Transit Tomorrow

Existing Conditions and Choices Report

Lane Transit District

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Table of Contents

1 Introduction and Summary 4

Transit Tomorrow is a review of LTD's services, their performance, and the values they reflect. 5

LTD's existing transit network (May 2017). 6

Where does transit fit in our region's transportation system? 7

How do LTD's services perform? 8

How much access to opportunity does LTD's existing network provide? 9

Transit Tomorrow will examine what future LTD service could and should look like. 10

Community input is critical in making the decisions on LTD's future service. 11

2 How Transit Works 12

Transit can serve many purposes; which purposes it should serve depends on your values. 13

High ridership depends on making transit service useful and liberating. 14

But ridership isn't just about service. High ridership also depends on the built environment. 16

Examples from Eugene/Springfield: Density and Walkability 17

Examples from Eugene/Springfield: Linearity 18

Examples from Eugene/Springfield: Proximity / Continuity 19

Transit geometry outside the metro area: it's about coverage. 20

3 Market and Needs Assessment 21

Indicators of Demand: Residential Density 22

Indicators of Demand: Employment Density 23

Indicators of Demand: Activity Density 24

Indicators of Demand: Walkability 25

Indicators of Need: Zero-vehicle Households 26

Indicators of Need: Low-Income Households 27

Indicators of Need: Seniors 28

Civil Rights: Racial and Ethnic Minorities 29

4 The Fixed-Route Network 30

The Fixed-Route Network is the core of LTD's services. 31

Most people can access bus service within a short walk, but few have access to frequent service. 33

In some areas, two parallel routes go different places. This limits the frequency of both routes. 34

The usefulness of the network depends a lot on your location. 35

Ridership responds strongly to frequency. 36

Ridership is much lower on evenings and weekends, when service levels are much lower. 37

The network is based around timed connections between buses, mostly at Eugene Station 43

Timed connections are very useful, but their value depends on whether a trip starts at the right time. 44

LTD has a long-term policy to expand frequent service. 45

The frequent service policy is related to land use and investments in infrastructure. 46

Frequent service doesn't require timed connections. 47

LTD ridership has declined since 2011. Some routes are more affected than others. 48

The amount of bus service LTD provides is vulnerable to increases in costs and swings in the economy. 49

Table of Contents

5 Demand-Responsive Services 50

The RideSource brokerage serves a range of ADA paratransit, medical and human service trips. 51

LTD provides fewer ADA paratransit trips, and more medical trips than similar agencies. 52

Most trips facilitated by LTD RideSource are paid for by Medicaid and human service funds. 53

Providing reimbursed health care trips saves LTD money and protects the fixed-route network. 54

RideSource handles a mix of complex billing requirements, simplifying the user experience. 55

The public would benefit from expanded web information on available services. 56

6 Travel Options (Point2point) 57

Point2point has built an array of outreach programs addressing travel options. 58

Point2point can increase its reach by embracing more new technology tools. 59

7 Key Choices 60

How should we balance high ridership and extensive coverage? 61

How should we balance walking and waiting? 62

Does LTD's network need small adjustments, or a major overhaul? 63

Appendix A- LTD Fixed Route Atlas

Appendix B - Title VI Baseline

Appendix C - RideSource Technical Assessment

1 Introduction and Summary

Transit Tomorrow is a review of LTD's services, their performance, and the values they reflect.

What is Lane Transit District?

Lane Transit District (LTD) is the public transportation provider in the Eugene/Springfield metropolitan area and surrounding communities. LTD's district includes Eugene and Springfield, as well as Veneta, Junction City, Coburg, Lowell, Creswell, Cottage Grove, and the McKenzie River Highway corridor. LTD's transportation services include:

- **Fixed-route transit.** This includes all LTD bus routes, such as EmX, other metro area routes, and commuter routes to small towns and rural communities. These services are open to the general public. Anyone can ride.
- **Demand-response (RideSource).** This includes paratransit for persons with disabilities, non-emergency medical trips, and transportation for human services agencies. Only passengers meeting eligibility requirements (e.g. disability, Medicaid etc.) may ride.
- **Vanpools.** This is a specialized program for interested groups of commuters who work relatively far from home, near each other, and on similar schedules. LTD helps pay for a share of the rental and fuel costs of a shared van. Members of the group use the van to get to and from work.

LTD also serves as a source of public information on transportation through the Point2point **regional travel options** program. Point2point helps individuals and business understand the alternatives to driving alone. This includes transit, but also walking, cycling, and vehicle sharing.

Fixed-route buses are the largest component of LTD's service; they account almost 95% of LTD ridership.

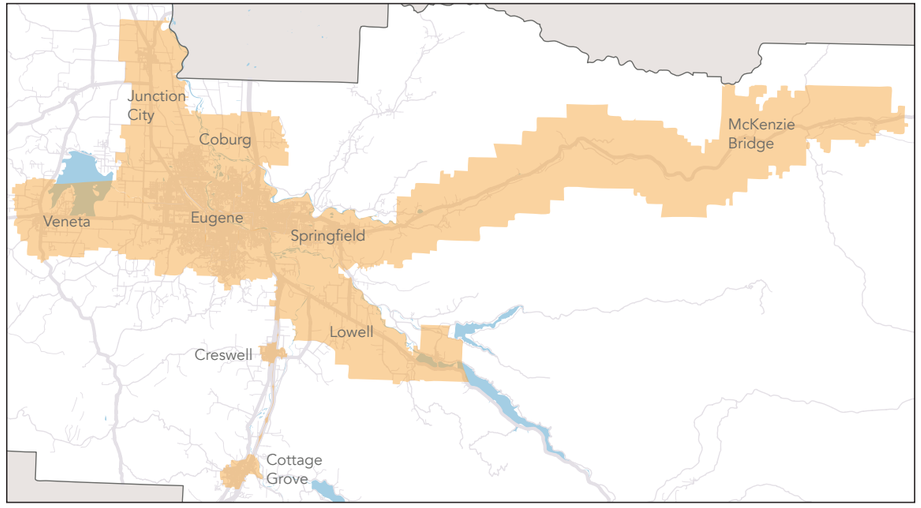


Figure 1: LTD district boundaries. The district extends beyond the metro area to cover significant portions of Lane County.

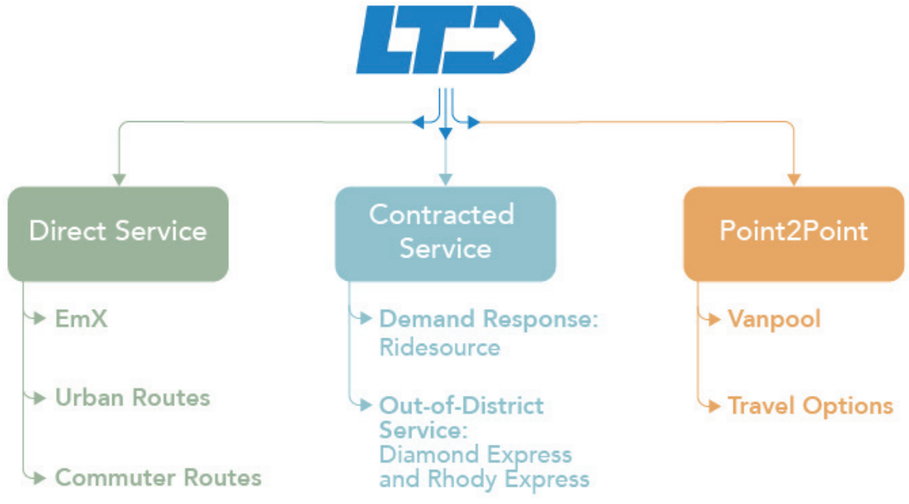


Figure 2: Organization of LTD services. LTD directly operates all fixed routes within the district, but contracts out demand-response service through the RideSource program. The Point2point program administers Valley Vanpool, in addition to coordinating efforts to inform the public of available non-driving travel options.

LTD's existing transit network (May 2018).

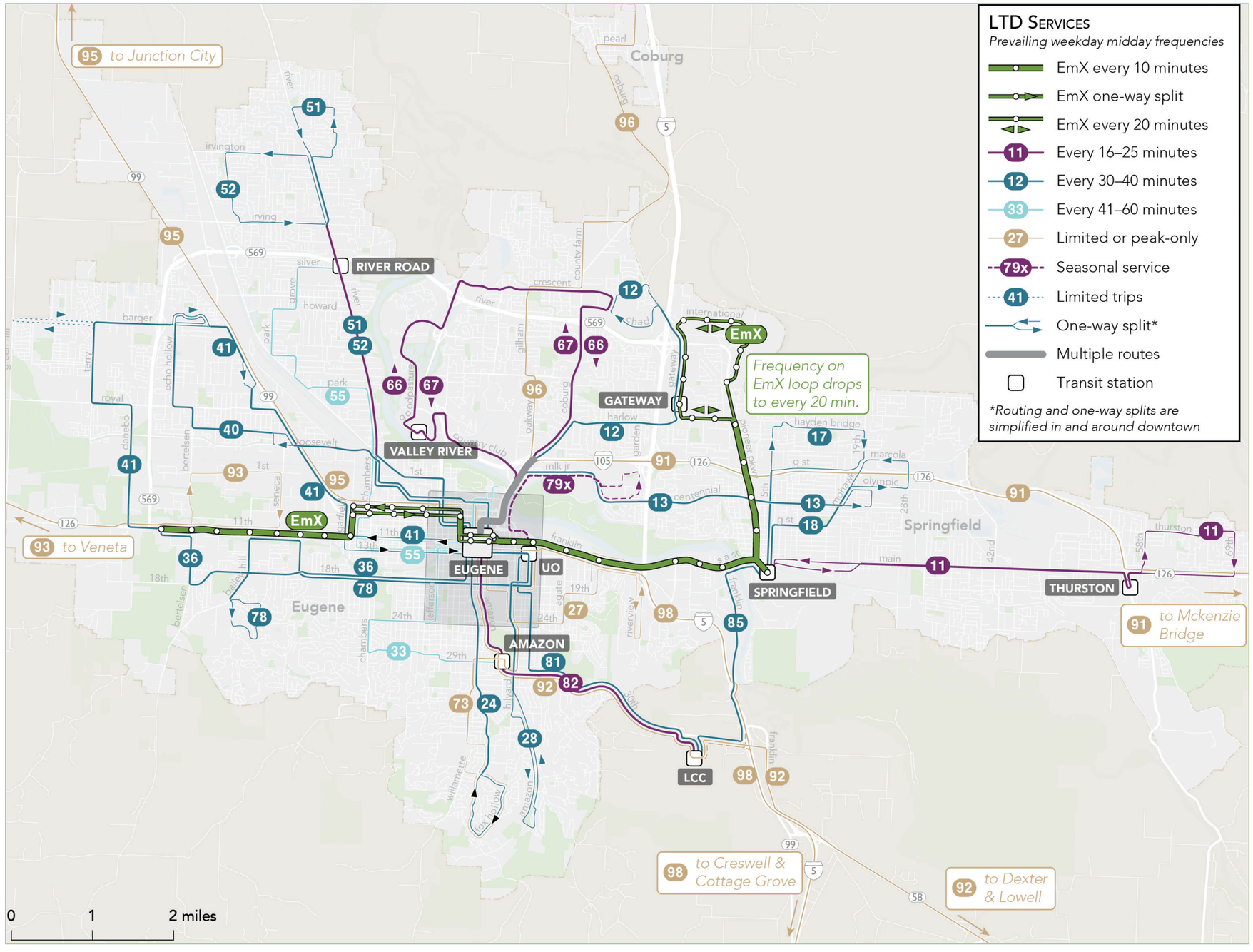


Figure 3: LTD bus network in the Eugene/Springfield metro area. This includes EmX (in green), other lines that travel within the urbanized area (Routes 1 to 85), and connections to nearby communities (Routes 91 to 98).

Where does transit fit in our region's transportation system?

Transit Tomorrow and our mobility

In the right conditions, transit can do two things:

- Extend how far people can go on foot, or on a bicycle, providing some of the benefits of access to a private vehicle.
- Replace driving trips in times and places where driving a car is inconvenient or too expensive.

But transit can't meet every transportation need at all times. Walking and biking will be more useful for many shorter trips. Longer, very urgent, or more isolated trips may always require a car.

Transit Tomorrow will focus on how to improve mobility in our region, focusing on transit specifically. But the goal isn't to create a bus system that competes with every other mode at all times. Rather, we are seeking to understand the best way to use buses to get the outcomes most valued by the community.

Why focus on transit?

Transit can't serve every trip, but it has many personal and community benefits, such as:

- **Transit is very inexpensive.** LTD's day pass costs $3.50. According to AAA, it costs about $15 per day to own a car. Transit can help improve individuals' economic freedom by reducing the amount of money they spend on transportation.
- **Transit can move many people.** The average LTD bus carries 45 passengers per hour, and operates 12 to 16 hours per day. Most cars carry one or two people, and sit parked most hours of the day.
- **Transit requires very little space.** A typical sedan requires 70 square feet of road space for a single person. A typical bus carries ten to 60 people on 400 square feet of road space. That's up to ten times less road space per person!
- **Transit requires less fuel, and produces fewer emissions than driving alone.** A diesel bus gets 4 to 8 miles per gallon. That means it only takes 5 passengers on board to make a bus more fuel efficient than most cars.
- **Transit is available to everyone.** Not everyone can drive or cycle for their travel needs, and not everyone wants to. Transit allows all individuals the freedom not to rely on a personal vehicle, and not to depend on friends and family for transportation.

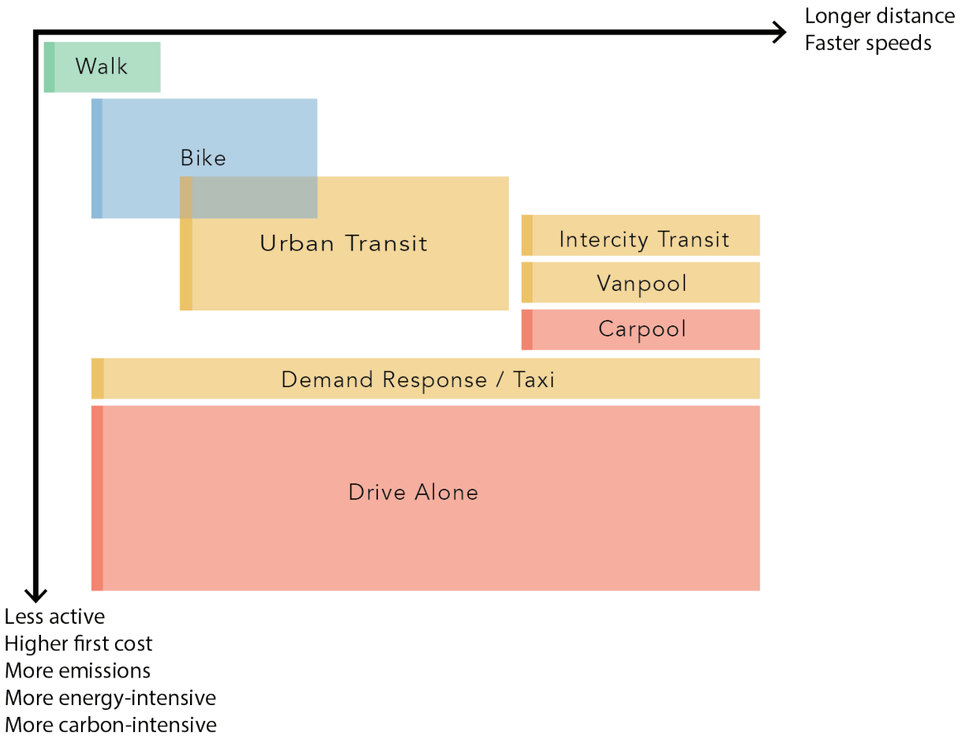


Figure 4: Different transportation modes are useful for different types of trips. When conditions are right, transit can extend the reach of biking or walking trips, or replace driving.

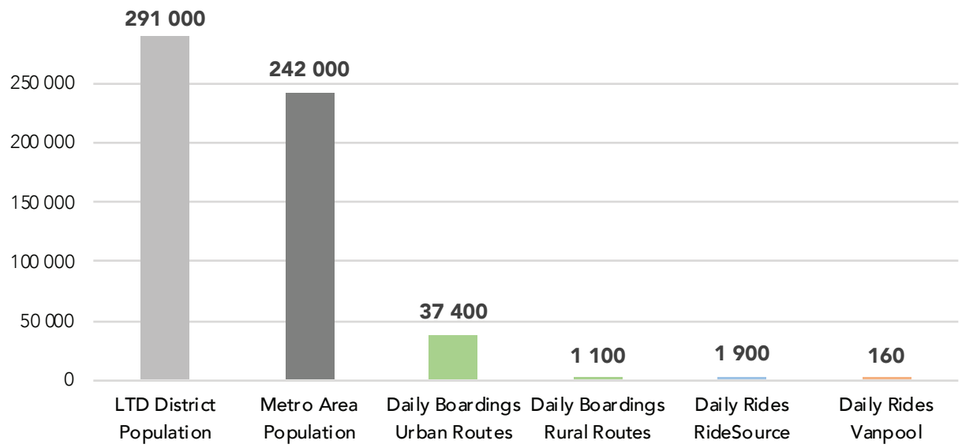


Figure 5: A sense of scale. Nearly 300,000 people live in LTD's service district; transit receives about 40,000 boardings per weekday. The vast majority of boardings are on buses in the metro area.

How do LTD's services perform?

How do we measure LTD's performance?

Many different measures provide insights into the effectiveness and efficiency of LTD's services. But LTD's performance as a transit agency isn't just a function of its services. Factors outside the agency's control also have a direct bearing on the likely performance of any public transit.

Transit Tomorrow starts with this Choices Report, which examines how LTD is performing through a comprehensive lens. In this report:

- **Chapter 2: How Transit Works** explains what makes transit service valuable, and how land use, neighborhood design and street design contribute to how useful a bus network can be.
- **Chapter 3: Market and Needs Assessment** describes how the location of population, jobs, and universities in the Eugene/Springfield area influence the demand for transit service.
- **Chapter 4: The Fixed-Route Network** is a detailed look at LTD's existing network. This includes facts, analysis and discussion on topics like the following:
  - » How LTD's bus routes combine to form a network, and the ways in which different routes complement and conflict each other.
  - » How well the existing network does (or doesn't) facilitate access to jobs and opportunity.
  - » The relationship between ridership and service levels and how that has changed over time.
  - » How ongoing changes in revenues and service costs are influencing the amount and types of service LTD can provide.
- **Chapter 5: Demand Responsive Services** describes how LTD's unique RideSource model combines ADA-required paratransit with medical and human services transportation, and how that is beneficial to riders, to the agency and to the general public.
- **Chapter 6: Travel Options (Point2point)** describes LTD's regional travel options program, how its activities interact with transit and the overall transportation system, and opportunities to further increase its reach.

Key Findings

The following is a selection of the most important findings of this Choices Report:

- **Most people can access an LTD bus route within a short walk, but few have access to frequent service.** As a result, public transit is not a viable transit option for many people, even though it reaches nearly everyone in the Eugene/Springfield metro area within a half-mile.
- **The usefulness of LTD's transit network depends a lot on your location.** People who live or work near more frequent services can use transit to reach far more places in the same amount of time than people elsewhere. Because of its frequency and speed, the EmX provides more benefit than any other LTD bus route. When transit is more useful to reach places quickly, it is a more viable alternative to driving.
- **Ridership responds strongly to frequency.** Transit's usefulness is strongly correlated to how often the bus comes. LTD's more frequent routes attract more riders per hour of service than routes that operate every 30 minutes or less often. And system ridership is much lower in the evenings and weekends, when most routes operate only every 60 minutes, and some routes don't operate at all.
- **Most of LTD's network is centered around timed connections that take place every 30 minutes at Eugene Station.** This timed connection provides significant benefit to riders on less frequent routes, allowing them to travel across town without long waits for a transfer. But it doesn't fix the long wait at the bus stop (or knowledge of the schedule) required in the first place.
- **Quality of service on LTD's more frequent routes is negatively impacted by the desire to make timed connections.** Frequent routes are useful in part because riders know they can show up anytime, and the bus will come shortly. Requiring frequent routes to make timed connections requires scheduling uneven waits or holding buses for several minutes at transfer locations. Added time waiting at a bus stop (or while a bus holds) makes frequent transit a less viable alternative to driving than it otherwise might be.
- **LTD has made significant investments in infrastructure on selected corridors. These investments support frequent service, and improve the pedestrian and cycling environment.** Development of EmX and its Gateway and West Eugene extensions served as the catalyst for improved pedestrian and bicycle facilities near transit stops. This is also reflected in the ongoing MovingAhead and Main/McVay studies defining the types of infrastructure that would best support frequent transit service in other corridors.
- **The University of Oregon is the largest single source of transit ridership in the region.** At least 17% of all LTD weekday trips start or end within one block of UO. The vast majority of these (74%) take place on EmX.
- **Ridership on most LTD routes is down 20% since 2011, but ridership on EmX is up 35%.** Ridership losses have been especially significant (-50%) on the 70- and 80-series routes that are specifically geared to providing service to UO and LCC.
- **The amount of service LTD provides is vulnerable to increasing costs and swings in the economy.** Most of LTD's revenue comes from a local payroll tax; this is significantly and immediately impacted during recessions. Furthermore, the cost of providing service has increased much faster than inflation in recent years.
- **LTD's RideSource program provides both all-purpose ADA paratransit and externally funded non-emergency medical transportation. This reduces the amount of local public funds required for paratransit, while increasing the total amount of transportation provided to special-needs populations.** The whole community benefits, as funds that would otherwise be necessary for paratransit are instead available for fixed route service that is available to the general public. In many other communities, a significant portion of trips taken on paratransit are medical in nature, but are paid for by the transit agency's general funds.
- **The Point2point travel options program leverages LTD's investments in service and infrastructure, by ensuring that more people are aware of the different travel options available to them.** Point2point's emphasis extends beyond transit to cover events and information campaigns that promote walking, cycling, carpooling and vanpools.

How much access to opportunity does LTD's existing network provide?

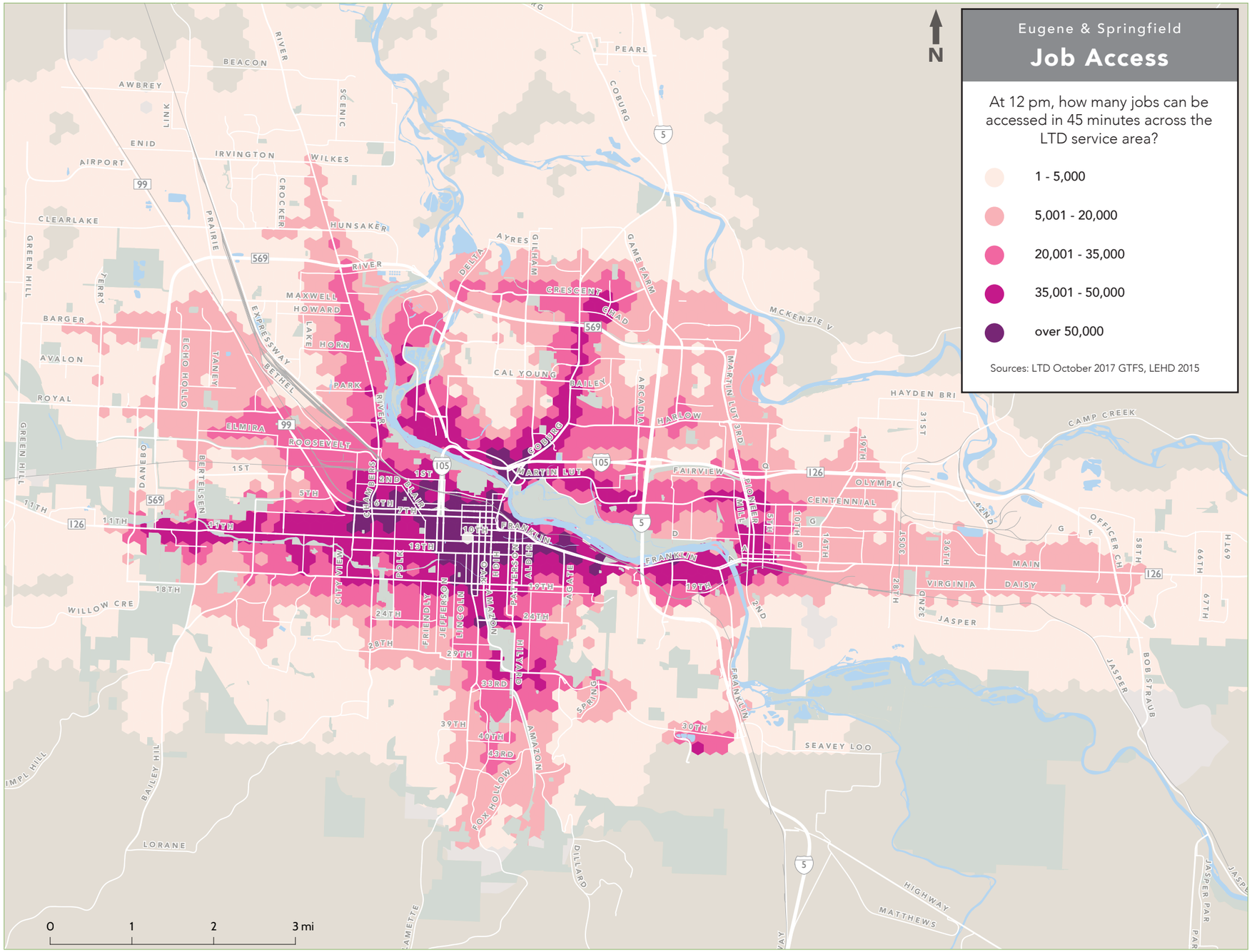


Figure 6: Number of jobs that can be reached from any location in the Eugene/Springfield metro area within 45 minutes by transit and walking at 12 PM (noon) on a weekday. High job access is an indicator that the transit network is providing access to many opportunities, including shopping, education and socializing. On this map, darker shades of purple tend to indicate a combination of nearby employment, and access to higher-frequency transit. EmX provides the most job access, but other higher-frequency routes also provide significant benefits, such as Routes 66/67 on Coburg Road and Routes 51/52 on River Road.

Transit Tomorrow will examine what future LTD service could and should look like.

What choices does the system reflect?

Transit Tomorrow is a unique opportunity to rethink the purpose of LTD's transit system, and how it relates to other ways of getting around such as walking, cycling and driving.

The amount and types of transit service available today reflect not only technical decisions, but also value judgements about what LTD should and should not provide.

For example, a quick look at the network map in Figure 3 (see page 6) shows that the existing bus network provides some level of service within a half-mile of nearly all developed areas in Eugene and Springfield. As shown in Figure 7, over 90% of the metro area's residents live within a half-mile of a bus stop.

This is not necessarily a given: there are benefits and costs to deciding to serve the entire metro area. On the one hand, it ensures that nearly everyone is at least near a lifeline service to Downtown Eugene or Springfield. On the other hand, it means finding ways to operate in neighborhoods that were never designed with transit service in mind.

Transit Tomorrow will re-examine some of these choices. We've summarized the most important trade-offs in this Choices Report, as **Chapter 7: Key Choices,** asking you to consider some of the choices LTD is facing:

» ***How should we balance high ridership and extensive coverage?*** Is it more important to provide frequent service for long hours in places that will attract the most riders, or to get a little bit of service as close as possible to every possible place?

» ***How should we balance walking and waiting?*** Is it more important to have a bus stop very nearby, or to know that if you walk a little farther the bus will come sooner and move more quickly?

» ***Does LTD's network need small adjustments, or a major overhaul?*** Is it more important to make small improvements to the system we already have, or does it need to be redesigned completely from a blank slate?

None of these questions have "correct" answers: there are valid reasons to go either way, or to fall anywhere in between the two extremes.

Ridership vs. Coverage

The most basic choice is the degree to which the transit system should be pursuing ridership or coverage. Pursuing high ridership or high coverage leads to substantially different outcomes.

Pursuing high ridership means focusing service on places where many people go, and designing service so the bus is always coming soon. Service focused primarily on ridership:

- Expands the range of trips for which transit is a viable option.
- Limits the amount of car traffic, congestion and pollution.
- Reduces the amount of public subsidy required for transit.

Pursuing high coverage means reaching as many places as possible with a basic level of service. Service focused primarily on coverage:

- Ensures every neighborhood has access to the transit system.
- Provides lifeline access to critical services for all.
- Doesn't provide a viable transportation option for most people.

LTD can pursue high ridership and extensive coverage within the same budget, but not with the same dollar. The more it does of one, the less it does of the other.

Walking vs. Waiting

Another way to think about the question of ridership and coverage is to think specifically about how far a person should have to walk to reach a bus stop, and how long they should have to wait, on average, before the next bus comes.

Walking and waiting are important to consider on their own, because both of these activities add time and inconvenience to any transit trip, and different people have a wide variety of preferences regarding each.

A transit system designed to minimize how far people walk requires many routes near each other. This means most routes will be infrequent.

Conversely, a transit system designed to minimize waits requires high frequencies. In that case, many people need to walk longer distances to reach service.

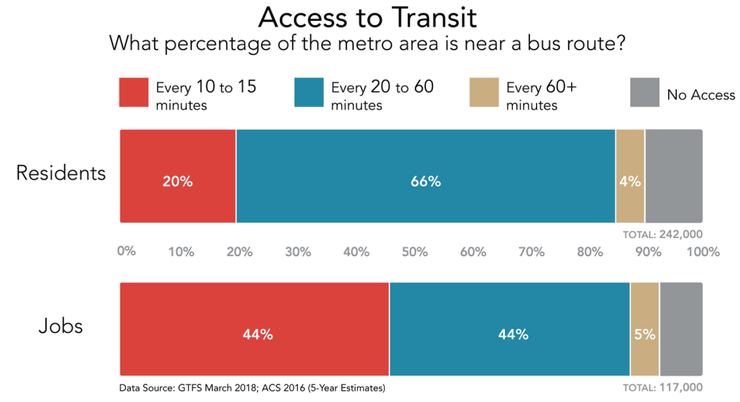


Figure 7: Percentage of the Eugene/Springfield metro within a half-mile of an LTD bus route. The network is designed to get some service within a half-mile of almost everyone. As a result, the percentage of the population near frequent service (in red) isn't very high. This isn't the only possible choice: if LTD served fewer places, more of its routes could run every 10 to 15 minutes. What is more valuable?

