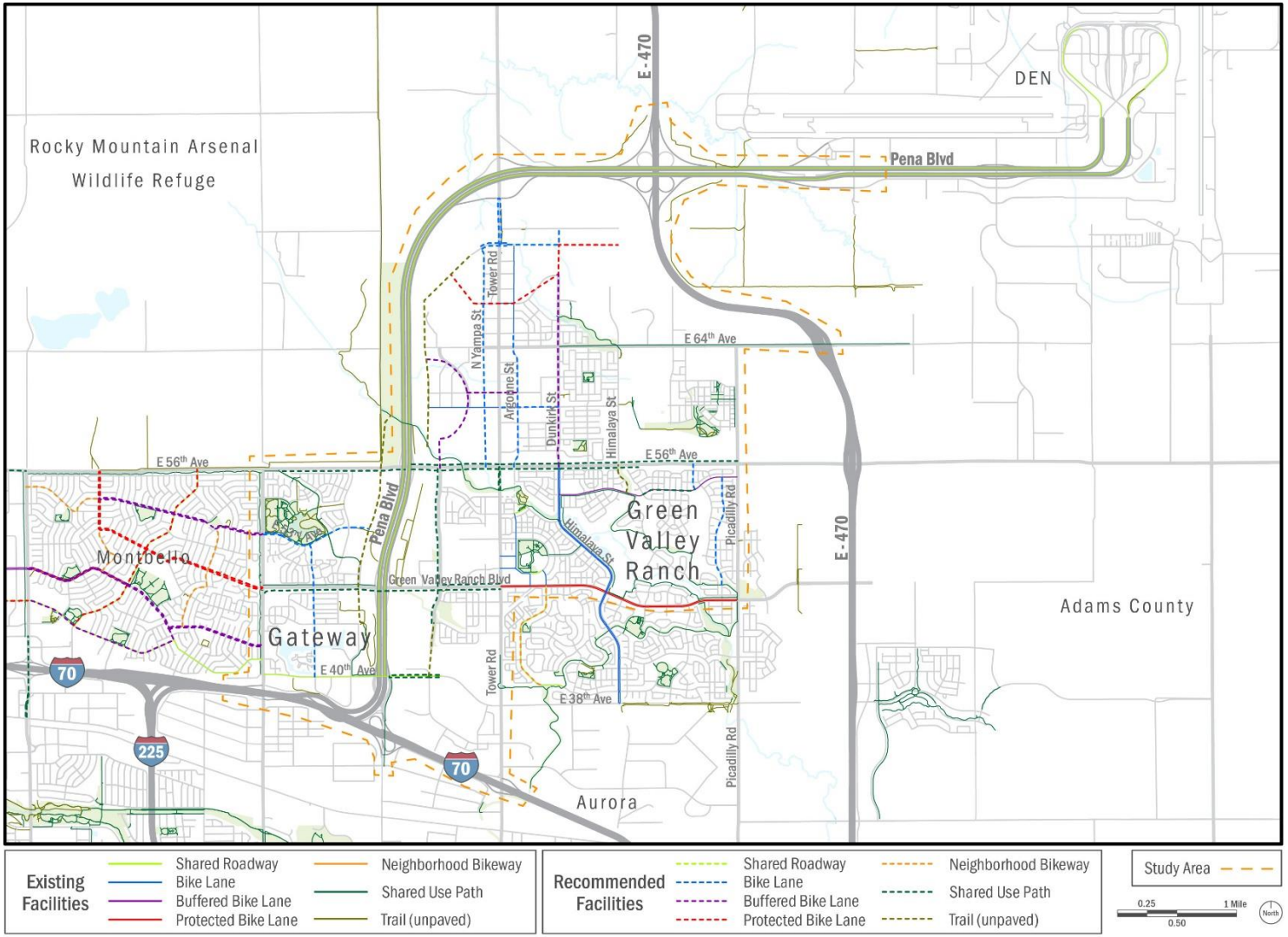
On-street and off-street bike facilities including shared roadways, neighborhood bikeways, bike lanes, buffered bike lanes, protected bike lanes, shared use paths and unpaved trails provide options for users to travel through the Study area. Most of these existing facilities are located in Green Valley Ranch's southern neighborhoods between E 38th Avenue, E 56th Avenue, Tower Road, and Picadilly Road. The existing bicycle and shared-use facilities, as well as those recommended in the Far Northeast Area Plan (FNAP), are shown in Figure 3-6.

A network of off-street shared use paths provides safe and comfortable options for cyclists traveling through the Green Valley Ranch Golf Club and adjacent greenways. Other shared use paths are scattered throughout parks in the Study area but do not provide adequate connections to destinations outside of each park.

Bike lanes on Himalaya Street and protected bike lanes on Green Valley Ranch Boulevard provide on-street cycling facilities that move cyclists north-south and east-west through the Study area. The protected bike lanes on Green Valley Ranch Boulevard currently end at Tower Road, however the FNAP proposes off-street shared use paths on Green Valley Rand Boulevard from Tower Road to Chambers Road that will fill this gap in the network. Similarly, the bike lanes on Himalaya Street currently end on E 56th Avenue, but the FNAP proposes buffered bike lanes on Dunkirk Street that will extend from E 56th Avenue north to High Point Boulevard.

Other major gaps currently exist in the areas west of Tower Road and north of E 56th Avenue. The FNAP proposes an array of facilities in this area that include bike lanes on Himalaya Street, N Yampa Street, and E 71st Avenue, buffered bike lanes on N Telluride Way and Dunkirk Street, protected bike lanes on High Point Boulevard and portions of E 71st Avenue, and shared use paths along E 56th Avenue and the southern portions of Telluride Street.

Figure 3-6 - Bicycle and Shared-use Infrastructure



3.5. Site Visit

A site visit was conducted on Monday, August 29, 2022, with the members of the Study's Technical Advisory Committee (TAC) and the consultant team. The Technical Advisory Committee (TAC) is led by Atkins and composed of managers from DEN Planning, DOTI Design and Plan staff, and task leads from Peña PMT. The TAC oversees the overall management, coordination, and overseeing study approach and deliverables. The goal of the visit was for the TAC to better understand the barriers, opportunities, and evolving land use within the Study area to help guide the development of proposed alternatives and solutions for the combined Study area. The site visit was led by OV Consulting who developed much of this Existing Conditions Report and DEN provided a shuttle bus for all attendees to travel through the Study area together.

- The size of the Study area and the scale of developments was impactful
- Good to see barriers and opportunities the current transportation network presents
- The land-use within the Study area is a lot more mixed use than expected
- It is stark how different land-uses butt up against each other (industrial, residential, and commercial alongside each other)
- The 40th & Airport and 61st & Peña Stations have quite different characteristics:
  - 40th & Airport is not very walkable, has a large park-n-ride facility, there are some social trails showing the need for additional connections and it is surrounded by a lot of industrial land-use
  - 61st & Peña is shaping up to be more of a transit-oriented development (TOD) – more walkable and higher density residential

Figure 3-7 - Site Visit Photos

TAC members on the tour bus

TAC discussing future developments at 61st & Peña Station

Social trail highlighting lack of connectivity at 40th & Airport Boulevard Station

4. Peña Boulevard Geometric Existing Conditions

This section documents the geometric and roadway existing conditions of Peña Boulevard, including roadway characteristics, right of way, bridge structures, drainage facilities and major utilities.

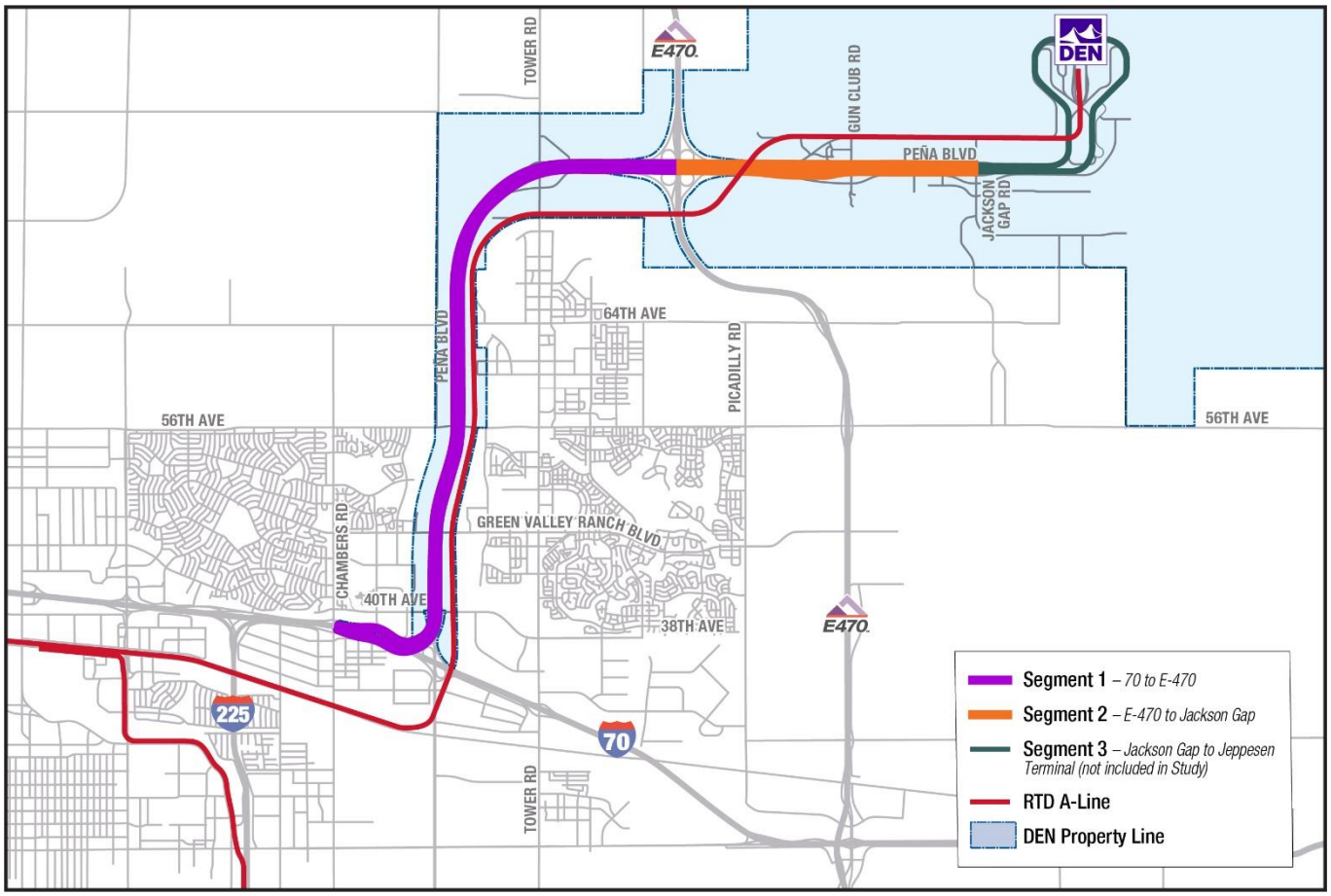
4.1. Roadway Characteristics

Peña Boulevard is a divided concrete freeway that extends from I-70 to the Jeppesen Terminal at DEN. Through its 11.1-mile length, the freeway has three distinct cross-sections:

- Segment 1: I-70 to E-470
- Segment 2: E-470 to Jackson Gap
- Segment 3: Jackson Gap to Jeppesen Terminal

These segments are outlined in Figure 4-1 and described in the following sections.

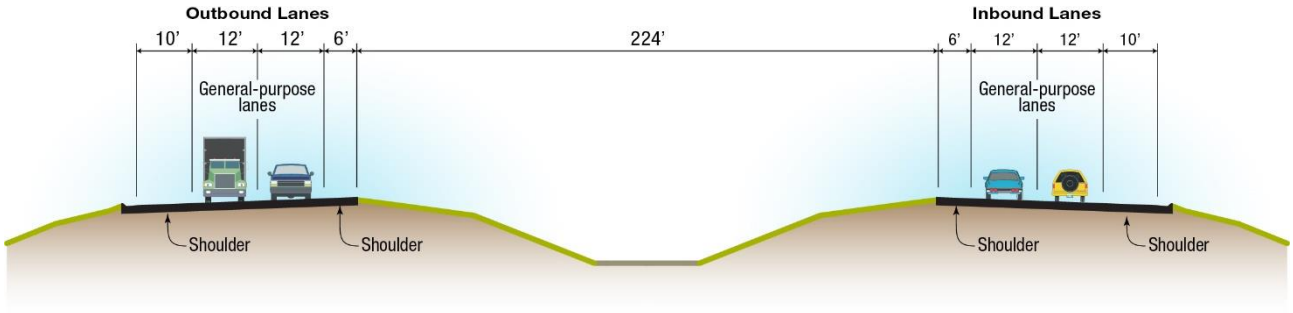
Figure 4-1 - Peña Boulevard Cross-section Segments



4.1.1. Segment 1 – I-70 to E-470

Through the approximately 7 miles of segment 1 (I-70 to E-470) Peña Boulevard is four lanes (two lanes in each direction) as shown in Figure 4-2.

Figure 4-2 - Peña Boulevard Segment 1



Through this segment, inside shoulder widths are typically 6’ with two 12’ lanes and a 10’ outside shoulders. ROW is extensive, approximately 1,200’ wide, and the corridor is generally unconstrained. There is a very wide unpaved median (224’) and few walls or obstructions are present in this segment. Guardrail is used sparingly, typically at the approaches and departures of bridges but in few other locations. Surface drainage to ditches/culverts far off the main roadway is the norm, but mountable curb and gutter is used in some locations to constrain runoff and prevent erosion. Due to the high design speeds, cable barrier rail is typically installed along with the curb and gutter to prevent vaulting.

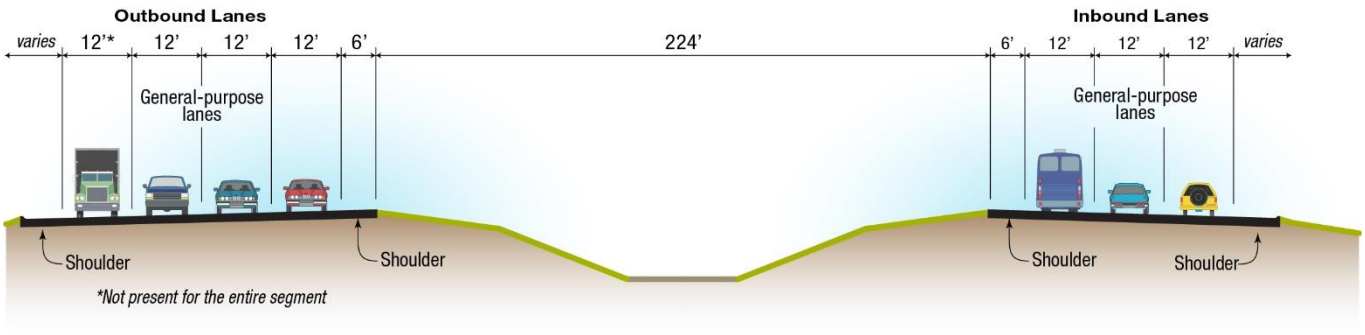
Auxiliary lanes are present in both directions between the off and on-ramps from E 40th Avenue and Green Valley Ranch Boulevard. There is a segment of 2 lane collector distributor road adjacent to the inbound lanes in the vicinity of the E-470 interchange; this collector distributor road acts to isolate the merging E-470 traffic into a single inbound auxiliary lane that terminates at the inbound offramp to Gun Club Road. There is also an auxiliary lane in the outbound direction which terminates at the Tower Road off-ramp.

4.1.2. Segment 2 – E-470 to Jackson Gap

From E-470 to approximately Jackson Gap Street, a third lane is added in each direction as shown in Figure 4-3. The addition of a third lane occurs in slightly different locations for each direction; in the inbound direction, the third lane is added just before the A Line bridge crosses the roadway. In the outbound direction, the third lane is carried from the merging of west and east terminal outbound lanes. There is an additional fourth lane in the outbound direction; this is present from the cell phone lot/ Gun Club Road on-ramp to just east of E-470.

Inside shoulder widths tend to stay at 6’, but outside shoulder widths change regularly. They tend to be 8’ east of E-470 where 3-4 lanes are present and become extremely variable in the vicinity of the toll plaza (roughly between the A Line bridge and Gun Club Road). Because the former toll plaza pavement widths are so irregular, inside and outside shoulder widths cannot be accurately summarized. East of Gun Club Road the outside shoulders tend to be a consistent 12’, a trend which carries forward towards the terminal.

Figure 4-3 - Peña Boulevard Segment 2



Drainage is likewise quite variable, with surface drainage to ditches more typical west of Gun Club Road, but mountable curb and gutter with cable rail consistently applied east of Gun Club Road. Due to the presence of more signage, lighting, and adjacent facilities on the approach to the terminal, there is a larger amount of guardrail and barrier to protect these roadside elements.

4.1.3. Segment 3 – Jackson Gap to Jeppesen Terminal

This segment is highly variable, with multiple lane additions and branches to direct traffic to or from the appropriate terminal (west or east). Since this segment was recently reconstructed as part of the Phase 1A work, some important elements were applied in a more consistent fashion: 12' inside shoulders, 12' outside shoulders, and mountable curb and gutter applied on the low side of the road along with cable rail provides for a more consistent drainage pattern throughout. This is similar to the previous segment east of Gun Club Road but is applied in a more systematic fashion with this roadway reconstruction. The presence of these elements should be strongly considered for future phases of design work in this corridor.

4.1.4. Current Condition of Pavement

In March 2018, the *2016-2017 Landside Roadway Pavement Assessment – Capital Improvement Plan* was released by Muller Engineering for the use of Denver International Airport. The report assesses the conditions of the existing pavement in the airport area, including Peña Boulevard, and provides recommendations for the prioritization of pavement replacement.

As indicated in the report, much of Peña Boulevard (approx. 80% of the total laneage) fell into the "FAIR" or "POOR" category, with replacement/improvement prioritization broken into phases roughly corresponding to the condition. In this case, pavement identified as part of Phase 2 tends to be in worse condition overall than the pavement identified as part of Phase 3 (see Section 4.1.5 for more details on Peña phases), etc. No comprehensive assessment has been conducted since the release of the plan, but an additional 5 years has passed since the field assessments were conducted. In general, the same conditions can be assumed to persist, and potentially worsened given the additional half decade of use.

Peña Boulevard is more than 25 years old, required maintenance work is extensive, and the cost to maintain the aging facility is substantial. Table 4-1 outlines DEN's annual investment in pavement maintenance and improvement for Peña Boulevard. The completion of the upgrades stemming from the Study would reduce the cost of the annual maintenance work required except for planned major maintenance events, in accordance with industry standard design practice.

