

Memorandum

Date: September 19, 2024
To: Nora Kern & Brittney Compton – Denver Regional Council of Governments
From: Sydney Provan, AICP, Jason Miller, & Katherine Turner – Fehr & Peers
Subject: **StreetLight Data Analysis Report** - North Federal Community Transportation Study

This memorandum provides a description of the analysis of StreetLight data conducted as part of the North Federal Community Transportation Study as well as the results of that analysis. A summary of the findings in this memorandum will be included as a section in the final report for this study.

Summary

Through analyzing StreetLight data of trips made to, from, and within the study area, common travel patterns emerged. The analysis of internal travel indicated that there are higher volumes of travel in the middle and northern portions of the study area. The largest share of trips that start or end outside of the study area go to Denver. These existing travel patterns will help the project team in drawing potential zones for a new community transportation service to serve the neighborhood's travel needs.

Trips Internal to the Study Area

Internal trips, or trips starting and ending in the study area, comprise 28% of all trips originating in the study area. This proportion of trips is not surprising considering the relatively large size of the study area and the mix of land uses in the area that allow for lots of local trips (homes, schools, shopping, human services, etc.) This proportion of internal trips is similar to comparable study areas Fehr & Peers has analyzed in the DRCOG region. For example, in a Streetlight data analysis of the Vista Ridge neighborhood of Erie 25% of trips were internal to the neighborhood and in the Globeville and Elyria-Swansea neighborhoods of Denver 38% of trips were internal to the two neighborhoods.

Many of the highest trip pairs are clustered in the northern third of the study area – with a high volume of trips originating from the two Sherrelwood residential neighborhoods in the northeast corner. Internal travel within zone 7 (the southeast corner of the study area) is higher than many of the surrounding zones, which include other residential zones and some industrial zones just north of I-76.

Top destinations are relatively consistent across time of day and weekday versus weekend, however, there is more travel to residential locations during the AM and PM peaks and more travel to commercial destinations on weekends. Residents in the study area tend to go to commercial areas located nearby their zone of origin.

Trips that Start or End Outside the Study Area

Of all external trips (where one end is in the study area and one end is outside), 18% are to or from Denver, 3% to downtown Denver specifically. The remaining 82% of trips travel to more dispersed destinations in the adjacent communities like Thornton, Arvada, and Westminster. There are less trips to cities farther outside the study area such as Aurora, Broomfield, Lakewood, and Boulder. A community transportation service that better connects residents to regional transit services, such as the G and B light rail lines and bus routes 31, 72, and 51, would help provide more options for traveling to these regional destinations for study area residents by filling existing first and last mile gaps.

StreetLight Data Analysis

Origin-destination trip data for North Federal and the surrounding area were collected using StreetLight Data. StreetLight Data is an on-demand mobility analytics platform and a “Big Data” provider that compiles origin-destination trip data from global positioning system (GPS) tracking technology provided through location-based services (LBS) data (anonymized cell phone location data) or connected vehicle data (CVD) (data collected from vehicles equipped with advanced communication technology). CVD from 2023 was used for the bulk of this analysis as it is the most up to date and reliable data available although it has a smaller sample size than LBS data. The data collection time period was between March 2023 and May 2023 and data was collected for typical weekdays (Tuesday – Thursday) and weekends (Saturday – Sunday).

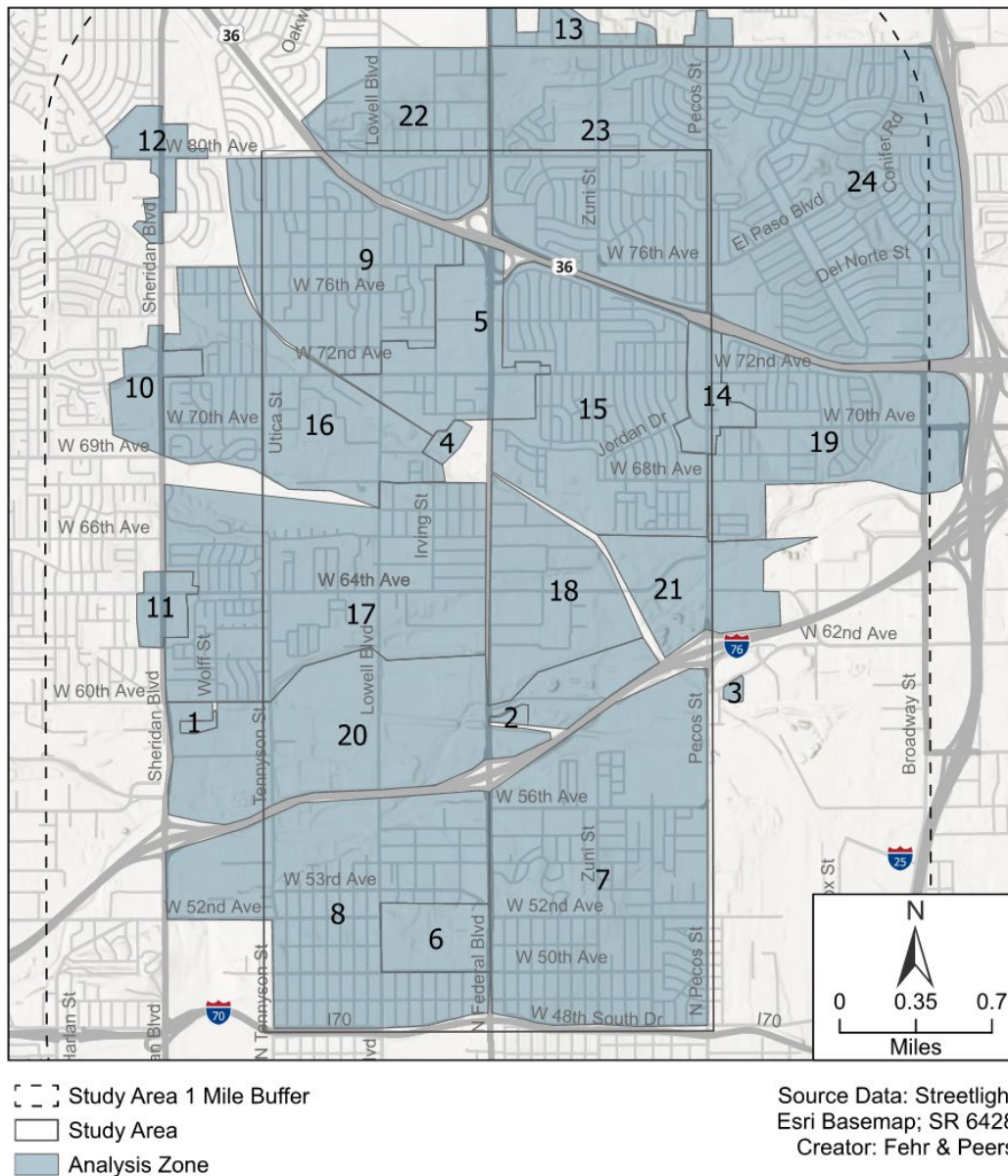
Older 2022 LBS data was used for the analysis of trips to and from rail stations in order to understand travel patterns for all modes of transportation to and from the rail stations. Streetlight aggregates this data to capture the travel trends across various times of day and days of the week.