Adjustments vs. Overhaul

As a general rule, the more a transit system changes, the more disruption it produces in existing riders' lives. On the other hand, a bigger change can make it possible to achieve much greater benefits for the community as a whole.

To date, LTD customers have experiences seasonal adjustments to routes and schedules, three times per year. Some of these changes, like the route changes and frequency improvements associated with EmX extensions, have been larger than others.

Transit Tomorrow is an opportunity to consider whether the community would generally prefer LTD to make improvements to the network in its current form, or to rethink the network from the ground up.

Community input is critical in making the decisions on LTD's future service.

What is the public input process?

Transit Tomorrow will combine technical analysis and broad-based community input to develop a public transit network for the future. Along the way, we'll take the following steps:

- **June 2018: Choices Report.** This report provides facts and analysis about the existing network, and describes the general choices and trade-offs that LTD will need to weigh in designing future service.
- **July - August 2018: Public Input on Values and Priorities.** LTD will be presenting key information online and at community events, and seeking public feedback through a variety of channels, including:
  - » Meeting the public at community events, and holding dedicated listening sessions.
  - » Online open house seeking public feedback: http://openhouse.jla.us.com/transit-tomorrow
  - » Project web page: www.ltd.org/transit-tomorrow
  - » Project e-mail address: transit-tomorrow@ltd.org
- **August - December 2018: Analyze Public Input and Design Alternatives.** LTD will use public feedback to help guide the design of up to three different alternatives for future service. Each alternative will reflect a different direction and set of priorities.
- **Winter 2019: Public Review of Alternatives.** LTD will ask the public for feedback on the alternatives. Each alternative will illustrate the real-world consequences of applying different values to the transit network, so that members of the public can make more informed judgements on the type of service they'd prefer.
- **Early Spring 2019: Refine Alternatives.** Community input will help LTD understand which alternative(s) should be studied further. LTD will develop more detailed plans.
- **Late Spring 2019: Board Decision.** Taking into account public feedback and the refined alternative(s), the LTD Board of Directors will make a decision on the preferred structure of the future transit network. Depending on community input, the future network could be similar to what exists today, or it could be very different.
- **2020: Service Changes**. LTD will make regular seasonal adjustments to service throughout this process. If the preferred version of the future network looks very different from existing service, significant service changes will likely come in 2020.

Figure 8: Project and community input timeline. LTD will seek public feedback in two phases. The first phase will focus on the public's values and priorities. This will help LTD design several alternative visions for future service. In the second phase of input, LTD will share these alternatives, so the public can see the real-world consequences of different priorities. Public feedback on alternatives will be critical in shaping the final LTD Board decision, leading to possibly significant changes in the LTD transit network in 2020.

2 How Transit Works

Transit can serve many purposes; which purposes it should serve depends on your values.

Public transit can serve many different goals. But different people and communities value these goals differently. And it's not usually possible to serve all of them well all the time.

Possible Goals of Transit

Understanding which goals matter most in the Eugene/Springfield area is a key step in designing future service as part of Transit Tomorrow.

Possible goals for transit include:

- **Economic.** Transit can give businesses access to more workers, and give workers access to more jobs. Transit can also help attract certain industries, new residents, tourists, or other economic contributors.
- **Environmental.** Increased transit use can reduce air pollution and greenhouse gas emissions. Transit can also support more compact development and help conserve land.
- **Social.** Transit can help meet the needs of people who are in various situations of disadvantage, providing lifeline access to services and jobs.
- **Health.** Transit can be a tool to support physical activity by walking. This is partly because most riders walk to their bus stop, but also because transit riders will tend to walk more in between their transit trips.
- **Personal Liberty.** By providing people the ability to reach more places than they otherwise would, a transit system can be a tool for personal liberty, empowering people to make choices and fulfill their individual goals.

Some of these purposes are served only when transit has high ridership. We call these ridership goals. For example, the environmental benefits of transit only arise from many people riding the bus rather than driving, taking a taxi, or otherwise getting a ride in a private vehicle. And subsidy per rider is lower when ridership is maximized.

Other purposes are served by the mere presence of transit. We call these coverage goals. A bus route through a neighborhood provides residents insurance against isolation, even if the route is infrequent and few people ride it each day. Or that same route helps fulfill a political equity need; the desire to provide some service to all political wards within a city or town.

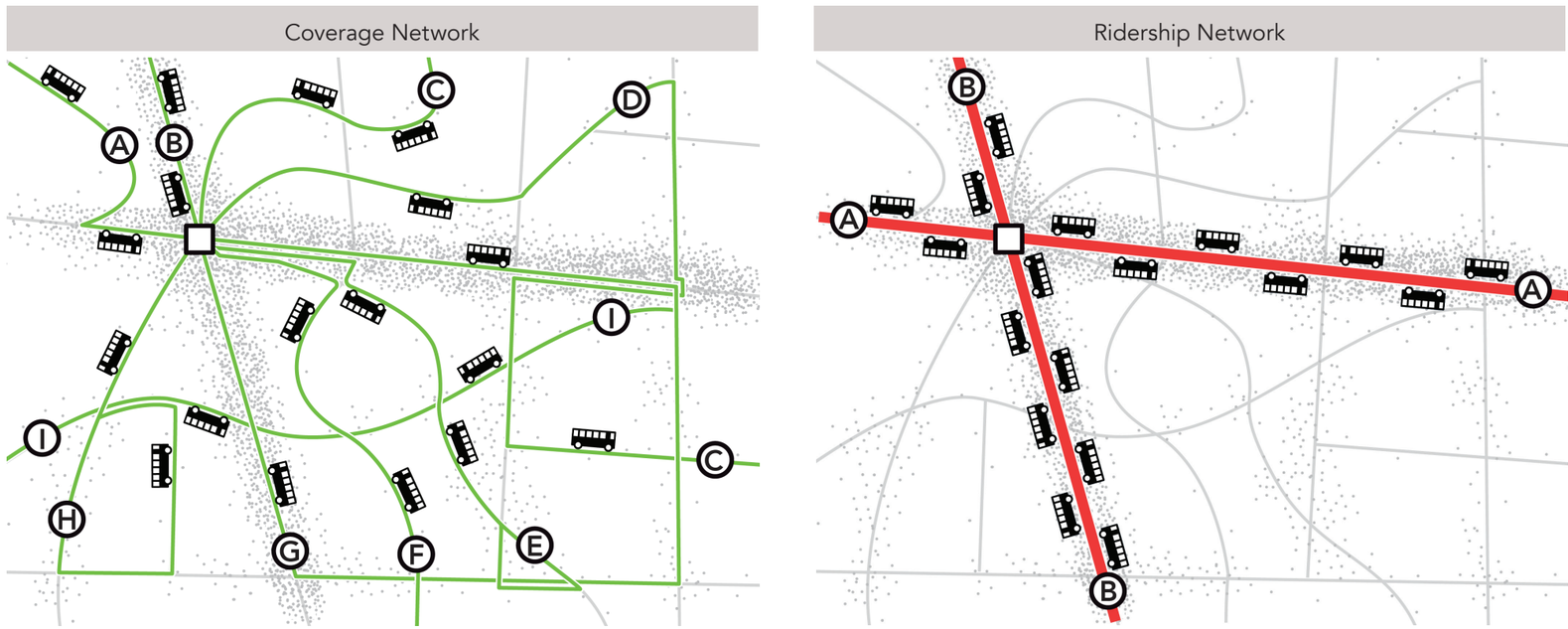


Figure 9: The Ridership / Coverage Trade-off. Imagine you are planning a network for the imaginary town above. If you wanted to create a service with the highest possible ridership, you would put all your buses on the two main streets with the most people and destinations (dots in this diagram). If you want to cover as much territory as possible, you will create many routes, but none of them will be very frequent, and they aren't likely to generate much ridership.

Ridership and Coverage Goals are in Conflict

Ridership and coverage goals conflict. Within a fixed budget, if a transit agency wants to do more of one, it must do less of the other. Consider the fictional town in Figure 9. The little dots indicate dwellings and commercial buildings and other land uses. The lines indicate roads. As in many towns, most activity is concentrated around a few roads.

A transit agency pursuing only ridership would run all its service on the main streets, since many people are nearby, and buses can run direct routes. Service would be very frequent and convenient, but only available in certain areas. This would result in a network like the one at top-right.

If the transit agency were pursuing only coverage, it would spread out so that every street had some service, as in the network at top-left. Service would be available almost everywhere, but all routes would then be infrequent, even on the main streets.

These two scenarios require the same number of buses and cost the same amount to operate, but deliver very different outcomes. To run buses at higher frequency on the main roads, neighborhood streets will receive less coverage, and vice versa.

An agency can pursue ridership and provide coverage within the same budget, but not with the same dollar. The more it does of one, the less it does of the other.

These illustrations also show a relationship between coverage and complexity. Networks offering high levels of coverage – a bus running down every street – are naturally more complex.

The choice between maximizing ridership and maximizing coverage is not binary. All transit agencies spend some portion of their budget pursuing each type of goal. A particularly clear way for cities and transit agencies to set a policy balancing ridership and coverage goals is to decide what percentage of their service budget should be spent in pursuit of each.

The "right" balance of ridership and coverage goals is different in every community. It can also change over time as the values and ambitions of a community change.

High ridership depends on making transit service useful and liberating.

Public transit ridership arises from the combination of three things:

- **Access (or Freedom).** Where can you get to on public transit in a reasonable amount of time, compared to your alternatives?
- **Pricing.** What does transit cost given its alternatives?
- **Preferences.** These include all the subjective factors that govern decisions about how to travel, as well as reactions to other aspects of the transit experience.

Network design and planning mostly determine access, so let's look at that concept in more detail.

Ridership and Access (or Freedom)

Wherever you are, there is a limited number of places you could reach in a given amount of time. These places can be viewed on a map as a blob around your location. Figure 10 shows an example of this type of visualization of transit access.

Think of this blob as "the wall around your life." Beyond this limit are jobs you can't hold, places you can't shop, and a whole range of things you can't do because it simply takes too long to get there.

The technical term for this is accessibility, but it's also fair to call it freedom, in the physical sense of that word. The extent of this blob determines what your options are in life: for employment, school, shopping, or whatever places you want to reach. If you have a bigger blob, you have more choices, so in an important sense you are more free.

How Transit Expands Access

On transit, the extent of access is determined by:

- **The network**, including transit lines with their frequency, speed, and duration. These features determine how long it takes to get from any point on the network to any other point.
- **The layout of the city**. For each transit stop on the network, this determines how many useful destinations are located there or within easy walking distance.[1] For example, if density is higher, that means there are more people or useful destinations at a given stop, which means that good access from that point is of more value to more people.

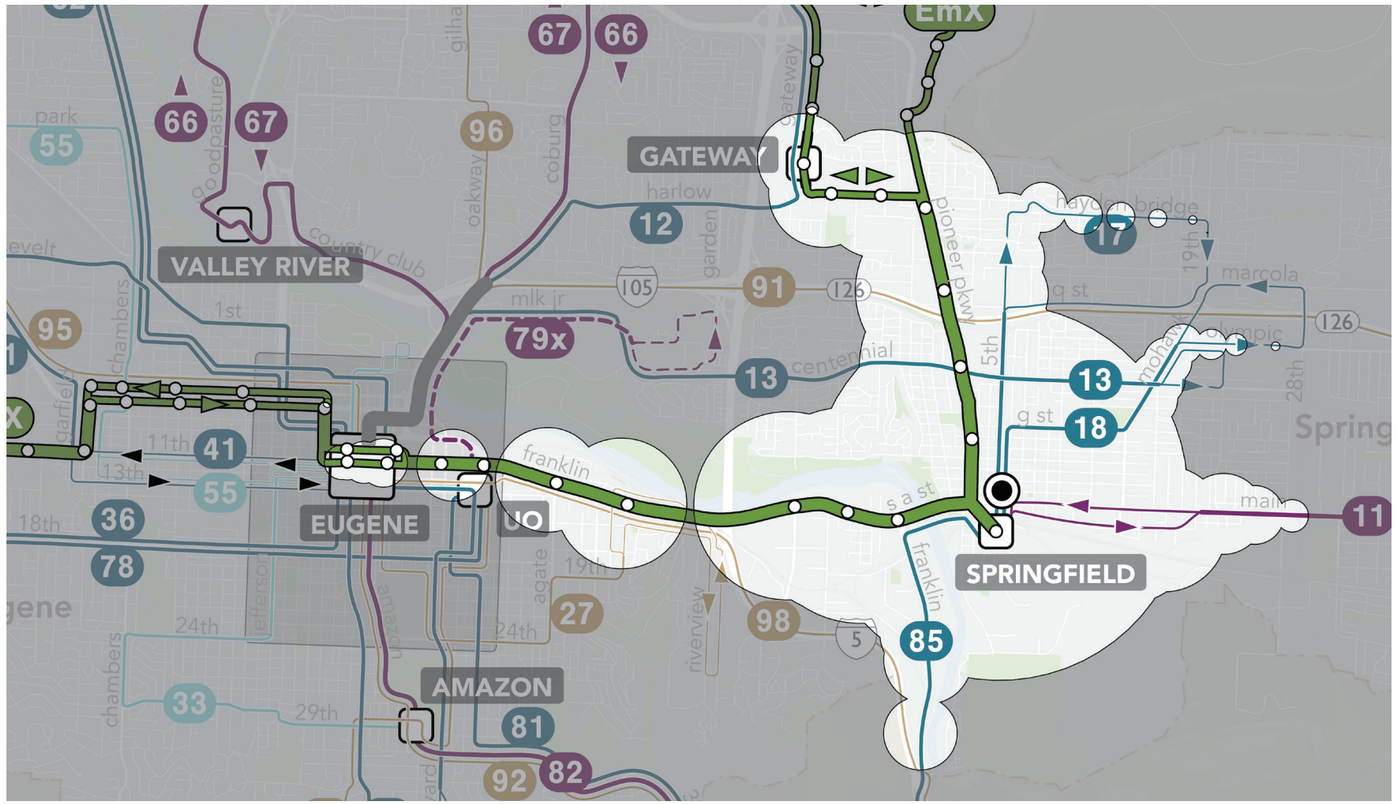


Figure 10: How far one can travel in 30 minutes on average, by transit and walking (including average waits) from Springfield Station. The size of the area you can travel in, and the places within that area, are a good indication of how much access the transit network provides.

Access is a Matter of Geometry

The way these factors combine to determine the access from each point is purely a matter of geometry. That's because freedom is about what you could do, not what we predict you will do. Access is a basic part of what determines ridership, but it also represents something that many people will see as a worthy goal in itself. For example:

- **Access to jobs** is a key concern for keeping people employed.
- **Access from a particular location** is something that gives that location value. Real estate firms routinely study where you can get to by car from a particular development parcel, and this is the same analysis for transit. In dense cities, transit access can be an important factor in overall value.

Access describes an outcome in terms that many people will care about. If you are deciding where to live based on whether you'll be able to get to your job, school, or relatives, you are asking a question about access.

From Access to Ridership

Ridership arises from the combination of access and human behavior. Human behavior is heavily impacted by pricing, and also by many other features that psychologists and social scientists study.

So while access is not, in itself, a prediction of ridership, it is a foundation of it. It is also the aspect of ridership that transportation planning mostly influences, and it can be described geometrically in a way that gives us a high degree of confidence.

Finally, access is directly relevant to a range of other issues, such as unemployment and real estate value. This is why we recommend focusing on it as a useful of transit's outcomes.

1. 1 There are other ways to get to transit other than walking, but walking is by far the most common, so we use it here for simplicity as we explain the basic concepts.

How Frequency Increases Freedom

A transit network is a pattern of routes and services, in which each line has:

- a path
- a duration, what hours and days it runs.
- an average speed, and
- a frequency — how often a transit vehicle serves a stop.

Of these, frequency is the one that needs the most explanation. It is invisible and easy to forget, and yet it is often the dominant element of travel time, and determines where you can go in a given amount of time.

More frequent service dramatically improves access

Frequent service reduces travel time by providing several linked benefits for customers:

- **Shorter Waits.** The average wait for a bus is half of its frequency. So, for example the average wait time for a 15-minute service is just 7.5 minutes.
- **Faster Connections.** The ability to change from one vehicle to another is the essence of how you get to many places that are not on the line you happen to be on. Connections are the glue that combines a pile of lines into a network. Frequency makes connections easy, because the next bus is always coming soon.
- **Easier Recovery from Disruption.** Frequent service is more reliable because if a bus breaks down, the next bus is always coming soon.
- **Spontaneity.** Rather than building your life around a bus schedule, customers can turn up at the stop and go.

Because these benefits are independent of each other, the payoffs are greater as frequency improves, with the highest ridership benefit usually being found in frequencies of 5-15 minutes.

Figure 11 plots the frequency and productivity of each route operated by large number of US transit agencies. The x-axis is frequency (better frequency is a low number, so more frequent service is to the left). The y-axis is productivity — ridership divided by quantity of service provided. Each hexagon is shaded by the number of unique routes occupying that point on the graph. It shows that ridership rises with frequency even though the cost of frequency pulls the productivity ratio down.

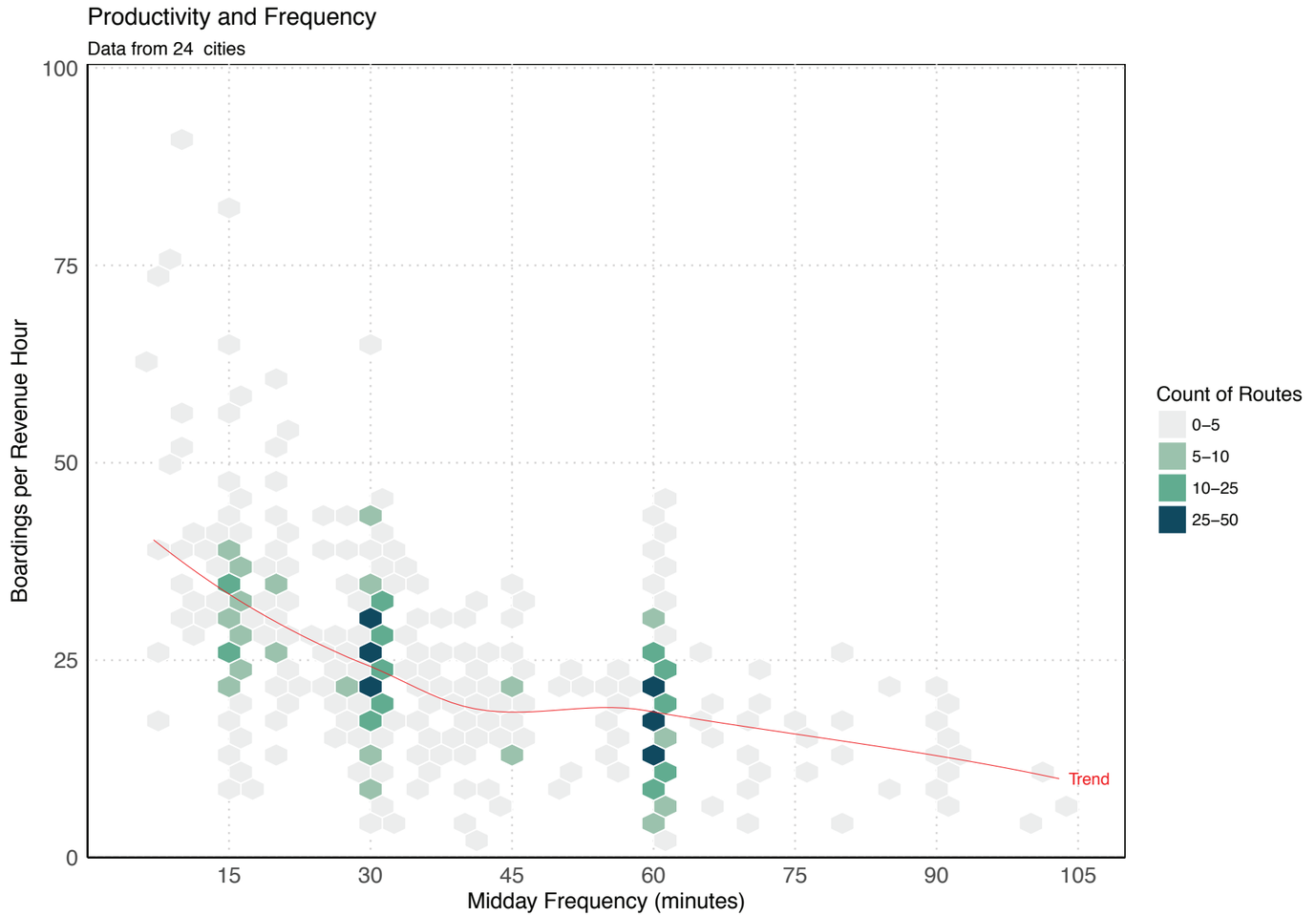


Figure 11: Transit Productivity and Frequency in 24 cities across the USA. Routes that operate more frequently tend to attract a higher number of riders per hour of service. This is because frequency makes transit trips shorter and more reliable.

How much frequency is enough?

Frequency is expensive, so it's important to think about just how frequent service needs to be. Two points should be noted:

- For most urban purposes, **a frequency of 15 minutes or better has a chance of being useful** for someone whenever they have to travel. At frequencies of this level or better, the nonlinear payoff begins to appear.
- **Adequate frequency depends on average trip length**, because it doesn't make sense to wait long to go a short distance. Very short downtown circulators, for example, often don't make sense unless they can be run at frequencies well under 10 minutes. If the bus isn't coming very soon, it's probably quicker to walk the whole way.

But ridership isn't just about service. High ridership also depends on the built environment.

How Urban Form Governs Transit Outcomes

Because frequency is expensive, it can't be offered everywhere. This means it is important to focus frequent service in the places where it can provide the most benefit. This comes down to two questions:

- **How many residents and useful destinations can be easily reached from each stop?**
  - » In areas with higher density, more people will be near a stop.
  - » In places with better walkability, the stop serves a larger area.
- **Is it easy and convenient to serve high demand stops?**
  - » Linearity is about whether a line can be straight, while still providing reasonable service to major destinations.
  - » Proximity is about how many gaps of low or zero demand a line must cross to connect areas with higher demand.

These geometric facts are the basis of a difficult political challenge around transit — a transit system focused on the most useful service, and generating the highest possible ridership, serves its city very unevenly, concentrating service where demand is high and relatively easy to serve.

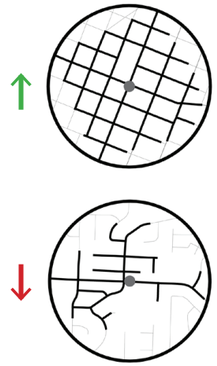
Imagine that Mrs. Smith lives in an apartment downtown (dense, walkable, linear, proximate) while Mrs. Jones lives in a large house in a suburban cul-de-sac (not dense, not walkable, not linear, not proximate). The objective fact is that it would cost much more to provide the same level of service to Mrs. Jones than as to Mrs. Smith.

Is it fair to give Mrs. Jones and Mrs. Smith the same level of service regardless? Or is it fair to spend the same amount serving each of them, which would mean very little service for Mrs. Jones?

The Ridership Recipe: Higher Ridership, Lower Costs

Density *How many people, jobs, and activities are near each transit stop?*

Walkability *Can people walk to and from the stop?*

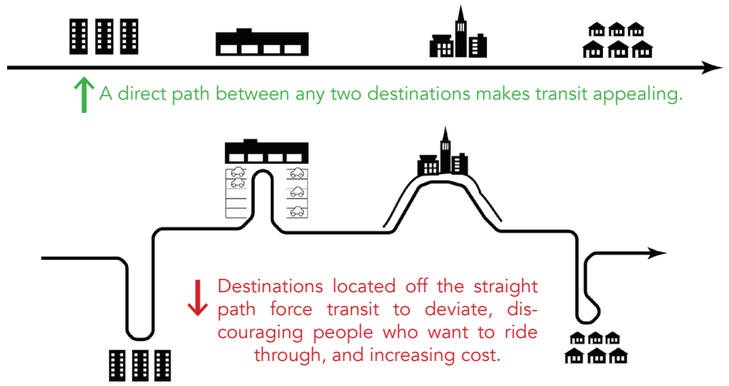


The dot at the center of these circles is a transit stop, while the circle is a 1/4 mile radius.

The whole area is within 1/4 mile, but only the black-shaded streets are within a 1/4 mile *walk*.

It must also be safe to cross the street at a stop. You usually need the stops on both sides for two-way travel!

Linearity *Can transit run in reasonably straight lines?*



Proximity *Does transit have to traverse long gaps?*

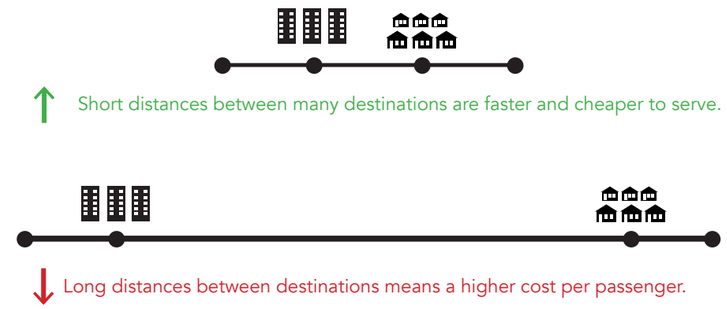


Figure 12: How Urban Form Governs Ridership. On balance, routes that traverse areas with more people and a better pedestrian network, and that follow straighter paths going through fewer empty areas, will attract far more riders, and at lower cost, than the opposite.

Examples from Eugene/Springfield: Density and Walkability

Because dense areas often support multiple land uses in close proximity, density and walkability often go hand in hand. This is especially true in areas that were developed before car ownership became widespread.

Nonetheless, there's nothing inherently walkable about a high-density neighborhood. There's also no specific reason why a low-density neighborhood can't feature good pedestrian connections.

The examples in Figure 13 show four ends of the density/walkability spectrum in Eugene/Springfield. Specifically:

- **High density/high walkability: West of the UO Campus.** This area immediately south of Downtown Eugene is among the densest neighborhoods in the region, with around 20 residents per acre in its residential portions. It features a traditional street grid, with legal crossings every 400 feet, and sidewalks on both sides of every street. Residential areas have access to nearby retail and University space.
- **High density/low walkability: Goodpasture Island Road.** This area in Northeast Eugene is almost as dense in residents, but is much less walkable. A combination of landscaping, fences and walls makes it impractical or impossible to walk in a straight path, except to the main road. Limited retail is available in the far northeast corner of the area, a 1/2- to 3/4-mile walk from most apartments.
- **Low density/high walkability: North of Downtown Springfield.** This area is much less dense than older parts of Eugene for a variety of reasons such as smaller buildings and houses, more empty lots, and more parking lots. Nonetheless, the pedestrian infrastructure, and proximity to city services and retail make this area very walkable.
- **Low density/low walkability: Barger & Beltline.** This is a relatively typical example of a suburban single-family neighborhood. Density is relatively low, because houses are located on large lots and subdivisions are buffered from each other with lots of green space. Walkability is difficult; sidewalks aren't available everywhere, and most houses are located on long blocks or cul-de-sacs. Neighborhood streets ultimately lead to wide and fast main roads with few and difficult pedestrian crossings.

Because these four neighborhoods are built very differently, they will produce different levels of transit ridership, even if they have the same exact level of service.

Eugene, West of the University of Oregon
High Density, High Walkability

Northeast Eugene, Goodpasture Island Road
High Density, Low Walkability

Springfield, North Downtown
Low Density, High Walkability

Northwest Eugene, Randy Pape Beltine & Barger Drive
Low Density, Low Walkability

Figure 13: Examples of Density and Walkability in Eugene and Springfield.

Examples from Eugene/Springfield: Linearity

Because of the way the metro area has developed, some major destinations can be served very directly by transit, while others require the bus to twist and turn and deviate off its path.

The examples in Figure 14 contrast two situations where connecting to a major destination requires more or less deviation from a straight path:

- **Very Linear: Routes 51 and 52 to Santa Clara.** River Road is a straight arterial corridor, leading directly from Chambers Street to Santa Clara. Along the way, it serves a major commercial location at Santa Clara Square. This location is very easy to serve: all the bus needs to do is to make stops on River Road on its inbound and outbound journey. No deviations are necessary.
- **Not Linear: Routes 66 and 67 to Valley River Center.** Valley River Center is located off the Delta Highway, one mile north of Downtown Eugene. Valley River is one of the largest commercial destinations in the region, but serving it requires navigating the bus through a series of freeway interchanges. Furthermore, because the mall and its major destinations are oriented toward the river rather than Valley River Drive, and because the pedestrian environment around the mall is poor, the bus must loop all the way around the mall to provide passengers safe access.

Passengers on a bus going through Valley River Center need to sit through a series of complicated loops, so it takes longer to get to and from other places on the way. In contrast, passengers on a bus going by Santa Clara Square can essentially ride straight through.