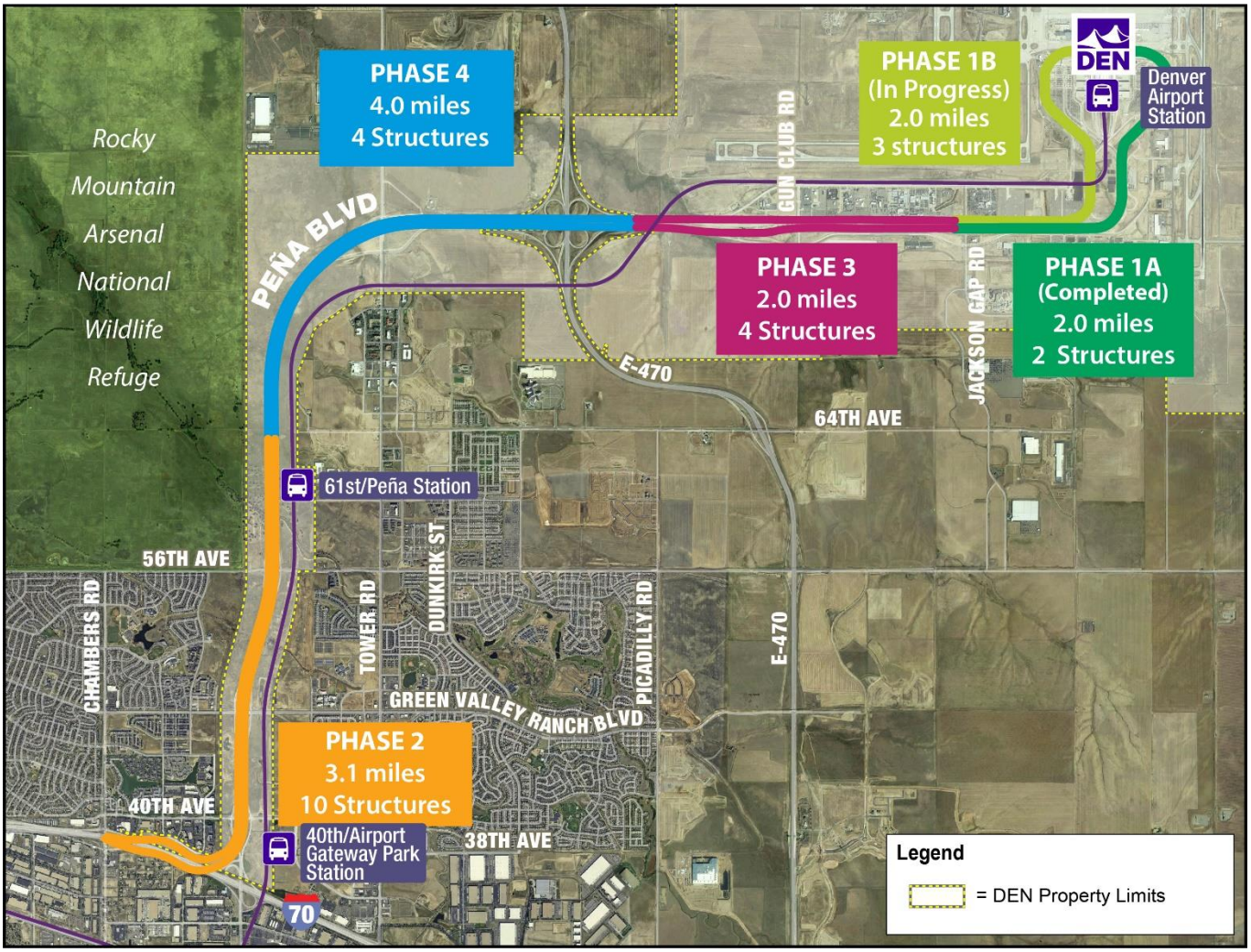
Table 4-1 - Pavement Management Program Investment

Year	Investment
2022	$3,745,154
2021	$2,408,647
2020	$0 (Project canceled due to COVID)
2019	$2,731,245
2018	$3,868,562
2017	$4,222,041

4.1.5. Roadway Improvements

Upgrades to Peña Boulevard are proposed to be constructed in four phases (Figure 4-4). Deemed essential to ensure reliability of shuttle bus and ground transportation operations and to address safety and pavement conditions, DEN has completed Phase 1A and Phase 1B is in progress, which includes reconstruction on outbound Peña Boulevard between Jackson Gap Street and Jeppesen Terminal. Phase 1A completed improvements on inbound Peña Boulevard through design-build to expedite needed improvements. The work started in 2020 and was completed in 2021. Phase 2 encompasses the southernmost portion of Peña Boulevard from I-70 to 64th Avenue, Phase 3 includes Jackson Gap Street to E-470, and Phase 4 comprises E-470 to 64th Avenue. This Study is focused on an 8-mile section of Peña Boulevard, from I-70 to Gun Club Road

Figure 4-4 - Four Phases of Corridor Improvement



4.1.6. Design Speed and Speed Limit

The majority of the corridor has a design speed of 70 miles per hour (mph) with a posted 65 mph speed limit. This speed limit steps down at the approach to terminal, with inbound speeds reducing ultimately to 15 mph at the passenger drop-off area. A corresponding step up in speeds occurs in the outbound direction, with speeds increasing as the user departs the terminal area until the posted speed once again reaches 65 mph.

4.1.7. Areas Where Corridor Does Not Meet Standards

Standards are generally met with the overall horizontal geometry of the road, with a few exceptions:

- Inconsistent or inadequate shoulder widths: As the number of lanes increases, it is generally desirable to have wider shoulders, both inside and outside. It is also desirable to have consistent shoulder widths throughout the entire corridor, where feasible. This is inconsistently applied in the vicinity of and east of E-470, with some bridges reducing shoulder widths, some shoulder widths varying (often due to post-construction restriping), and some shoulder end conditions (presence of curb and gutter, etc.) varying. This was applied in a systematic manner in phase 1a work that was recently completed; it is assumed that the same consistency would apply in the design and installation of other phases (II, III, etc.) and should be a priority of design.
- Auxiliary lane lengths and ramp spacing: The outbound auxiliary lane created by the E-470 cloverleaf is short and has a very undesirable weave. The spacing between the loops of the cloverleaf is short. This overall area should be examined closely during the development of Phase III-IV design and determine if there are any opportunities for improvement.
- Left hand lane drops: there are numerous instances of dropping lanes from the left-hand side on the outbound roadway. A lane continuity analysis should be done at a high level to determine if some of these can be removed or switched to the right-hand side to provide smoother outbound travel.

4.1.8. Right of Way

Right of way is approximately 1200’ outside of the vicinity of the terminal and is large enough to leave the design of the roadway unconstrained, see DEN Property Line in Figure 4-1. There are no concerns with sufficiency of right of way, and no anticipated need for acquisition to allow for roadway improvements.

4.2. Major Structures

This section describes the bridges, railroad crossings, and drainage structures along Peña Boulevard.

4.2.1. Bridges

Figure 4-5 highlights the bridges along the Peña Boulevard corridor. These bridges are typically installed in pairs, with one in the inbound direction and one in the outbound direction.

Figure 4-5 - Bridges on Peña Boulevard

- E 40th Avenue Crossing: Inbound and outbound lanes cross over E 40th Avenue on separate structures in this location. Inspection reports for these bridges are not available.
- Green Valley Ranch Boulevard Crossing: Inbound and outbound lanes cross over Green Valley Ranch Boulevard on separate structures (Structure ID# D-31-PB-160 inbound, D-31-PB-150 outbound). The latest inspection reports give sufficiency ratings of 96.8 and 96.9 for the inbound and outbound bridges, respectively.
- E 56th Avenue Crossing: Inbound and outbound lanes cross over E 56th Avenue on separate structures (Structure ID# D-31-PB-210 inbound, D-31-PB-200 outbound). The latest inspection reports give sufficiency ratings of 95.7 and 96.9 for the inbound and outbound bridges, respectively.
- First Creek Crossing: Inbound and outbound lanes cross over First Creek and an adjacent multi-use trail on separate structures (ID# D-31-PB-230 inbound, D-31-PB-220 outbound). The latest inspection reports give sufficiency ratings of 96.9 and 97.0 for the inbound and outbound bridges, respectively.

- East Branch Highline Canal Crossing: Inbound and outbound lanes cross over the east branch of the Highline Canal on separate structures (ID# D-31-PB-320 inbound, D-31-PB-310 outbound). The latest inspection reports give sufficiency ratings of 97.0 for both the inbound and outbound bridges.
- Tower Road Crossing: Inbound and outbound lanes cross over Tower Road on separate structures (Structure ID# D-31-PB-360 inbound, D-31-PB-350 outbound). The latest inspection reports give sufficiency ratings of 97.0 for both the inbound and outbound bridges.
- Unnamed Second Creek Tributary Crossing: Inbound and outbound lanes cross over an unnamed dry wash, tributary to Second Creek, on separate structures (ID# D-31-PB-420 inbound, D-31-PB-410 outbound). The latest inspection reports give sufficiency ratings of 94.3 and 93.2 for the inbound and outbound bridges, respectively.
- Gun Club Rd. Crossing: Inbound and outbound lanes cross over Gun Club Road on separate structures (ID# D-31-PB-470 inbound, D-31-PB-460 outbound). The latest inspection reports give sufficiency ratings of 95.4 and 93.5 for the inbound and outbound bridges, respectively.
- Jackson Gap Rd. Crossing: Inbound and outbound lanes cross over Jackson Gap Road on separate structures (ID# D-31-PB-540 inbound, D-31-PB-530 outbound). The latest inspection reports give sufficiency ratings of 97.4 and 93.2 for the inbound and outbound bridges, respectively.
- RTT over IB Crossing: Former return to terminal (RTT) lanes cross over the inbound lanes on a structure (ID# D-31-PB-650). The latest inspection report gives a sufficiency rating of 96.1. Note this structure is preserved only for emergency vehicle use since its functionality was replaced with an RTT loop at Jackson Gap.
- WTOB over ETOB Direct Connect Crossing: West Terminal Outbound (WTOB) lanes cross over the East Terminal Outbound (ETOB) Direct Connect lanes on a structure (ID# D-31-PB-710). The latest inspection report gives a sufficiency rating of 98.4.
- ETOB over WTIB Direct Connect Crossing: East Terminal Outbound (ETOB) lanes cross over the West Terminal Inbound lanes on a structure (ID# D-31-PB-680). The latest inspection report gives a sufficiency rating of 92.9.

In general, structures should be maintained and repaired as scheduled and indicated in regular inspection reports, but there are no specific or significant issues that would warrant immediate replacement or concern on the corridor. Bridge widening is likely to be a feasible option in many circumstances where additional width is required given the overall condition of the existing structures.

4.2.2. Railroad Crossings

The RTD A Line train tracks cross over Peña Boulevard on an elevated structure approximately 3300’ to the east of E-470. Vertical clearance to the structure is sufficient and the structure is fairly new at the time of this writing (<10 years). RTD owns and maintains this structure.

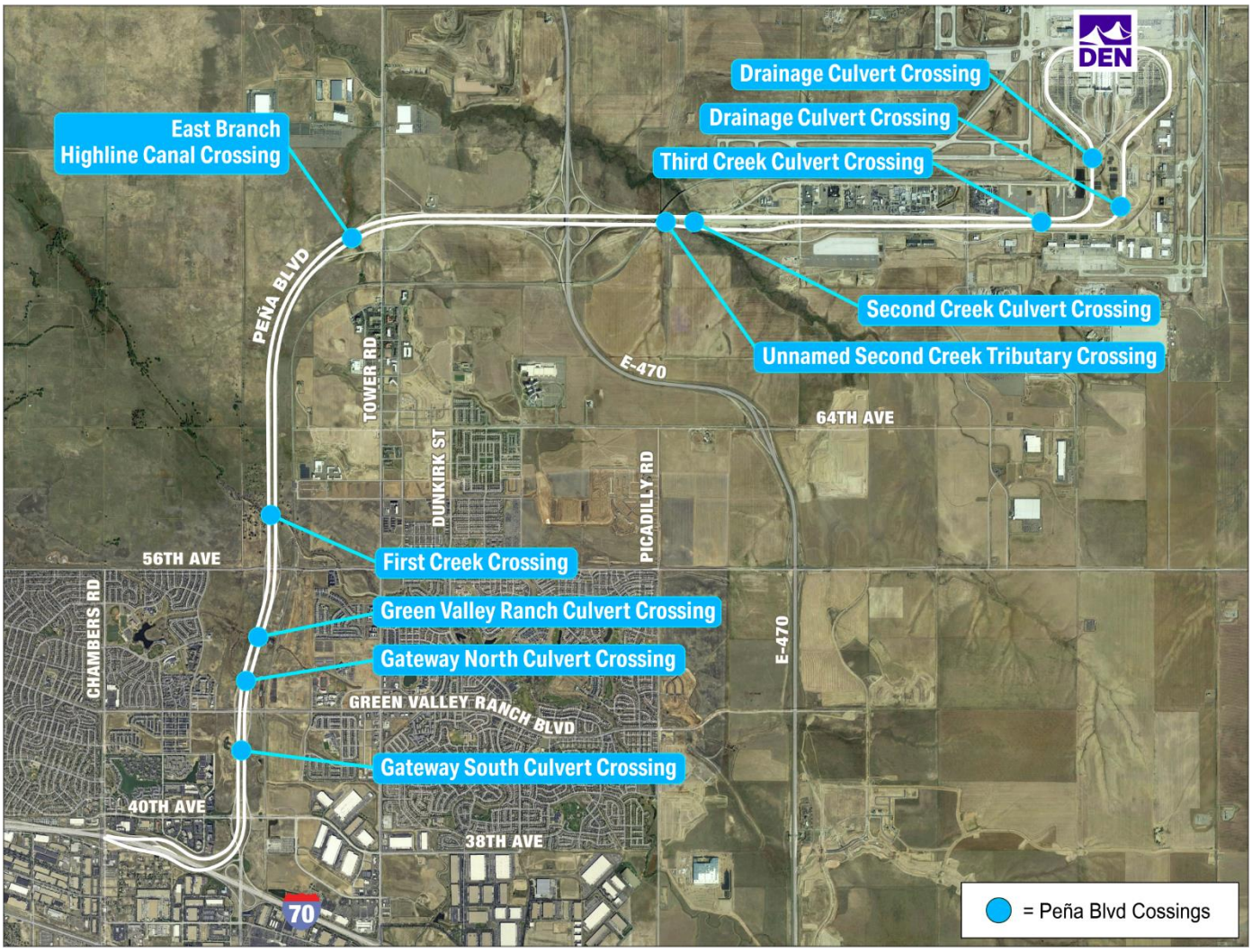
Horizontal clearance to existing piers is quite limited, and there is unlikely to be sufficient horizontal clearance for an additional lane in either direction due to the location of existing piers. This may not be a problem due to the

fact that the third inbound lane starts just before this structure, but it should be noted that future attempts to correct shoulder widths and/or provide detour pavement to repave in this location may run into clearance issues. This should be carefully considered when designing Phase 3 and sequencing future construction in this area.

4.3. Drainage

Peña Boulevard crosses numerous major and minor drainageways, see Figure 4-6. Those indicated as simply "crossings" are bridged, and those bridges are indicated in the major structures section. Other crossings are either piped or pass-through box culverts but are noted here as significant enough to be represented on the map. In all instances these should be considered during reconstruction/widening, and culverts/pipes protected during the construction process.

Figure 4-6 - Drainage Structures on Peña Boulevard



4.4. Utilities

The Peña Boulevard corridor contains numerous utilities. The majority are minor and are too numerous to list here (electrical, communication, minor drainage, sanitary, etc.); if and when new roadway phases are implemented these minor utilities can be protected, adjusted or rerouted as needed.

There are a number of major crossings that are of special importance and will be listed here:

- 40th Avenue, Green Valley Ranch Blvd, 56th Avenue, Tower Road, Gun Club Road, Jackson Gap St.: All these streets contain multiple utilities running in parallel and passing underneath Peña Boulevard. Any work in or around these crossings may have the potential to impact multiple utilities, and proposed work in these areas should be considered in this context. In particular, any replacements or adjustments of ramp intersections should assume utility impacts.
- West of First Creek: There is a significant natural gas line passing under Peña Boulevard in this location. It is unlikely to be impacted significantly if roadway grades do not change, but the addition of structures and/or grade changes may create significant impacts.
- Vicinity of E-470 interchange/Second Creek: Multiple major natural gas and oil lines cross Peña Boulevard in this general area. Any work that significantly impacts grades, or involves the installation of new structures, should consider the potential impacts and probable cost increases that will result from dealing with these utilities.
- West of Jackson Gap: A major communication line crosses Peña Boulevard west of Jackson Gap. This should be considered with any construction for Phase 3.

5. Traffic

Peña Boulevard was originally constructed 30 years ago and opened to passengers in 1993. It served 31 million passenger trips in 1995. By 2019, DEN served 69 million passengers, a 123% increase since opening in 1995. Despite this growth, most of the corridor has not been rebuilt since its original construction. This section discusses historical travel patterns along Peña Boulevard, the traffic data collection effort for this Study, and the current traffic volumes, truck percentages, and peak periods for Peña Boulevard and the Gateway area. Results of the traffic modeling analysis will be submitted separately under a detailed '*Existing Conditions Memorandum for Traffic Analysis*.' The memorandum will include intersection delays, congestion hotspots, queue lengths, and other traffic operational details which will help to identify problem areas and recommend mitigation measures.

5.1. Historical Traffic Volumes

On a regional level, Northeast Denver, comprising of Montbello, Gateway, Green Valley Ranch, and Denver International Airport neighborhoods, is experiencing unprecedented growth. From the 2018 opening of the Gaylord Rockies Resort and Convention Center, to the millions of square feet of industrial projects, to plans for 20,000 more residential units, the area is undergoing rapid growth. Table 5-1 shows the change in traffic volumes along major corridors in the traffic modeling Study area since the last decade. All Study area roadways show an increase in traffic volumes over the last decade. The growth rate is highest on the east-west roadways in the Study area due to a growth in local traffic in the Green Valley Ranch and Gateway neighborhoods. Historically, traffic volumes on Peña Boulevard east of E-470 have been the highest. The growth of traffic on this segment indicates the growth in passenger and employee traffic to DEN over the years.

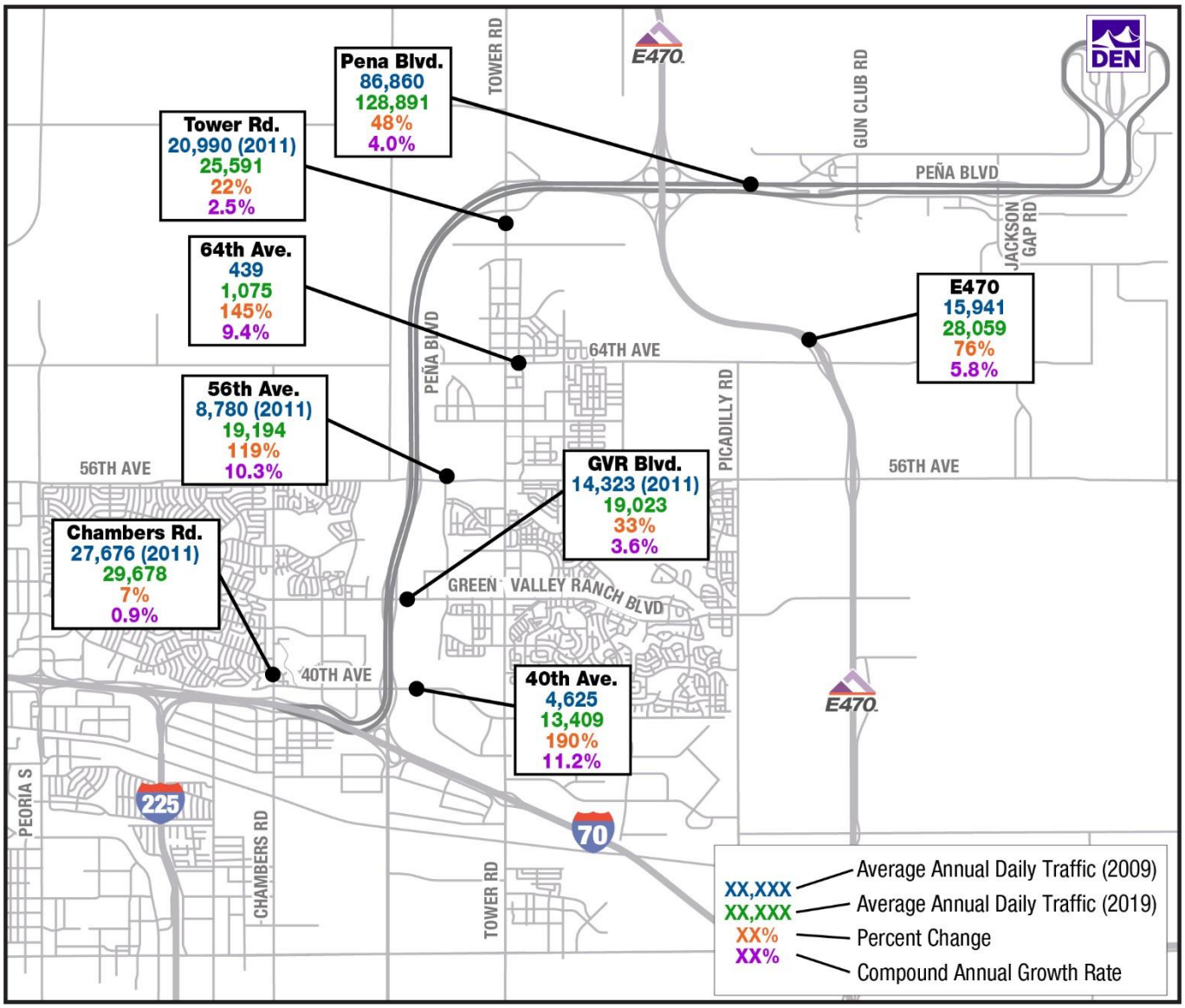
Table 5-1 - Traffic Volume Growth on Study Area Roadways