Zones

Transportation zones are the building blocks for running analyses on the StreetLight data platform. Zones can be used to analyze trips that originate or terminate within a specified area. To capture all the critical origins and destinations within and nearby our study area, 24 zones were developed for this analysis. The zones developed for this analysis were based on existing land use patterns, including separate zones for major commercial areas and recreational facilities, separate zones for the major transit stations and Park-

n-Rides, and separate zones for residential areas divided by major roads. **Figure 1** shows a map of the zones analyzed and **Table 1** shows the zone descriptions, with numbers corresponding to the map. In addition to these 24 zones, an additional analysis was conducted using larger geographies such as municipalities and counties in order to better understand travel between our study area and the larger region.

Figure 1: StreetLight Analysis Zones



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Table 1: StreetLight Analysis Zone Descriptions

Zone Number	Zone Name
1	60 th Avenue/Sheridan-Arvada Gold Strike Station
2	Clear Creek - Federal Station
3	Pecos Junction Station
4	Westminster Station
5	N Federal Boulevard/72nd Commercial, South of US 36
6	Regis University
7	I-70 to I-76 and N Federal Boulevard to Pecos Street
8	I-70 to I-76 and Sheridan to N Federal Boulevard (No Regis)
9	Northwest Study Area (South Westminster)
10	Sheridan Boulevard/W 72 nd Avenue Commercial (Walmart)
11	Sheridan/W 64 th Avenue Commercial (King Soopers)
12	Sheridan/W 80 th Avenue Commercial (King Soopers)
13	W 84 th Avenue Commercial N Federal Boulevard to Pecos Street
14	Pecos Street/US 36 Commercial
15	Residential North of Rail and South of US 36
16	Westminster High School Area
17	Near W 64 th Avenue Neighborhoods, West of Federal
18	Near W 64 th Avenue Mobile Home Park and Salvation Army
19	Twin Lakes
20	Industrial around G Line Rail
21	Industrial along W 64 th Avenue
22	Lowell/W 80 th Avenue Residential
23	Sherrelwood West of Pecos Street
24	Sherrelwood East of Pecos Street

Analysis Goals

To best inform the study of the existing travel patterns, and potential transit demand, the Streetlight analysis aimed to answer the following questions:

