

Transfort Route Improvement Project (TRIP) Report and Recommendations

November 2016

TRANSFORT



Prepared by:

TMD
TRANSPORTATION MANAGEMENT
& DESIGN, INCORPORATED

INTRODUCTION

The Transfort Route Improvement Project Report (TRIP) encompasses an assessment of Fort Collins' market opportunities for transit mobility and an analysis of Transfort ridership and service performance through a data-driven process in collaboration with community stakeholders. The findings from this analysis provide a framework for shaping route recommendations. Specifically, the report identifies opportunities to improve service quality, maximize the use of Transfort resources, continue ridership growth, and address unmet mobility needs.

The report begins with an overview of the underlying market conditions in the Transfort service area. Demographic and density data provide insight into the transit propensity and mobility needs across Fort Collins. Next, an analysis of the existing Transfort services evaluates the design decisions that shape these services and the impact that these decisions have on performance across different metrics. The report concludes with a summary of key findings and recommendations that will help guide the future growth of Transfort services. In August 2016, Transfort began implementing some of the recommendations that were developed as part of the TRIP process. Due to the recent implementation of those changes, they are not reflected in this report.

DATA SOURCES

The Market Assessment component uses American Community Survey (ACS) data from the US Census to analyze underlying demographics and population and employment densities. StreetLight data is used to understand community travel patterns.

The Service Analysis component utilizes monthly Transfort service data to evaluate performance measures at a route level. For time period and stop level analysis, the report uses Trip Summary and Automated Passenger Counter (APC) ridership data, respectively. Route Profiles, which include a more detailed summary of individual route characteristics, are found in the Appendix.

Prepared by:



Table of Contents

- Market Assessment.....6**
- Introduction..... 6**
- Service Area Overview..... 6**
- Population and Employment Density..... 6**
- Existing Conditions..... 6
- Population..... 6
- Employment..... 6
- Demographic Characteristics..... 7
- Median Household Income..... 7
- Zero Vehicle Households 7
- Seniors (Ages 65+)..... 7
- College-Aged (Ages 18-24) 8
- Transit Propensity..... 8
- Origin and Destination Analysis 16**
- Key Findings 16
- Transfort Service Analysis 21**
- Introduction..... 21**
- Service Overview 21**
- Service Design Decisions 23**
- Route Descriptions 23**
- Frequency 24**
- System Performance 29**
- Ridership..... 29**
- System Ridership 29
- Ridership by Time of Day 33
- Ridership by Route..... 33
- Productivity (Passengers per Revenue Hour) 35**
- Productivity by Time Period..... 35
- Productivity by Route 37
- Passengers per Revenue Mile 39**
- Customer Comments..... 41**
- Key Findings and Issues 42**
- Frequency Investments..... 42**
- Out-of-Session Network 44**
- Requests for New Service..... 44**
- Weekend Service 46**
- Leverage MAX Service..... 47**
- Infrastructure 47**
- Recommendations 48**
- Proposed Network..... 48
- Rider Benefits/Impacts 49
- Implementation Phasing..... 52

List of Figures

Figure 1: Population Density	9
Figure 2: Employment Density	10
Figure 3: Median Household Income	11
Figure 4: Zero Vehicle Households	12
Figure 5: Senior Population	13
Figure 6: College Student Population	14
Figure 7: Transit Propensity.....	15
Figure 8: Origin-Destination Zones.....	18
Figure 9: Origin-Destination Daily Trip Frequencies.....	19
Figure 10: Origin-Destination PM Peak Period Trip Frequencies	20
Figure 11: Transfort Existing Network.....	22
Figure 12: Transfort All Year Service vs. Seasonal Service	26
Figure 13: Average Weekday Ridership by Month (2015)	29
Figure 14: System Weekday Ridership Map (School Year).....	31
Figure 15: System Weekday Ridership Map (Summer).....	32
Figure 16: Weekday Ridership by Time Period.....	33
Figure 17: Average Weekday Boardings by Route (School Year)	34
Figure 18: Average Weekday Boardings by Route (Summer)	35
Figure 19: Weekday Productivity by Time Period (School Year)	36
Figure 20: Weekday Productivity by Time Period (Summer)	36
Figure 21: Weekday Productivity by Route (School Year)	38
Figure 22: Weekday Productivity by Route (Summer)	38
Figure 23: Weekday Passengers per Revenue Mile (School Year)	40
Figure 24: Weekday Passengers per Revenue Mile (Summer)	40
Figure 25: Summary of Public Comments	41
Figure 26: Productivity by Peak Frequency (School Year)	43
Figure 27: Productivity by Peak Frequency (Summer)	43
Figure 28: School Year Route Productivity Comparison.....	45
Figure 29: Productivity by Day Type (School Year).....	46
Figure 30: Productivity by Day Type (Summer).....	47
Figure 31: Proposed Interim Transfort Network.....	50
Figure 32: Proposed Long Term Transfort Network.....	51
Figure 33: Map of Ridership Impact	52

List of Tables

Table 1: Weekday Frequency Summary	25
Table 2: Weekday Service Spans	27
Table 3: Transfort Fare Structure	28
Table 4: Top Five Daily Boarding Stops (School Year)	30
Table 5: Top Five Daily Boarding Stops (Summer)	30
Table 6: Transfort Passenger per Hour Standards	37
Table 7: Standards for Passengers per Revenue Mile	39
Table 8: Ridership Impact Summary.....	49
Table 9: Proposed Interim Transfort Network Frequencies.....	53
Table 10: Proposed Long Term Transfort Frequencies	54
Table 11: Proposed Service Requirements.....	54

Market Assessment

Introduction

Understanding the demographic characteristics and geography of Fort Collins are key components of creating a transit network that meets the mobility needs of residents and visitors. The location and density of housing, employment, and key activity centers has significant implications on the ability of transit to provide efficient and effective service within the community. TRIP will use the findings from this market assessment to optimize network structure and route alignments, match frequencies with demand, and address unmet mobility needs.

Service Area Overview

Fort Collins is the fourth largest city in Colorado and the most populous in Larimer County. The city has a population of 163,000 spread over 56 square miles and is home to Colorado State University with over 32,000 students. Transfort is responsible for providing local transportation services within the City of Fort Collins as well as regional connections to surrounding communities. The agency operates 22 routes with 20 of them running all-day service.

Population and Employment Density

Existing Conditions

Population

Higher population densities are positive market indicators for transit success. These areas typically attract more passengers per unit of service than lower density developments because they have a bigger pool of potential customers from which to draw. Due to the short distances required to reach destinations in a high density environment, there is a stronger propensity to use transit, as well as walk and bike to complete trips. In the Transfort service area, the highest population densities are located around the CSU campus and along major corridors such as College Avenue and West Elizabeth Street. The remaining residential land uses are marked by lower density uses in both the core of the city and in outlying areas. Several higher density apartment complexes are interspersed throughout the city, but they are surrounded by the low-density, single-family homes. This pattern of development impedes the growth of frequent and productive transit service.

Employment

Like population density, areas with high employment support more productive levels of transit. These employment hubs can generate daily demand for transit due to work trips. However, the role of transit in these job centers will vary by type of employment. Corridors with commercial activity centers typically attract consistent levels of ridership throughout the day from both employees and customers, while other types of employment generate most of their demand during the peak periods. Industrial

employment centers are a challenge for Transfort to serve effectively. They are usually located in more remote locations and part of their work schedules fall outside of the more traditional 9-to-5 hours of business.

Employment in Fort Collins is concentrated around Colorado State University, downtown, and the Harmony Road and College Avenue corridors. These areas have the density and the type of commercial activity to attract higher levels of daily ridership.

Demographic Characteristics

Certain demographic groups utilize transit service more often than the general population due to a variety of factors including limited access to personal vehicles or financial constraints. Understanding the distribution of these populations throughout the service area will allow Transfort to address any unmet mobility needs and develop an effective strategy for serving those who must rely on it for their daily transportation needs through TRIP. A market analysis of demographic characteristics also ensures compliance with Title VI Federal regulations, which requires the identification and mitigation of disproportionate burden and disparate service impacts to those potentially underserved by the existing transportation network.

Median Household Income

Fort Collins has a lower median household income and higher poverty rate than the State of Colorado as a whole. The median household income in 2013 was \$53,780, which is below the state median of \$58,433. The poverty rate was 18.6% compared to 13.2% at the state level. These statistics are influenced by the large numbers of college students that reside within Fort Collins.

Low-income populations affect transit demand, as they are more likely to rely on transit for travel than households with higher incomes. In Fort Collins, the areas with the lowest median household income (<\$21,000/year) are in and around Colorado State University. Incomes increase outwards towards the city boundaries, where densities also begin to drop.

Zero Vehicle Households

Zero vehicle households rely on transit and other alternative modes of transportation to complete daily trips, some by choice (a growing subgroup), but most out of necessity. The highest concentrations of zero vehicle households in Fort Collins are found near Colorado State University, downtown, and along the College Avenue corridor between Drake and just north of Wilcox – areas currently served by Transfort.

Seniors (Ages 65+)

Seniors make up 8.8% of the population in Fort Collins compared to 10.9% at the state level. However, the senior population is expected to grow significantly both locally and at the state level in the next few decades. High concentrations of seniors exist at the numerous assisted living and retirement communities in Fort Collins. Many assisted living facilities are located near Harmony Road as well as Drake Road. The remaining senior facilities are spread throughout Fort Collins. Most of these facilities do not have direct easy access to existing transit corridors, which makes it more difficult and costly to provide mobility with the regular transit network.

College-Aged (Ages 18-24)

College-aged residents live throughout Fort Collins, but the highest concentrations are seen in major apartment complexes near Colorado State University as well as on campus in student housing. Through a partnership with the university, all students are eligible to receive a RAM Card (which prepays semester transit fares out of student fees), which allows them to ride Transfort services free of additional fares. This program combined with the high cost of parking on-campus means that CSU students represent a significant proportion of Transfort ridership. Because of this, particular attention should be paid to both where CSU students now live in Fort Collins (adjust transit to housing) and to future student housing locations (adjust housing locations to efficient high quality transit) to ensure that Transfort can provide heavily used transit cost effectively.

Transit Propensity

Transit Propensity scores are calculated using factors that are indicative of likely transit use. These include concentrations of college age residents, population and employment density, zero-auto households, and median income levels. Scores are assigned for each factor between zero and three depending on the density, percentage, or amount corresponding to the assumed transit responsiveness. Transit propensity is highest in the core of Fort Collins, close to CSU, and along the College Avenue corridor.