Roadway	Average Annual Daily Traffic (2009) *	Average Annual Daily Traffic (2019) *	Percent Change	Compound Annual Growth Rate (CAGR)	CAGR between 2006-2015#
Peña Boulevard east of E-470	86,860	128,891	48%	4.0%	1.6%
Peña Boulevard between Tower Road and E-470	66,503	97,000	46%	3.8%	1.5%
Peña Boulevard between 56th Avenue and Tower Road	57,507	97,899	70%	5.5%	1.4%
Peña Boulevard between Green	81,532	115,000	41%	3.5%	2.6%

Roadway	Average Annual Daily Traffic (2009) *	Average Annual Daily Traffic (2019) *	Percent Change	Compound Annual Growth Rate (CAGR)	CAGR between 2006-2015[#]
Valley Ranch and 56th Avenue					
Peña Boulevard between 40th Avenue and Green Valley Ranch	113,904 (2011)	122,453	8%	0.9%	3.2%
Chambers Road north of 40th Avenue	27,676 (2011)	29,678	7%	0.9%	N/A
Tower Road south of Peña Boulevard	20,990 (2011)	25,591	22%	2.5%	N/A
40th Avenue east of Peña Boulevard	4,625	13,409	190%	11.2%	N/A
Green Valley Ranch Boulevard east of Peña Boulevard	14,323 (2011)	19,023	33%	3.6%	N/A
56th Avenue east of Peña Boulevard	8,780 (2011)	19,194	119%	10.3%	N/A
64th Avenue east of Tower Road	439	1,075	145%	9.4%	N/A
E-470 north of 64th Avenue	15,941	28,059	76%	5.8%	N/A

Source: *CDOT Transportation Data Management System, [#]Peña Boulevard Corridor Transportation Study (2017)

Figure 5-1 - Traffic Volume Growth on Study Area Roadways



5.2. Traffic Data Collection

The Study team conducted a data collection effort for the Study area roadways in May 2022 to gather the most recent average daily traffic counts and turning movement volumes for the traffic analysis. Conducting the counts in May ensured that school traffic in the Gateway Area was captured. A detailed data collection plan was submitted in May 2022 to DEN and DOTI and approved prior to data collection. The following data was collected:

- Average Daily Traffic (ADT) counts with speed and vehicle classifications were collected on a Wednesday through Friday in 15-min intervals to capture the peak travel days for both Peña Boulevard and the Gateway area. Counts in the Gateway area were gathered when the local schools were in session (between May 18 and May 27) while those on I-70 ramps, E-470 ramps, and Peña Boulevard were

collected during the summer when traffic peaks on these facilities (during June and July). ADT count locations are shown in Figure 5-2. These counts will be supplemented with DEN's permanent traffic counters on Peña Boulevard which are available in hourly intervals. The ADT counts will be used to understand the latest Study area traffic characteristics such as truck percentages, traffic directionality, K-factor, and peak periods. Vehicle classification data will be used to calculate the truck percentage on Study area roadways which will be used as input in the traffic models. Similarly, speed data will be used to develop traffic speed profiles along the arterial roadways. The speed profiles will be input in the traffic model for respective roadways to help with model calibration. For roadways where speed data is unavailable, the posted speed limit will be used to develop a speed profile.

K-factor is the proportion of AADT occurring in the peak hour.
K-factor is calculated as follows:

$$\frac{Peak\ hour\ volume}{AADT} \times 100\%$$

- Intersection turning movement counts (TMC) comprising of vehicle, pedestrian, and bicycle counts: Once the peak periods were determined from the ADT counts, 2-hour TMCs were gathered for the AM, mid-day, and PM peak periods on a Thursday. These counts were gathered when the local schools were in session (before May 28). TMC count locations are shown in Figure 5-3. A list of TMC count locations has been provided to DEN and DOTI as part of the Data Collection Plan. These counts will be used to develop traffic volume diagrams and provide traffic inputs for the traffic modeling exercise.
- Origin-destination (OD) data: Peña Boulevard experiences a higher volume of vehicles during the peak summer travel season when schools are out of session. Two sets of OD data will be gathered to account for different travel patterns when the local schools are in session and when schools are out. Since OD data are available for historical travel patterns, an OD set will be obtained for May 2022 travel patterns, and another will be gathered for July 2022 travel patterns. As of the writing of this report, DEN is finalizing the OD data vendor. The purpose of gathering OD counts is to understand where traffic to DEN is coming from and develop future transportation demand management strategies. The counts will also distinguish between heavy truck patterns and passenger vehicles, thereby enabling DEN to determine airport versus non-airport freight traffic.

Figure 5-2 - ADT Count Locations

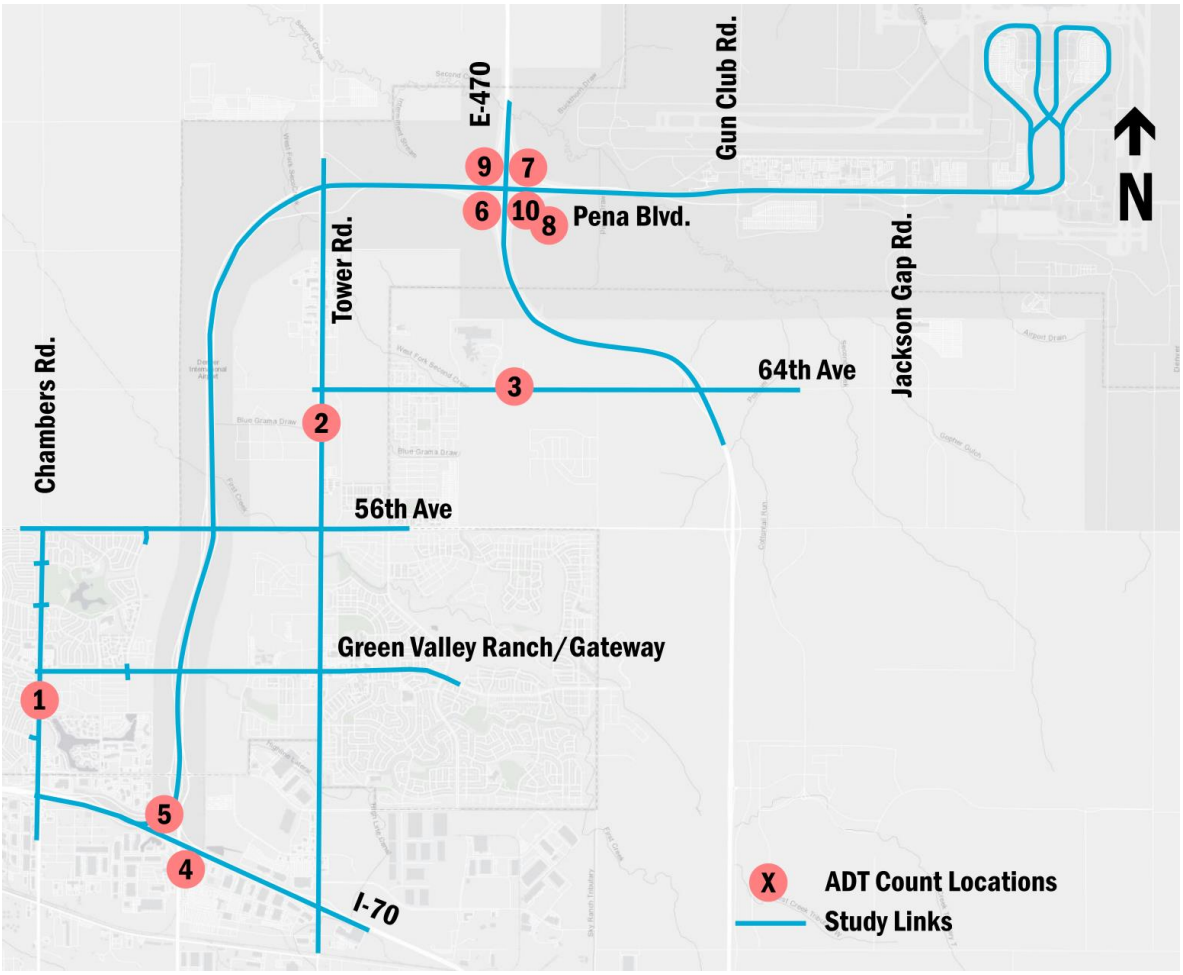
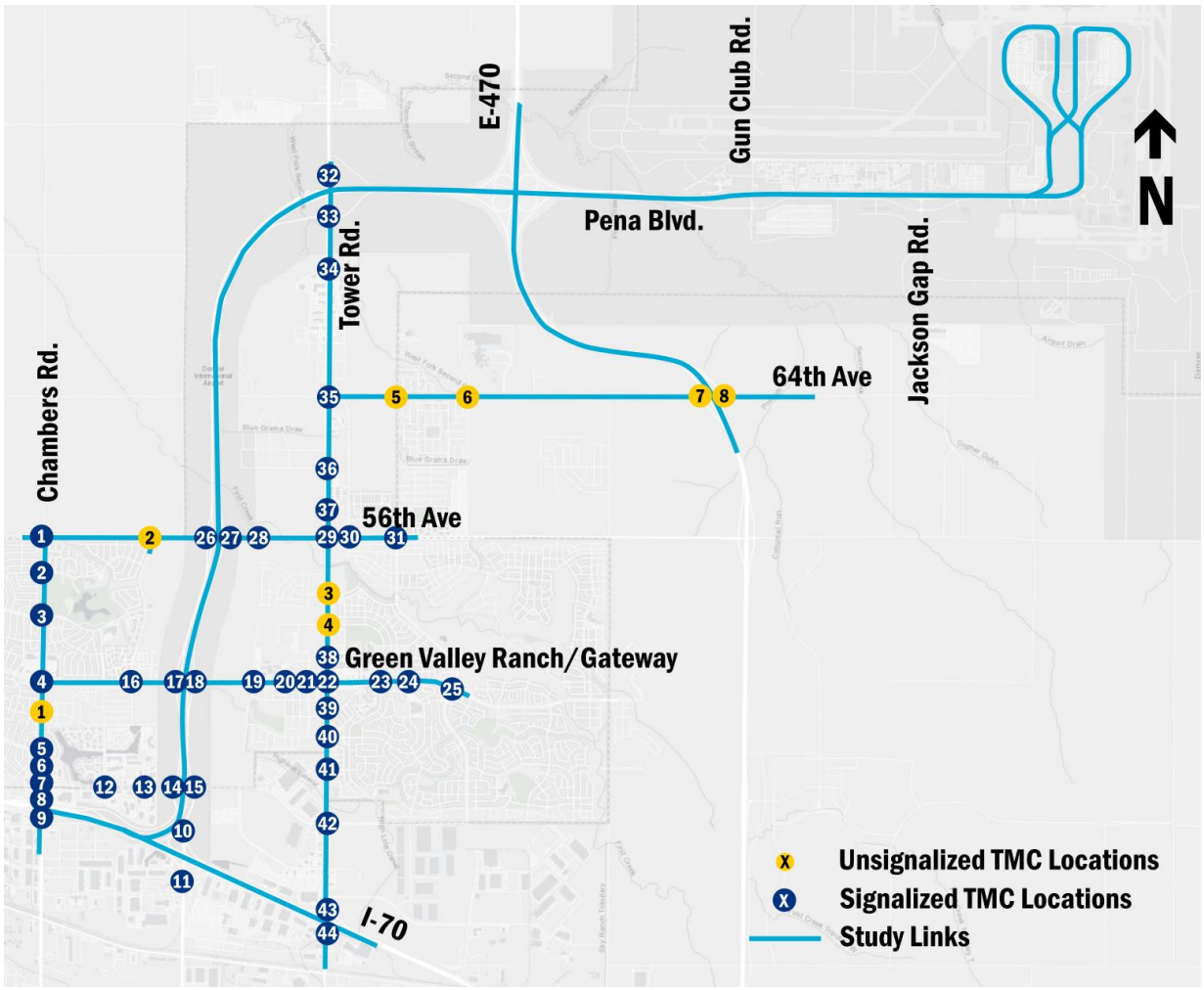


Figure 5-3 - Turning Movement Count Locations



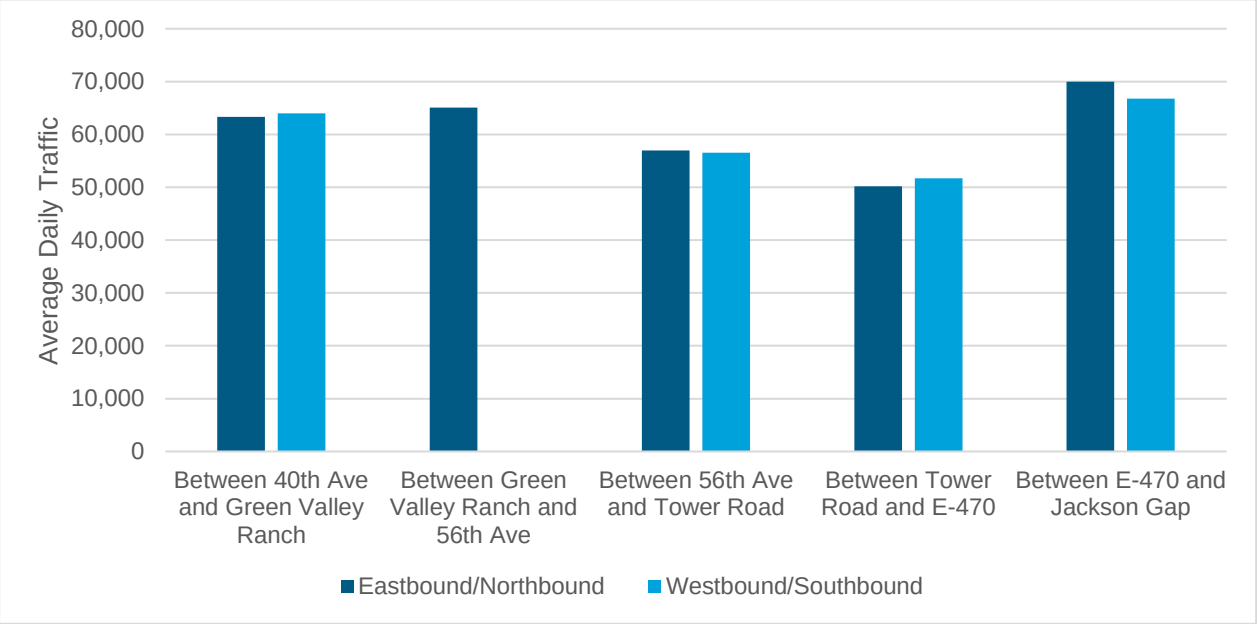
5.3. Traffic Data Analysis

This section discusses the peak periods for Peña Boulevard and the Gateway area, in addition to the K-factor, the D-factor and truck percentages.

5.3.1. Peak Period Determination

According to June 2022 counts collected by DEN's permanent traffic counters, the average daily traffic on Peña Boulevard is approximately 136,750 vehicles per day east of Gun Club Road. Generally, this segment of Peña Boulevard has the highest ADT volumes along the corridor. The segment of Peña Boulevard between 56th Avenue and Tower Road has the lowest ADT volumes. Figure 5-4 shows the variation in ADT along Peña Boulevard for June 2022 counts.

Figure 5-4 - Variation of Average Daily Traffic along Peña Boulevard (June 2022)



Note: DEN Counter on southbound Peña Boulevard between Green Valley Ranch and 56th Avenue was out of commission during June 2022

Directional hourly distribution of traffic volumes at two locations on Peña Boulevard are shown in Figure 5-5. The distribution shows that traffic patterns vary significantly over the day and are closely corelated with flight arrival and departure times. For example, the peak in volumes at 5:00 AM on eastbound Peña Boulevard between E-470 and Jackson Gap is associated with flight departures and similarly the peak in traffic from Jackson Gap to E-470 at 11:00 PM is associated with flight arrivals later at night. Between Green Valley Ranch and 40th Avenue, traffic patterns are mostly stable throughout the day. After a comparison of traffic distribution on all segments of Peña Boulevard, it was observed that the eastbound/northbound direction (inbound to the airport) is the peak direction during the AM period and the westbound/southbound direction (outbound from the airport) is the peak direction during the PM period peak. The AM peak period is more defined and occurs consistently between 7:00 AM and 8:00 AM while the peak PM traffic is spread over the afternoon and occurs typically between 2:00 PM and 6:00 PM. Traffic patterns do not show a pronounced peak during the mid-day period.

Figure 5-5 - Directional Distribution of Traffic Volumes on Peña Boulevard

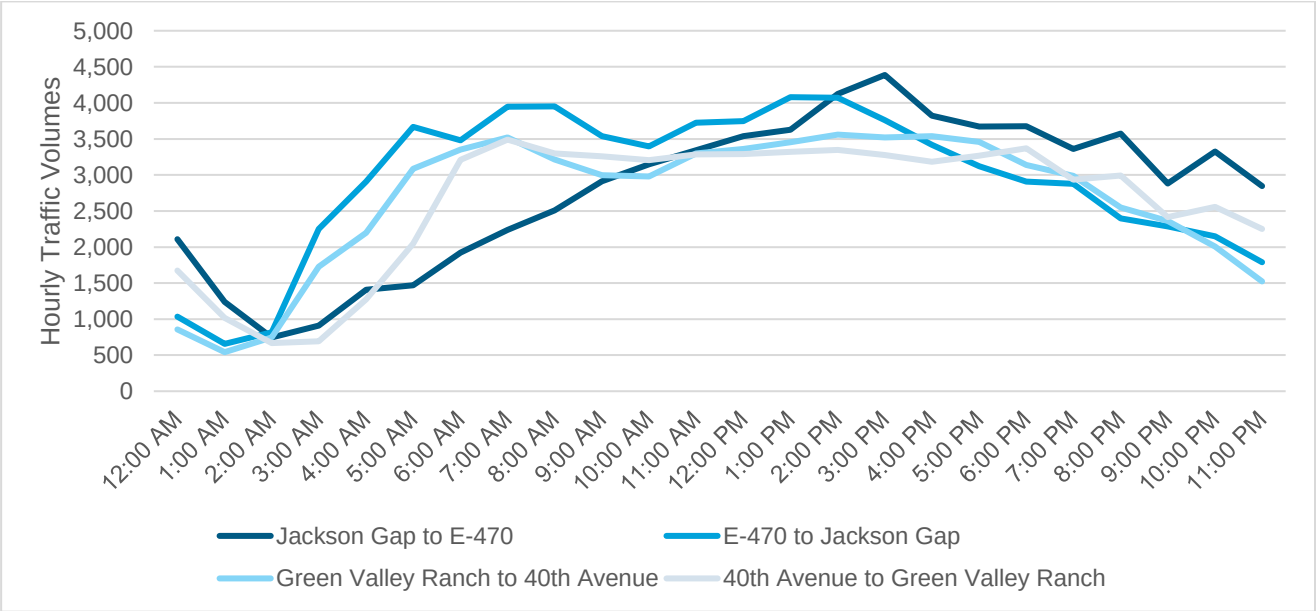
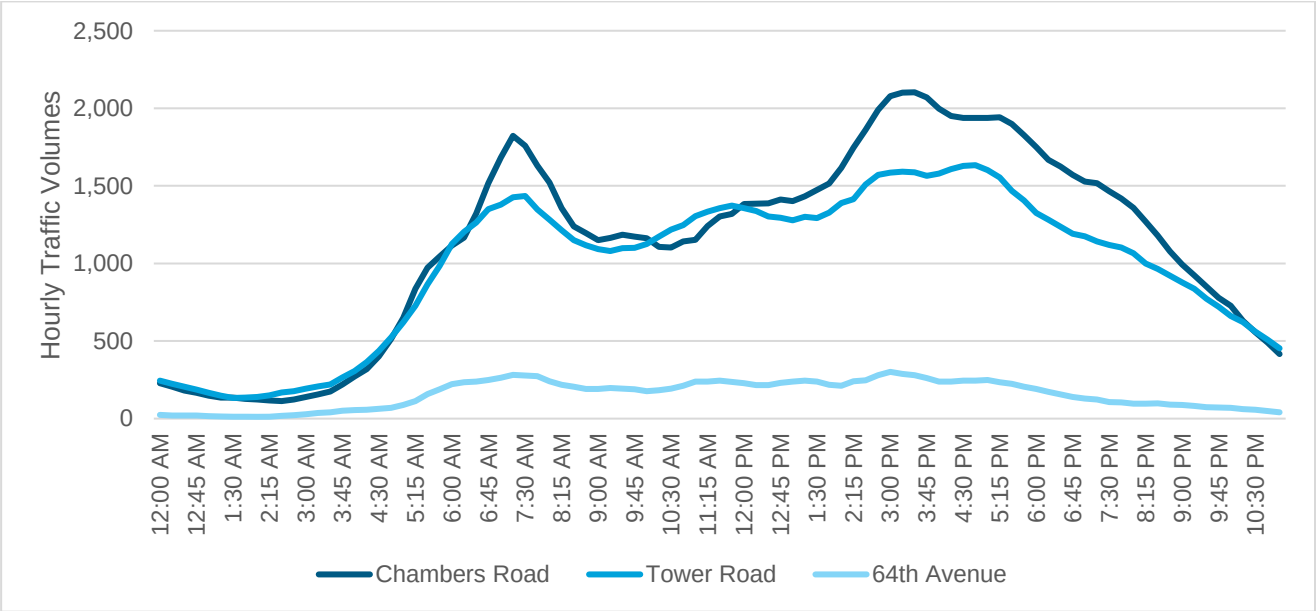


Figure 5-6 highlights the traffic distribution on Chambers Road, Tower Road, and 64th Avenue. These counts were gathered in 15-min intervals in May 2022 when schools were in session. Counts at Chambers Road and Tower Road show a pronounced peak between 7:00 AM – 8:00 AM during the AM period and a peak between 2:30 PM and 6:00 PM during the PM peak period. The mid-day peak around noon is lower than both the AM and the PM peaks. Volumes on 64th Avenue are significantly lower than those on Chambers Road or Tower Road, hence these were not considered when determining the peak period for the Study Area.