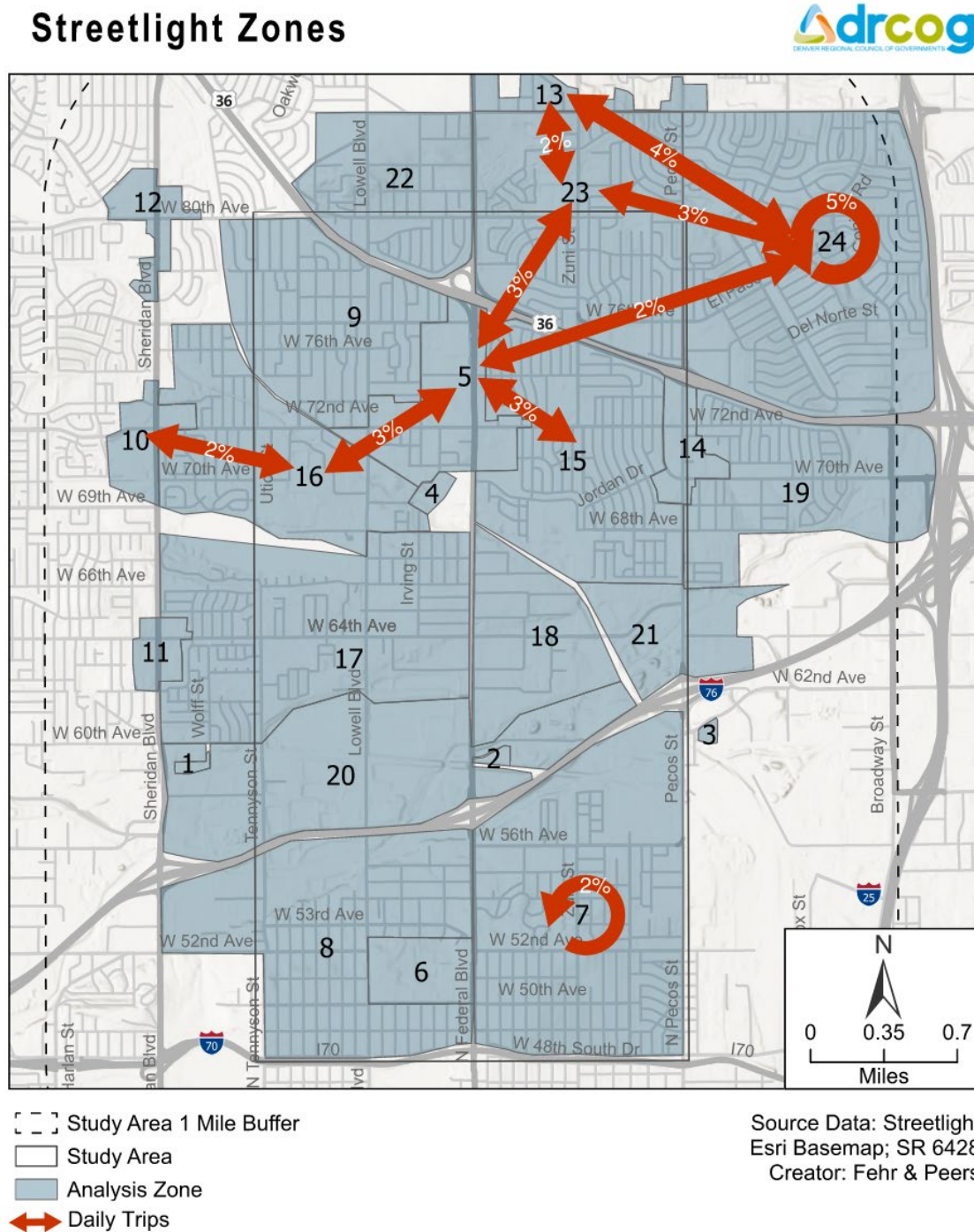
1. Where are the top origin-destination pairs in the study area?
2. What are the top origins to commercial zones within the study area?
3. What are the top destinations within and just outside of the study area?
4. Where are study area residents traveling within the larger region?

Local Travel

Top Trip Pairs within Study Area

The term "Trip Pair" refers to the pairing of the origin and destination locations of a trip. **Figure 2** displays the top ten trip pairs within the study area. The trip pairs with the largest share of trips are internal trips within the Sherrelwood East of Pecos zone and trips between Sherrelwood East of Pecos and 84th Commercial Federal to Pecos. A large portion of trips originate and end in the Sherrelwood East of Pecos zone across all days of the week and times of day. The largest volume trip pairings are largely clustered in the northeast portion of the study area. This concentration of trips in the Sherrelwood neighborhood makes sense as there are a large number of homes within the zone and also two parks, four schools, a King Soopers grocery store, two shopping centers, a light industrial center and a post office. This great diversity of land use types allows for residents of this zone to make many short daily trips to the different services in the area and makes the zone a draw for people who live in other parts of the study area. The zone is a mile and a half across and with the suburban style street grid is 2 miles across when driving so there are many trips within this neighborhood which would be 1-2 miles long which many people will choose to drive. This is especially true if people are trip chaining these shorter trips. For example, care takers may be driving children to school in the neighborhood before driving elsewhere to work or stopping by the grocery store before picking their children up from school. It is likely there are many walking and biking trips occurring in this neighborhood as well, but the mix of land uses and large size of the zone explain why the internal vehicle trips are so high in this area.

Figure 2: Top Trip Pairs within North Federal Study Area (Daily Trips)