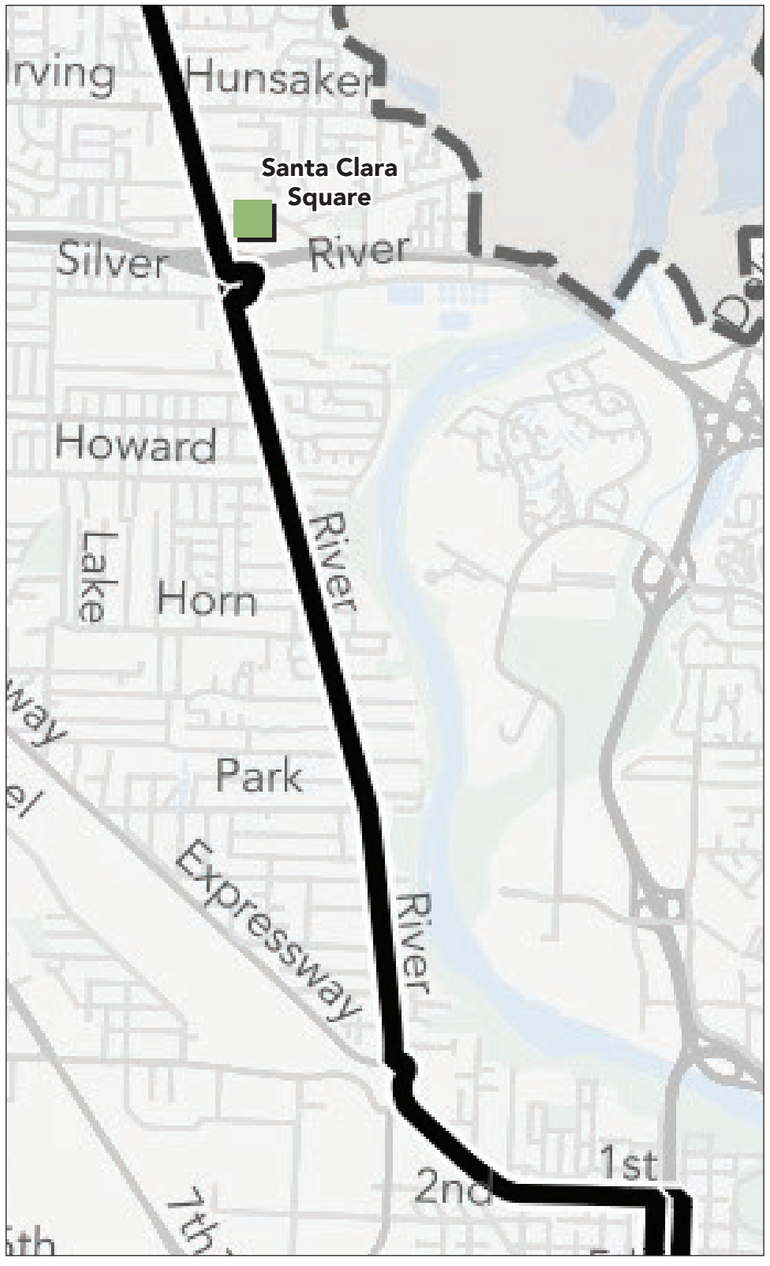


Figure 14: Example of Linearity in Eugene. Santa Clara Square and Valley River Center are both major destinations, but the road network around them means they are served differently. Buses through Valley River must go through a maze of loops and interchanges, but buses to Santa Clara can just travel up and down River Road.

Examples from Eugene/Springfield: Proximity / Continuity

Transit lines that go through areas of continuous demand are more productive than lines that go through long empty areas. This is because they generate more boardings for every mile or hour of service.

The examples in Figure 15 contrast a situation where transit demand is consistent throughout a corridor, and where it is concentrated at both ends:

- **Very Continuous: Route 11 along Springfield Main Street.** Main Street goes through a series of residential and commercial strips that continue at a similar density from Downtown Springfield to Bob Straub Parkway. As a result, there is a steady level of demand along most of the line.
- **Not Continuous: Route 82 to Lane Community College.** LCC is in a very isolated location four miles southeast of Downtown Eugene, and the neighborhoods nearest LCC are not very dense. As a result, the line goes through long stretches where no one boards or gets off the bus.

In practice, service to Lane Community College is efficient only because LCC is such a huge destination in its own right, generating lots of ridership at both ends of the line. If LCC were smaller, or a few miles farther from Downtown Eugene, Route 82 would be considerably less productive than Route 11.

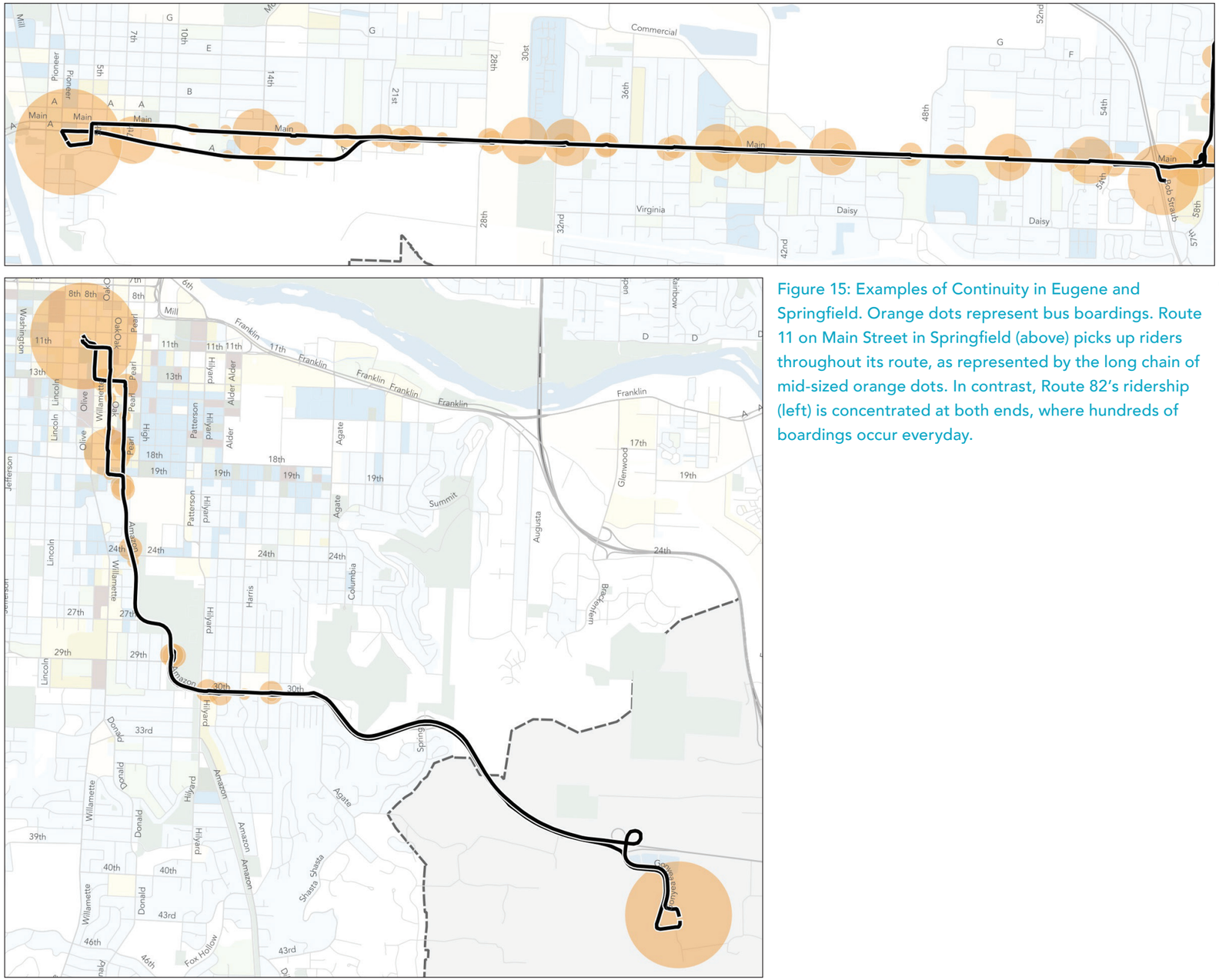


Figure 15: Examples of Continuity in Eugene and Springfield. Orange dots represent bus boardings. Route 11 on Main Street in Springfield (above) picks up riders throughout its route, as represented by the long chain of mid-sized orange dots. In contrast, Route 82's ridership (left) is concentrated at both ends, where hundreds of boardings occur everyday.

Transit geometry outside the metro area: it's about coverage.

LTD provides transit service connecting small towns and rural areas within the district to Eugene, on Routes 91 to 98. **Generally speaking, expectations for transit ridership are much lower outside the metro area.** This is because fewer people live in these outlying areas and they are located much further apart from one another. As a result, there is:

- **Much lower density, and no continuous development.** Even within small towns like Coburg or Cottage Grove, the average population density is typically lower (1,000 - 2,500 people per square mile) than in the metro area (3,500 - 4,000 people per square mile). Outside small towns, rural residences and jobs are highly scattered and isolated, generating minimal ridership if any at all.
- **Very limited walkability.** There are generally very few pedestrian facilities in rural areas. It's still possible to walk, and some people do, but most rural residents must travel much farther between their residence and other destinations, even when they stay in their own neighborhood. So there are fewer reasons to walk in general, and it's harder to reach a bus stop even if it's there.
- **To be cost effective, service must be linear. But residences and jobs are not.** The longer a bus route, the more expensive it is to operate, but many rural residences and jobs are located far from the main roads that provide the most direct paths between towns and to the metro area. Deviations are only cost-effective to serve town centers.

As a result, most service outside the metro area is meeting a coverage goal, rather than a ridership goal. The existing service pattern makes sure that every community that pays into the system through payroll taxes receives a minimum level of service, even if very few residents and workers in these communities will use it.

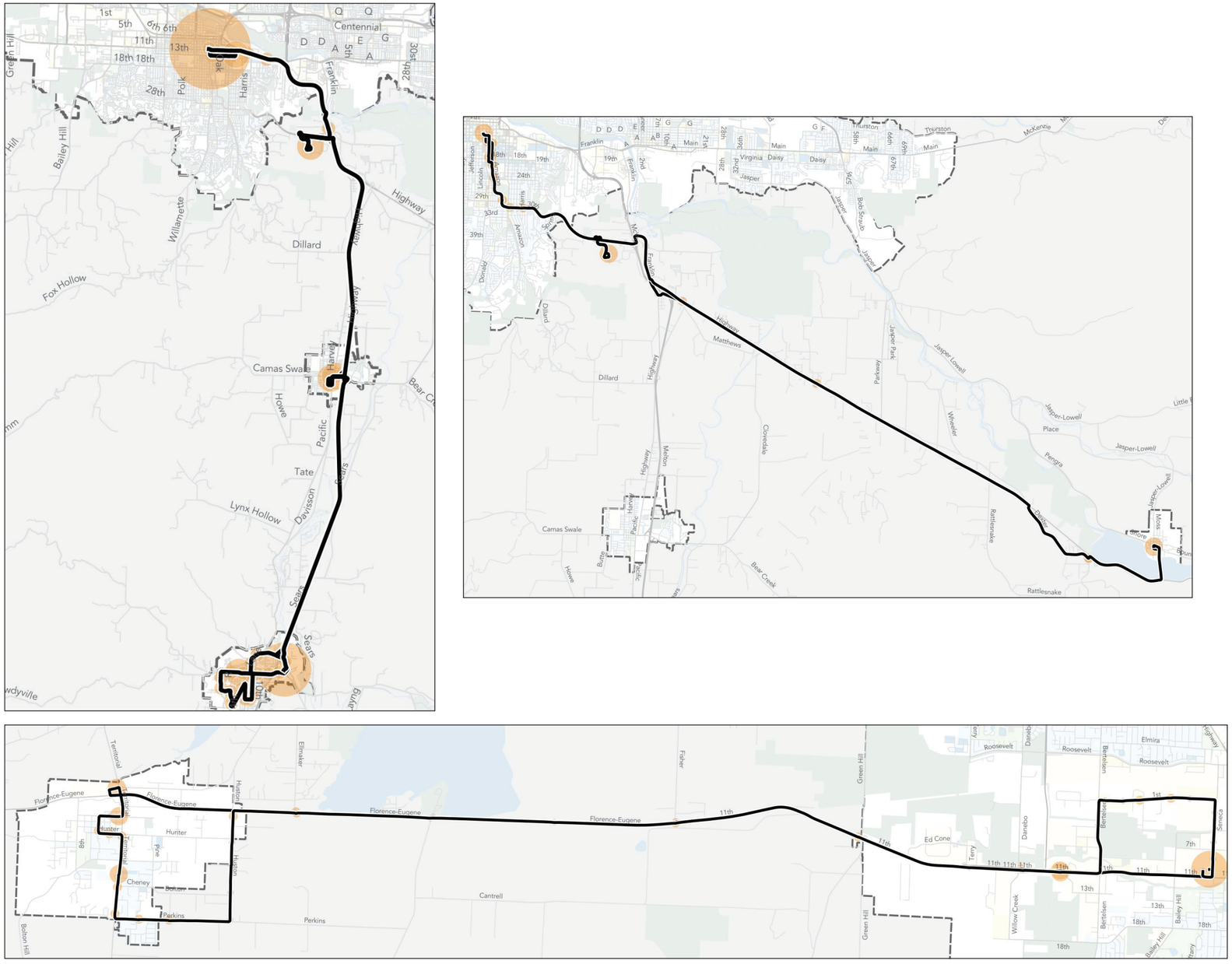


Figure 16: Examples of LTD Routes operating outside the metro area. Route 98 to Cottage Grove (top left), Route 92 to Lowell (top right), and Route 93 to Veneta (bottom). Ridership - represented with orange dots - is concentrated within the towns; there are long stretches between towns where the bus must be operated, but does not attract any boardings.

3 Market and Needs Assessment

Indicators of Demand: Residential Density

This chapter presents an overview of maps displaying key measures of the market and need for public transit service in Eugene and Springfield. It's important to distinguish between measures of transit demand and measures of transit need, since focusing on one or the other means focusing on different transit objectives.

Measures of transit demand focus on identifying the strongest overall ridership markets. This means focusing the most useful service on areas with high population and employment densities. Similar to how a retail business might seek a location with as many potential customers nearby as possible, ridership-oriented transit will seek to offer useful service in as many places with a high density of potential customers as possible within budgetary constraints.

Measures of transit need focus on identifying and locating disadvantaged populations, such as households without vehicles, people in poverty, and seniors. Many people in these categories will have a higher-than-average need for transit (or paratransit) service. Understanding where those populations are located makes it possible to see whether a transit system is providing coverage equitably.

Locating disadvantaged populations is also useful from a civil-rights perspective. Low-income and minority populations are specifically protected by Title VI of the Civil Rights Act of 1964. LTD is required to ensure that its services do not discriminate on the basis of race, and that service changes do not disproportionately impact or burden minority and low-income populations.

Residential Density

Residential density is a key metric in assessing the strength of transit markets, since most people's daily travel behavior begins and ends at home. Figure 17 presents a map of census block-level residential density in Eugene and Springfield.

From this map, we can observe that the largest area of continuous high density is in the prewar core of Eugene and around the University. However, there are many smaller pockets of high-intensity residential development, and an even more extensive areas developed at moderate densities still capable of generating substantial transit demand.

It's important to understand that this map only represents one side of the overall travel market. The other half is where people go once they leave their home, such as offices, schools, universities, retail, industries, recreational areas, houses of worship and other gathering places.

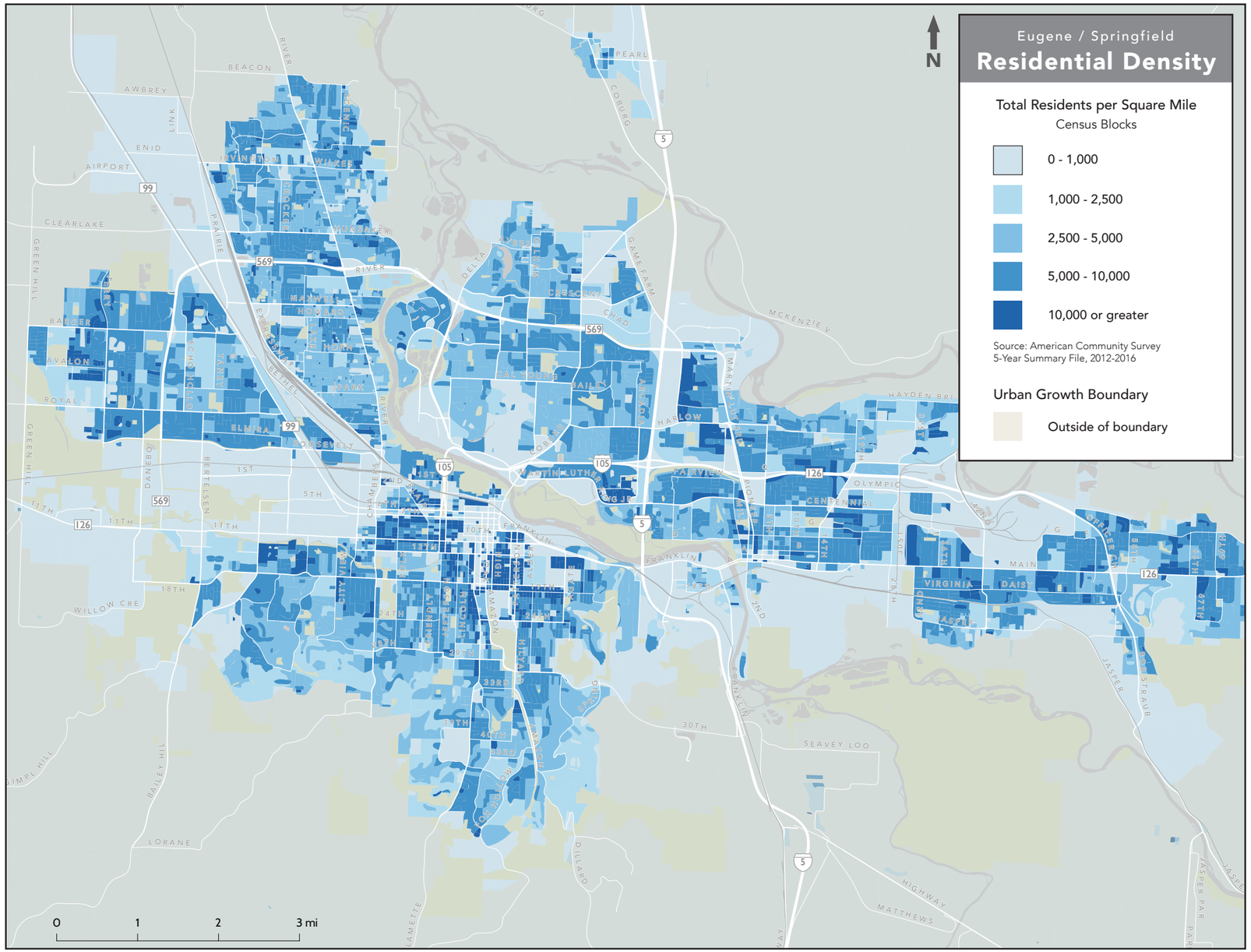


Figure 17: Eugene / Springfield Residential Density. The highest continuous densities are in the older neighborhoods at the core of Eugene. Other areas that stand out in Eugene: Autzen vicinity, and parts of Santa Clara, west Bethel, and West Eugene between 11th and 18th Avenues. The highest-density residential area in Springfield is the vicinity of Gateway Mall, but there are other isolated pockets of high-intensity development, especially near Main Street between 30th and 50th.

Indicators of Demand: Employment Density

Examining employment density is a primary method of understanding the most important destinations people travel to. Employment doesn't just tell us about where people might be going to work. Particularly in the retail and service sectors, high employment density also indicates places that are likely to have a high density of customers.

The map in Figure 18 displays the density of employment for census blocks in Eugene and Springfield. The densest employment area in LTD's service district are Downtown Eugene and the University of Oregon campus.

However, there are many other significant concentrations of employment visible on this map, including:

- Major commercial areas, such as the Gateway and Valley River Center shopping malls, or the strip commercial development along W. 11th Ave in Eugene.
- Smaller commercial nodes, such as the area around 29th Avenue and Willamette Street in Eugene, downtown Springfield, or the retail cluster around Santa Clara Square.
- Office park developments, such as those north of Gateway and the Beltline.
- Large industrial sites, such as those located just north of the intersection of Highway 99 and the Beltline.

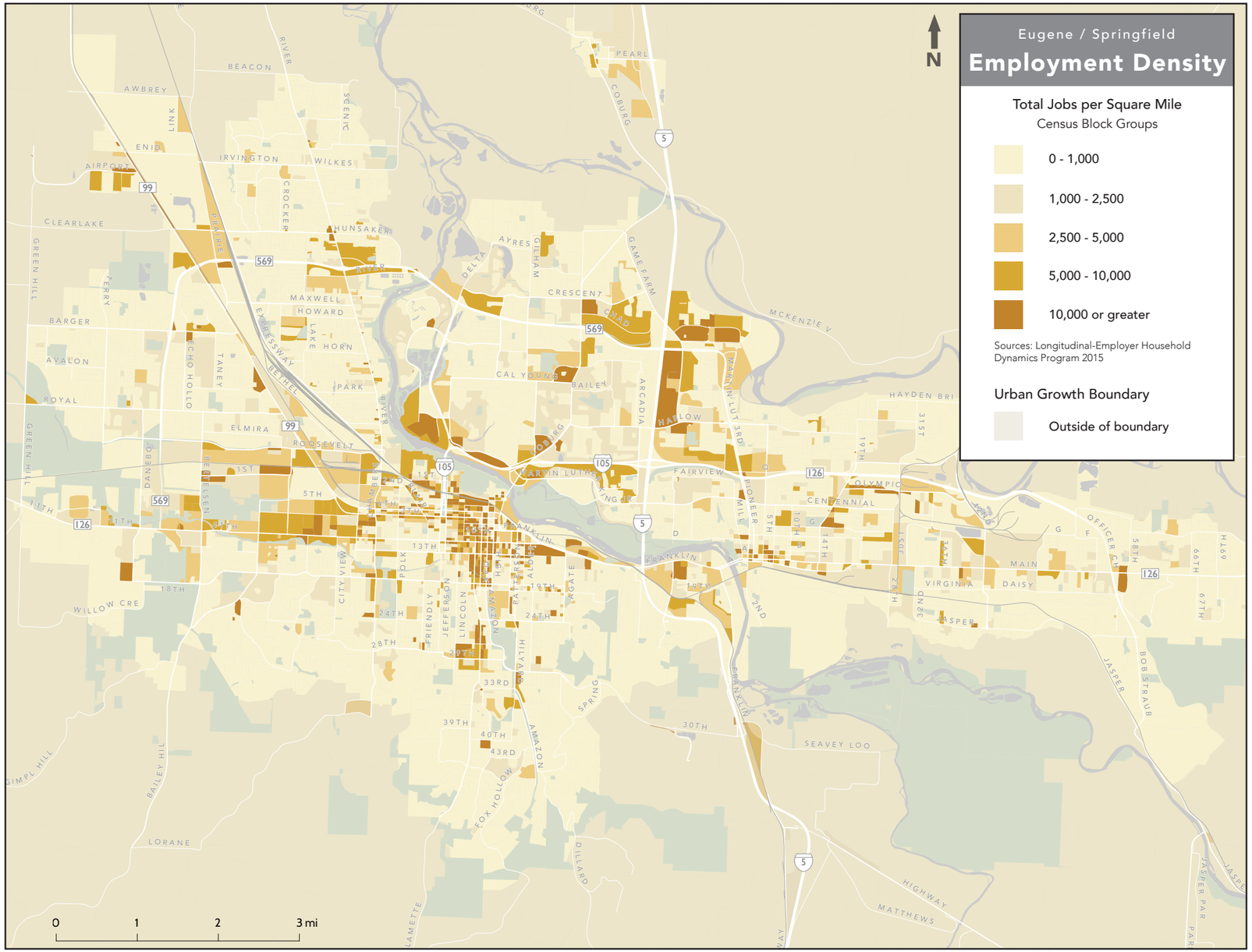


Figure 18: Eugene / Springfield Employment Density. Employment density is an indicator not just of job locations; in many cases, employment density is highest in locations that have all-day activities, such as neighborhood commercial centers and major shopping malls.

Indicators of Demand: Activity Density

Figure 19 presents the combination of residential and employment density in Eugene and Springfield. This gives us a more comprehensive view of travel demand in the metro area.

Most trips people make are between residences, workplaces, and major destinations and commercial areas. Overall travel demand is typically greatest where high residential and employment densities are found in combination. Places with a mixture of uses are more likely to have travel demands that are balanced throughout the day, compared to areas dominated by a single use.

On this map, places that are predominately residential are shown in increasingly saturated shades of blue. Employment is shown in yellow. Purple and red signify places with varying degrees of mixed residential and employment density levels.

Overall, the map in Figure 19 shows that most of the Eugene/Springfield metro area consists of moderately dense residential neighborhoods, anchored by a limited number of major employment and mixed-use centers, such as Downtown Eugene, the commercial and industrial areas of West Eugene, and the vicinity of the Gateway Mall.

The map also shows a number of smaller commercial and mixed-use nodes along major streets, such as on upper Coburg Road, River Road, Willamette Street, and in Downtown Springfield.

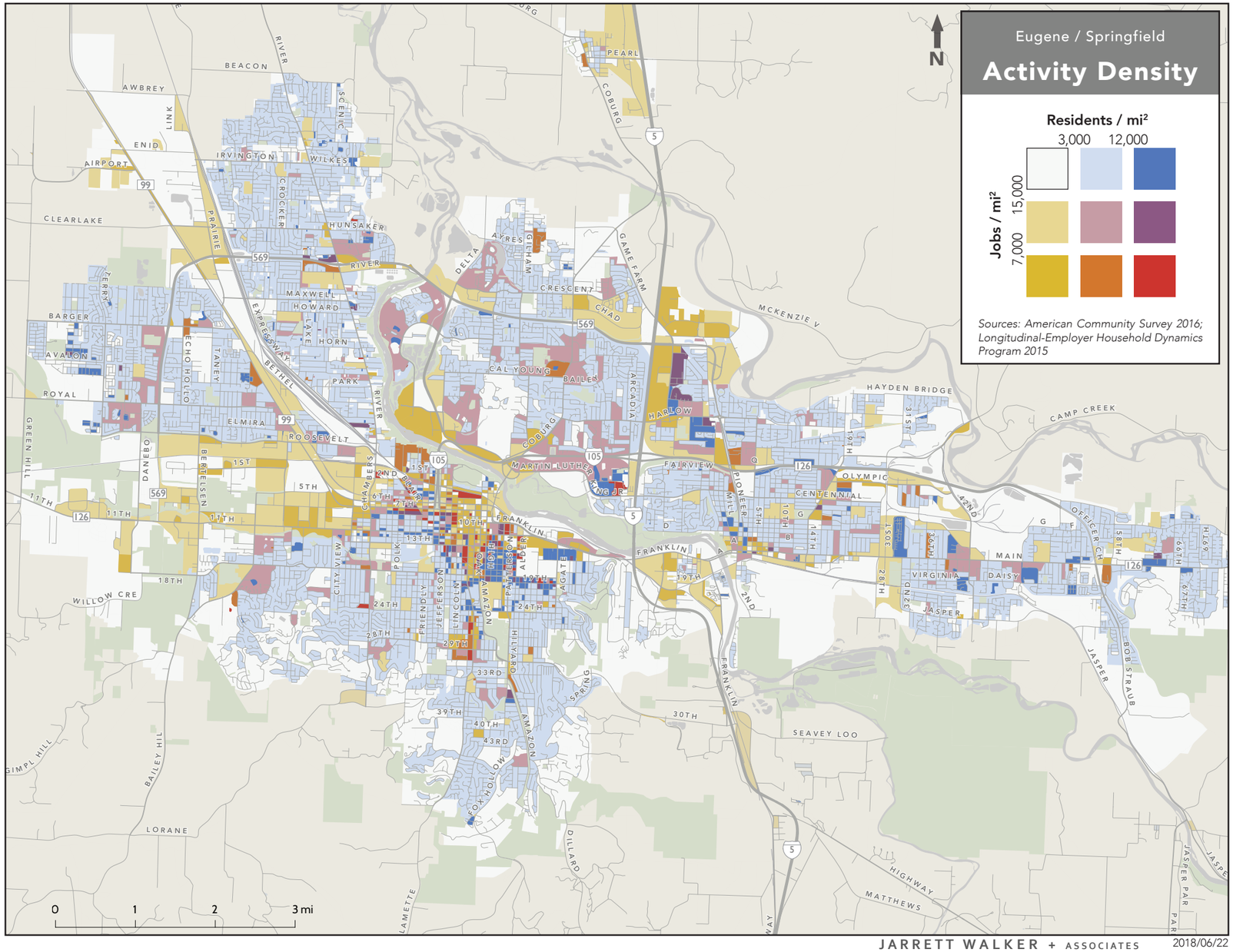


Figure 19: Eugene / Springfield Activity Density. This map combines residential density (in shades of blue) with employment density (in shades of yellow). Three major commercial and employment areas stand out from a background of moderately dense residential development: Downtown Eugene, the vicinity of Gateway, and West Eugene.

Indicators of Demand: Walkability

Figure 20 shows an estimate of how walkable different parts of the metro area are, based on the percentage of the area within a half-mile of any given point that can actually be reached by walking a half-mile, using available streets and pedestrian paths.

This map clearly outlines the more walkable pre-war neighborhoods of Eugene and Downtown Springfield, where a dense grid of streets with many intersections makes it possible to easily walk from one place to another. At sufficient density, these more walkable neighborhoods are natural markets for transit, because anyone getting off the bus in a walkable neighborhood can easily access a large area.

Walkability is lower in most suburban neighborhoods, as a result of common features of more recent development. Many subdivisions are disconnected from neighboring development, usually because there are simply no streets linking one subdivision to the next one. The same is true of many suburban apartment complexes and trailer parks.

The lowest levels of walkability are found at the edges of suburban neighborhoods, in very hilly neighborhoods like Southeast Eugene, and in "big box" industrial, employment and large retail zones.