Population Density - Census Block Groups

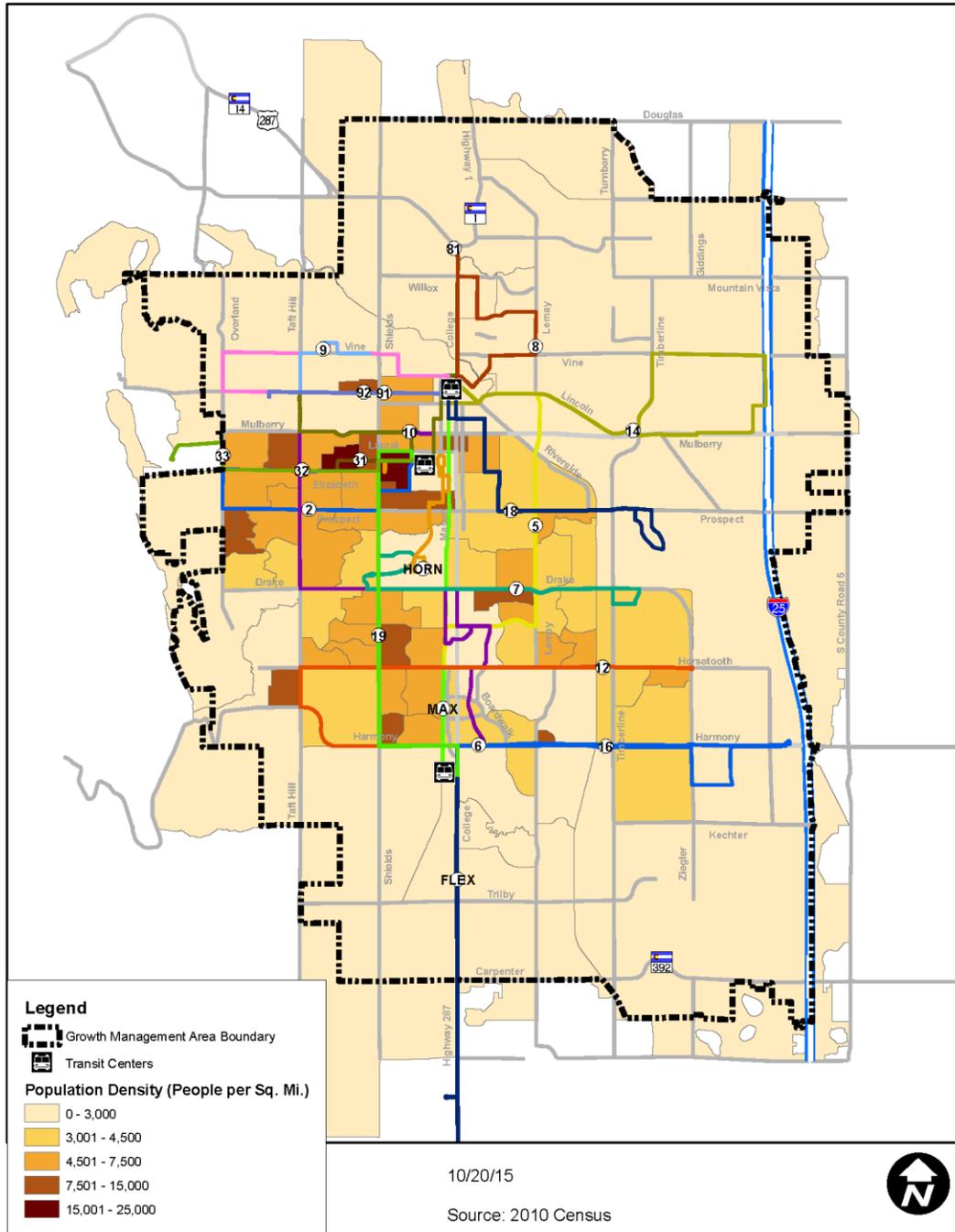


Figure 1: Population Density

Employment Density

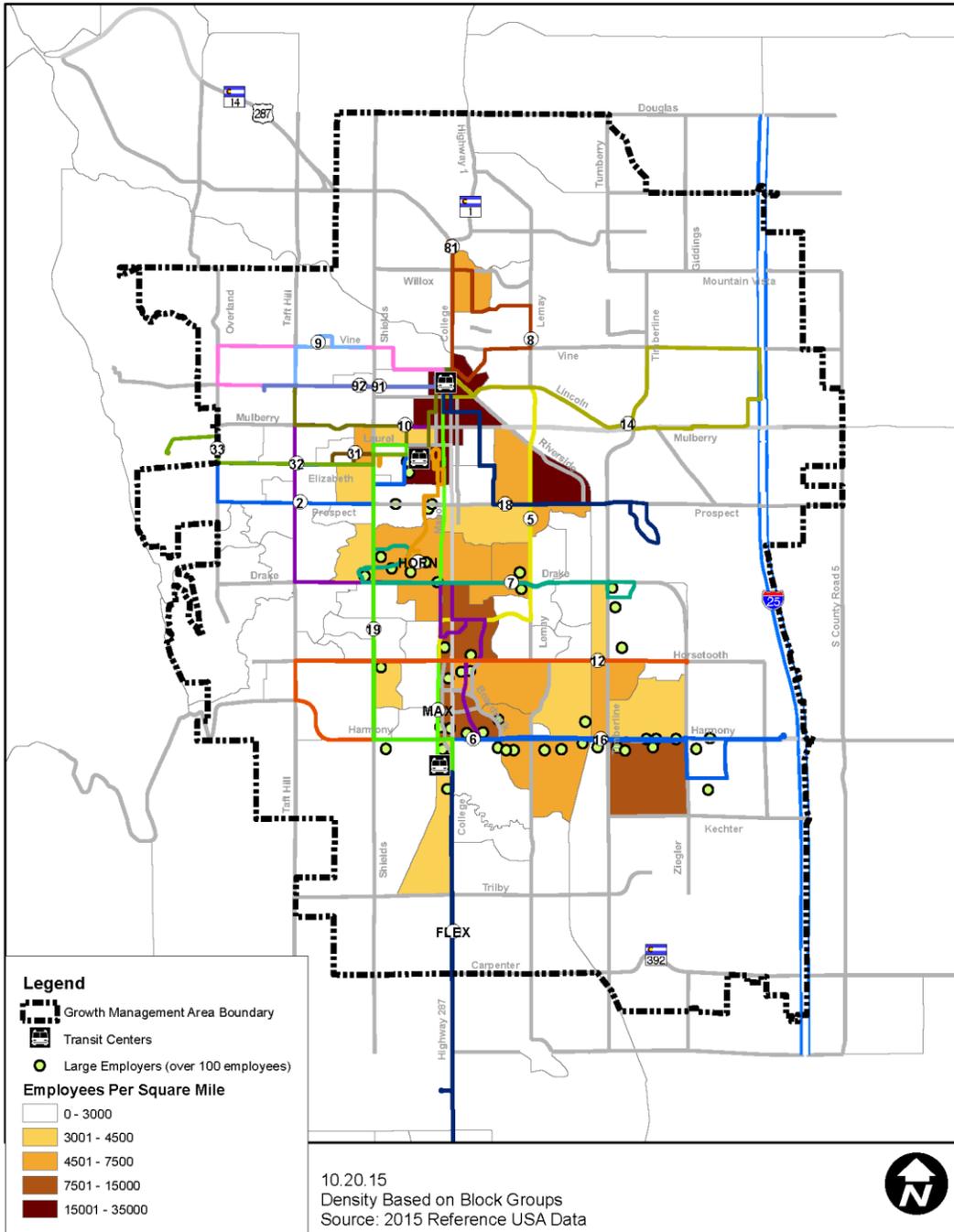


Figure 2: Employment Density

Median Household Income

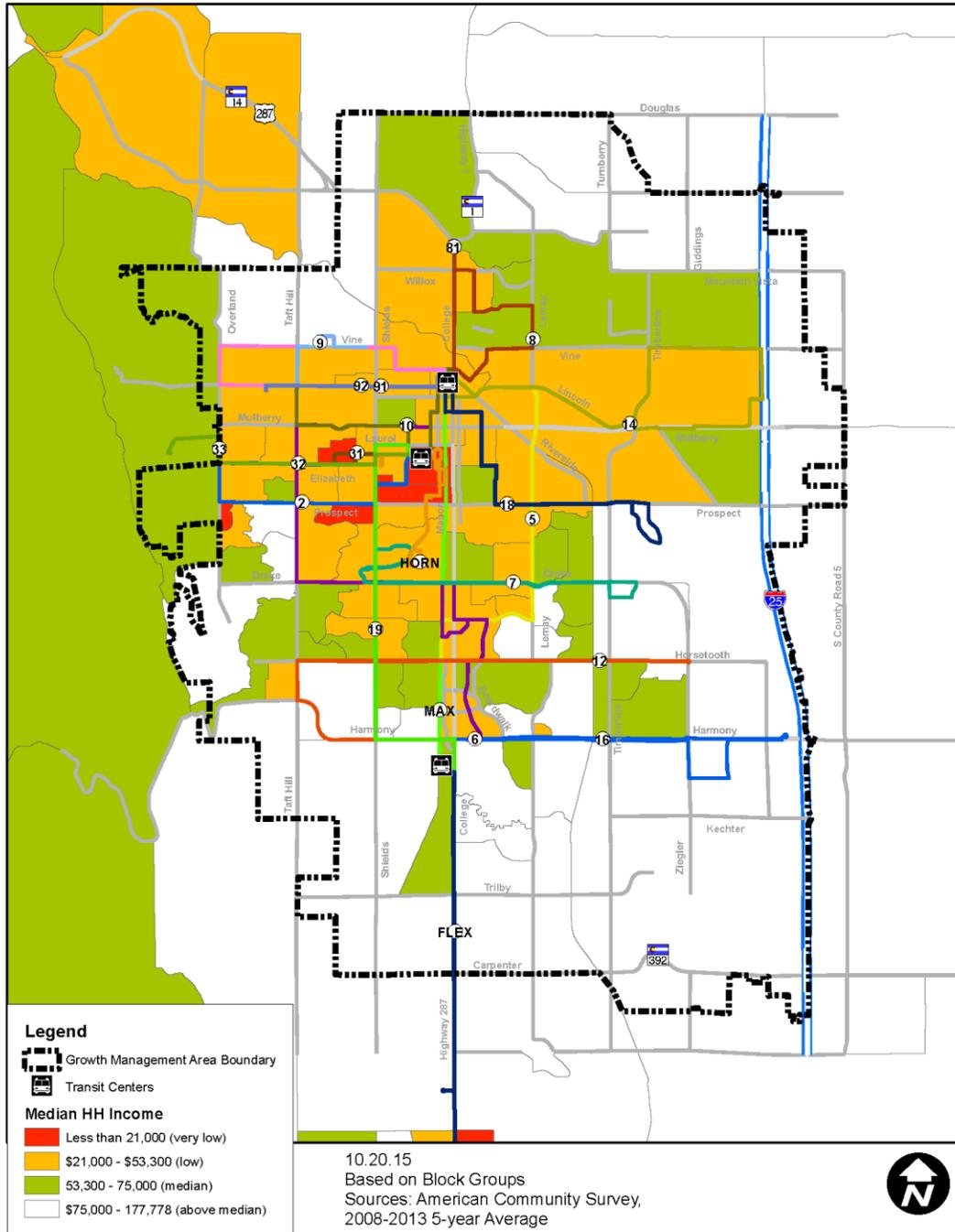


Figure 3: Median Household Income

Percent Zero Vehicle Households

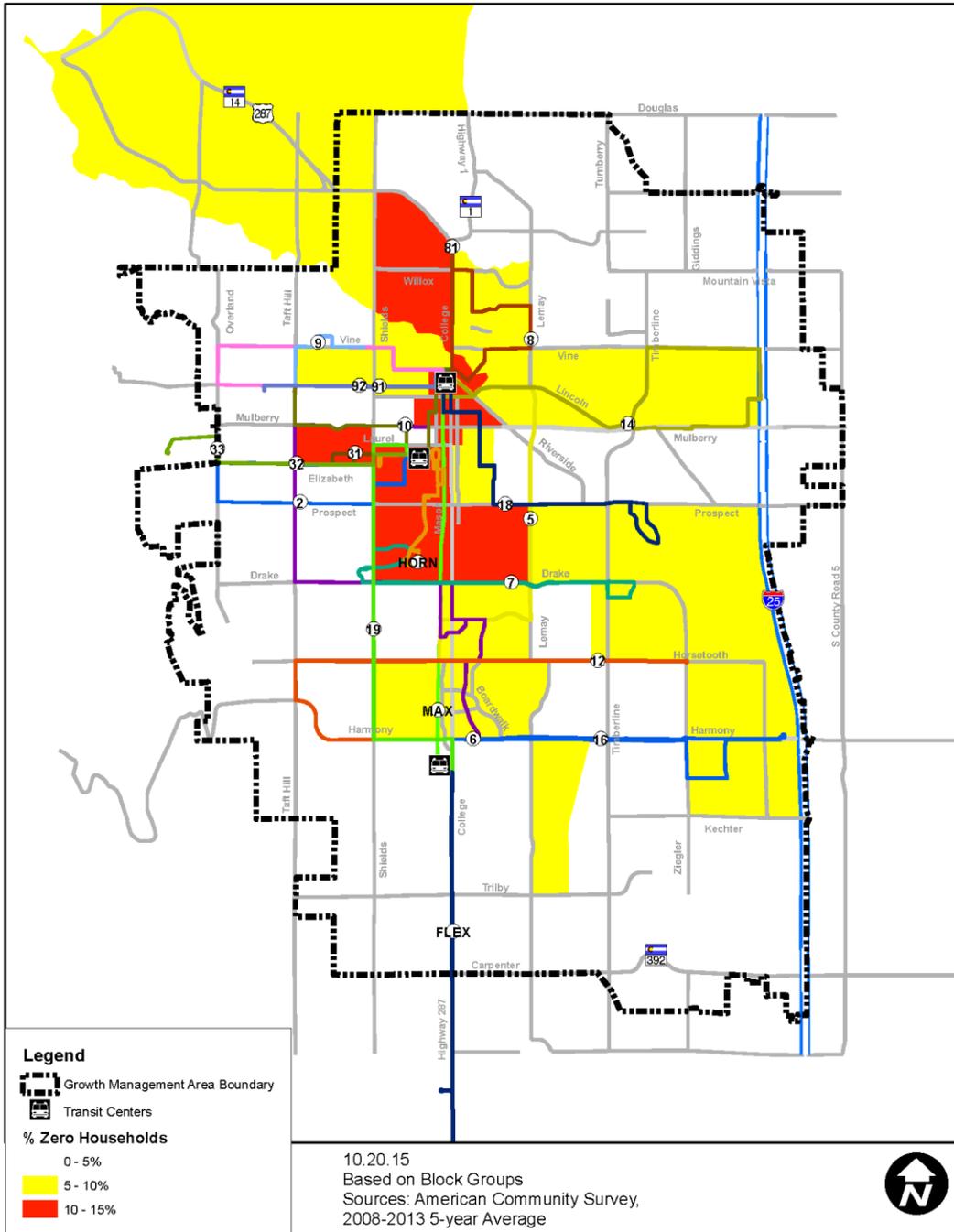


Figure 4: Zero Vehicle Households

Percent Senior Population

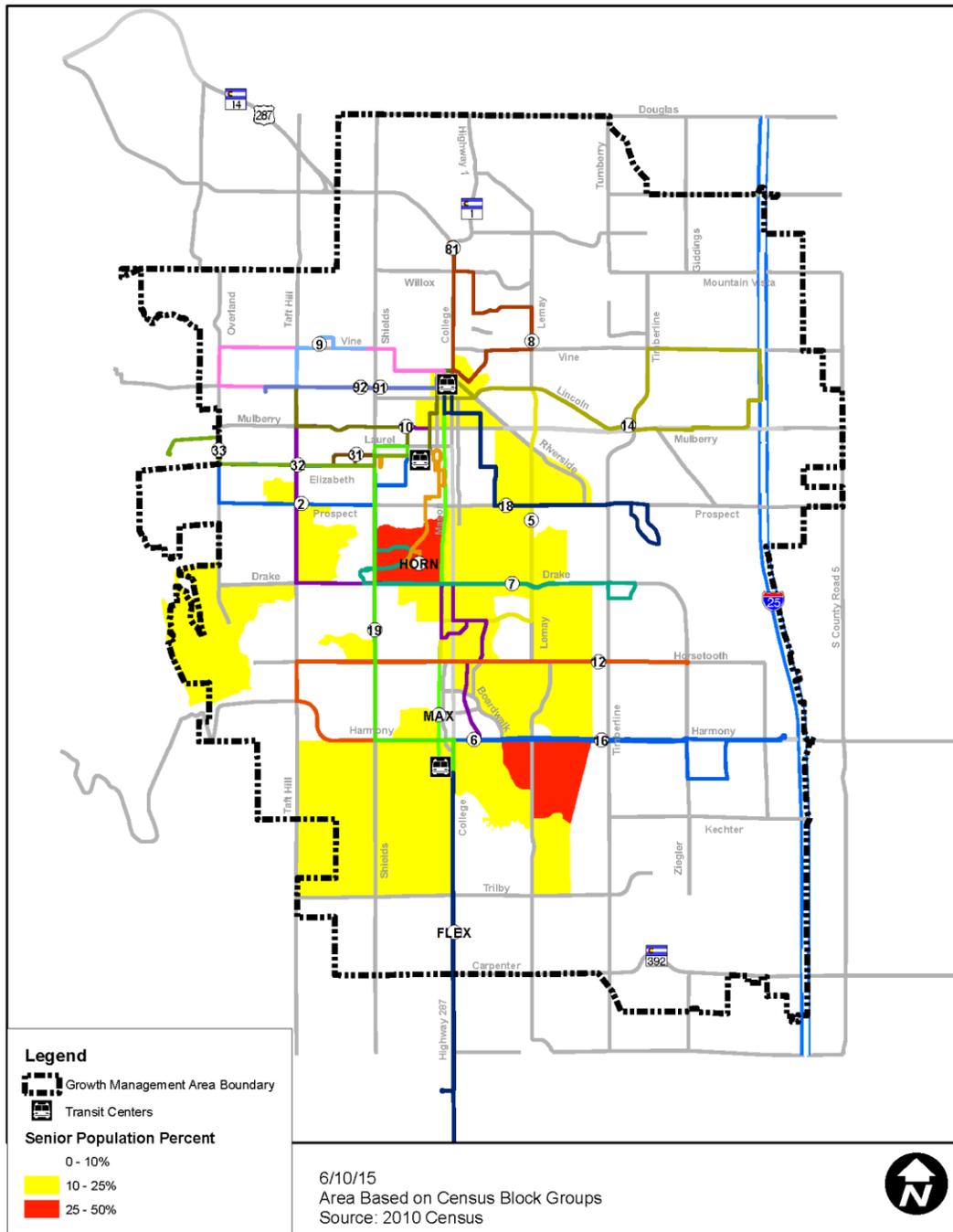


Figure 5: Senior Population

Percent College Student Population

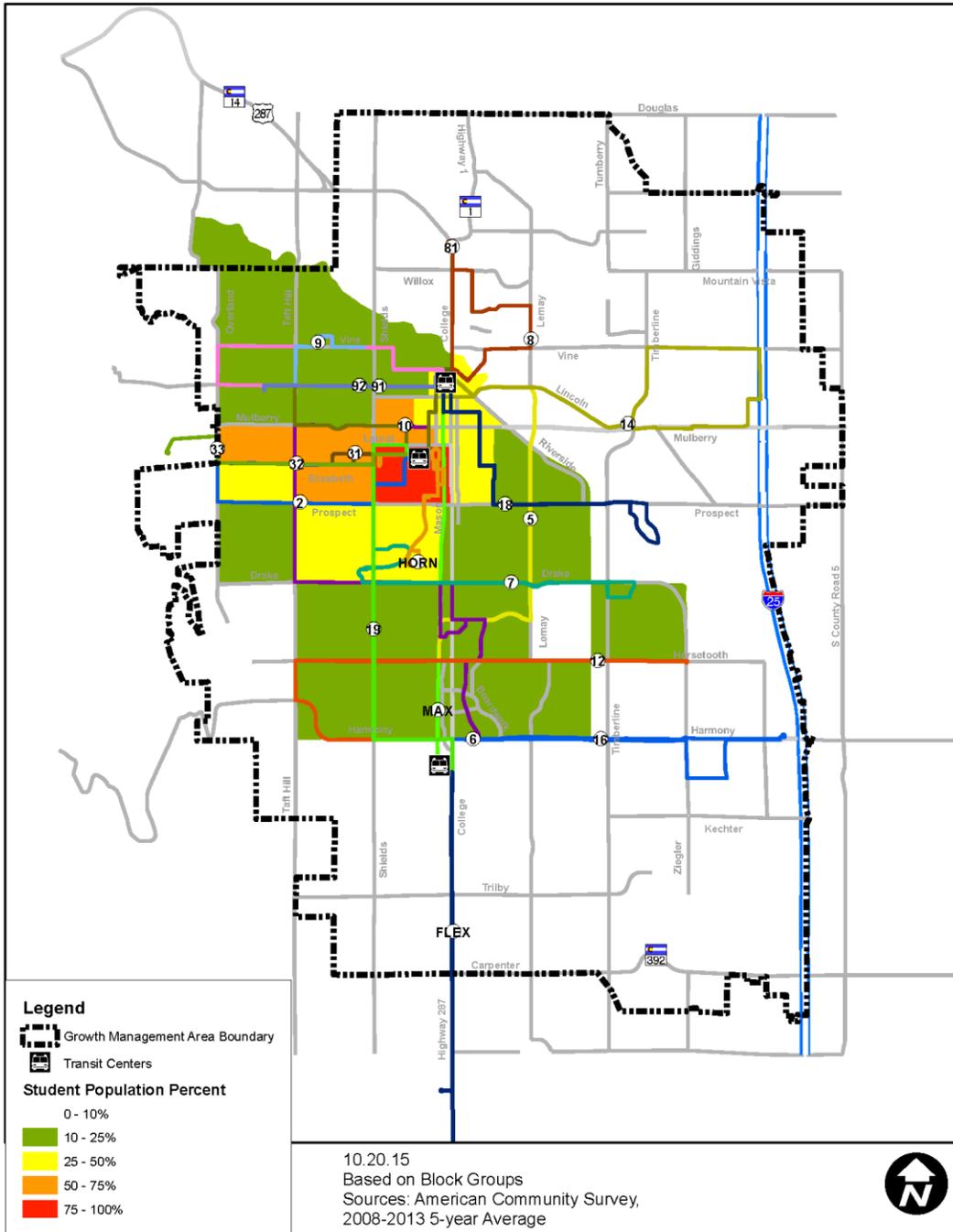


Figure 6: College Student Population

Existing Transit Propensity Analysis

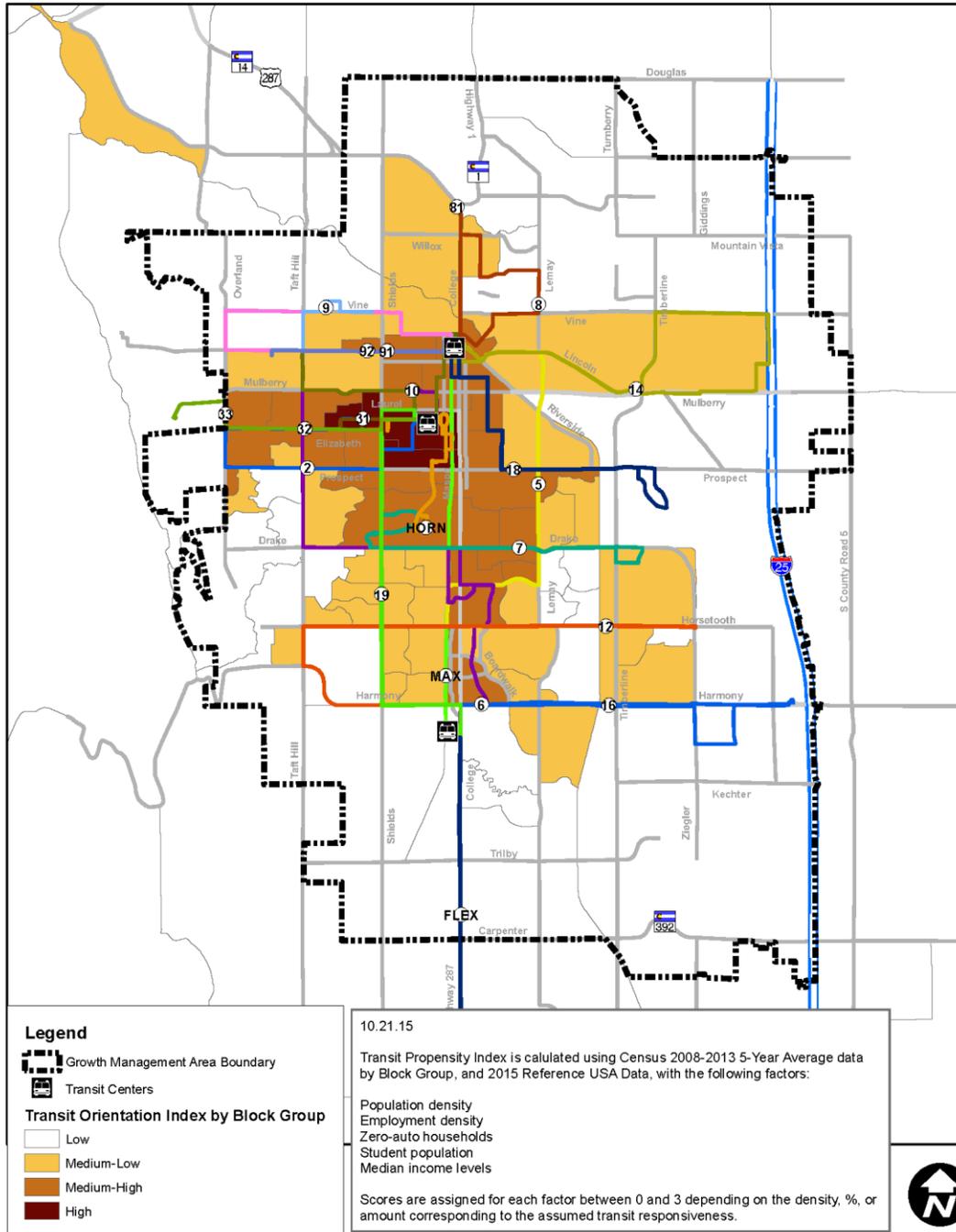


Figure 7: Transit Propensity

Origin and Destination Analysis

An origin-destination study of vehicle trips was completed within Fort Collins. The purpose of this study is to understand how the vast majority of trips are completed and identify the top trip pairs which will inform the development of Transfort services. As changes for the Transfort system are evaluated, the metrics provided in this study can be used to estimate the benefits of altering Transfort service.

