TRINITY METRO
SYSTEM REDESIGN

April 13, 2020

DRAFT

TRINITY METRO

FORT WORTH

HUITT-ZOLLARS


14 SYLVANIA-WALMART
N.S. TRANSFER CENTER
1116


Dr Pepper
XII
CHAMPIONSHIP
FOOTBALL
CHAMPIONSHIP
12 | 7
2019
AT&T
STADIUM
TICKETS AT
SeatGeek
FORT WORTH
ONE WAY


46 JACKSBORO HWY

Existing Conditions

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1 The Network Serves Downtown Well, but Not Other Employment Centers

A Service / Network Analysis

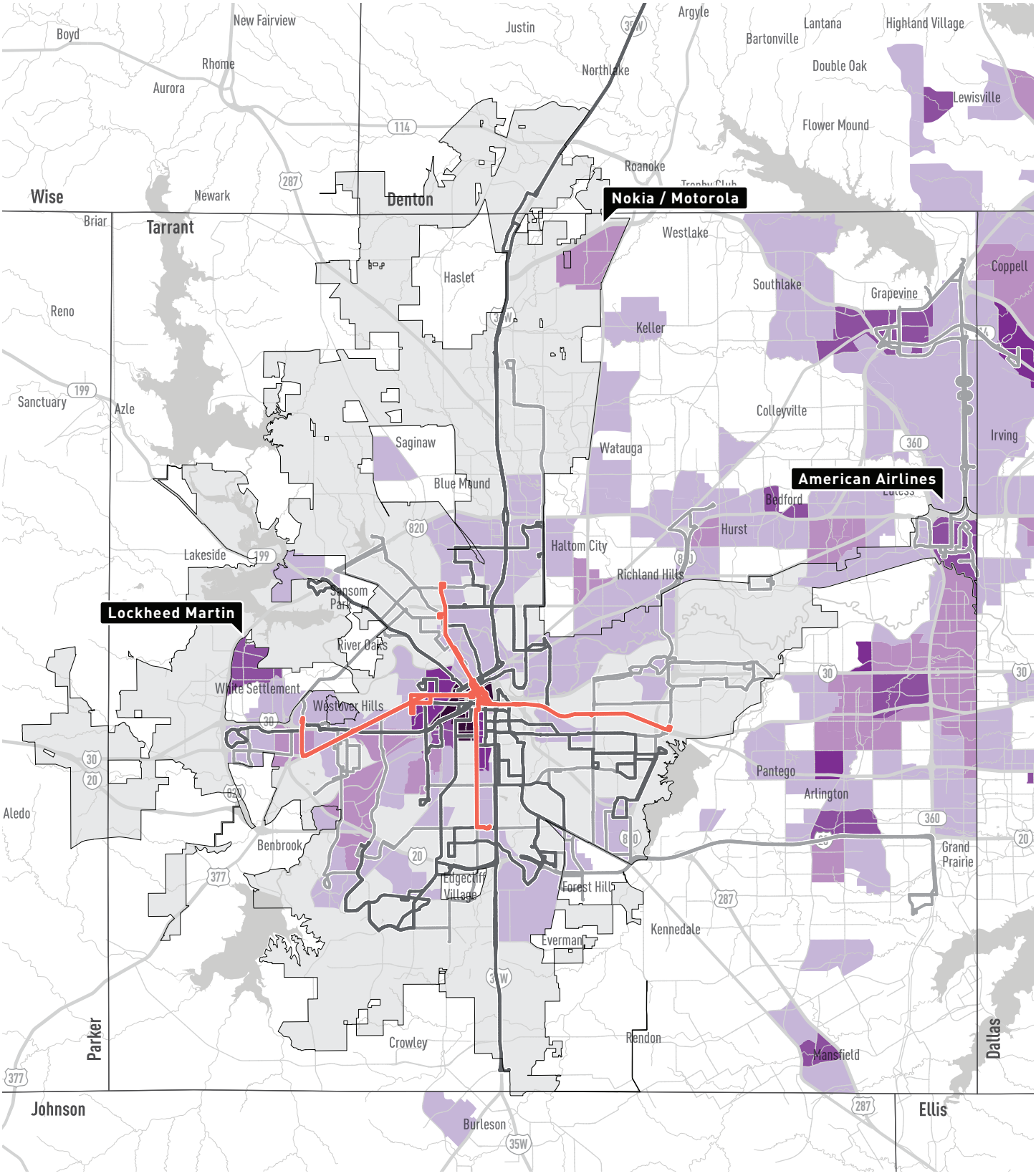
Fort Worth has multiple employment centers, but the bus system is focused on Downtown. Twenty-seven of Trinity METRO's forty-three bus routes travel through Downtown Fort Worth, including all eight of the system's high-frequency routes. This means that the City's center is well served by the system. However, jobs are distributed across the region, and while Downtown is a significant job center, it is only one of many. A lot of Fort Worth's largest employers, as well as many of the service jobs, are outside of Downtown.

It is important that transportation networks service all major commercial, retail, and employment centers so that more people can access jobs without having to rely on having a car. A transit system, which primarily focuses on one employment center, like Downtown, excludes the people who work elsewhere from taking advantage of this public infrastructure.

The overall system is Downtown centric, with a radial pattern, meaning that many riders must travel to Downtown and transfer to another bus in order to reach their destination. For example, if you live in Sunset Heights South, and work or take classes at Texas Christian University, your commute by car would be eight minutes, but by transit, the commute would be an hour.

In addition to the lack of cross-town connectivity, there are no high-frequency routes that do not go through Downtown. This means that many people who do not work Downtown, do not have good transit options for their commute.

There are also a lot of employment centers that fall entirely outside of any transit service zone, most notably the ones in and near Arlington and the DFW Airport. These two areas have large employment areas and are generally high-employment zones, and it's likely that people who live in Fort Worth, live in Arlington, and visa-vera. Although Arlington is not part of the agreed Trinity Metro service area, based on the sheer number of jobs in Arlington indicates that it would benefit from transit connections.



Employment

Jobs per square mile (OTM)

1,000 | 2,500 | 5,000 | 7,500 | 15,000+

Routes with a frequency of 15 min

Routes that travel through Downtown

Routes that do not travel through Downtown

Roads

Rail

Water Features

County Limits

City Limits

0 | 2.5 | 5 | 10 miles

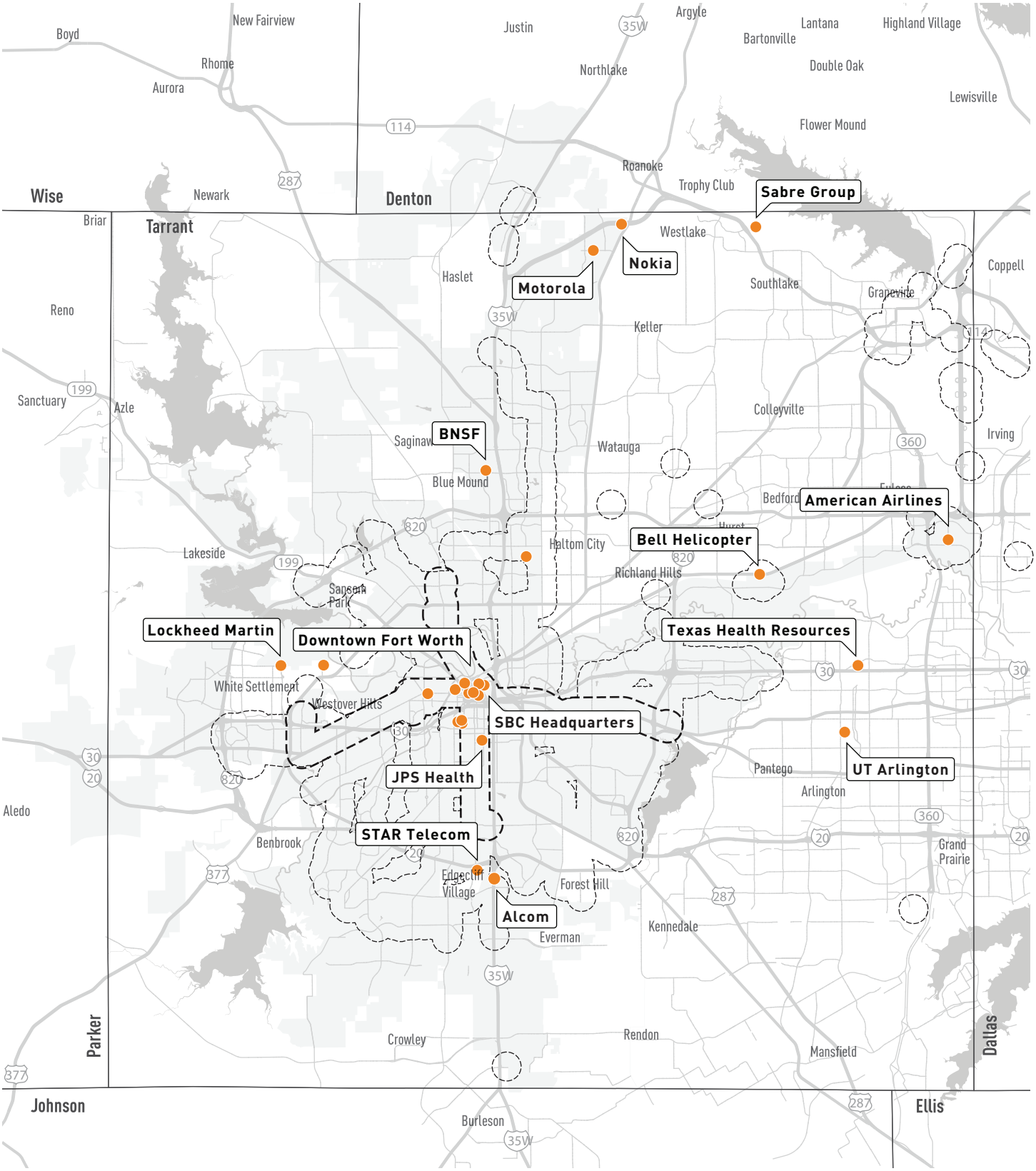
1 The Network Serves Downtown Well, but Not Other Employment Centers

B Major Employment Centers

The transit network serves the major Downtown employers well, but Fort Worth has several major employers outside of Downtown that the bus system does not service. Despite the fact that a few of the largest employers have routes specifically for them, thirty-six percent of major employers in the Fort Worth area are still not served by transit. Most of the major employers outside of the service area are service jobs.

Many of the major employers that have transit service are in Downtown, near frequent bus routes, and even though only 68 percent of the major employers have access to transit, almost half of Fort Worth's major employers can be accessed by frequent buses. The majority of these employers are health or finance-related businesses.

Fort Worth's largest employer, American Airlines, has a route, which specifically serves its headquarters and the airport. Bell Helicopter, the fifth largest employer, also has a circulator that serves it's campus, but those routes are not well connected to the rest of the network. The second and third largest employers, Texas Health Resource (THR) and Lockheed Martin, do not have any service at all, even though THR has a route that could be easily be extended to it. Lockheed Martin is located in a strangely bare part of an otherwise almost full-coverage transit zone centered on Downtown. The University of Arlington, which also falls into the to ten largest employers in the area, is also notably left out of the transit system, as are several other major employers, including BNSF, Sabre Group, Motorola, and Nokia. Few of the top ten largest employers in the area have access to transit, or have limits access to the network, and the majority of the employers that do not have any transit access are service-related jobs.


Sabre Group
Nokia
Motorola
BNSF
American Airlines
Bell Helicopter
Lockheed Martin
Downtown Fort Worth
Texas Health Resources
SBC Headquarters
JPS Health
UT Arlington
STAR Telecom
Alcom
Wise
Denton
Tarrant
Parker
Johnson
Dallas
Ellis
Boyd
New Fairview
Rhome
Aurora
Justin
Argyle
Northlake
Bartonville
Lantana
Highland Village
Double Oak
Lewisville
Flower Mound
Roanoke
Trophy Club
Westlake
Haslet
Southlake
Grapevine
Coppell
Keller
Reno
Sanctuary
Azle
Newark
Briar
Saginaw
Blue Mound
Watauga
Colleyville
Irving
Bedford
Euless
Hurst
Haltom City
Richland Hills
Lakeside
Sansom Park
White Settlement
Westover Hills
Pantego
Arlington
Grand Prairie
Aledo
Benbrook
Edgecliff Village
Forest Hill
Everman
Kennedale
Crowley
Rendon
Mansfield
Burleson
Major Employment Centers
Major Employers
1/2 mile radius from frequent routes
1/2 mile radius from all routes
Roads
Rail
Water Features
County Limits
City Limits
0
2.5
5
10 miles

1 The Network Serves Downtown Well, but Not Other Employment Centers

C Travel Times

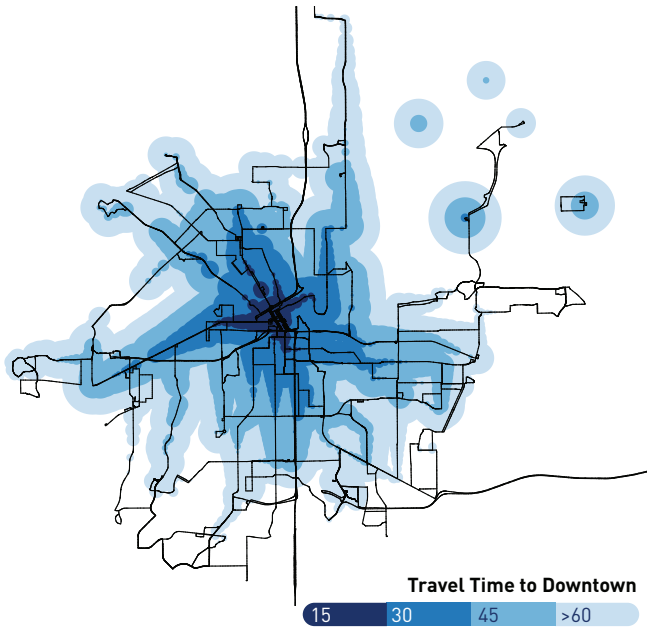
Fort Worth has several high-frequency bus routes, but they all travel through Downtown. Many go down distinct streets, providing Downtown with a large blanket of access to good transit. However, there are multiple job centers in Fort Worth, and Downtown is only one of them. The Medical Center and Fossil are both large job centers that do not receive the same amount of convenient transit.

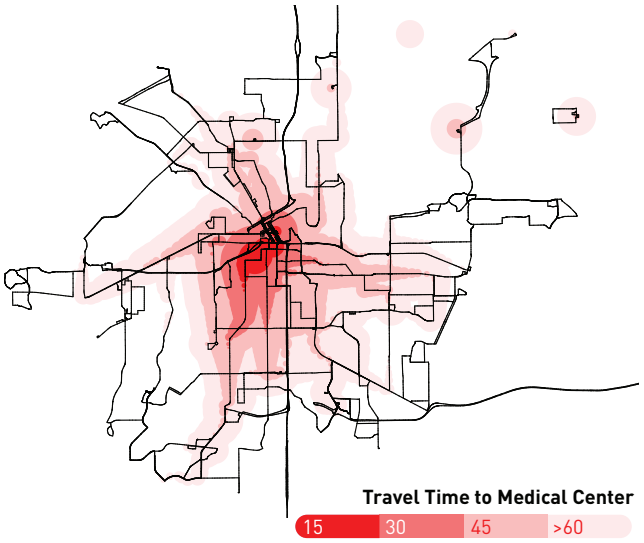
In addition to all of the high-frequency routes that travel through Downtown, many of the routes in the network also run through Downtown. This makes it relatively fast to travel to-and-from Downtown compared to other job centers. The high-frequency routes that almost exclusively service Downtown, also expand the distance a transit-rider can travel to-and-from Downtown within 15 minutes and, by extension, also greatly increases the distances one can go within 30 or 45 minutes compared to other job centers.

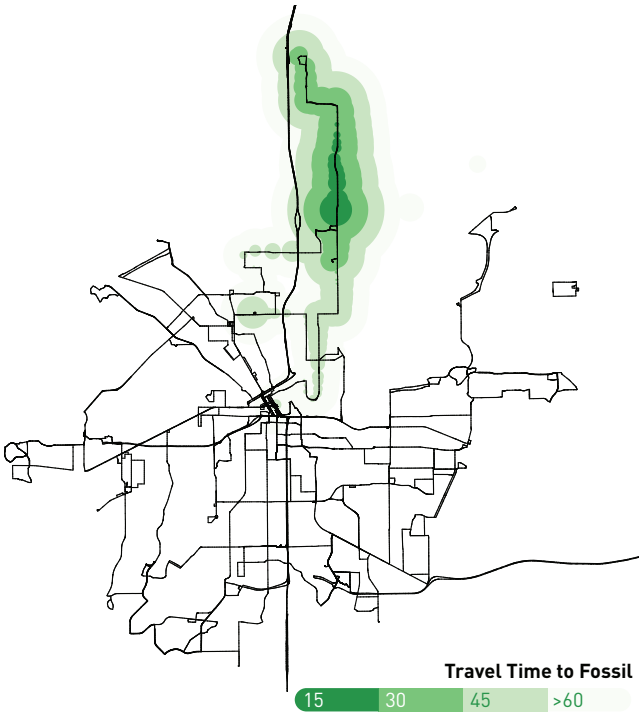
The fact that many of the routes in the network travel to Downtown or connect to routes, means that riders can take almost any route to get to Downtown. In conjunction with the high-frequency routes, this means that riders can get on the bus at many points in the network and travel to Downtown in less than an hour.

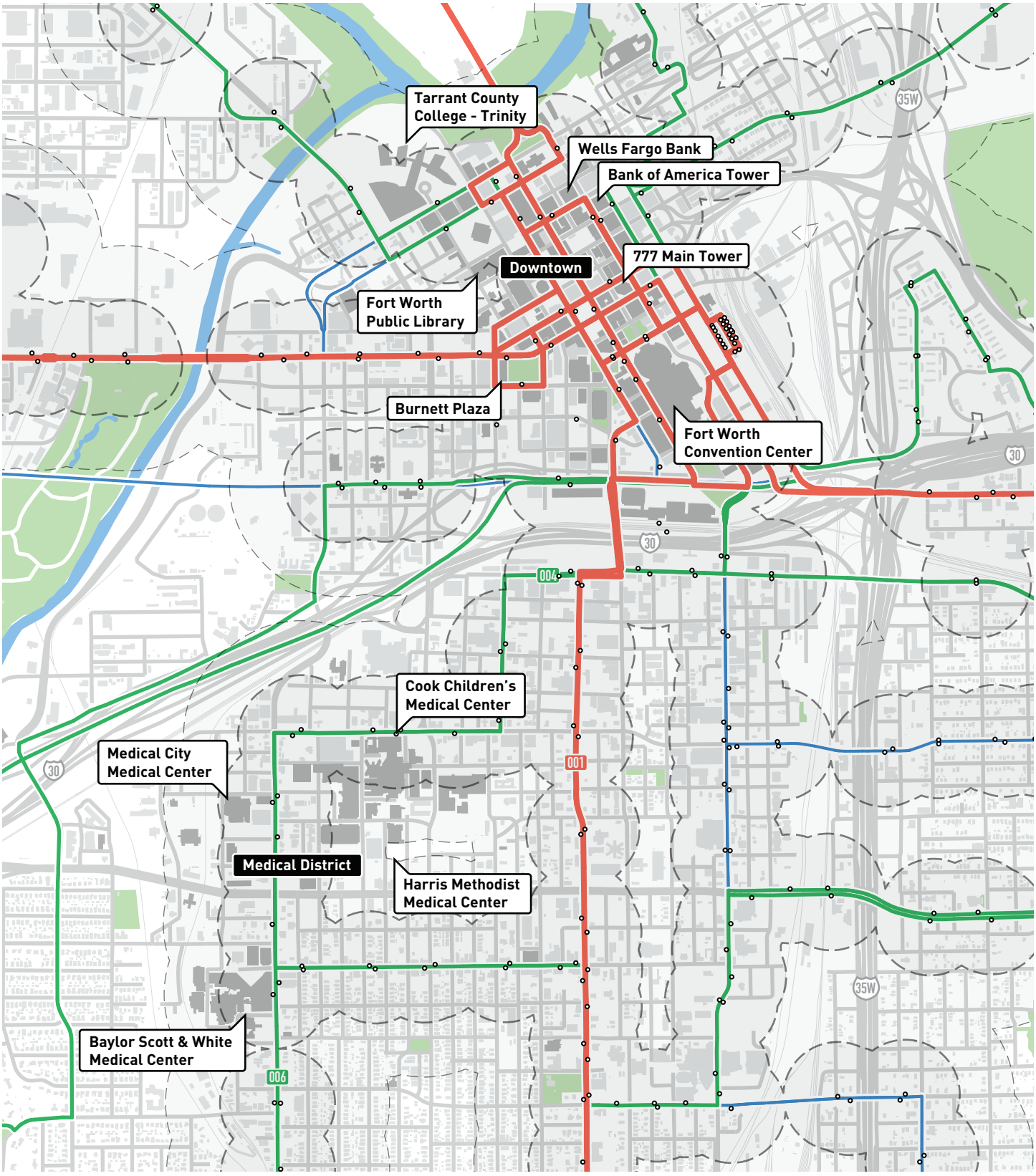
In contrast, the time it takes to get to-and-from the Medical Center is much longer. Only one high-frequency route runs through the edge of the district. The center of the district is served by two routes, both with a 30-minute frequency. The lack of access to high-frequency routes means that the distance that riders can travel within 15 minutes is small. The distance that can be traveled in an hour to the Medical Center (which, is very close to Downtown) is very similar to the distance that can be traveled to Downtown in 45 minutes. This clearly shows that the network does not serve every job center equally, even if they happen to be very close to each other.

The contrast between travel-times to Downtown and travel-times to the Fossil job center is even greater. Fossil only has one bus route that directly serves it, route #016, and only a few other routes connect to it. This means that it's very hard to get to jobs via transit in Fossil. The 15-minute travel range is incredibly small, and the 30-and 45-minute distance areas reflect mostly walking times, rather than bus transit times.









Frequency

- 15 min
- 30 min
- 60 min

Access

- Bus Stops
- 5 min walk radius
- 10 min walk radius

- Roads
- Buildings
- Parks

0 1/8 1/4 1/2 mile

2 Most of the Network Is Infrequent

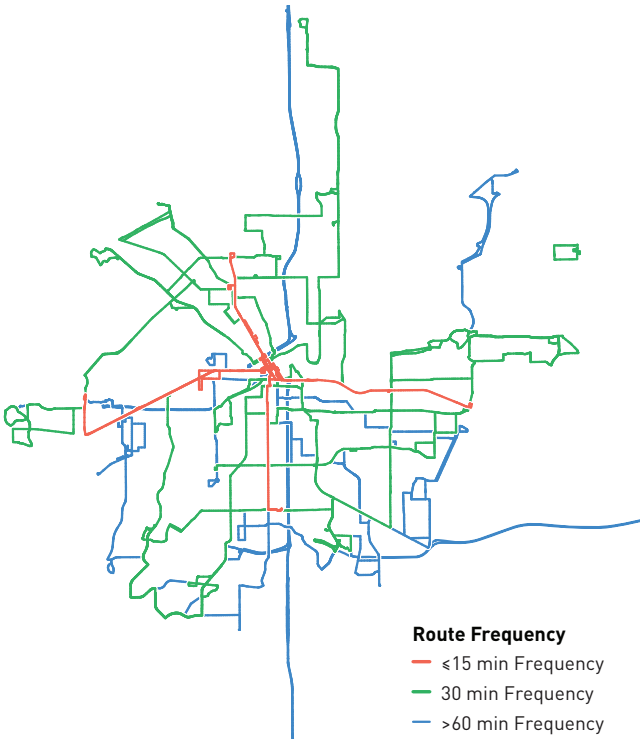
A Frequent Service

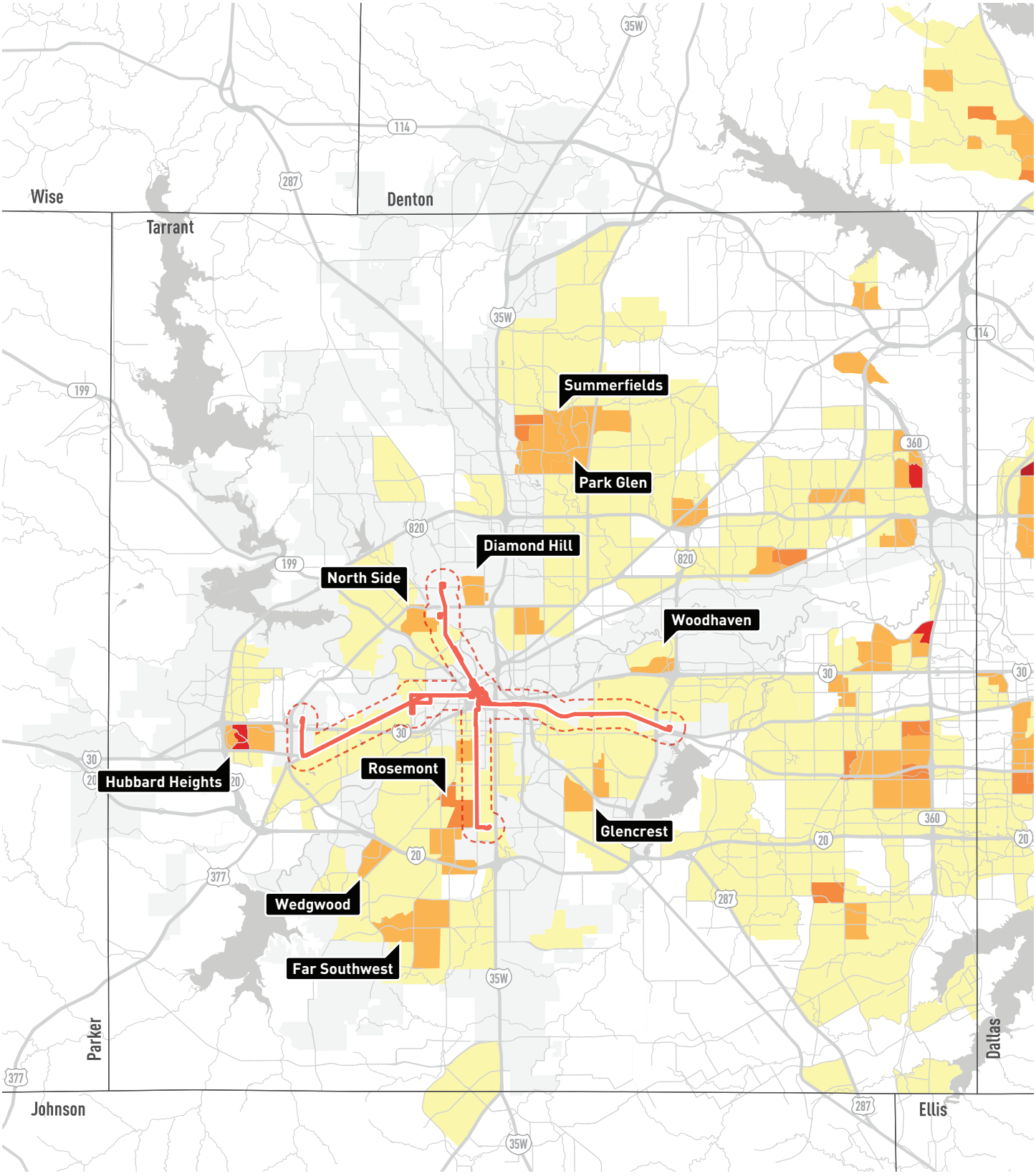
Frequency makes transit much more useful; the difference between 15 minutes and 60 minutes, is the difference between transit that is there when you need it, and transit that you have to plan your life around. Fort Worth has eight frequent bus routes, but half of them run only within Downtown. This is problematic because population density is dispersed over broad areas outside of Downtown, and not within the city center. This means that while the Downtown businesses are well served, the residential areas are not.