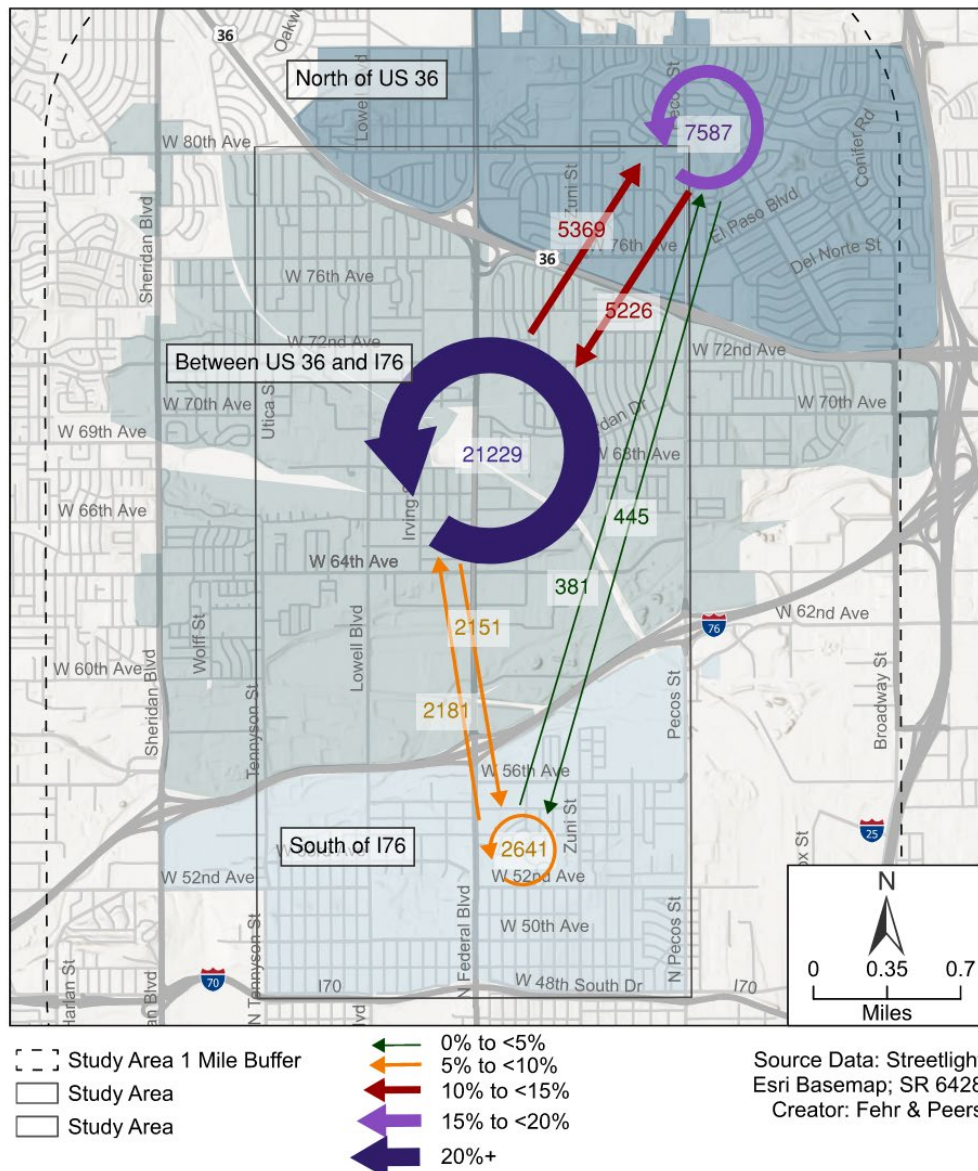


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Internal Travel by Area

Figure 3 below shows the number of trips between three regions of the study area: north of US 36, between I-76 and US 36, and south of I-76. A high volume of travel occurs in the northern and middle portions of the study area, with relatively less travel in the southern portion. Several of the commercial destinations and a large portion of residential areas fall within the middle third of the study area, and the higher volume of trips aligns generally with where people live and are interested in going.

Figure 3. Internal Travel by Study Area Region



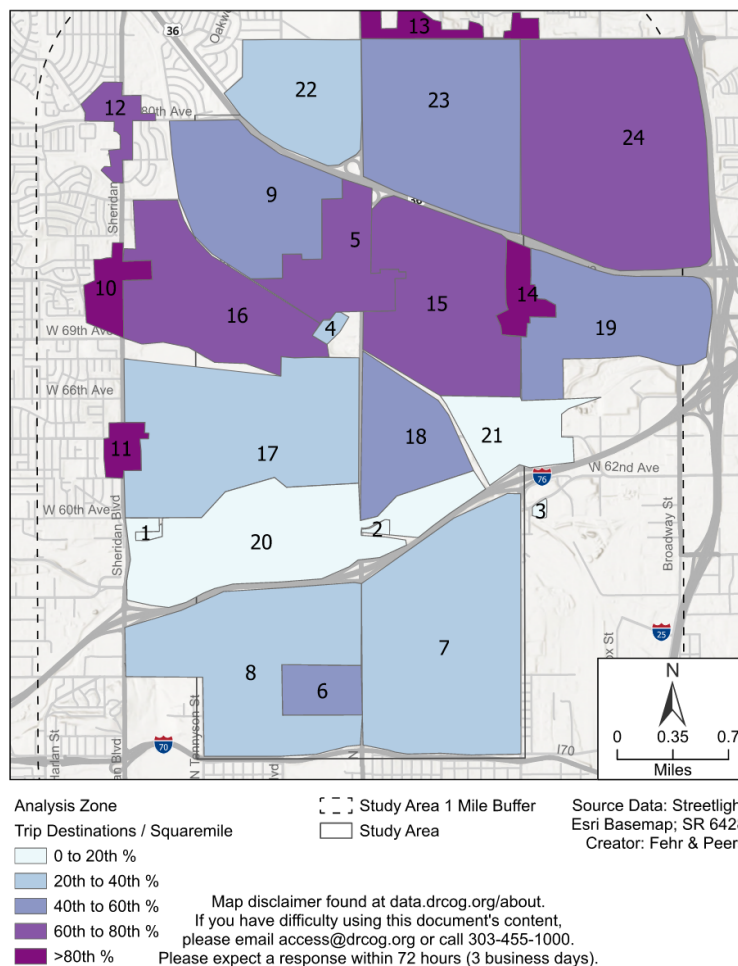
Top Destinations within Study Area

The top destinations within and the study area for trips that begin in the study area are displayed in **Figure 4**. These are locations where the greatest portion of vehicle trips end normalized by square mile area of the analysis zone. The top destinations normalized by area are the large commercial areas:

- Sheridan & West 80th Avenue (King Soopers)
- Sheridan & West 72nd Avenue (Walmart)
- Sheridan & West 64th Avenue (King Soopers)
- North Federal Boulevard and 72nd Avenue (Large shopping center)
- N Federal Boulevard and W 84th Street (King Soopers)
- North Pecos Street and US 36 (Lowe's Mercado and small shopping area)