Origin-destination data was obtained from StreetLight Data, who derives travel metric data from in-vehicle GPS navigation devices (either original equipment manufacturer devices or aftermarket devices). Origin-destination data was provided for 12 months between March 2014 and June 2015 (all months except for April-June 2014). Total origin-destination matrices for these 12 months were provided for three time periods: daily, AM peak period (6-10 AM) and PM peak period (3-7 PM). Origin-destination matrices are provided in units of trip frequencies. Trip frequencies are the real number of sample trips and are accurate relative to each other; however, trip frequencies are not intended to correspond to the real number of trips. The origin-destination data analyzed for this study only includes trips whose origin and destination is within Fort Collins (internal-internal trips); trips with an origin or destination outside of Fort Collins are not considered part of Transfort's potential market.

Key Findings

Key findings by time period are:

- In the daily time period:
 - Zones 7 and 21, generally off of Mulberry Road and Harmony Road, include a large number of trip ends. On a daily basis, it is likely that many pass-by trips have a trip end along Mulberry Road and Harmony Road. Additionally, because of the commercial land uses on Harmony Road, it is likely that many short trips occur between nearby businesses. As these trips may be pass-by trips from I-25 and/or are accessing a variety of low-density commercial uses, these trips may be difficult to serve with transit.
 - The two largest trip frequency values are between zones 17 and 21, these zones include areas north and south of Harmony Road between College Avenue and Timberline Road (zone 17) and Timberline Road and I-25 (zone 21), respectively.
 - The third largest trip frequency value is between zone 17 and zone 13. Zone 13 is generally centered on the Shields Street/Drake Road intersection.
 - A cluster of medium-value trip frequencies occurs between zones 10, 11, 12 (Downtown Fort Collins and Colorado State University), 13, 15 (generally centered on the Lemay Avenue/Drake Road intersection) and 17.
- In the AM peak period:
 - As in the daily time period, the two largest trip frequency values are between zones 17 and 21.
 - Similar to the daily time period, a cluster of medium-value trip frequencies occurs between zones 10, 11, 12, 13, 15 and 17.
 - Similar to the daily time period, large trip frequency values are observed between zones 17 and 21 and to/from zone 7.
- In the PM Peak period:

- As in the daily time period, the two largest trip frequency values are between zones 17 and 21.
- Trip frequencies between zones 10, 11, 12, 13, 15 and 17 generally represent a lower proportion of PM peak hour trips than in the AM peak hour.

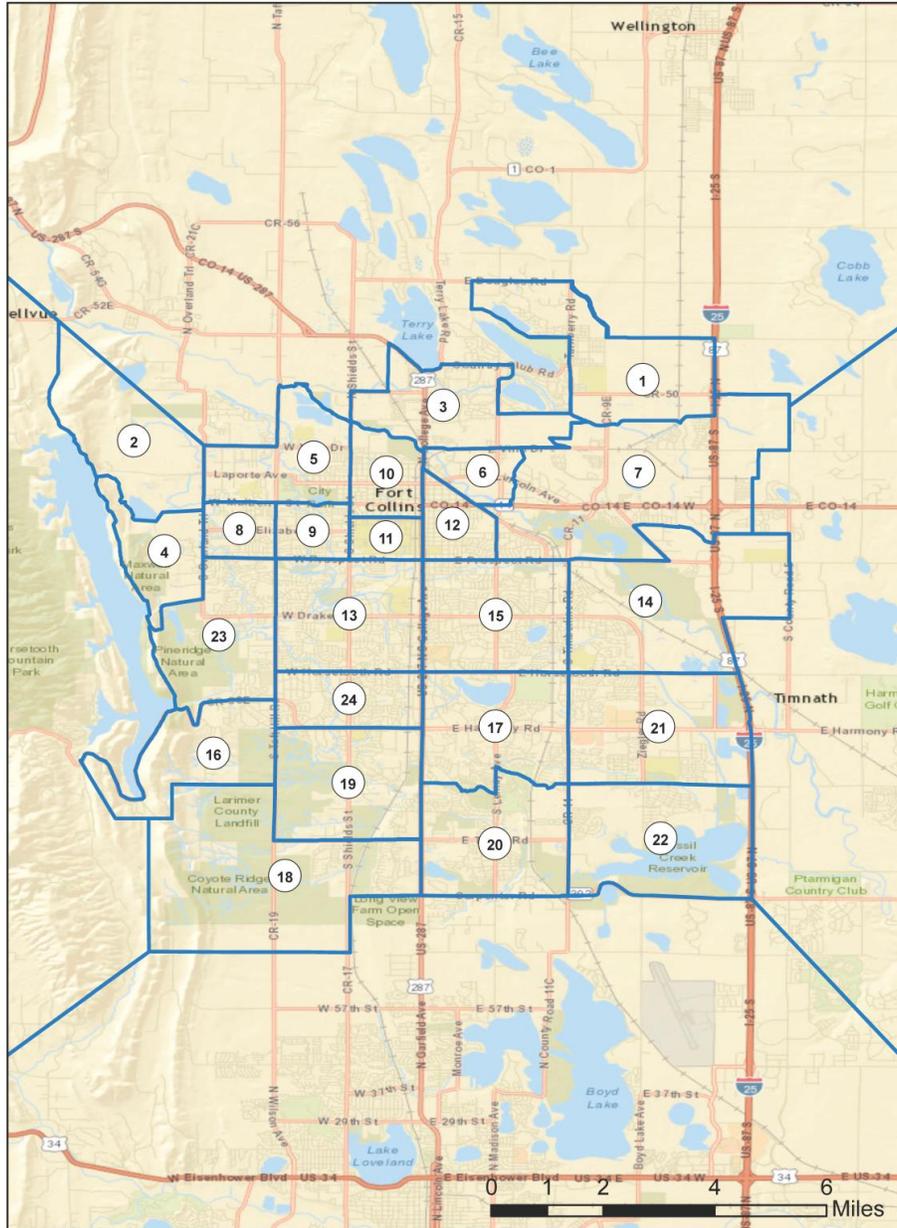


Figure 1: Origin-Destination Zones

Figure 8: Origin-Destination Zones

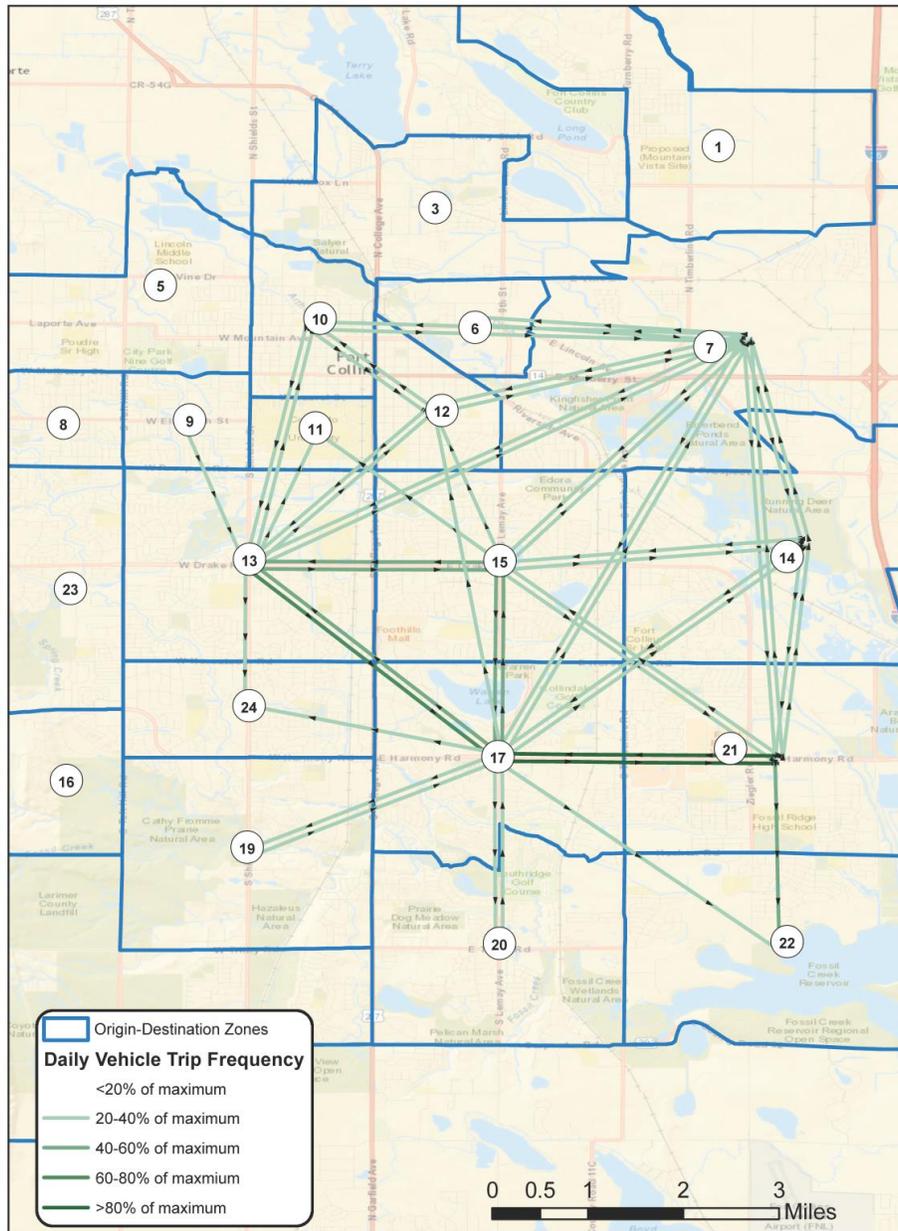


Figure 2: Daily Trip Frequencies

Figure 9: Origin-Destination Daily Trip Frequencies

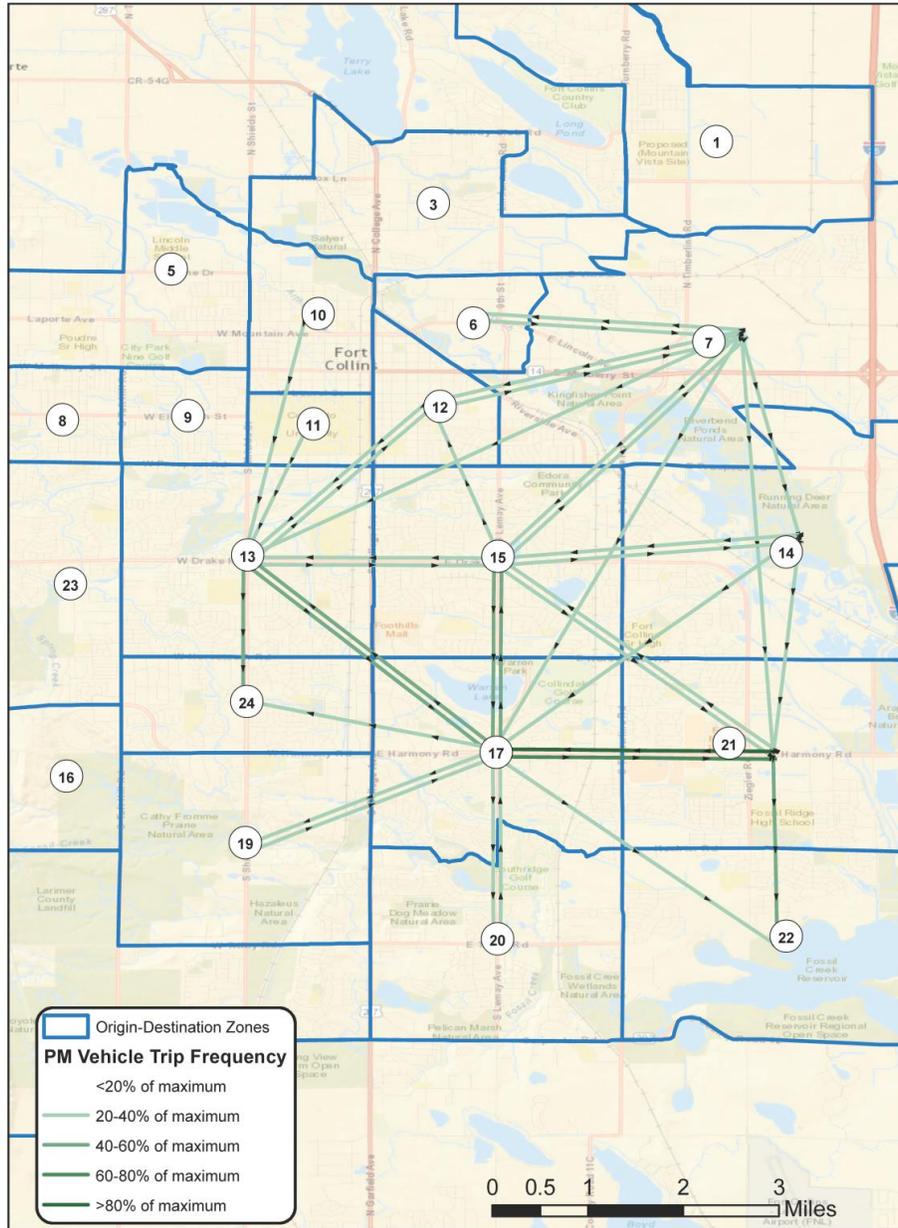


Figure 4: PM Peak Period Trip Frequencies

Figure 10: Origin-Destination PM Peak Period Trip Frequencies

Transfort Service Analysis

Introduction

The service evaluation will assess the existing Transfort network, describing the design decisions that shape how routes are used, and the impact that these decisions have on performance across different metrics. The key findings from this evaluation, combined with the findings from the market assessment, will form the framework for developing the proposed service recommendations.

Service Overview

Transfort is an agency within the Department of Planning, Development, and Transportation for the City of Fort Collins. The agency operates 24 fixed-routes to serve the City of Fort Collins. Local and shuttle routes provide community circulation with many feeding into MAX, the high frequency BRT network spine. FLEX is a regional service with connections to Loveland, Berthoud, Longmont, and now Boulder. Transfort also operates the CSU “Around the Horn” (Horn) as a campus circulator. The Gold and Green Routes run on Friday and Saturday nights connecting the CSU community and the Downtown Transit Center.

Transfort has designed a hybrid grid/hub-and-spoke network. In this configuration, passengers have access to frequent, grid-based service on key network spines. These spines are often mixed-use, high-density corridors that feed into key activity centers and hubs. Transfort is currently anchored by three hubs: Downtown Transit Center, Colorado State University Transit Center, and South Transit Center. Passengers can use these hubs to access lower density, residential communities via timed transfers to less frequent routes.

Transfort recognizes the impact that CSU has on transit demand and ridership. The agency has designed a network to match this market demand; Transfort invests more in university-based mobility when class is in session. Routes and frequencies change throughout the year based on the school calendar. This adds a layer of complexity and creates a barrier to transit usage. The service recommendations will evaluate opportunities to lower these barriers and effectively increase ridership across different market segments.

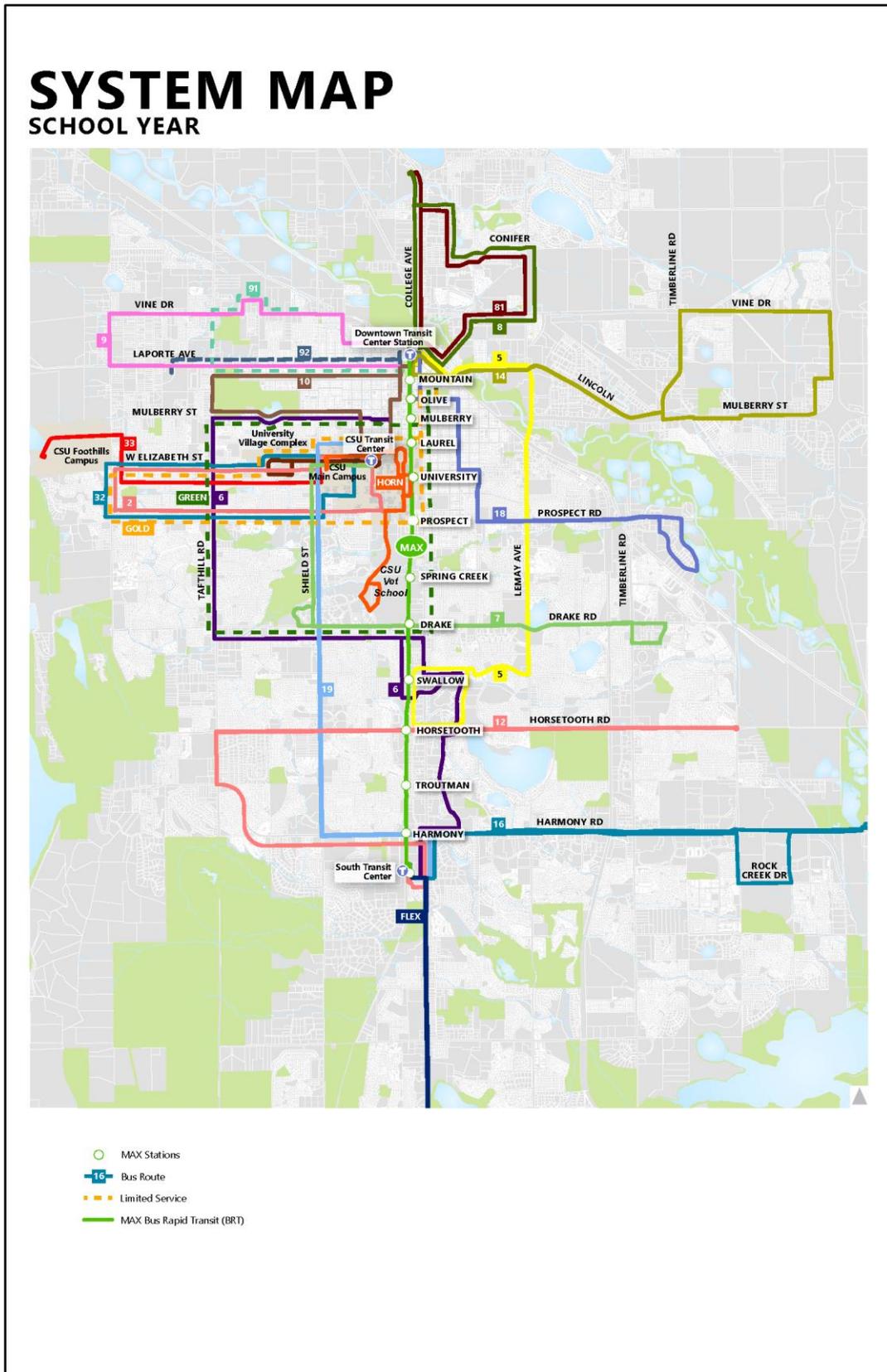


Figure 11: Transfort Existing Network

Service Design Decisions

This section begins with an overview of the design decisions for Transfort services. More specifically, the section describes how the agency structures its routes, spans, frequencies, and fares. These decisions directly influence how a route is used and how it performs.