Successful high-frequency transit corridors require high-population and employment densities. The more homes and jobs within half-/quarter-mile radius from bus stops, the higher the potential ridership. Unlike its employment density, Fort Worth's population density is not centered around the Downtown area. The City is mostly made up of areas with 5,000 people per square mile or less. Furthermore, the highest concentrations of residents are not arranged along specific corridors, rather they are distributed over wide areas, creating hindrances to providing useful transit. Residential areas are also unevenly distributed across the Forth Worth area, with a large portion of residents outside of Fort Worth city limits to the north and east in areas that are not included in Trinity METRO's service area, but whose residents work within it.

Trinity METRO runs eight bus routes at a frequency of 15 minutes or better; #001, #002, #015, #089, #991, Molly the Trolley, the Dash, and the Burnett Plaza Lunch Line. These routes serve Downtown well, but the same is not true for all the dispersed areas of high-population density. Of the eight high-frequency routes, four operate outside the core area around Downtown, and only two have stops within a half-mile radius of a population density of 5,000 people per square mile or more; route #001 and #015.

Overlaying the high-frequency routes on to population density, also reveals that areas like Summerfields, Far Southwest, Wedgwood, Glencrest, Park Glen, Diamond Hill, Woodhaven, and Hubbard Heights are under-served by the system despite having the largest concentrations of residences in the city.





Population

People per square mile (2010 census)

2,500 | 5,000 | 7,500 | 10,000 | 12,500+

Routes with a frequency of 15 min

1/2 mile radius from frequent routes

Roads

Rail

Water Features

County Limits

City Limits

0 | 2.5 | 5 | 10 miles

3 The Network Is Designed for 9-to-5 Jobs

A Service Span

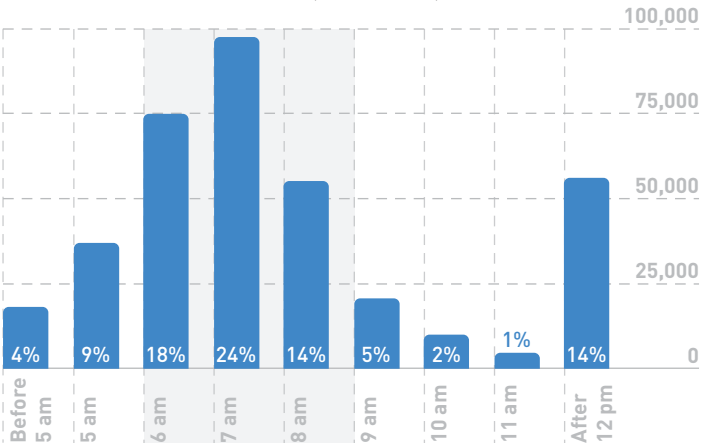
Like many transit networks, Trinity Metro service was designed to prioritize 9-to-5 jobs, with the most service at rush hour. But, while this is when traffic peaks, it misses many trips. Some office jobs regularly require people to work late. Many service jobs have different hours altogether, like warehouses working multiple shifts, restaurants that start in the middle of the day and extend into the night, and retail that operate 7 days a week. "Off-peak" service is also critical for people going to school, medical appointments, shopping, and the other necessities of life. Thus, a large portion of the transit users are left with insufficient service.

Many routes operate at a 30-minute frequency at peak, but only hourly during the very early, middle, and late hours of the day.

On weekdays, around noon, there are eight routes running at a frequency of 15 minutes or better, nine routes running every 30 minutes, and nearly 60 percent of the system is running at a hourly rate or worse.

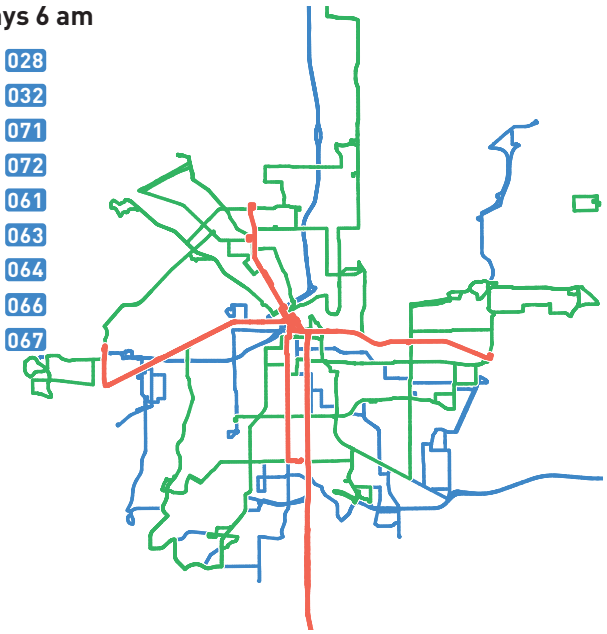
Sixteen routes are lost after the evening peak. The eight high-frequency routes dwindle down to two, and only five routes operate at a frequency of 30 minutes. At around 9:00 pm, almost 75 percent of the system is running at a hourly rate or worse. Residents and businesses south of the Ronald Reagan Memorial Highway, (with the exception of Highland Hills and just northwest of Granbury Road) lose access to the network after 8:00 pm. The same is true for many areas throughout the City, including parts of Polytechnic Heights, Stop 6, Park Hill, Berkeley Place, Mistletoe Heights, Eastern Hills, and Forest Hill.

Start Time of Commute to Work for Fort Worth Residents (2017 ACS)



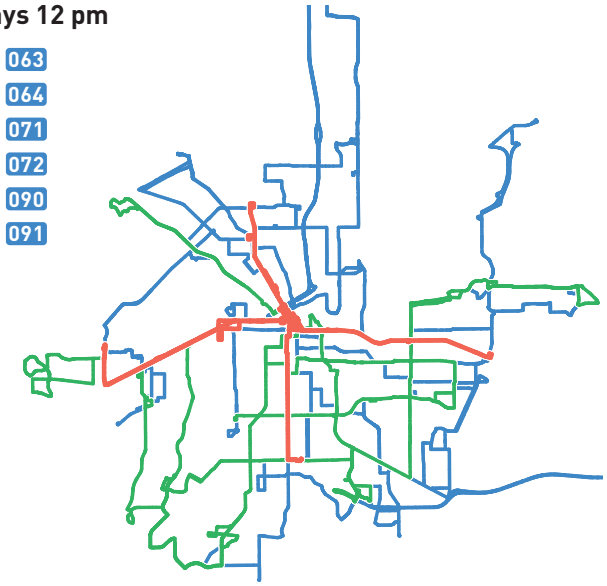
Weekdays 6 am

001 026 028
002 044 032
015 045 071
089 046 072
065 090 061
003 091 063
004 030 064
006 031 066
011 060 067
012 111
014 05a
016 05b
020 007
021 009
022 010
024 023
025 027



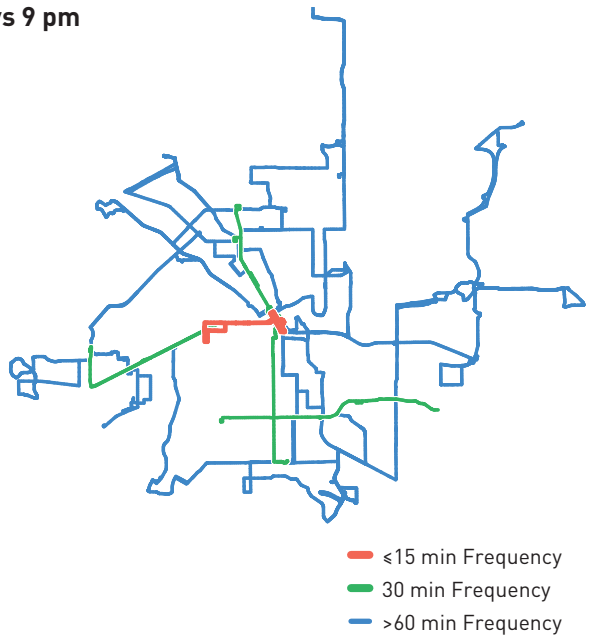
Weekdays 12 pm

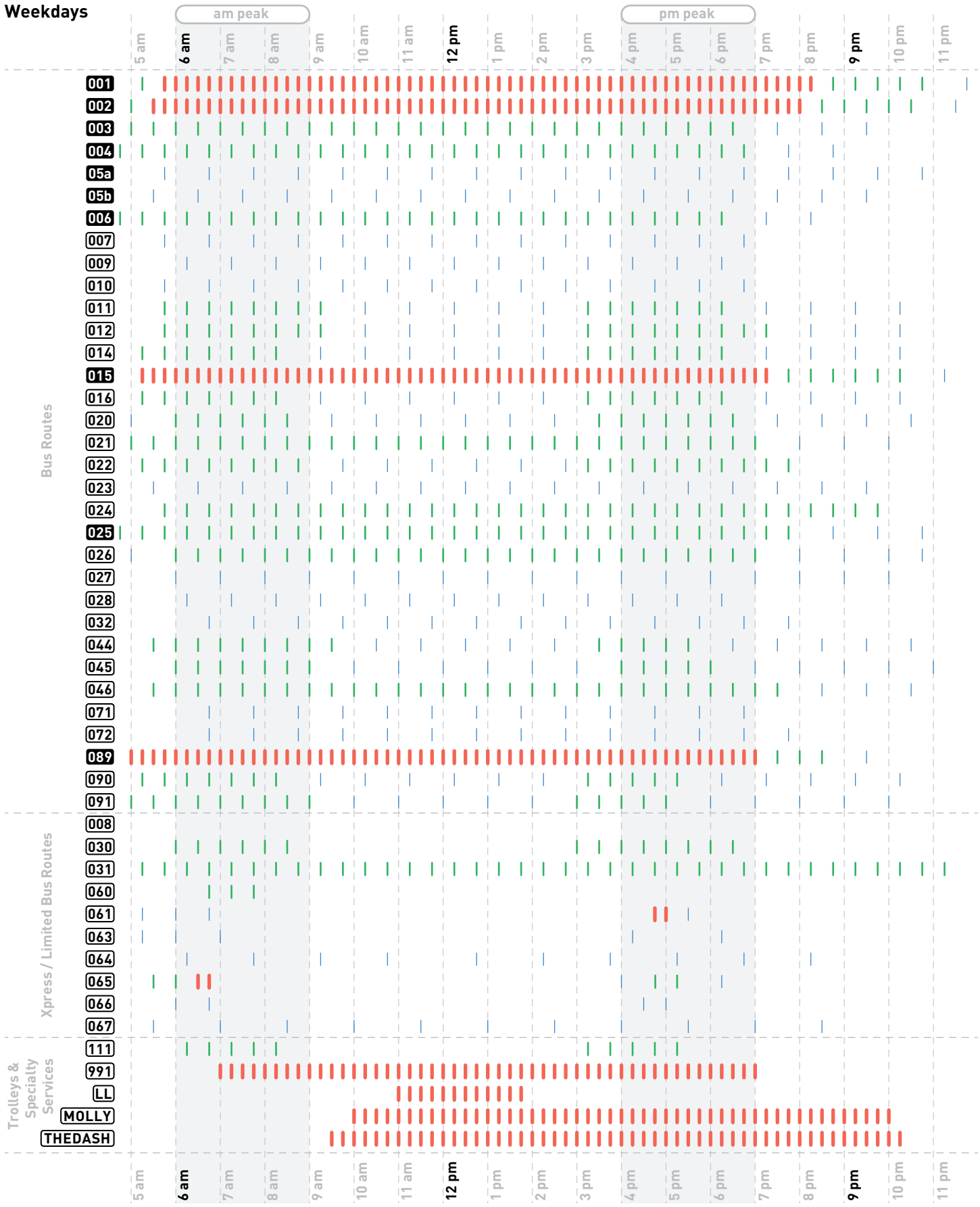
001 05a 063
002 05b 064
015 007 071
089 009 072
991 010 090
LL 011 091
MOLLY 012
THEDASH 014
003 016
004 020
006 022
021 044
024 023
025 027
026 028
031 032
046 045



Weekdays 9 pm

MOLLY 025
THEDASH 026
001 027
002 044
015 045
024 046
031 089
003 090
05a 091
05b
011
012
014
016
020
021
023




Weekdays
am peak
pm peak
5 am
6 am
7 am
8 am
9 am
10 am
11 am
12 pm
1 pm
2 pm
3 pm
4 pm
5 pm
6 pm
7 pm
8 pm
9 pm
10 pm
11 pm
Bus Routes
001
002
003
004
05a
05b
006
007
009
010
011
012
014
015
016
020
021
022
023
024
025
026
027
028
032
044
045
046
071
072
089
090
091
Xpress / Limited Bus Routes
008
030
031
060
061
063
064
065
066
067
Trolleys & Specialty Services
111
991
LL
MOLLY
THEDASH
000 Route
000 Top 10 High Ridership Route
Each tick represents a bus stopping at the origin of the route.
Stops are rounded to nearest 15 min interval
≤15 min Frequency
30 min Frequency
>60 min Frequency

3 The Network Is Designed for 9-to-5 Jobs

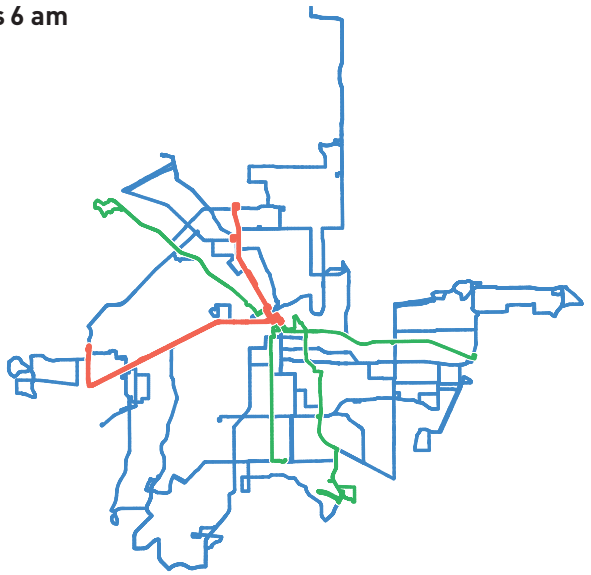
A Service Span

On weekdays, during peak morning hours, there are twenty-eight routes running at a frequency of 30 minutes or better. On Saturdays, there are only seven routes running during those times. Of the thirty-one routes that have service before 6:00 am, only twelve of them run on Saturdays before 6:00 am.

On Saturdays, after 9:00 pm, service is absent from the same neighborhoods as those listed on weekdays after 9:00 pm, with the addition of Burchill, University West, Frisco Heights, and Bluebonnet Hills. All of these neighborhoods are served by route #024. This leaves large residential and commercial areas, just southwest and southeast of Downtown Fort Worth without service.

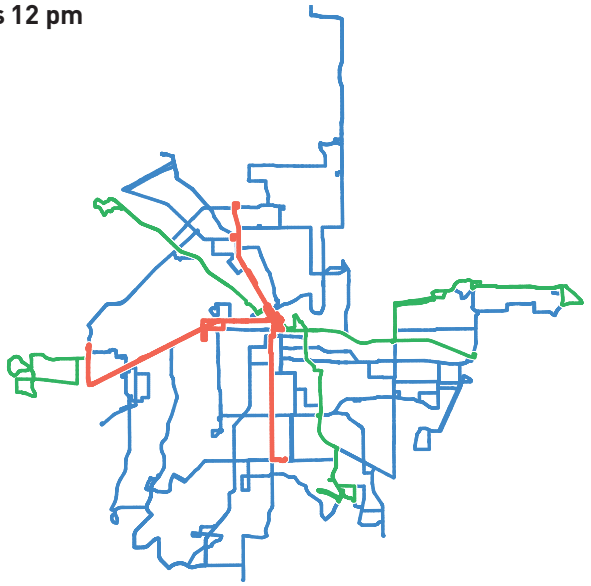
Saturdays 6 am

002 020
015 021
001 022
003 024
031 025
046 026
089 027
004 030
05a 032
05b 044
006 045
009 090
010 091
011
012
014
016



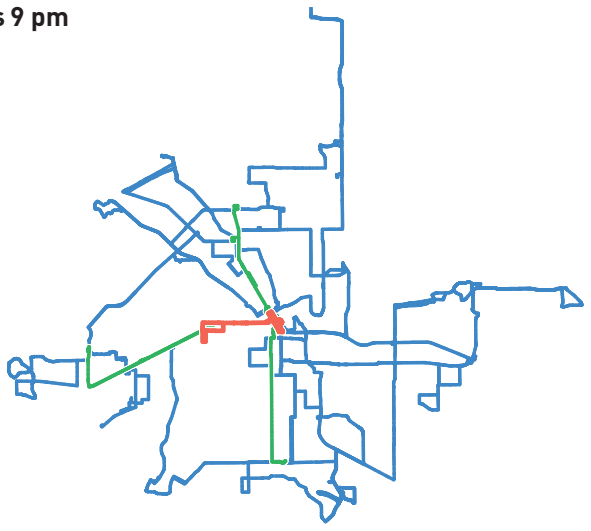
Saturdays 12 pm

001 010
002 011
015 012
MOLLY 014
THEDASH 016
003 020
021 022
026 024
031 025
046 027
089 032
004 044
05a 045
05b 071
006 072
007 090
009 091



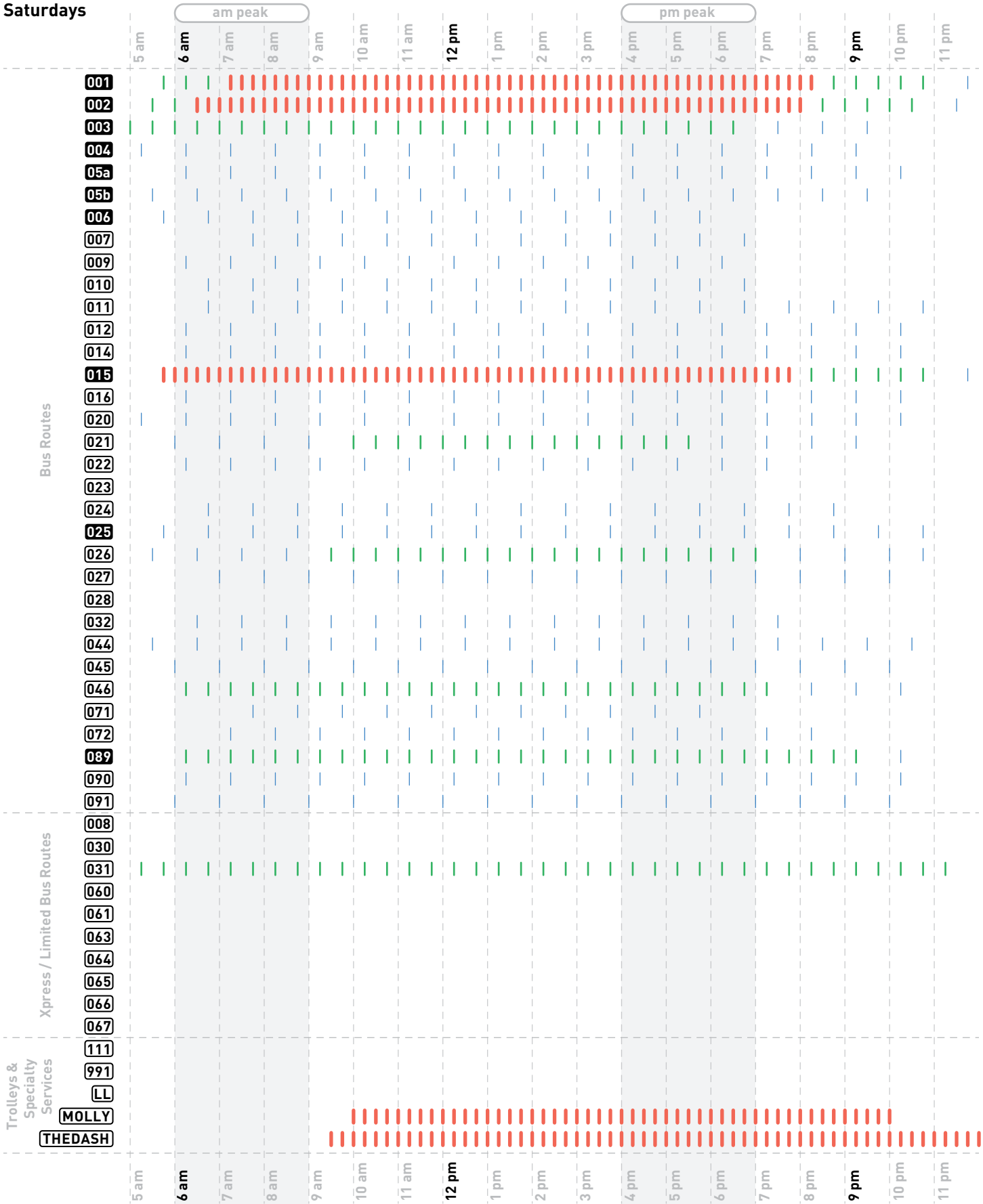
Saturdays 9 pm

MOLLY 026
THEDASH 027
001 044
002 045
015 046
031 089
003 090
004 091
05a
05b
011
012
014
016
020
021
025



≤15 min Frequency
30 min Frequency
>60 min Frequency

Saturdays



000 Route

000 Top 10 High Ridership Route

Each tick represents a bus stopping at the origin of the route.
Stops are rounded to nearest 15 min interval

- ≤15 min Frequency
- 30 min Frequency
- >60 min Frequency

3 The Network Is Designed for 9-to-5 Jobs

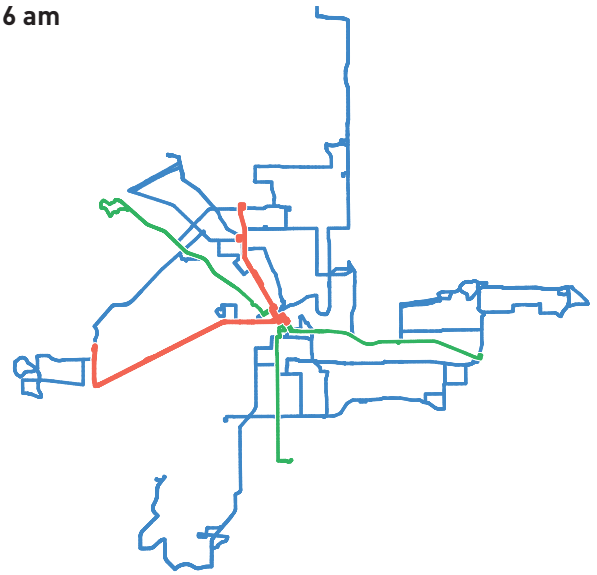
A Service Span

On Sundays, before 6:00 am, there are only seven routes running. During the morning peak, only five routes have a frequency of 30 minutes or better. Of the ten routes with the highest ridership, seven continue their service.

Sundays after 9:00 pm, almost the entirety of the area south of I-30 does not receive service, with the exception of route #001.