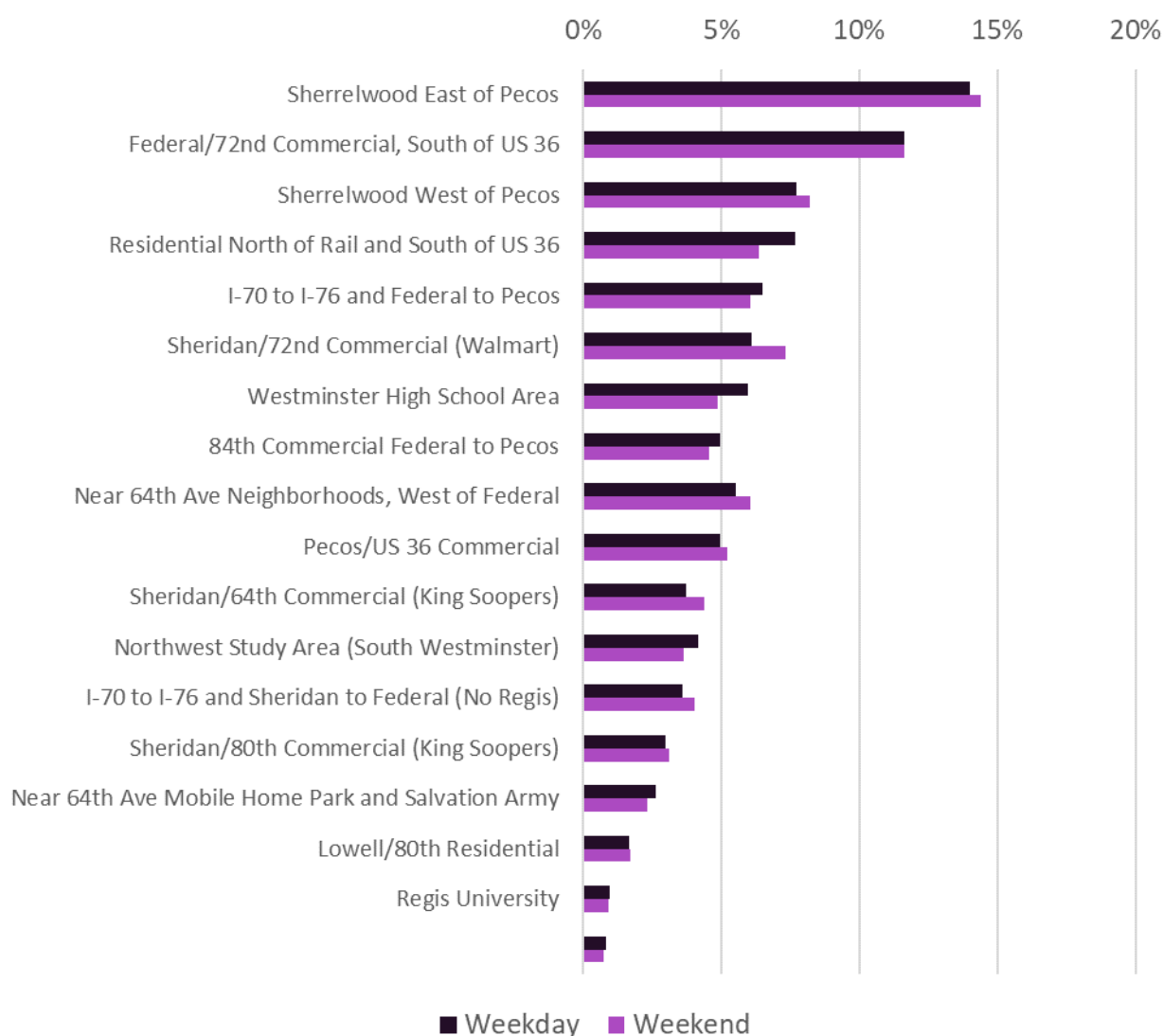
The industrial areas north of I-76 generally have lower travel volumes than other areas and there is a high volume of travel in the northeast quadrant of the study area.

Figure 4: What are the top destinations in and around the Study Area? (March-May 2023, Daily, All Day)



Travel patterns vary slightly depending on the day of the week, as seen in **Figure 5**. A larger portion of trips are to commercial destinations on weekends, which is consistent with the top trip pairings previously discussed. The trip distribution between weekday and weekend are relatively consistent. The most common trip destinations in the figure below differ from the zones shown in the figure above because the map figure is normalized by zone area while the figure below displays total trip destination percentages. Sheridan/72nd Commercial – Walmart (zone 10) and Sheridan/64th Commercial – King Soopers both constitute a higher portion of weekend trips than weekday trips.

Figure 5: What are the top destinations in and around the Study Area? (March-May 2023)



Source: StreetLight Data, Fehr & Peers

Trips were also analyzed by time of day split into AM peak (6AM – 10AM), midday (10AM – 3PM), PM peak (3PM – 7PM) and late night (7PM – 12AM). The largest portion of trips to commercial destinations on weekdays occurred during the midday period with the second highest share occurring during the PM peak period, while residential destinations are more prominent during the late night hours.

About two-thirds of all trips occur between 10AM and 7PM, with only 16% of trips during the AM peak (6AM to 10AM). Although this trend may seem counter intuitive, peak travel times have been shifting away from the traditional AM and PM peaks that were common before the COVID-19 pandemic. Through similar travel pattern analyses in other areas, Fehr & Peers has observed lower AM and PM peak travel and higher midday travel when compared to pre-pandemic levels.

Top Origins within Study Area to Select Commercial Zones

Understanding the origins of trips to the 6 commercial zones identified previously as popular destinations can help identify potential travel markets and transit demand. For this analysis, the two King Soopers locations and the Walmart West of Sheridan were analyzed together and the three remaining commercial zones on Federal Boulevard and Pecos Street were analyzed together.