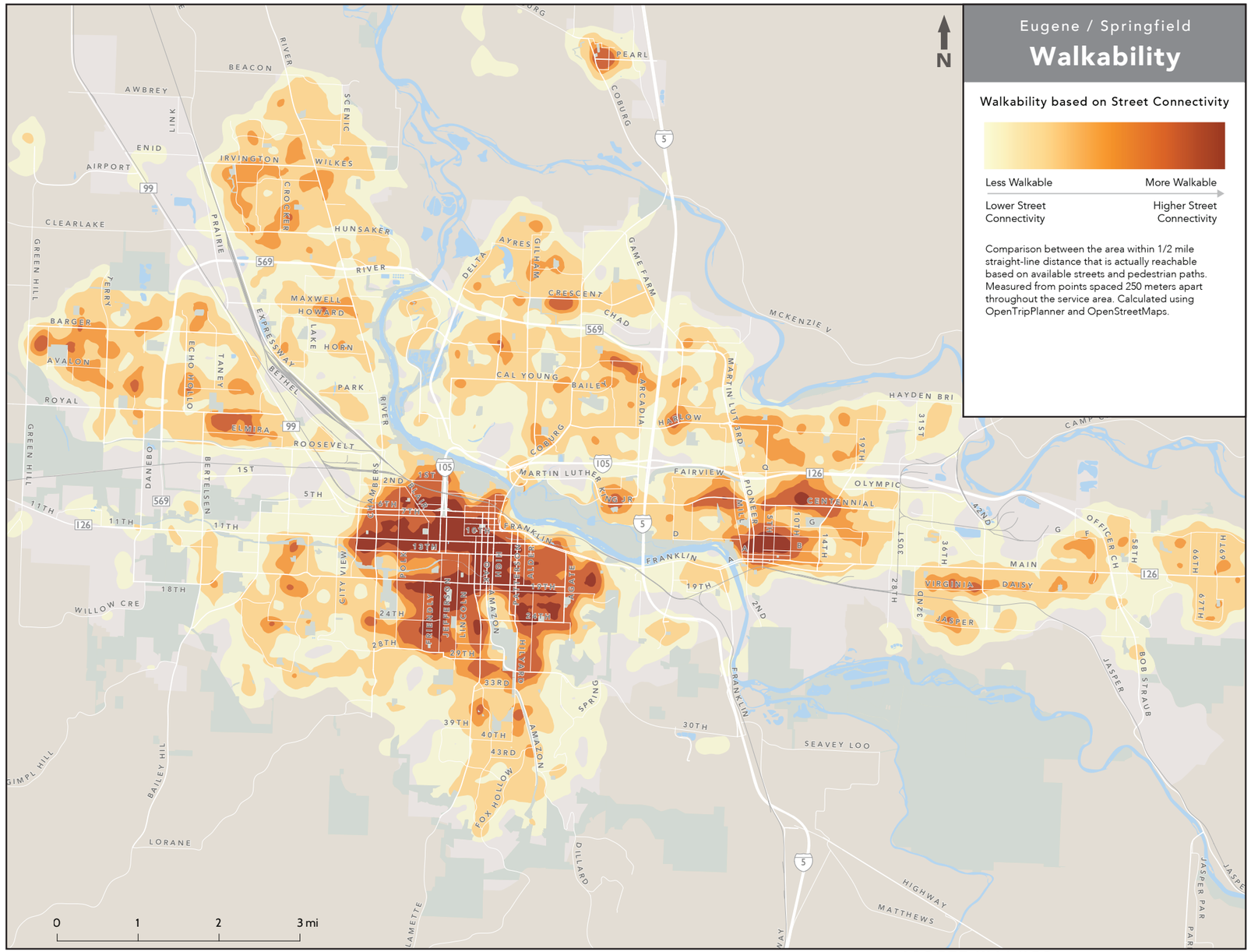


Figure 20: Eugene / Springfield Walkability. Older neighborhoods surrounding Downtown Eugene and Downtown Springfield are substantially more walkable than the rest of the region. The lowest levels of walkability are found at the edge of suburban neighborhoods, in very hilly areas, and in large industrial and employment zones.

Indicators of Need: Zero-vehicle Households

Another factor affecting transit's competitiveness in an area is the availability of personal cars. Figure 21 maps the density of households with zero vehicles.

While people who don't own cars don't use transit by default, they have fewer options than those people who do have access to personal automobiles. As a result, if transit is a useful (fast, reliable, available when they need to travel) method of reaching the places they need to go, it can be a compelling option.

If transit does not present a realistic travel option, then people without cars will find other ways of reaching the places they need to go, by getting rides from friends or family members, cycling, walking, or using taxis or ridesharing services.

In Eugene and Springfield, the absolute highest density of zero-vehicle households is found in and around the University of Oregon campus, a common pattern in cities with large universities, since students, particularly those living in on-campus residences, are much less likely to own cars than the general population.

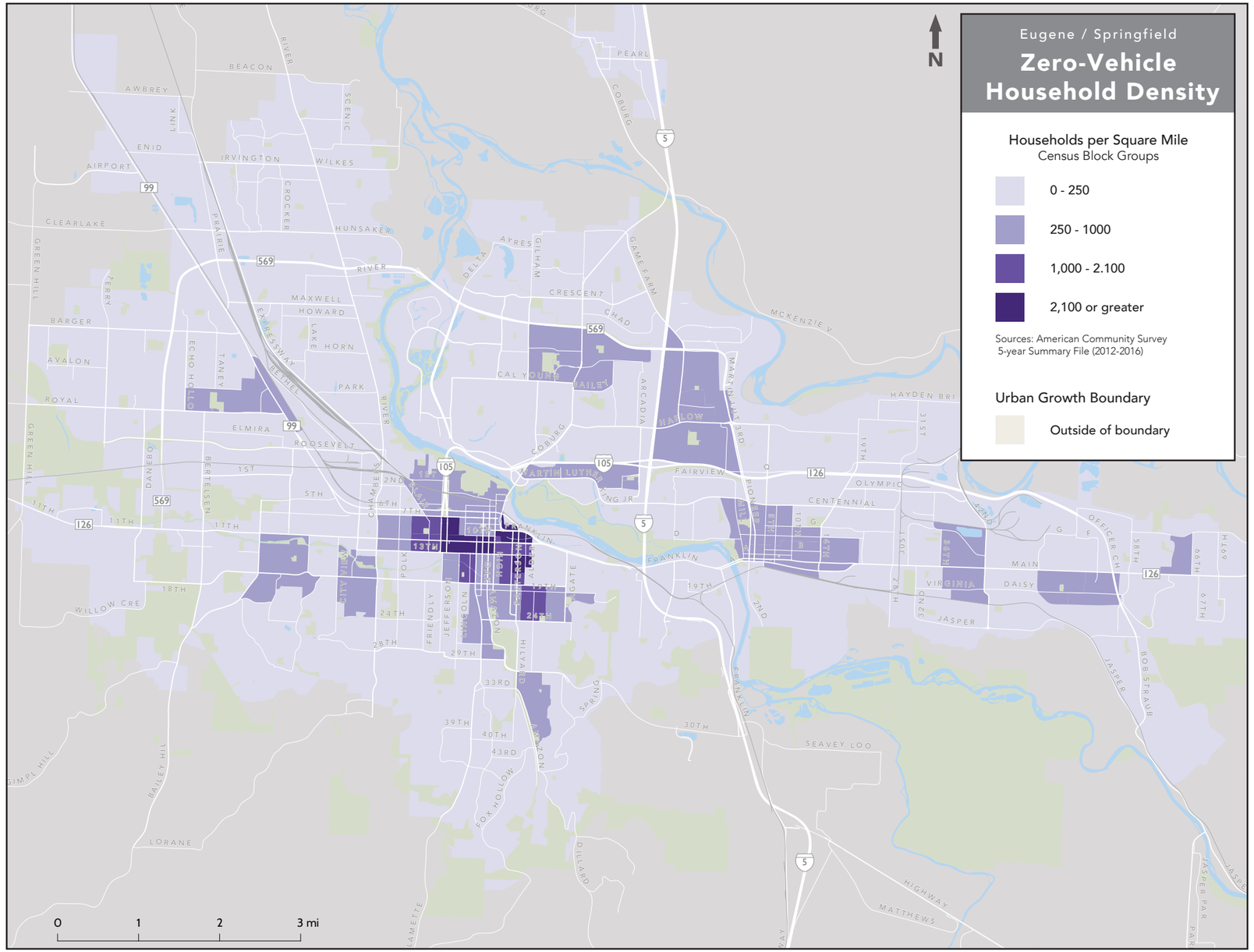


Figure 21: Eugene / Springfield Density of Zero-Vehicle Households. The highest concentrations of households without vehicles are south of Downtown Eugene near the University of Oregon. Students are much less likely to own cars than the general population.

Indicators of Need: Low-Income Households

Low-Income Households

In many places, one of the most important goals for transit service is to provide an affordable transportation mode for lower-income people, who are less likely to own cars.

In addition, understanding where low-income populations are located is a key civil rights requirement. LTD's Title VI policy requires that no major service change may place a disproportionate burden on low-income populations.

Comparing the maps in Figure 21 (previous page) and Figure 22 (right), there is in fact a correlation between some areas of higher poverty and lower vehicle ownership in the Eugene/Springfield area (e.g. east Bethel in Eugene, parts of Downtown Springfield).

Transit can be an attractive option for low-income people due to its low price and low barrier to entry. In medium to high density areas, with walkable street networks, this can be a powerful ridership generator.

However, if transit isn't actually useful for the type of trips people need to make, in a reasonable amount of time, even lower-income people will not use it, if they have other choices. And they will seek other options, even if those other options cause financial stress.

The largest concentration of households in poverty in Eugene and Springfield, by a significant margin, is the vicinity of the University of Oregon, likely reflecting the low incomes of students. However, there are low-income residents distributed throughout the metro area. Some of the other larger concentrations of low-income households can be found in the following areas:

- Parts of Downtown Springfield and the adjacent Kelly Butte neighborhood.
- Harlow neighborhood south of Highway 105 in Eugene (Autzen vicinity).
- Parts of the Bethel neighborhood in Northwest Eugene.

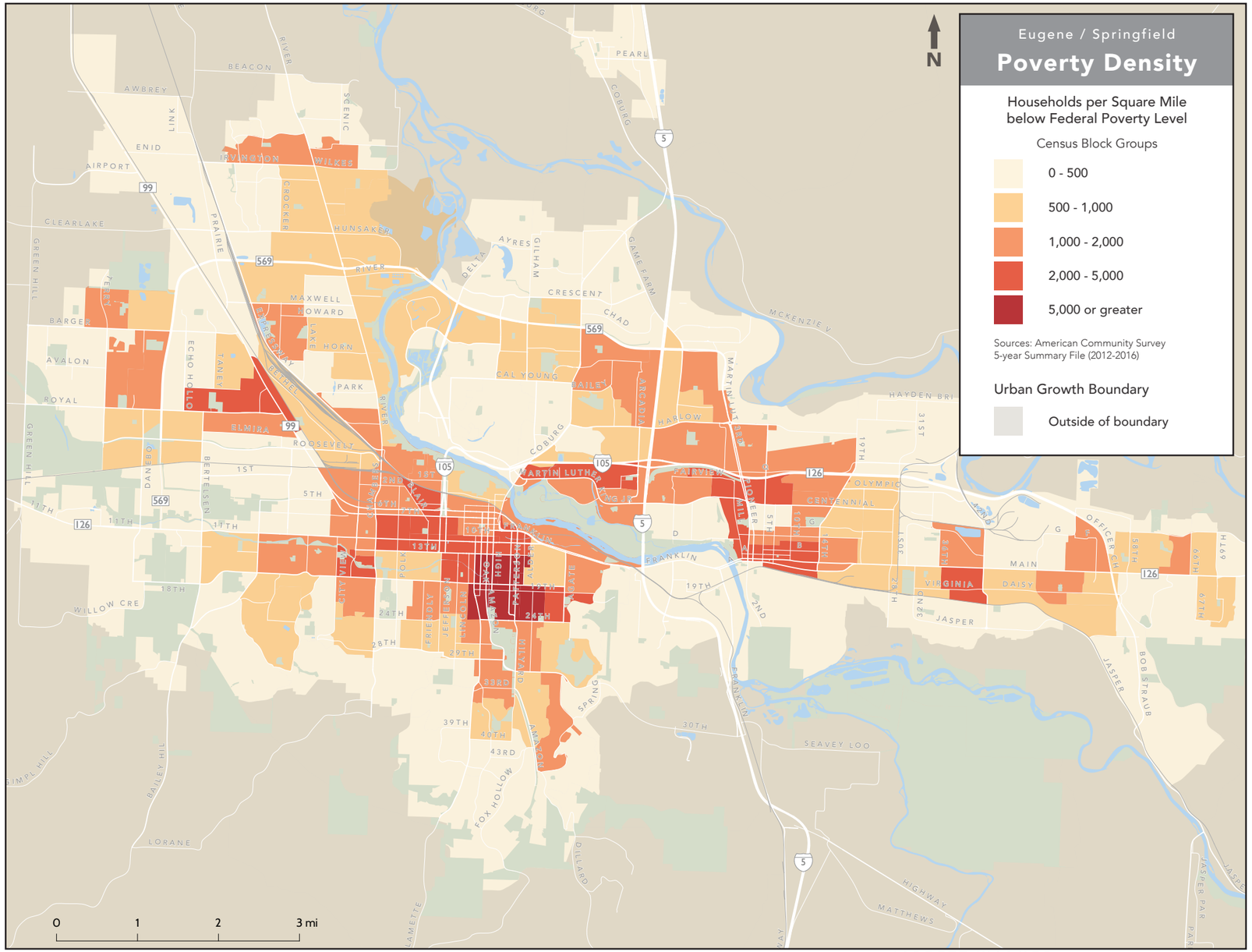


Figure 22: Eugene / Springfield Density of People in Poverty. 23% of the population in Eugene and Springfield live in poverty. The largest concentration of households in poverty is in the vicinity of the University of Oregon. Nonetheless, low-income households are located throughout the metro area.

Indicators of Need: Seniors

Seniors

Seniors (persons age 65 and above) are an important constituency for transit. As a demographic group, they are less likely to own cars than the general population, a built-in advantage for transit in places where the other preconditions for high ridership (density, walkability) are present.

Seniors constitute 13-14% of the total population in the Eugene/ Springfield metro area. This is slightly below the state average of 17%. Seniors are also spread out in every neighborhood. As a result, concentrations of seniors are relatively few and small.

Nonetheless, based on Figure 23, some areas stand out as housing slightly more seniors than others. Most (but not all) of these concentrations are in relatively outlying and suburban area, such as:

- Portions of Thurston and East Springfield.
- The northern halves of the Harlow and Cal Young neighborhoods in Northeast Eugene.
- Parts of the Bethel neighborhood in Northwest Eugene.
- Areas of Southwest Eugene, especially in the Churchill neighborhood.

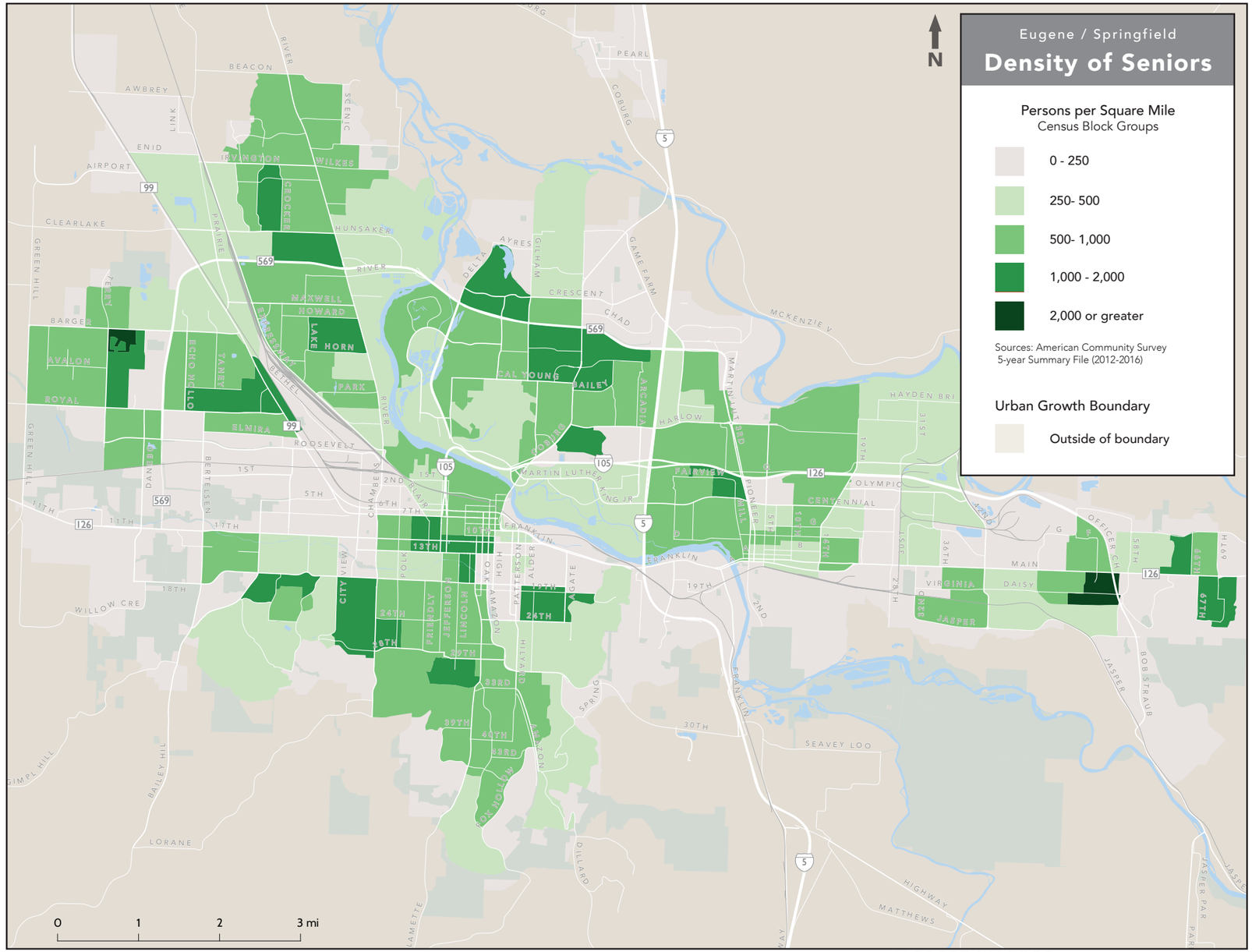


Figure 23: Eugene / Springfield Density of Seniors. Compared to other disadvantaged populations, seniors are spread out fairly thinly and evenly across the metro area.

Civil Rights: Racial and Ethnic Minorities

There is no direct link between race, ethnicity and the likelihood to use public transit. Nonetheless, transit agencies like LTD are required by Title VI of the Civil Rights Act of 1964 to ensure that the services they provide do not discriminate on the basis of race.

LTD's Title VI Policy requires that no major service change should disproportionately impact non-white populations. For this reason, it is useful to understand where minority populations are located.

The map in Figure 24 shows that the largest concentration of minorities is immediately south and west of the UO campus, which is likely related to the composition of the student body. Smaller concentrations of minority populations are present throughout the metro area, with slightly higher densities in parts of Bethel, West Eugene, Downtown Springfield and East Springfield.

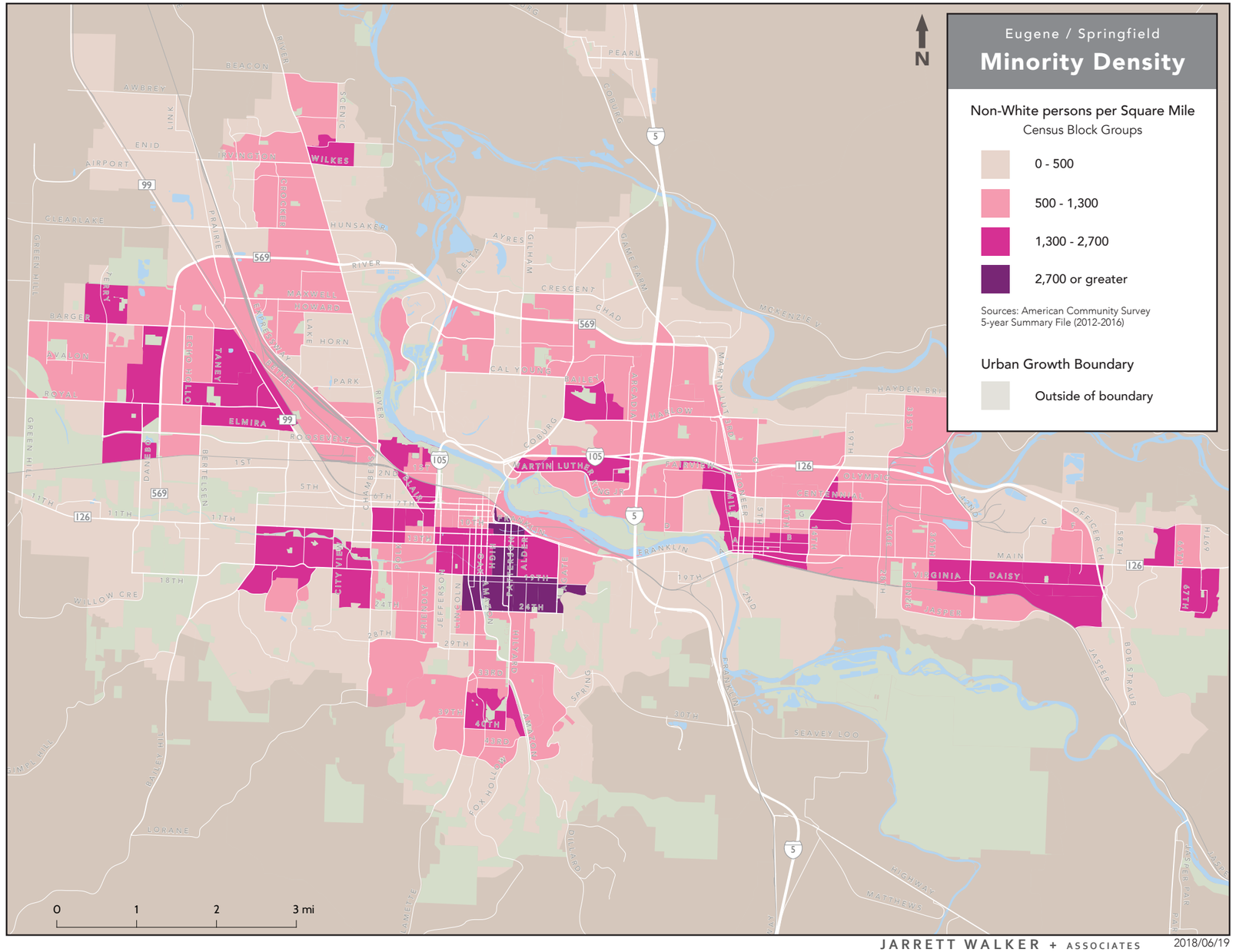


Figure 24: Eugene / Springfield Minority Density. Minority status is not a driver of transit need or demand, but it is important for civil rights purposes to know whether any planned service change has a disproportionate impact on minority populations.

4 The Fixed-Route Network

The Fixed-Route Network is the core of LTD's services.

Service Inventory

LTD's fixed-route bus network includes the EmX Bus Rapid Transit line, metro area bus routes (Routes 1 to 85) and rural routes connecting outlying communities to Eugene (Routes 91 to 98). **These services account for 52% of LTD's service hours, 70% of total operating expenses, and nearly 95% of total ridership.**

Figure 25 is a map of the bus network with lines color-coded by the prevailing frequency on weekdays, between 10 AM and 2 PM. Visualizing lines by frequency provides an easy way to see where a transit agency's most expensive and most useful services operate. On weekdays, midday frequency provides the best overall sense of a route's service level, because it is often the lowest frequency operated in the daytime.

EmX (Emerald Express)

LTD's most frequent service is the EmX. EmX is a Bus Rapid Transit service that operates mostly in reserved right-of-way, exclusive bus lanes and shared Business Access and Transit (BAT) lanes. EmX operates from Commerce Station in West Eugene to Gateway Station in North Springfield.

At the moment, the EmX operates every 10 minutes in both directions from about 7 AM to 7 PM on weekdays, with late evening service every 15 to 30 minutes. In the Gateway area of Northeast Springfield, the route splits into a two-way loop; in the middle of the day, this means buses arrive only every 20 minutes in each direction.

Fall 2018 service changes will split the EmX split into a Green Line (West Eugene to Springfield Station) and Blue Line (Springfield Station to Gateway Station). If this takes place, the current service proposal would reduce frequency on the Blue Line to operate every 15 minutes on weekdays (i.e. every 30 minutes in each direction on the Gateway Loop).

20-minute services

Apart from the EmX, the highest frequency that is consistently available all day is approximately every 20 minutes, shown in purple on the frequency map. We say "approximately" because in some cases, 20 minutes is the worst case frequency during the midday, but intervals between particular trips are sometimes shorter. Routes 11, 66, 67, 79x and 82 fall into this category.

In the case of Routes 11 and 82, the number of vehicles currently used to deliver the service could in theory provide a higher all-day

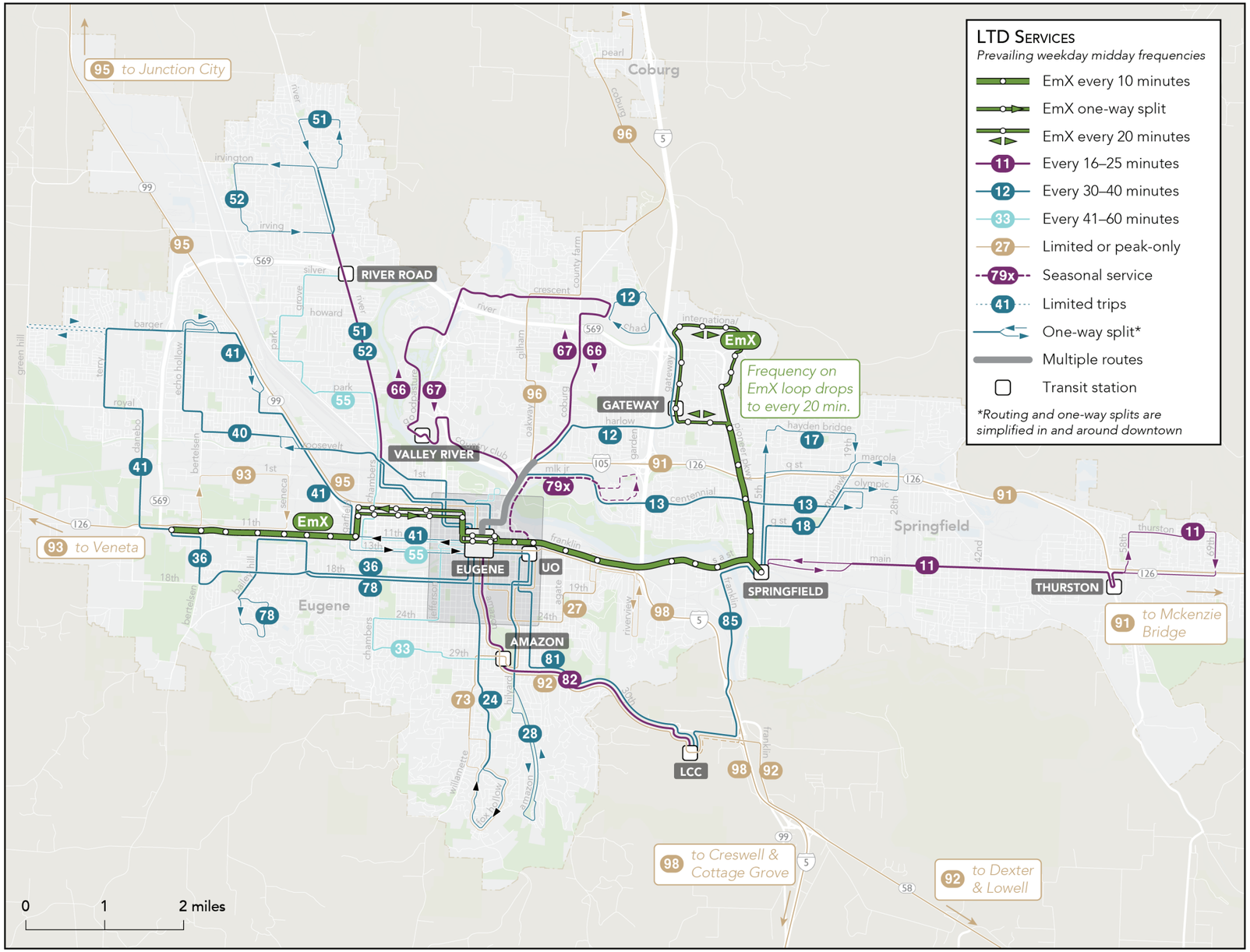


Figure 25: LTD Network Midday Frequency Map. This map shows LTD routes and the prevailing service frequencies, on weekdays in the middle of the day.

frequency at the same cost, if the schedules were adjusted in favor of maintaining a consistent 15-minute headway rather than timing arrivals at Springfield Station (Route 11) and Eugene Stations (Route 82). However, both Routes 11 and 82 are slated for some service reductions in Fall 2018.

30-minute services

Most LTD bus routes operate every half hour for most of the day, dropping to every 45 to 60 minutes during the evenings. The exact period during which 30-minute service is available varies from route to route, but is typically between 6 AM and 7 PM.

On River Road, Routes 51 and 52 both operate every 30 minutes, but at staggered intervals. This makes it possible to provide outbound service on most of River Road every 15 minutes. However, because the routes are different lengths, the intervals between buses inbound are staggered at 11 and 19 minutes. As a result, the frequency that a passenger can rely upon without referring to a schedule is closer to 20 minutes.

60-minute services

Routes 33 and 55 operate only every 60 minutes in the middle of the day, providing coverage service to lower-density areas away from higher-densities corridors like River Rd. or Willamette St. Route 33 operates more frequent service (every 30 minutes) in the morning and afternoon peak hours.

Limited or peak-only services

LTD operates 5 limited or peak-only services centered on Eugene. These routes offer service less frequently than every hour throughout the day, or only run during rush hours. They include:

- Route 27, which operates every 30 minutes during the rush hours between Laurel Hill and Eugene Station, with one additional round trip in the midday.
- Route 73 operates every 30 to 60 minutes between the Spencer Butte neighborhood and UO campus.
- Route 91 offers four round trips per day between Eugene and McKenzie Bridge, serving communities along the McKenzie River Highway.
- Route 92 provides three round trips per day (and an additional inbound AM trip) between Eugene Station and Lowell.
- Route 93 provides 10 round trips per day between the town of Veneta and the Seneca Park & Ride in West Eugene.
- Route 96 provides nine round trips per day between Coburg and Eugene Station.
- Route 98 provides nine round trips per day between, Eugene, Creswell and Cottage Grove via Lane Community College and I-5.

Out-of-District and Contracted Services

LTD also manages several services outside of its taxing district (but within Lane County), which are not shown on the map on the previous page. In each case, these services are not directly operated by LTD, but through contract to a private operator. They are funded by different mixes of state and federal grants for rural and intercity services, and matching local funds.

- Diamond Express: Four trips per day between Eugene and Oakridge. The Diamond Express is operated by an external contractor, but uses LTD vehicles. It overlaps with LTD's Route 92 from Eugene to Lowell.
- Rhody Express: an hourly circulator route in Florence. The Rhody Express does connect to any other part of LTD's network, but does generate the requirement to coordinate ADA paratransit service within ¾ mile.
- South Lane Wheels provides service within Cottage Grove, which is inside LTD's district. This is a non-profit service using LTD vehicles and some LTD funds. South Lane Wheels' service partially overlaps with LTD Route 98 currently, but this will change in Fall 2018.

Discussions are ongoing on a potential 12 month pilot service between Florence and Yachats, to fix a gap in service on the Coast. Like the Rhody Express, this would not connect with the rest of the LTD network.

Most people can access bus service within a short walk, but few have access to frequent service.