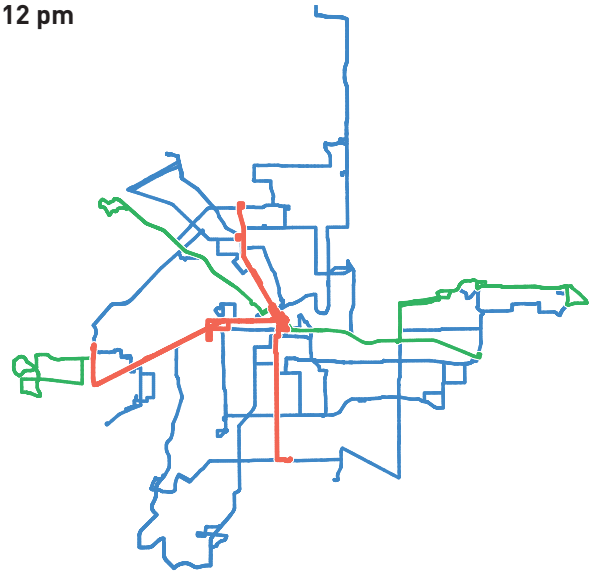
Sundays 6 am

002 026
015 044
001 045
046 090
089 091
004
006
008
010
011
012
014
016
020
021
022
024



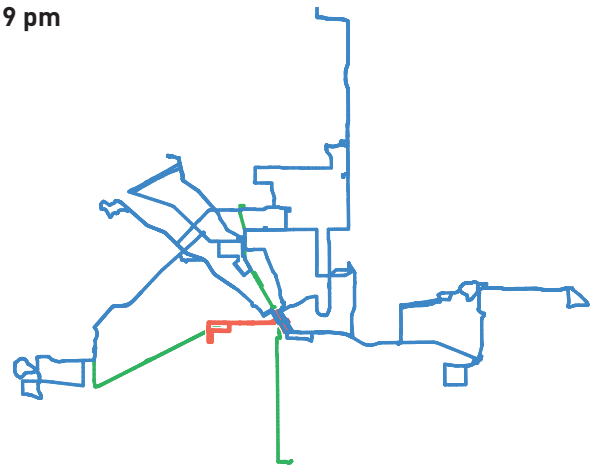
Sundays 12 pm

001 016
002 020
015 022
MOLLY 024
THEDASH 025
021 027
026 044
046 045
089 090
004 091
006
007
008
010
011
012
014

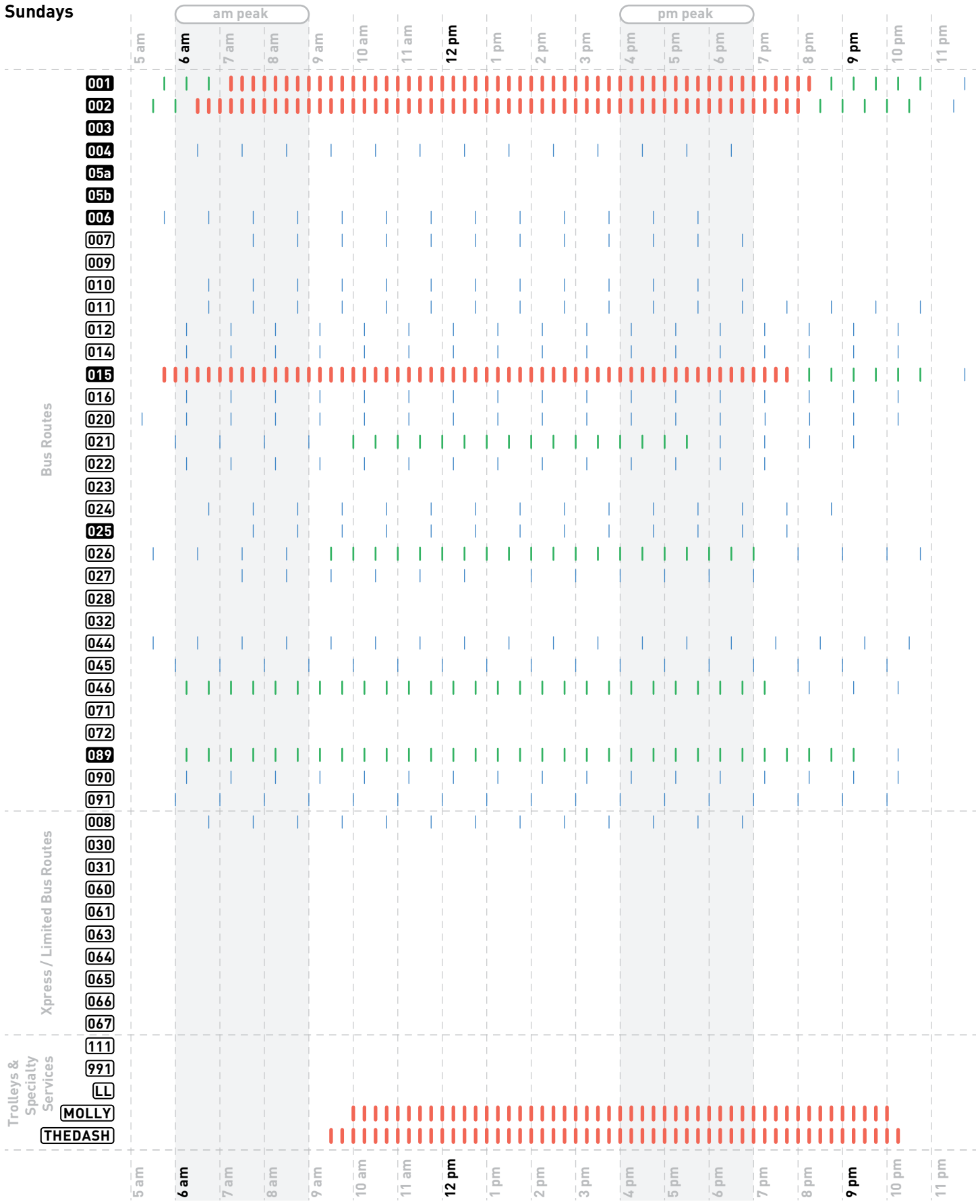


Sundays 9 pm

MOLLY 091
THEDASH
001
002
015
011
012
014
016
020
021
026
044
045
046
089
090



≤15 min Frequency
30 min Frequency
>60 min Frequency


Sundays
am peak
pm peak
5 am
6 am
7 am
8 am
9 am
10 am
11 am
12 pm
1 pm
2 pm
3 pm
4 pm
5 pm
6 pm
7 pm
8 pm
9 pm
10 pm
11 pm
Bus Routes
001
002
003
004
05a
05b
006
007
009
010
011
012
014
015
016
020
021
022
023
024
025
026
027
028
032
044
045
046
071
072
089
090
091
Xpress / Limited Bus Routes
008
030
031
060
061
063
064
065
066
067
Trolleys & Specialty Services
111
991
LL
MOLLY
THEDASH
000 Route
000 Top 10 High Ridership Route
Each tick represents a bus stopping at the origin of the route.
Stops are rounded to nearest 15 min interval
≤15 min Frequency
30 min Frequency
>60 min Frequency

4 The Pulse Drives Schedules Across the Network

A System structure

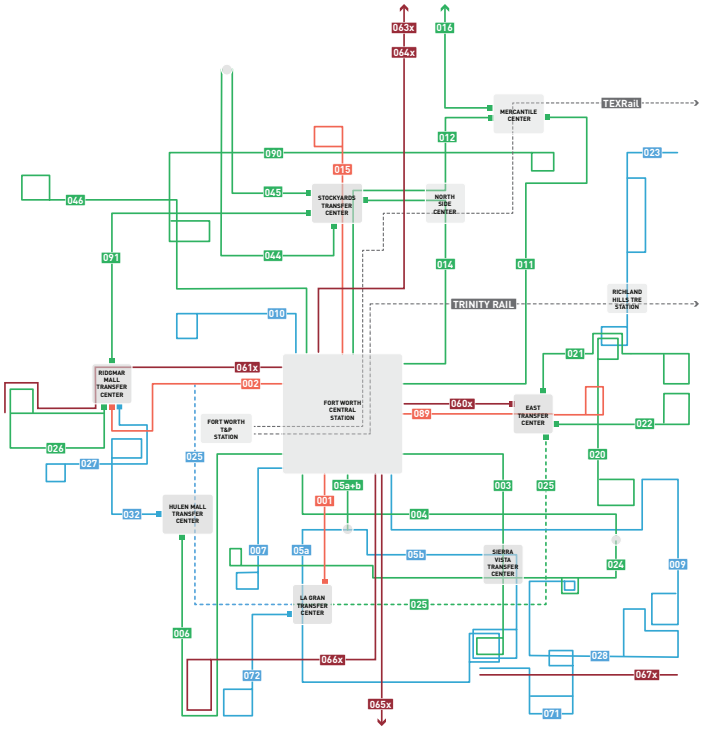
Fort Worth Trinity Metro has a bus network that functions as a radial system with one primary transit center and many secondary transit centers. In order to coordinate route transfers, the transit centers "pulse." This is when many buses arrive and/or leave at the same time to allow for transfers. It is a type of system that depends greatly on the accuracy of bus times and route consistency.

Radial pulse networks are a common way for bus networks to be organized, especially if they are smaller networks. They are an efficient way to create useful connections between low-frequency services. Fort Worth is one of the largest bus networks to be organization around a pulse.

Many larger networks use some variation of a grid network. This allows for multiple transfer points between routes and less dependency on specific time coordination. However, it requires more frequent service to create useful transfers, since the schedules cannot be coordinated around a single point.

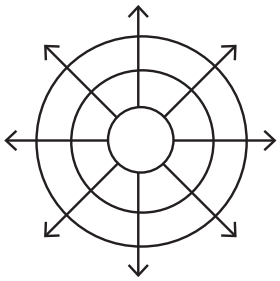
Central Station "pulses" at :45 each hour and each of the routes depend on this moment for people to transfer buses.

All route-times shown in these diagrams are for normal weekday operations. Crosstown connector routes are shown as dashed.

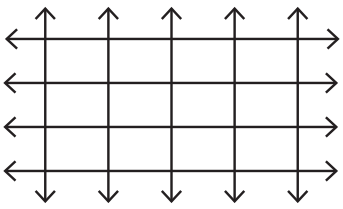


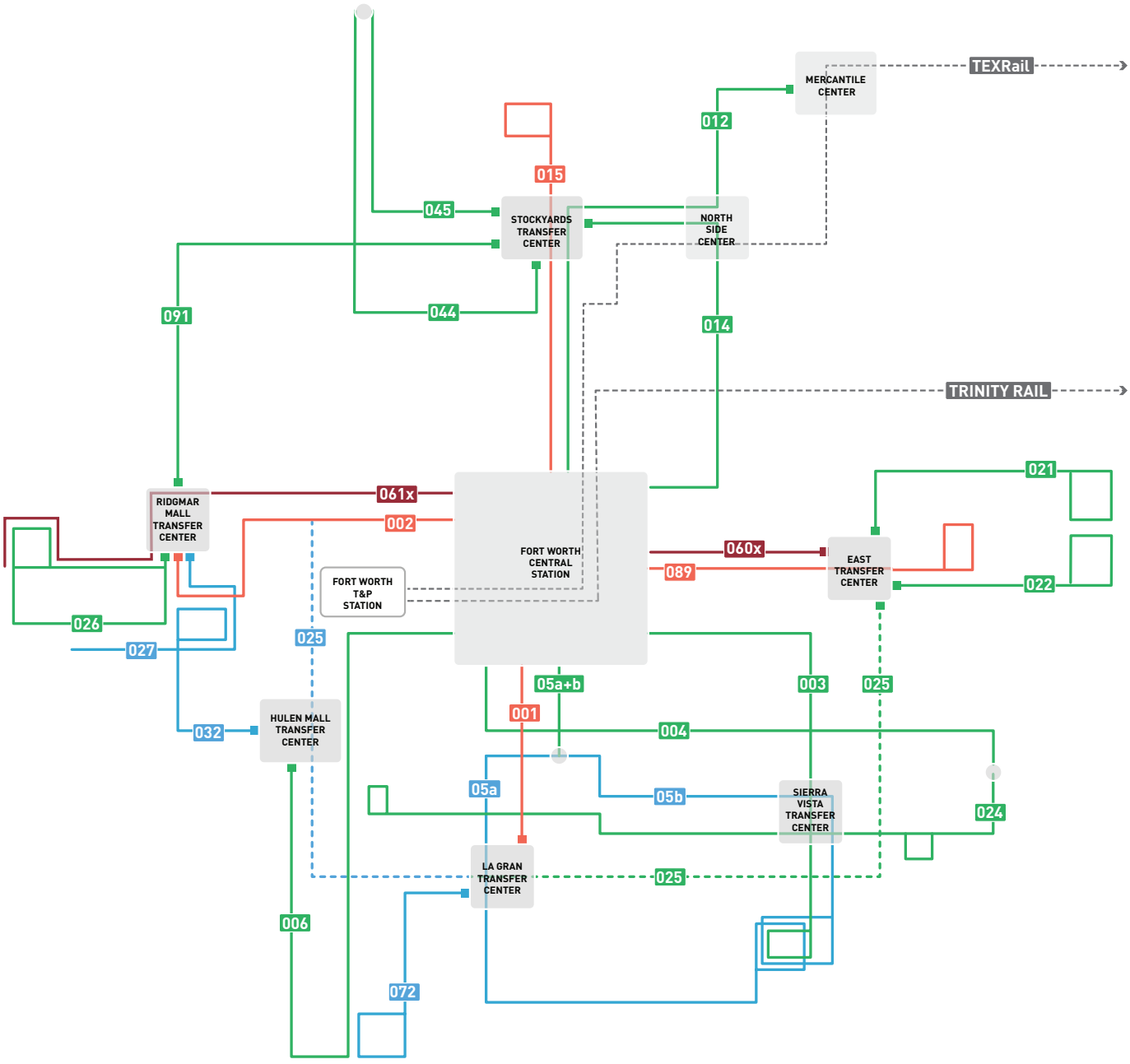
This diagrammatic representation of the system and its components shows route relationships and adjacencies.

Radial System



Grid System





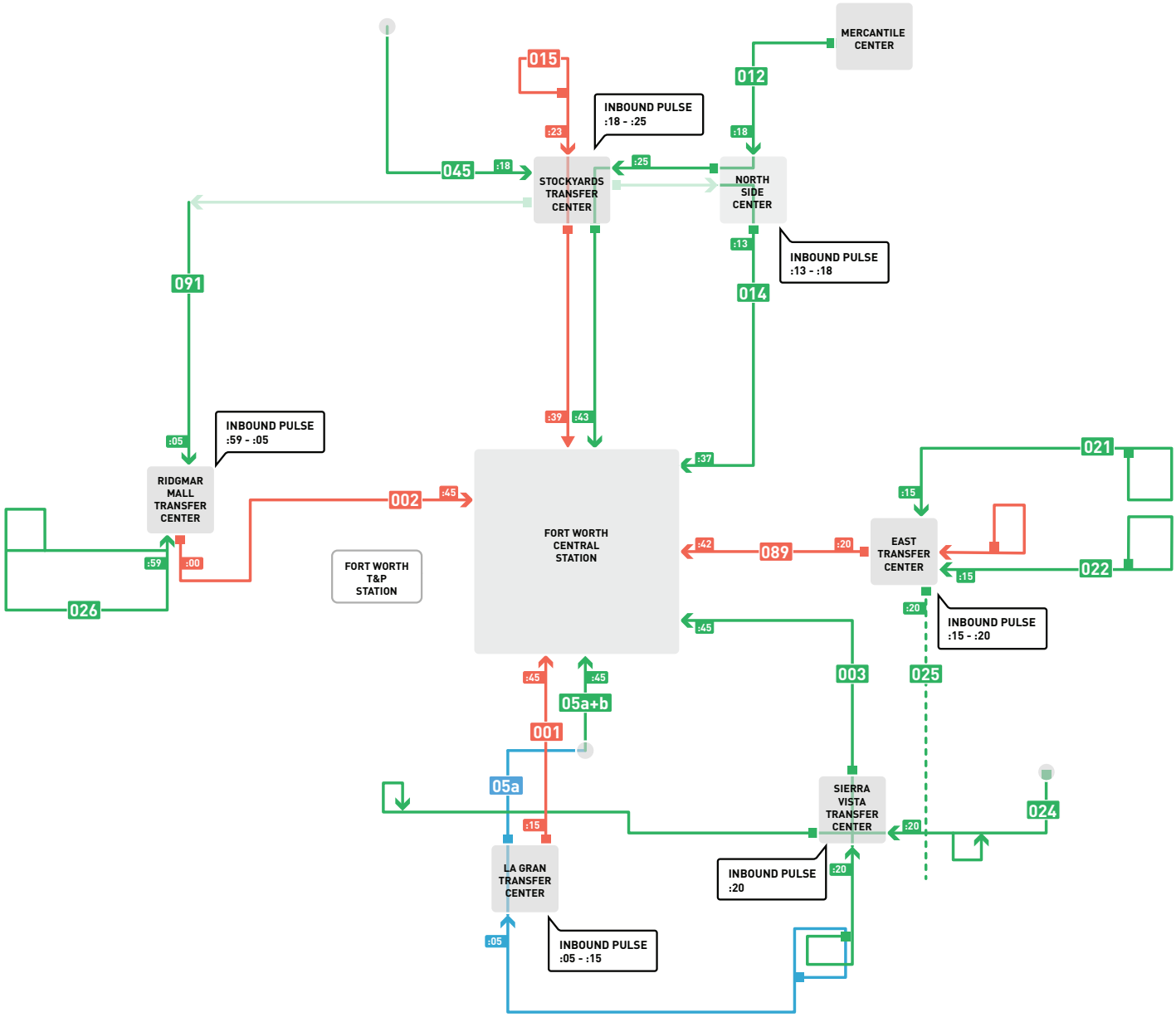
Routes Connecting Through Transit Centers

Each secondary transit center serves as a hub for its own set of routes, with the transit centers creating connections to Central. The #025 and the #091 serve as important routes between secondary transit centers.

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

4 The Pulse Drives Schedules Across the Network



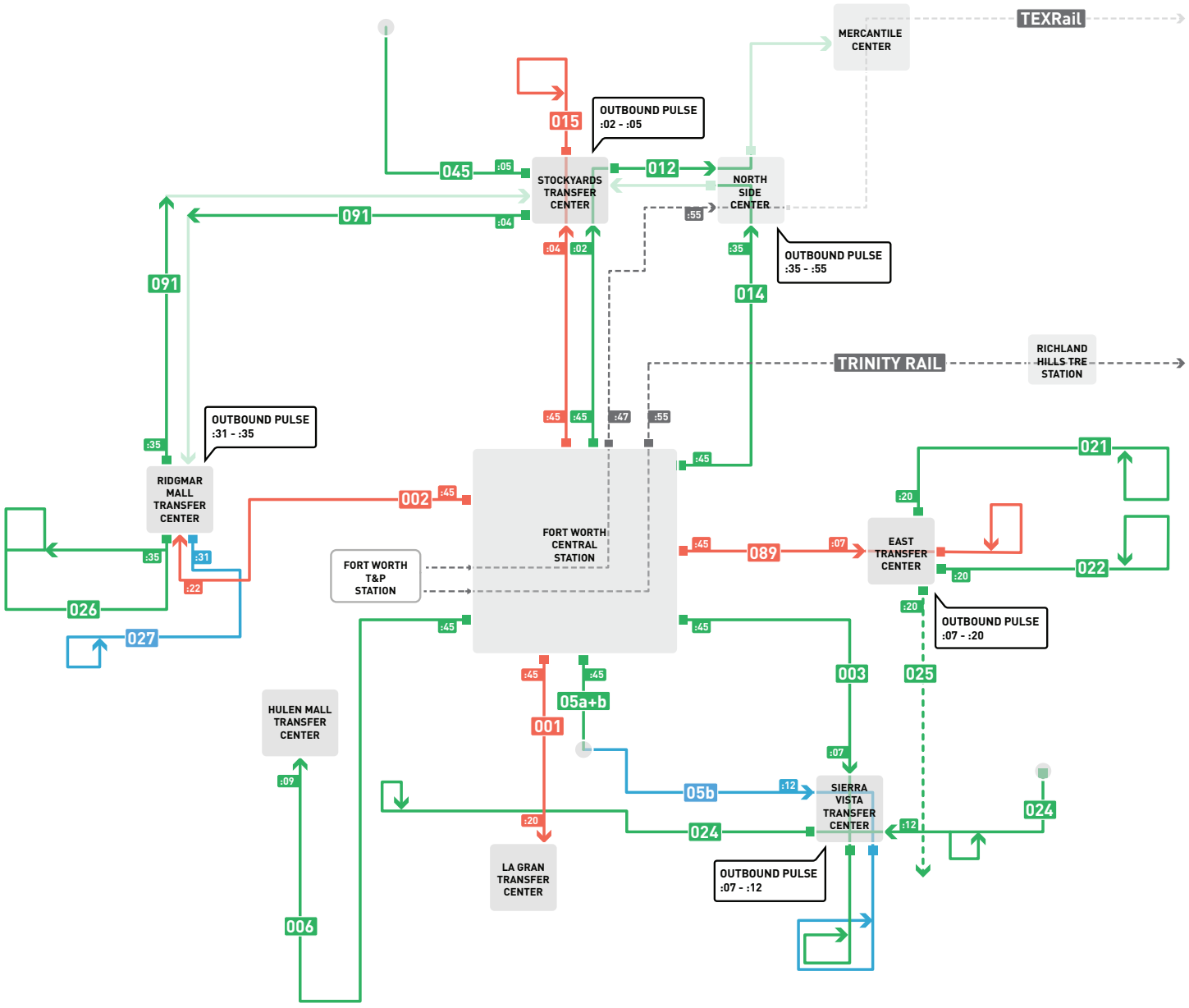
Central Pulse Routes (Inbound)

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

Every hour, buses start from around the network to converge on Central. Routes first converge on secondary transit centers, some routes continue to Central, and others terminate and passengers can transfer to Central. Thus, each center has its own pulse time, set, so that the primary route to Central arrives at :45 after the hour.

Stockyards Transit Center – to Downtown :25
East Transit Center – to Downtown :20
Sierra Vista – to Downtown :20
La Gran Transit Center – no inbound Central Pulse
Hullen Transit Center – no inbound Central Pulse
Ridgmar Transit Center – to Downtown :00



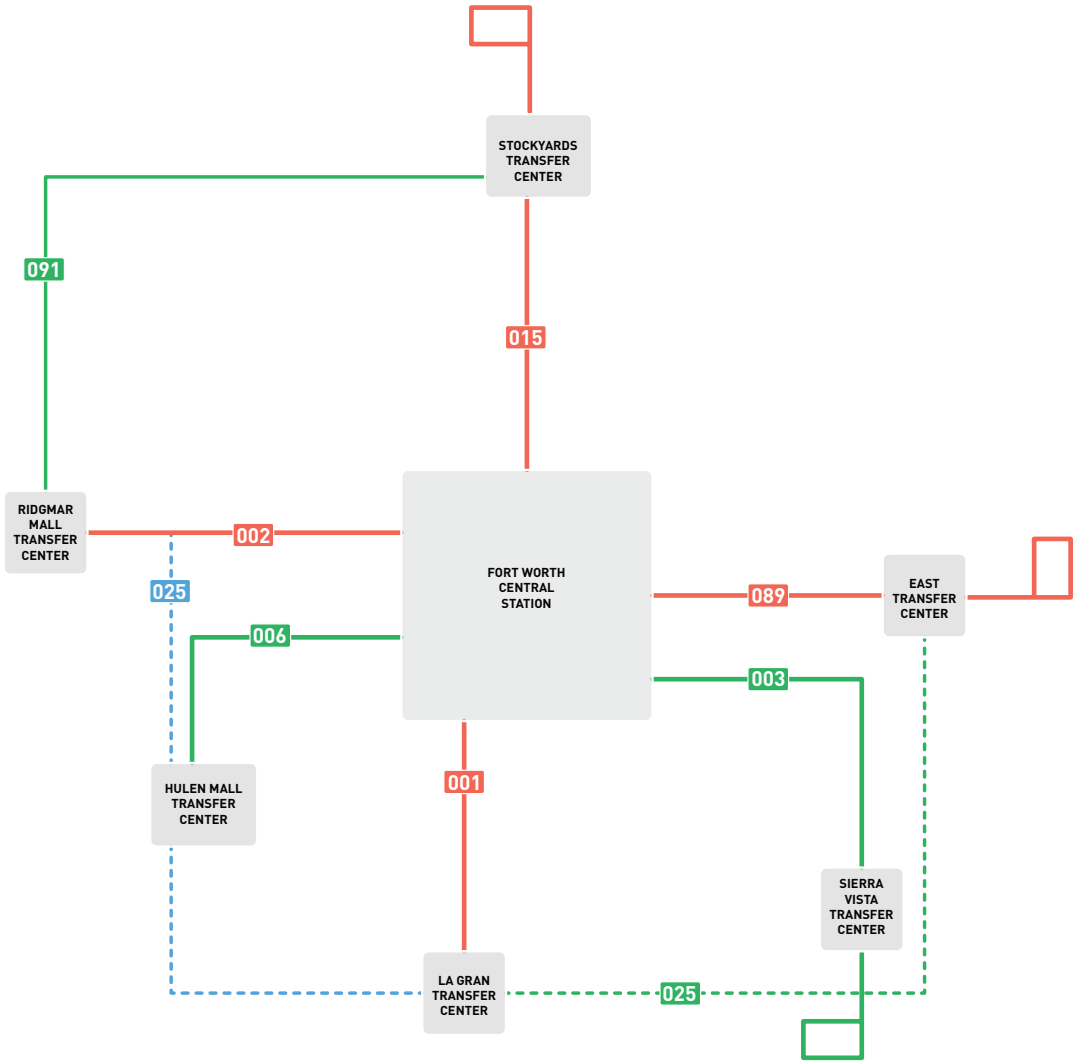
Central Pulse Routes (Outbound)

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

Passengers arrive at Central at :45 after and have their choice of 9 bus routes and 2 rail lines radiating back out. These return to the secondary transit centers, where they then trigger another outbound pulse.