Figure 5-6 - Traffic Distribution on Gateway Area Roadways



With approximately 73 percent of the traffic on Peña Boulevard destined for the Airport, the corridor has unique traffic patterns, and the peak periods are influenced by flight schedules more so than typical commuter traffic patterns. Roadways in the Gateway Area, serving a predominantly commuter population, experience more typical commuter travel patterns with peaks during the AM and PM periods. As a result, peak periods for this Study were determined based on a combined review of traffic patterns on Peña Boulevard and the Gateway area roadways to identify the most suitable peak periods. The Study team received approval from DEN and DOTI to proceed with an AM peak period of 7:00 AM to 9:00 AM and a PM peak period of 2:30 PM to 6:30 PM. Turning movement counts were gathered for these time periods. Table 5-2 summarized the peak hours and peak periods for this study.

Table 5-2 - Peak Hours and Peak Periods for Traffic Analysis

Time of Day	Peak Hour	Peak Period
AM	7:00 AM – 8:00 AM	7:00 AM – 9:00 AM
Mid-day	2:30 PM – 3:30 PM	2:30 PM – 6:30 PM
PM	5:00 PM – 6:00 PM	2:30 PM – 6:30 PM

5.3.2. K-factor and D-factor

Table 5-3 summarizes roadway traffic characteristics such as K-factor and D-factor. K-factor is defined as the proportion of annual average daily traffic occurring in an hour. Typically, K-factor is calculated at a permanent traffic count location on the roadway. Since the Gateway area roadways do not have permanent counters, the K-factors reported here are calculated using ADTs gathered during May 2022. The D-factor or the directional distribution factor is the proportion of traffic traveling in the peak direction during the peak hour.

Table 5-3 - K-factor and D-factor

Roadway	Period	Peak Direction	K-factor	D-factor
Peña Boulevard east of E-470	AM	Eastbound	5.6%	61%
Peña Boulevard east of E-470	PM	Westbound	6.6%	54%
Chambers Road	AM	Southbound	8.7%	60%
Chambers Road	PM	Northbound	8.1%	55%
Tower Road	AM	Southbound	6.2%	54%
Tower Road	PM	Southbound	7.2%	55%
64th Avenue	AM	Westbound	8.1%	56%
64th Avenue	PM	Westbound	9.5%	63%

Lower K-factor values indicate that traffic is more uniformly distributed over the day. This is observed particularly on Peña Boulevard where volumes are distributed more uniformly over the day based on flight arrival and departure times. A higher K-factor such as on Chambers and 64th Avenue indicates that volumes during the peak hour are reasonably higher than at other times of the day. The range of K-factors observed on Study roadways is within reason and typical for urban arterial roadways.

Chambers Road and Peña Boulevard show a typical directional pattern with one direction peaking in the AM peak period and the opposite direction peaking during the PM peak period. However, on Tower Road traffic volumes are consistently higher in the southbound direction and on 64th Avenue traffic volumes are consistently higher in the westbound direction indicating that drivers prefer to use these roadways across the day and use other local roads for the return leg of their commute. A review of historical data on Tower Road shows the same predominance of southbound traffic during previous years.

5.3.3. Truck Percentage

According to DRCOG's regional multimodal freight plan, Tower Road, Peña Boulevard, 56th Avenue, I-70, and E-470 are all major freight corridors. The data collected for this study and historical data available from the CDOT traffic data management system was used to determine truck percentages on Study area roadways. Table 5-4 summarizes the truck percentage for daily volumes as well as the AM and PM peak periods. As of the writing of this report, vehicle classification counts on Peña Boulevard were not available.

Table 5-4 - Truck Percentages

Roadway	Period	Single-unit Trucks	Multi-unit Trucks	Total
Chambers Road	Daily	4%	3%	7%
Chambers Road	AM	5%	4%	9%
Chambers Road	PM	4%	4%	8%
Tower Road	Daily	5%	7%	12%
Tower Road	AM	7%	7%	14%
Tower Road	PM	4%	6%	11%
64th Avenue	Daily	5%	12%	17%
64th Avenue	AM	8%	11%	19%
64th Avenue	PM	4%	13%	17%

Overall, each of the three roadways analyzed in Table 5-4 show a high truck percentage. Truck traffic is particularly high on Tower Road and 64th Avenue, both of which are regional and local freight corridors. While the proportion of single-unit trucks and multi-unit trucks are comparable to each other on Tower Road and Chambers Road, 64th Avenue shows a high proportion of multi-unit truck traffic, particularly in the westbound direction. This explains the traffic directionality on westbound 64th Avenue noted in Section 5.3.2. Peak period truck percentages are similar to the daily truck percentages indicating that truck traffic follows similar time-of-day patterns as other vehicular traffic.

5.4. Safety

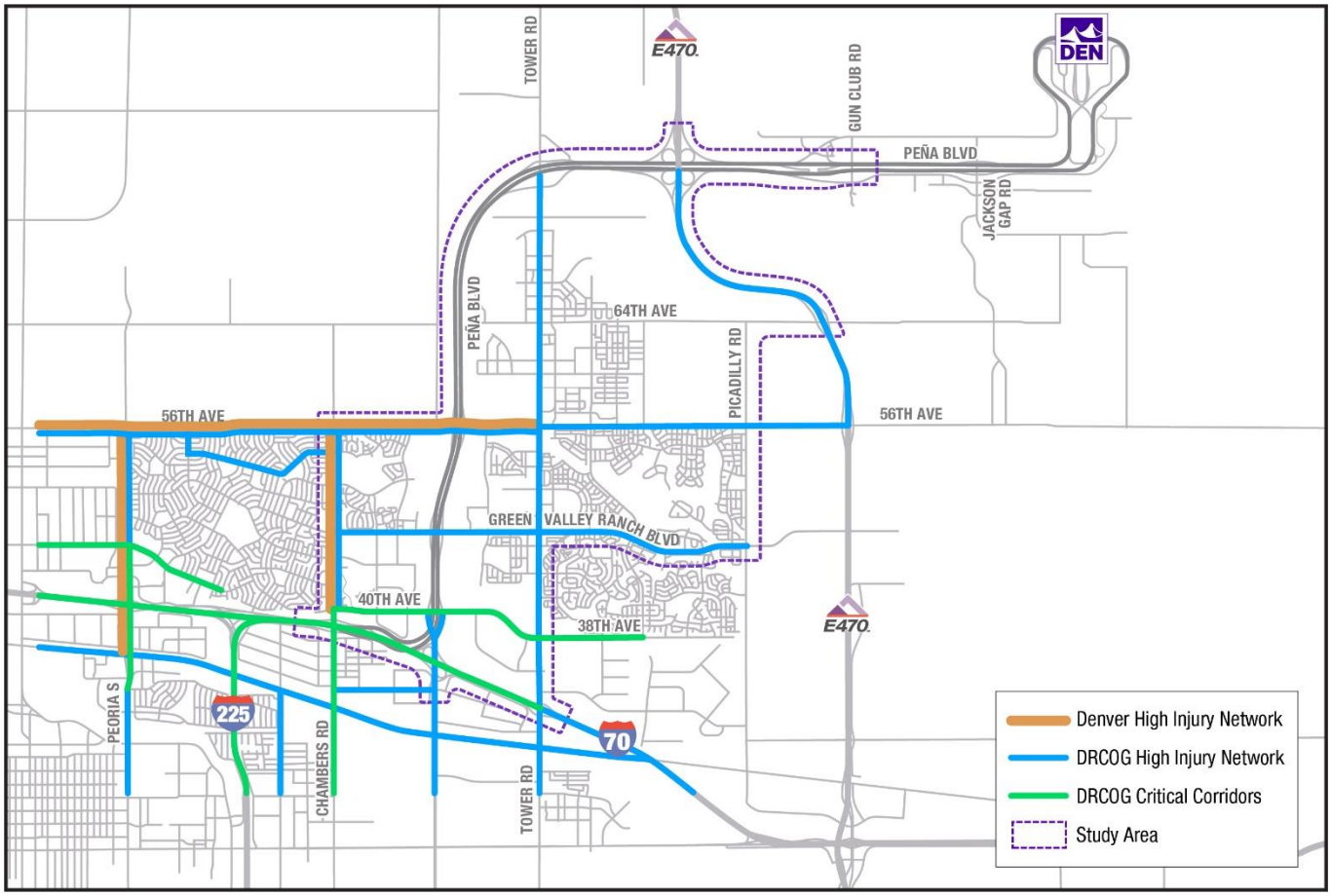
The safety assessment was conducted to establish a baseline of existing crash patterns along the corridor and to determine the presence of causal relationships, if any, among each facility type and road users. The findings of the safety analysis will assist the Study team to identify solutions that aim to increase safety and reduce crash rates within the Study area.

5.4.1. High-Injury Network

DRCOG created a Regional High Injury Network (HIN) map to highlight the corridors with the highest density of killed and serious injury crash cases in the Denver region using 2013-2017 crash data. The critical corridors identify the top 50% of KSI (KSI = killed or significantly injured) crash density corridors along the regional High

Injury Network. The City of Denver also identified a HIN, representing the corridors in Denver with the highest number of fatal and injury crashes. Collectively, the Denver's HIN represents 5% of the City's entire street network, or 161 miles, but accounts for 40% of all traffic related crashes and 47% of serious injuries and deaths. High Injury Network streets are primarily high-speed, multi-lane arterial roadways. Figure 5-7 highlights DRCOG's and Denver's high injury and critical corridors within the Study area.

Figure 5-7 - High Injury and Critical Corridors within the Study Area



Within the Study area, Chambers Road and 56th Avenue are on both Denver's and DRCOG's HIN. Additional Study roadways on DRCOG's HIN are Airport Boulevard, Green Valley Ranch Boulevard, Tower Road and E-470, with 40th Avenue on DRCOG's Critical Corridors. Particular attention to safety enhancement will be considered for any proposed improvements to these corridors.

5.4.2. Overview of Crashes on Peña Boulevard

Incidents created by crashes and inclement weather on Peña Boulevard have frequently caused significant traffic backups and delays to airport users. The City and County of Denver's crash data was used to analyze crashes on Peña Boulevard between 2016 and 2021. Figure 5-8 shows the highest cluster of crashes occur at the Green Valley Ranch, 56th Avenue and Tower Road Interchanges. The Study will explore solutions to reduce the number, rate, and consequences of traffic-related accidents, serious injuries, and fatalities, in particular in high-cluster locations.

Figure 5-8 - Collision Heat Map

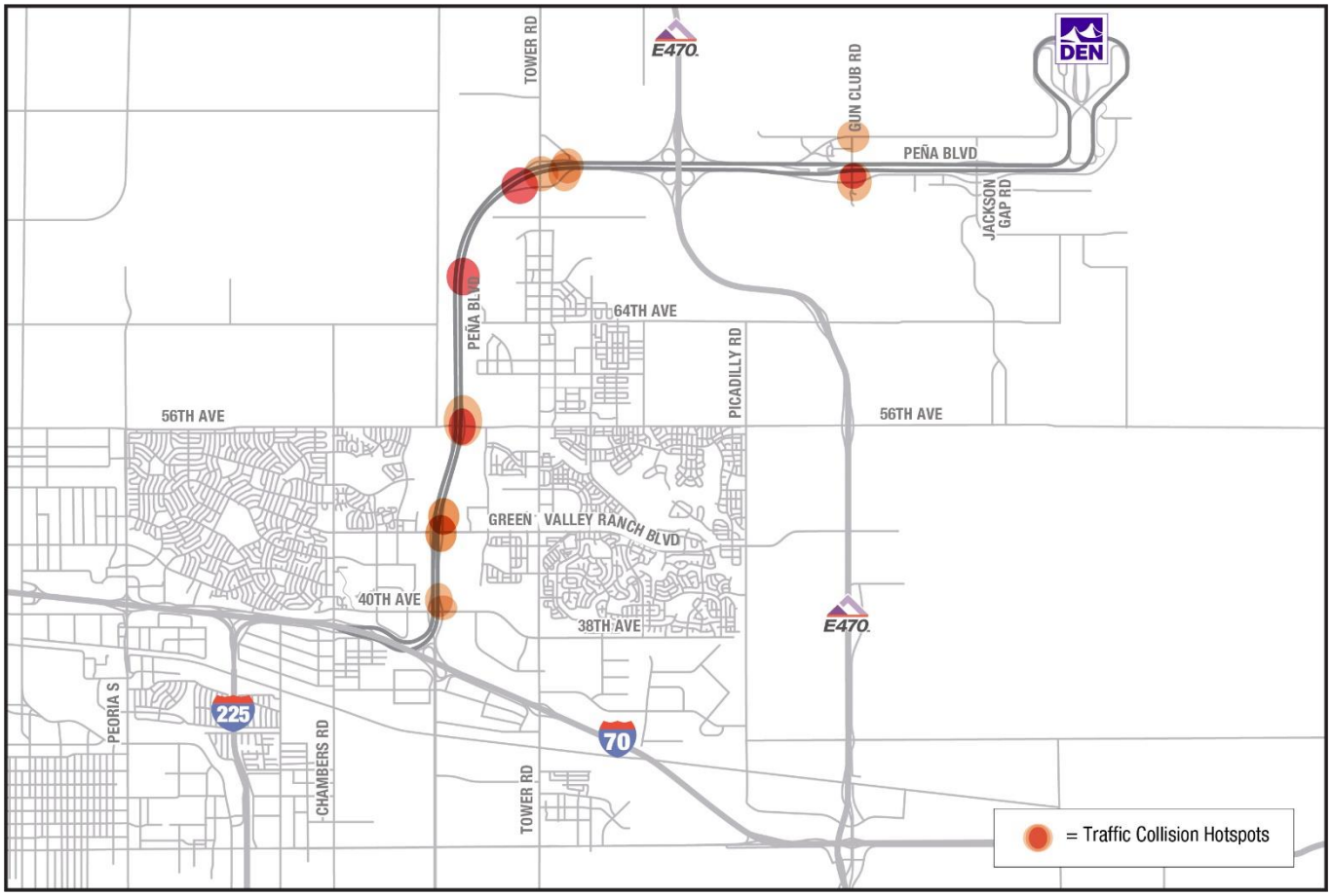
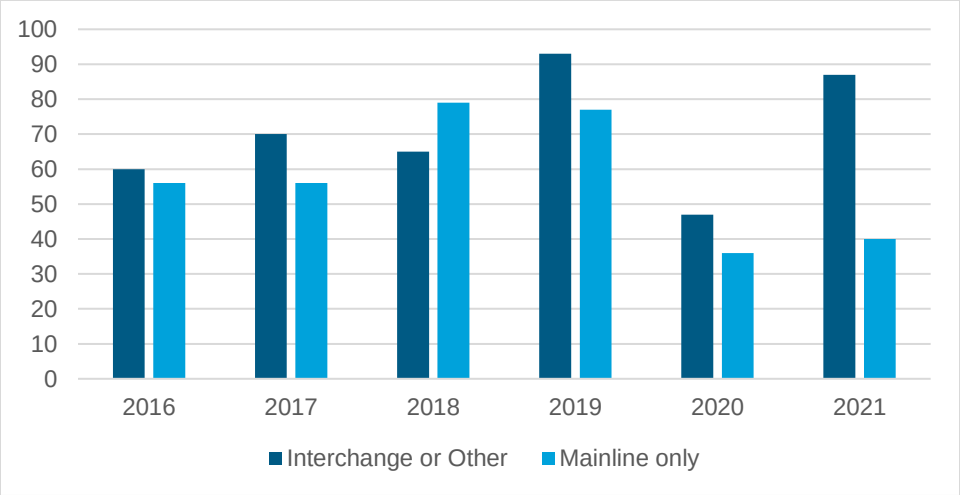


Figure 5-9 highlights the breakdown of interchange vs mainline collisions on Peña Boulevard between 2016 and 2021 and shows that traffic incidents were on the rise from 2016 through 2019, with almost 200 crashes per year on Peña Boulevard in 2019.

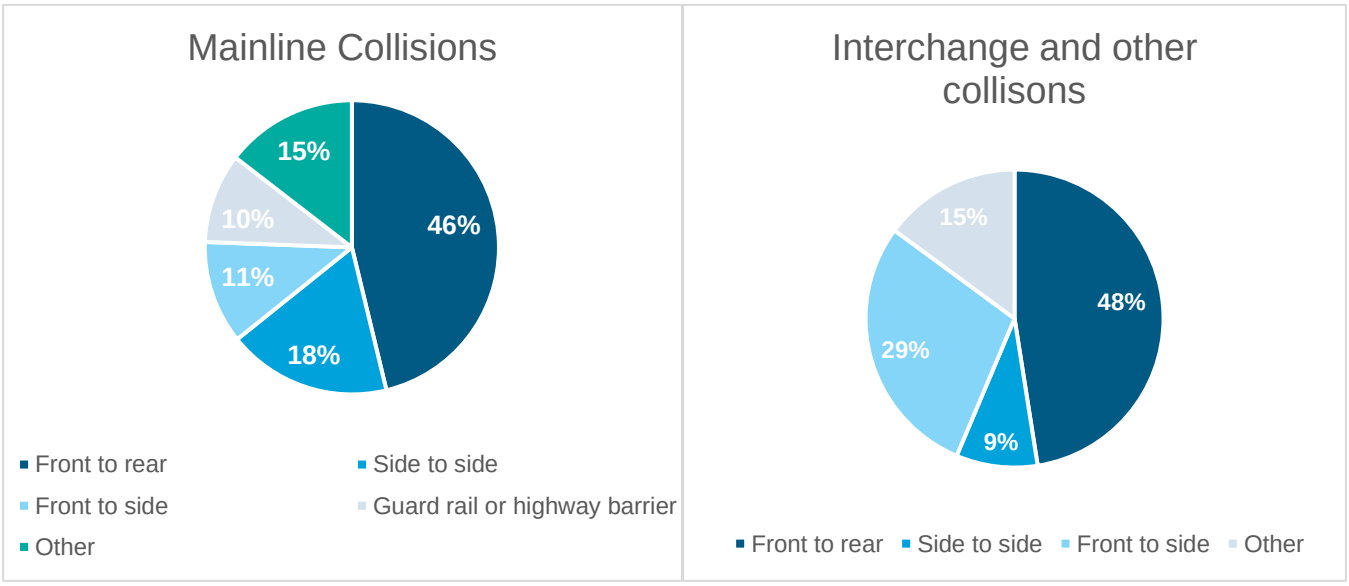
Figure 5-9 - Collisions on Peña Boulevard



Note: Lower air passengers and traffic volumes due to the COVID-19 pandemic has resulted in lower collision rates from 2020 through 2022 to date.