Route Descriptions

Transfort routes each have a different role in providing regional, community, and neighborhood mobility.

- Route 5 is an hourly service that connects the Downtown Transit Center, Poudre Valley Hospital, and Foothills Mall primarily along Lemay Avenue.
- Route 7 serves the Shields and Drake Avenue Corridors with connections to CSU Transit Center, and the Drake Avenue MAX station.
- Routes 8 and 81 run counterclockwise and clockwise loops respectively in north Fort Collins connecting it to the Downtown Transit Center and the rest of the Transfort network.
- Route 9 runs in a counterclockwise loop in northwest Fort Collins primarily on Vine Drive and Laporte Avenue. The service is supplemented with two school trippers with their own route designations (91 & 92)
- Route 12 operates every 30 minutes as a crosstown service on Horsetooth Road and West Harmony Road with connections to MAX at the Horsetooth Road MAX station and South Transit Center and serving Foothills Mall and Front Range Community College.
- Route 14 serves Mulberry Street every 60 minutes along with portions of northeast Fort Collins.
- Route 16 serves East Harmony Road with major regional connections at the South Transit Center and Harmony Transfer Center.
- Route 18 runs on multiple streets on the eastside of Fort Collins. Major destinations include the Downtown Transit Center and the Midpoint Drive area.
- Routes 2, 32, and 33 are the primary services on the West Elizabeth Street. Route 2 is a year-round service while Routes 32 and 33 provide additional overlay service when CSU is in session.
- Route 31 is a high-frequency, walk extender that operates on Plum Street, a 3-minute walk from West Elizabeth Street.
- HORN operates on Plum Street from Moby Arena through the CTC to provide campus circulation to East Drive and Mason Trail.
- Route 10 is an hourly, one-way loop that runs north of the CSU Transit Center to the Downtown Transit Center.
- Routes 6 offers a north-south connection between CSU and the South Transit Center with direct connections to The Shops at Foothills Mall.
- Route 19 provides service on Shields Street providing a direct connection between CSU and the South Transit Center.
- MAX is the very frequent BRT spine that connects downtown Fort Collins and South Transit Center along a linear corridor between CSU and South College Avenue. Transfort launched MAX and a redesigned service network in 2014 to complement the BRT investment.

- Route 91 and 92 are afternoon school trippers designed to connect students from Poudre High School and Lincoln Middle School to the Downtown Transit Center.
- Gold and Green Routes run on Friday and Saturday nights year round connecting the CSU community and the Downtown Transit Center.

Frequency

Frequency is one of the most important attributes of a route because it influences both the attractiveness of a service¹ and the resources needed to operate it. At frequent service levels (every 15-minutes or better), passenger random arrival wait times are minimized and service comes often enough that most riders will not have to consult a schedule to plan their trips, they simply show up at the bus stop. Frequent transit makes a sustainable mobility lifestyle viable in the denser parts of communities.

Lifeline or basic mobility transit services operate at frequencies of every 60 minutes or less often. These frequencies require that passengers plan their trips in advance and often increase overall wait times, especially when transfers are involved. Passengers of lower frequency services typically arrive at stops earlier in order to ensure that they make their trip. The limitations of basic mobility frequencies make it difficult for these services to perform productively or cost-effectively. These frequencies are usually reserved for lower-demand, coverage-based mobility markets.

The table below shows existing weekday frequencies. Transfort adjusts frequencies based on school demand. Overall service levels decrease when CSU or the Poudre School District are not in session. Routes 31, 32, and 33 cease operation during these periods and Routes 19 and the HORN run with reduced frequencies. These frequency decisions reflect the significant changes in demand when school is not in session.

Routes have a wide range of frequencies, from basic mobility frequencies to high “spontaneous use” frequencies. This reinforces the notion that Transfort is willing to stratify its service product based on market conditions, which is an effective strategy. The highest frequency services are Routes 31, HORN, and MAX. These services operate every 10 minutes during the day and transit becomes a part of lifestyle mobility on these corridors. The lower frequency services such as Routes 5, 6, 9, 10, 14 and 18 target lower density corridors and neighborhoods providing lifeline mobility coverage.

¹ The top two attributes in attracting new customers are frequency and fast travel times in that order. Thus, fast, less frequent transit attracts fewer riders than a very frequent service with reasonable travel times. One that does both, like MAX, is highly attractive to consumers. Note that these attributes influence initial trial use of transit; delivering reliable, on-time service in sufficient capacity every day is the key to retaining customers.

Table 1: Weekday Frequency Summary

WEEKDAY FREQUENCIES				
Route	Frequencies (CSU In Session)			Change when CSU Out of Session
	Peak (AM/PM)	Midday	Saturday	
2	30	30	30	_____
5	60	60	60	_____
6	60	60	60	_____
7	30	30	60	_____
8	30	30	30	_____
9	60	60	60	_____
10	60	60	60	_____
12	30	30	60	_____
14	60	60	60	_____
16	30	30	60	_____
18	60	60	60	_____
19	30	60	N/A	60 minute frequency all day
31	10	10	N/A	Does not run
32	30	30	N/A	Does not run
33	30	30	N/A	Does not run
81	30	30	N/A	_____
HORN	10	10	30	30 minutes all day
MAX	10	10	10	_____
Gold ²	_____	_____	_____	_____

² Operate every 15 minutes late night on Fridays and Saturdays year round.

SYSTEM MAP

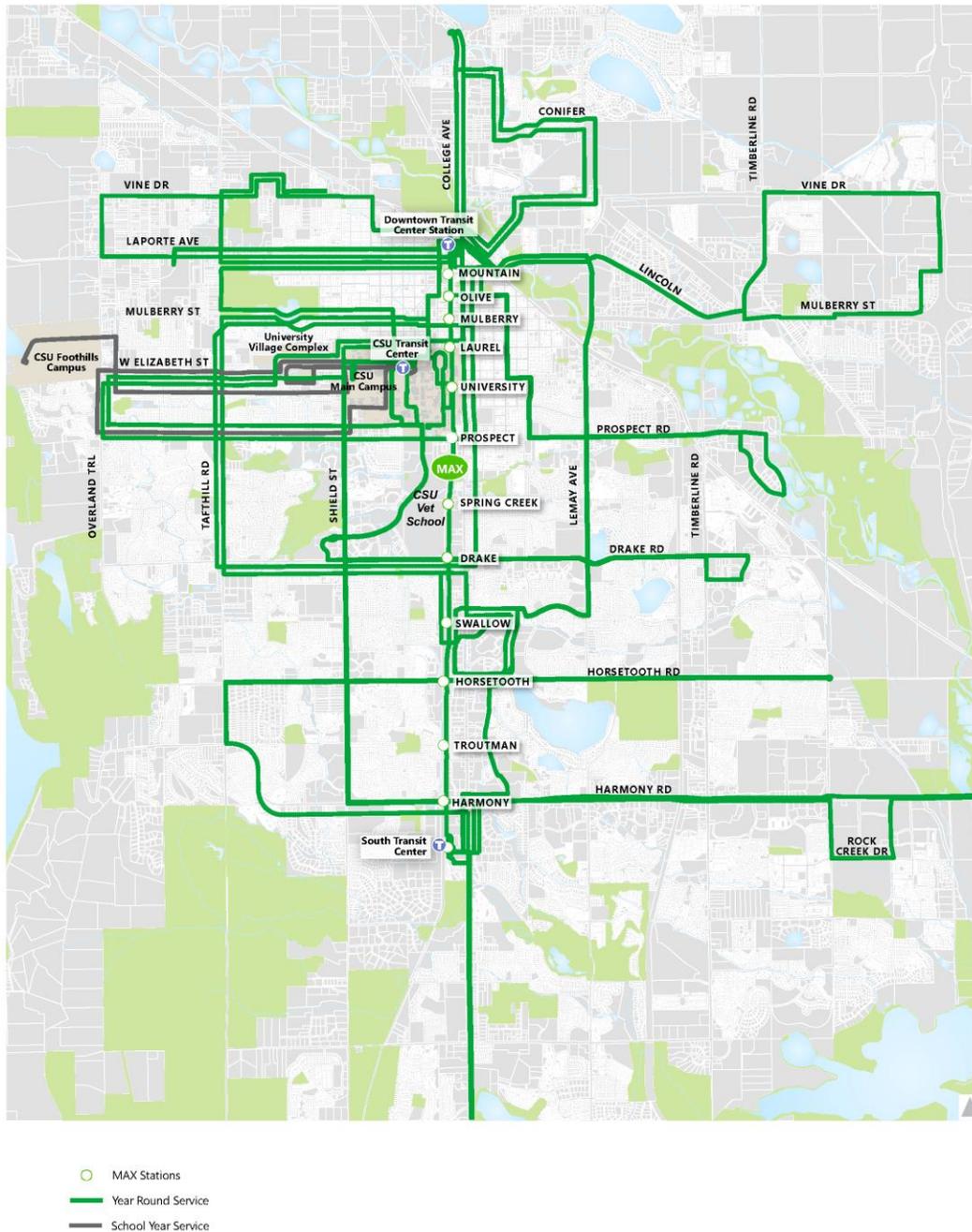


Figure 12: Transfort All Year Service vs. Seasonal Service

Service span describes the hours of operation for a transit service. A longer service span helps increase ridership by offering passenger more trip opportunities and an increased peace of mind. An increased span usually generates additional ridership at both ends of the trip since it makes round trips more feasible. Most of the services operated by Transfort start just before 7 AM and end between 6 PM and 7:45 PM. This span effectively serves traditional work trips, school trips, and midday circulation. This limits other types of trip making (i.e. service jobs, second shift, evening shopping) to the seven routes that operate late evening spans: Routes 2, 6, 7, 8, 12, 16, and MAX.

Table 2: Weekday Service Spans

WEEKDAY SPANS	
Route	Span (CSU In Session)
2	6:22 AM - 10:00 PM
5	6:05 AM – 7:15 PM
6	6:06 AM - 10:18 PM
7	6:40 AM – 10:34 PM
8	6:22 AM – 10:40 PM
9	6:15 AM – 6:38 PM
10	6:45 AM - 7:08 PM
12	6:35 AM – 10:34 PM
14	6:10 AM – 6:47 PM
16	5:54 AM – 10:44 PM
18	6:30 AM – 7:39 PM
19	6:52 AM – 7:43 PM
31 ³	6:52 AM - 7:43 PM
32 ³	6:58 AM - 6:20 PM
33 ³	6:50 AM - 6:40 PM
81	6:52 AM - 5:49 PM
HORN	6:42 AM - 6:38 PM
MAX	5:10 AM - 12:16 AM
Gold ⁴	10:30 PM – 2:30 AM
Green ⁴	10:30 PM – 2:30 AM

³ Operates only when CSU is in session.

⁴ Operate Fridays and Saturdays only year round.

The fare structure affects a system’s ability to attract riders, generate revenue, and stay financially sustainable. In addition to passenger fare revenue, Transfort receives funding from Colorado State University that allows CSU students to ride for free.⁵ The free fares allow students to use transit as part of their lifestyle mobility (augmenting walking and biking). This fare structure is a significant reason why students make up a substantial portion of Transfort ridership – spontaneous riding. The other single ride and pass fare pricing also encourages riding and is attractive for even the shorter trips that are prevalent in Fort Collins.

Table 3: Transfort Fare Structure

FARES AND PASSES		
Fare Group	Single Ride Fare	Annual Pass Price
Adult	\$1.25	\$154 ⁶
Seniors	\$0.60	\$25
Disabled and Medicare	\$0.60	\$25
Youth (17 & younger)	Free	Free
CSU students	Free	Free
Transfers	Free	NA
Late-Night Downtown Service (Green & Gold Routes)	\$1.00/\$0.50	Not Accepted

⁵ Technically, the students do not ride for free, but pre-pay for transit as part of their student fees.

⁶ Other Adult Passes are available: Day Pass \$3.00; 7 Day Pass \$10.00; 31 Day Pass \$25.00.

System Performance

This section evaluates the performance of the transit system across different performance metrics. The observed performance is the result of many factors, including service design decisions and local market conditions. The findings from this analysis provide insight into existing strengths and opportunities for improvement.

Ridership

System Ridership

The chart below displays the average weekday ridership for all routes combined. The data shows the influence of Colorado State University on transit demand. The University’s spring semester did not start until January 20, 2015. As a result, Routes 31, 32, and 33 did not operate and overall ridership volumes were lower for the month. Ridership also dropped in March and May through August when school was out of session due to spring and summer breaks.

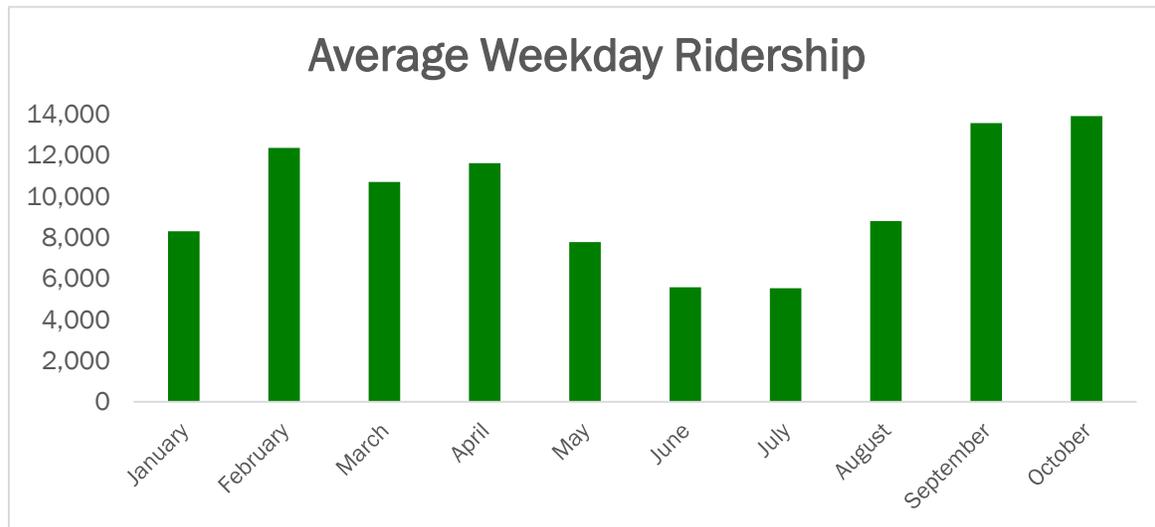


Figure 13: Average Weekday Ridership by Month (2015)

The maps below show how average weekday ridership is distributed across stops when school is in and out of session. When school is session, ridership is concentrated around the three hubs and such corridors as Elizabeth Street, Plum Street, and the MAX guideway. CSU is the anchor, generating nearly 3,000 boardings per weekday. Outside of these transit network spines, Prospect and Shield generate above average ridership for a corridor. The other corridors and communities attract lower, lifeline mobility levels of ridership.

The significant change in ridership when school is out of session manifests with ridership drops on West Elizabeth, Prospect, and Shield. The demand at the CSU Transit Center also drops by over 85

percent. The MAX guideway maintains its ridership and remains the dominant corridor when school is out of session. As well, Blue Spruce and Lemay retain their above average ridership during school breaks. Transfort already adjusts its structure to account for fluctuations in ridership, but the proposed service changes will consider additional opportunities to restructure the out-of-session network.