Stockyards Transit Center – from Downtown :05
East Transit Center – from Downtown :20
Sierra Vista – from Downtown :12
La Gran Transit Center – no outbound Central Pulse
Hullen Transit Center – no outbound Central Pulse
Ridgmar Transit Center – from Downtown :35

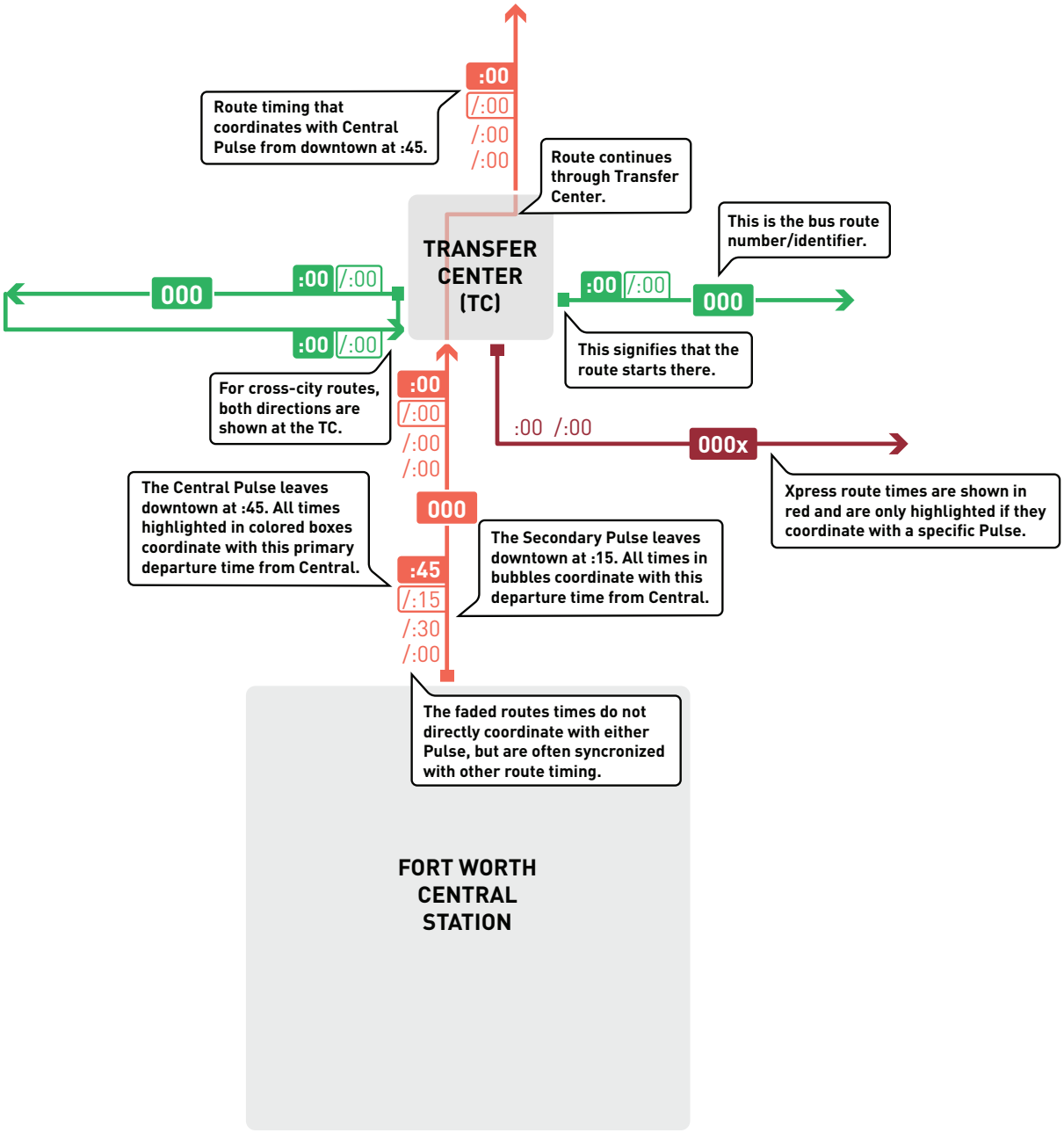


Transit Centers

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

Every local route runs at least once an hour, to meet the main pulse. But, some routes run more often. 30-minute routes create an additional pulse. Every individual transit center also has its peculiarities. The following pages map the complete schedule at each transit center.



Pulse Network Diagram Key

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

4 The Pulse Drives Schedules Across the Network

B East Transit Center

East Transit Center serves many residential neighborhoods and their needs -- such as libraries, grocery stores, and markets. Historically, both the #021 and #022 went Downtown independently, but the #089/SPUR replaced the need for that redundancy in the system.

East Transit Center is both the simplest and most coordinated transit center within the Trinity Metro System. The #089 and #060x create a quick link between Central Station and the transit center, and the #021, #022, and #025 are well timed for the Central and Secondary Pulse arrivals and departures. This is massively aided by the lack of need for these routes to simultaneously coordinate with other pulses or complicated route connections. The routes are also fairly short, leaving fewer moments for delays or complications.

Routes that coordinate with Central Pulse Outbound:

089 ⟶ **021** **022** **025**

Routes that coordinate with Secondary Pulse Outbound:

089 ⟶ **021** **022** **025**

Routes that coordinate with Central Pulse Inbound:

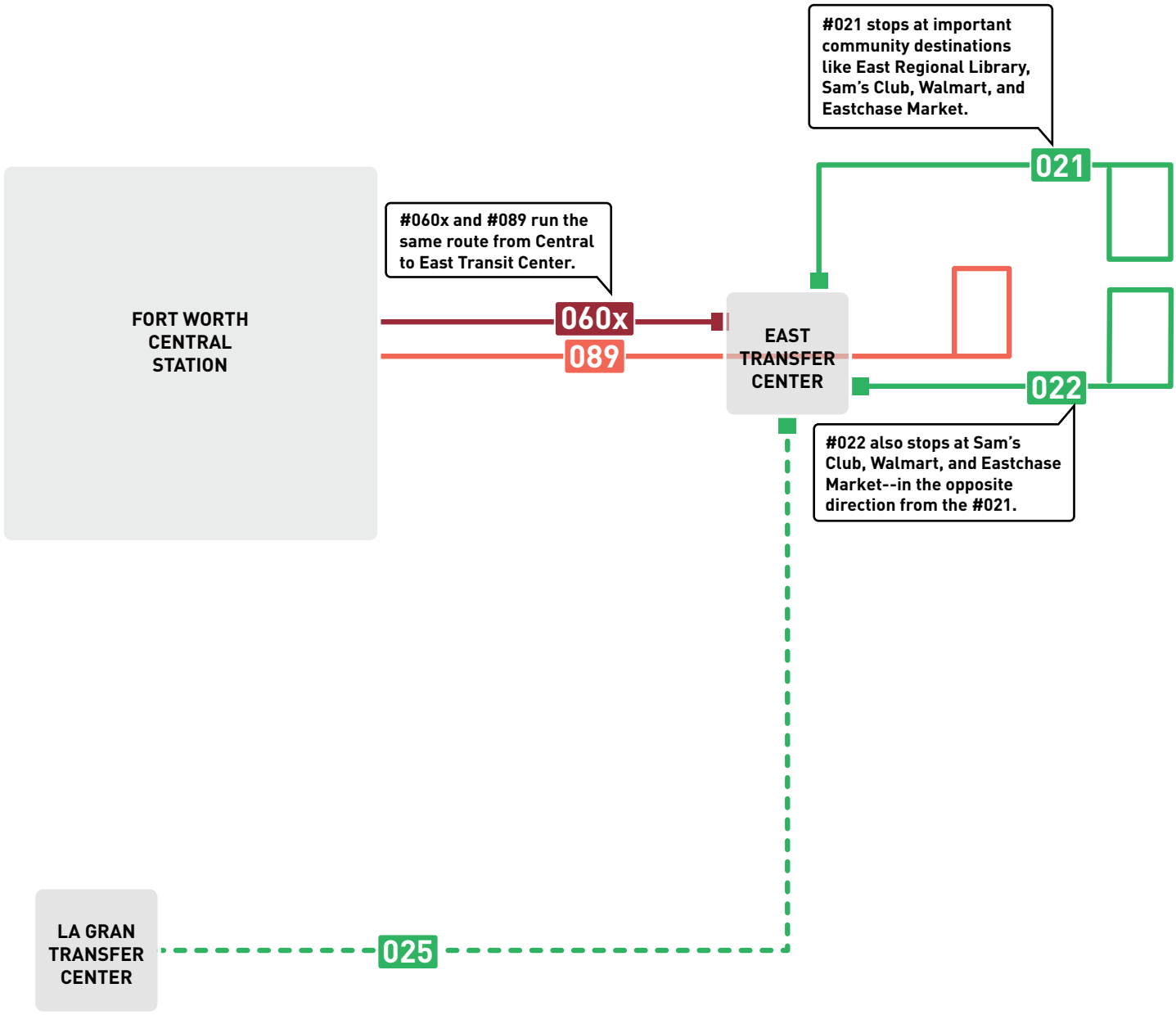
021 **022** **025** ⟶ **089**

Routes that coordinate with Secondary Pulse Inbound:

021 **022** **025** ⟶ **089**

From Downtown (Outbound)
Primary/ :45 Central Pulse ⟶ :20 East Transit Center pulse
Secondary/ :15 Central Pulse ⟶
:50 East Transit Center pulse

To Downtown (Inbound)
Primary/ :20 East Transit Center pulse ⟶ :45 Central Pulse
Secondary/ :50 East Transit Center pulse ⟶
:15 Central Pulse



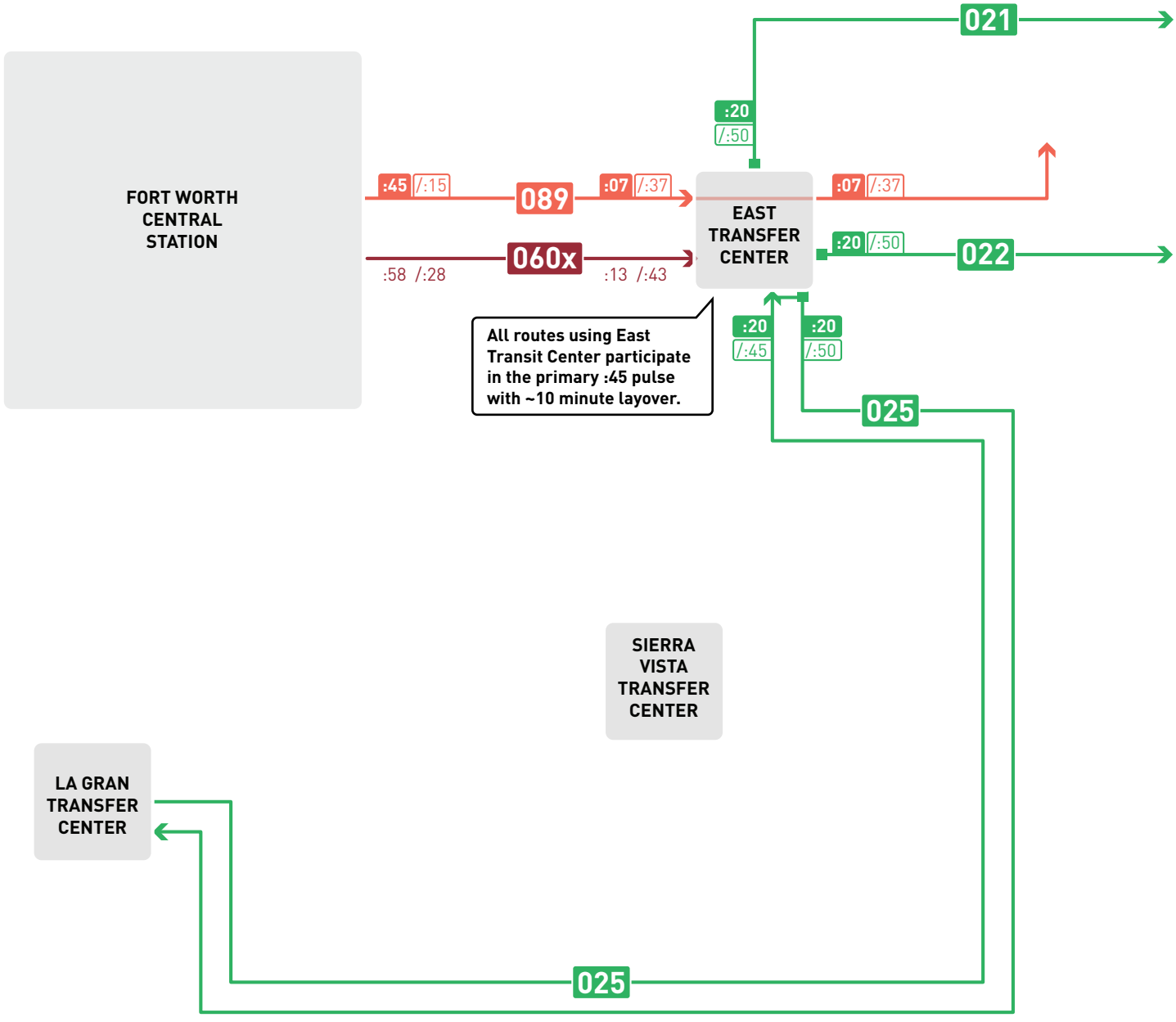
East Transit Center Connections

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

4 The Pulse Drives Schedules Across the Network

B East Transit Center



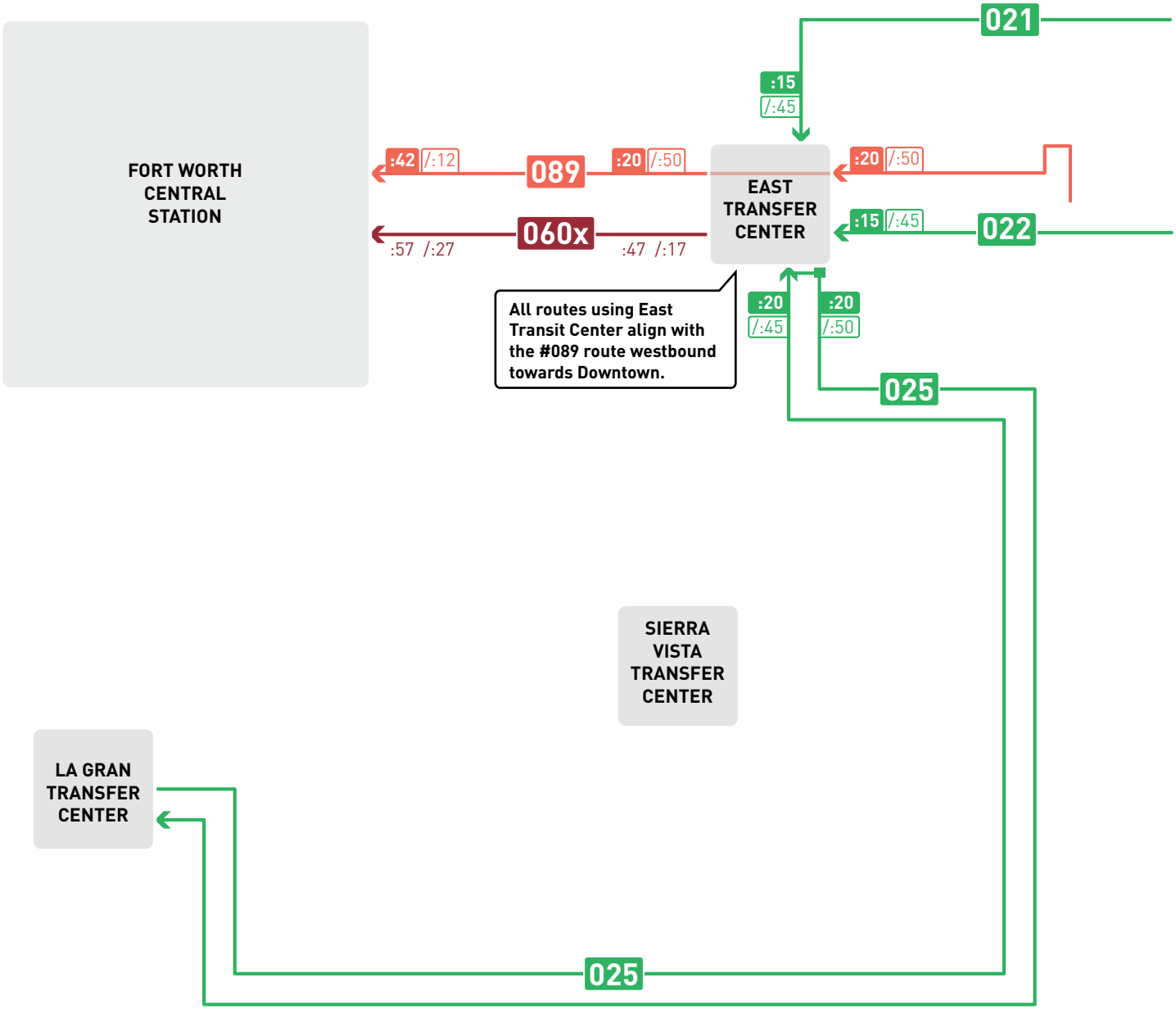
East Transit Center from Downtown

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

Both the #089 (SPUR) and Xpress #60x leave customers waiting at least 10 minutes for their connection to their on-ward bus.

Route #021 is shorter on the way out than coming back to the East Transit Center.



East Transit Center to Downtown

Frequency

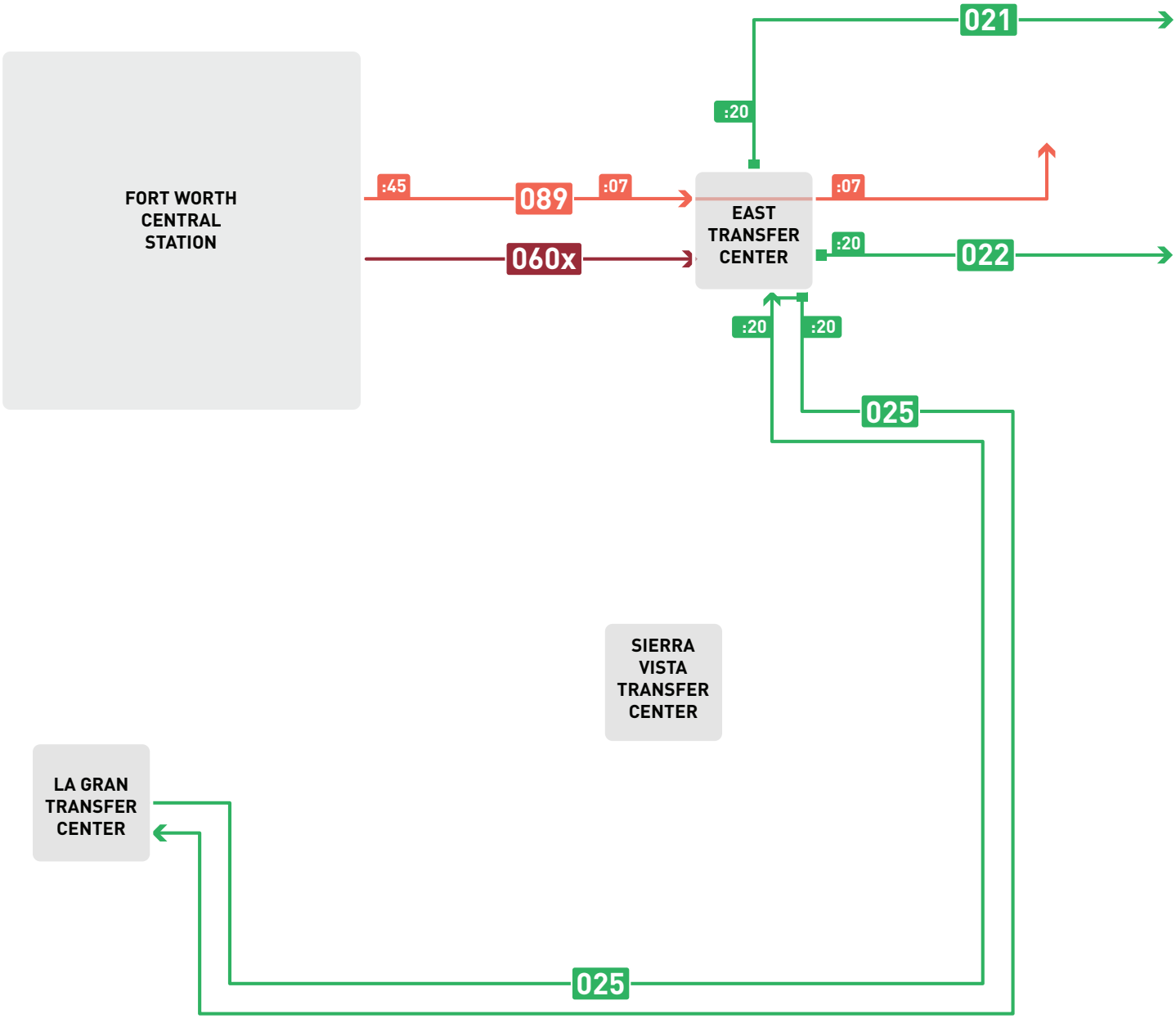
- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

East Transit Center pulses at :15 to allow people to catch the :20 bus to Downtown that gets them to the :45 Central Pulse.

The Secondary Pulse at :45, which gets people on the :50 #089 – allowing them to reach Downtown, but not for the Central Pulse.

4 The Pulse Drives Schedules Across the Network

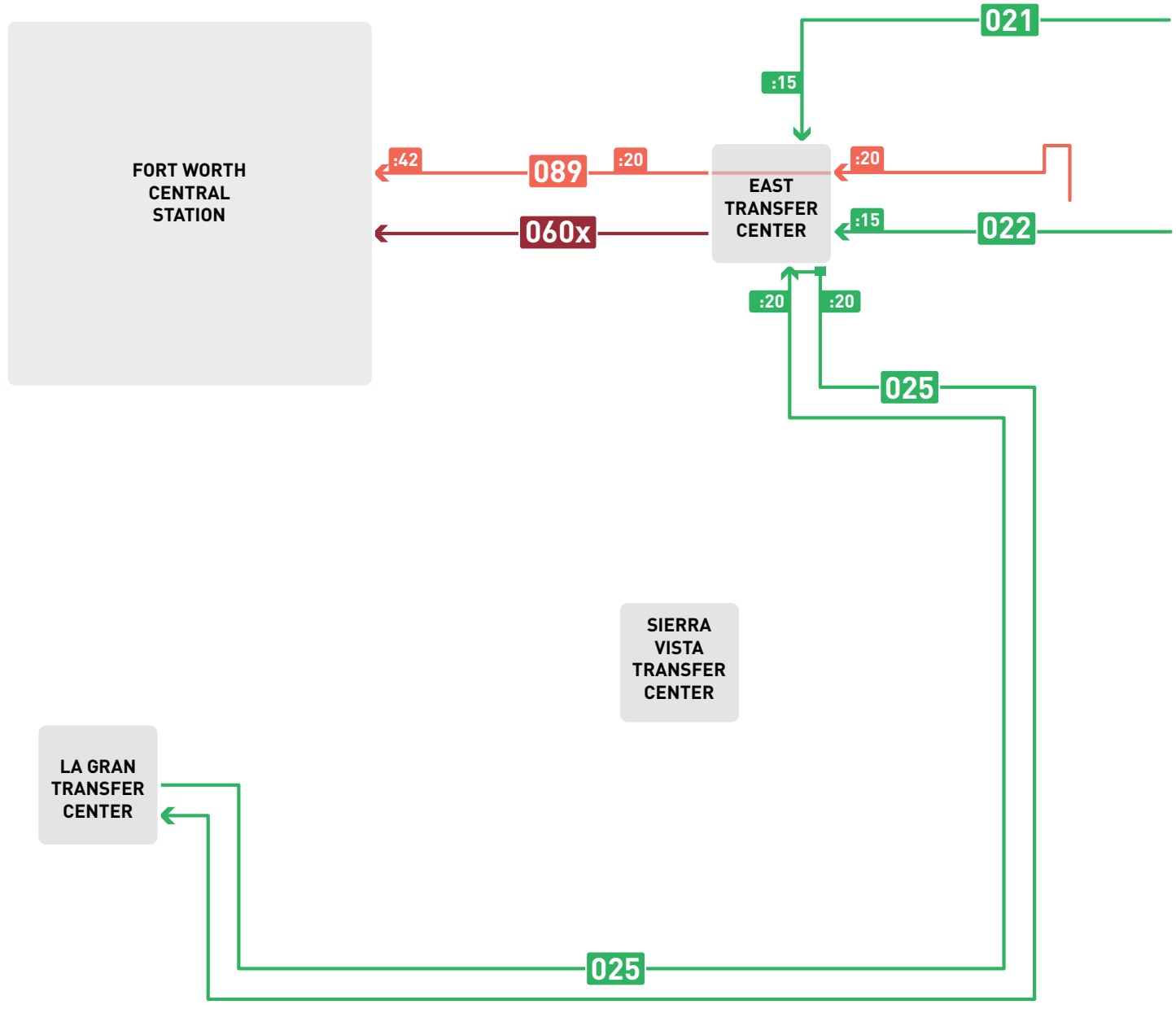
B East Transit Center



East Transit Center from Downtown
(Central Pulse)

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines



East Transit Center to Downtown
(Central Pulse)

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

4 The Pulse Drives Schedules Across the Network

C La Gran Transit Center

La Gran Transit Center - Overall

La Gran provides the central connector for the #025 route -- it waits between 10 and 12 minutes at La Gran Transit Center on both its eastbound and westbound routes. This allows it to be more useful for transferring to other routes that do not have any other reasonable transfer points. Westward of La Gran, the #025 is hourly rather than every half hour.