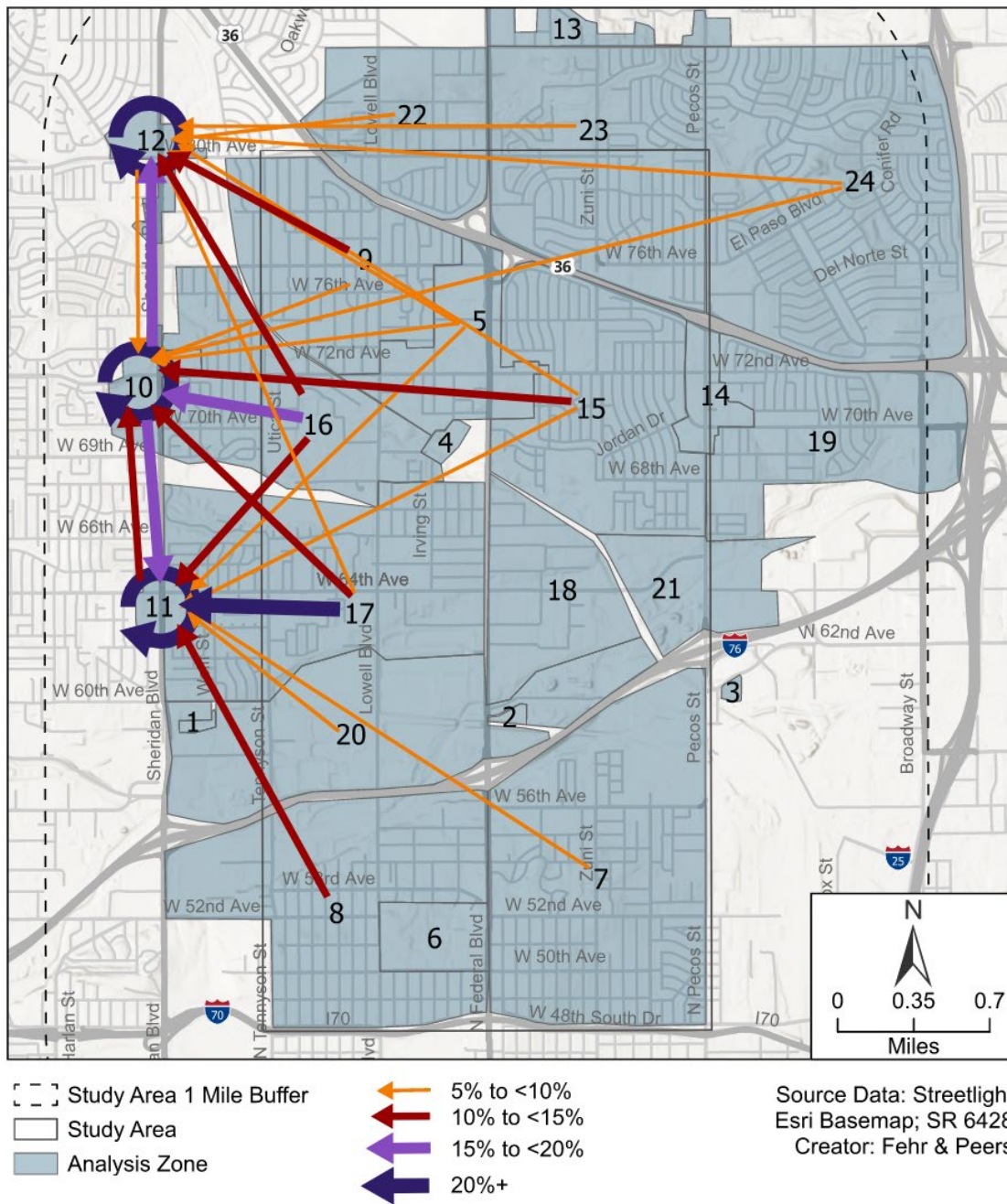
Thirteen percent of trips in the study area (during all days of the week and times of day) end at one of the supermarket commercial zones on Sheridan Boulevard. **Figure 6** displays the top origins to the Sheridan Boulevard supermarkets by percent of trips ending at each zone.

Twenty percent of trips that end at one of the supermarket commercial zones originate inside another supermarket commercial zone. The Westminster High School area (zone 16) is a key origin for the three supermarket commercial zones. While many of the most common origin zones are directly neighboring the supermarket areas, zones 7 (southeast corner), 8 (southwest corner), and 5 (Federal commercial zone south of US 36) are also popular origin points.

Figure 7 below shows the top origins for the three other commercial zones in the study area on Federal Boulevard and Pecos Street. The commercial area at Federal Boulevard and 72nd Avenue is where the now closed Walmart Neighborhood Market was located. The majority of trips to the northern commercial area at Federal Boulevard and 84th Avenue are from the two Sherrelwood residential areas. Trips to the commercial area south of US 36 along Federal have more dispersed origins drawing from many of the surrounding neighborhoods.