Coverage Analysis

Figure 26 shows the percentage of residents, jobs, and various disadvantages populations in LTD's district that are located near a bus stop. Key findings include:

- 62% of the district's residents live within 1/2-mile of an EmX stop, or a 1/4-mile of any bus stop. As shown in Chapter 1, this number rises to 90% when considering metro area residents within 1/2-mile of any bus stop.
- 74% of district jobs are located within 1/2-mile of EmX, or a 1/4-mile of any bus stop (rising to 93% for metro area jobs within 1/2-mile of any service).
- In contrast, only 16% of residents and 39% of jobs are located within a 1/2-mile of EmX specifically, with access to high frequency service.
- Service is located advantageously for many zero-vehicle households. This is likely related to the strong concentration of zero-vehicle households in central neighborhoods of Eugene.
  - » 81% of zero-vehicle households live near the transit network, and 37% specifically live within 1/2-mile of EmX, compared to 16% of all residents.
- Service is located equitably to minority and low-income populations.
  - » 68% of minority residents and 74% of low-income residents live near the transit network, compared to 62% of all residents.
  - » Furthermore, 20% of minority residents and 28% of low-income residents live near EmX, compared to 16% of all residents.
- Service is not located advantageously to seniors. This may reflect the fact that there are more concentrations of seniors at the outer edges of the metro area than in inner neighborhoods.
  - » Only 56% of seniors live near the transit network, compared to 62% of all residents.
  - » Only 11% of seniors live near EmX, compared to 16% of all residents.

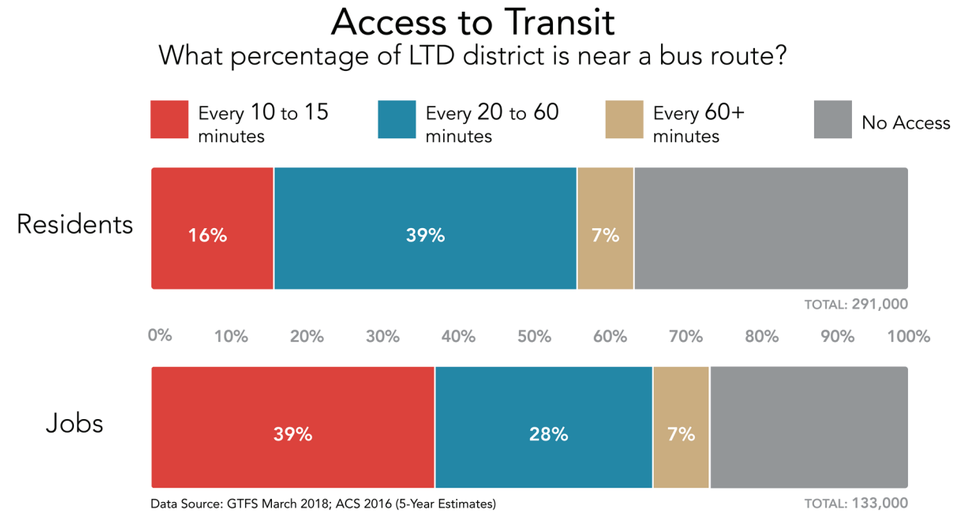


Figure 26: LTD Network Coverage. 62% of the district's residents, and 74% of district jobs are located less than a half-mile from an EmX station, or less than a 1/4-mile from any other route.

In some areas, two parallel routes go different places. This limits the frequency of both routes.

Service Duplication

In a number of corridors, multiple LTD bus routes provide service that is mainly differentiated by whether one or the other terminates at Eugene Station or at UO Station.

Figures 25 and 26 show the three main examples:

- On West 18th Ave, Routes 36 and 78 both run every half hour, and offer largely duplicative service, except that Route 36 travels north from 18th at Olive into downtown, while Route 78 stays on 18th towards UO. This means that a person traveling from along W. 18th can count on a one-seat ride to both major destinations, but it also means that even though 4 trips per hour serve many of the same stops along 18th, those buses are not able to provide 15-minute frequency.
- In South Eugene, Route 73 serves similar areas as Route 24 south of Amazon Station. North of Amazon Station, Route 73 follows the same path as Route 28 to UO Station. Route 73 is mostly a peak-hour service providing extra capacity from South Eugene to UO Station in the morning and afternoon. In a different service design, it might be possible to accommodate that capacity as 15-minute peak frequency on Route 24, with a transfer to EmX at Eugene Station. This would mean a longer time on the bus for existing Route 73 passengers, but also that everyone on Routes 24 and 73 would experience much shorter waits between trips.
- Up to 6 buses an hour leave LCC going to Eugene Station in the middle of the day on weekdays. But Route 81 serves UO Station along the way, whereas 82 takes the slightly faster path via Amazon Station. As both routes are somewhat timed to the beginning and end of class periods, Routes 81 and 82 often leave LCC within one minute of each other. As a result, the actual frequency between LCC and Downtown Eugene is just the frequency of Route 82, which is more frequent. Route 81 provides a direct path to UO, but no real benefit for passengers headed downtown.

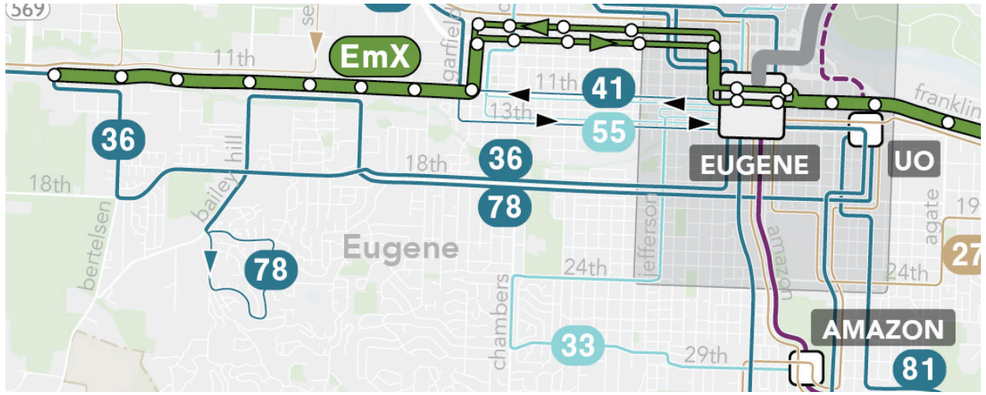


Figure 27: Service Duplication on West 18th Ave. Both Route 36 and Route 78 serve most of West 18th Avenue. But Route 36 goes to Eugene Station while Route 78 goes to UO Station.

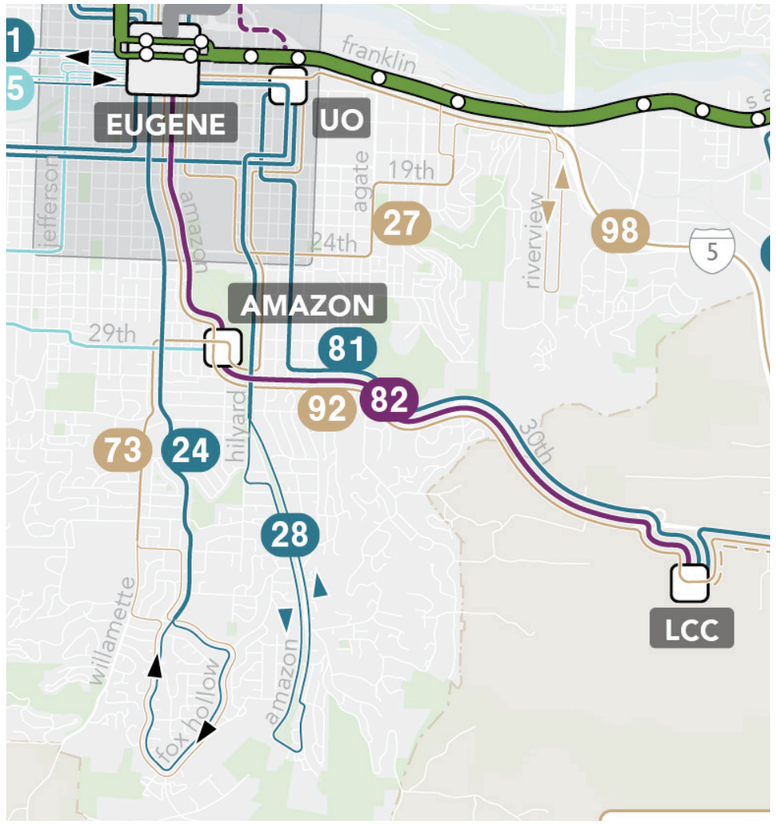


Figure 28: Service duplication in South Eugene. Route 73 overlaps with significant parts of Routes 24 and 28, but at a lower frequency. Routes 81 and 82 both connect LCC to Eugene Station, but only Route 81 also serves UO Station.

The usefulness of the network depends a lot on your location.

Transit Access

When we describe transit as "useful", we mean that it is capable of satisfying the travel needs of many people. A common method of gauging the level of usefulness of transit is analyzing the number of jobs a person can reach in a given period of time.

The more jobs a person can reach in a particular travel time, the more potential employment opportunities are available to them within a reasonable commute, and the more opportunities for shopping, to take advantage of services, visit restaurants, and take part in other aspects of the commercial and cultural life of the city.

Figure 29 maps the access to jobs in 45 minutes during the middle of the day on weekdays. From each hexagon on the map, we have computed the area that can be reached within 45 minutes by transit and walking, and the number of jobs located in that area based on the US census' LEHD workplace location data. This provides a high-level view of how transit access varies across the region.

Immediately obvious is the extent to which EmX enhances access; nearly the entire extent of its route provides the highest tier of job access, and nowhere other than the EmX line offers this degree of access.

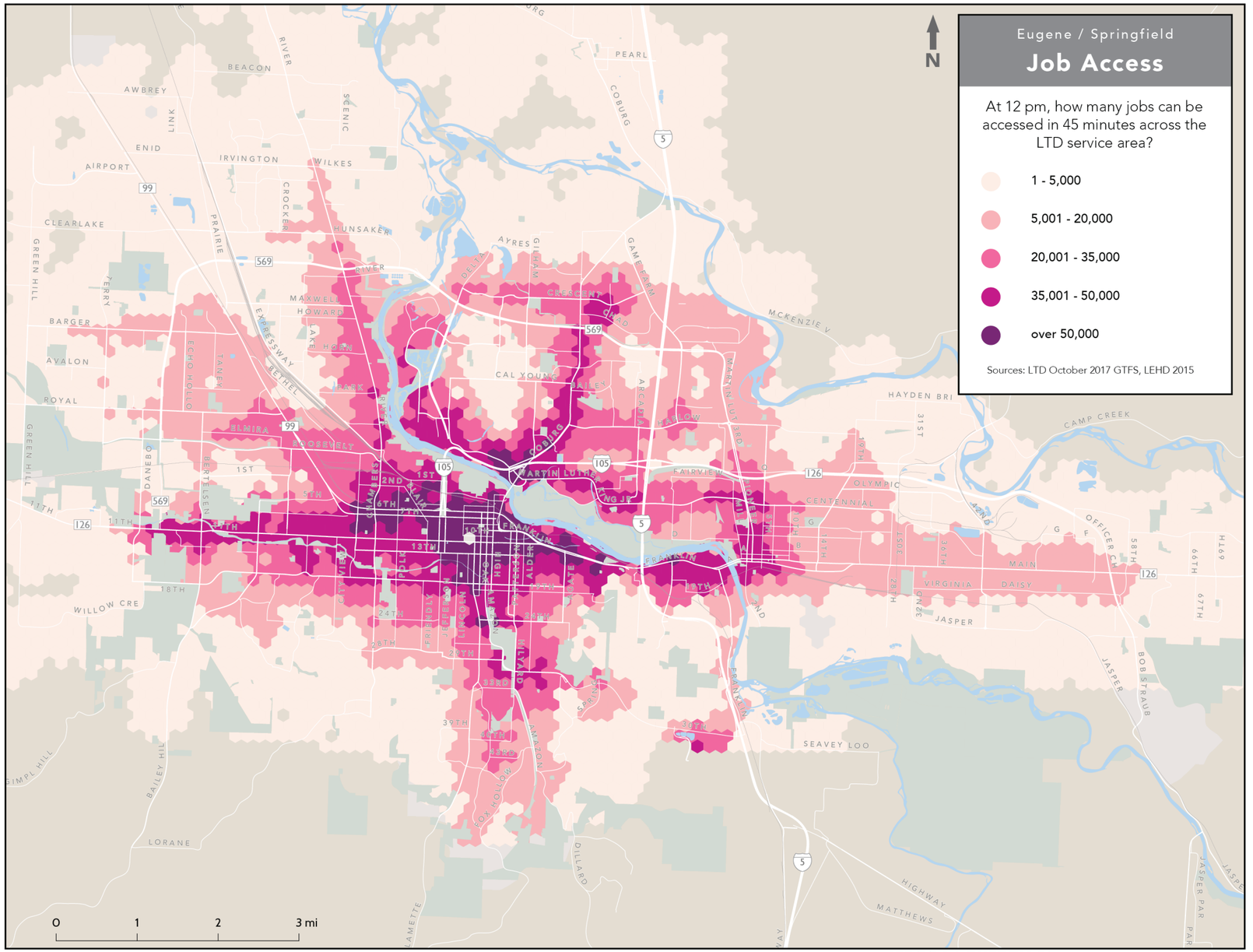


Figure 29: Jobs accessible within 45 minutes, by walking and transit, in the Eugene/Springfield metro area. The areas with the highest level of job access are concentrated along the core of the EmX line, which provides the most frequent service. Areas along 20-minute lines that feed directly into Downtown Eugene (e.g. Routes 66/67 and Route 82) also have higher than average access.

Ridership responds strongly to frequency.

Frequency and Productivity

As shown in Chapter 2, experience across many cities tells us that more frequent routes tend to attract higher ridership. On some level, this is obvious: if there are more buses, there are more opportunities for passengers to come onboard.

In cases where the basic demand conditions for transit are strong, the benefits of frequency are so strong that the relationship is non-linear: **more frequent routes not only attract more riders in total, but they often attract more riders on each bus. This means that more frequent routes are often more productive.**

The productivity of a bus route is measured in boardings per hour of service[1]. The chart in Figure 30 shows the productivity of LTD's fixed routes, compared to their scheduled weekday frequency, in the middle of the day.

At first glance, the relationship is clear: productivity is much higher on EmX than on 30-minute routes, and productivity on 30-minute routes is much higher than on 60-minute and limited routes.

However, not all routes at the same frequency have the same productivity, for a variety of reasons such as:

- **EmX is LTD's most productive route; it operates every 10 minutes and receives around 75 boardings per revenue hour.** EmX also operates through all of the district's largest job centers, and by the University of Oregon, the single largest driver of ridership in the whole system (trips to and from UO account for 17% of boardings[2]). This might mean that EmX could remain productive at a lower frequency; on the other hand, a less frequent EmX would be so much less convenient, and would reduce the usefulness of the whole network so much, that ridership would almost certainly fall significantly on many other routes as a result.
- The 20-minute route class has several special cases.
  - » Routes 79x and 82 respectively serve the UO and LCC campuses, and their schedules are tightly coordinated with class times (especially Route 79x). As a result, they experience exceptionally high productivity, beyond what their frequency would suggest.
  - » On the other hand, Routes 66 and 67 have relatively low productivity, despite serving major destinations like Valley River Center and upper Coburg Road. This is probably related to the circuitousness of the route, and the long segments of relatively low demand required to reach major destinations from both directions.
- Compared to transit in other cities, many of LTD's 30-minute routes have exceptionally high productivity, over 40 boardings per revenue hour. This is likely related to two main factors:
  - » The "pulse" system of timed transfers at Eugene Stations extends the usefulness of 30-minute routes for travel in many directions, as there almost no waiting involved when changing buses.
  - » The same pulse means that a relatively high share of boardings on LTD are transfers. Individual riders may often be double-counted.
- The following 30-minute routes have especially high productivity:
  - » Route 13 serves the same high-density student markets as Route 79x, in addition to relatively dense low-income areas along Centennial Boulevard in Springfield.
  - » Route 24 connects neighborhoods in South Eugene to Downtown Eugene, but also serves both neighborhood and regional retail along Willamette Street.
  - » Route 36 connects relatively dense residential areas along West 18th Avenue and Churchill High School to Downtown Eugene.
- Route 78 is a special case, with exceptionally low productivity for a 30-minute route. This is probably because Route 78 has a very small unique market. Most of Route 78 overlaps with Route 36. But instead of serving Downtown Eugene, Route 78 goes to the University of Oregon. This means Route 78 doesn't serve the largest employment center and the main transfer point in the network. Also, it's likely that many passengers headed to UO take the first bus that shows up, since Route 36 passengers can easily transfer to EmX to reach UO.

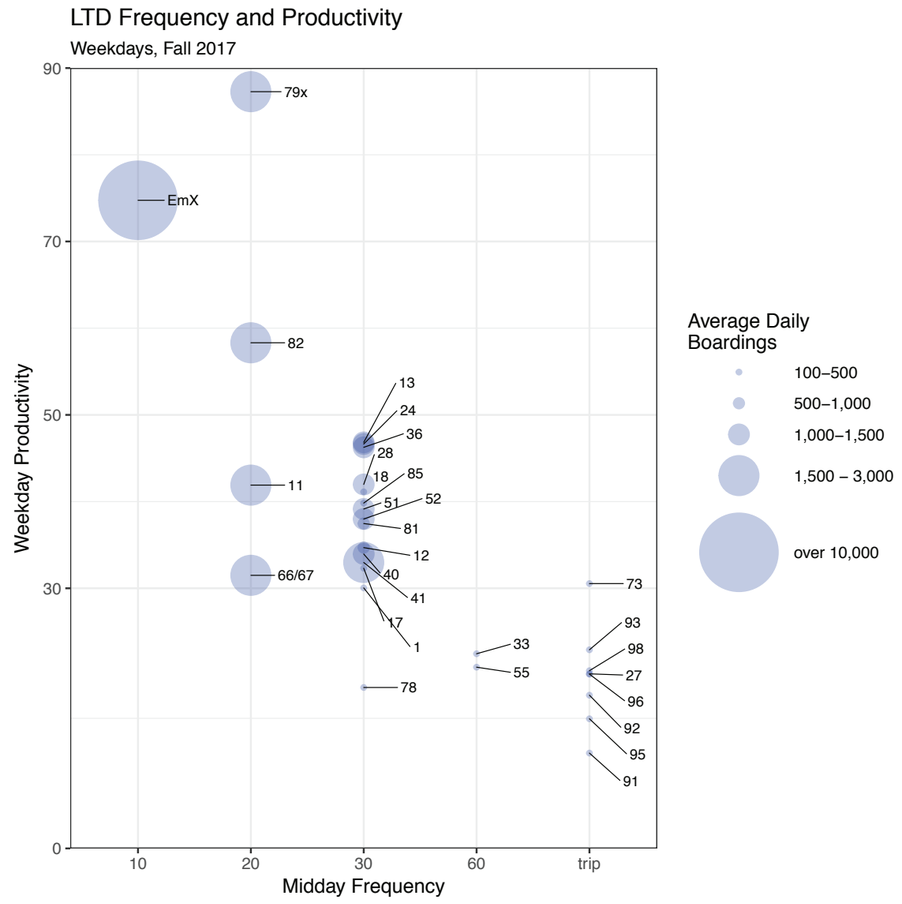


Figure 30: LTD Weekday Productivity and Midday Frequency by Route. Frequent routes tend to generate more boardings per hour of service.

- The comparison between frequency and productivity makes less sense for rural routes (91 to 98), partly because frequencies are so low and partly because the routes have very different lengths.
  - » For example, Route 91 appears to have low productivity because it is by far the longest route LTD operates, and it serves very sparsely populated areas.
  - » This doesn't mean the bus is less popular than others; when measured in passenger loads, the average Route 91 bus enters and leaves the metro area with 20 passengers on board, compared to less than 10 on the much shorter Routes 95 and 96.

1 More precisely, we measure productivity in revenue hours, which includes both in-service time, schedule recovery time, and driver breaks. In-service time constitutes about 85% of LTD revenue hours.

2 Based on average weekday boardings (3,447) and alightings (3,019) at stations located less than 1 block of UO campus in Fall 2017. Includes Dads Gate Station, Agate Station, UO Station, and Alder & 17th.

Ridership is much lower on evenings and weekends, when service levels are much lower.

Ridership by Time of Day

Figure 31 shows the total ridership by hour of day for all LTD services, split by day of week. LTD's daily ridership pattern is not particularly focused on traditional rush hours associated with the "9-to-5" commute. Instead, it appears to reflect a broad-range of all-day uses.

On weekdays, there appears to be a steady baseline ridership of 2,500 boardings per hour. This baseline is achieved by 7 AM, an hour after most routes are in full service; it continues until almost 7 PM, when most routes switch to a 60-minute evening frequency (see Figure 33, next page). It is notable that there is no significant weekday morning peak in ridership. The only clear peak is between 2 and 4 PM, when boardings reach up to 3,700 per hour; this early afternoon peak is common in systems with significant ridership from high school students.

There is some variability in ridership throughout the day by route on weekdays, shown in Figure 32. This chart displays a heatmap of ridership per trip by direction and hour of the day for each LTD route.

Saturday and Sunday ridership exhibit very similar patterns to each other, except ridership is typically 50% higher on Saturdays than Sundays. Both days experience a slower ramp-up in ridership than on weekdays, leading to a soft afternoon peak between 1 and 5 PM. On Saturdays, ridership peaks at 1,700 boardings per hour; on Sunday, the peak is around 1,100 boardings per hour.

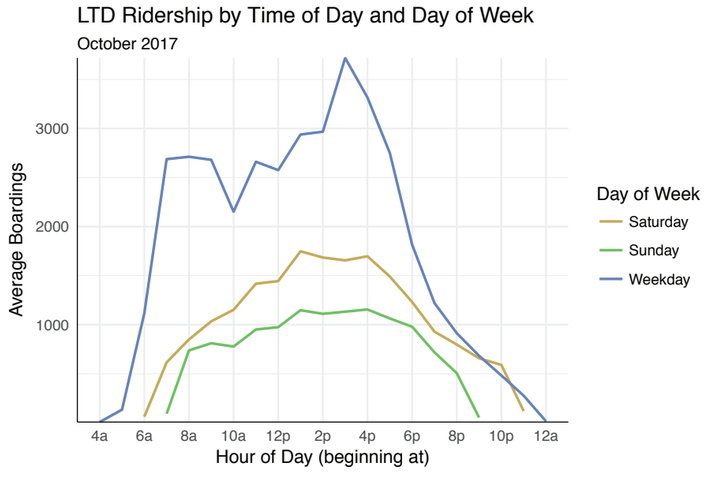


Figure 31: LTD Ridership by Hour of Day. Weekday ridership is steady until the early evening, when most routes drop to 60-minute service.

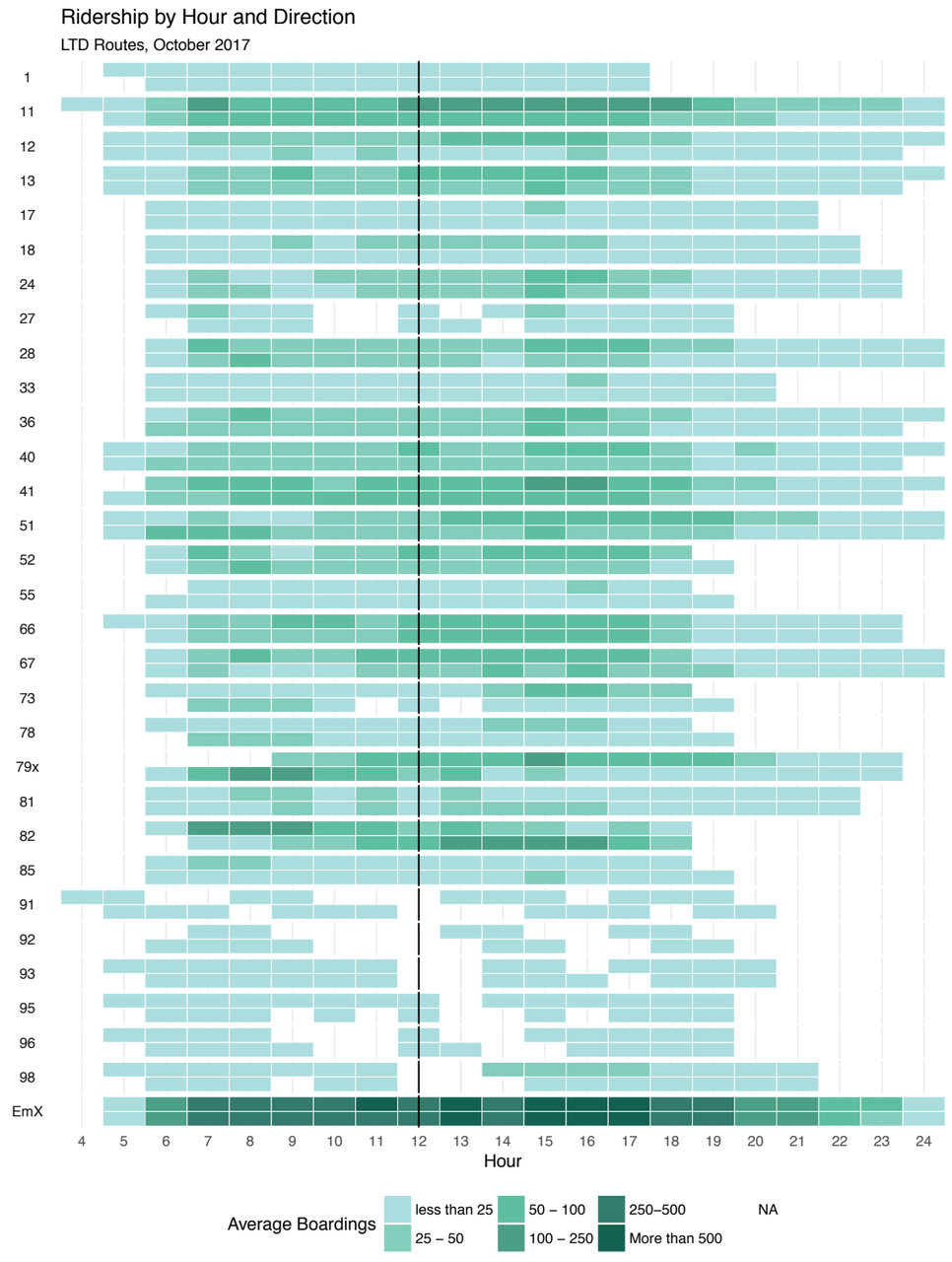


Figure 32: LTD weekday ridership by route, direction and hour of day. Not all routes experience the same peaks (and several routes experience morning and afternoon peaks in opposite directions), but nearly every route's ridership drops significantly after 7 PM.

Lane Transit District

Route Frequencies and Spans of Service

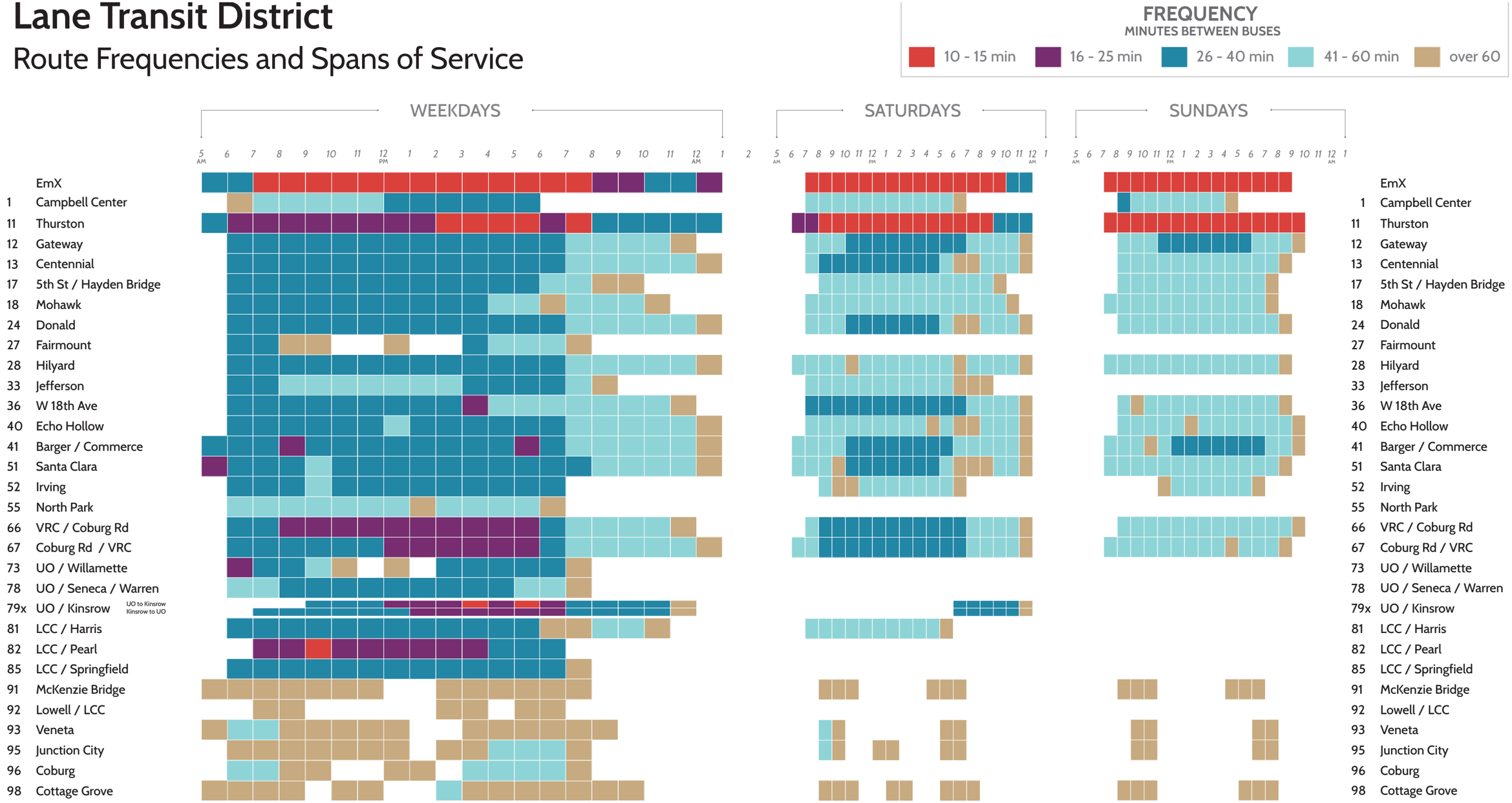


Figure 33: LTD Network Weekday Frequency Table. This chart shows frequency by bus route, at every hour of the day, based on early 2018 service.