Routes that coordinate with Central Pulse Outbound:

001 ⟶ **N/A**

05a **005** ⟶ **N/A**

Routes that coordinate with Secondary Pulse Outbound:

001 **072** ⟶ **025**

Routes that coordinate with Central Pulse Inbound:

N/A ⟶ **001**

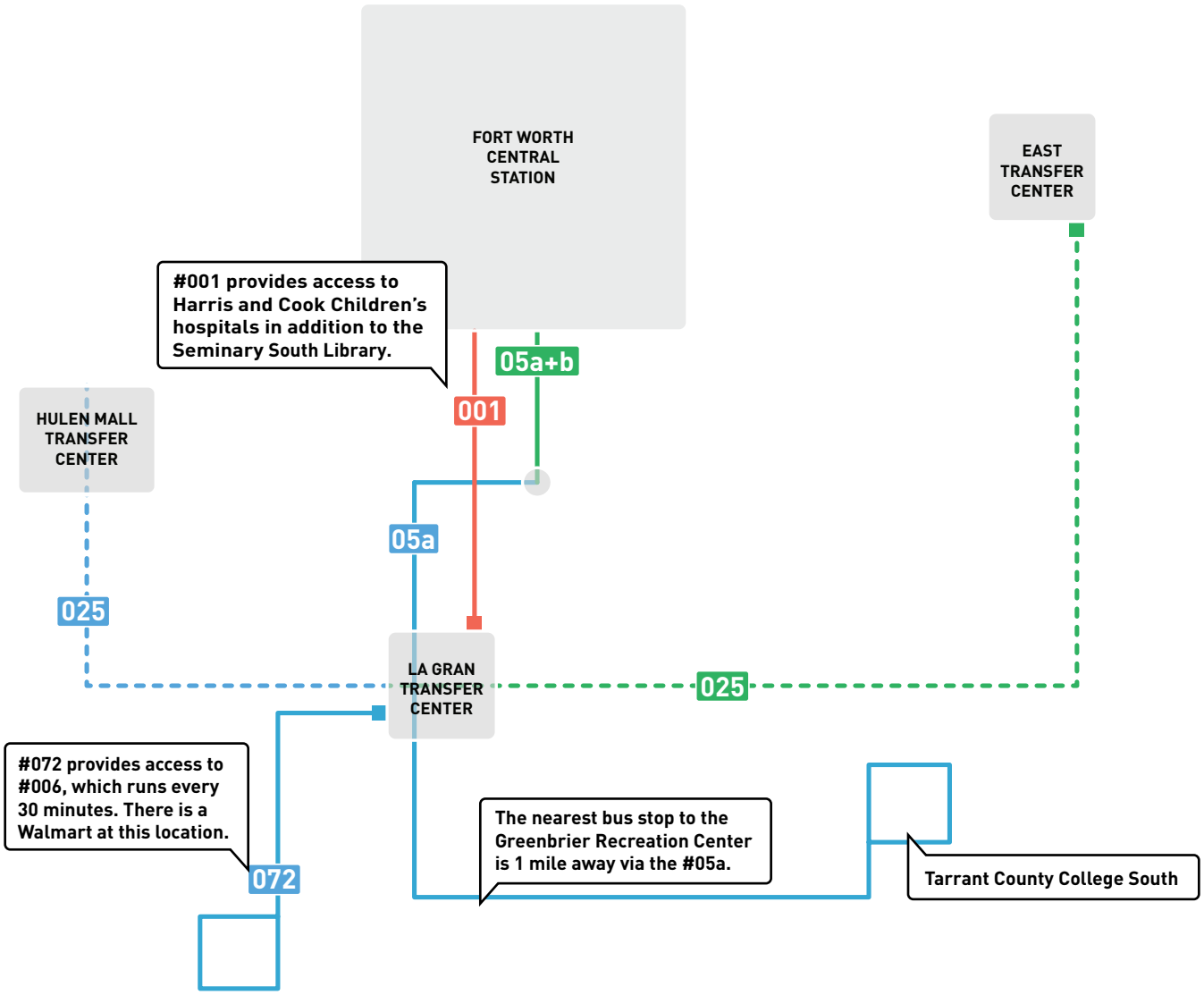
N/A ⟶ **05a** **005**

Routes that coordinate with Secondary Pulse Inbound:

025 ⟶ **001**

From Downtown (Outbound)
Primary/ :45 Central Pulse ⟶ N/A
Secondary/ :15 Central Pulse ⟶
:40 La Gran Transit Center pulse

To Downtown (Inbound)
Primary/ N/A --> :45 Central Pulse ⟶
Secondary/ :30 La Gran Transit Center pulse
:15 Central Pulse



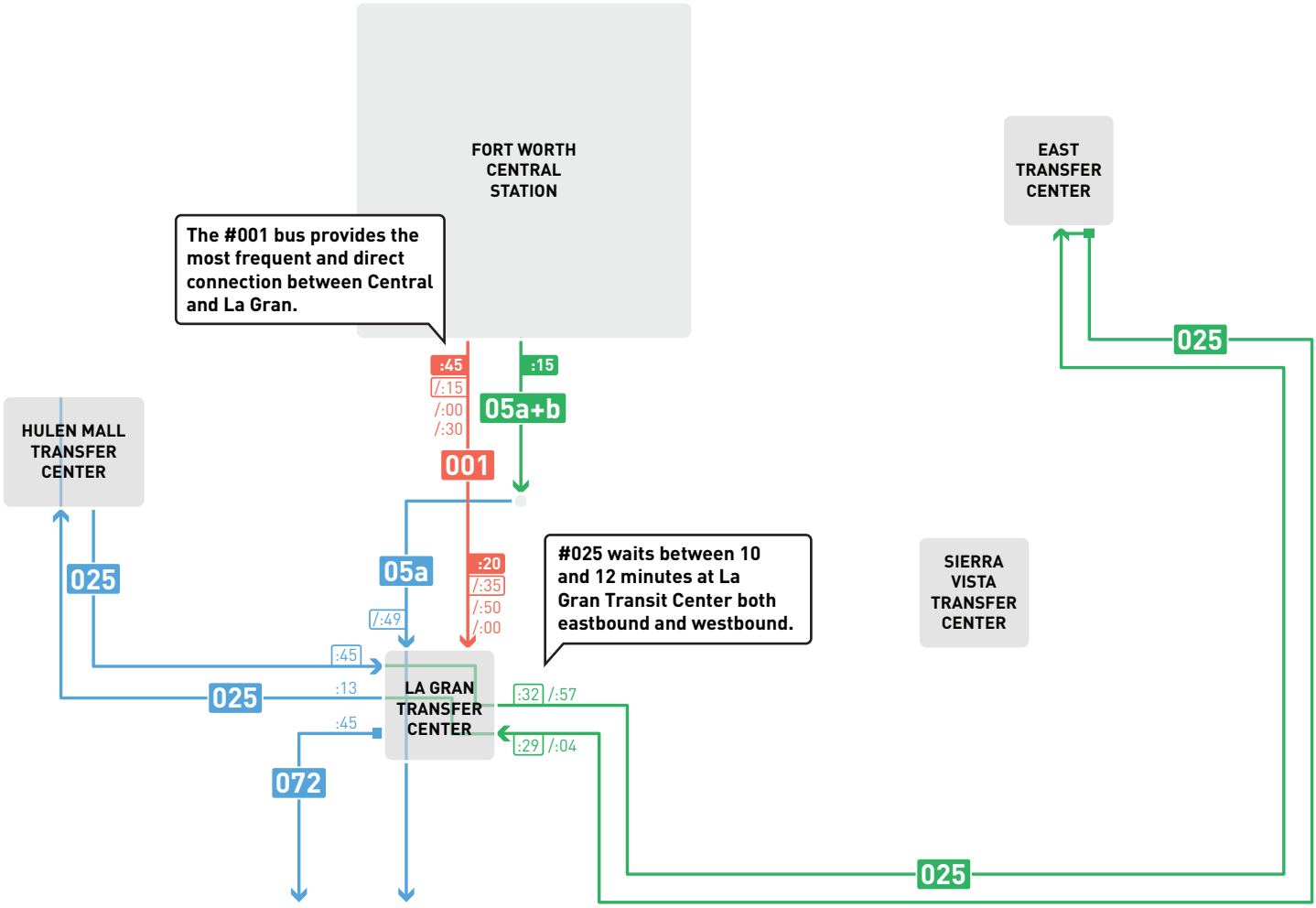
La Gran Transit Center Connections

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

4 The Pulse Drives Schedules Across the Network

C La Gran Transit Center



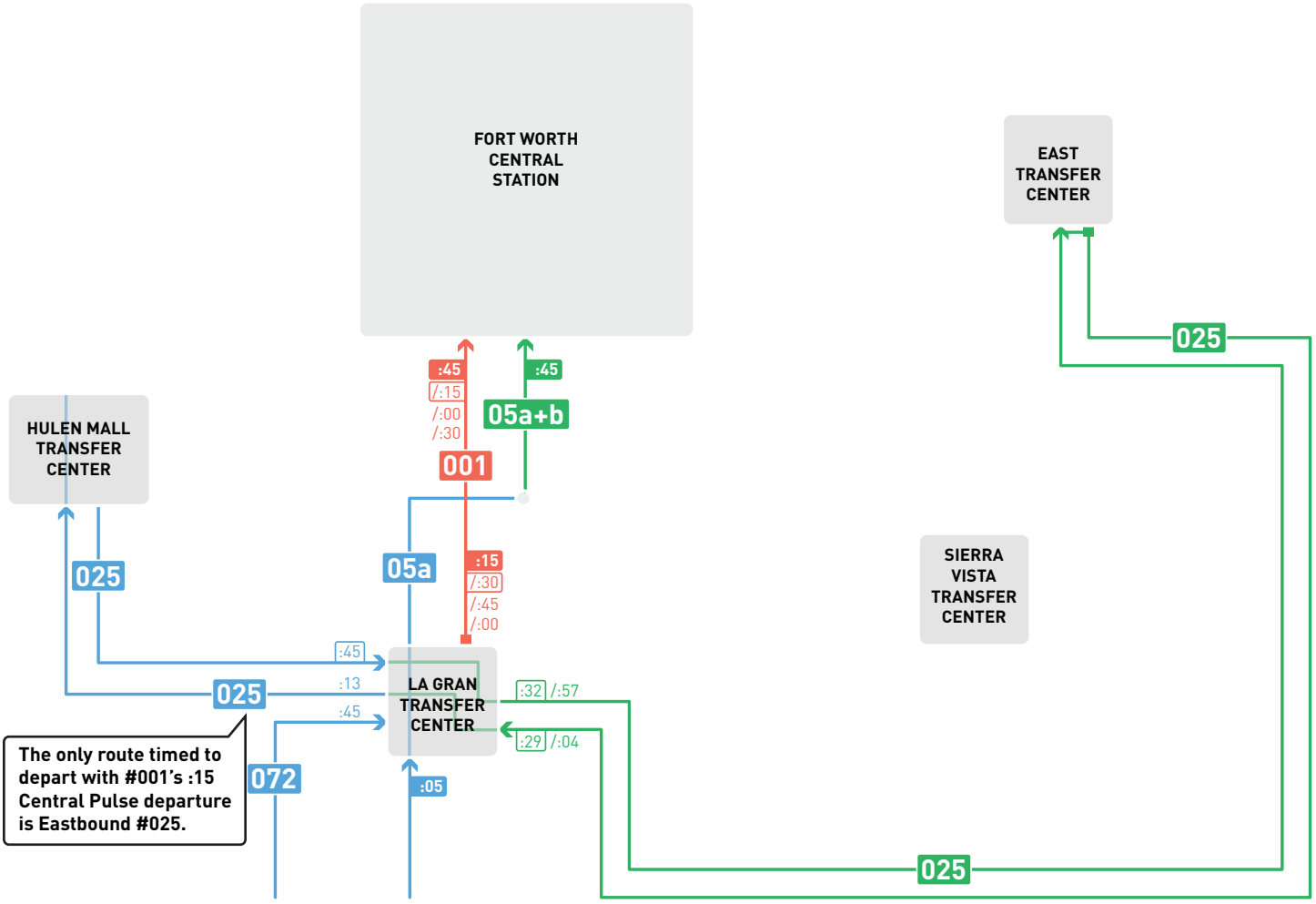
La Gran Transit Center from Downtown

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

The La Gran pulse at ~:45/:50 does not work well with westbound #025, but is coordinated otherwise.

The #072 bus leaves 4 minutes before the hourly #005a route arrives.



La Gran Transit Center to Downtown

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

#001's :15 departure time to arrive at the Central Pulse Downtown is not well timed with other arrivals to the La Gran Transit Center -- the #025 Eastbound and #072 arrive 15 minutes after it leaves.

The Westbound #025 arrives at :45 to time with the :45 departure of #001 to Downtown. This does not participate in one of Central's pulses, but it is a mini-pulse of it's own.

4 The Pulse Drives Schedules Across the Network

D Ridgmar Transit Center

Ridgmar Mall Transit Center serves as the primary location for the #061x Xpress route to transfer to the #026 and #027 residential routes as well as the #091 connector. The #002, Ridgmar's Downtown connector, also serves as the termination point for the #025 crosstown route mid-route at the Camp Bowie and Hulen stop.

Routes that coordinate with Central Pulse Outbound:

002 ⟶ **026** **027** **091**

Routes that coordinate with Secondary Pulse Outbound:

002 ⟶ **026** **091**

Routes that coordinate with Central Pulse Inbound:

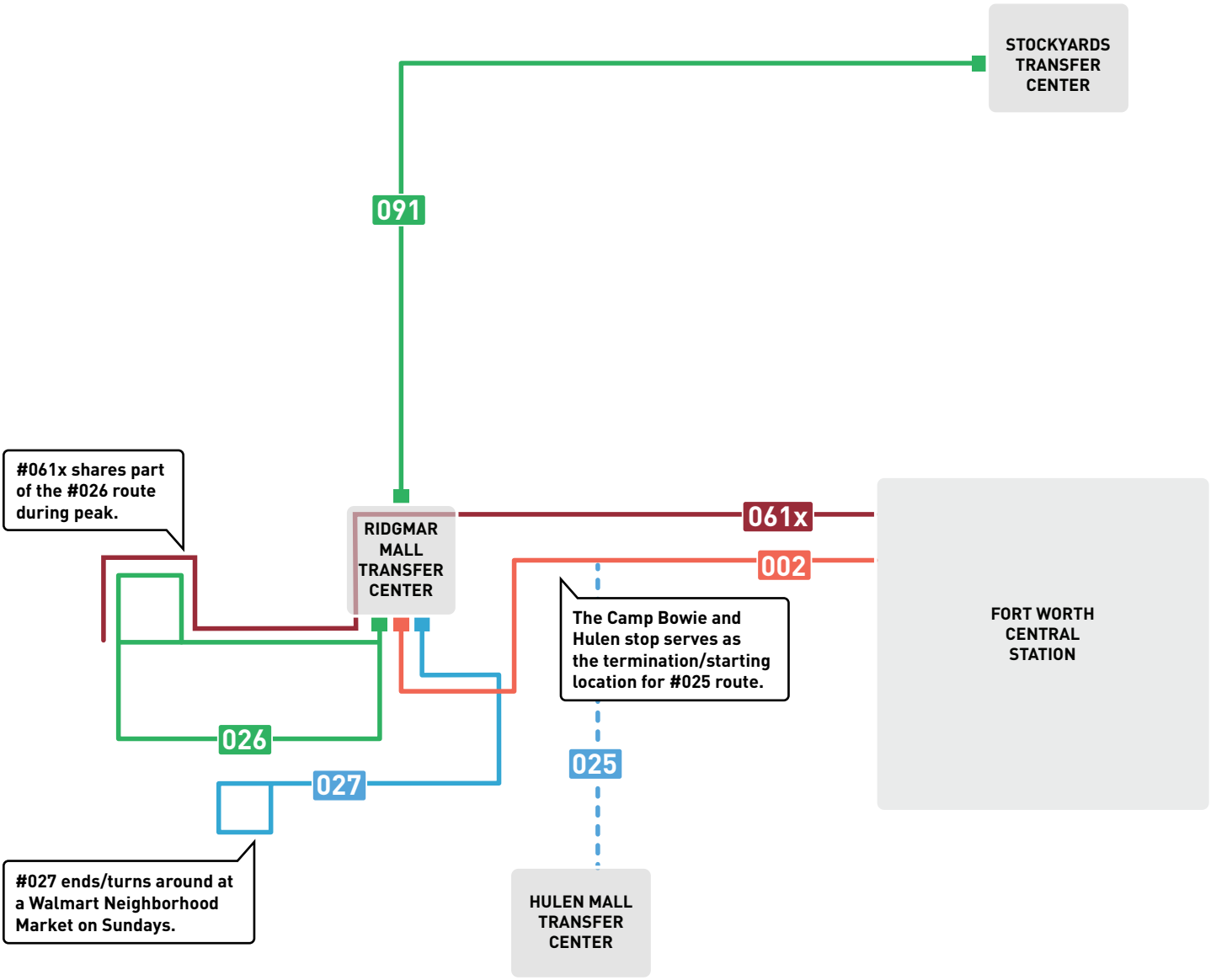
026 **091** ⟶ **002**

Routes that coordinate with Secondary Pulse Inbound:

026 **027** ⟶ **002**

From Downtown (Outbound)
Primary/ :45 Central Pulse ⟶
:30 Ridgmar Transit Center pulse
Secondary/ :15 Central Pulse ⟶
:00 Ridgmar Transit Center pulse

To Downtown (Inbound)
Primary/ :00 Ridgmar Transit Center pulse ⟶
:45 Central Pulse
Secondary/ :30 Ridgmar Transit Center pulse ⟶
:15 Central Pulse



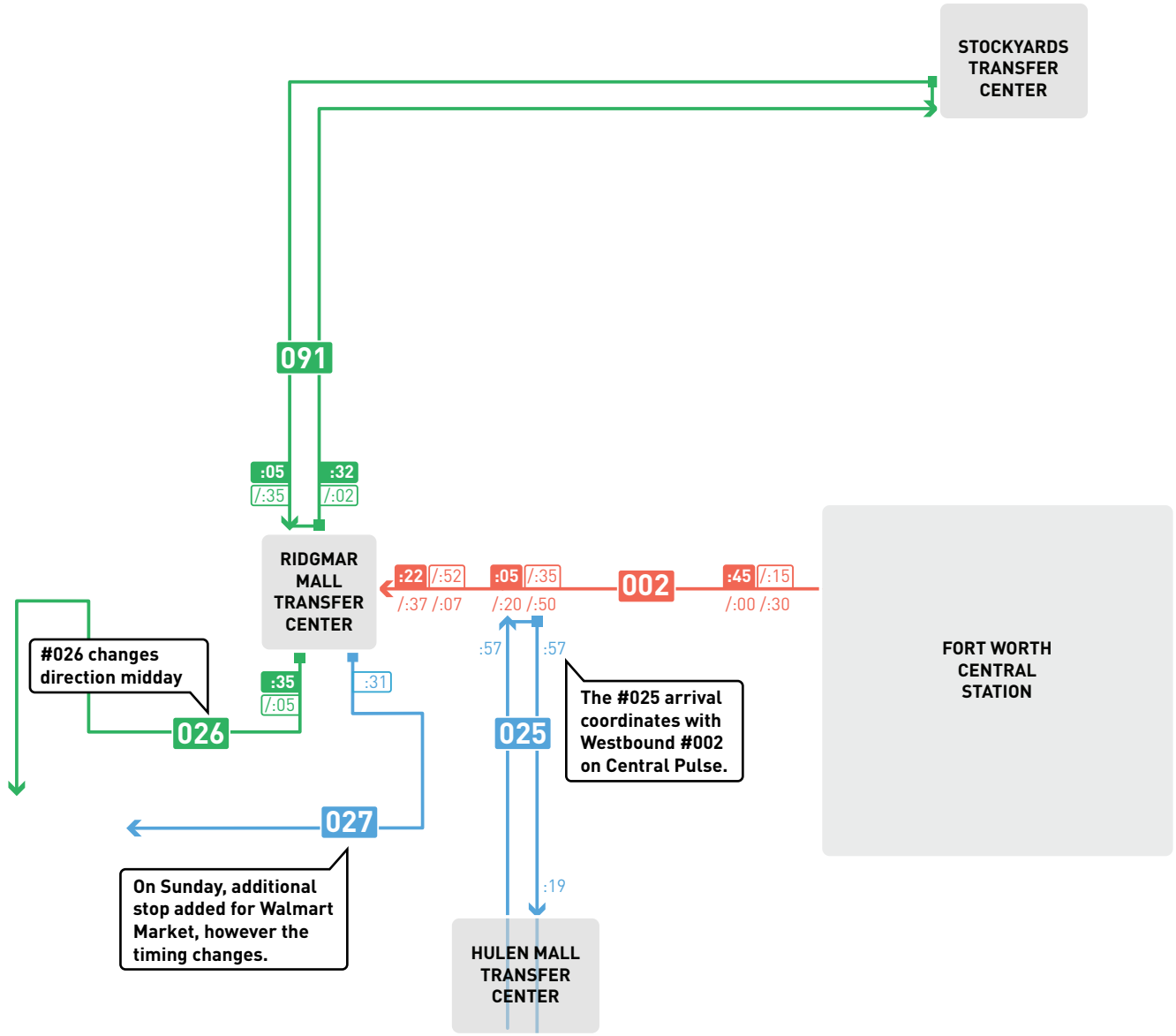
Ridgmar Transit Center Connections

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

4 The Pulse Drives Schedules Across the Network

D Ridgmar Transit Center

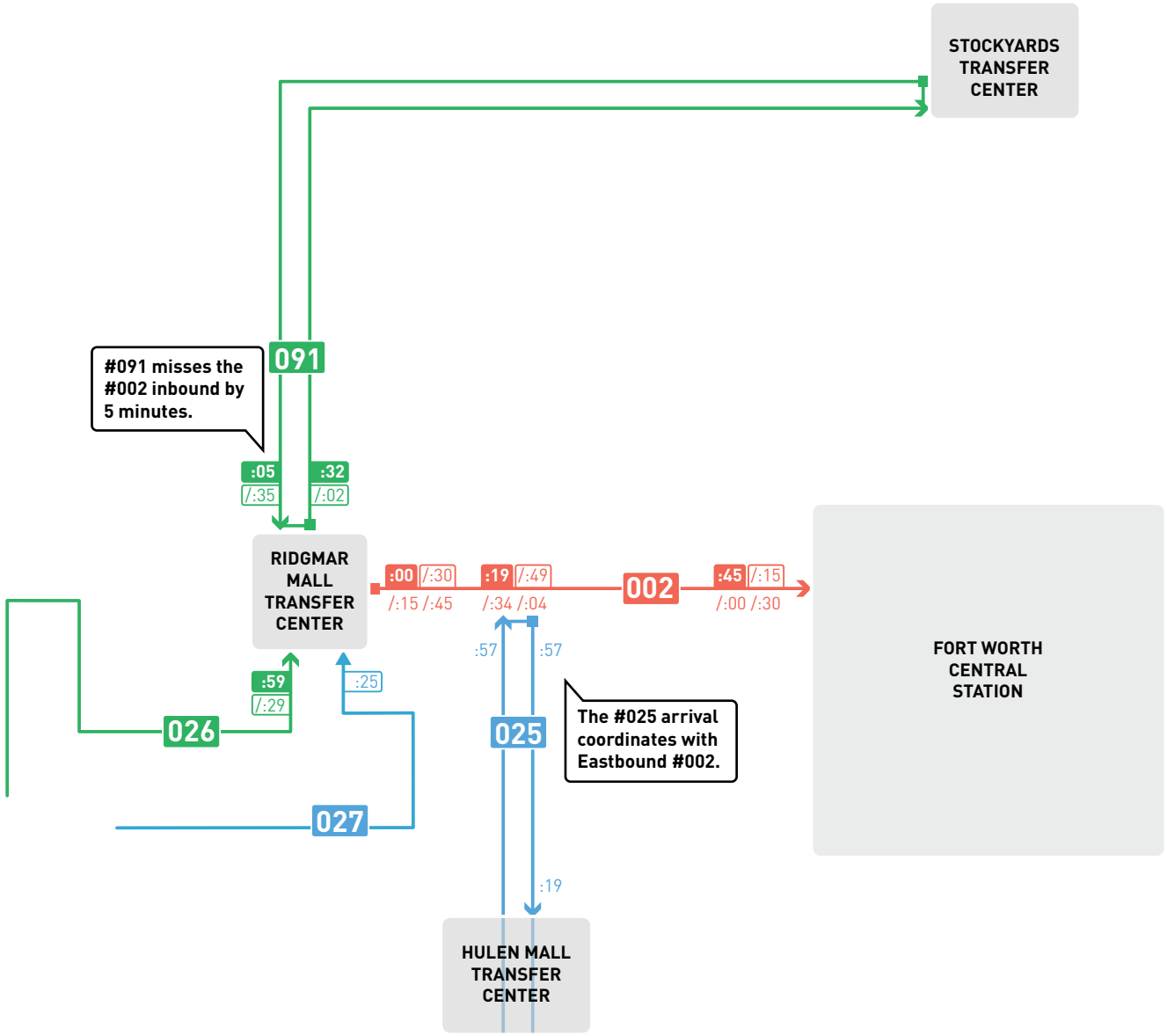


Ridgmar Transit Center from Downtown

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

The :22 arrival from Central Station gives access to all :3x departures from Ridgmar Transit Center. It also coordinates with the #025 arrival at Camp Bowie & Hulen stop. As the #025 is hourly west of La Gran Transit Center, this is a critical connection in both directions.



Ridgmar Transit Center to Downtown

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

Inbound, the routes that use Ridgmar Transit Center have coordinated access to the #002 towards Downtown. The #026 and #091 are both timed well to arrive for the Central Pulse, but the #027 only functions for the Secondary Pulse.