Table 4: Top Five Daily Boarding Stops (School Year)

TOP FIVE DAILY BOARDING STOPS (SCHOOL YEAR)	
Stop	Average Daily Boardings
CSU Transit Center	2,911
South Transit Center	869
Downtown Transit Center	761
Elizabeth & King Soopers	566
MAX University Station	370

Table 5: Top Five Daily Boarding Stops (Summer)

TOP FIVE DAILY BOARDING STOPS (SUMMER)	
Stop	Average Daily Boardings
South Transit Center	813
Downtown Transit Center	746
CSU Transit Center	372
MAX Drake Station	169
MAX University Station	147

SYSTEM RIDERSHIP

SCHOOL YEAR

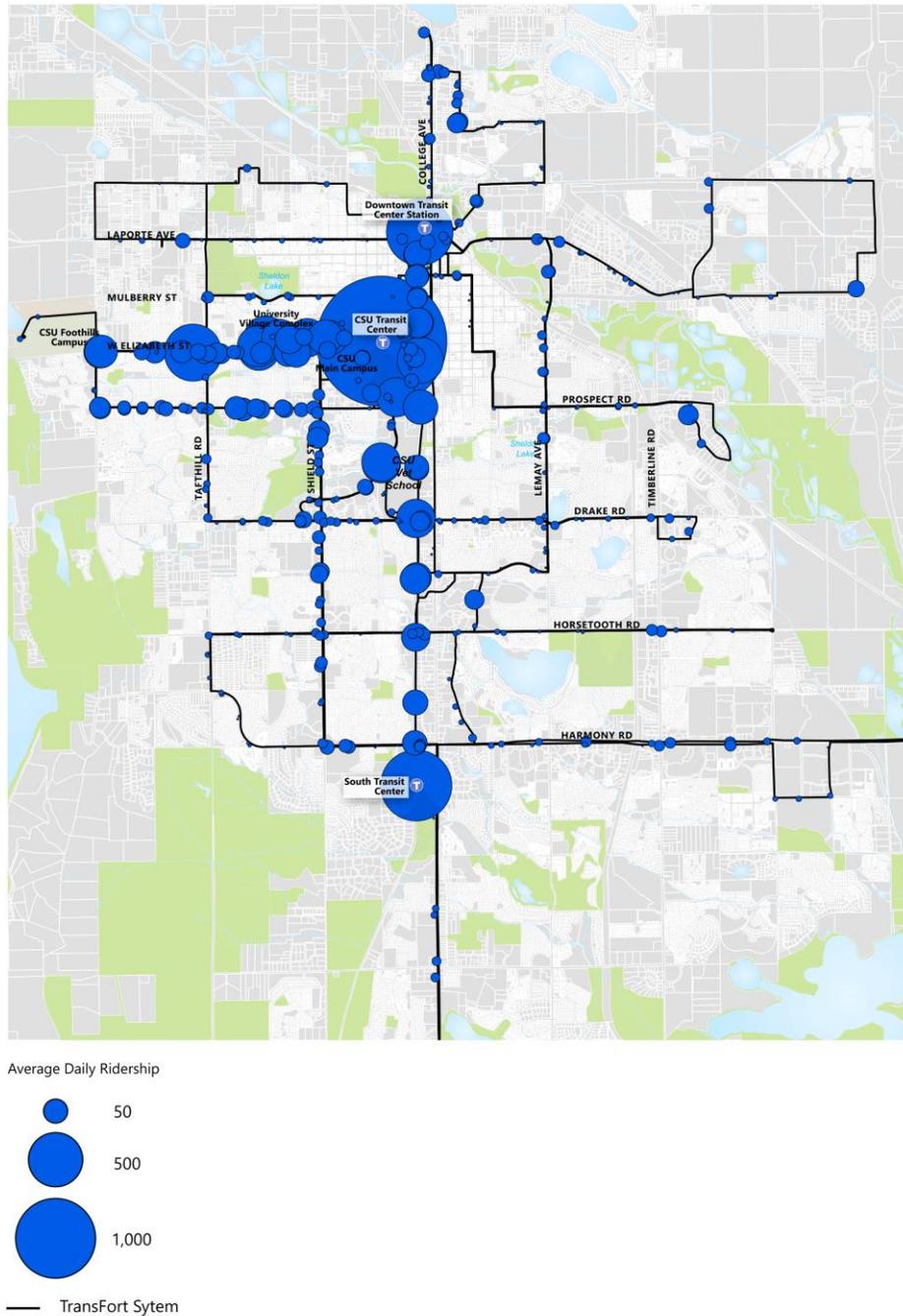


Figure 14: System Weekday Ridership Map (School Year)

SYSTEM RIDERSHIP SUMMER

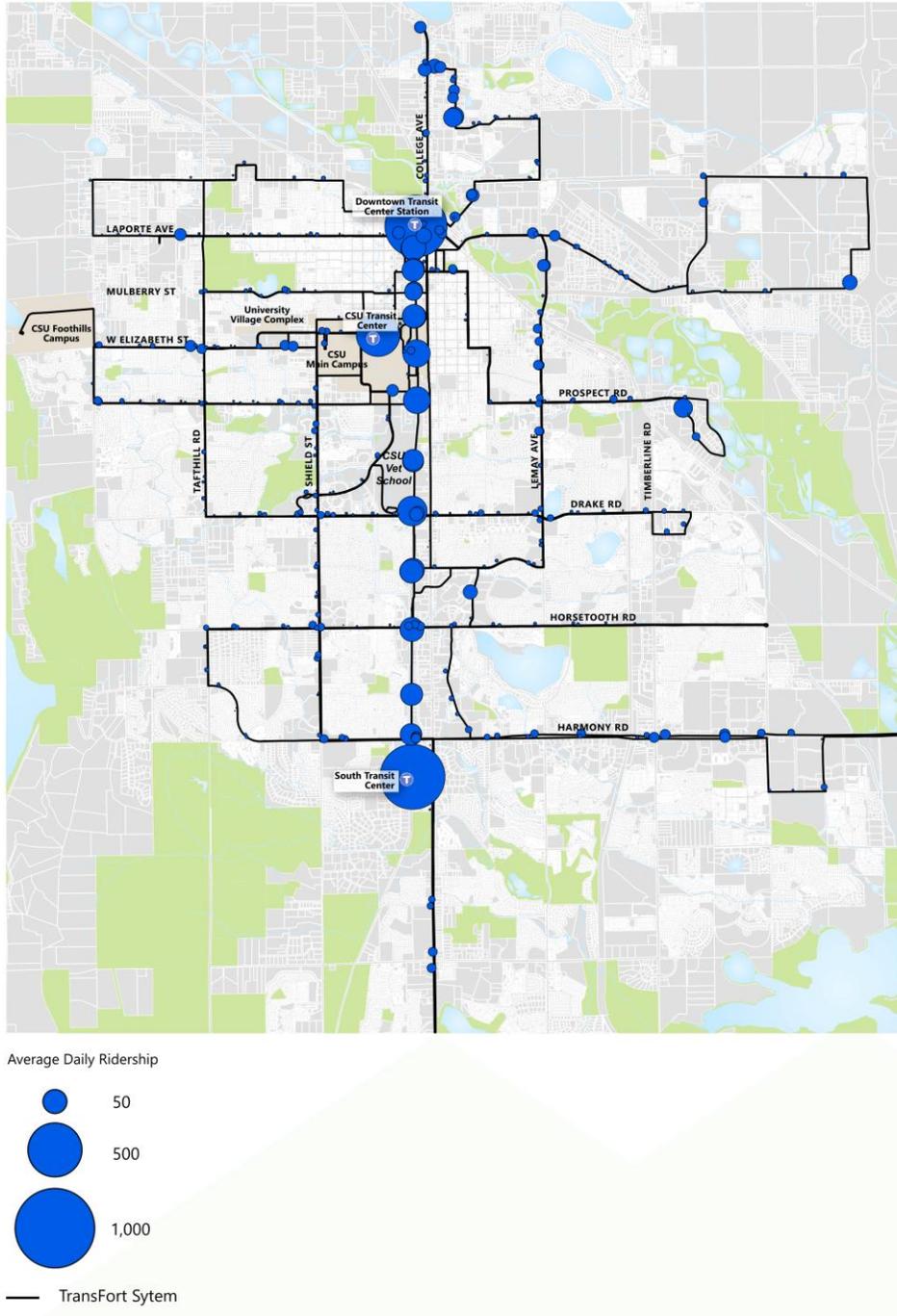


Figure 15: System Weekday Ridership Map (Summer)

Ridership by Time of Day

Evaluating ridership by time of day offers additional information on usage patterns that can help with resource investment and system optimization.

Transfort uses the following definitions for its time periods:

- AM Peak: 6:00 AM – 10:00 AM
- Midday: 10:00 AM – 3:00 PM
- PM Peak: 3:00 PM – 7:00 PM
- PM (Evening): 7:00 PM – 11:00 PM
- Late Night: 11:00 PM – 3:00 AM

The ridership distribution by time period does not deviate from expectations given that frequencies are fairly consistent throughout most of the day. In many systems that provide lifestyle mobility rather than just work and school commute travel, the midday ridership will equal the sum of AM and PM Peak time periods. Transfort mostly follows this positive pattern once the expanded peaks are taken into account. The low ridership during the evening reflects the significant drop in evening service levels after the PM Peak Period.

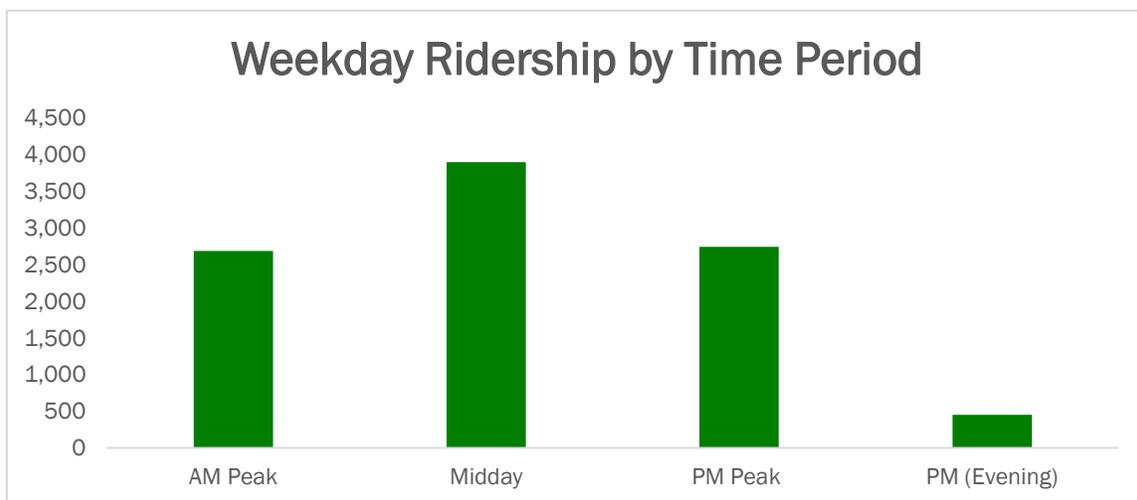


Figure 16: Weekday Ridership by Time Period

Ridership by Route

In addition to ridership being concentrated across key corridors and centers, ridership is also concentrated at the route level. Routes 31 and MAX account for approximately 42 percent of the average weekday boardings in the entire Transfort system when CSU is in session. Passengers have responded positively to these frequent, linear routes. These services provide key connections to major destinations and hubs such as CSU, CTC, downtown Fort Collins, and South Transit Center. MAX continues to play a significant role in transit mobility even when school is out of session.

Routes 2 and 32 have the third and fourth highest ridership. These routes provide direct connections to CSU in complementary loops west of campus. These routes serve West Elizabeth Street and West Prospect Road, corridors with large concentrations of CSU students. However, when CSU is not in

session, ridership on Route 2 drops significantly and Route 32 no longer runs. This part of the network is especially sensitive to university-based demand.

HORN is the fifth highest ridership service due to strong transit demand at CSU. The “Around the HORN” provides campus circulation every 10 minutes when the university is in session. While it is the fifth most popular route, HORN carries just 1/3 the riders of Route 31. This may be the result of CSU being very walkable which makes transit circulation less necessary, especially when the route is operating around the periphery of campus.

FLEX service is also important to the overall network and region. As the route with the sixth highest ridership in the system, FLEX provides connections to Longmont and Loveland and now Boulder. The top six routes operated by Transfort account for 2/3 (67%) of system ridership.

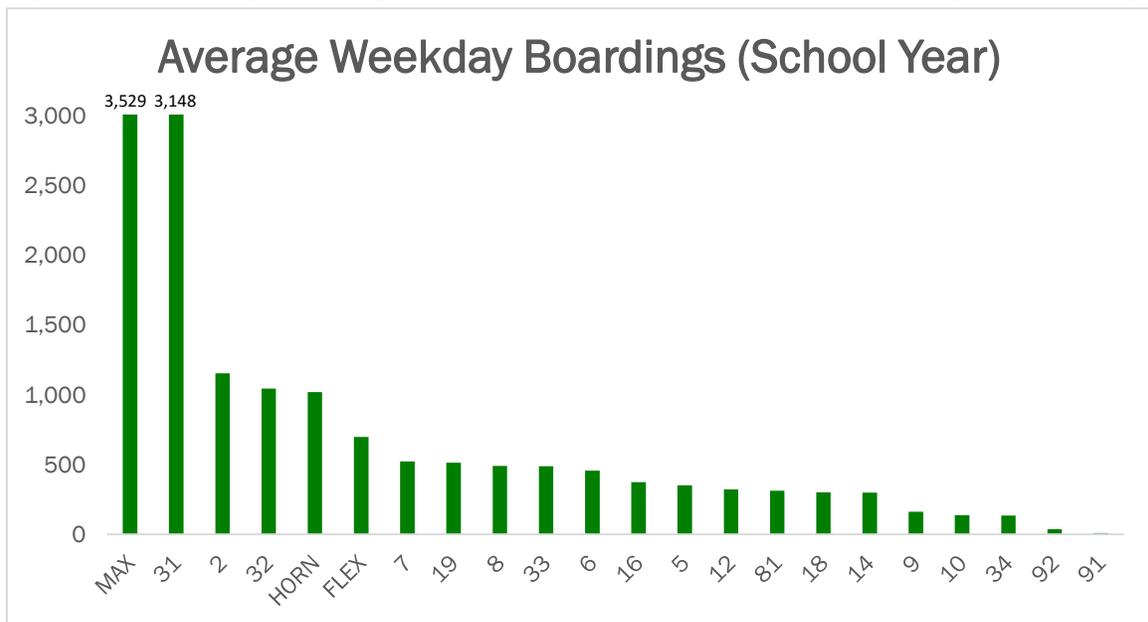


Figure 17: Average Weekday Boardings by Route (School Year)

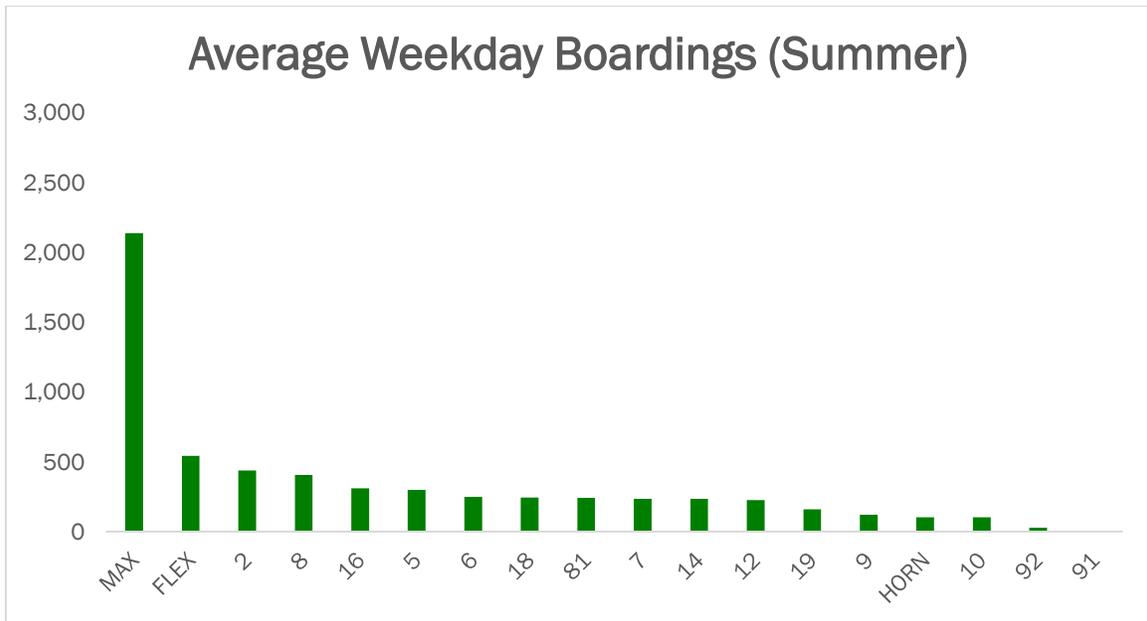


Figure 18: Average Weekday Boardings by Route (Summer)

Productivity (Passengers per Revenue Hour)

Productivity by Time Period

Productivity is a service effectiveness metric which measures average ridership per unit of service. The average productivity for Transfort fixed-route, all-day service is 39 boardings per revenue hour during the school year. This high level of productivity satisfies Transfort’s standards for most service types. When broken down by time period, midday service is the most productive period. This is a strong indication that transit is providing lifestyle mobility in key areas around the University and along the MAX corridor. However, there are still opportunities to improve overall productivity throughout the service area.

During the summer months when CSU is out of session, productivity drops to 23 boardings per revenue hour. The decrease is seen consistently throughout all time periods. Despite Transfort’s reduction in service hours during out-of-session periods, this significant drop in productivity indicates that there is still a mismatch between the out-of-session transit network and the market demand for service.