Data Source: LTD GTFS feed, January 2018

Weekday vs. Weekend Service

As shown in Figure 33 (see prior page), LTD's weekend service level is substantially lower than its weekday service offering, a common pattern in transit agencies primarily designed around 9-to-5 work schedules and education commutes.

Figure 34 (below) shows the total service level and ridership for each day type in October, 2017. The Saturday service level is about half that of weekdays, while the Sunday service offers around 1/3. Ridership follows the same pattern.

Interestingly, while ridership systemwide does decline on weekends, productivity doesn't. For some routes serving moderate-to-high demand corridors and destinations, like Routes 66 and 67, or Routes 51 and 52, productivity actually increases. When weekend productivities are higher than weekday productivities, this suggests a degree of unmet ridership potential.

While the number of people commuting to work is much lower on weekends than weekdays, many people still do travel to work, and for other reasons. In fact, according to the 2016 American Time Use survey[3], while 46% of the population engaged in travel to work on weekdays, 14% of the population do so on weekends as well. In the case of Eugene / Springfield, there is also a clear link between routes with higher weekend productivity and the presence of major retail.

While the volume of work travel is lower on weekends than weekdays, transit networks designed to maximize ridership often continue to provide a high level of service to places that carry high demand through the weekends, such as dense residential areas, and retail or service-oriented employment areas.

3 American Time Use Survey, Table A-2A. Time spent in detailed primary activities and percent of the civilian population engaging in each activity, averages per day on weekdays and weekends, 2016 annual averages, total. 2016.

	Daily Revenue Hours	Weekend Rev. Hrs. % of Weekday	Average Daily Boardings	Weekend Boardings % of Weekday	Productivity	Productivity % of Weekday
Weekday	862		38,400		44.6	
Saturday	449	52%	19,600	51%	43.6	98%
Sunday	293	34%	12,372	32%	42.23	97%

Figure 34: LTD Weekend Service and Ridership Levels. Systemwide, ridership declines at almost the same rate as service levels.

Weekend Frequencies vs. Productivity

Most of LTD's bus routes stay in service through both weekend days. The exceptions are routes primarily geared to peak-hour commuters or specialized services targeted specifically at UO and LCC (like the 70- and 80-series routes).

LTD's two highest-ridership routes, the EmX and Route 11, continue to provide high-frequency service on both Saturdays and Sundays. In the case of Route 11, service is actually more consistently frequent than on weekdays, because it operates at the same 15-minute frequency as EmX.

Apart from these routes, no other lines run more frequently than every 30 minutes on weekends.

On Sundays, apart from EmX and Route 11, only Routes 12 and 41 operate more often than every hour. While these hourly routes still converge downtown and allow for timed connections, the initial passenger wait to access any service other than the EmX and Route 11 is substantially longer.

While the network as a whole is less useful for the same variety of trips on weekends compared to weekday service, it's clear from the systemwide and route-level productivity numbers that many people are still finding value in the weekend service offering.

For example, Routes 66 and 67 turn down to 30-minute service on Saturdays, but every hour of service operated on Saturdays generates 10 more boardings than on weekdays. This is very strong weekend performance at a lower service level, and suggests that improving weekend service could have a favorable ridership payoff (though perhaps at a somewhat lower level of productivity than today).

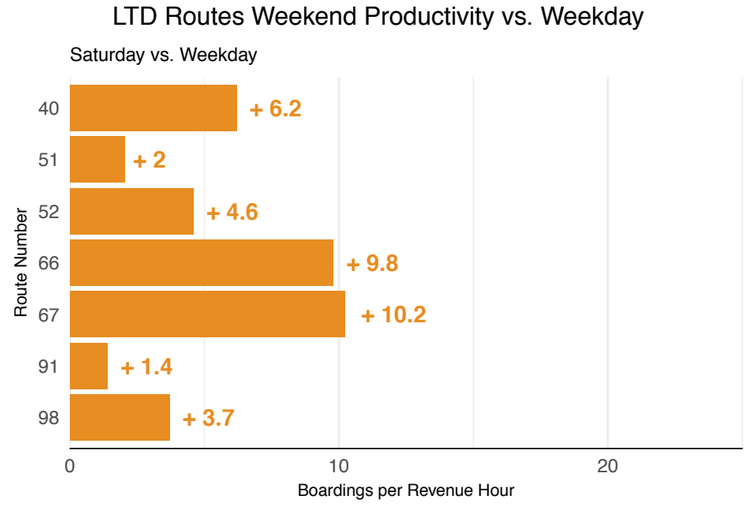


Figure 35: LTD Routes with Higher Productivity on Weekend Days. Several routes have higher productivities on weekends than weekdays, despite much lower service levels (e.g. Routes 13, 40, 41, 51/52, and 66/67). This suggests potentially untapped weekend ridership demand. Almost all of these routes serve significant neighborhood or regional retail.

Weekday Ridership

Weekdays feature the network's highest levels of service and ridership. Figure 36 gives an idea of the number of boardings at each bus stop, compared to the prevailing midday frequency. A few interesting patterns emerge:

- EmX ridership is very strong nearly everywhere, with hundreds of boardings per day at most stations. The main exceptions are the northern and eastern segments of the Gateway Loop, where there is a combination of less dense land uses and lower frequency, with service effectively operates every 20 minutes rather than every 10 minutes.
- Route 11's ridership on Springfield Main Street is exceptionally even from one end of the line to the other, with strong demand at many points between Thurston and Springfield Station.
- Most other routes depend in large part on specific high ridership-generating points, such as the vicinity of Autzen stadium (Routes 13 and 79x), Churchill High School (Route 36), North Eugene High School (Routes 51 and 52), Valley River Center and upper Coburg Road (Routes 66 and 67), or Lane Community College (Route 82)

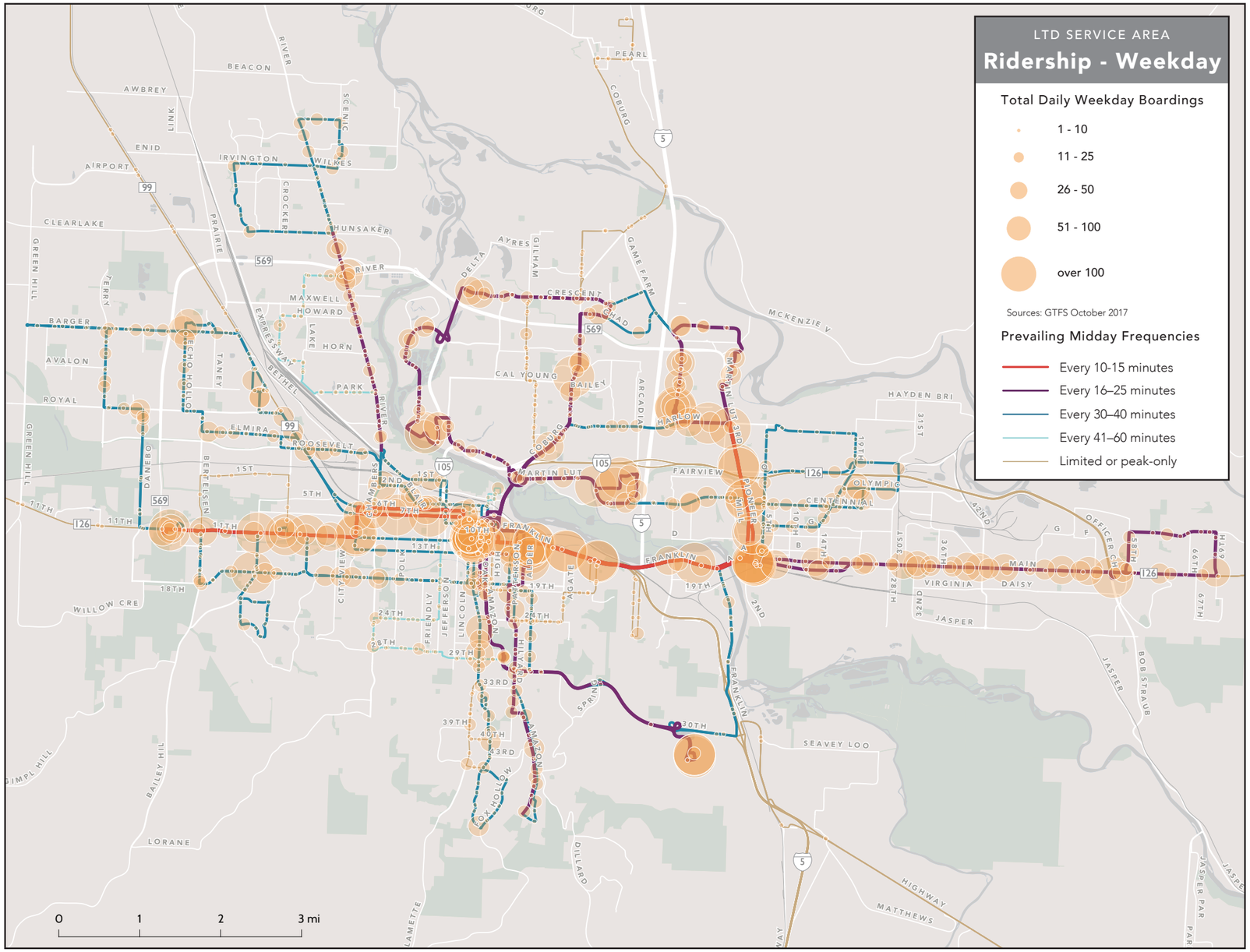


Figure 36: LTD Average Daily Boardings (Weekday) Map

Saturday Ridership

On Saturdays, several routes drop in frequency from every 30 to every 60 minutes (Routes 17, 18, 23, 28 and 52), while certain routes oriented toward UO or LCC do not operate at all (Routes 73, 78, 82 and 85).

Nonetheless, most of the all-day network is still in operation at frequencies close to the weekday service level. In general, it is still possible to travel by transit across much of the network without too much added travel time.

The higher ridership areas observed during weekdays are mostly still represented here, relative to the overall lower ridership level on weekends: these include Downtown Eugene, the University of Oregon, most other locations along the EmX line, Springfield Main St., and many of the important shopping centers like Valley River Center, Gateway, and other smaller commercial centers.

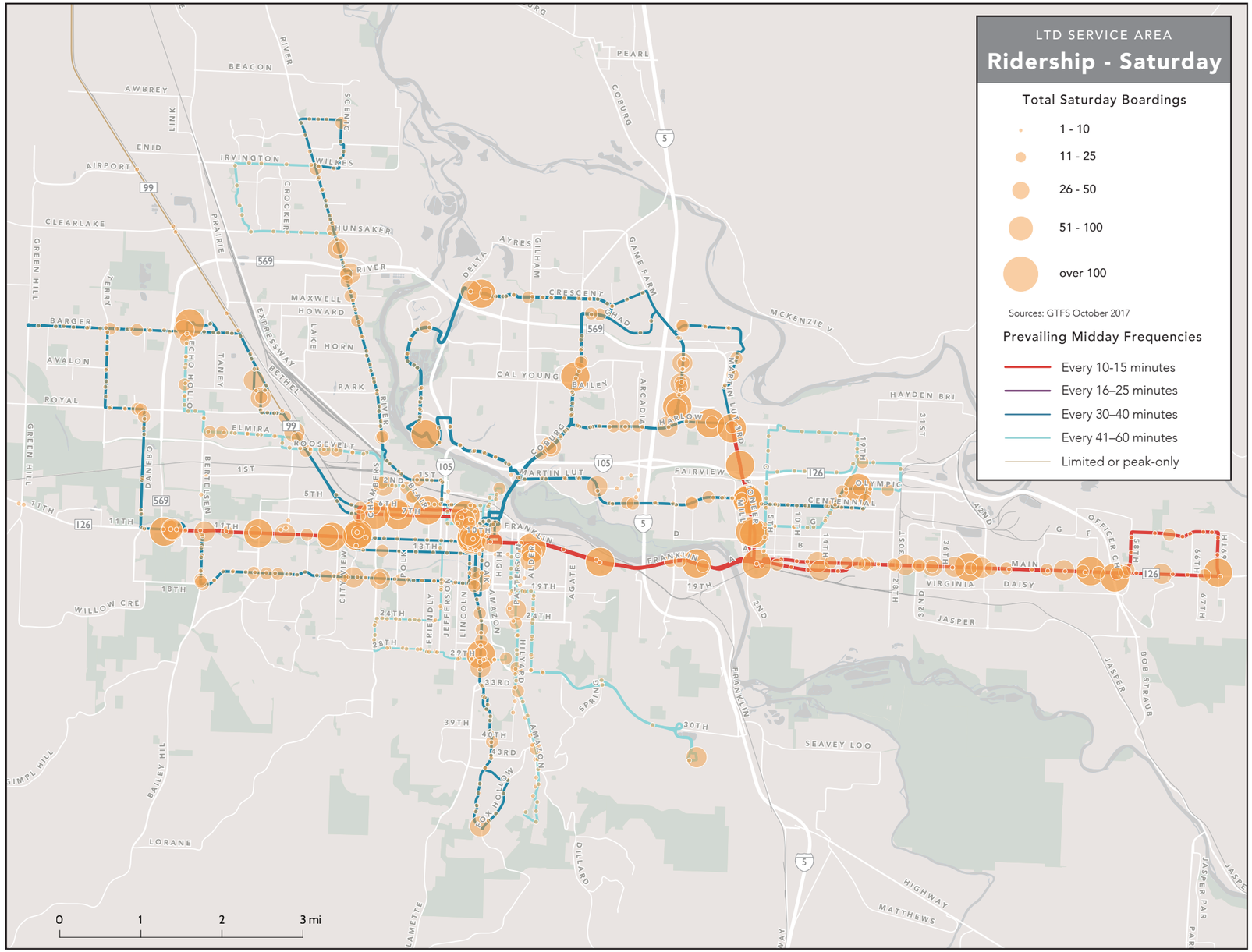


Figure 37: LTD Saturday Ridership and Route Frequencies

Sunday Ridership

The drop-off in service and ridership on Sundays is much more dramatic than for Saturdays. On Sundays, the majority of the network has turned down to 60-minute frequency.

For the parts of the network that retain more frequent service, it is clear that service is still found useful by many people. Most EmX stops continue to see very high numbers of passenger boardings; in some cases higher than on Saturdays, perhaps because other services nearby are less useful.

Consistent moderate-to-high ridership can also be observed along the Main St. corridor on Route 11, which continues to operate frequently, and at the major commercial destinations served only by low-frequency routes.

The decline in ridership compared to weekdays and Saturdays is most notable in low-to-mid density residential areas, such as along routes 13, 17 and 18 in Springfield, Routes 24 and 28 in South Eugene, Route 36 in West Eugene and others.

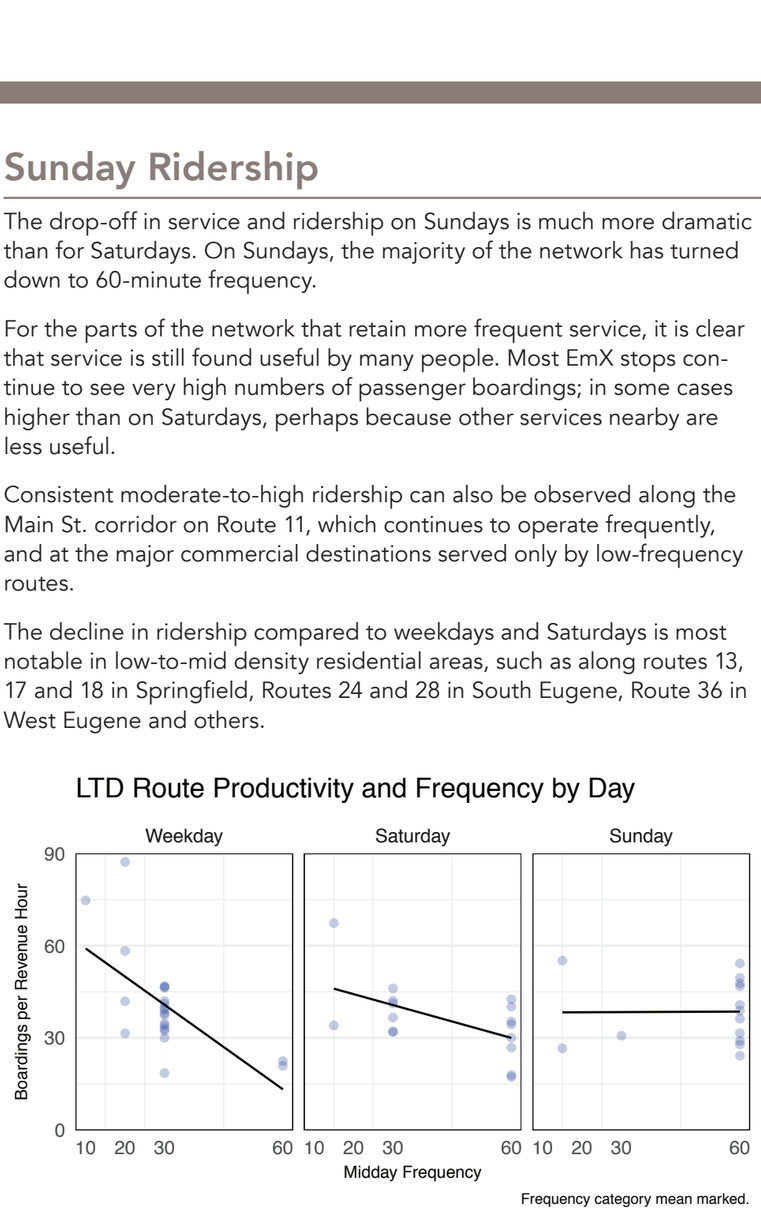


Figure 38: Comparison of the relationship between LTD route frequency and productivity on weekdays, Saturdays and Sundays. On weekdays, routes with higher frequencies clearly attract more boardings per hour. This is still true, but less so, on Saturdays. On Sundays, productivity and frequency are unrelated, with high productivity on many routes operating only every 60 minutes. This suggests those routes have strong drivers of demand even on Sundays; more weekend service would likely attract higher ridership.

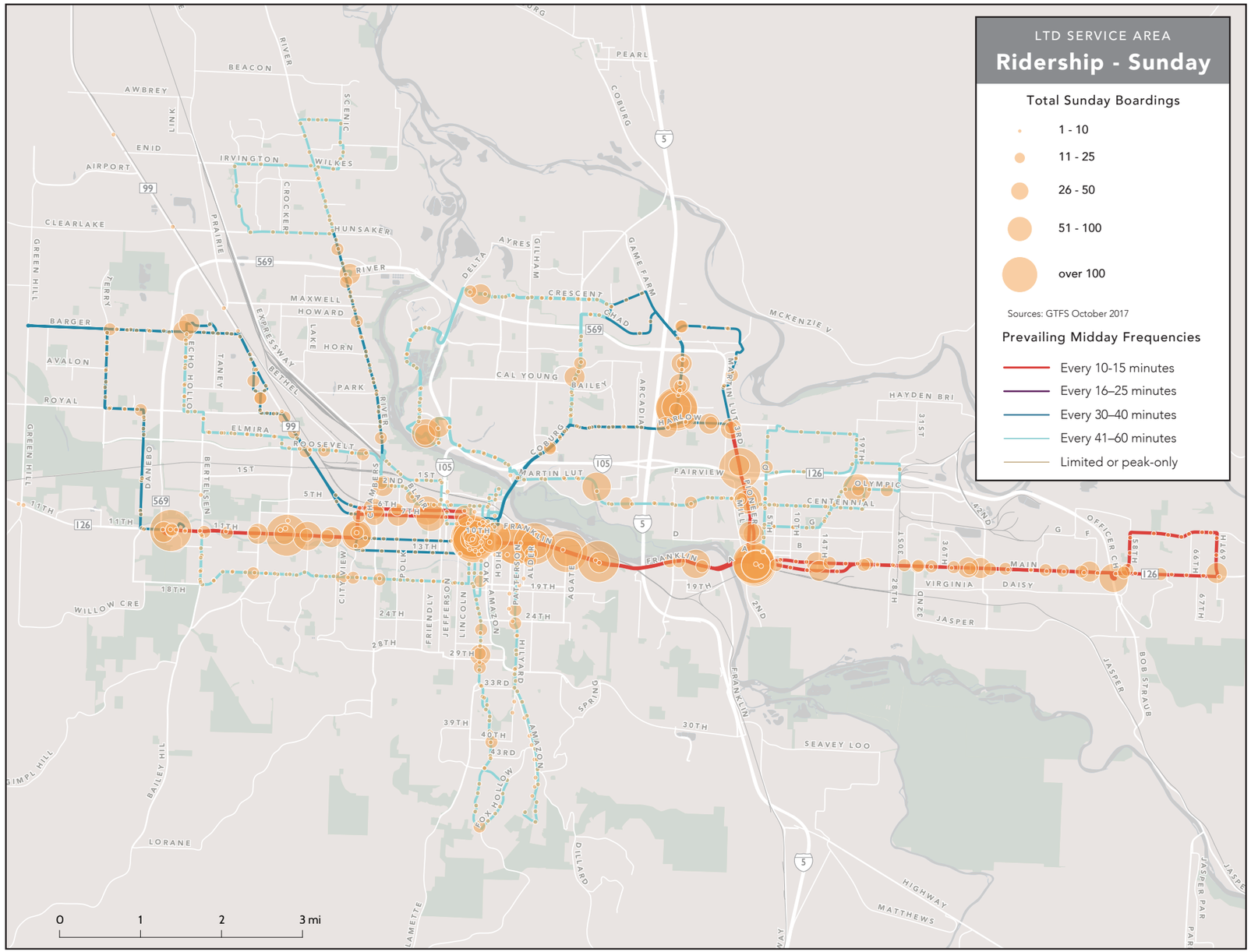


Figure 39: LTD Sunday Ridership and Route Frequencies

The network is based around timed connections between buses, mostly at Eugene Station

The Downtown Pulse

Most of LTD's routes in the metro area connect downtown at Eugene Station, where the arrivals and departures of many routes are coordinated every 30 minutes.

In the middle of the day, over 20 buses arrive at Eugene Station every half hour, sit for a few minutes while passengers make transfers, and then leave again. This is called a "pulse" or "timed transfer", and ensures quick transfers, reducing travel times and improving the usefulness of low-frequency routes which otherwise require long average wait times.

Routes operating hourly meet every other pulse, while routes offering limited trips are generally timed in conjunction with a pulse time, so that people can connect to or from many local routes. By making it possible to avoid a long wait for a second bus, pulses provide a very large expansion in access for people who are able to take advantage of them.

Conversely, because the routes on the pulse are infrequent, access is more limited the further away in time from the pulse a person begins their journey. For example, at downtown Eugene, a person beginning their trip at 11:55 am will be able to almost immediately board a bus and be on their way; a person beginning at 12:05 PM must wait until the next pulse, at 12:30 PM, to begin their journey on most bus routes.

Figure 40 displays the area accessible in 45 minutes by transit and walking from Eugene Station, as measured for every minute between noon and 1 PM on weekdays. The lightest pink area shows the portion of the metropolitan area that is only accessible 10% of the time, while the darkest purple area is accessible in 90% of the time.

The pulse system is a great way to reduce passenger travel times through Downtown and improve the usefulness of a network based around infrequent routes. However, it still involves an element of luck: passengers that reach the pulse point 5 minutes late will take much longer to reach their destination than passengers who are 5 minutes early.

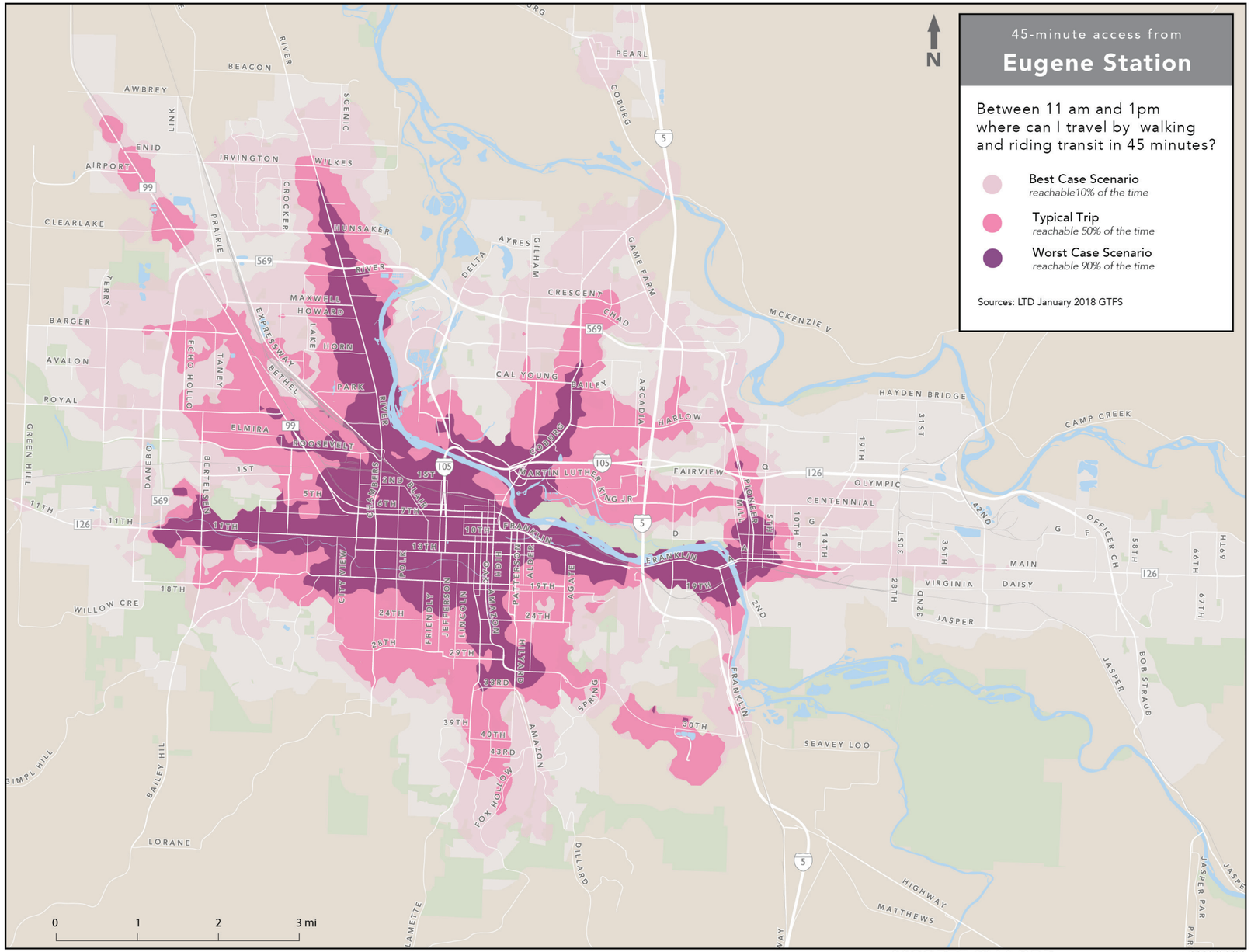


Figure 40: Area accessible from Eugene Station within 45 minutes, by transit and walking. Because almost bus all routes leave Eugene Station at the same time every 30 minutes, the accessible area varies a lot. If a passenger can reach Eugene Station right before the pulse, they can leave immediately to almost anywhere. But if they arrive right afterward, they will have to wait up to 29 minutes before the next bus leaves on most routes.

Timed connections are very useful, but their value depends on whether a trip starts at the right time.

To illustrate both the significant benefits of the pulse and the element of passenger luck involved, the map in Figure 41 shows how far passengers can get in 45 minutes, beginning from Lane Community College's campus.

The area that is accessible 90% of the time is largely confined to the places that can be directly reached directly by Routes 81, 82 and 85, which have stops on campus. However, the area accessible 50% of the time is significantly larger, because many passengers will be able to take advantage of timed connections at Eugene Station and Springfield Station. But many will also still experience long waits.

Consider the experience of a passenger leaving Lane Community around 1 PM. At this time, a bus is leaving LCC every 10 minutes, but the actual usefulness of each bus trip is very different:

- A passenger leaving LCC at 1:07 PM on Route 82 will arrive at Eugene Station at 1:25 PM, and often experience a five minute delay while they transfer to another route. Within 45 minutes from leaving campus, they would be able to access the entire area depicted in light pink, and possibly even slightly farther.
- But a passenger able to catch the bus leaving LCC at 12:58 PM on Route 81 or at 12:59 PM on Route 82 would arrive at Eugene Station between 1:15 and 1:20 PM. They would have to wait ten to fifteen minutes before their next bus leaves, *so they would not reach their ultimate destination any earlier than if they had waited eight or nine more minutes on campus*. Within 45 minutes from leaving campus, they would only be able to access the area in darker pink.
- If the passenger misses the 1:07 PM bus, the next departures are at 1:28 PM and 1:29 PM. They would therefore need to wait up to twenty more minutes, and would arrive at Eugene Station between 1:45 and 1:59 PM. Having missed the pulse, they would have a 23 minute wait until their next bus leaves at 2:00 PM. Within 45 minutes from leaving campus, they could only reach the area in dark purple.

In other words, it's probably very important to most passengers travelling from LCC around 1 PM not to miss the bus leaving at 1:07 PM. This also means that, if someone leaving campus around this time cannot consistently make the 1:07 bus, they will be a lot less likely to find transit service useful, and a lot more likely to drive to campus.