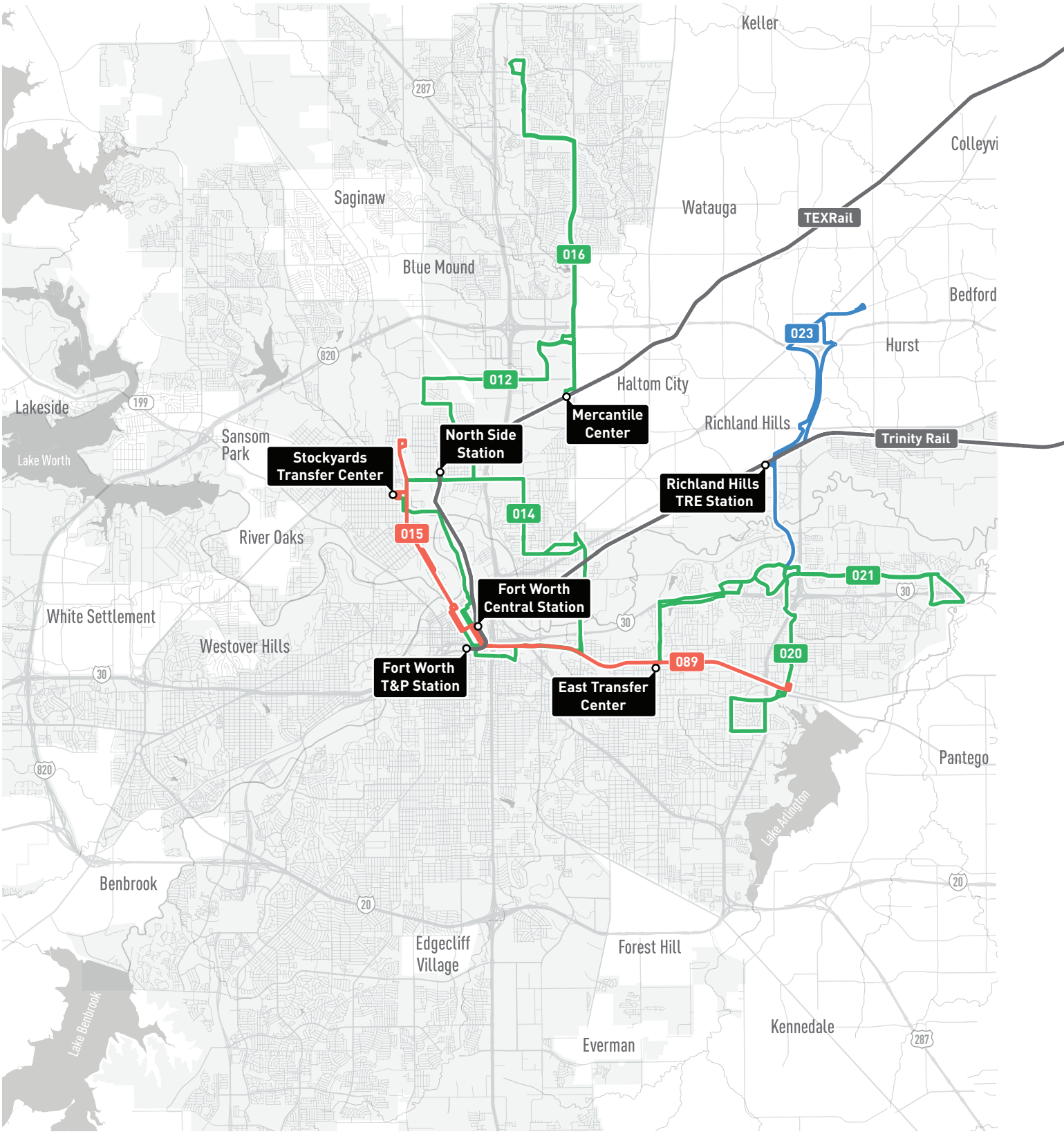
5 TEXRail and TRE Are Not Fully Integrated Into the Bus Network

A Train and Bus Interaction Points

Fort Worth has two rail lines. TexRail, operated by Trinity Metro, connects Downtown to Mercantile Center, North Richlands Hills, Grapevine, and DFW Aairport. Trinity Rail Express connects Downtown to Richland Hills, Irving, and Downtown Dallas.

Both rail lines conveniently connect to the Trinity Metro bus network at Central Station, though the inbound times do not work well with the pulse. However, the design of the bus network preceded the rail lines. The bus network other-side does not take advantage of the rail lines or provide convenient connections outside of Downtown. Access from routes south and west of the network are very limited. In most cases, a transfer at Fort Worth Central Station, East Transfer Center, or Stockyards Transfer Center is required to be able to access TEXRail and TRE.

Connections between rail stations and transfer centers are generally not very frequent, with the majority of connections between transfer centers and stations with rail connections arriving every 30 or 60 minutes. The only routes with frequency of every 15 minutes are routes #015 and #089, connecting Stockyards and East Transfer Centers to Fort Worth Central Station, providing access to both TEXRail and TRE.



Frequency

- 15 min
- 30 min
- 60 min
- Rail Lines

- Roads
- City Limits

0 0.25 0.5 1.5 miles

5 TEXRail and TRE Are Not Fully Integrated Into the Bus Network

A Train/Bus Interaction

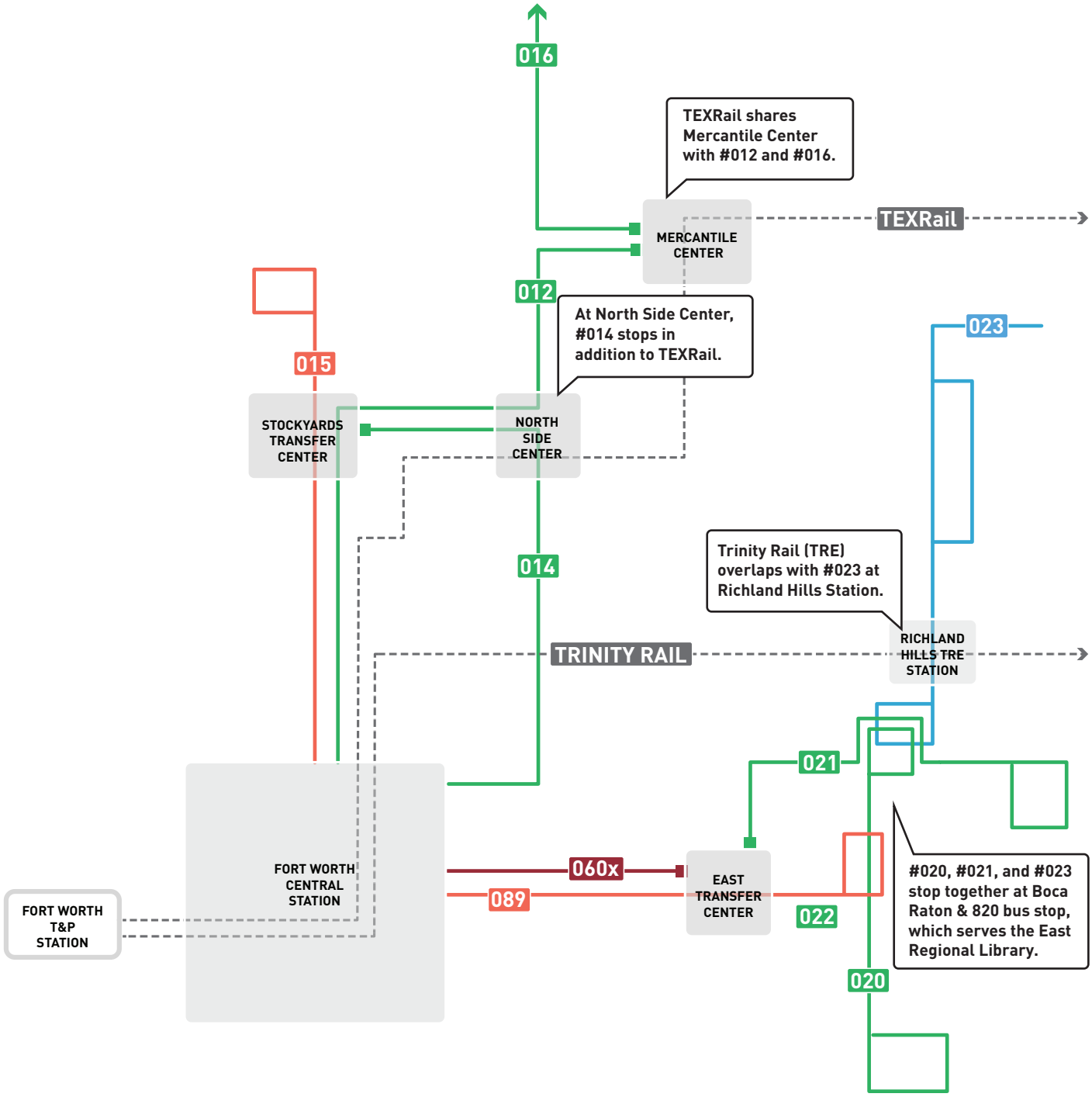
Mercantile, North Side, and Richland Hills Stations

TEXRail, TRE, and the bus network interact at North Side Center, Mercantile Center, Richland Hills, and Fort Worth Central Stations. These stations have most direct and efficient access to TRE and TEXRail, as there are significantly less efficient connections through the bus network to other nearby stations.

Connection from Stockyards Transfer Center to/from TEXRail is relatively efficient as routes #014 and #012 provide a direct connection from North Side Station, while a connection to/from TRE through Fort Worth Central Station is possible via route #015.

East Transfer Center proves to have more limited access to TEXRail and TRE requiring a connection to Fort Worth Central Station through routes #089 and #060x. Additionally, the intersection of routes #021 and #023 at the Boca Raton and 820 stop provides access from East Transfer Center to TRE at Richland Hills station. This connection to TEXRail requires bus transfer between Transfer Centers, increasing travel time and decreasing efficiency.

Connections to both TRE and TEXRail occur only at Fort Worth T&P Station and Fort Worth Central Station.

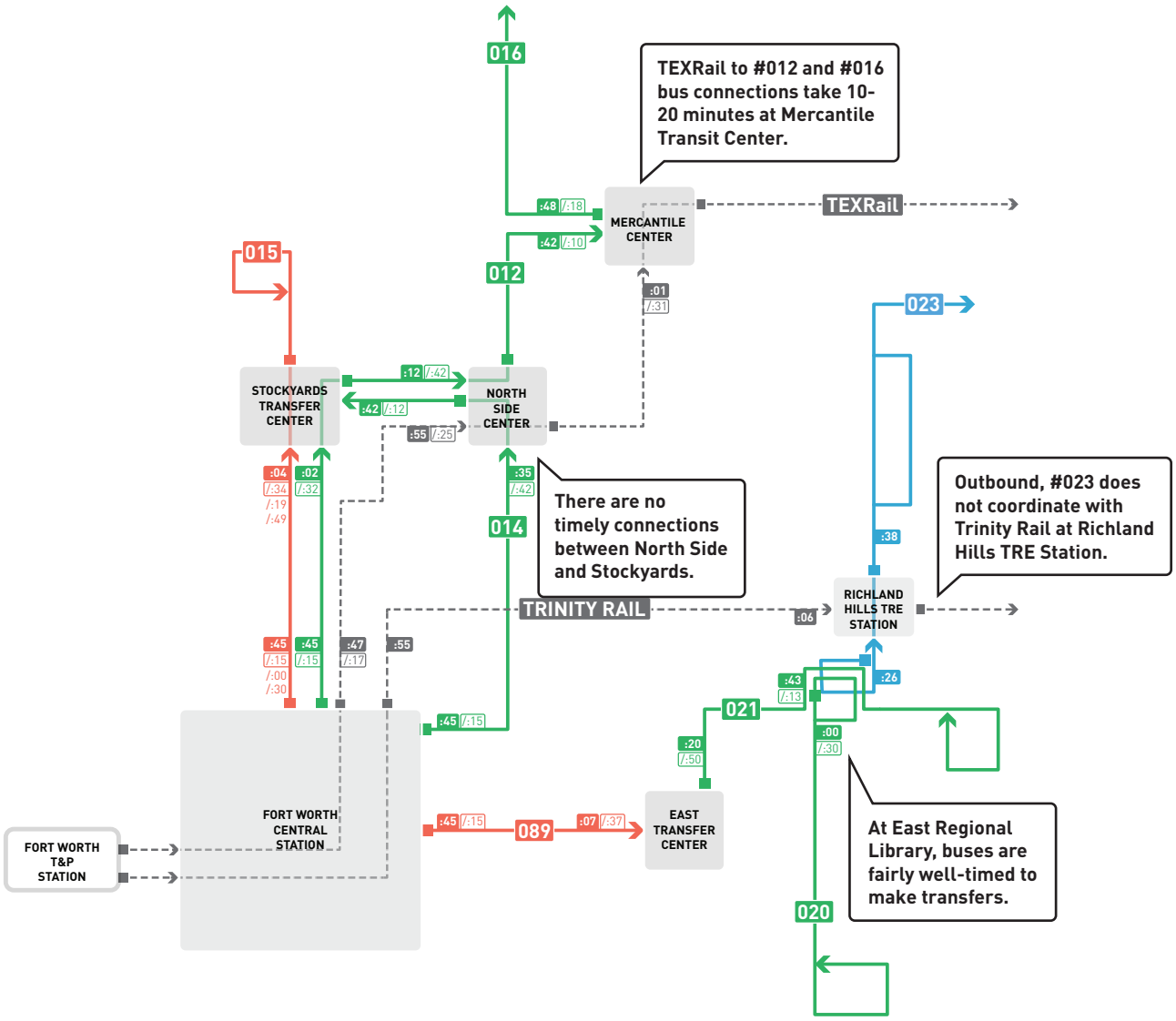


Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

5 TEXRail and TRE Are Not Fully Integrated Into the Bus Network

A Train and Bus Interaction



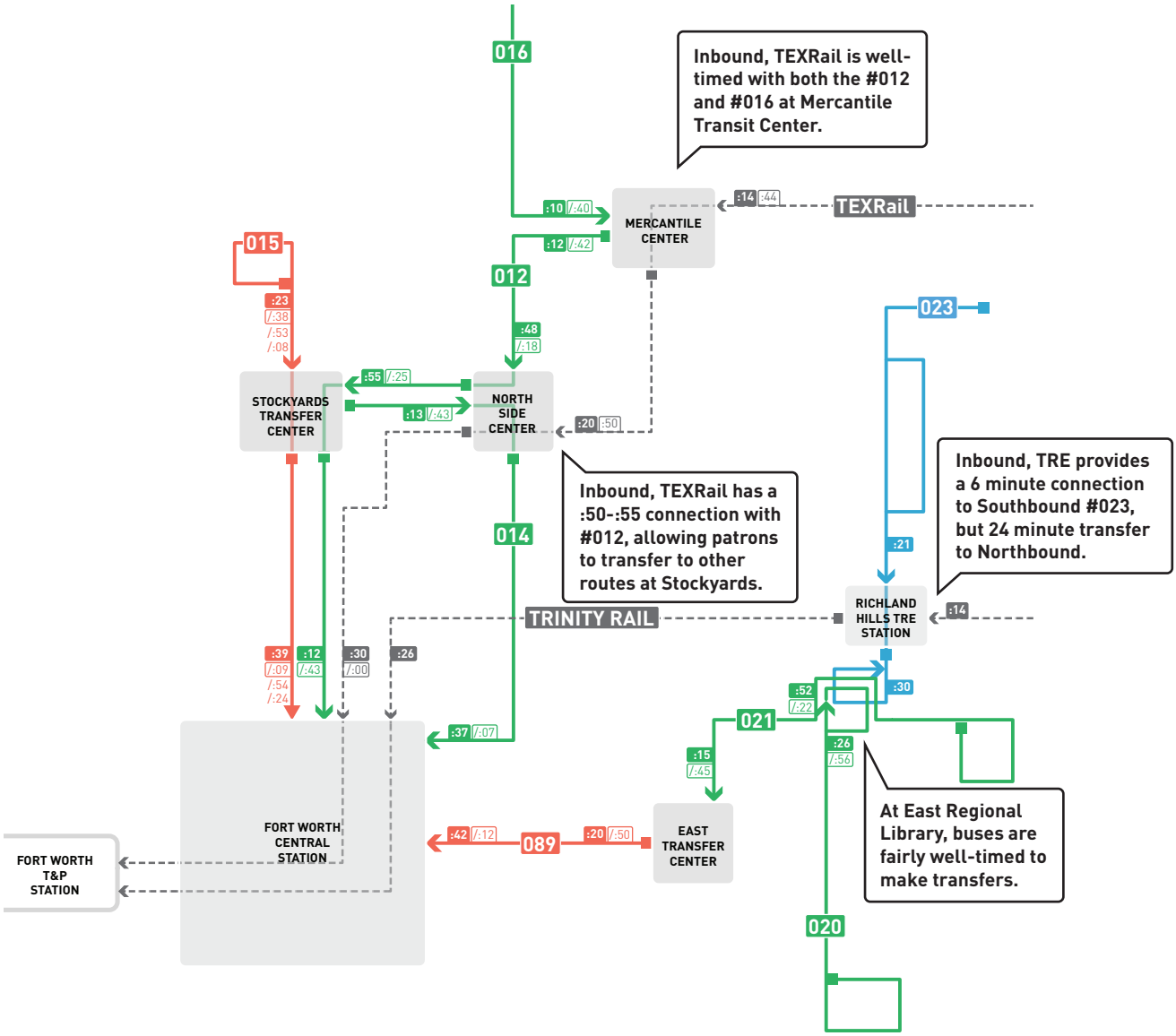
Routes (Outbound)

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

Central Transit Center - :45

Stockyards Transit Center – from Downtown :25
North Side Transit Center – from Downtown :42
(does not include TEXRail)
Mercantile Transit Center – no outbound Central Pulse
East Transit Center – from Downtown :20
Richland Hills TRE Station – no outbound Central Pulse



Routes (Inbound)

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

Central Transit Center - :45

Stockyards Transit Center – to Downtown :25
North Side Transit Center – to Downtown :20
Mercantile Transit Center – to Downtown :10
East Transit Center – to Downtown :20
Richland Hills TRE Station – to Downtown :15

5 TEXRail and TRE Are Not Fully Integrated Into the Bus Network

B TEXRail Pulse + Stockyards

Stockyards Transit Center + TEXRail - Overall

Some routes at Stockyards Transit Center coordinate with the North TEXRail station--the #012 and #014 buses both stop at TEXRail stations as well as at Stockyards. The #091 is the direct connector between Stockyards/North FtW and the western part of the city, and the #044 and #045 both give direct access to Tarrant County College Northwest.

Routes that coordinate with Central Pulse Outbound:

015 **012** ⟶ **045** **091**

Routes that coordinate with Secondary Pulse Outbound:

015 **012** ⟶ **045** **091**

Routes that coordinate with Central Pulse Inbound:

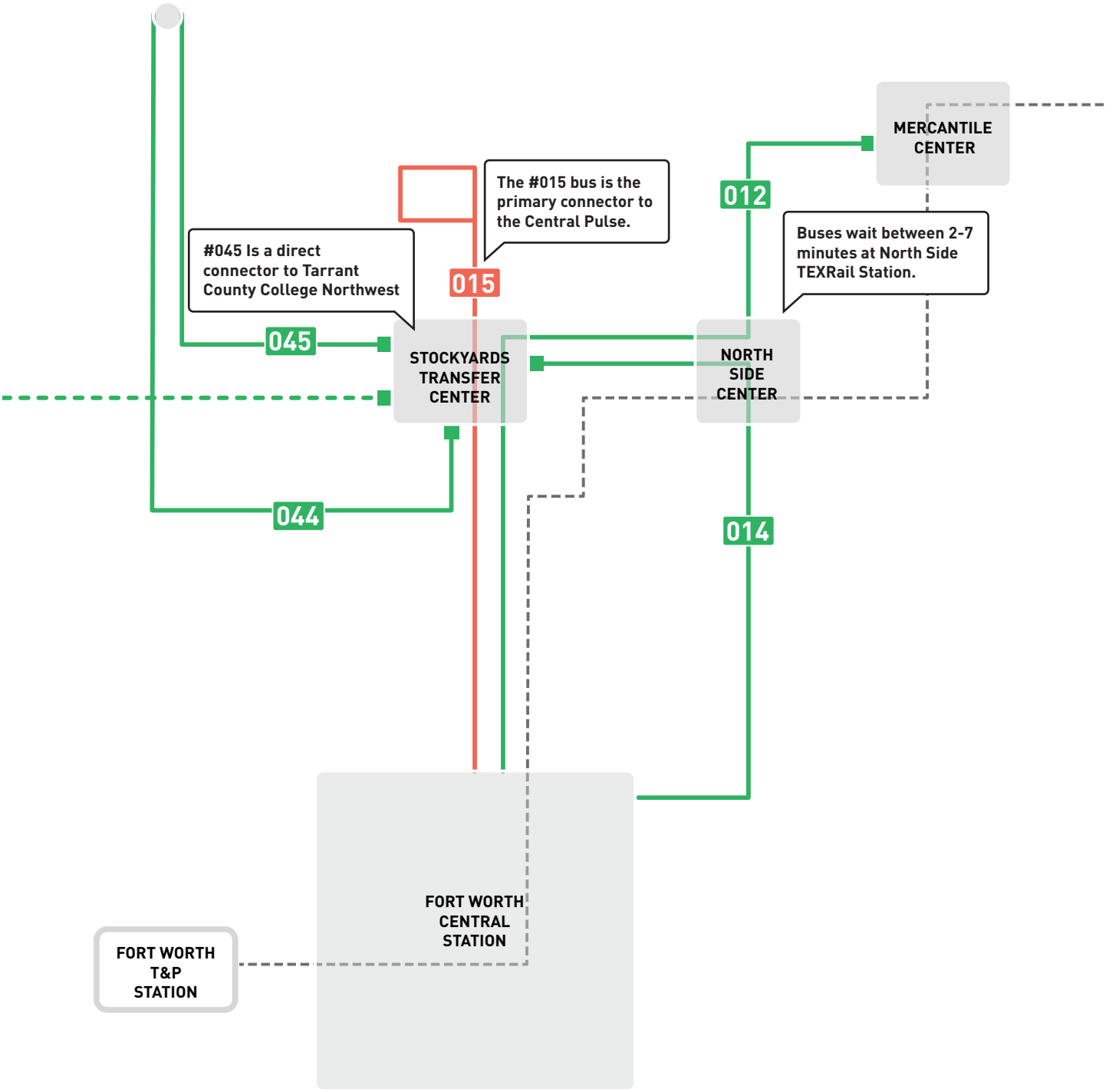
045 ⟶ **015**

Routes that coordinate with Secondary Pulse Inbound:

045 ⟶ **015** **012**

From Downtown (Outbound)
Primary/ :45 Central Pulse ⟶
:05 Stockyards Transit Center pulse
Secondary/ :15 Central Pulse ⟶
:35 Stockyards Transit Center pulse

To Downtown (Inbound)
Primary/ :25 Stockyards Transit Center pulse ⟶
:45 Central Pulse
Secondary/ :55 Stockyards Transit Center pulse ⟶
:15 Central Pulse