Of the approximately 860 collisions shown in Figure 5-9, approximately 350 occurred along the Peña Boulevard mainline, approximately 360 occurred at an interchange or intersection and there is no roadway location for the remaining 150. As shown in Figure 5-10, almost 50% of collision were front to rear (rear-end collision).

Figure 5-10 - Collision Types on Peña Boulevard



Of the approximately 860 collisions recorded on Peña Boulevard between 2016 and 2022, four incidents involved fatalities. Details of these fatal collision is outlined in Table 5-5.

Table 5-5 - Fatal Collisions on Peña Boulevard

#	Year	Number of Fatalities	Location	Description of Incident
1	2016	2	E 56th Avenue/ Peña Blvd	The incident occurred during dark lighting at the intersection and involved both pedestrians standing in the roadway
2	2017	1	17000 Block E 56th Avenue	The driver was under the influence of drugs or alcohol when they collided with a bridge structure which led to the fatality of a passenger
3	2019	1	E GVR Blvd / Peña Blvd Outbound	The incident involved a collision between motorcycle and a SUV at the signalized intersection. The motorcycle was reported to have been going straight and driving aggressively when it collided with the left turning SUV
4	2020	1	23200 Block E 78th Avenue	The driver who was reportedly unfamiliar with the area collided with a highway barrier which led to the fatality of a passenger

5.4.3. Bicycle Safety on Peña Boulevard

The shoulders on Peña Boulevard are a designated bike route to DEN however, with shoulder widths varying from 6 feet to 12 feet, a posted speed limit of 65 miles per hour, and no dedicated bicycle provision through interchanges, this is not a preferred or comfortable bicycle facility. Colorado Public Radio published an article in March 2020 titled "*Why Is Peña Boulevard A Bike Route? And Does Anyone Actually Use It*?." Quotes from cyclists on the corridor highlight the safety concerns for biking on Peña Boulevard; *"Riding Peña might sound scary, that's because it is scary;"* "*it's a challenging ride*" and "*cyclists will be cycling at their own risk.*" As expected, bicycle volumes are virtually nonexistent on this facility. The solutions for the Study will include parallel off-roadway bicycle facilities with connections to RTD transit stations along the corridor.

6. Environmental Overview

This section documents the desktop environmental evaluation conducted as part of the existing conditions assessment. The information on these environmental resources along Peña Boulevard will be used to identify any potential barriers toward proposed alternatives and to evaluate the feasibility of alternatives, so that planning decision may be moved into National Environmental Policy Act (NEPA) review later in the project development. This Study aims to identify a preferred alternative for Peña Boulevard; once determined, detailed design and an environmental study will be conducted.

6.1. Greenhouse Gas Emissions

Climate change is an important national and global concern. While the earth has gone through many natural changes in climate in its history, there is general agreement that the earth's climate is currently changing at an accelerated rate and will continue to do so for the foreseeable future. Anthropogenic (human caused) greenhouse gas (GHG) emissions contribute to this rapid change. Carbon dioxide (CO2) makes up the largest component of these GHG emissions. Other prominent transportation GHGs include methane (CH4) and nitrous oxide (N2O).

Many GHGs occur naturally. Water vapor is the most abundant GHG and makes up approximately two thirds of the natural greenhouse effect. However, the burning of fossil fuels and other human activities are adding to the concentration of GHGs in the atmosphere. Many GHGs remain in the atmosphere for time periods ranging from decades to centuries. GHGs trap heat in the earth's atmosphere. Because atmospheric concentration of GHGs continues to climb, our planet will continue to experience climate-related phenomena. For example, warmer global temperatures can cause changes in precipitation and sea levels. According to the U.S. Environmental Protection Agency (EPA) Greenhouse Gas Reporting Program, Colorado emitted approximately 40 million metric tons of carbon dioxide equivalent in 2020.

To date, no national standards have been established regarding GHGs, nor has the EPA established criteria or thresholds for ambient GHG emissions pursuant to its authority to establish motor vehicle emission standards for CO2 under the Clean Air Act. GHGs are different from other air pollutants evaluated in federal environmental reviews because their impacts are not localized or regional due to their rapid dispersion into the global atmosphere. The affected environment for CO2 and other GHG emissions is the entire planet.

In addition, from a quantitative perspective, global climate change is the cumulative result of numerous and varied emissions sources (in terms of both absolute numbers and types), each of which makes a relatively small addition to global atmospheric GHG concentrations. In contrast to broad scale actions such as actions involving an entire industry sector or very large geographic areas, it is difficult to isolate and understand the GHG emissions impacts for a particular transportation project. Furthermore, presently there is no scientific methodology for attributing specific climatological changes to a particular transportation project's emissions (Colorado DOT, CDOT NEPA Manual, 2020. CDOT NEPA Manual — Colorado Department of Transportation (codot.gov)).

The Colorado Transportation Commission has approved a new standard to reduce greenhouse gas emissions from the transportation sector, improve air quality, reduce smog and provide more travel options. The standard is one of several transportation strategies identified in the state's Greenhouse Gas Pollution Reduction Roadmap and is a key requirement established in the 2021 state transportation funding bill (SB21-260). The standard builds on the state's effort to rapidly deploy electric vehicles by encouraging a future transportation system that improves transit, biking, and walking options.

The standard requires CDOT and the state's five metropolitan planning organizations to determine the total greenhouse emissions expected from future transportation projects and reduce emissions by set amounts. This standard recognizes that the projects we build have an impact on how Coloradans travel and will help bring about a transportation system that provides more choices for travelers across the state.

6.2. Hazardous Materials

The EPA defines hazardous material as anything causing harm to people, plants, or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment. Regulatory records were analyzed to determine the presence of environmental concerns located in the Study area that would be expected to have an impact to human health or the environment.

The Study area was historically undisturbed or used as farmland until the 1990s. Therefore, it is unlikely that there are any unknown hazardous materials within the Study area. Based on a desktop survey, there are a couple of locations noted for their use. Several gas stations and vehicle rental locations were identified on either side of North Gun Club Road, and train tracks cross Peña Boulevard east of E-470 and run parallel to Peña Boulevard until they cross I-70. The risk for encountering hazardous materials is considered low for these resources since they were constructed recently and the locations of the underground tanks are known.

6.3. Water Quality

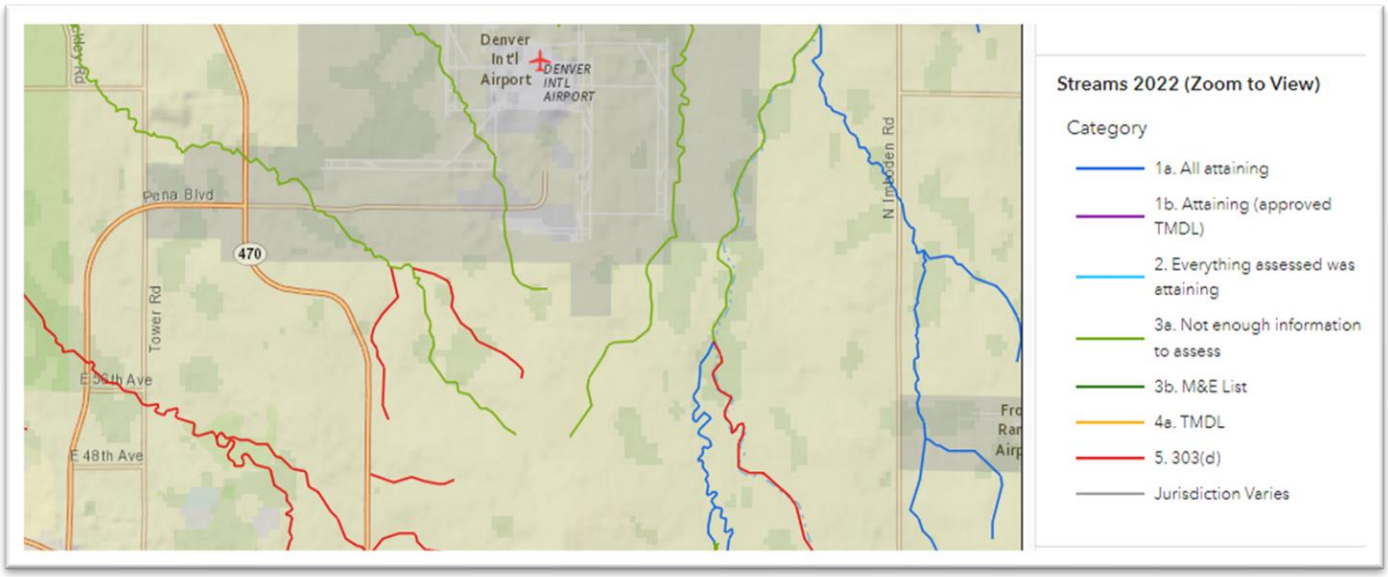
The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972. "Clean Water Act" became the Act's common name with amendments in 1972.

Under the CWA, EPA has implemented pollution control programs such as setting wastewater standards for industry. EPA has also developed national water quality criteria recommendations for pollutants in surface waters. Section 303(d) of the Federal Clean Water Act requires states to identify waters where effluent limitations are not stringent enough to attain water quality standards. These waters are compiled into the Section 303(d) List of Impaired Waters.

The Colorado Section 303(d) List identifies those waterbodies where there are exceedances of water quality standards or nonattainment of uses. This includes waters impaired as a result of nonpoint source, point source discharges or combined point source and nonpoint source contributions including natural sources. All tributaries to the South Platte River, including all wetlands, from the outlet of Chatfield Reservoir, to a point immediately below the confluence with Big Dry Creek, except for specific listings in the subbasins of the South Platte River, are

on the 303(d) list for E. coli and Selenium. Streams that cross Peña Boulevard in the study area are: Box Elder Creek, Third Creek, Second Creek, West Branch of Second Creek, and First Creek. Box Elder Creek, Second Creek and First Creek are the tributary streams of the South Platte River that are included on the 303(d) list, shown in red in the Figure below. Stormwater runoff from Peña Boulevard enters these waters after being treated in stormwater treatment facilities along the corridor, to prevent sediment and pollutants entering the streams.

Figure 6-1 - Streams Crossing Peña Boulevard



6.4. Socio-economic Resources

See Section 1.3 for discussion on the socioeconomic resources in the study area.

6.5. Environmental Justice

Executive Order 12898 of February 11, 1994 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of federal projects on minority and low-income populations. The U.S. Environmental Protection Agency defines EJ as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EJ efforts focus on improving the environment in communities, specifically minority and low-income communities, and addressing disproportionate, adverse environmental impacts that may exist in those communities. See the discussion in Section 1.3.2 and 1.3.3 for information on minority and low-income communities in the study area.

6.6. Agricultural Soils and Operations

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The land could be cropland,

pastureland, rangeland, forest land, or other land, but not urban built-up land or water. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government should encourage and facilitate the wise use of the Nation's prime farmland. The National Resources Conservation Service (NRCS) is responsible for keeping current an inventory of the prime farmland and unique farmland of the nation.

The NRCS Web Soil Survey was consulted to generate a list of soil types within the study area. Figure 6-2 shows the soil types within the Study Area which are described further in Table 6-1. Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. While there are several locations that have been identified as possible prime farmland or farmland of statewide importance, these areas are owned by the City and County of Denver and have not been in production for at least 30 years.

Figure 6-2 - Soil Types within the Study Area

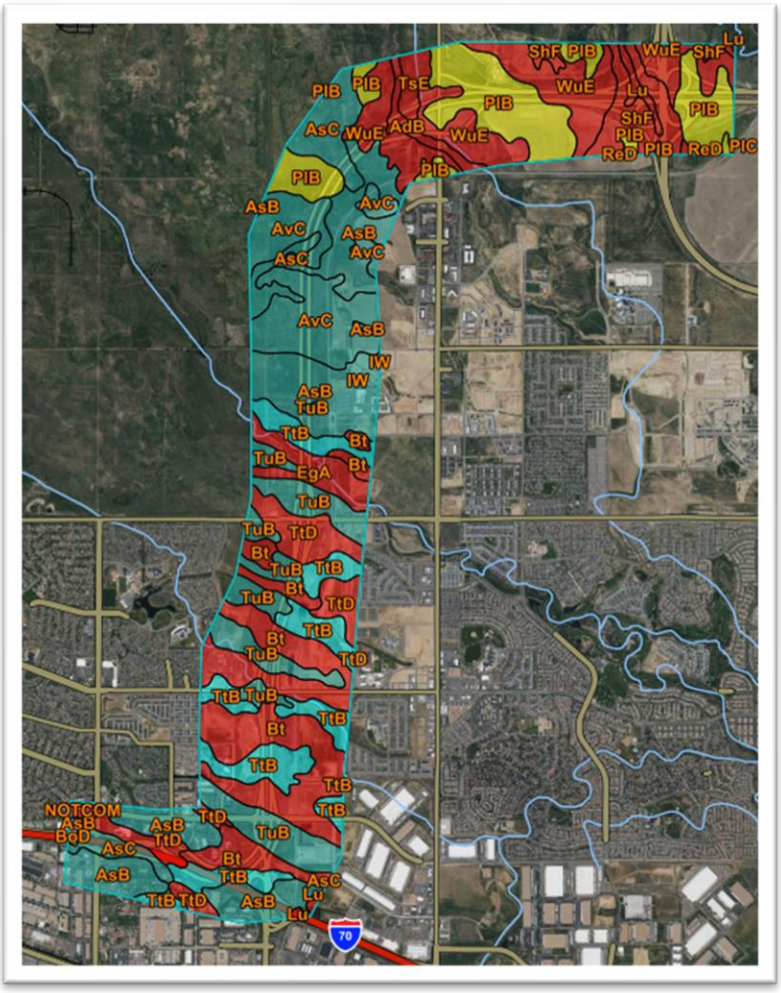


Table 6-1 - Soil Types within the Study Area

Map Unit Symbol	Map Unit Name	Acres in Study Area	Percent of Study Area	Prime Farmland
AdB	Arvada loam, 0 to 3 percent slopes	33.4	0.9%	Not prime farmland
AsB	Ascalon sandy loam, 0 to 3 percent slopes	595.8	16.6%	Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
AsC	Ascalon sandy loam, 3 to 5 percent slopes	139.7	3.9%	Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60.
AvC	Ascalon-Vona sandy loams, 1 to 5 percent slopes	327.1	9.1%	Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60.
BoD	Blakeland loamy sand, 3 to 9 percent slopes	3.5	0.1%	Not prime farmland
Bt	Blakeland-Truckton association	518.2	14.4%	Not prime farmland
EgA	Ellicott-Glenberg complex, 0 to 3 percent slopes, occasionally flooded	84.6	2.4%	Not prime farmland
IW	Intermittent water	1.3	0.0%	Not prime farmland
Lu	Loamy alluvial land	25.4	0.7%	Not prime farmland
PlB	Platner loam, 0 to 3 percent slopes	419.7	11.7%	Prime farmland if irrigated
PlC	Platner loam, 3 to 5 percent slopes	3.5	0.1%	Prime farmland if irrigated
ReD	Renohill loam, 3 to 9 percent slopes	2.8	0.1%	Not prime farmland
ShF	Samsil-Shingle complex, 3 to 35 percent slopes	133.6	3.7%	Not prime farmland
TsE	Terry-Vona-Tassel complex, 3 to 20 percent slopes	36.6	1.0%	Not prime farmland
TtB	Truckton loamy sand, 0 to 3 percent slopes	339.0	9.4%	Farmland of statewide importance

Map Unit Symbol	Map Unit Name	Acres in Study Area	Percent of Study Area	Prime Farmland
TtD	Truckton loamy sand, 3 to 9 percent slopes	192.2	5.4%	Not prime farmland
TuB	Truckton sandy loam, 0 to 3 percent slopes	344.2	9.6%	Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
WuE	Wiley-Adena-Renohill complex, 3 to 20 percent slopes	381.7	10.6%	Not prime farmland
NOTCOM	No Digital Data Available	9.3	0.3%	Unknown
Subtotals for Soil Survey Area:		**3,591.8**		**100.0%**

Source: NRCS Web Soil Survey

6.7. Natural Resources

This section describes the natural resources within the Study area including floodplains, streams and wetlands, and threatened and endangered species.

6.7.1. Floodplains

A floodplain is the area surrounding a waterway that will be inundated during a flooding event. Any construction that could affect the delineation of these floodplains must prevent any increase to the elevation of flood waters and any adverse spreading of these flood waters.

The Federal Emergency Management Agency (FEMA) has different classifications for floodplain delineation, according to zone and percent chance of flooding every year and whether flood water surface elevations or Base Flood Elevations (BFEs) have been established.

The Study area covers two different FEMA floodplain categories. These categories are described in Table 6-2. These floodplain categories have low potential to impact any proposed improvements to the corridor.

First Creek within the Study area is a Zone AE floodplain with floodway. This means that the area is subject to inundation by the 1-percent-annual-chance flood event and BFEs have been established by FEMA. The boundaries of the floodplain follow First Creek under Peña Boulevard.

Second Creek within the Study area is a Zone A special flood hazard area. The base flood elevation is the water surface elevation of the 1-percent-annual-chance flood. No base flood elevations have been determined for this area. The special flood hazard area is subject to inundation by the 1-percent-annual-chance flood. The flood insurance rate map (FIRM) notes that the 1-percent-annual-chance flood discharge would be contained in the culver running under Peña Boulevard.