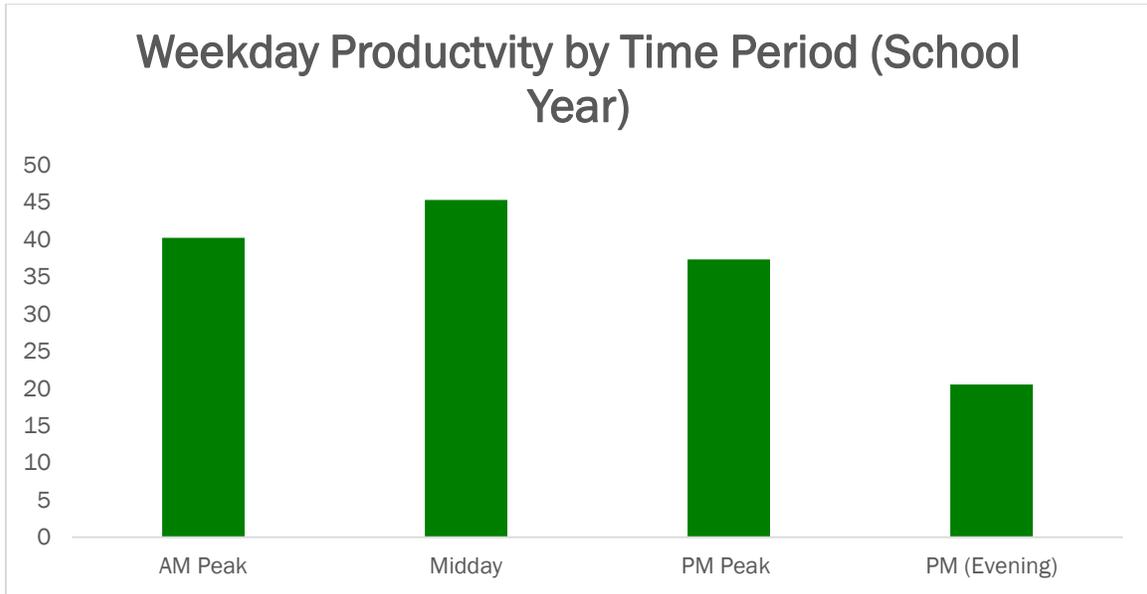


Figure 19: Weekday Productivity by Time Period (School Year)

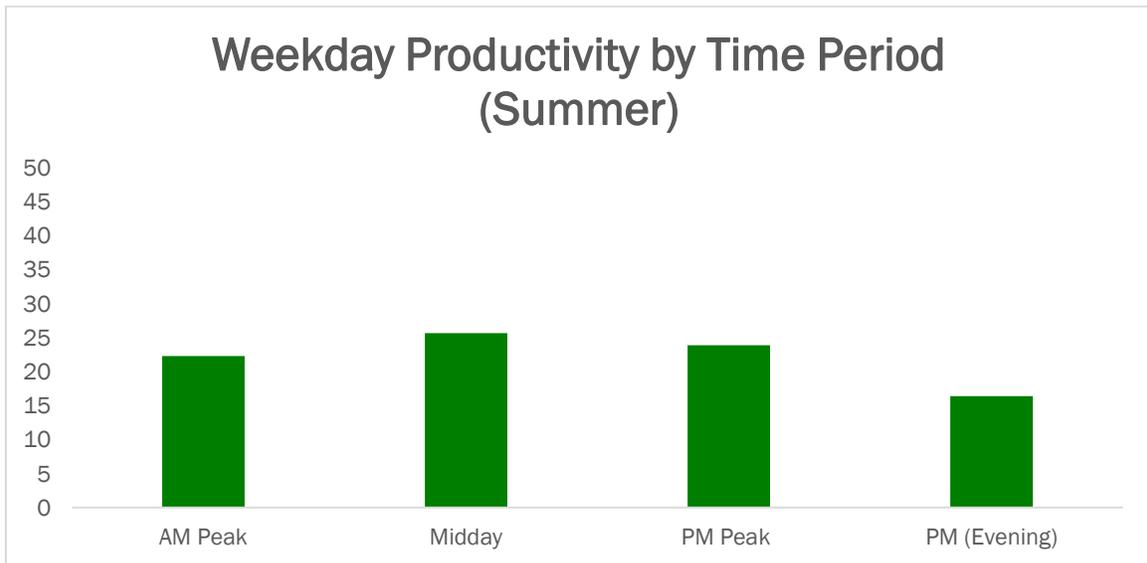


Figure 20: Weekday Productivity by Time Period (Summer)

Productivity by Route

Route level productivity highlights critical information on the efficiency of individual route design. A route can generate a high level of ridership, but if its design uses resources inefficiently to operate, its productivity will suffer.

Transfort has established performance standards for routes based on service type. The agency recognizes that different routes should have different expectations based on their role in the network. University-based services have higher thresholds given their larger potential market.

Table 6: Transfort Passenger per Hour Standards

TRANSFORT PASSENGER PER HOUR STANDARDS				
Classification	Rapid Route	University Route	Residential Route	Commercial Route
Exceeds	>50	>60	>40	>30
Satisfactory	41 - 50	30 - 60	20 - 40	20 - 30
Marginal	20 - 40	20 - 30	15 - 20	15 - 20
Unsatisfactory	<20	<20	< 15	< 15

Routes 31, 32, and 33 are able to generate more than the minimum 30 passengers per revenue hour for university routes. In fact, Route 31 greatly exceeds the top university route standard by over 2½ times, generating more than 100 passengers per revenue hour. Transfort has developed a well-designed, highly effective route that presents some lessons learned for the rest of the service area: frequent, direct alignment, that’s easy to understand and use, and uses resources efficiently – generates high ridership. The RamCard and free fares for CSU students play a key role in the route’s productivity, but Route 31 still reflects some of the best practices in design. The most productive routes operate with direct alignments.

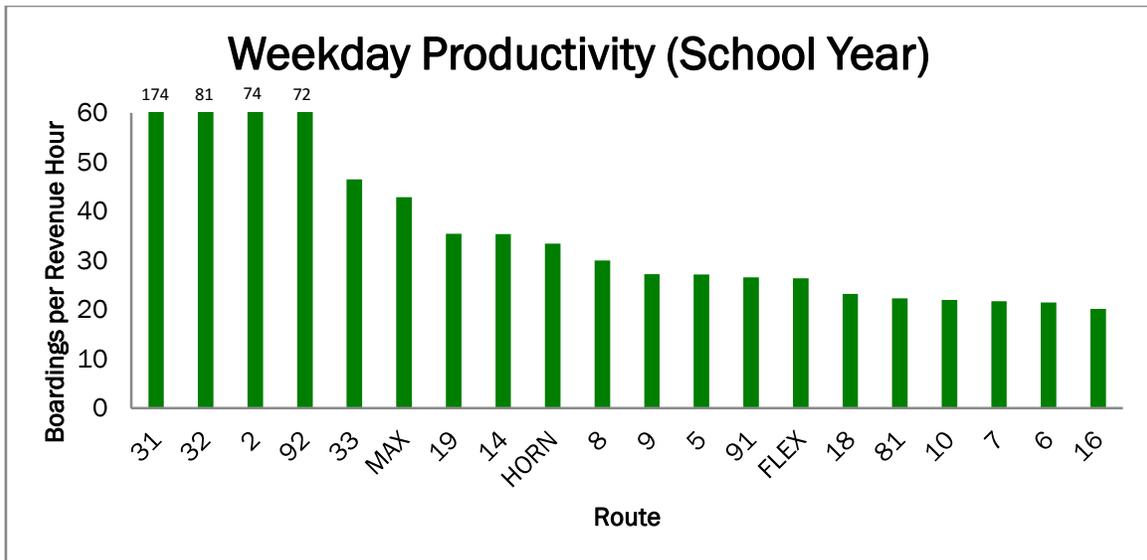


Figure 21: Weekday Productivity by Route (School Year)

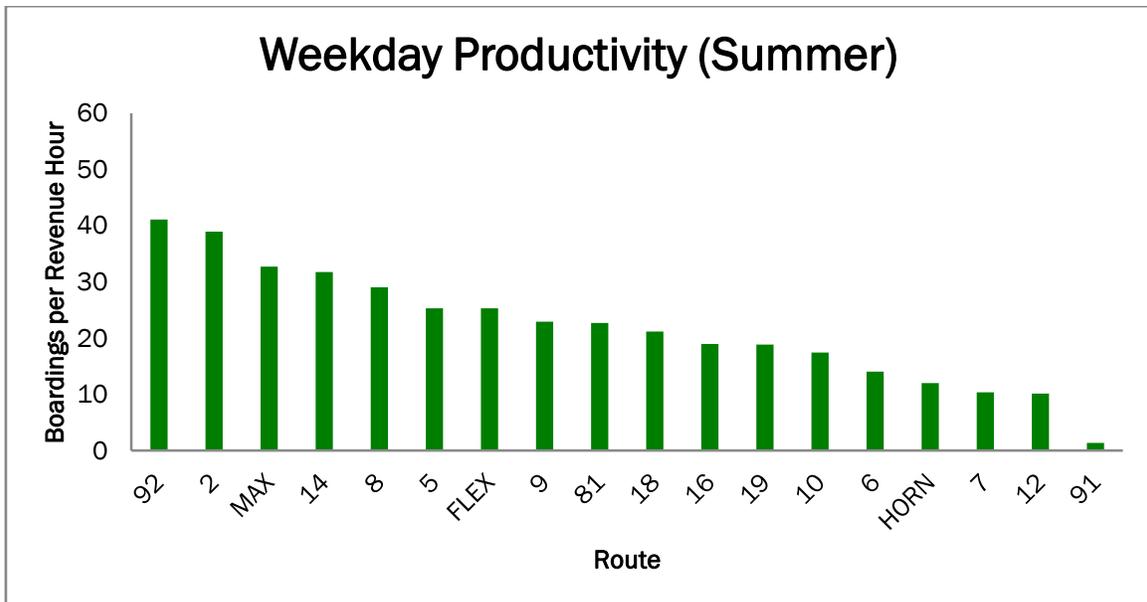


Figure 22: Weekday Productivity by Route (Summer)

MAX averages more than 40 passengers per revenue hour. This is a regional spine that should also carry passengers over longer distances while also supporting higher seat turnover⁷. The productivity of the MAX service should increase as other corridors become more oriented towards lifestyle mobility. MAX will be able to leverage the benefits of a frequent network, as more passengers will be able to rely on transit as an all-day, all-week mobility solution.

⁷ Productivity metrics based on boardings per revenue hour can be misleading for Rapid/BRT/Express service given their longer average passenger trip lengths. A better comparison is Passenger Miles per Revenue Hour or Mile as it levels the productivity “playing field” between high turnover routes (e.g., Route 31) and lower turnover routes (e.g., MAX/FLEX).

HORN is one of the most frequent services but it generates a below average productivity. It provides peripheral transit circulation around a very walkable campus. HORN is fairly circuitous⁸ and takes three buses to operate. Although the route still meets the agency standard for a university service, there is still an opportunity to rethink the role of the Horn.

Route 12 is the least productive route in the entire system. It operates on Horsetooth Road and Harmony with connections to MAX, but suffers from low ridership and productivity due to limited transit demand along these corridors. The route lacks an anchor outside of South Transit Center transfers, even when school is in session. Transfort can improve the productivity of its system by adjusting how poor performing services operate. The agency can streamline alignments to reduce running times, optimize scheduling, redesign the route to target key trip generators, adjust service levels to better match the market demand, or consolidate the route and reinvest resources towards more productive services.

Passengers per Revenue Mile

Transfort also monitors passengers per revenue mile, another way of normalizing ridership over a unit of service. This metric typically parallels productivity per hour except where there are significant differences in operating speed or passenger turnover.

Table 7: Standards for Passengers per Revenue Mile

STANDARDS FOR PASSENGERS PER REVENUE MILE				
Classification	Rapid Route	University Route	Residential Route	Commercial Route
Exceeds	>8	>5	>2	>3.5
Satisfactory	6 - 8	3 - 5	1.5 - 2	2.5-3.5
Marginal	4 - 5	1.5 - 3	1 - 1.5	1.5-2.5
Unsatisfactory	<4	<1.5	<1	<1.5

Once again, Route 31 is the top performer. Its high ridership volumes and short alignment allow it to perform well, reinforcing its role as an efficient walk extender. Routes 2 and 32 are other services that meet Transfort passengers per revenue mile standards.

MAX does not generate high passengers per revenue mile; 3.28 passengers per revenue mile is below the Transfort standard for Rapid/BRT service. However, Rapid services are designed to accommodate longer trips and this type of service should be expected to have fewer passengers per revenue mile.

Route 12 continues to be at the lower end of the performance scale. It generates less than 1 passenger per revenue mile which is significantly below Transfort standards.

⁸ HORN has the frequency to capture spontaneous use riders, but not the alignment (peripheral) or fast travel (it's circuitous) necessary to achieve productivity goals.

Like passengers per revenue hour, the passengers per revenue mile measure drops when school is out of session. Route 92 has the highest passengers per revenue mile, but is a high school-based route with limited trips. The remaining routes, including MAX, average less than 3 passengers per revenue mile. This continues to indicate a shift in demand.

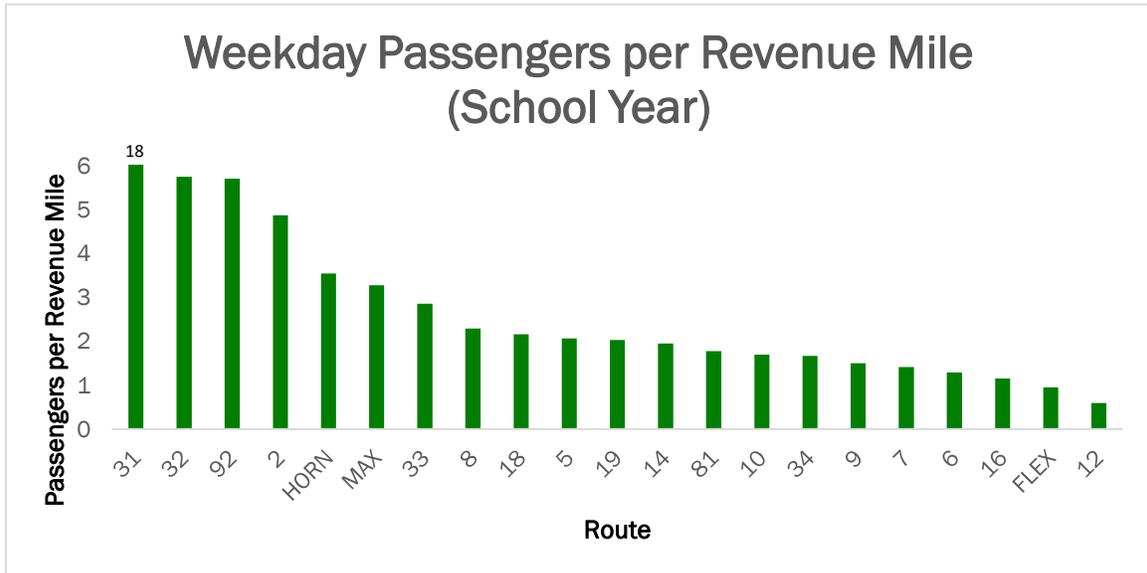


Figure 23: Weekday Passengers per Revenue Mile (School Year)

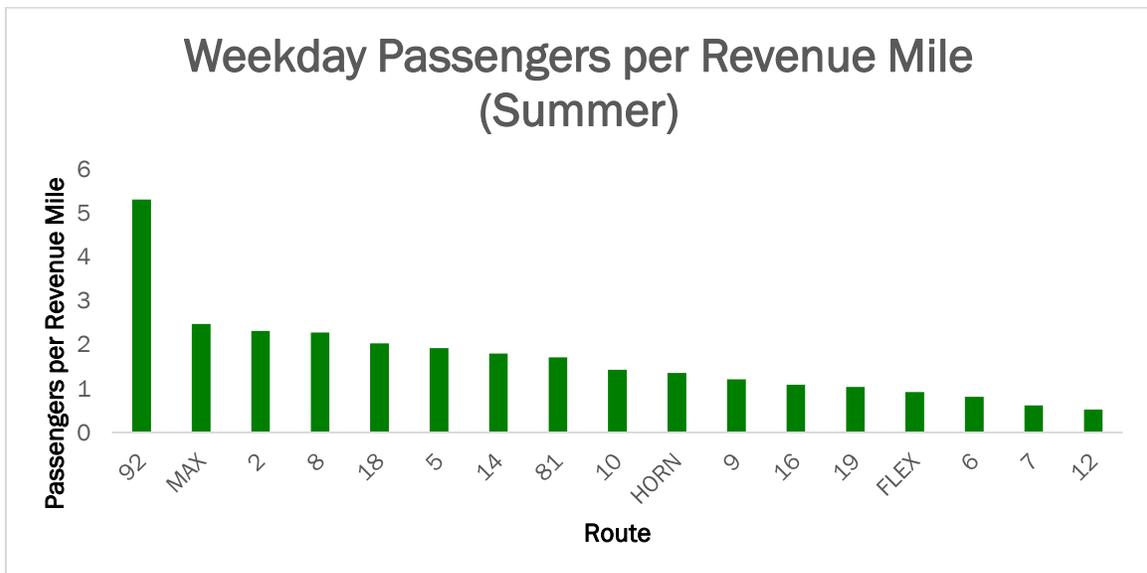


Figure 24: Weekday Passengers per Revenue Mile (Summer)

Customer Comments

Over the past two years, Transfort has collected public comments regarding their service and operation. Riders and community members have submitted comments online, via email to Transfort staff, or given written and verbal comments to drivers. The comments detailed their concerns as well as the changes that they would like to see with the agency and its operations.

Public comments were categorized by the type of request. At 25 percent, the most frequent request was for a new route in an area without Transfort service. Within this category, 50 percent specifically mentioned Timberline as a high priority for service. Many of the other comments were requests for service in different areas throughout Fort Collins. This implies that many of the comments are looking for a transit network that is less focused on CSU connections and more on expanded coverage.

About 23 percent of comments requested expanded hours or days of service. In particular, Sunday service was a recurring request during this timeframe. Particular attention was paid to requesting Sunday MAX service.

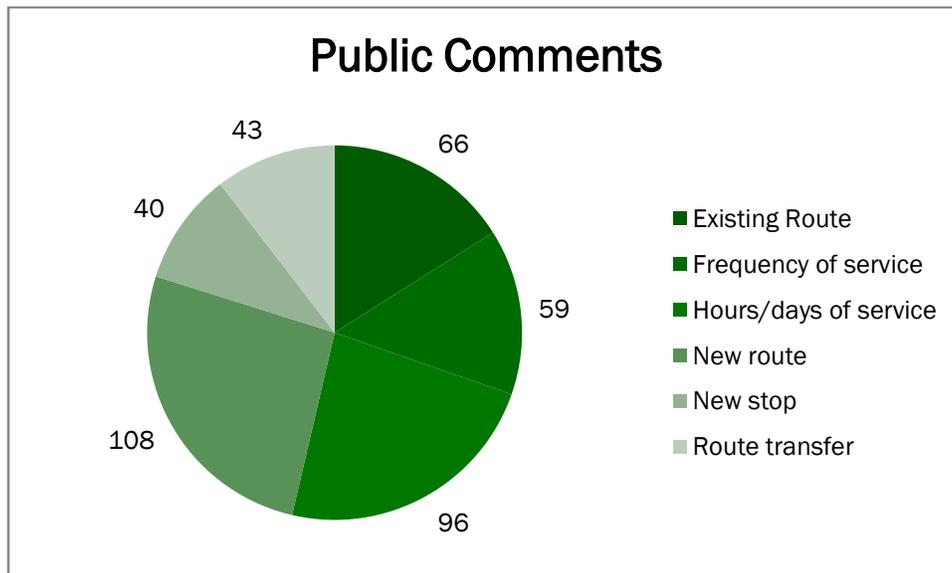


Figure 25: Summary of Public Comments

Key Findings and Issues

Transit is at an important juncture in Fort Collins. The demand for transit will continue to grow as sustainable travel alternatives become a bigger part of local and regional mobility. This report evaluated the existing market and service conditions in the Transfort service area. It attributed network and route-level performance to key market and service design factors. These factors come together to create an environment where transit can or cannot thrive.