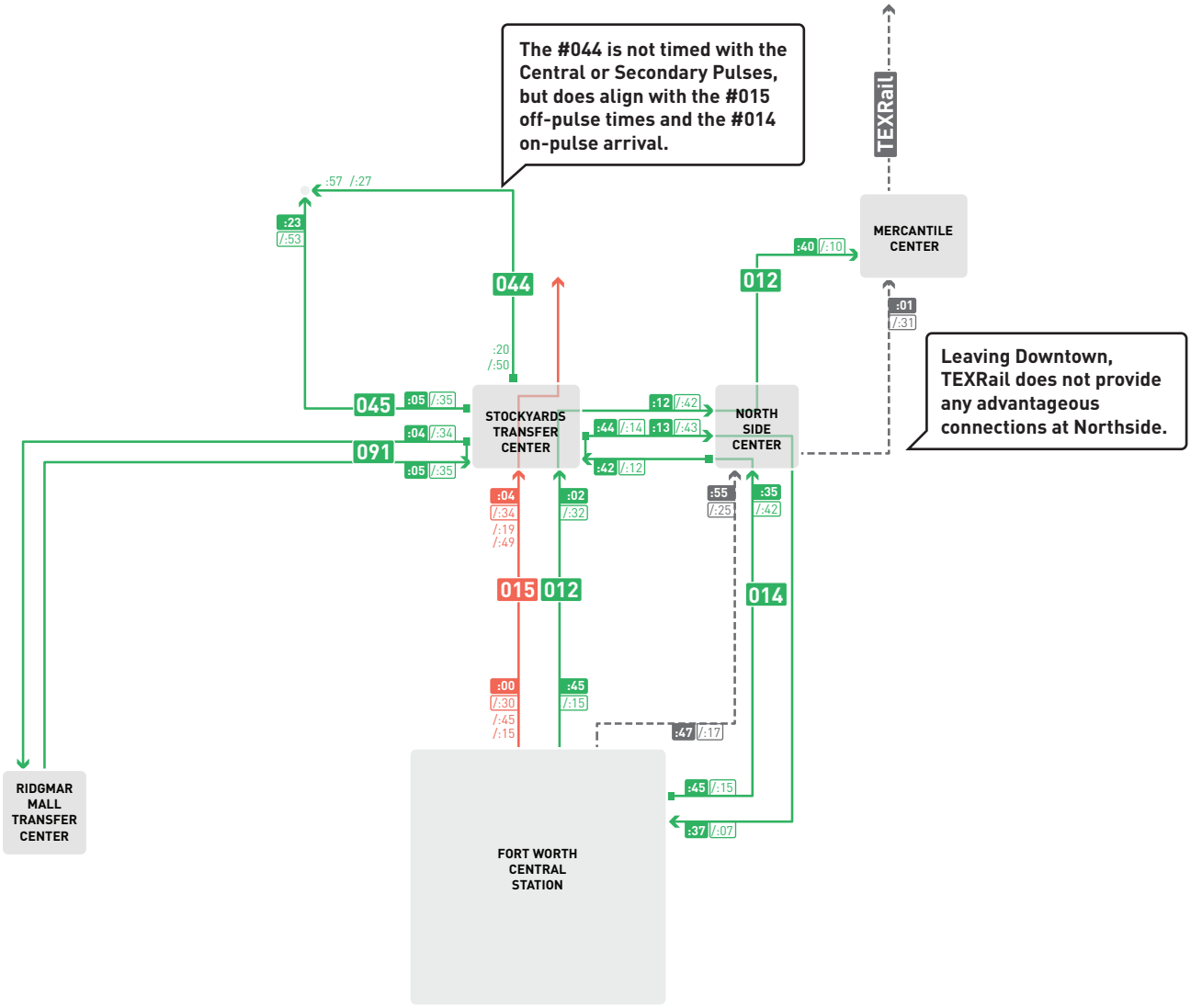


Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

5 TEXRail and TRE Are Not Fully Integrated Into the Bus Network

B TEXRail Pulse + Stockyards



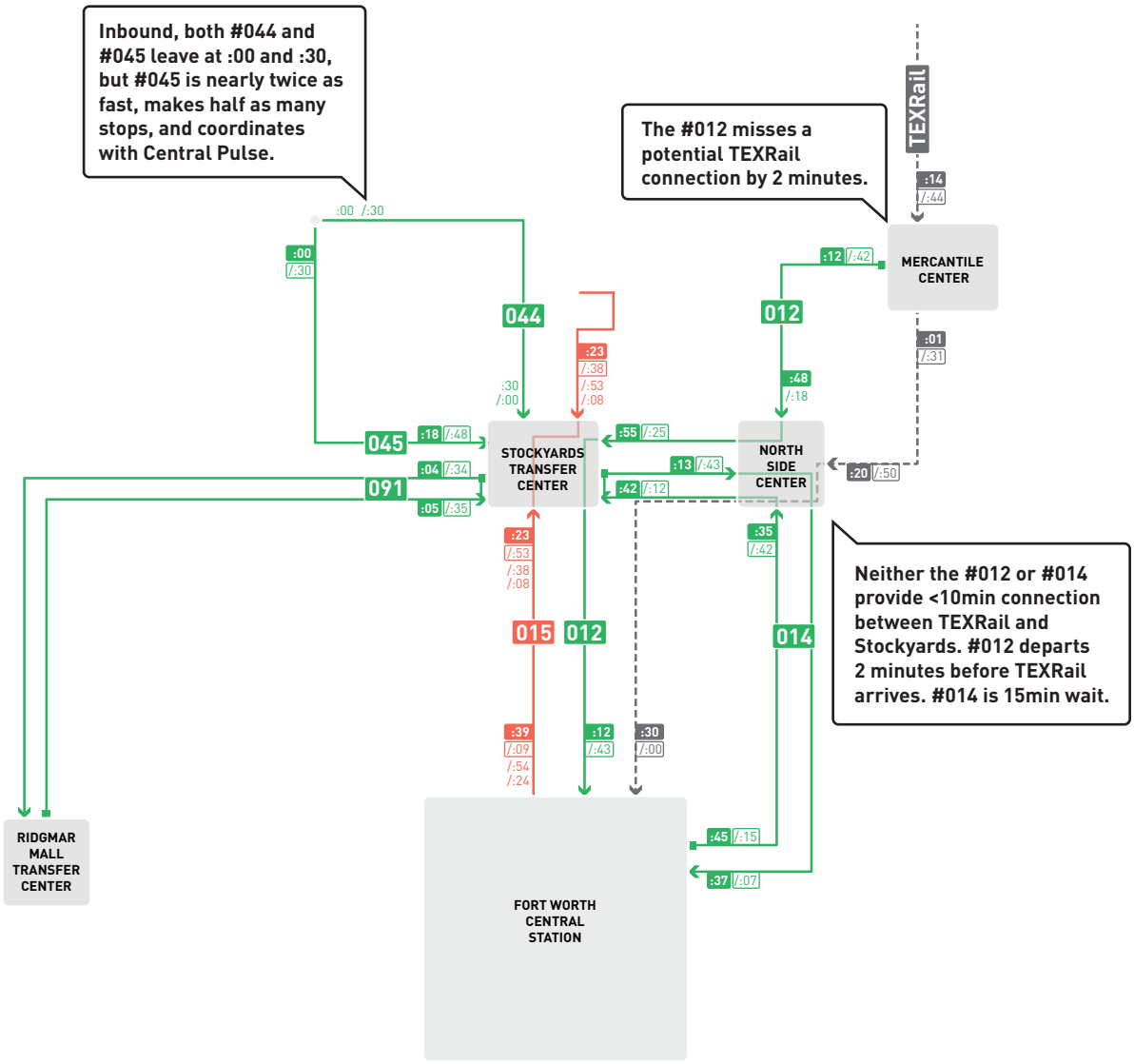
Stockyards Transit Center from Downtown

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

Stockyards Transit Center functions primarily as the connector between route #015 and #044/#045, but can also provide more direct connections to route #012 depending on departure time.

Routes #044 and #045 are coordinated to alternate with #015's arrivals.



Stockyards Transit Center to Downtown

Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Xpress/Limited Routes
- Rail Lines

Routes #012 and #014 go to Downtown autonomously, so #045 is the only route at Stockyards Transit Center that relies on a pulse. It is timed to align with the pulse out of Downtown at :45.

Inbound TEXRail does not align with the #012 or #014 bus routes that would allow for easy transfer to the #045 bus.

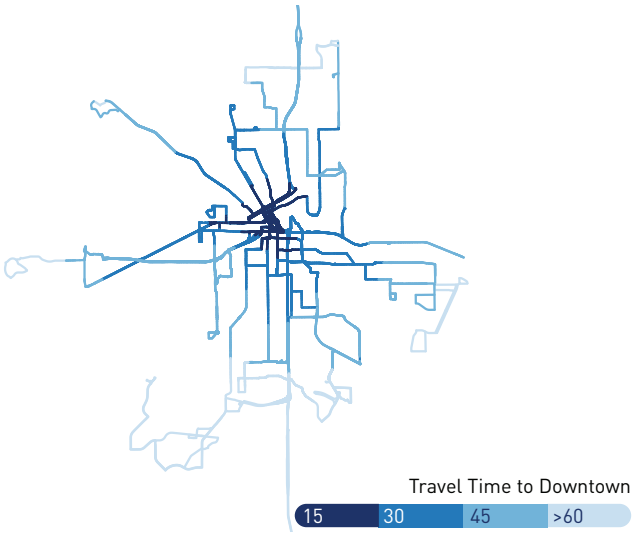
6 Trips Are Slow

A Travel Times

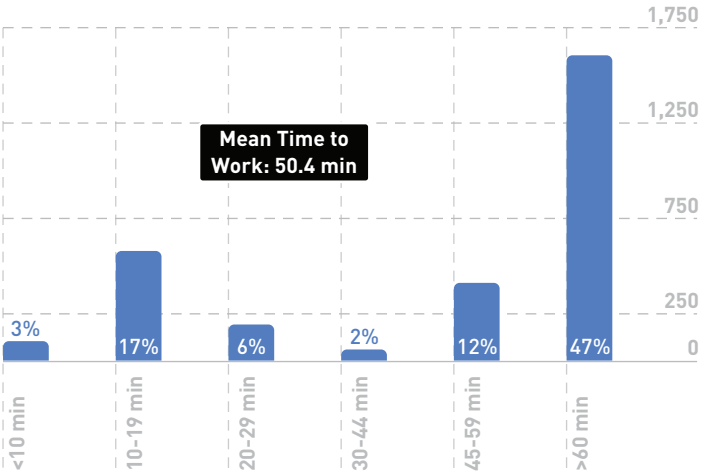
In general, transit in the Trinity Metro area is slow. While some buses on the outskirts of the transit area achieve speeds higher than twenty miles per hour (with the maximum average speed between time-points at 40 mph), the majority of bus speeds are below sixteen miles per hour.

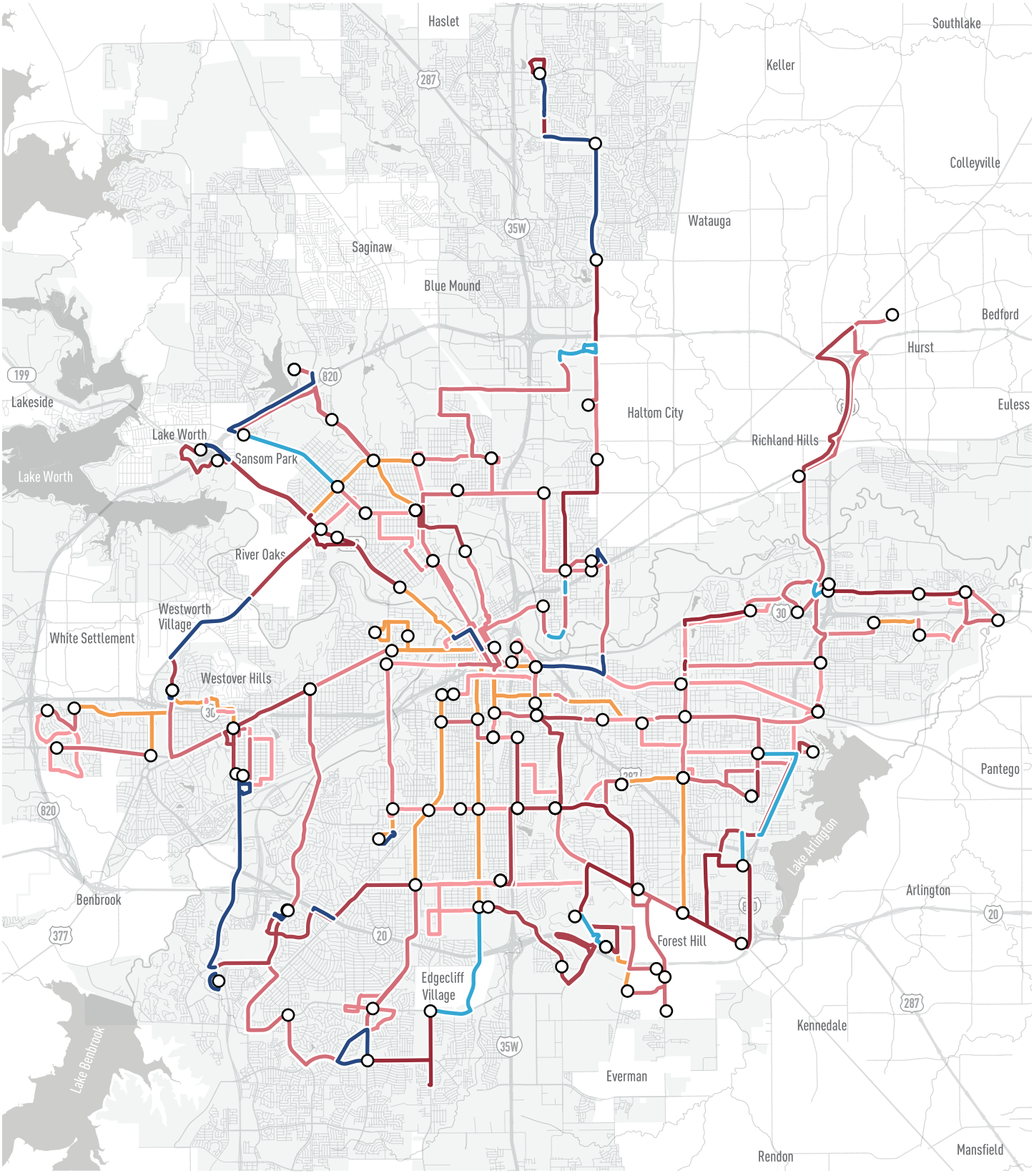
In Downtown Fort Worth, the majority of the speeds between time-points are below twelve miles per hour, and along bus routes that service Downtown, the route typically slows down within the Downtown area. This is not surprising, but it shows an opportunity for better bus infrastructure within Downtown, so that buses do not have to contend with traffic and red lights as much and could therefore provide faster service.

The map also shows other slow areas. Buses in congested corridors from Downtown to the Medical Center and Cultural District are slow routes, with a lot of turns that are often slow due to time lost at intersections. The buses that travel east from Downtown are also particularly slow.



Commute Length for Transit Riders (2017 ACS)





Service Speed (MPH)

- <10
- 10-12
- 12-14
- 14-16
- 16-18
- 18-20
- 20-22
- >20

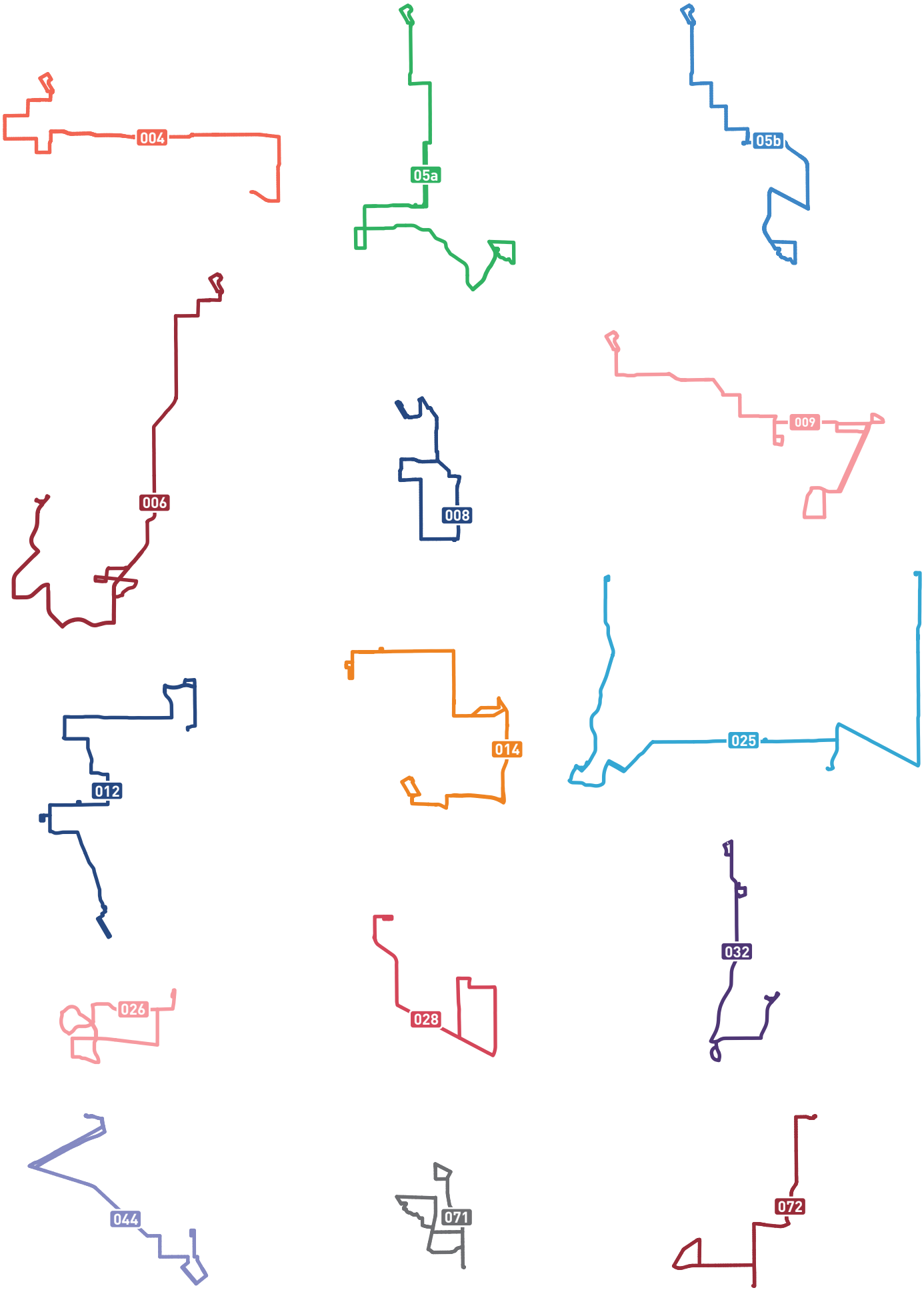
- Scheduled Timepoint
- Roads
- City Limits
- Water Features

0 1 3 6 miles

6 Trips Are Slow

B Indirect Routes

There are several routes in the Trinity Metro network that are indirect or roundabout and that make taking public transit inconvenient. Routes go in large loops, routes have a lot of auxiliary loops branching off of the main route, or that go in a U, J, or large L shape. These types of routes make riders stay on the bus for much longer and much further than they would if the route went in a relatively straight line. For example, a person trying to take route #006 from the Downtown Transit Center to Hulen Mall, would ride the bus for one hour and ten minutes and travel 10.8 miles instead of the 6.7 miles as the crow flies between the two destinations. Because the route is so round-about, it is actually faster to take bus #025 and transfer to bus #002 to go from Downtown to Hulen Mall, rather than take bus #006. Routes that run in loops run in only one direction, requiring riders to take a longer trip. If the loop ran in both directions, travel time and distances could be reduced. The travel time map on page 52 includes travel times for indirect routes, showing the inconvenience of their longer travel times.


004
05a
05b
006
008
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071
072

7 The Network Provides Access to Services, but the Connections are often not Convenient

A Amenities

Transit serves a critical function in connecting residents to essential services ranging from grocery stores to government offices.

Approximately sixty percent of the services within Tarrant County are within half a mile of transit, but only twenty-four percent of the amenities are served by transit that runs frequently (every 15 minutes or less.) However, within the Trinity Metro service area, which includes Fort Worth and Blue Mound, the numbers are a little better, at eighty percent and thirty-two percent respectively.

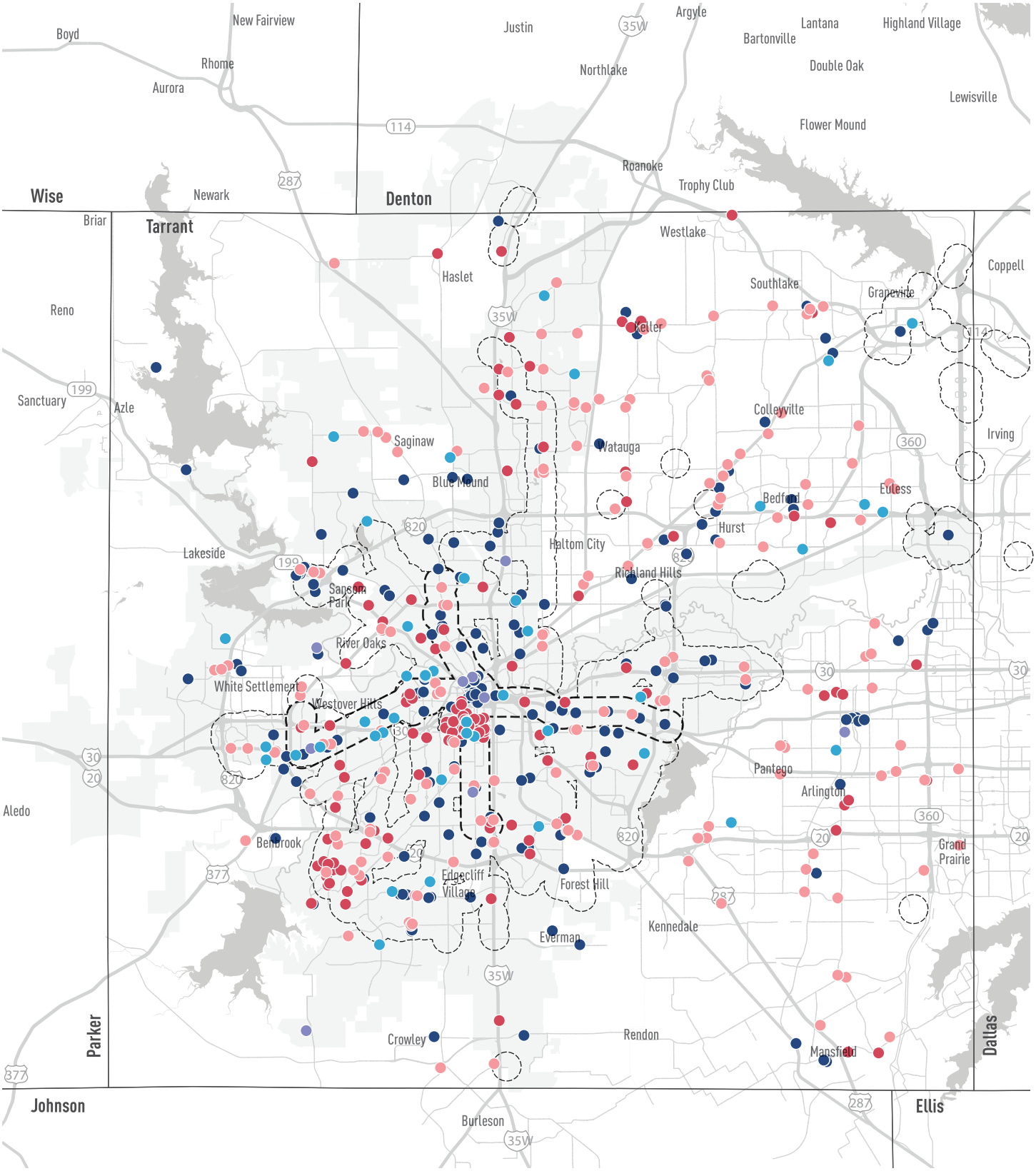
The important offices and services, which we have identified are hospitals, grocery stores, high schools, colleges, major employers, and government offices and services, which include courts, social services, libraries, police departments, fire stations, and post offices, among others.

The majority of government offices and services are well distributed within the central area of Fort Worth and are seventy-five to ninety percent served by transit. Courts, libraries, and fire stations are the best served of these services, while post offices, police stations, and other government offices are slightly less so. These numbers also appear to be consistent with the number of offices outside of central Fort Worth, for example, there are more post offices northeast of Fort Worth than there are courts. The number of governmental services that are served by frequent transit is much lower (around fifty percent) and follow the same pattern, with post offices standing out as an outlier with only twenty percent within a half mile of frequent bus service. This means that for the most part, it is possible to get to government offices via transit, but it's probably not fast.

Services that are well distributed throughout the populated parts of the county, like grocery stores and high schools have somewhat lower access to transit, even though these services are distributed so that people should not have to travel too far to get to one. Seventy-seven percent of grocery stores within the service area are served by transit, and only sixteen percent are served frequently. Transit does serve high schools better than grocery stores, at ninety-one percent within the Trinity Metro area and only thirty percent are served by frequent transit, but the low numbers served by frequent bus routes indicate that the number of bus routes that run frequently do not cover enough area and do not serve the places that people visit the most frequently well enough.

Colleges, including community colleges and trade schools, are also under-served by transit. There are only nine colleges and trade schools in the county, eight within the service area, and only six are served by transit. Of those six though, five are serviced by frequent transit.

Services with high concentrations in Downtown Fort Worth, like hospitals and courts, are served by transit the best, with ninety-three and ninety percent served by transit respectively. Twelve percent of hospitals are located in a cluster in Downtown Fort Worth, with another cluster of hospitals located in South Fort Worth near Benbrook, within a half mile from transit service. However, despite the high number of offices located in Downtown and within transit service areas, the number of hospitals and courts that are served by frequent bus is not much higher than the percentage located within Downtown (thirty-two percent for hospitals and forty-five for courts) This information exposes a lack of frequent transit service.



Services

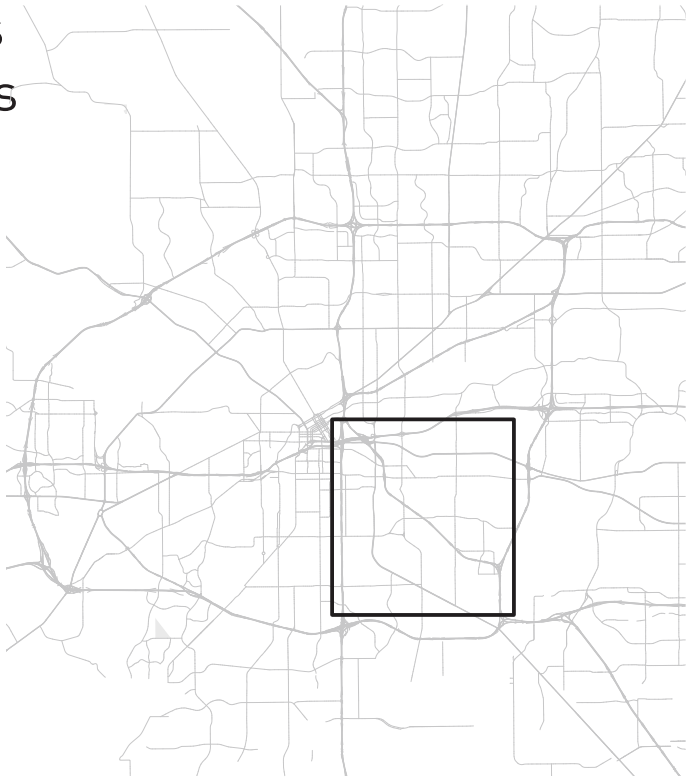
- Government Offices
- High Schools
- Colleges
- Hospitals
- Grocery Stores
- 1/2 mile radius from frequent routes
- 1/2 mile radius from all routes

- Roads
- Rail
- Water Features
- County Limits
- City Limits

0 2.5 5 10 miles

7 The Network Provides Access to Services, but the Connections are often not Convenient

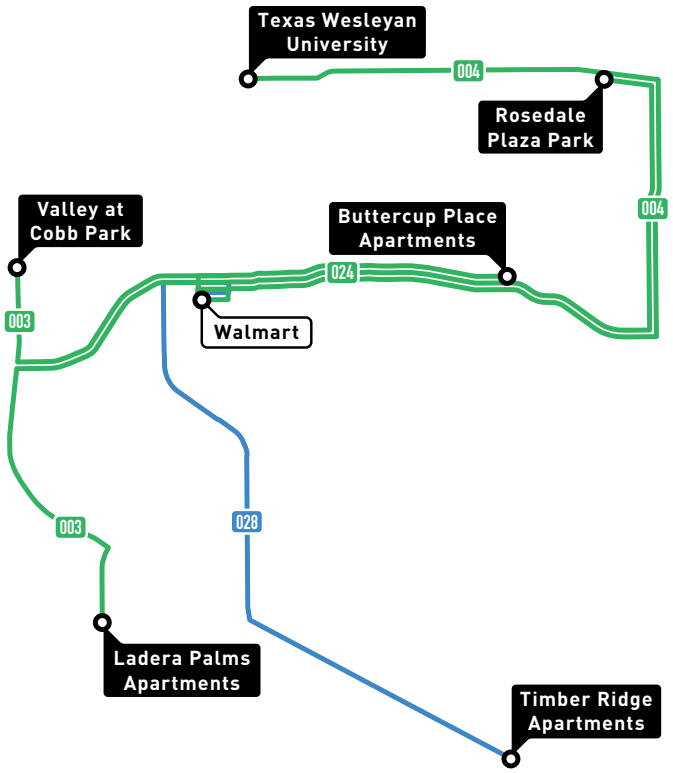
B Case study: southeast Fort Worth



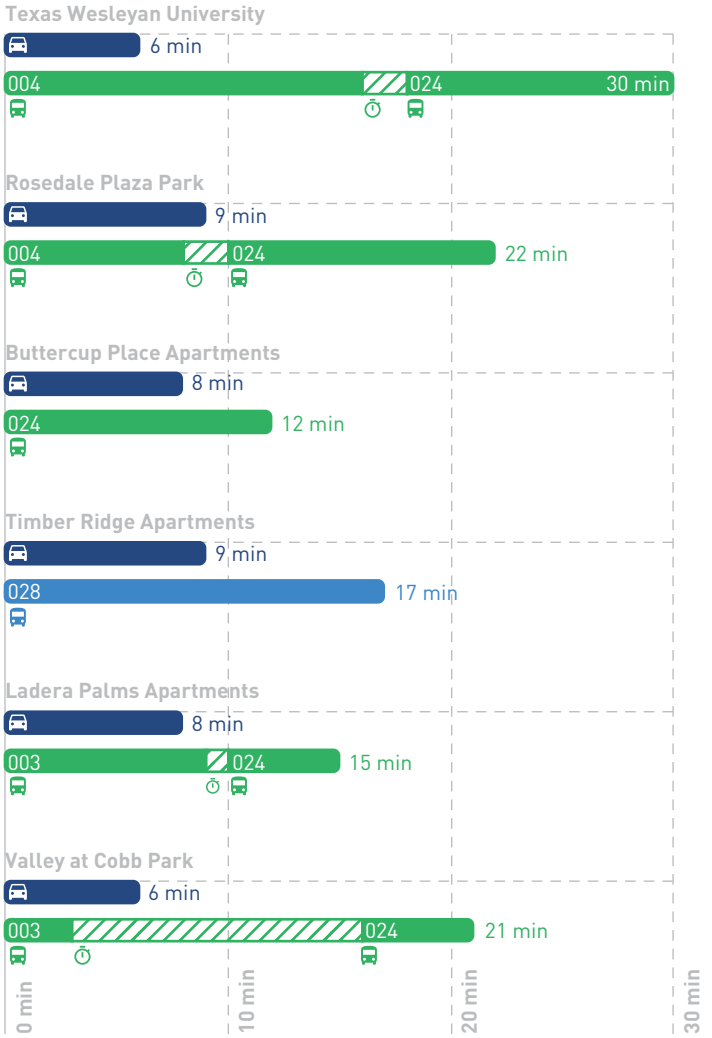
The area east of IH-35 and south of IH-30 is largely Hispanic and Afican American, and includes some of the poorest areas of Fort Worth, with median household incomes under $40,000.00. Many residents here are dependent on transit for their everyday trips. It is a good illustration of how transit does and does not help residents do what they need to do.