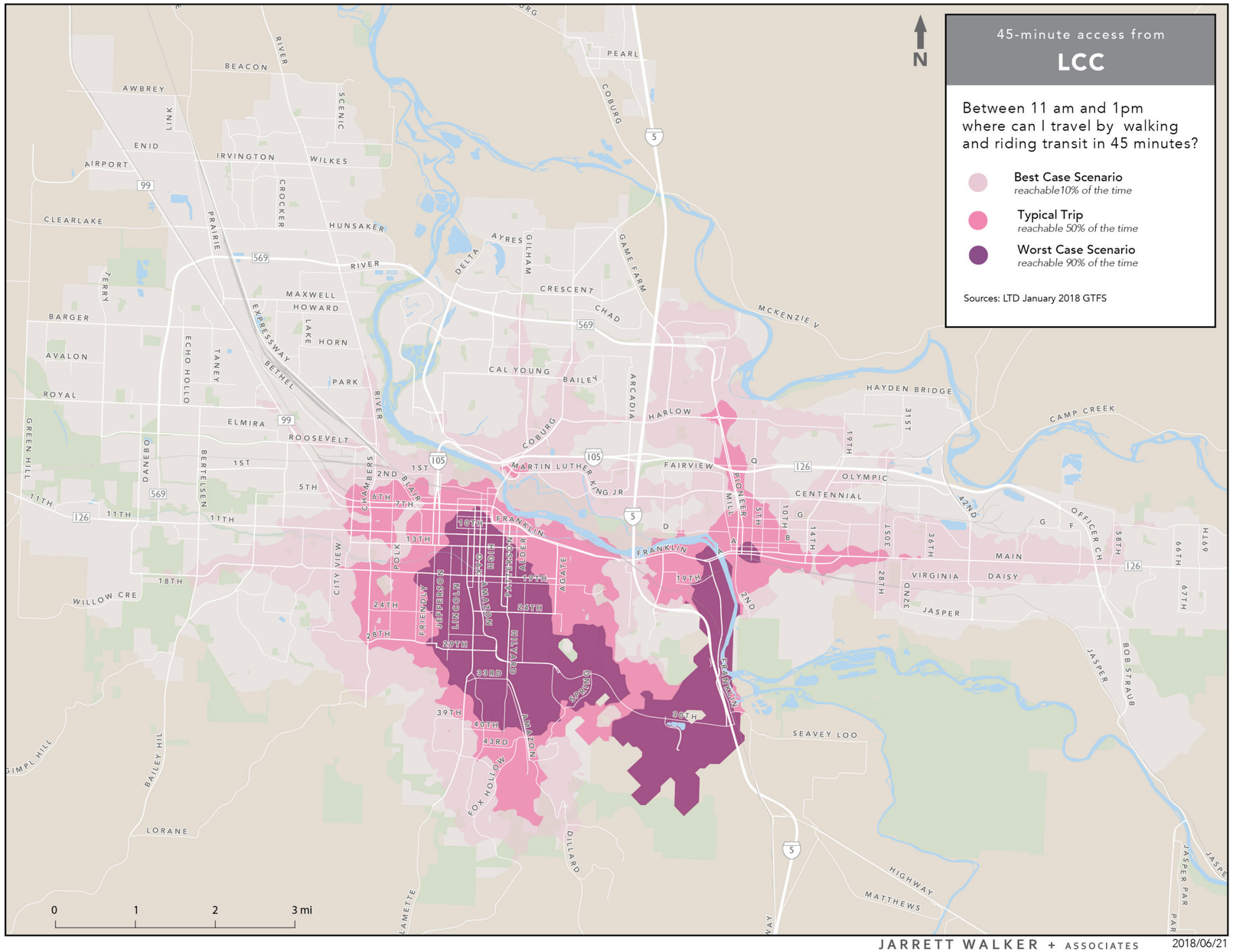


Figure 41: Area accessible within 45 minutes from Lane Community College. Timed connections at Eugene and Springfield Station mean that the value of each bus trip from campus is very different. For example, if a passenger leaves campus at 1:07 PM, they can make timed connections in Downtown Eugene access the entire lightest pink area within 45 minutes. But if they miss that bus, or take the earlier bus, the connection takes longer, and their total trip time will be much longer.

LTD has a long-term policy to expand frequent service.

The Frequent Transit Network (FTN)

Recognizing the access benefits of frequent service, Lane Transit District has established a policy to develop and expand a Frequent Transit Network (FTN). Figure 42 shows the proposed FTN, as it was envisioned in 2014. The corridors envisaged include:

- All areas currently now on EmX (West Eugene, Franklin Boulevard, Gateway).
- Several areas where existing routes operate at frequencies approaching 15 minutes, such as:
  - » River Road from Downtown Eugene to Santa Clara
  - » Amazon Parkway and 30th Avenue to Lane Community College
  - » Main Street from Springfield Station to Thurston
- Other corridors with relatively high existing ridership and/or productivity:
  - » Highway 99 from Downtown Eugene to Barger Road
  - » Coburg Road and Harlow Road to Gateway
  - » Martin Luther King Boulevard and Centennial Boulevard to North Springfield

At full development, areas on the FTN are supposed to receive a higher level of service, including:

- Service 7 days a week, and at least 16 hours per day
- Frequencies averaging 15 minutes or better
- High quality transit stations developed with an eye to facilitating connection to nearby pedestrian and bicycle facilities

Because this level of service is relatively expensive to provide, development of the Frequent Transit Network has proceeded in fits and starts. The primary addition to the frequent network since 2014 has been the West 11th Avenue segment of EmX, which came into service in Fall 2017.

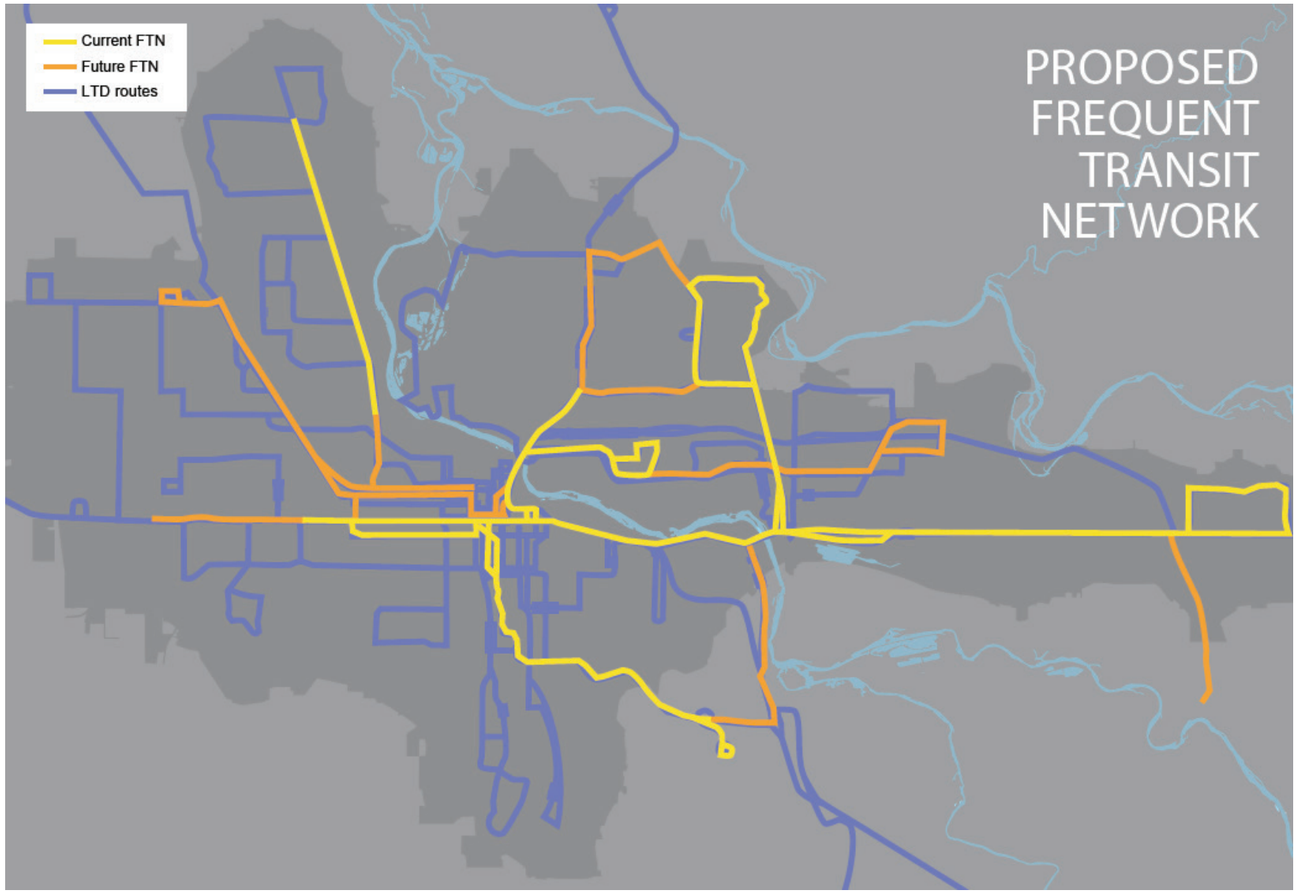


Figure 42: Map of the Frequent Transit Network (FTN), as envisioned in LTD's 2014 Long-Range Transit Plan. In current service, only the EmX line fully meets the FTN service standard. Service levels on Route 11 on Springfield Main Street, Routes 51/52 on River Road, and Route 82 to Lane Community College have service levels that approach an average frequency of 15 minutes per day, with service 16 hours per day, seven days per week. Route 79x on Martin Luther King Boulevard to the Autzen vicinity also provides relatively frequent service on weekdays, but that frequency is very targeted and concentrated to match UO class times.

The frequent service policy is related to land use and investments in infrastructure.

The Eugene-Springfield region has worked for over two decades to combine its land use and transportation planning processes to encourage growth in areas that are well served by a broad range of transportation options including transit, bikes, and walking.

EmX and Bus Rapid Transit

The first major step in this direction was the development of the EmX Bus Rapid Transit system in 2007, followed by its extensions in 2011 and 2017. Both the original Franklin corridor, and the subsequent Gateway and West Eugene extensions specifically focused on the areas with the highest employment density in the region. Furthermore, each phase of EmX work was accompanied by significant investments in pedestrian infrastructure.

MovingAhead - Enhanced Corridors in Eugene

The next phase of coordinated land use, transportation and infrastructure improvements is taking shape through the Moving Ahead project in Eugene, and the Main/McVay Transit Study in Springfield.

MovingAhead is about planning future transportation investments on Eugene's major streets. The project launched with community conversations in 2015 looking at transportation investments for people walking, biking, using mobility devices, and riding the bus. The focus has since been narrowed to five key corridors: Highway 99, River Road, 30th Avenue to Lane Community College, Coburg Road, and Martin Luther King, Jr. Boulevard.

Technical work is underway to determine which of these corridors will be most ready for investments in walking, cycling and transit infrastructure in the next 10 years, with decisions on priorities and funding packages expected in late 2018.

Main/McVay Transit Study

LTD and the City of Springfield have been examining a range of transit improvements on Main Street and in the McVay Highway corridor since 2013. This effort is now being added to through the Main Street Safety Project, which is considering how to coordinate traffic safety improvements such as roundabouts and medians with the possibility for the future expansion of transit facilities in the corridor.

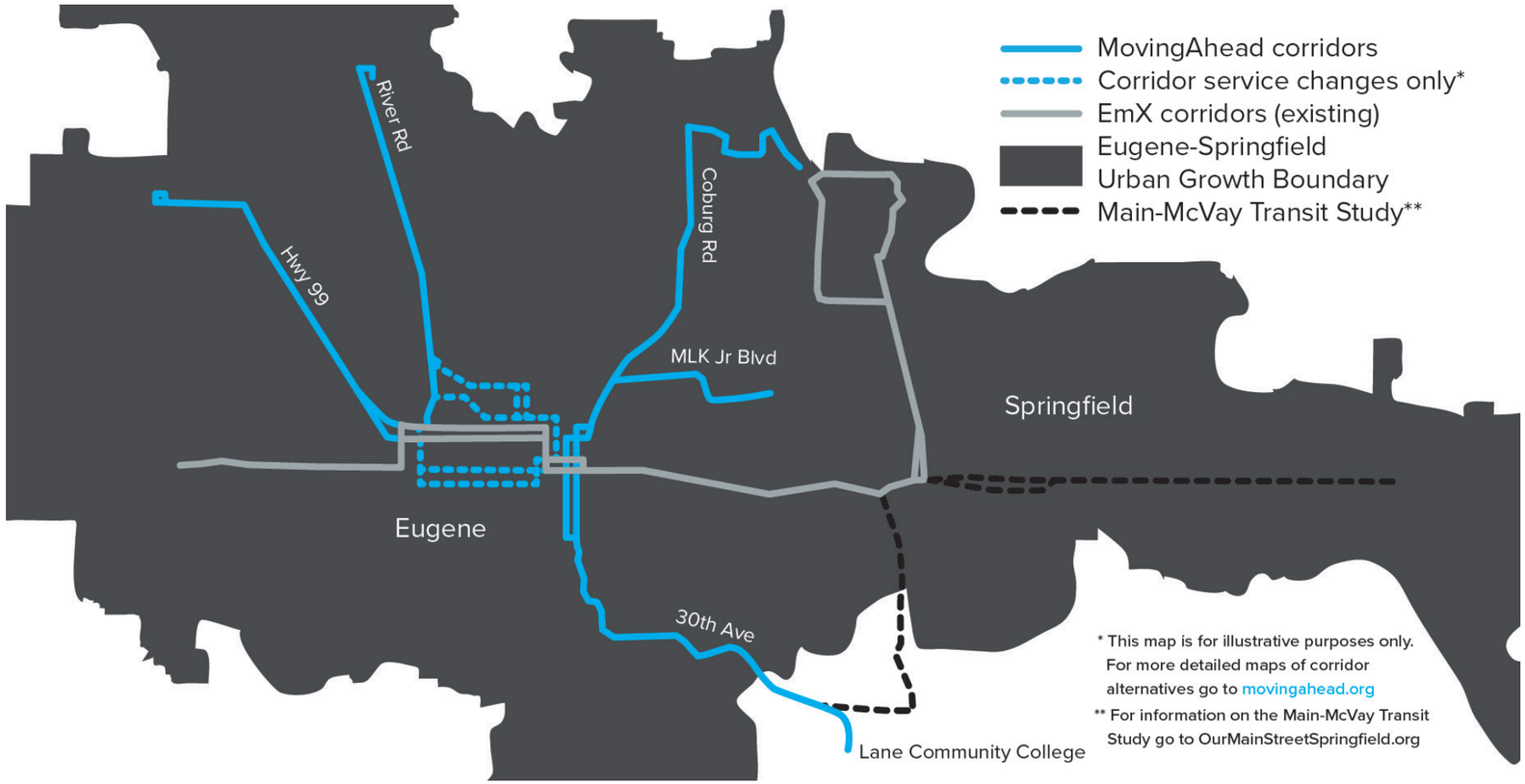


Figure 43: Map of the EmX, Moving Ahead and Main/McVay Transit Study projects. EmX was deliberately built to connect the largest concentrations of jobs in the Eugene/Springfield region, and included pedestrian, bicycle and transit improvements. Moving Ahead and Main/McVay are considering the suitability of similar infrastructure improvements in some of the most likely corridors for future frequent service.

Frequent service doesn't require timed connections.

By establishing timed connections, the pulse system described on pages 43 and 44 significantly increases the access provided by infrequent transit routes. In existing service, most LTD bus routes operate every 30 minutes, and many more people live near these infrequent routes than live near the EmX. This makes timed connections essential.

However, **timed connections are less important between frequent services. If two bus lines operate every 15 minutes, the average wait in a random transfer is 7.5 minutes, which is not much more than the 5-minute time window required in a pulse.** If two frequent lines operate every 10 minutes, then the average transfer wait becomes 5 minutes. This is comparable to the pulse time window, but with a much smaller initial wait for the first bus.

In fact, timed connections actually make it much more difficult to schedule and reliably operate frequent service:

- **Frequent services rely on consistent headways.** Frequent service means a bus should be coming soon, so that you don't need a schedule to use the service. As a result, making sure the next bus is coming no more than 10 or 15 minutes behind the last one is more important than the exact time the bus arrives.
- **Timed connections require meeting a 5-minute window every 30 minutes**. On an infrequent route, it's usually possible to build enough time in the schedule so that the driver can reliably make the bus arrive on time at the pulse point, every time.
- **To date, LTD has chosen to schedule for timed connections and to sacrifice consistent wait times between frequent buses. This means most "frequent" service isn't actually frequent.** Figures 43 shows headways for Routes 11 and 82, which operate four to five buses per hour, and have been scheduled to meet timed connections. As a result, the headway varies significantly throughout the hour, and customers can't consistently rely on a headway of less than 20 minutes.
  - » On EmX, LTD schedules both a consistent 10-minute headway and timed connections at Eugene and Springfield Stations. In practice, this means that both the headway and the timed connections are not as reliable as they would be if a clear choice were made in the schedule.

Route 11 Westbound Arrivals to Springfield Station

Departure Time	Headway
10:01 AM	20 minutes
10:21 AM	20 minutes
10:41 AM	20 minutes
10:53 AM	12 minutes
11:04 AM	11 minutes
11:23 AM	19 minutes
11:41 AM	18 minutes
11:52 AM	11 minutes
12:11 PM	19 minutes
12:24 PM	13 minutes
12:43 PM	19 minutes
12:58 PM	15 minutes
1:13 PM	15 minutes
1:24 PM	11 minutes
1:39 PM	15 minutes
1:54 PM	15 minutes

Route 82 Southbound Departures from Eugene Station

Departure Time	Headway	Not available during LCC Break
10:00 AM	20 minutes	
10:10 AM	10 minutes	x
10:30 AM	20 minutes	
10:40 AM	10 minutes	x
11:00 AM	20 minutes	
11:10 AM	10 minutes	x
11:30 AM	20 minutes	
11:40 AM	10 minutes	x
11:50 AM	10 minutes	x
12:10 PM	20 minutes	
12:20 PM	10 minutes	x
12:30 PM	10 minutes	x
12:40 PM	10 minutes	
1:10 PM	30 minutes	
1:20 PM	10 minutes	x
1:40 PM	20 minutes	

Figure 44: Weekday midday headways for Route 11 coming into Springfield Station and Route 82 departing Eugene Station to LCC. Despite operating 4 to 5 trips per hour, the effective frequency of the service is closer to 20 minutes. This is because every trip Route 11 is trying to ensure a timed connection the EmX inbound to Eugene, and Route 82 is trying to keep departures as close as possible to the :00 and :30 of each hour with the pulse at Eugene station.

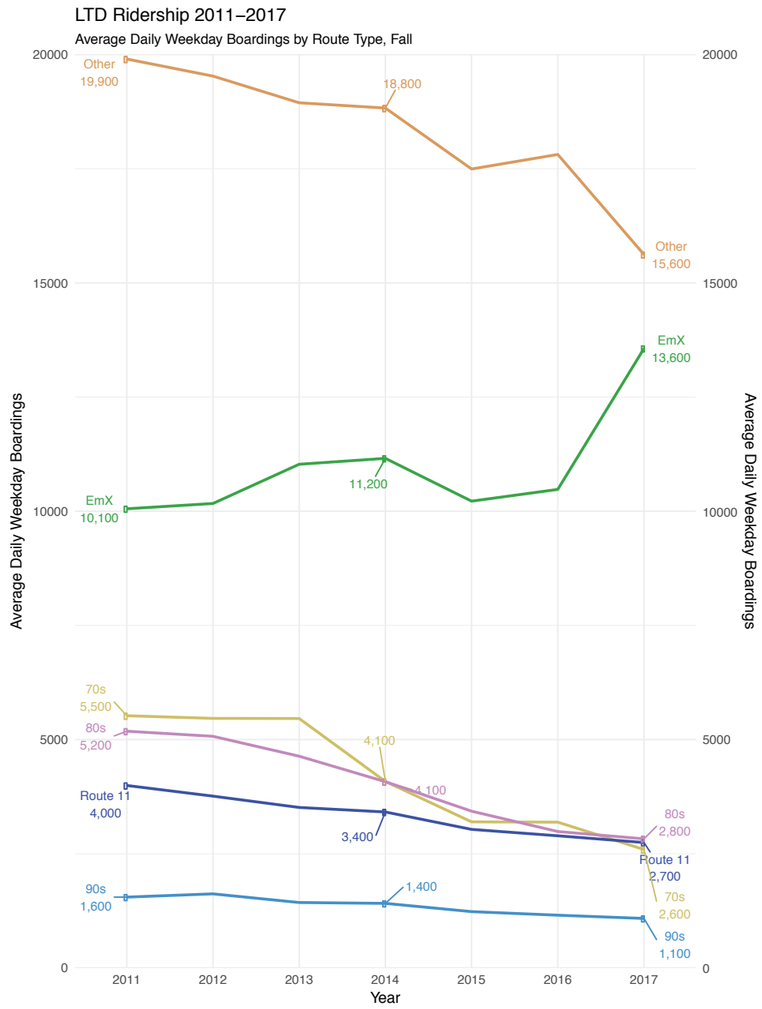
- **Expanding frequent service in LTD's transit network would require letting go of timed connections between infrequent and frequent routes. This would make transit much more useful for those who live near frequent routes, but less useful for everyone else.** Once a frequent network is fully functional, routes that operate every 30 minutes or less will no longer be as useful, and they will likely become less productive. The role of these less frequent routes will effectively shift almost entirely away from generating ridership and toward ensuring basic coverage.

LTD ridership has declined since 2011. Some routes are more affected than others.

Ridership Trends

LTD's fixed-route ridership peaked in 2009, in the early stages of the Great Recession, at 11.7 million rides per year. However, the most recent relevant year for historic ridership comparisons is 2011, which included both a major service expansion in part of the network (opening of the Gateway EmX), and a huge overall service cut of 11%.

- In 2011, the LTD network experienced 11.2 million annual boardings, corresponding to over 46,000 average weekday boardings.
- Overall service levels remained steady from 2011 to 2014, while total ridership experienced very minor fluctuations from year to year. However, it appears that:
  - » Ridership on the EmX went up over 10%, and EmX productivity increased to over 100 boardings per revenue hour.
  - » Ridership and productivity on all other routes decreased by the same amount.
- **Since 2014, the same general trend has continued: increased ridership on EmX, and decreased ridership on other routes, especially specialized routes with narrow markets.**
  - » EmX ridership declined slightly from 2014 to 2016 due to ridership losses on the Gateway segment, but increased nearly 30% in 2017 after the opening of the West Eugene extension. However, productivity on EmX has declined to 75 boardings per hour, as ridership declined by 13% on the original Franklin segment in 2017.
  - » **Ridership on the specialized 70- and 80-series routes to UO and LCC has declined by about 50% since 2011, with a 55% drop in productivity. This accounts for over half the total ridership loss on the network in this period.** The decline in 80-series ridership appears to be in line with declining enrollment at LCC as the economy has improved. The decline in 70-series ridership is less clear, as enrollment has been stable. Possible reasons may include: students living closer to campus, and passengers shifting from specialized service to EmX.
  - » **Ridership on Route 11, the network's second most used route, has declined by 25% since 2011 (over 30% on weekdays), and productivity has declined from 63 to 42 boardings per hour.** The causes for this decline are unclear, as service levels have remained steady over this period. This may suggest significant shifts in travel patterns, or possibly even demographic shifts in East Springfield and/or Thurston.



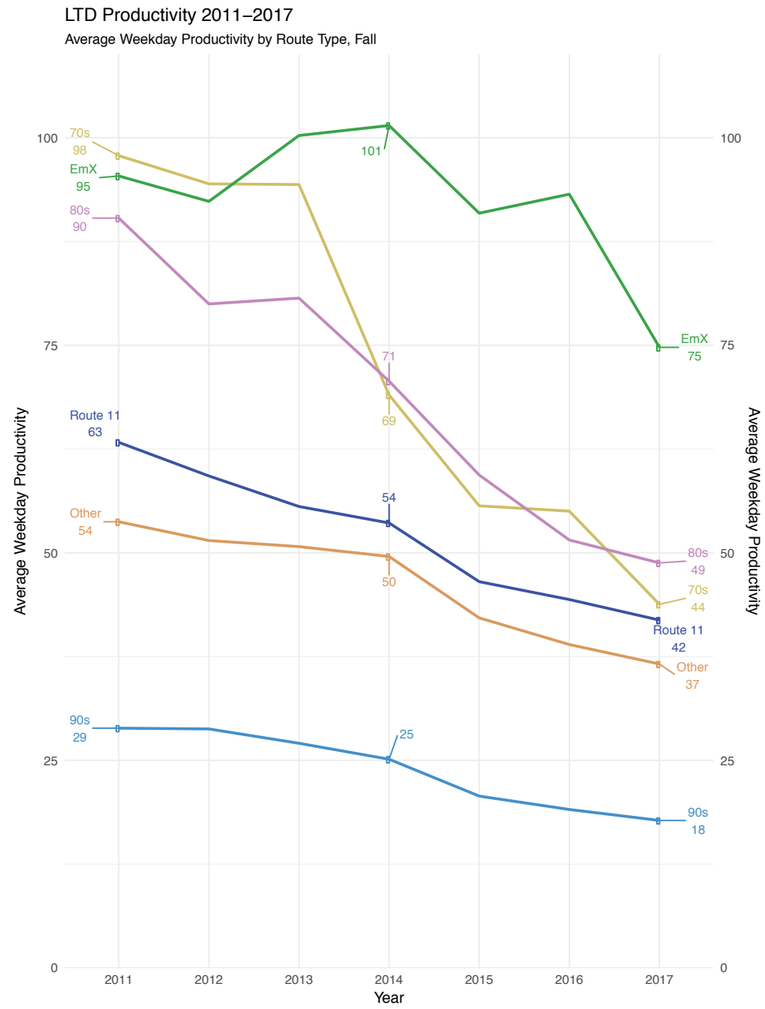


Figure 45: Ridership and productivity by route class, 2011 to 2017. System ridership declined 10% over this period, despite a 14% service increase since 2014. Annual boardings stabilized at 10.1 million in 2016 and 2017. Certain route classes (e.g. the 70- and 80- series serving UO and LCC) have seen much steeper declines than others. EmX ridership has grown substantially since the opening of the West Eugene extension, compensating for losses on other routes.

- » **Ridership on the rural 90-series routes also declined by 20% overall, and by 30% on weekdays, from 2011 to 2017.** It is hard to draw general conclusions for this series, because each route serves a very small and very different market. Generally speaking, declines are especially notable on Route 92 to Lowell, Route 93 to Veneta and Route 98 to Cottage Grove.

The amount of bus service LTD provides is vulnerable to increases in costs and swings in the economy.

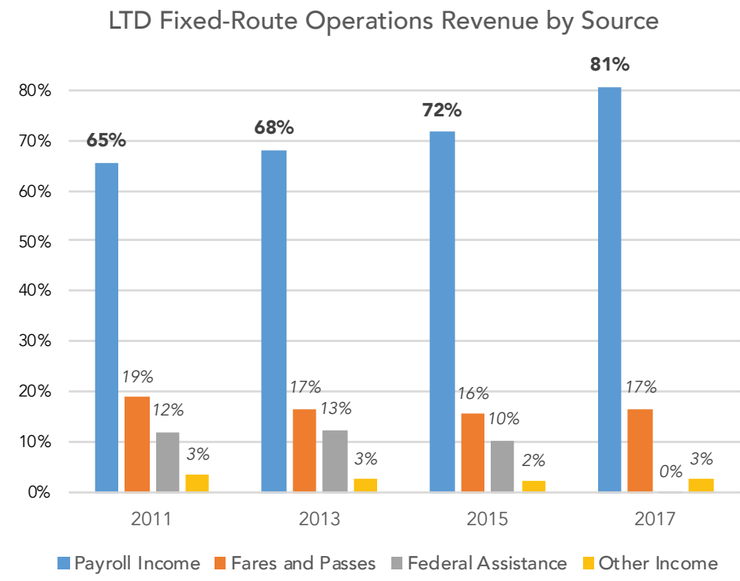
Revenue Trends

LTD's fixed-route operations revenues have increased by almost 50% in the last decade, going from $32.4 million in 2007, to a projected $48.0 million in 2018.

The vast majority of LTD's increased revenue since 2007 stems from payroll taxes, which have increased by over $13 million since 2011. This increase is partly due to rate increases, and is also related to the economic upswing since the end of the Great Recession. The share of fare and pass revenue has declined slightly in the same period, while federal operating assistance has also declined. As a result, the share of payroll-related sources in LTD's operating income has increased from 65% to 81% of the total, as shown in Figure 46 (across).

In other words, as the economy has improved, LTD revenues from payroll taxes have increased significantly, and these now constitute the overwhelming majority of its revenues. If the economy were to falter, LTD revenues would be significantly and immediately impacted. This would likely result in service cuts.

Figure 46: LTD Operations Revenue by Source, 2011 to 2017. The share of LTD revenues drawn from payroll sources has increased steadily. Because these taxes depend directly on employment, revenue would be severely impacted in a recession.



Cost Trends

LTD's total fixed-route operating costs were approximately $43.4 million in 2017. The largest single item in this cost was driver labor and benefits, which accounted for $25.4 million.

Because labor-related costs are such a large share of costs, and because the vast majority of driver labor is behind the wheel, it's useful to think of how these costs relate to the number of total hours that vehicles are on the road. LTD operated over 292,000 vehicle hours in 2017, so the average cost per vehicle hour was $149[4].

Since 2007, LTD's operating cost per vehicle hour has increased at an average rate of 4.7%, compared to an average US inflation rate of 1.5%. Driver costs, administrative costs, and maintenance costs have all increased at an average 4 to 5%. **This means that, while LTD's revenues have increased, costs are increasing even faster. If costs cannot eventually be contained, LTD will need to find ways to raise even more revenue, or make service cuts, or both.**

The actual source of these increases are many and complicated, but the following factors appear to be significant contributors:

- Rapidly increasing costs of employee benefits, like healthcare and retirement. This is likely the largest single factor, with medical insurance costs rising by 15% annually in some years.
- Driver wages are increasing faster than the rate of inflation.
- Higher percentage of service on EmX, which carries higher fuel, maintenance, facilities, and driver training costs than other routes.
- Aging and varied vehicle fleet, causing increased maintenance costs. As operating costs have increased, and capital funds have been concentrated in developing EmX, LTD has at times postponed purchasing new vehicles.
- Increasing technology support costs, including support for hardware, software, and communications systems.