Figure 6-3 - Zone AE Floodplain

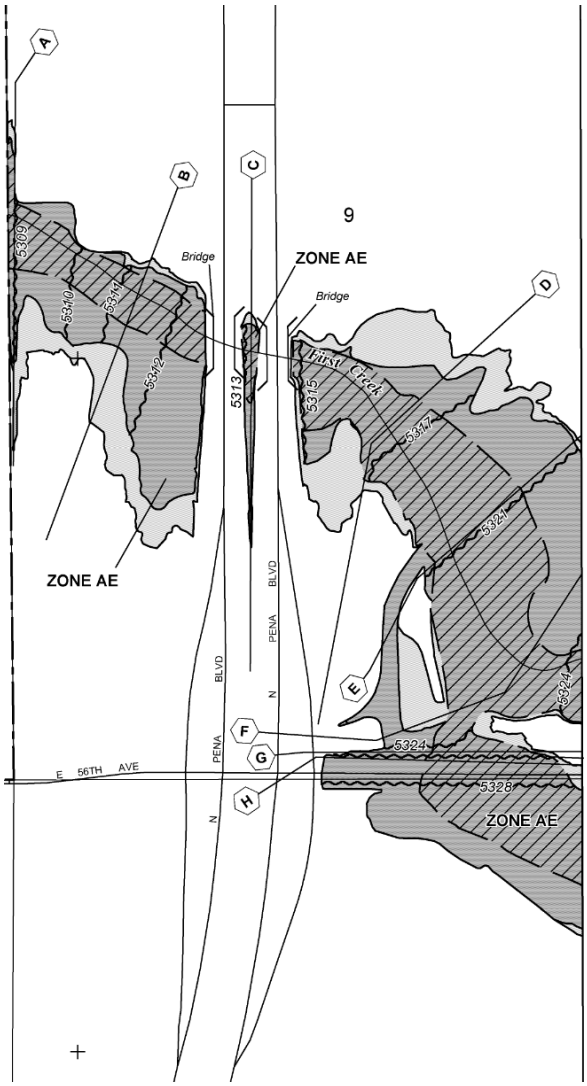


Figure 6-4 - Zone X Floodplain

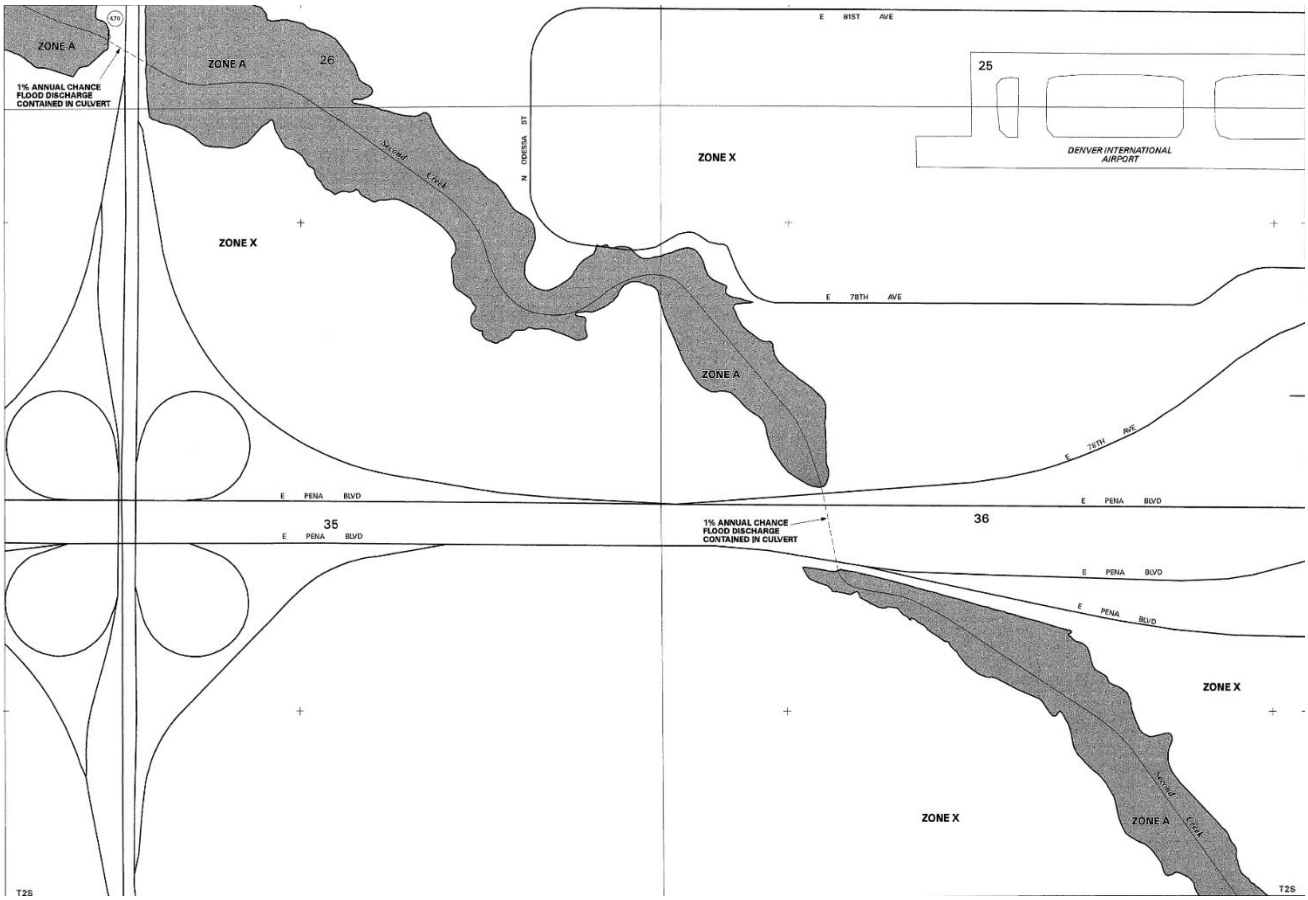


Table 6-2 - FEMA Floodplain Categories

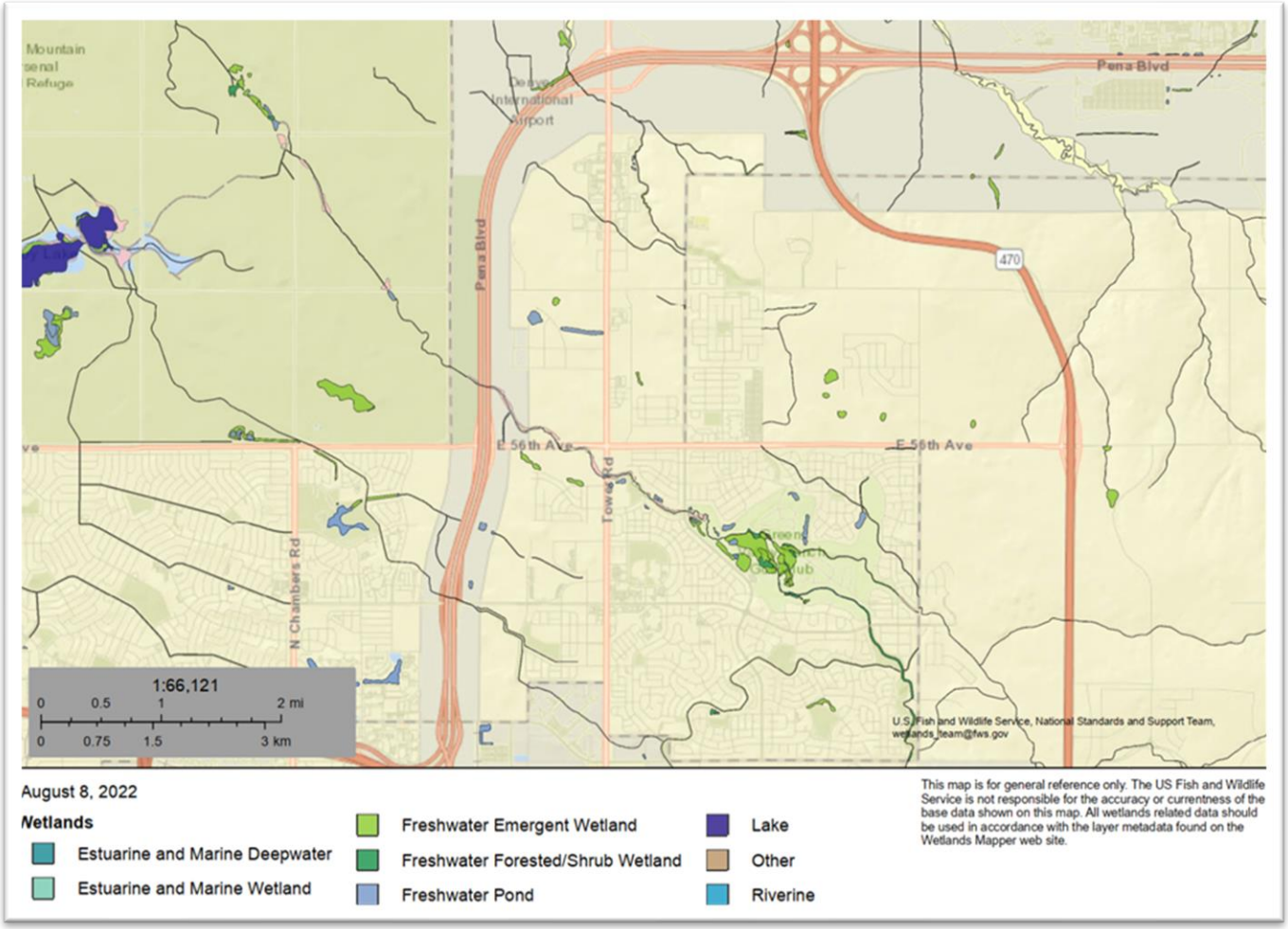
Zone	Description
AE, Floodway	• Areas subject to flooding in a 1-percent-annual-chance flood as determined by detailed methodologies • BFEs have been established • Area must be kept free of encroachment so that floodwaters can be carried without substantial increases in flood heights
X	• Areas outside the 0.2-percent-annual-chance flood • Areas subject to flood depths of less than 1 foot in a 1-percent-annual-chance flood • Areas protected by levees from a 1-percent-chance-annual flood

6.7.2. Streams and Wetlands

Eight streams, three wetlands, two freshwater ponds, and several other waters were identified within the Study area (locations shown in Figure 6-). Atkins staff examined existing surface water, wetland, and hydrography geospatial data including the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) (2021) dataset. There are eight streams that cross under Peña Boulevard within the Study area. Six streams have box culverts, and Peña Boulevard has been bridged over First Creek north of East 56th Avenue and Second Creek west of Tower Road. Several additional waters appear to be within the Study area but do not cross under Peña Boulevard. The length, classification (intermittent versus perennial), representative channel width, bank height, water depth, and substrate values require a field visit to determine details.

There were three listed wetlands located within the Study area. The largest wetland is located just north of Peña Boulevard, west of Tower Road. Another wetland is located north of Peña Boulevard, between the ramp and cloverleaf at E-470. The third wetland is located east of Peña Boulevard and north of East 56th Avenue. Additionally, there are two freshwater ponds within the Study area found east of Peña Boulevard, between East 56th Avenue and Green Valley Ranch Road.

Figure 6-5 - Wetlands and Waters



6.7.3. Threatened or Endangered Species

The Information for Planning and Consultation (IPaC) was accessed to generate a list of species and other resources such as critical habitat under the USFWS jurisdiction that are known or expected to be on or near the project Study area. Table 6-3 may also include resources that occur outside of the Study area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effect a project may have on resources typically requires gathering additional site-specific and project-specific information.

Table 6-3 - Federal Species Potentially Affected

Mammals			
Common Name	*Scientific Name*	E	Notes
Black-footed Ferret	*Mustela nigripes*	E	No critical habitat has been designated for this species
Gray Wolf	*Canis lupus*	E	This species only needs to be considered if the project activity includes a predator management program. There is final critical habitat for this species
Preble's Meadow Jumping Mouse	*Zapus hudsonius preblei*	T	There is final critical habitat for this species. The location of critical habitat is not available
Birds			
Piping Plover	*Charadrius melodus*	T	This species only needs to be considered if the project includes water-related activities and/or use in the N. Platte, S. Platte, and Laramie River Basins which may affect listed species in Nebraska. There is final critical habitat for this species
Whooping Crane	*Grus americana*	E	There is final critical habitat for this species. The location of critical habitat is not available
Fishes			
Pallid Sturgeon	*Scaphirhynchus albus*	E	This species only needs to be considered if the project includes water-related activities and/or use in the N. Platte, S. Platte, and Laramie River Basins which may affect listed species in Nebraska
Insects			
Monarch Butterfly	*Danaus plexippus*	C	No critical habitat has been designated for this species
Flowering Plants			
Ute Ladies'-tresses	*Spiranthes diluvialis*	T	No critical habitat has been designated for this species
Western Prairie Fringed Orchid	*Platanthera praeclara*	T	No critical habitat has been designated for this species

* E – Endangered, T – Threatened, C – Candidate Species

Potential effects to critical habitat(s) in the project area must be analyzed along with the endangered species themselves; however, there are no critical habitats for federal species within the Study area. An important potential effect from any project is from depletion of water to the South Platte River, which may affect species downstream and outside of the study area.

Certain birds are protected under the Migratory Bird Treaty Act of 1918 and the Bald and Golden Eagle Protection Act of 1940. Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures. The birds listed Table 6-4 are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in the Study area.

Table 6-4 - Federal Migratory Birds Potentially Affected

Common Name	Scientific Name	Notes	Breeds in Study Area
Bald Eagle	*Haliaeetus leucocephalus*	This is not a BCC in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities	Breeds Oct 15 to Jul 31
Chimney Swift	*Chaetura pelagica*	This is a BCC throughout its range in the continental USA and Alaska	Breeds Mar 15 to Aug 25
Clark's Grebe	*Aechmophorus clarkia*	This is a BCC throughout its range in the continental USA and Alaska	Breeds Jun 1 to Aug 31
Ferruginous Hawk	*Buteo regalis*	This is a BCC only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Mar 15 to Aug 15
Lesser Yellowlegs	*Tringa flavipes*	This is a BCC throughout its range in the continental USA and Alaska	Breed elsewhere.
Long-billed Curlew	*Numenius americanus*	This is a BCC only in particular BCRs in the continental USA	Breeds Apr 1 to Jul 31
Long-eared Owl	*Asio otus*	This is a BCC throughout its range in the continental USA and Alaska	Breeds Mar 1 to Jul 15
Red-headed Woodpecker	*Melanerpes erythrocephalus*	This is a BCC throughout its range in the continental USA and Alaska	Breeds May 10 to Sep 10

The Colorado Natural Heritage Program and Colorado Parks and Wildlife species lists (Table 6-5) were accessed to identify potential state protected species within the Study area.

Table 6-5 - State Species Potentially Affected

Common Name	Scientific Name	Status	Notes
Mammals			
Black-tailed Prairie Dog	*Cynomys ludovicianus*	SC	Project is within species overall range
Birds			
Burrowing Owl	*Athene cuniculalria*	T	Commonly found in prairie dog towns throughout Colorado. No permitted, authorized, or human encroachment activities within 1/8 mile of the nest site during the nesting season March 15 to August 31. For large disturbances, no activities within ¼ mile of the nest site during nesting season
Ferruginous Hawk	*Buteo regalis*	SC	Bird of open grasslands and shrub steppe communities. Nest in flat, rolling or rugged terrain in open areas, including shortgrass prairie, canyons with cliffs or rock outcrops, and areas with isolated trees or small groves in grasslands, shrublands, or riparian areas.
Bald Eagle	*Haliaeetus leucocephalus*	SC	Distribution is highly scattered throughout North American and in Colorado. Important wetland habitats are those connected with large bodies of water, such as rivers and reservoirs. Bald eagles use tall trees and dead snags along the edge of waterbodies to perch and watch for prey.
Amphibian			
Plains Leopard Frog	*Rana/ Lithobates blairi*	SC	Habitat in the vicinity of streams, natural and artificial ponds, reservoirs, creek pools, irrigation ditches, and other bodies of water in plains grassland, sandhills, stream valleys, and canyon bottoms. May disperse far from water during wet, mild weather
Northern Leopard Frog	*Rana/ Lithobates pipiens*	SC	Habitat in west meadows and the banks and shallows of marshes, ponds, lakes, reservoirs, streams, and irrigation ditches. May roam far from water during wet, mild weather
Reptiles			
Common Garter Snake	*Thamnophis sirtalis*	SC	Habitat in marshes, ponds, and the edges of streams; generally restricted to aquatic, wetland, and riparian habitats along the floodplains of streams

* T – State Threatened, SC – State Special Concern (not a statutory category)

Once a preferred alternative is selected at the end of this Study, preliminary design and an environmental review under NEPA will be conducted. The environmental review will involve additional site-specific and project-specific information to determine if there are any endangered species in the Study area.

6.8. Cultural Resources

A historic property (or historic resource) is defined in the National Historic Preservation Act (NHPA) [54 U.S.C. § C300308] as any "prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on, the National Register of Historic Places, including artifacts, records, and material remains related to such a property or resource." The significance of historic resources refers to their ability to meet one of the four National Register criteria (A-D). The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association. The Study area appears to have one historic resource based on historic imagery from the website historicaerials.com and construction dates from the Denver Property Taxation and Assessment System. Historic aerials show that the Study area was historically undeveloped open space and farmland. The high-density residential development started in the 1990s around the same time as the construction of Peña Boulevard.

The Red Barn House, shown in Figure 6-, is the only historic resource identified within the Study area. It appears to have been historically part of a larger family farm with many additional buildings. The other buildings were likely demolished during construction of Peña Boulevard. The Red Barn House was originally located west of its current location, approximately where northbound Peña Boulevard is currently located. It was moved to the east for preservation. The resource is currently fenced off with no access points.

Figure 6-6 - Historic Red Barn near Peña Boulevard

Figure 6-7 - Aerial of the Red Barn House from 1956

Figure 6-8 - Aerial of the Red Barn House from 2019

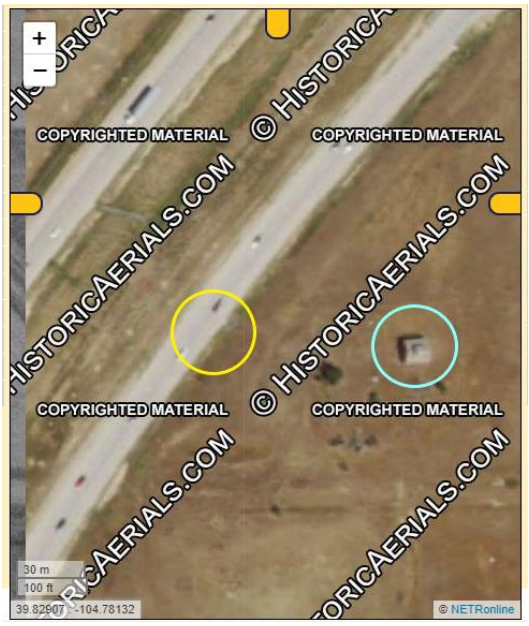


Figure 6-9 - Aerial of Study Area from 1971

Figure 6-10 - Aerial of Study Area from 2019

During construction of the Denver International Airport, many archaeological finds were uncovered. While land near Peña Boulevard was disturbed during construction of the road in the 1990s, some locations within the Study area with less disturbance may contain archaeological finds.

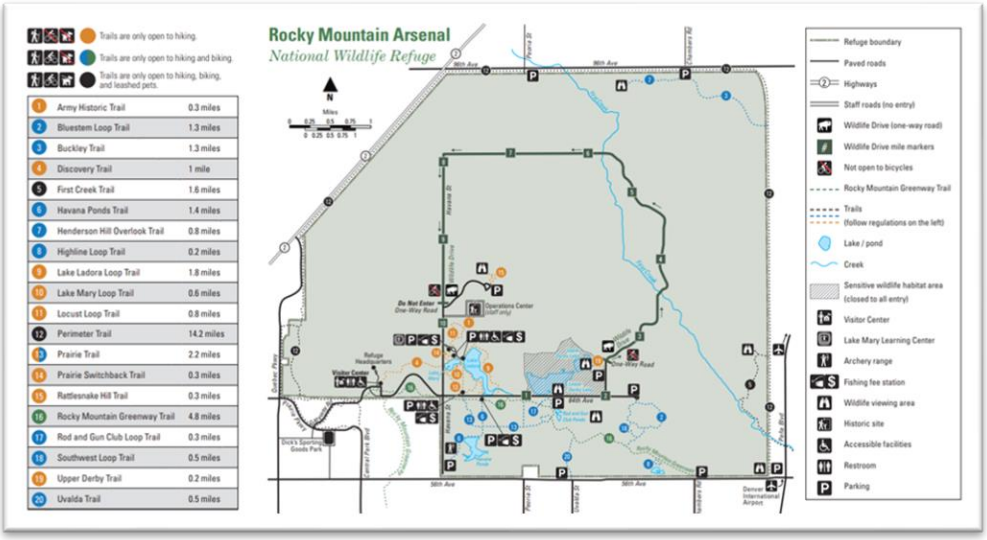
6.9. Recreational Areas and Section 4(f)

Recreation resources, including parks, open space, and major trail networks, are important community facilities that provide environmental, aesthetic, and recreational benefits. Section 4(f) of the Department of Transportation Act affords protection to publicly owned land in the form of a public park, recreation area, or wildlife and/or waterfowl refuge of national, state, or local significance, and land of an historic site of national, state, or local significance. Section 4(f) protected properties usually are considered in two categories: historic and non-historic. Section 4(f) non-historic properties include existing and planned publicly owned recreation facilities, where recreation is the significant purpose of the facility. "Planned" means specific facilities are identified in an appropriate master planning document.