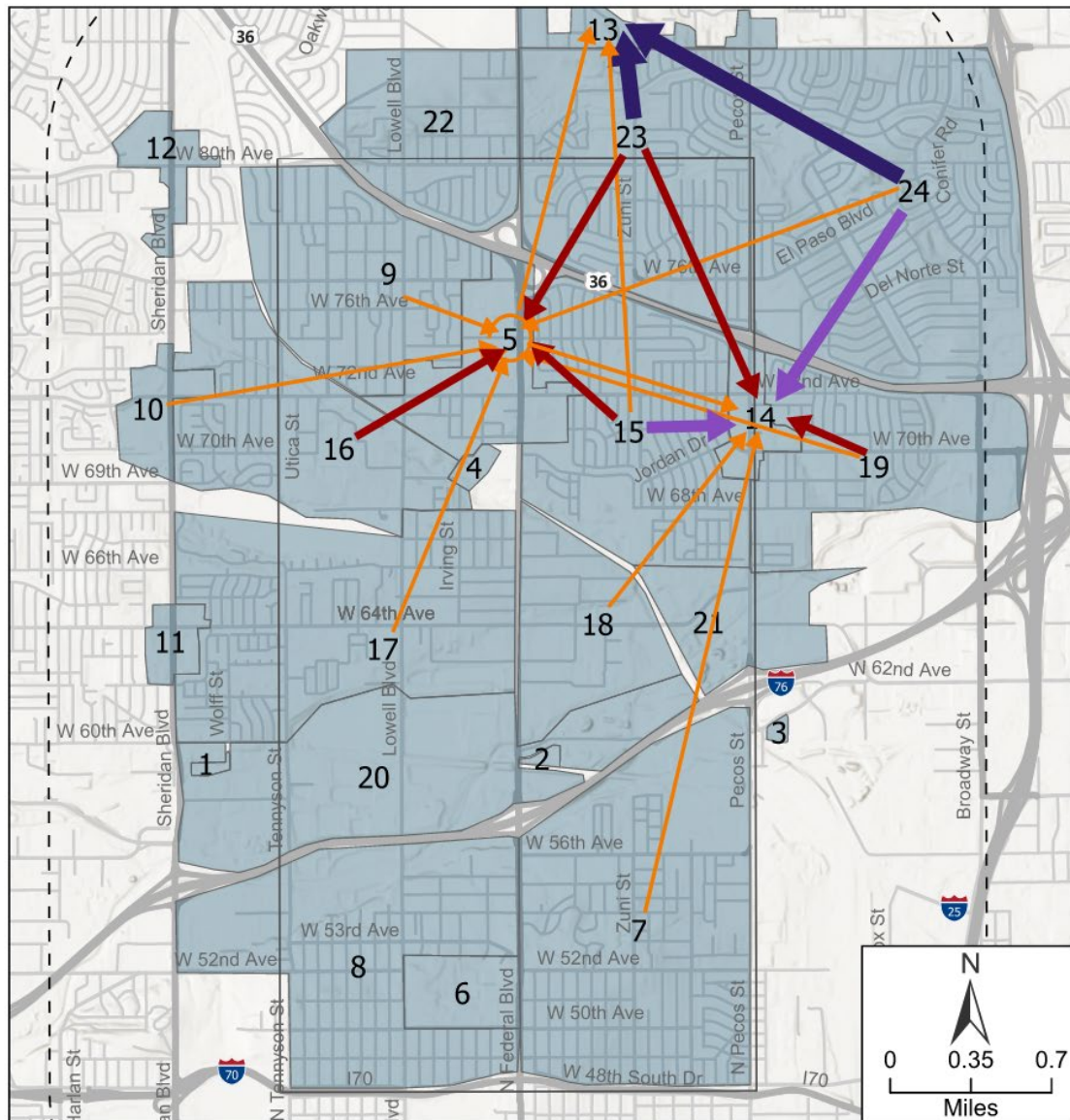
Zone 16, adjacent to Walmart and the Westminster station and containing Westminster High School, is a large origin for all three of the supermarket destinations and the Federal/72nd Commercial zone. Despite being adjacent to the zone 5 commercial area, trips from zone 9 more commonly go to the northern King Soopers (zone 12) and the Walmart at Sheridan and 72nd.

Figure 6. Origins of Supermarket Trips



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Figure 7: What are the top origins to Commercial Zones? (March-May 2023, Daily, All Day)



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Regional Travel

Travel Outside the Study Area

To understand where people in the study area are traveling to outside of the study area, an origin-destination analysis with larger regional geographies was conducted. In this analysis the origins are set as the custom zones within North Federal, and the destinations are municipal and county boundaries surrounding the study area.