Transfort recognizes that the CSU campus is a critical part of its service plan. The university generates significant amount of demand and will continue to do so for the foreseeable future. However, the demand for Transfort service changes dramatically when CSU is out of session. The agency has also received a number of requests that shift investments towards areas outside of the university. The Transfort Route Improvement Project (TRIP) should focus on developing a planning framework that addresses several key issues in order to guide its future investment strategies moving forward.

Frequency Investments

Currently, only three routes operate at a lifestyle mobility frequency. A majority of the service operates at 30-minute frequency. Investments in frequency will help make transit a more viable alternative in Fort Collins, especially with much of the trip-making shorter distance. Significant numbers of Transfort riders and community members have also requested additional investments in frequency throughout the network.

In order to effectively prioritize frequency improvements, existing route performance should be compared against existing service levels. As the charts below indicate, certain routes perform significantly better than other services with the same level of frequency investment. During the school year, routes that serve the University such as 2, 32, and 19 appear initially to be good candidates for frequency improvements from the 30-minute service tier. Route 14, which connects downtown Fort Collins with the residential and industrial northeast part of the city, is productive at 60-minute frequency. Transfort should evaluate opportunities in the most successful routes at each service tier.

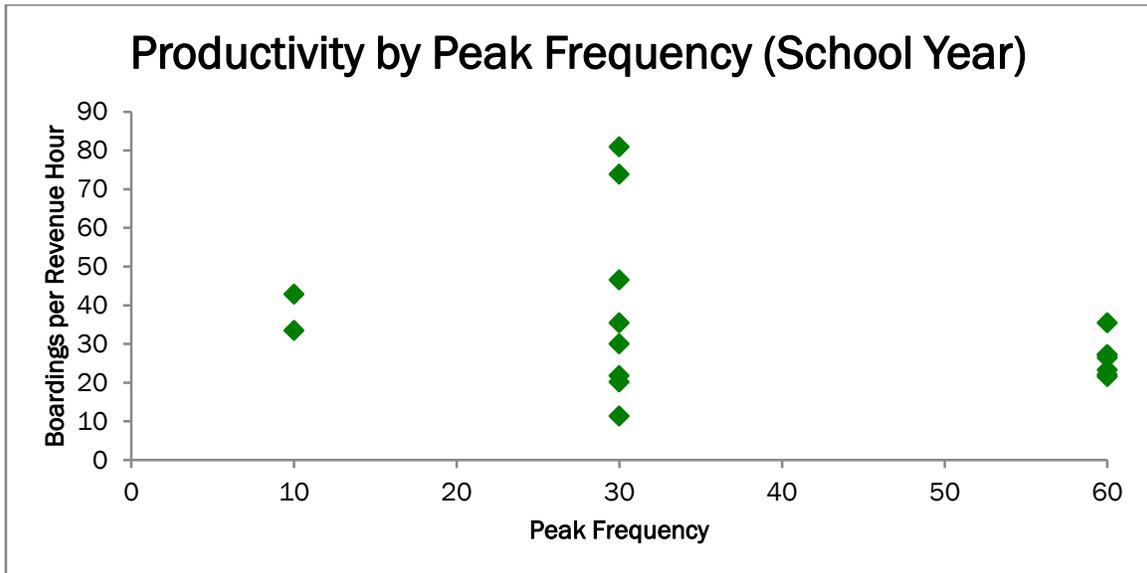


Figure 26: Productivity by Peak Frequency (School Year)

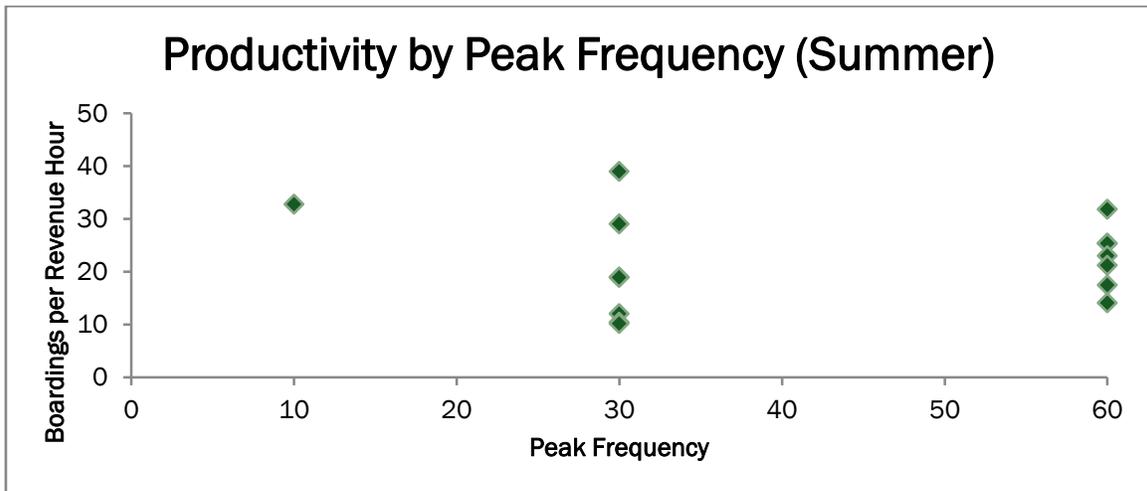


Figure 27: Productivity by Peak Frequency (Summer)

Out-of-Session Network

CSU is the dominant center of activity for the Fort Collins community and plays an even larger role in the transit network due to the population it serves. CSU has the highest concentration of jobs, population, zero vehicle households, and low-income households in the city. During the summer months when CSU is not in session, average weekday ridership drops 60 percent from approximately 15,000 to 6,000. Almost all routes in the system experience decreases in ridership and productivity. TRIP will need to develop a basic all-year transit network that is effective and efficient with CSU service overlays when in session. The agency should explore whether there are markets that are being overserved or underserved during the summer and whether it can adjust its network to address those gaps.

Requests for New Service

There have been a number of requests for new routes. Many of these requests have been for routes in new markets that are not currently served by Transfort. When evaluating any proposal, Transfort should only make investments in services that are projected to increase overall system productivity.⁹ When the agency receives a request for additional frequency or span, it can turn to comparable analysis of existing performance data relative to potential markets in determining its response.

Route 14 is an example of a non-university, coverage-based route that does relatively well during both the school year and the summer. The route connects downtown Fort Collins with the residential, industrial, and commercial areas in the northeast part of the city. According to the Transit Propensity Index, the market for this route was in the Medium-Low range. Despite its lower population and employment densities, Route 14 is able to generate ridership because it serves a population with a lower household income and a higher rate of zero vehicle households. However, there may still be opportunities to build upon this route's success through service tuning (optimization). TRIP will evaluate opportunities to improve Route 14 through changes in alignment or scheduling efficiencies.

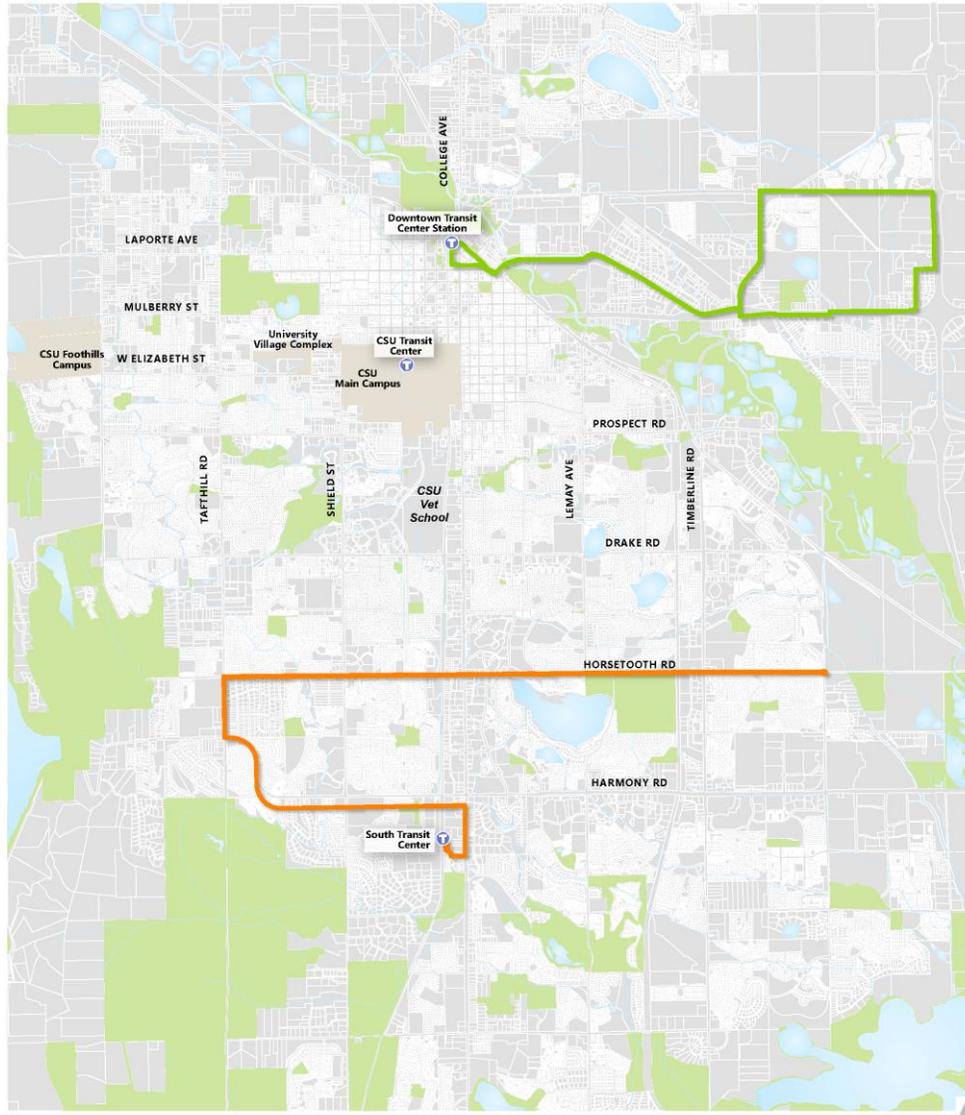
Route 12 is an example of a non-university, coverage-based route that performs below the system average. The route averages less than 11 passengers per revenue hour. The route travels through areas of higher employment density compared to Route 14, but it serves a community with higher household incomes and fewer zero vehicle households. Transfort also identified some portions of this route as low markets for transit based on the Transit Propensity Index. TRIP will evaluate opportunities to increase the productivity of these routes through more efficient allocation of resources.

Any requests for new service should be evaluated through a market and service design framework. The requests for service in higher propensity markets should be given additional priority. The requests should also leverage the frequent network and minimize duplication with existing services.

⁹ To preserve ongoing financial sustainability while providing useful transit service an emerging best practice is to initiate new services where they are likely to meet the average performance for that type of transit (service tier). As well, system ridership is largely the product of network synergy rather than individual route ridership making key transit spines like MAX critical to growing ridership on routes throughout the system.

SYSTEM PRODUCTIVITY

SCHOOL YEAR



Passengers per Revenue Hour

- █ More than 40
- █ 30 to 40
- █ 20 to 30
- █ 10 to 20
- █ Less than 10

Figure 28: School Year Route Productivity Comparison

Weekend Service

Transfort received a number of requests for Sunday service. As Transfort evaluates the need for Sunday service, the agency can turn to existing Saturday performance as a good proxy for assessing expected Sunday ridership.¹⁰ The charts below illustrate which services have the potential for all-day, all-week demand. A number of routes are relatively productive on Saturday (MAX, FLEX, Routes 2, 8, 14, 5, 16) with all but Route 2 sustaining minimal drop in productivity from weekdays. These are candidates for Sunday service.

HORN performs well on the weekday, but experiences a significant drop off in Saturday productivity. This route is unlikely to be a candidate for additional weekend investment.

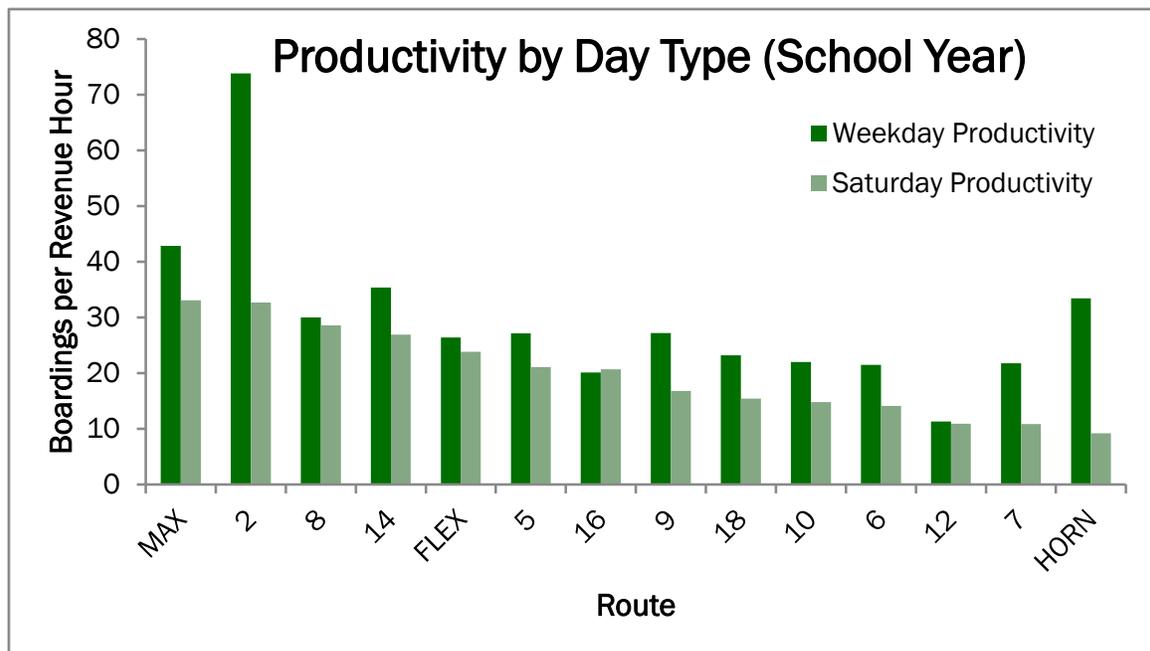


Figure 29: Productivity by Day Type (School Year)

¹⁰ Sunday travel demand is not significantly different from Saturdays other than a shorter span of service need.

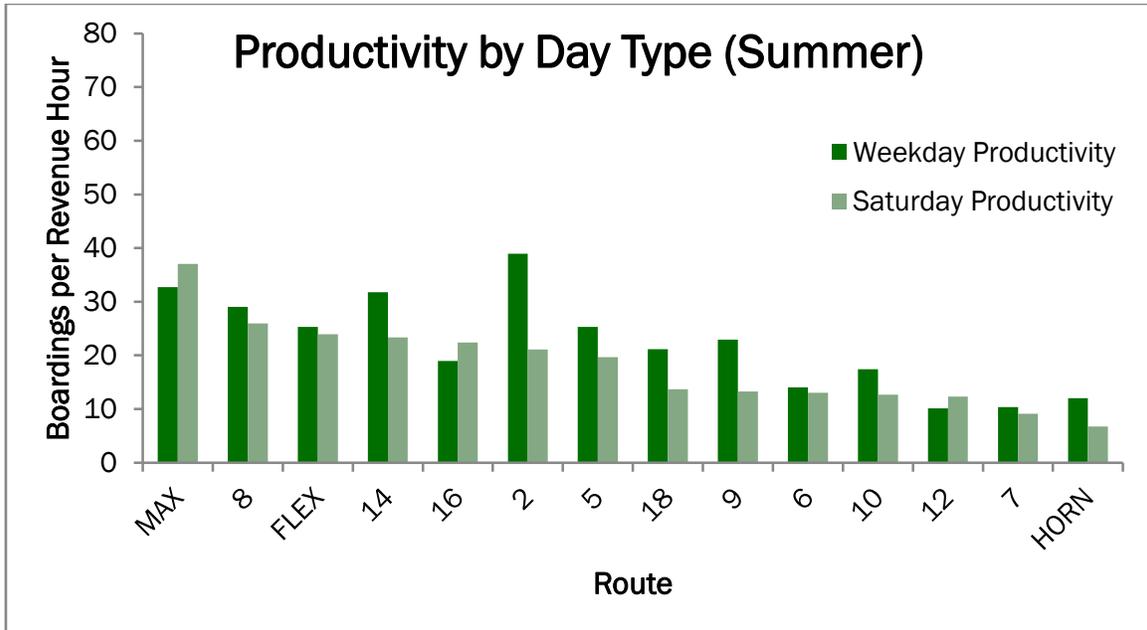


Figure 30: Productivity by Day Type (Summer)

Leverage MAX Service

The recently introduced MAX service is a key spine in the Fort Collins transit network. Additional investments in Enhanced Travel Corridors such as West Elizabeth, Harmony, and North College will help fully leverage the core north-south MAX service. Other routes in the system should be designed to feed into the existing and future MAX corridors. Creating better connections between supporting routes and MAX will improve the passenger experience and can move the network towards a more efficient grid system.