Section 6(f)(3) of the Land and Water Conservation Fund (LWCF) Act of 1965 contains provisions to protect properties that are purchased or improved with grant monies from the LWCF. Section 6(f) applies to all transportation projects that could involve possible conversion of the use of these public outdoor recreational properties. The LWCF website confirms there are no 6(f) properties in the Study area.

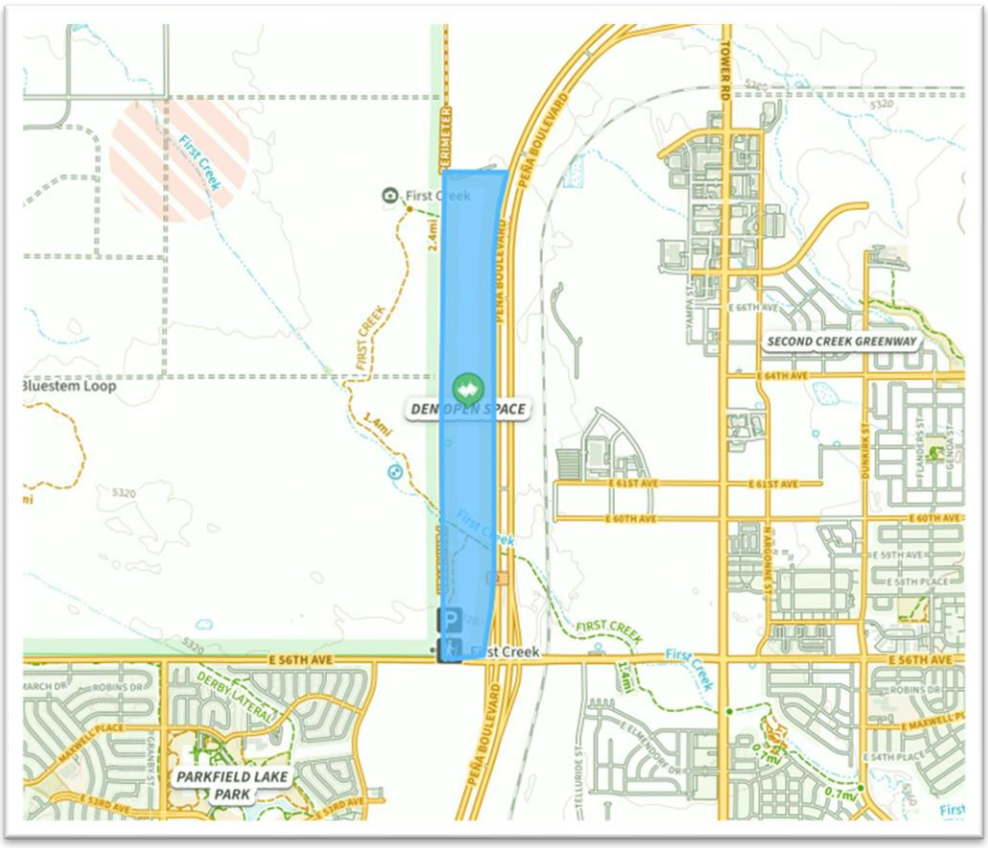
There are no historic Section 4(f) resources in or near the Study area. Denver's Open Data Catalog was used to identify public parks, trails, and other recreational resources within the Study area boundary. One park, DEN Open Space, and one trail, First Creek Trail, are within the Study area boundary. The Rocky Mountain Arsenal National Wildlife Refuge (RMANWR), shown in Figure 6-, is just outside of the Study area, immediately west of DEN Open Space.

Figure 6-11 - Rocky Mountain Arsenal National Wildlife Refuge



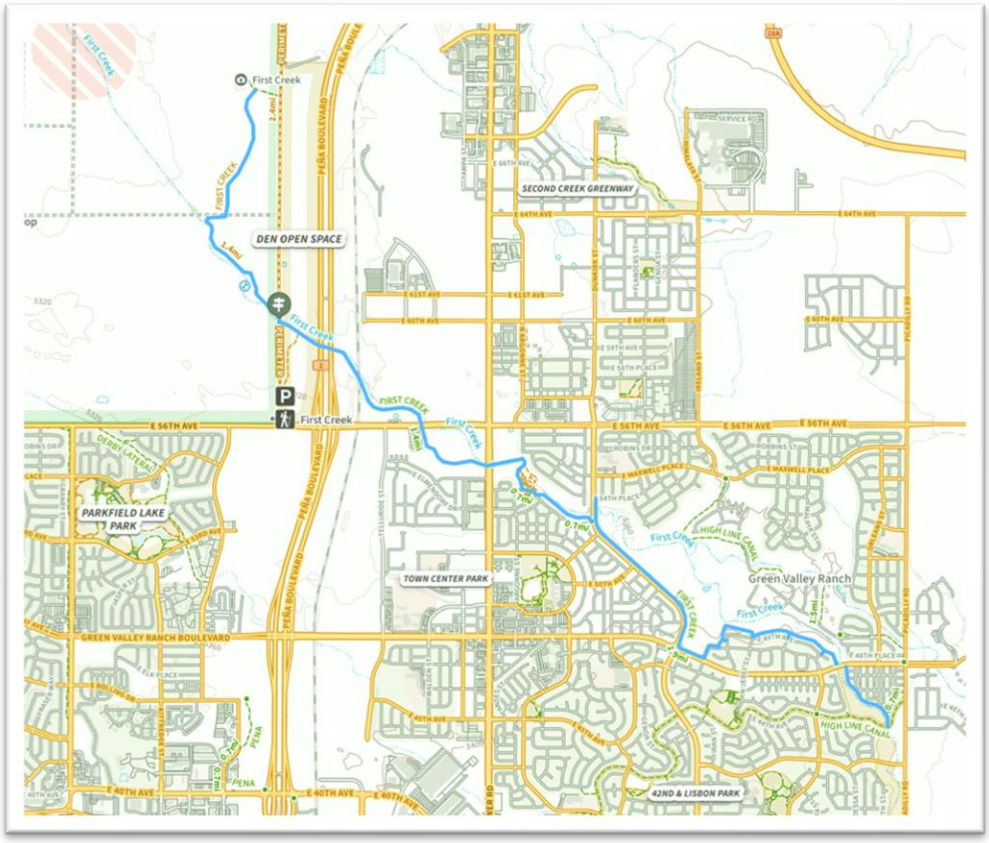
DEN Open Space, shown in Figure 6-, is Denver's largest open space park. The park opened in 2016 and include 198 acres of land between Peña Boulevard and the RMANWR. The property is owned by the Denver International Airport and is co-managed by the City of Denver's Parks and Recreation. The park has a parking lot and trailhead at the intersection of East 56th Avenue and Buckley Road. The trailhead connects with trails in the Denver neighborhoods of Montbello, Green Valley Ranch, and Parkfield.

Figure 6-12 - DEN Open Space



The First Creek Trail, shown in Figure 6-, is a 5.9-mile trail with 1.4 miles of dirt and 4.4 miles of concrete paving. The trailhead is in the DEN Open Space and is co-managed by the City of Denver's Parks and Recreation and Denver International Airport. East of the trailhead, First Creek Trail crosses under Peña Boulevard approximately 2,000 feet north of East 56th Avenue and continues to High Line Canal trail near Picadilly Road between East 48th Avenue and East 42nd Avenue. The First Creek Trail is one of the most scenic trails in the RMANWR and is very popular for hikers and bikers.

Figure 6-13 - First Creek Trail



6.10. Noise

Noise is generally defined as unwanted sound. Sound levels are expressed in dimensionless units called decibels (dB). Noise is emitted from many natural and man-made sources. Noise can affect daily activities, especially those that occur outdoors. Noise from traffic on roadways can be very disruptive at high levels if it is not mitigated.

A noise sensitive receptor is any property on which frequent human use occurs and highway traffic noise may be detrimental to the enjoyment and/or function of the property. This includes residences, schools, parks, hospitals, and businesses. CDOT has established noise levels for noise sensitive receptors based on activity categories. These measures are called Noise Abatement Criteria (NAC) (Table 6.6). Noise above these levels requires the analysis of noise abatement measures. CDOT also defines a substantial noise increase as a 10 dB(A) increase between the existing noise level to the design year predicted noise level. Either condition identifies a noise impact.

Table 6-6 - CDOT Noise Abatement Criteria

Activity Category	Activity Leq (h)*	Evaluation Location	Activity Description
A	56 dBA	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	66 dBA	Exterior	Residential
C	66 dBA	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	51 dBA	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E	71 dBA	Exterior	Hotels, motels, time-share resorts, offices, restaurants/bars, and other developed lands, properties, or activities not included in Activity Category A through D or F
F	N/A	N/A	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), warehousing, malls, stores, shops, and Government managed land
G	N/A	N/A	Undeveloped lands that are not permitted for development

Leq(h) = the equivalent steady state noise level that contains the same amount of sound energy for a sixty minute period.

A review of the existing conditions was performed, using desktop tools such as Google Maps and existing land use data, to identify noise sensitive activities within the Study area. The area for noise analysis extends 500 feet west and east of Peña Boulevard within the project limits. Some portions of the noise analysis area were extended to include areas that potentially could be affected by interchange improvements associated with the project.

There appear to be no existing noise-sensitive areas within 500 feet of Peña Boulevard from East 40th Avenue to North Gun Club Road. There are active train tracks that run parallel to Peña Boulevard approximately 700 feet to the east. Residential neighborhoods are approximately another 1,000 feet east of the train tracks. The closest receptors to the west are a NAC Category B apartment complex along Airport Way approximately 950 feet west of Peña Boulevard and two NAC Category E hotels along Airport Way approximately 800 feet west of Peña Boulevard.

Between Chambers Road and East 40th Avenue, there is a group of NAC Category E hotels and offices. The closest is approximately 200 feet from Peña Boulevard.

6.11. Air Quality

Air pollution comes from many different sources: stationary sources such as factories, power plants, and dry cleaners; mobile sources such as cars, buses, planes, trucks, and trains; and naturally occurring sources such as windblown dust. Air quality can be affected in many ways by the pollution emitted from these sources.

The National Ambient Air Quality Standards (NAAQS) are health-based pollution standards set by the Environmental Protection Agency (EPA) for six of the most common air pollutants including: carbon monoxide, lead, ground-level ozone, particulate matter, nitrogen dioxide, and sulfur dioxide. Areas of the state that have measurements below the NAAQS levels are called attainment areas.

The proposed project corridor is located within the Denver metropolitan area, which has been designated as a maintenance area for carbon monoxide (CO) for more than 20 years. The area is expected to move from maintenance to attainment for particulate matter (PM) with diameter equal to or less than 10 micrometers (PM10) on October 16, 2022. The area is a serious nonattainment area for ozone (O_3) currently and will be downgraded to Severe status because the deadline to meet the 2008 8-hour standard was not met. The area is in attainment for all other NAAQS criteria pollutants.

Transportation conformity is required under the CAA section 176(c) to help ensure that federally supported highway and transit project activities are consistent with the local air quality goals outlined in the State Implementation Plan (SIP). By conforming to the SIP, transportation activities should not cause or contribute to new air quality violations, worsen existing violations, or delay timely attainment of the relevant NAAQS (FHWA, 2017). Transportation conformity requirements apply in areas of nonattainment and maintenance for the NAAQS. Both regional and project level analyses are required to demonstrate conformity. Any project recommended by this study will have to meet regional and project conformity if it is determined to be regionally significant or a project of air quality concern, as outlined by Colorado and US EPA guidance.

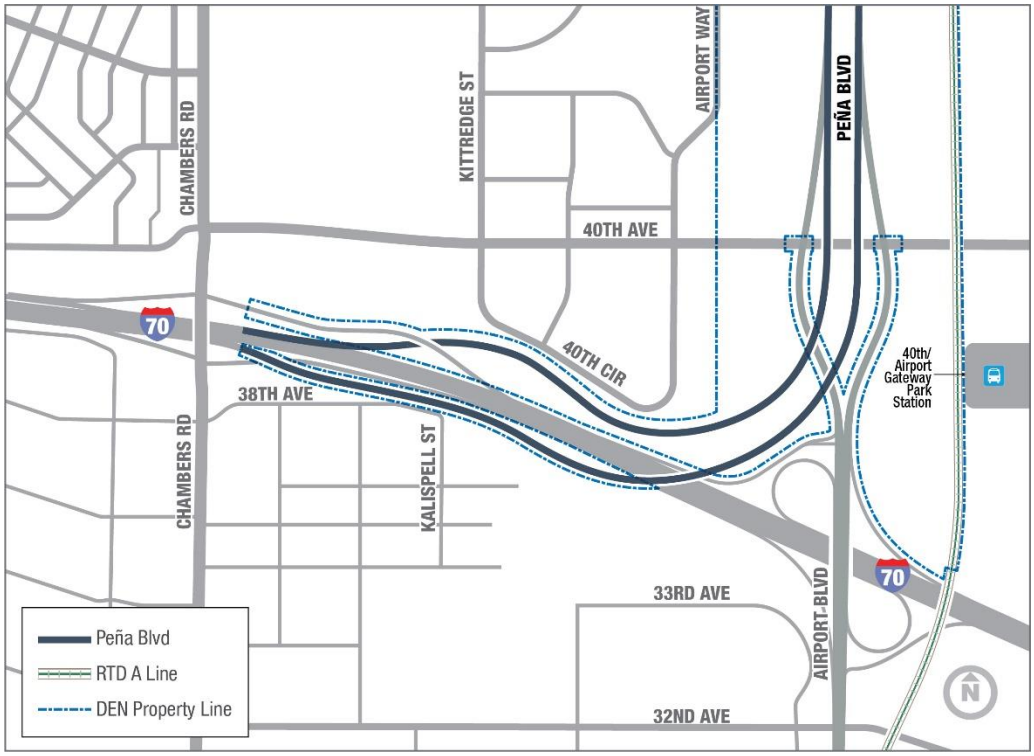
Appendix A. Interchanges on Peña Boulevard

A.1. Major Interchanges and Intersections

A.1.1. I-70 & Peña Boulevard

I-70 provides the primary access to Peña Boulevard through a directional, braided-ramp interchange. The directional ramps provide access only to eastbound I-70 traffic heading to Peña Boulevard and to westbound I-70 traffic from Peña Boulevard as shown in Figure . Both the directional ramps are two-lanes wide. The majority of the greater Denver metropolitan airport traffic uses this access point Peña Boulevard.

Figure A1 - I-70 and Airport Boulevard Interchanges with Peña Boulevard



A.1.2. Airport Boulevard/40th Street & Peña Boulevard

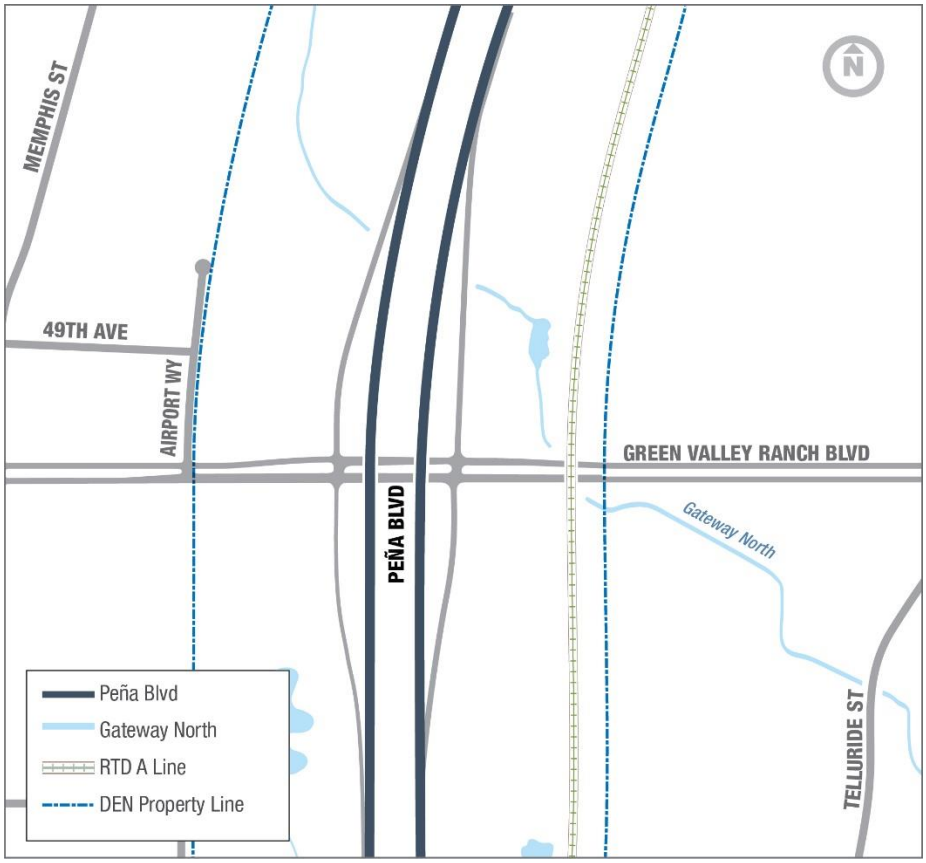
The Airport Boulevard/40th Street and Peña Boulevard interchange, shown in Figure A1, is a partial access diamond interchange with a northbound on-ramp and a southbound off-ramp. The northbound Peña Boulevard on-ramp is a two- transitional ramp with a 1,300-feet long auxiliary lane for vehicles to merge onto Peña

Boulevard. The southbound Peña Boulevard off-bound ramp to Airport Boulevard/ 40th Avenue has a two-lane, 100-foot deceleration lane in the form of an auxiliary lane which then establishes Eastbound/Westbound access to 40th Avenue as well as Southbound Airport Boulevard. Each ramp terminal is signalized and has marked crosswalks.

A.1.3. Green Valley Ranch & Peña Boulevard

This interchange is a full access traditional diamond interchange, see Figure A2. The northbound off-ramp has one lane and a 1,300 feet long deceleration lane in the form of an auxiliary lane. The northbound ramp terminal is a signalized intersection and has marked crosswalks. The northbound on-ramp has a 200-feet long acceleration lane before vehicles have to merge with Peña Boulevard. The southbound off-ramp has one-lane and a deficient deceleration distance of 200 feet. The southbound on-ramp has one lane with a 1,100 feet acceleration distance in the form of an auxiliary lane. Both the interchange ramp terminals are signalized, have marked crosswalks, and sidewalks.