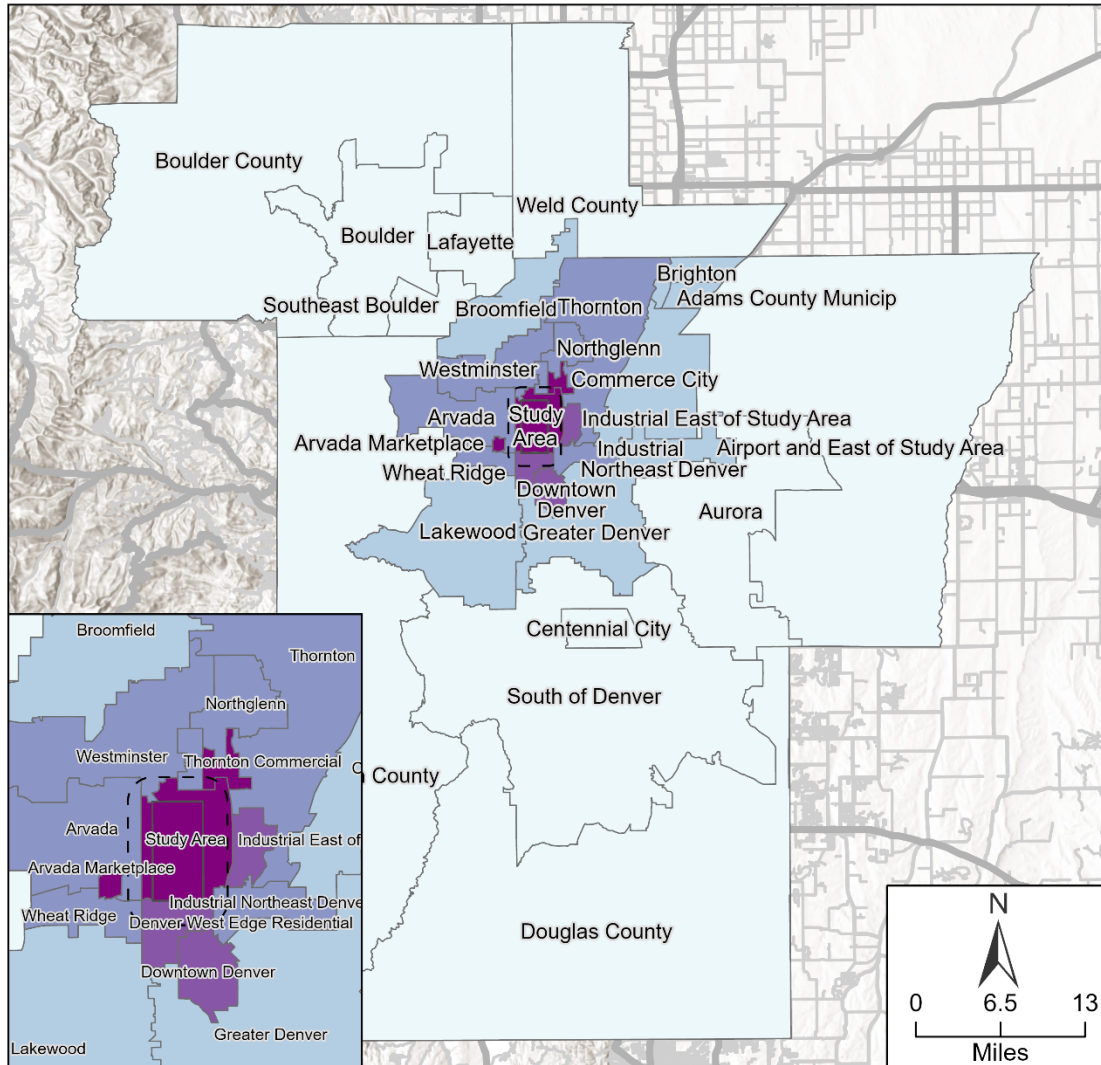
Table 2 and **Figure 8** displays the average daily distribution of all destinations for trips beginning in the study area across all days of the week and times of day. Twenty-eight percent of trips originating in the study area are internal travel. Trips outside the study area are concentrated mainly in the nearby regions of Denver, Thornton, Arvada, and Westminster.

Nearly 20% of external trips are to somewhere in the City of Denver, with 3% of all trips destined for Downtown Denver specifically. Thirteen percent of trips are to Thornton and 4% of trips are to the Thornton commercial area near I-25 and 104th Avenue.

Table 2. Top Regional Destinations

Neighborhood	Number of Trips	Percent of Trips
Study Area	40,844	28.2%
Denver Total	15,892	18.1%
Greater Denver	10,364	7.2%
Denver West Edge Residential	5,293	3.7%
Downtown Denver	4,558	3.1%
South of Denver	3,077	2.1%
Industrial Northeast Denver	2,964	2.0%
Thornton Total	18,440	12.7%
Thornton	12,865	8.9%
Thornton Commercial	5,575	3.9%
Arvada Total	14,948	10.3%
Arvada	12,514	8.6%
Arvada Marketplace	2,434	1.7%
Westminster	10,145	7.0%
All Other Locations	31,114	23.7%

Figure 8: Regional Destinations, All Day



Neighborhoods and Regions

Destination Traffic Trips/Square Mile

<=25

>25 - 150

>150 - 400

>400 - 900

>900

[- -] Study Area 1 Mile Buffer

Study Area

Source Data: Streetlight

Esri Basemap; SR 6428

Creator: Fehr & Peers

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Westminster Rail Trips

In addition to vehicle trips originating from the study area, person-trips (independent of mode) to and from the four surrounding rail stations were analyzed. LBS data was used for this analysis rather than CVD because it provides person trip data regardless of mode of transportation where CVD only provides vehicle trips. CVD was used in the other sections of this analysis because it is more up-to-date and reliable compared to LBS, but since many transit trips do not begin or end in a private vehicle it was important for us to use LBS data for this section. Rail origin and destination data was analyzed from March 1, 2022 – April 30, 2022.

Trip data was pulled for all rail stations in the study area: 60th and Sheridan, Clear Creek Federal, Pecos Junction, and Westminster. Sample sizes in the LBS data were found to be too small to when looking at individual rail stations to have confidence in a single station's origin destination pairs. For this reason, the project team combined the across the four rail stations listed previously to understand how important these stations are to travel in our study area. This analysis found that 50% of all trips going to or coming from the four light rail stations started or ended within our study area. This means that 50% of riders accessing those stations either live in our study area or use transit to access school, work, shopping, or other services in our study area. This finding confirms that connecting to light rail stations is an important component of a new community transportation service, especially in order to improve regional connectivity to the study area. The Westminster Station and Clear Creek Federal Station should be prioritized for connections to a new community transportation system because they are both central to our study area, between them serve the two commuter rail lines in the area (B and G) and connect to several bus routes including the 15-minute frequency section of the 31 that runs on Federal Boulevard.