Infrastructure

Transfort should also consider infrastructure improvements along major corridors. Capital investments enhance the overall transit experience through faster travel times, reduced delay, increased reliability, and an improved wait environment. These benefits reduce operating costs and resource requirements for Transfort and provide customers with a better transit product, making them more likely to ride transit and more often for different types of travel. Improvements include but are not limited to signal prioritization, bus bulbs, and dedicated right-of-way (e.g. MAX guideway/bus lanes).

Recommendations

The long term proposed Transfort route network builds off existing successes, while leveraging future growth and financial resources to create a frequent and heavily utilized public transportation system. Service network design prioritized a grid system to reduce deviations, improve travel times, and attract greater ridership. Existing community plans encourage mixed-use corridors, walkable neighborhoods, and deemphasizing auto use in the city, which will support the increased investment in Transfort services. Together these initiatives will help achieve the citywide goal of increasing transit use as a share of overall travel even as the City of Fort Collins continues to grow at a fast pace. The development of the proposed Transfort network relied on an analysis of existing route performance and trends, market research, community feedback, and consulting with a wide range of stakeholders.

Proposed Network

MAX SERVICE

The long-term proposed Transfort network is designed with MAX and MAX like services as the core trunk lines. These corridors include the current Mason corridor MAX service, along with future MAX-like investments on West Elizabeth, Harmony, and North College. These services will have the greatest investments in frequency, span, and infrastructure to reduce delay and improve travel times. The Harmony/Mason MAX service will travel from just east of I-25/Harmony Avenue to the Downtown Transit Center. The West Elizabeth/College MAX service will travel from the Foothills Campus at Overland Trail to North College Avenue/Wilcox Lane. This structure will result in higher frequencies of service between the main CSU campus and the Downtown Transit Center as the two services will overlap in this section. With the highest levels of service investment in the Transfort network, these trunk lines will carry a substantial proportion of riders, and play a strong role in facilitating multi route trips through the community.

FREQUENT LOCAL SERVICE

The next tier of services will form the remaining portion of the frequent network. This tier of service will include corridors such as Timberline, Lemay, Shields, Drake/Taft Hill/Laporte, and Mountain Vista.¹¹ At full implementation, these routes should be running at least every 15 minutes in the peak periods. The addition of these routes will extend the reach of the lifestyle mobility network, which will be essential to attracting discretionary riders and increasing transit mode share in the city.

¹¹ The Mountain Vista Enhanced Travel Corridor is currently classified between frequent service and basic mobility. The final development that takes place within the Mountain Vista neighborhood will dictate the level of service investment that is warranted by Transfort.

BASIC LOCAL SERVICE

Less frequent services that will provide basic levels of mobility will include corridors such as Riverside, Horsetooth, and Lincoln. These routes will provide coverage in areas of the city that will continue to have lower population and employment densities while still generating enough demand to warrant fixed route transit investments.

SHUTTLE SERVICE

In specific situations where fixed route services are not the right fit to meet transit demand, shuttle services will fill those gaps. The CSU Foothills Campus Shuttle, Vine Drive School Tripper, and late night Gold/Green routes are examples of services that will only run sporadically to meet specific community needs. These services provide important connections and help complete the Transfort network without running a full schedule when resources could be deployed more effectively in other routes.

Rider Benefits/Impacts

The proposed Transfort network provides many benefits as well as impacts to current riders and the community at large:

- Introduction of more direct cross-town service allows for faster travel.
- Transfers become easier with more connections to MAX service or services that are part of the frequent network.
- The streamlined, direct, linear alignments are easy for riders to understand, attracting more passengers to use the system.
- Elimination of out-of-direction service reduces travel time, improving the on-board experience for riders while maintaining short walking distances to access the network.
- A walkshed analysis shows that over 99% of existing riders are within a ¼ mile (5-minute walk) of basic service or ½ mile (10-minute walk) of frequent MAX service at full implementation.

Table 8: Ridership Impact Summary

	Average Weekday Boardings	Riders Losing Service	Percent Impact
CSU In-Session	16,643	24	0.14%
CSU Out of Session	6,461	32	0.50%

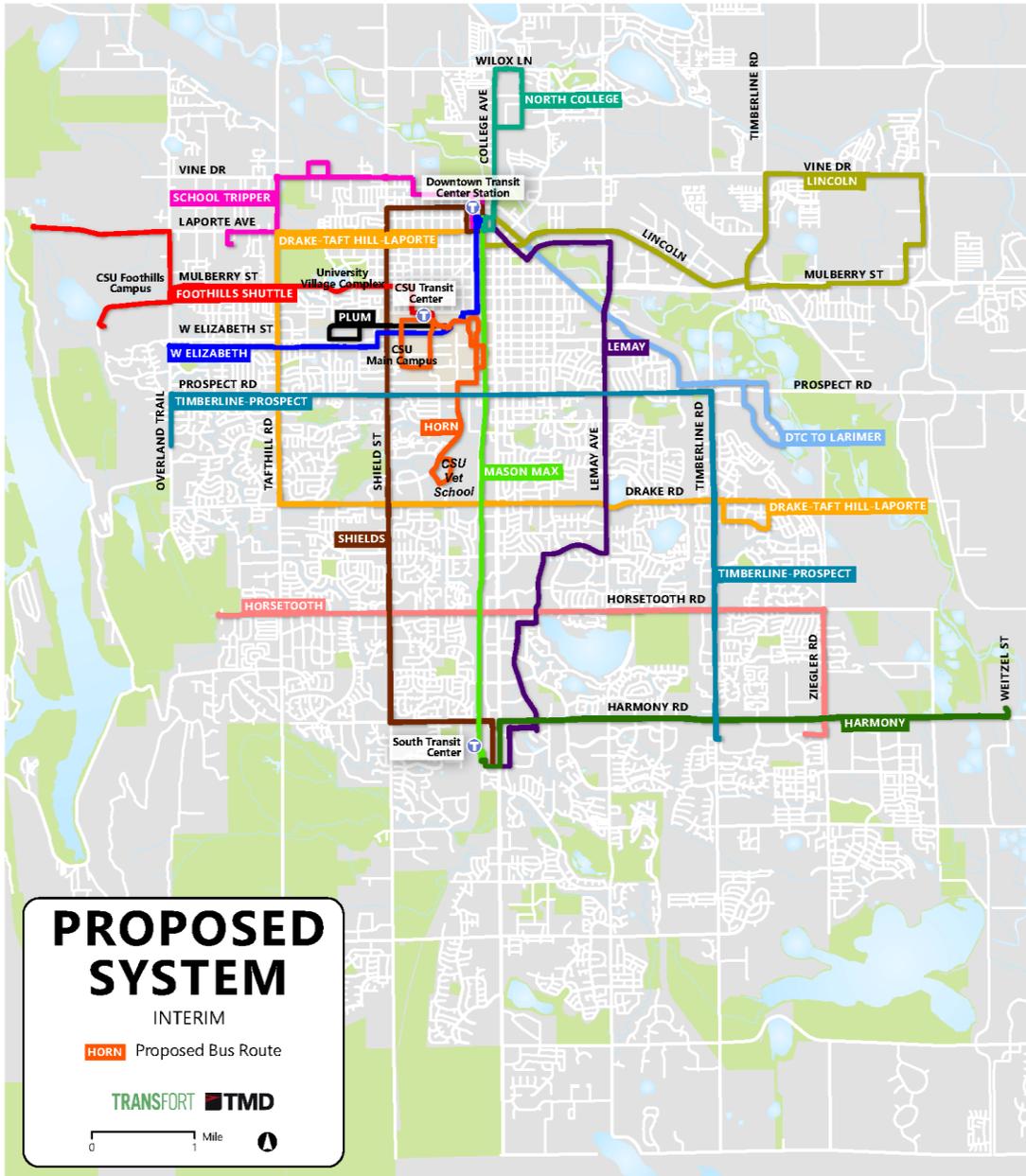


Figure 31: Proposed Interim Transfort Network

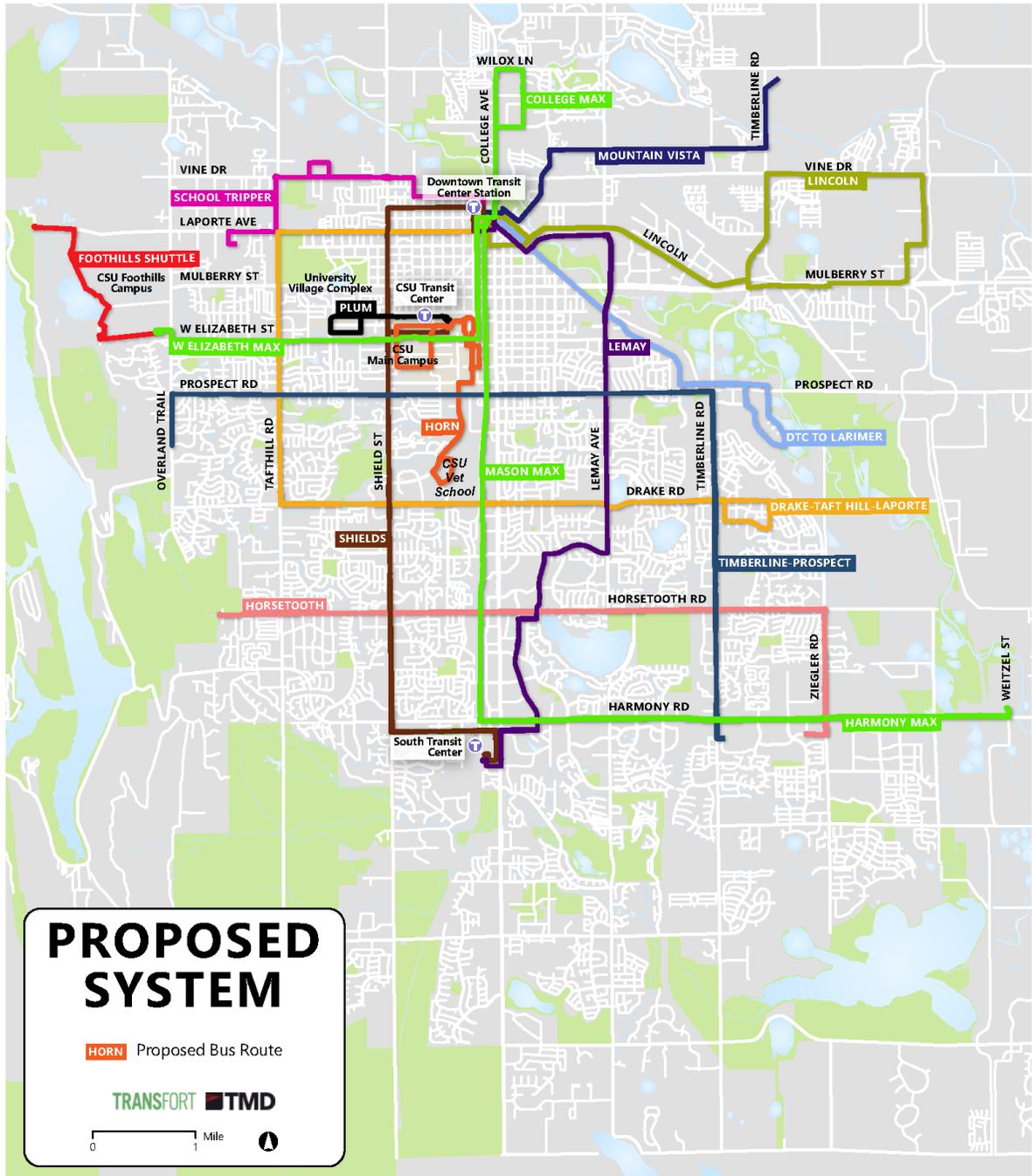


Figure 32: Proposed Long Term Transfort Network

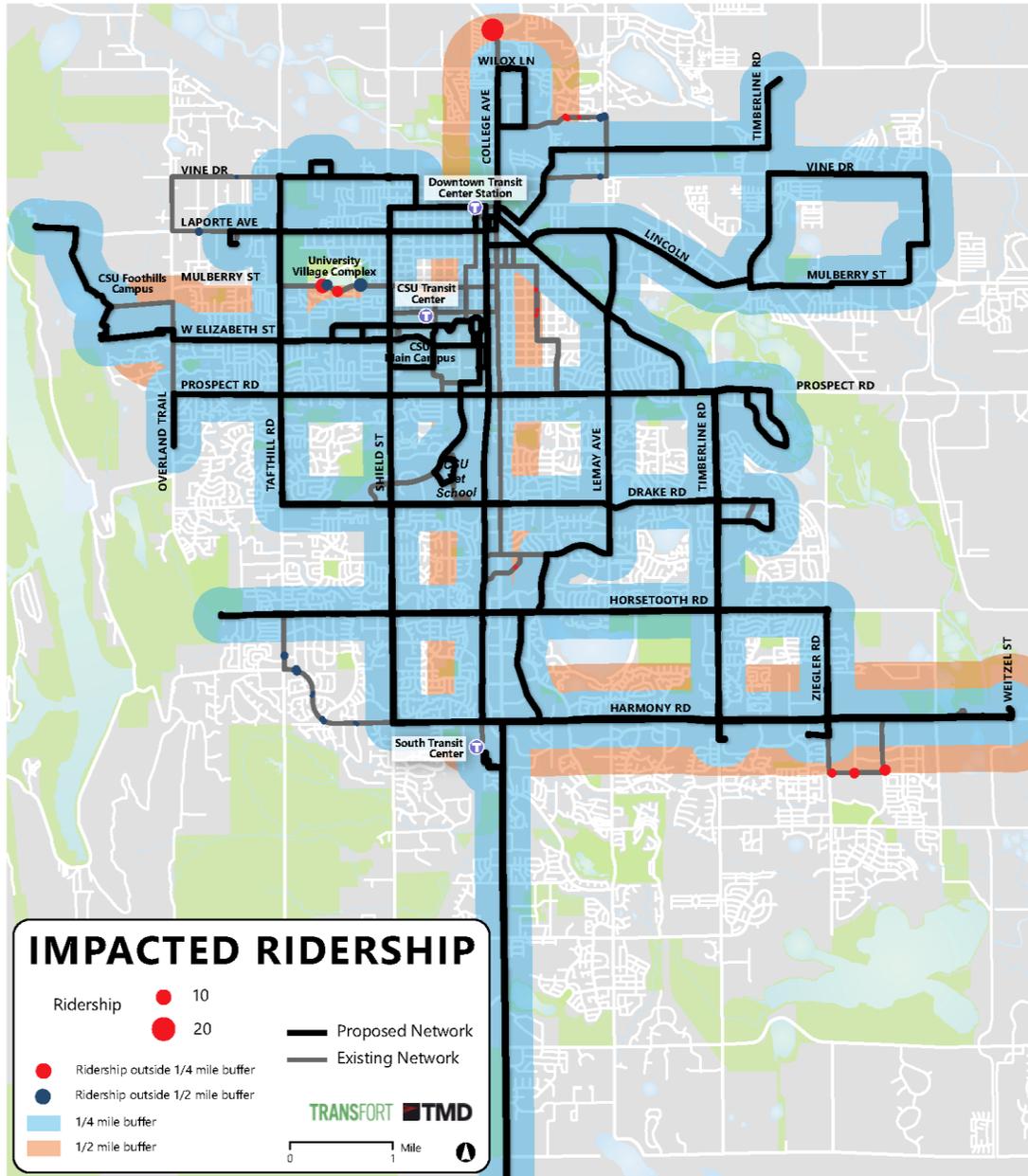


Figure 33: Map of Ridership Impact

Implementation Phasing

The proposed network structure and route designs serve as the foundation for Transfort services in the future. Frequency and span investments can slowly be ramped up over time as resources become available.

- Full implementation of the proposal will require an increase of 36% revenue hours, a 52% increase in revenue miles, and an increase in peak vehicles.

- The route network is recommended for implementation in the short term while investments in additional frequency and MAX like infrastructure will take place over the longer term.
- The frequency investments should be prioritized based on greatest potential for increased ridership, and overall network utility.

Table 9: Proposed Interim Transfort Network Frequencies

WEEKDAY FREQUENCIES				
Route	Frequencies (CSU In Session)			Change when CSU Out of Session
	Peak (AM/PM)	Midday	Saturday/Sunday	
Prospect/Timberline	30	30	30	_____
West Elizabeth	15	15	30	30 minutes all day
Lemay	30	30	30	_____
Drake/Taft Hill/Laporte	30	30	30	_____
North College	30	30	30	_____
Horsetooth	60	60	60	_____
Lincoln	60	60	60	_____
Riverside	60	60	60	_____
Harmony	30	30	60	_____
Shields	30	30	30	_____
Plum	10	10	N/A	Does not run
Vine School Tripper ¹²	*	N/A	N/A	Does not run
HORN	10	10	30	30 minutes all day
MAX	10	10	10	_____
Gold ¹³	_____	_____	_____	_____

¹² School tripper operates twice in the morning and twice in the afternoon.

¹³ Operate every 15 minutes late night on Fridays and Saturdays year round.

Table 10: Proposed Long Term Transfort Frequencies

WEEKDAY FREQUENCIES				
Route	Frequencies (CSU In Session)			Change when CSU Out of Session
	Peak (AM/PM)	Midday	Saturday/Sunday	
Prospect/Timberline	15	15	30	_____
MAX - West Elizabeth	10	15	15	_____
Lemay	15	30	30	_____
Drake/Taft Hill/Laporte	15	30	30	_____
MAX - North College	10	30	30	_____
Mountain Vista	30	30	30	_____
Horsetooth	60	60	60	_____
Lincoln	30	60	60	_____
Riverside	60	60	60	_____
MAX - Harmony	15	15	30	_____
Shields	30	30	30	_____
Plum	10	10	N/A	Does not run
Vine School Tripper ¹⁴	*	N/A	N/A	Does not run
HORN	10	10	30	30 minutes all day
MAX - Mason	10	10	10	_____
Gold ¹⁵	_____	_____	_____	_____

Table 11: Proposed Service Requirements

	Current Transfort Network		Long Term Transfort Network	
	Revenue Hours	Revenue Miles	Revenue Hours	Revenue Miles
Annual Total	118,846	1,262,850	186,000	2,177,000
Percent Change	_____	_____	56%	72%

¹⁴ School tripper operates twice in the morning and twice in the afternoon.

¹⁵ Operate every 15 minutes late night on Fridays and Saturdays year round.