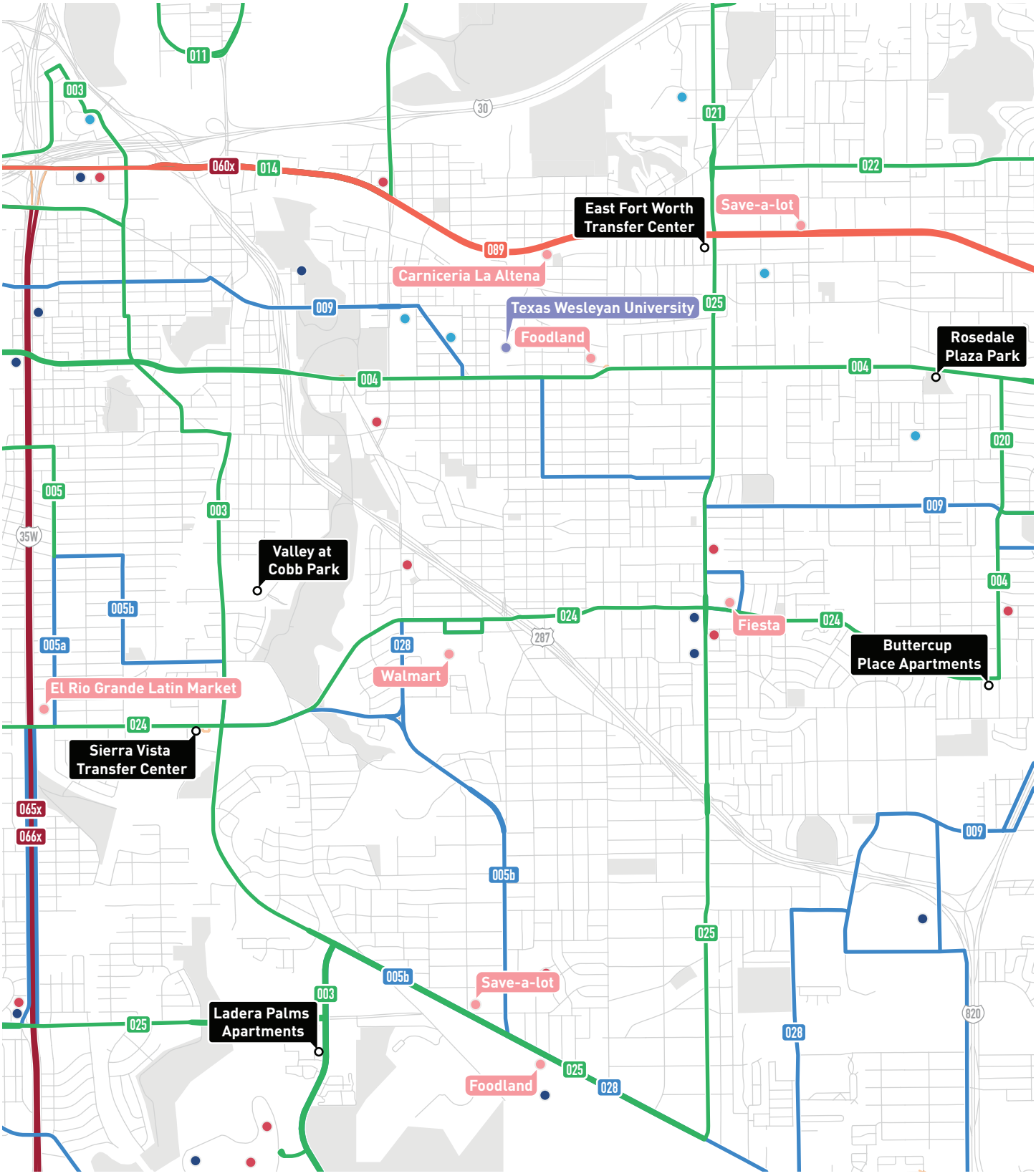
The neighborhood is relatively well-served by transit. Most residents are within a short walk of a bus stop, and major services in the area include several grocery stores and are generally located along transit routes.

But, access to services vary in convenience and trip-times are being impacted significantly by required transfers. Destinations along linear routes, such as Buttercup Place Apartments to Walmart, provide efficient access, while routes requiring transfers, such as Valley at Cobb Park to Walmart, increase travel-time significantly.



Travel Time to Walmart @ Renaissance Square





Frequency

- Every 15 Min.
- Every 30 Min.
- Every 60 Min.
- Express

Amenities

- Hospitals
- Grocery Stores
- High Schools
- Government Offices
- Colleges

- Bus Stops
- Roads
- Buildings
- Parks

0 0.25 0.5 1.5 miles

8 The Network is Complex, but for Specific Reasons

A Essential Services

The network is complex with indirect paths, deviations, and loops to service the locations of subsidized housing, social services, grocery stores, and other essential services. While these deviations and indirect paths may increase travel time throughout the network, they provide necessary access to services throughout the overall system. More efficient and direct routes with limited deviations and loops could potentially reduce access to employment, healthcare, and social services.

The complexity of the network is not limited to a specific area, but rather impacts the network as a whole, with many of the driving factors occurring beyond Downtown Fort Worth.

Some of the special circumstances that shape the network's complexity relate to the location of riders with disabilities and access to government offices, including social security and driver's license offices along route #006. Additionally, routes deviate and take indirect paths to provide direct access to social services, including food banks, community centers, homeless services, and drug rehabilitation programs along routes #089, #011 and #014.

1 Loop down service road to serve Veterans Affairs Clinic.

2 Services Lighthouse for the Blind.

3 Loop serves a subsidized apartment with elderly. Does not run past 8:00 PM to reduce noise for the elderly.

4 Deviation serves a subsidized apartment and New Mt. Rose Baptist Church.

5 Loop serves Social Security Administration Office and Texas Driver's License Office.

6 Extended loop serves an isolates subsidized apartment and social service agency.

7 Circuitous path serves T.C.C. Opportunity Center.

8 Deviation serves Fiesta grocery store.

9 Loop serves Casa Senior Center, apartments for disabled adults.

10 Indirect path serves American Red Cross.

11 Route serves food bank.

12 Indirect path serves location of Veterans Affairs drug rehabilitation program.

13 Deviation serves Tarrant County Resource Connection, a major social service hub.

14 Deviation serves a subsidized apartment.

15 Route serves subsidized apartment.

16 Extension serves Harris Southwest Hospital.

17 Route serves subsidized apartments on South side in Sansom Park.

18 Route serves Driver's License Office.

19 Route serves social services and alternative high school locations.

20 Route serves multiple social service agencies, concentration of homeless services, and shelters.

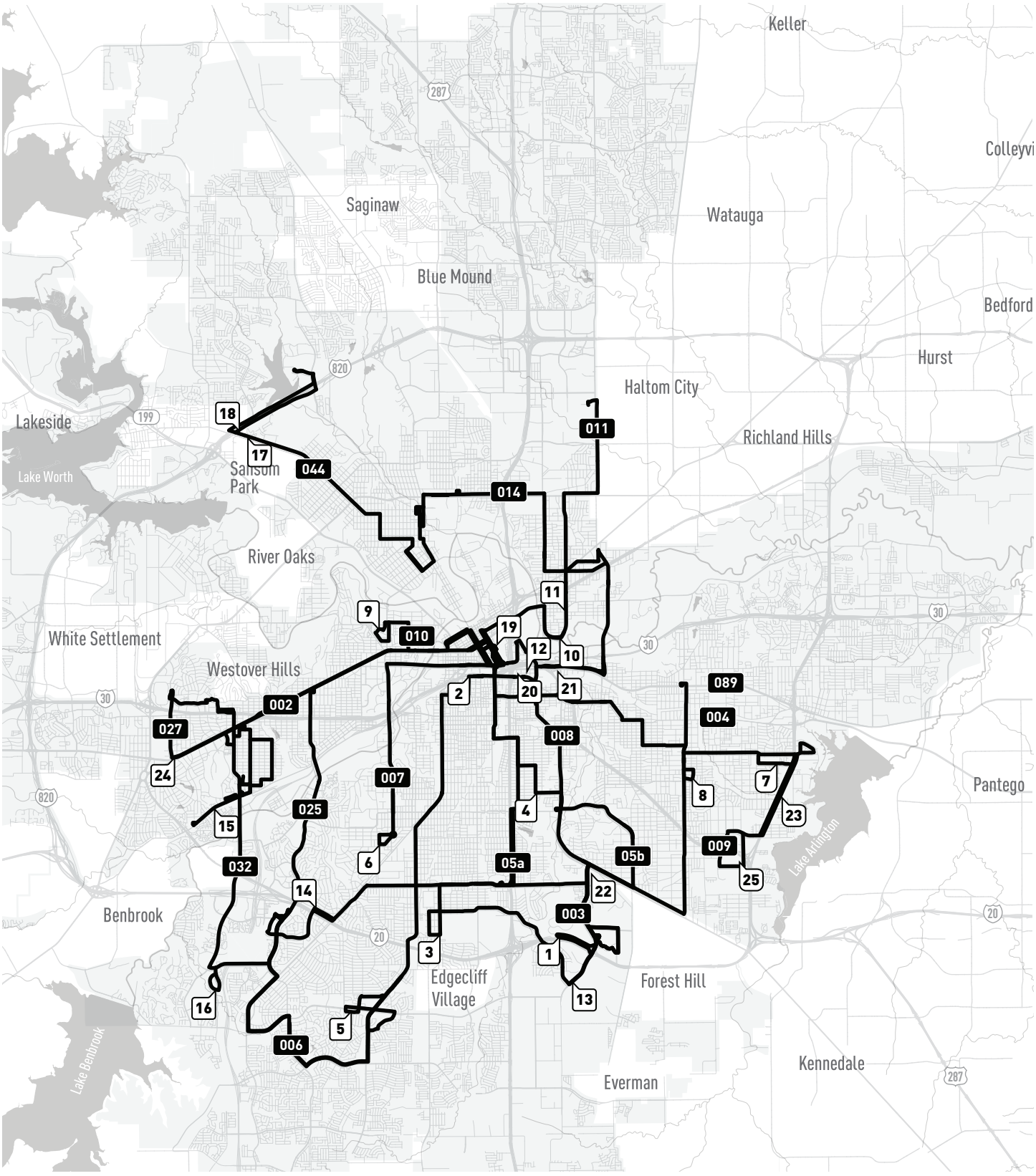
21 Route serves Salvation Army.

22 Route serves Goodwill.

23 Route serves Hope Center and food bank.

24 Route serves Como Community Center.

25 Route serves TX Criminal Justice and Parole Office.



Network Complexities

- Impacted Bus Routes
- Roads
- City Limits

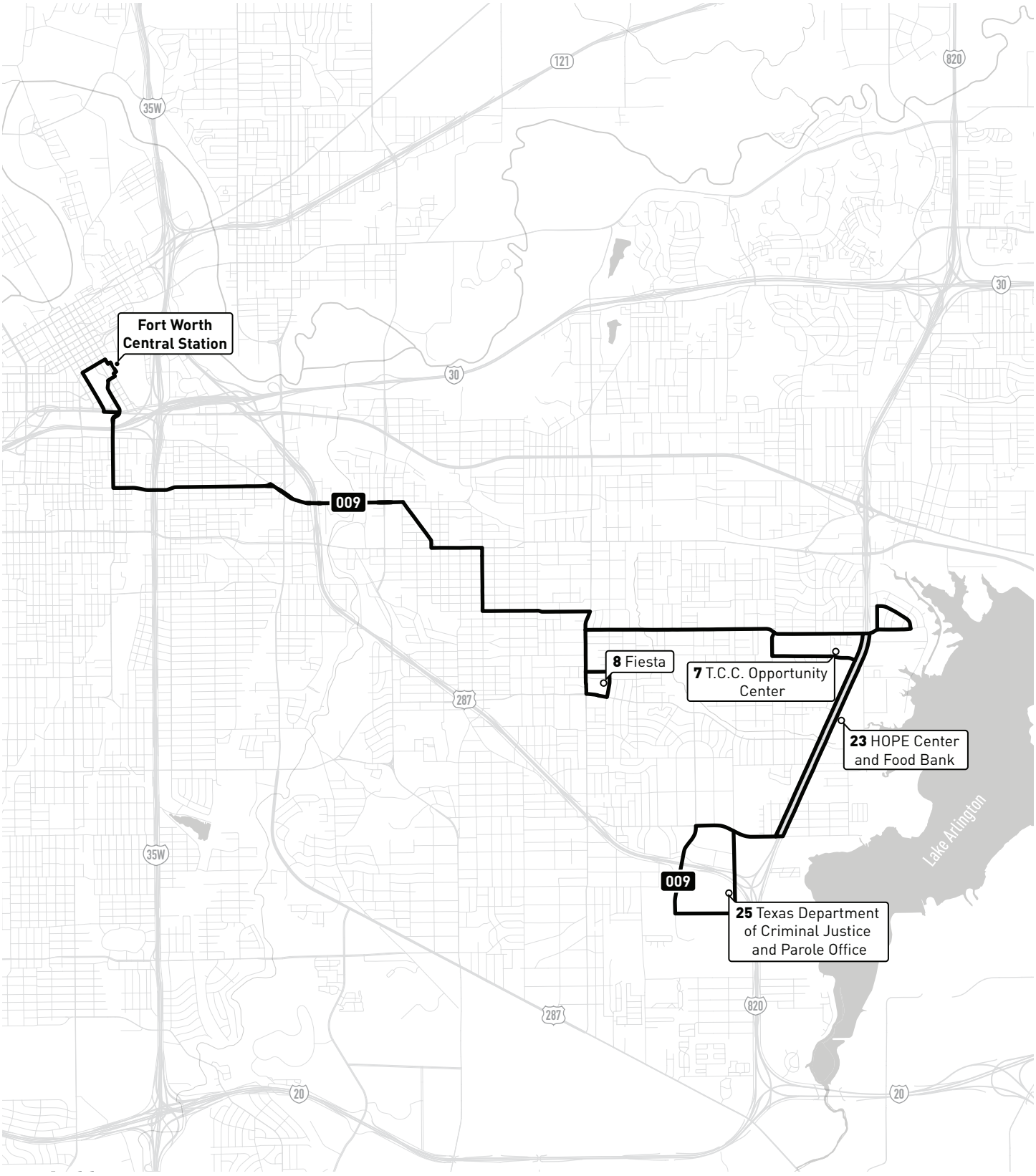
0 2.5 5 10 miles

8 The Network is Complex, but for Specific Reasons

A Essential Services

Route #009 in particular has several special circumstances driving it's complexity. A deviation occurs near the intersection of Miller Avenue and Berry Street to serve Fiesta grocery store. An indirect path occurs along Fitzhugh Avenue to serve Tarrant County College Career Opportunity Center. Route #009 runs on the frontage roads along I-820 South to serve HOPE Center and the food bank. Additionally, an extension to route #009 was added along Carey Street to serve Texas Criminal Justice and Parole Office.

Several other routes have similar conditions driving the complexity in deviations, loops, and indirect paths.



Route Complexities

- Route #009
- Roads
- City Limits

0 1.25 2.5 5 miles

9 Ridership Varies Significantly Throughout the Network

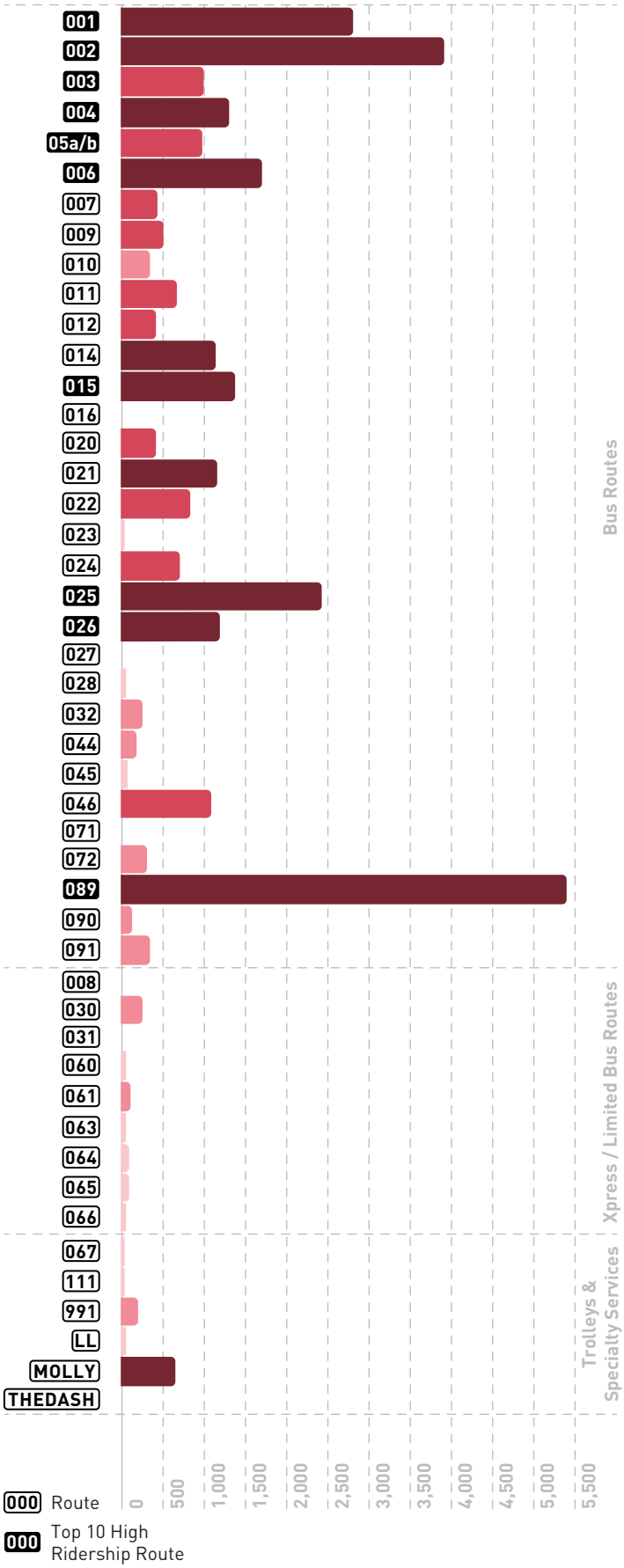
A Ridership by Routes

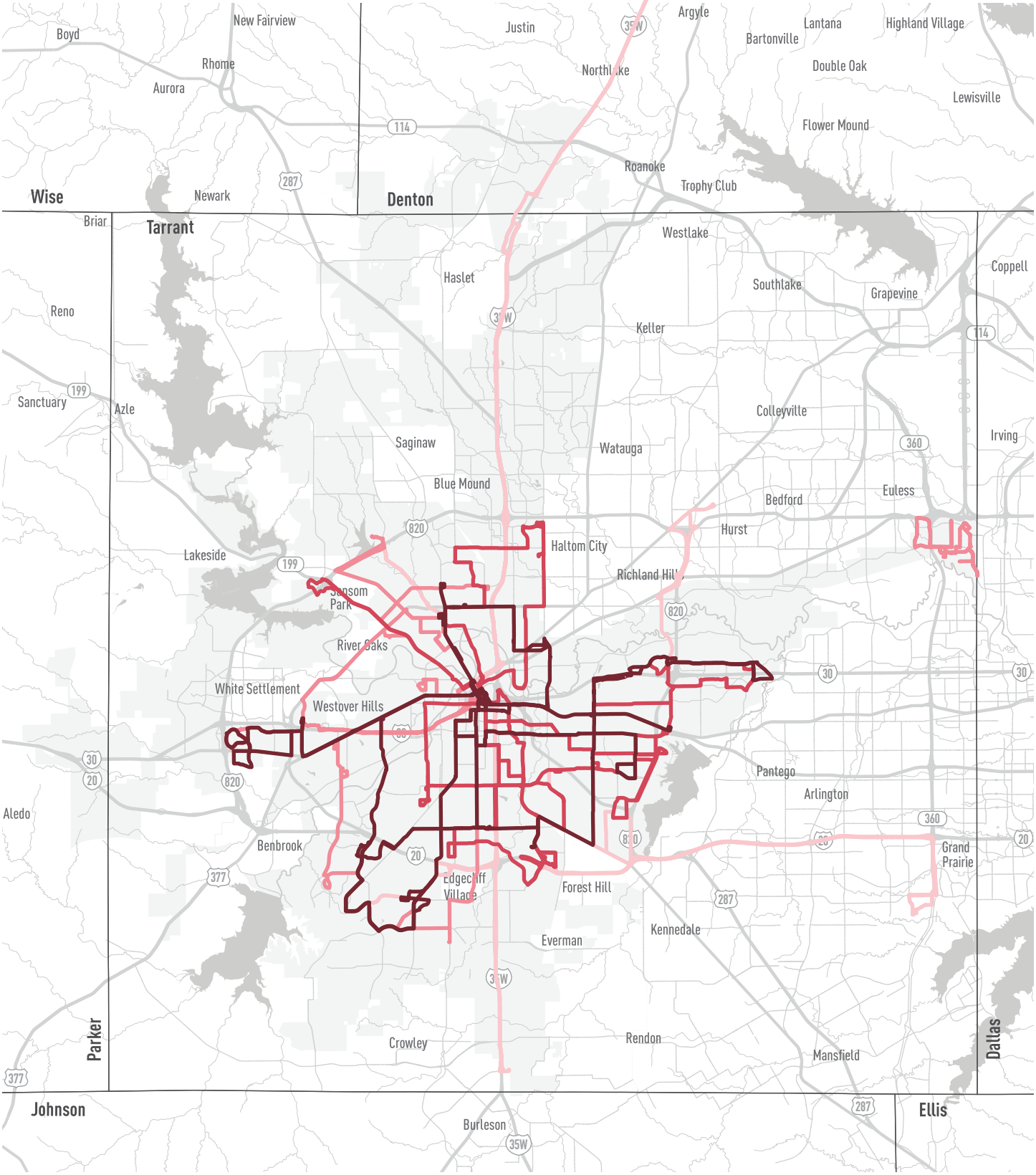
The twenty-seven routes in the network vary significantly in average ridership. Frequency and travel-time play a significant role on route ridership. Ridership throughout the network ranges between 5,500 and less than 1,000 average daily riders.

Routes #089 and #002 have significantly higher ridership than other routes on the network, with route #089 having between 3,000 and 5,500 average ridership throughout the week in fiscal year 2018. In general, routes that provide more frequent service, such as the #089, #002, and #015, have higher ridership. Routes #028, #063, #060, #113, and #066 have lowest average ridership on the network.

Ridership also varies between Weekday, Saturday, and Sunday service. Route #019, Molly the Trolley, has higher daily ridership on Saturday than Weekday or Sunday services. Routes #089, #002, and #001 have highest average ridership on their Weekday service. In general, most routes have the lowest average ridership on their Sunday service.

2018 Average Weekly Ridership by Route





Route Ridership

- Highest Quartile
- Upper Quartile
- Lower Quartile
- Bottom Quartile

- Roads
- Rail
- Water Features
- County Limits
- City Limits

0 2.5 5 10 miles