Figure A2 - Green Valley Ranch & Peña Boulevard Interchange

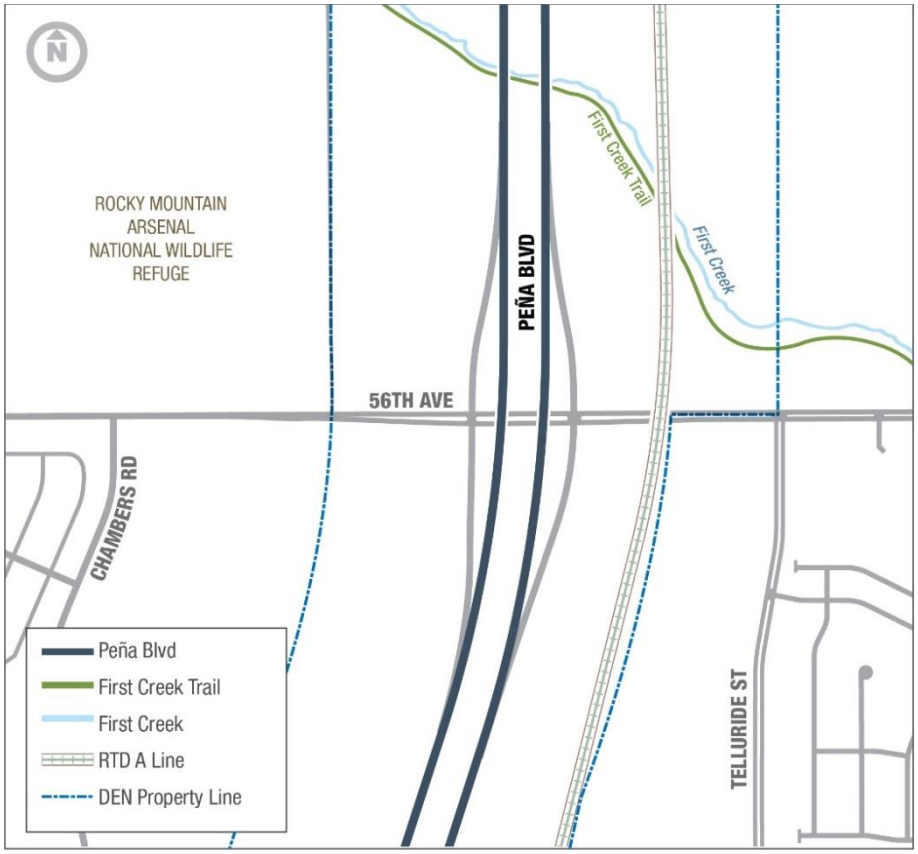


A.1.4. 56th Avenue & Peña Boulevard

This interchange is a full access traditional diamond interchange, see Figure A3. The northbound off-ramp has one lane and a 1,600 feet long deceleration lane in the form of an auxiliary lane. The northbound ramp terminal is a signalized intersection and has marked crosswalks. The northbound on-ramp has a deficient 220-feet long

acceleration lane before vehicles have to merge with Peña Boulevard. The southbound off-ramp is one-lane wide and has a 125-feet long deceleration distance. The southbound on-ramp has one lane and a 120-feet long acceleration distance before vehicles much merge with Peña Boulevard traffic. Both the ramp terminals are signalized and have recently been upgraded to include marked crosswalks and sidewalks on either side of 56th Avenue.

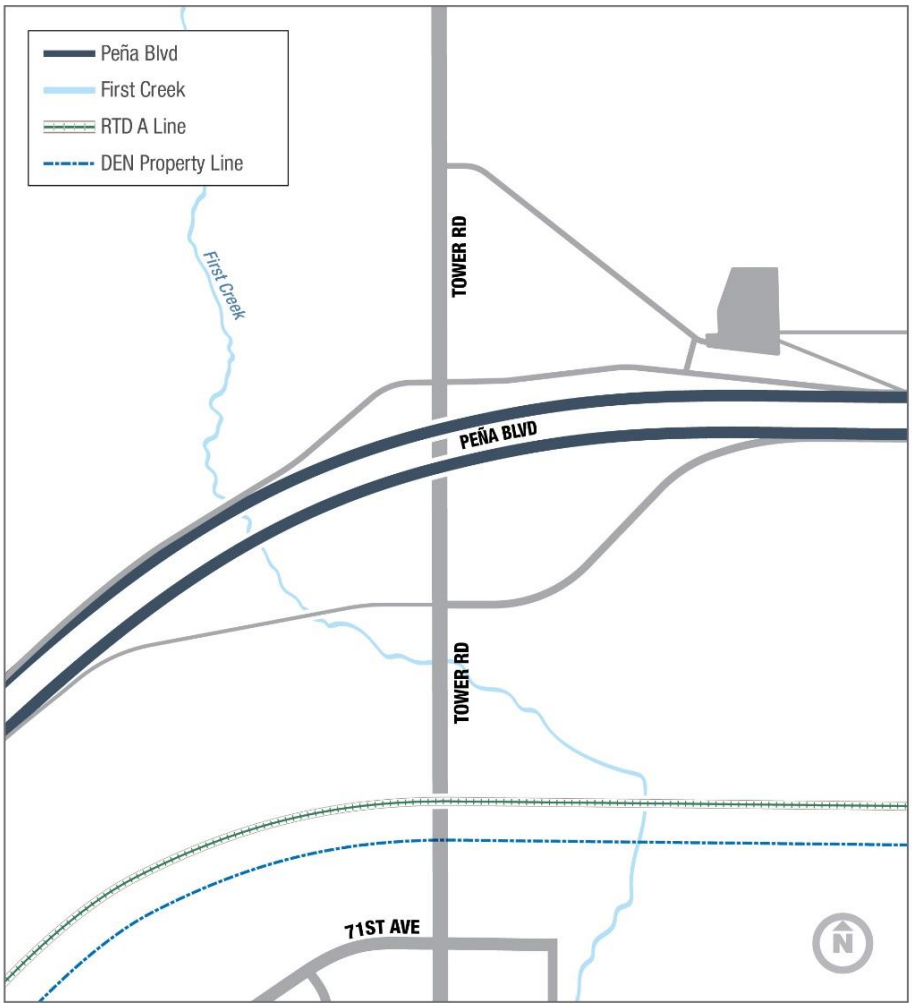
Figure A3 - 56th Avenue & Peña Boulevard



A.1.5. Tower Road & Peña Boulevard

The Tower Road and Peña Boulevard interchange, shown in Figure A4, is a full access traditional diamond interchange that provides access to Tower Road. The eastbound off-ramp has one lane and a 150-foot-long deceleration lane. The eastbound ramp terminal is a signalized intersection and has marked crosswalks. The eastbound on-ramp has a 1600-feet long acceleration lane before vehicles have to merge with Peña Boulevard. The rightmost lane of the westbound roadway is a trap lane that terminates at the westbound off-ramp. The off-ramp has one lane. The westbound ramp terminal is a signalized intersection and has marked crosswalks. The westbound on-ramp has a 550-feet long acceleration lane before vehicles have to merge with Peña Boulevard.

Figure A4 - Tower Road & Peña Boulevard

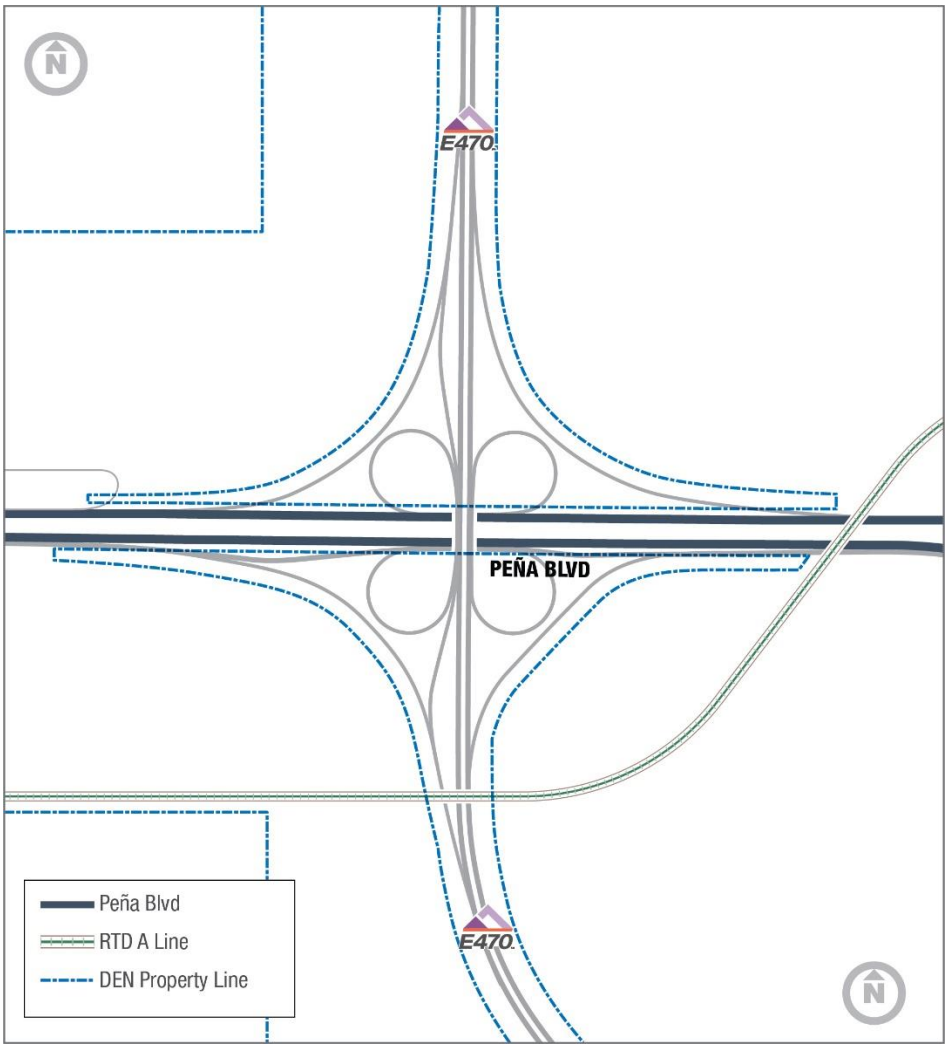


A.1.6. E-470 & Peña Boulevard

This Interchange is a freeway-to-freeway full access cloverleaf interchange with a collector-distributor type configuration in the eastbound direction, see Figure A5. The Eastbound off-ramp has 2 lanes and a 1,450-foot deceleration lane. The off-ramp diverges into two pathways – a one-lane ramp that connects to southbound E-470 and a two-lane collector-distributor road. The collector-distributor road provides access to the remaining

cloverleaf ramps from southbound E-470 to eastbound Peña Boulevard and from eastbound Peña Boulevard to northbound E-470. The westbound ramps form a traditional cloverleaf interchange providing access to northbound and southbound E-470.

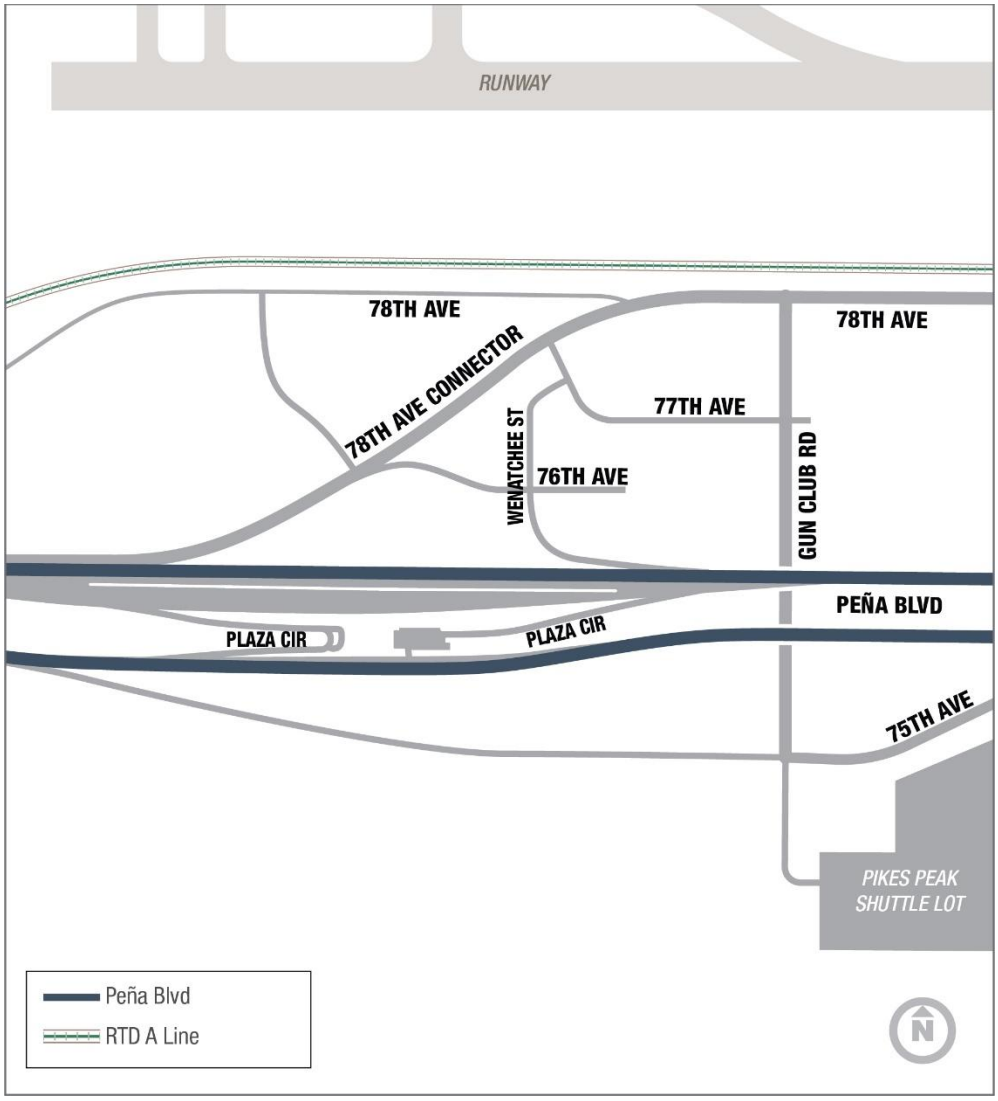
Figure A5 - E-470 & Peña Boulevard



A.1.7. Gun Club Road & Peña Boulevard

This interchange is a partial access diamond interchange which provides access to 78th Avenue, 75th Avenue, and Gun Club Road, see Figure A6. Both the ramp terminals are signalized intersections. However, neither of them has a sidewalk or marked crosswalks.

Figure A6 - Gun Club Road & Peña Boulevard



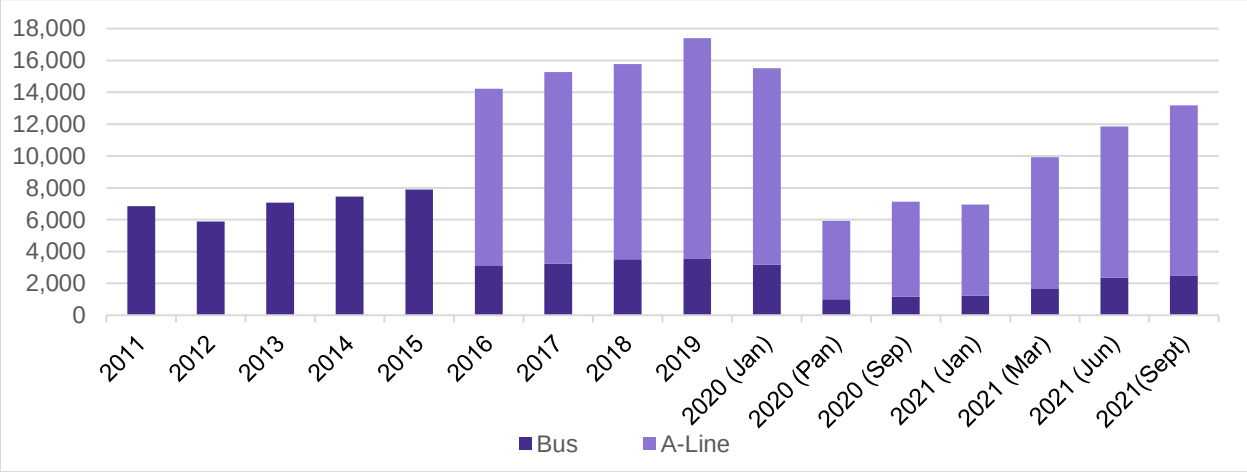
Appendix B. Transit Ridership

B.1. Transit Ridership to DEN

Seventy percent of DEN employees are front-line essential workers. In spite of a 95% decrease in passenger traffic at the airport at the beginning of the COVID-19 pandemic in April 2020, there were almost 6,000 daily riders on the A Line and RTD bus services to the airport. As of 2022, 45 employers at the airport offer their employees the RTD EcoPass, which allows them to ride any RTD service, including the A Line commuter rail, free of charge. As of 2019, 7,200 airport employees have EcoPass benefits.

Figure B1 highlights that, even during the global pandemic, these transit services were critical to essential workers. An employee commuter survey conducted in 2019 estimated that approximately 35% of DEN employees use public transit.

Figure B1 - Daily Transit Ridership



Note: The data for each year is average weekday boardings/alightings for the August Runboard (August to December). A Line opened for service in 2016.

Table B1 shows ridership and headways for RTD's regional routes that serve DEN, revealing which routes employees and airline passengers utilize the most. The A Line operates on a 15-minute frequency and sees the highest ridership of all the regional transit routes serving DEN. Weekday boarding and alighting counts captured during January 2022 show slightly more riders (5,318) use the A Line to travel from DEN back to Denver, while slightly less people (4,949) use the A Line to travel to DEN. Enhancing first and final mile connections in the immediate areas surrounding the 40th & Airport Boulevard Gateway Station and 61st & Peña Boulevard Station could encourage more people to walk, bike, or drive from their home to the stations.

Table B1 - DEN Weekday Regional Transit Ridership (Jan. 2022)

	N/E-Bound	N/E-Bound	S/W-Bound	S/W-Bound	Headways	Headways
	Boardings	Alightings	Boardings	Alightings	Peak	Off-Peak
A Line	0	4,949	5,318	0	15 min	30 min
AB	23	453	474	63	49-60 min	90 min
AT/ATA	14	417	398	29	60 min	60 min
145 X	10	0	0	11	100 min	100 min
104 L	12	163	155	10	30 min	60-90 min
169 L	0	68	52	3	60 min	300 min

The AB (serving Boulder) and the AT/ATA (serving the Denver Tech Center/Greenwood Village) routes saw the highest ridership counts of all five regional bus routes in January 2022. Both of these routes operate at 30-minute headways during peak hours, and 60-minute headways during off-peak hours. The 104L (connecting to Thornton) also operates at 30/60-minute headways but is not utilized as much as the AB and AT/ATA routes. Low ridership on the 104L may be attributed to the Thornton's auto-oriented nature compared to Boulder and the Denver Tech Center which provide more multimodal options to travel to and from transit stations. The 145X (serving Brighton) and the 169L (serving Aurora) routes saw the lowest ridership out of all the regional routes, which may be attributed to their limited-service hours and long headways.

Table B1 shows the weekday boarding and alighting counts for the three local bus routes that serve neighborhoods in the heart of the Study area. The 121-bus route connects Aurora to the 40th & Airport Boulevard Station, passing through Montbello. The 42 and 45 bus routes both connect Montbello to Green Valley Ranch via slightly different routes and are the only transit options serving the Green Valley Ranch Neighborhood in the center of the Study area. The 121-bus had the highest ridership in January of 2022, carrying more riders than the 45 and 42 routes combined. High ridership on the 121 may be attributed to its frequent headways which runs every 15-minutes during peak hours and every 30-minutes during off-peak hours. However, the 42 bus saw significantly less ridership despite having the same headways as the 121, which may indicate that the residents of Green Valley Ranch are less disposed to using transit than Montbello residents living on the other side of Peña Boulevard.

Table B2 - DEN Weekday Local Transit Ridership (Jan. 2022)

	N/E-Bound	N/E-Bound	S/W-Bound	S/W-Bound	Headways	Headways
	Boardings	Alightings	Boardings	Alightings	Peak	Off-Peak
42	750	750	706	706	15 min	30 min
45	486	486	474	474	30 min	30 min
121	1,449	1,449	1,387	1,387	15 min	30-60 min

B.2. Montbello Connector

The City of Denver is partnering with RTD, Downtowner APP, and Northeast Transportation Connections (NETC) to run the Montbello Connector, a free on-demand microtransit service operating in the Montebello neighborhood. The 12-month pilot will end in October 2022 and will help inform DOTI's future efforts to provide local transit services. The free shuttle has been highly utilized by the residents of Montbello who have taken over 19,500 trips in the first four months of 2022. Those trips served over 27,000 passengers who use the shuttle to travel to various destinations throughout Montbello (see Figure B2 below). The Montbello Recreation Center, Walmart, Denver's Montbello Branch Library, and the Peoria Station have been the most popular destinations. Each of those locations have seen over 750 trips, with the Peoria Station seeing 1,787 trips. Green Valley Ranch and the Gateway Neighborhood should look to the success of the Montbello Connector as a first and final mile service to explore additional connections to the A Line and other amenities.

Figure B2 - Montbello Connector Destination Trips