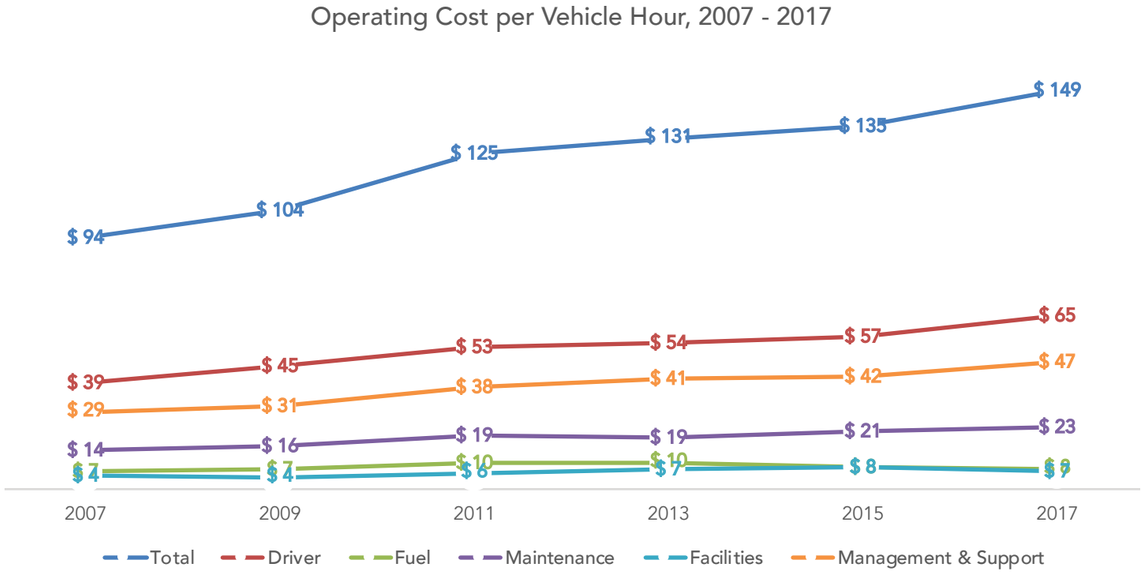


Figure 47: LTD Operating Cost per Vehicle Hour. The cost of delivering service has increased steadily since the mid-2000s, with particularly high increases in EmX expansion years. Cost increases in most categories have consistently exceeded inflation. The amount of cost increases varies by year; particularly large increases occurred in 2008 (7.4%), 2011 (17%), and 2016 (14.5%).

4 Vehicle hours include any time when a vehicle is out of the garage, including time in service, time between runs, and time out of service. This is different from revenue hours, which are usually limited to time in service, driver breaks, and schedule recovery time.

5 Demand-Responsive Services

The RideSource brokerage serves a range of ADA paratransit, medical and human service trips.

Lane Transit District, through the RideSource brokerage, administers a range of services that enable eligible residents with special needs to access transportation for all purposes.

The RideSource brokerage is administered by LTD's Customer and Specialized Services Department, and operated on a day-to-day basis by MTM, an independent contractor.

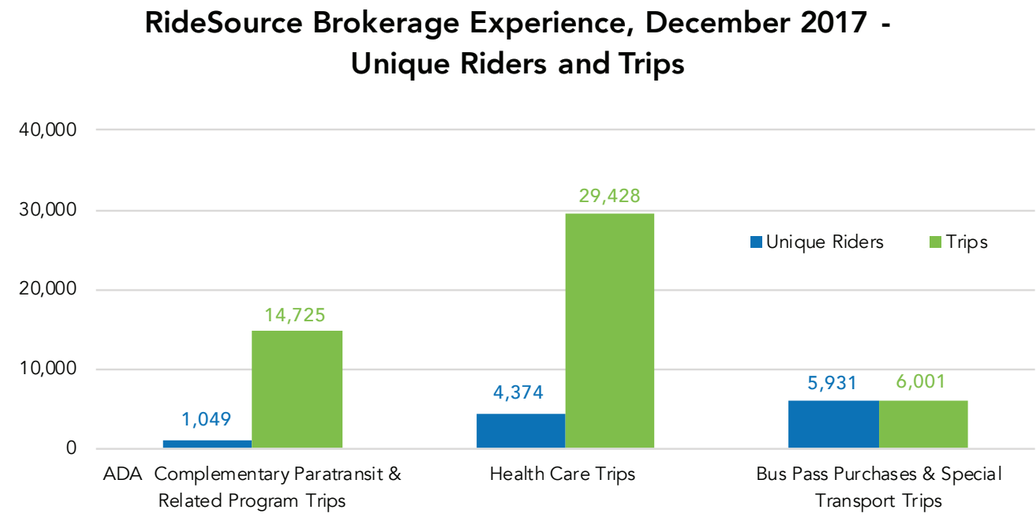
RideSource provides almost a half million trips per year. Approximately one-third of these trips are covered by Americans with Disabilities Act (ADA) complementary paratransit and related programs. ADA requires that qualifying disabled passengers may access paratransit within for any trips starting and finishing within 3/4-mile of an LTD bus route, regardless of trip purpose. For these trips, LTD offers door-to-door transportation from the passenger's point of origin all the way to their destination.

Operating ADA paratransit ensures that LTD is in full compliance with federal regulations, and with the law's intent that "persons with disabilities into the economic and social mainstream of American life… including through provision of paratransit for those who cannot use mainline accessible transportation." RideSource also supports its disabled customers in connecting with other transportation, including LTD fixed route services.

However, while RideSource provides ADA trips, it is also a brokerage for a wide variety of transportation needs, and especially non-emergency medical trips covered by Medicaid-related programs.

In December 2017:

- RideSource provided almost 15,000 ADA complementary paratransit trips to just over 1,000 persons (see Figure 48).
- In addition, RideSource brokered almost 30,000 additional trips for 4,400 unique individuals for health care and medically-related purposes.
- For another almost 6,000 persons, RideSource provided bus passes for trips on LTD's fixed routes or trips on a handful of other specialized transportation programs.



Note: A bus pass purchase is counted here as one trip, although a daily or monthly pass could serve more trips.

Figure 48: RideSource Trips in December 2017. On a typical weekday, RideSource provides almost 2,000 trips per day. Approximately one-third of these trips are provided by right to customers eligible through the Americans with Disabilities Act (ADA). Two-thirds of trips are paid for by a variety of medical and human service programs, primarily Medicaid through the Oregon Health Plan.

LTD provides fewer ADA paratransit trips, and more medical trips than similar agencies.

The RideSource program seeks to assist residents in accessing the most appropriate and cost-effective transit option for specific trips. This is aided by LTD's Travel Host and Travel Training programs to support those using fixed route for the first time or for some trips. As a result, many residents have a better understanding of their transportation options, and individuals otherwise eligible for ADA paratransit make more trips on general public transit.

Furthermore, because RideSource contracts with the local Oregon Health Plan Coordinated Care Organization, LTD receives reimbursements for from Medicaid for many non-emergency medical trips.

This array of transportation options and the RideSource capability to steer the rider to the most appropriate service has a measurable impact. Compared to public transit operators in similar areas, LTD provides relatively fewer trips as dedicated ADA complementary paratransit service, but still provides a high level of special-needs transportation overall.

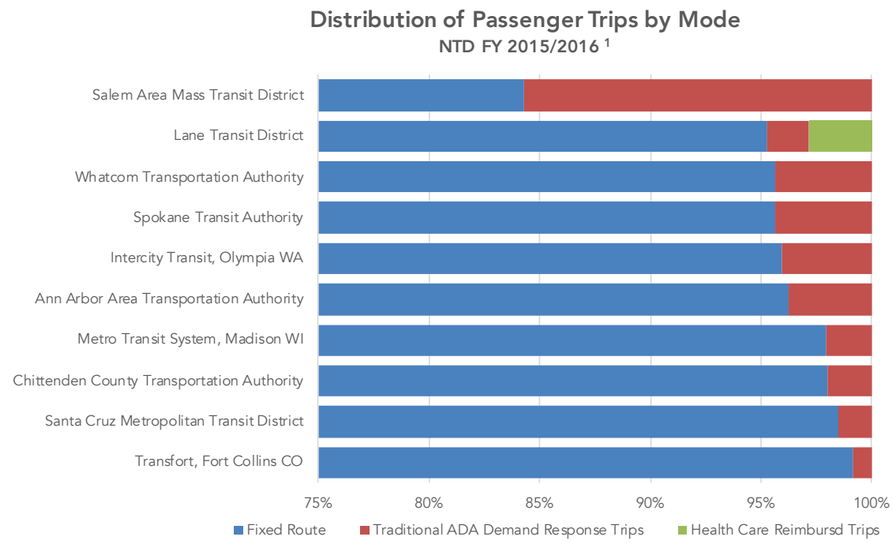
Figure 49 shows that traditional ADA trips are a much smaller proportion of total trips than for other transit providers. Among the selected group of peers, the Salem Area Mass Transit District reports the greatest proportion of ADA trips, at 15.7% of all transit ridership; Fort Collins' Transfort has the smallest proportion at 0.8%.

At 5% of total ridership, LTD's total share of demand-responsive trips is relatively high. However, when distinguishing ADA trips from trips subsidized by Medicaid and other programs, LTD has a much smaller proportion of traditional ADA trips, just 1.7% of its total ridership.

Figure 50 presents how many demand response trips LTD provides per capita in relation to its peers. Because LTD provides so many non-ADA medical and specialized trips, LTD is able to provides a relatively high overall level of demand-responsive service, at 1.8 trips per capita per year, second only to the Salem Area Mass Transit District. The next highest peer provides only 1.1 trips per capita per year.

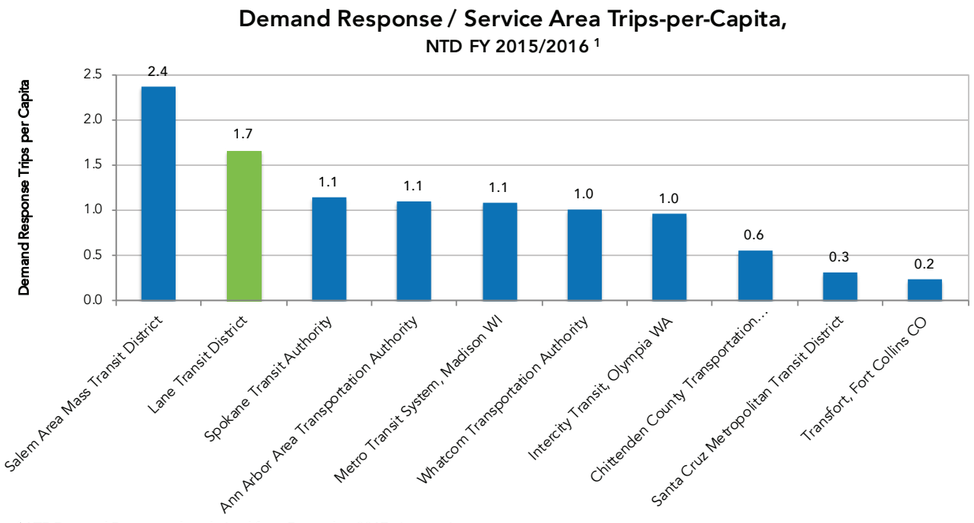
The experience of LTD's RideSource program contrasts very favorably with its peer organizations. RideSource has developed the ability to provide specialized trips funded by outside sources. As a result, LTD provides relatively few ADA paratransit rides, yet still actually supports significantly more mobility for those with specialized transportation requirements than most peer agencies.

Figure 49: Paratransit as a Percentage of Total Transit Ridership, comparison between LTD and nine peer agencies. LTD provides relatively few ADA paratransit rides (1.7%), partly because many non-emergency medical trips that might otherwise be provided as ADA paratransit are instead reimbursed by outside sources.



[1]Note: LTD Trips Demand Response trip data derived from December 2017 trip-experience; all other data from NTD FY 2015/2016

Figure 50: Demand-Response trips per Capita, comparison between LTD and nine peer agencies. LTD's Ride*Source* program is able to provide more trips than many of its peers, providing improved mobility for customers with specialized needs.



[1] LTD Demand Response data derived from December 2017 trip experience.

Most trips facilitated by LTD RideSource are paid for by Medicaid and human service funds.

Rider Assessment Program

RideSource operates as a travel brokerage, connecting customers with specialized needs to appropriate transportation options, funded by multiple sources.

A key element in facilitating this brokerage is a residence-based assessment program that looks beyond ADA eligibility criteria. This allows LTD to grant conditional ADA paratransit eligibility to potential customers, while working with individuals to facilitate their travel needs through health care and other specialized programs. The program can also provide referrals to other County programs as needed. In recent experience, between 175 and 225 assessments are carried out each month.

The rider assessment program is carried out through three contract partners: Lane County Senior and Disability Services, Alternative Work Concepts and the White Bird Clinic. These contractors conduct individual assessments of transportation needs and capabilities in the person's residential environment, wherever possible.

This approach differs from that of many other transit providers. Most agencies assess eligibility for ADA paratransit through interviews and assessments at purpose-built ADA eligibility facilities.

The LTD assessment approach ensures that individuals are provided with the most appropriate form of transportation for their capabilities and travel needs, while also ensuring that funding programs are being used for their designated purposes.

Coordinated Funding, Single Service

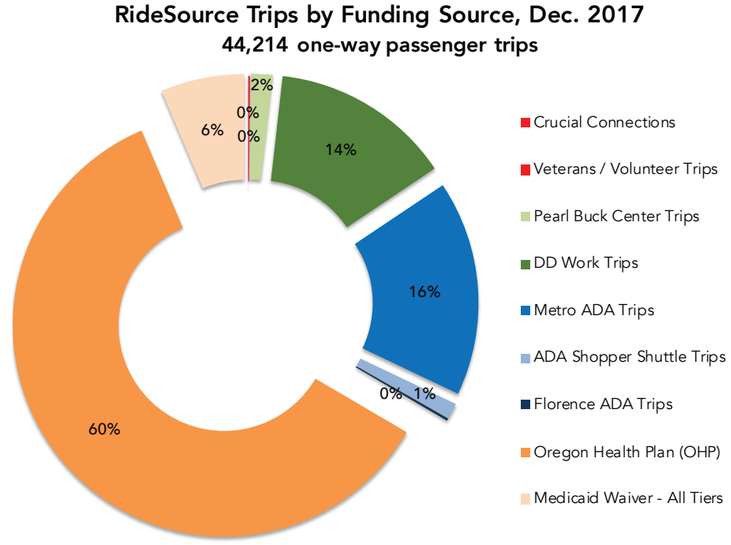
RideSource brokerage trips are paid for by multiple non-transit funding sources, including Medicaid, Oregon Health Plan and other smaller funds. **An examination of funding sources reveals that two-thirds of the trips provided through RideSource leveraged Medicaid and other non-traditional funding sources**, based on December 2017 data.

These federal, state and local non-transit funds are reported annually as components of LTD's budget: for FY 2017-2018 Medicaid funding totaled $10.1 million and the Accessible Services funding totaled $7.4 million.

Figure 51 shows that almost 30,000 December 2017 trips were subsidized by non-transit funding. Of all December trips, 60% were funded by the Oregon Health Plan trips, and 6% were funded via the Medicaid Waiver program. Note that this does not include bus pass trips which may also be purchased with these fund sources.

In part, this is possible because of the special character of Medicaid funding in Oregon, coupled with the Customer and Specialized Services Department's long-standing relationships with local health care providers.

A further 33% of trips, or 14,700 December 2017 trips, are provided in ADA paratransit (Metro ADA) and closely related programs, including Developmental Disability (DD) Work Trips, ADA Shopper and Pearl Buck. Other programs, such as Crucial Connections and Veterans programs, provide smaller numbers of regional, long-distance trips.



Note: Does not include bus pass trips purchased.

Figure 51: LTD RideSource Demand-Responsive Trips by Funding Source, December 2017. Nearly two-thirds of trips provided by RideSource are funded by Medicaid programs.

Providing reimbursed health care trips saves LTD money and protects the fixed-route network.

Trillium Community Health Plan has been the Coordinated Care Organization (CCO) in the Eugene/Springfield area. As the CCO, Trillium administers the Oregon Health Plan (OHP) locally, and coordinates a network of medical providers.

Following the recent purchase of Trillium by Centene, LTD has been advised that new and significantly more complex data and reporting requirements will be forthcoming for all services paid for with Oregon Health Plan funds. **Given that OHP funds approximately 60% of trips taken on RideSource currently, new and more complex data requirements are an important challenge to address.**

If these data requirements were considered too complex for LTD and RideSource to take on, RideSource might have to stop providing some, or possibly all trips currently funded by the Oregon Health Plan. This would have the following effect:

- Some riders, particularly riders who use RideSource only for their OHP-funded healtcare trips, would shift to a new dispatching system, presumably coordinated by Trillium.
- Some riders, particularly riders who qualify for ADA paratransit service, would probably not want to navigate multiple transportation providers if they can continue to use RideSource for most needs. These riders would likely continue to reach out to RideSource for their medical transportation needs, but the cost of their trips would be paid for out of the ADA paratransit program, which is funded by LTD's general fund.

As shown in Figure 52, if LTD had to provide even a relatively small proportion of existing healthcare trips (25%) using ADA paratransit funds, this would cost several million dollars per year[1]. Funding these trips could easily require a 5 to 10% service cut on fixed route services.

Providing ADA service for any trip purpose is a basic legal requirement that LTD must meet, so this could not be avoided.

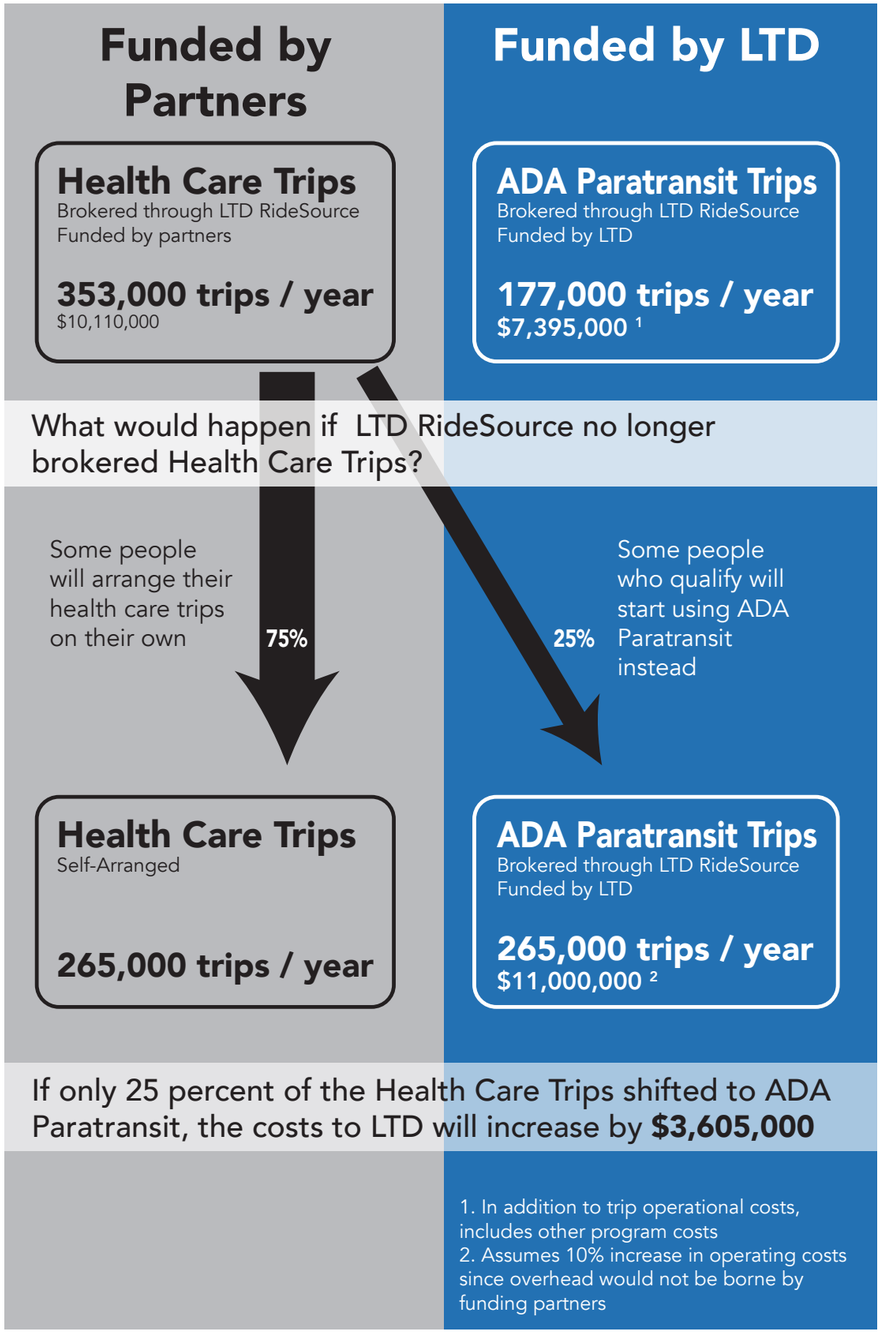


Figure 52: LTD derives significant benefit from the RideSource brokerage's ability to deliver non-emergency medical transportation reimbursed by Medicaid/OHP. If even a small fraction of these health care trips had to be provided by ADA paratransit, LTD's general fund would be significantly impacted, likely leading to a significant service cut on fixed routes.

1 Assumes an average cost of $34.56 per trip, or 10% more than the current average cost per trip, due to the fact that Medicare/OHP funding would also no longer cover any part of the administrative and overhead costs of the RideSource program.

RideSource handles a mix of complex billing requirements, simplifying the user experience.

Figure 53 explains how customers access trips through RideSource that, in fact, is made very simple for the user.

Through a single telephone call or visit to the LTD Customer Service Center, the potential rider (or caregiver on behalf of an aging parent or son or daughter with a disability) is connected to a range of mobility options. This can be as simple as specific trip planning information for a trip on one of LTD's fixed routes, or the prospective rider may be referred to the Home Assessment program to determine eligibility for one or more specialized transportation programs.

The in-home assessment process enables the RideSource brokerage to indicate in its software and records the specific programs for which the rider is eligible. If the rider can use a fixed route for some or all trips, he or she may be referred to the RideSource travel training program to give them confidence in using LTD's fixed schedule services.

A prospective rider may also be shown how to connect with an LTD Travel Host at the Eugene Station. And when that customer subsequently calls RideSource to secure a trip, they may be provided with a fixed route trip plan – and, potentially, subsidized bus passes. Or, for the same individual but for a different trip, the trip may be dispatched through the brokerage to the RideSource internal fleet, or dispatched out to one of the more than 200 external transportation providers.

The RideSource brokerage software that manages these processes, NOVUS/TripSpark, was newly installed in the fall of 2017, replacing long-standing legacy software. The transition to the new web-based software was more complicated and difficult than anticipated, in part because of the complexity of what is asked of it on the back-end, billing and trip administrative side.

While RideSource and its customers have moved through a longer-than-desirable settling-in period with the software, recent indications are that the system has stabilized and is now working as needed to receive trip reservations, book, schedule and dispatch trips and then to assist RideSource and the Customer & Specialized Services Department in appropriately billing its funding partners for eligible, provided trips.

The powerful but complex software that powers RideSource places LTD on the cutting edge of dispatching software technology. This has organizational implications, in that it is very important that the Customer and Specialized Services Department has ready access to in-house IT support.

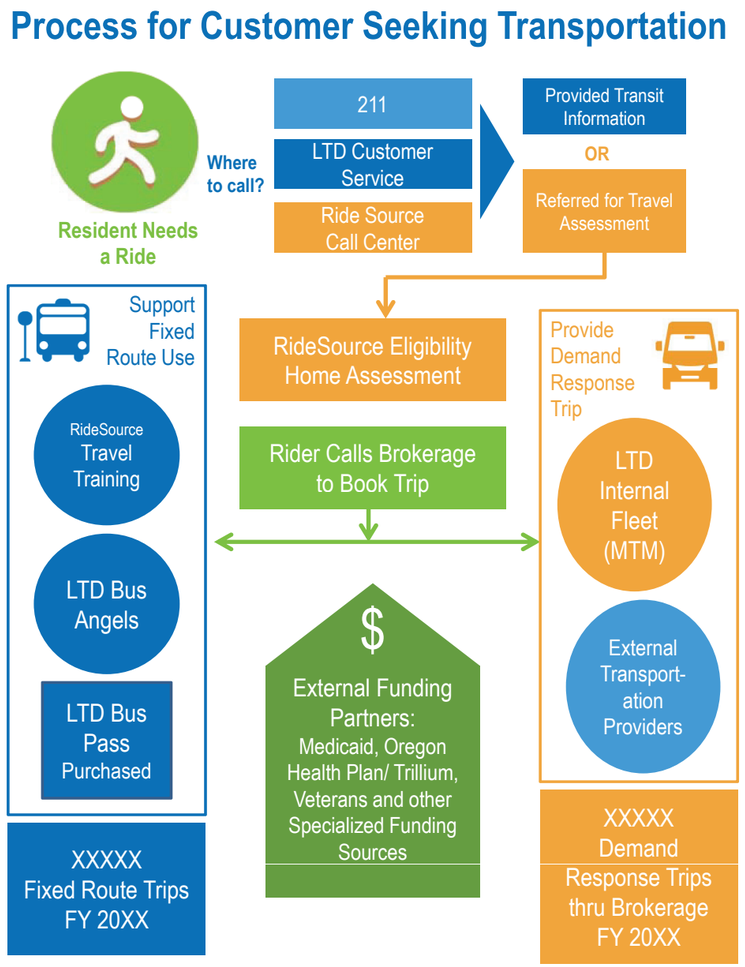


Figure 53: How Ride*Source* Provides Transportation. Customers referred for an in-home assessment become eligible for assistance through the Ride*Source* brokerage. When they call, they are channeled to the most appropriate transportation service based on their eligibilities and the specific needs of the trip they are requesting.

The public would benefit from expanded web information on available services.

More Website Information

Currently, people interested in LTD's demand-responsive transportation services persons can look up or be provided with telephone numbers by which to get further information. Online information is extremely limited.

The following information could readily be placed online:

- Key rider policies such as cancellation procedures, no-show and dwell time policy at-the-curb, and others to help advise customers of RideSource "rules of the road."
- Any upcoming or recent changes in the telephone reservation procedures.
- New rules and their rationale, such as the policy limiting will-call and same-day trips could be described.
- Information on the ADA Shopper Shuttle.

As RideSource information becomes more consistently available online, riders could be advised – and trained to look for updated information – on the website.

This combination of information would be useful not only to current Ride*Source* users; it would also enable prospective future users to understand how it works, and allow interested members of the public to better understand what services are available.

Other Technology Options

Ride*Source*'s software contractor may soon be piloting customer-facing technology innovations such as:

- Rider notification that the vehicle is approaching
- Passenger web-portal potential to "order a trip" or check on "where's my ride?"
- Moving some preliminary registration functions online, while retaining the critically important home assessment function.

It would be valuable for LTD and MTM (the Ride*Source* contractor) to track these innovations, and potentially to participate where it may improve customer service.

Furthermore, some "low-tech" options have been suggested by LTD's consumer advocates, including using the time that passengers wait while "on hold"to reserve a trip to communicate new policies and wider distribution of flyers to promote the new Shopper Shuttle schedule.

Figure 54: LTD Ride*Source* Webpage. At the moment, this page mostly provides the phone numbers to call to learn more. It would be helpful to prospective customers and the interested public to include further information on available services and policies online.

6 Travel Options (Point2point)

Point2point has built an array of outreach programs addressing travel options.

Point2point has built a creative array of outreach programs, from the neighborhood to the regional level.

Point2point is Lane Transit District's regional travel options program. In Oregon, travel options programs help individuals and business understand the alternatives to driving alone. This includes transit, but also walking, cycling, and vehicle sharing.

Point2point is in the business of outreach, and its extensive portfolio of programs serve multiple markets and needs, often in partnership with major institutions such as cities, school districts, the University of Oregon, large employers and governmental organizations.

Point2point's programs address a diverse range of audiences, including youth and schools, commuters, neighborhoods and employers. They fall under three general categories:

- Programs directly managed by Point2point.
- Collaborations with other departments at Lane Transit District
- Participation in programs managed by other organizations.

Directly Managed Programs

BUSINESS COMMUTE CHALLENGE
The Business Commute Challenge is a fun week-long competition when local employers and workplace teams join forces to turn their daily commute into a transportation adventure. Each year's Challenge is a highly visible opportunity for employees to rethink their daily work commute and try out new transportation options while saving money and winning prizes donated by local businesses. A follow-up survey is conducted six months after the challenge to identify any mode shift and increases in active transportation use resulting from this effort.

EMERGENCY RIDE HOME
The Emergency Ride Home Program provides eligible employees in the region with a free taxi ride home should they have an unforeseen emergency hen they have taken transit, biked, walked, carpooled or vanpooled to work.

VALLEY VANPOOL
Point2point administers 17 vanpools, as part of a larger regional program in the Willamette Valley. In addition to providing significant savings to its 150 average daily users, the vanpool program helps pay for itself in two important ways.

Vanpool passenger miles are added to LTD's overall passenger mile total, which increased LTD's share of available federal transit funds through FTA Section 5307. The vanpool program's annual operating expense of $386,000 in 2016 was more than offset, thanks both to these increased FTA formula funds and the $215,000 in direct vanpool rider receipts that further contribute to the program.

SCHOOLPOOL
SchoolPool is a free transportation matching service to help parents find walk, bike, or carpool partners among families whose children attend the same school. There are currently 35 parents enrolled in this program.

REGIONAL SAFE ROUTES TO SCHOOLS PROGRAMS
Point2point works with three school districts' Safe Routes to Schools (SRTS) Coordinators to develop SRTS Action Plans, and to enhance participation in annual encouragement events. For this effort, the program offers stipends to help interested schools conduct events to celebrate International Walk and Bike to School Day held biannually in May and October.

Point2point also maintains a relationship with the Eugene 4J School District and the City of Eugene River House Outdoor Program to deliver Bicycle Safety Education and Pedestrian Safety Education to elementary and middle schools. The long-term goal is to offer these courses to all second and fifth grade students from each school as funding is obtained.

SMARTTRIPS
SmartTrips is an outreach program that provides households with individualized travel tools aimed at increasing biking, walking, use of public transit, and carpooling. In 2015 and 2016, the SmartTrips Thurston Program targeted over 3,000 residents along Main Street between 62nd and 75th streets. SmartTrips staff was able to engage with more than 1,000 residents through events and mailings, and over 400 households ordered a travel kit with further information.

CONGESTION MITIGATION PROGRAM
The Congestion Mitigation Program's primary purpose is to guide community education and promotional efforts to increase the use of walking, cycling, transit and carpooling during and after major regional infrastructure investments. Point2point plans to expand this effort to include all of the most congested travel corridors in central Lane County.

Partnerships with Other LTD Departments

Point2point helps LTD in outreach and promotion on key LTD initiatives in three areas.

PARK & RIDE
Point2point helps promote 13 Park & Ride locations in Eugene, and eight in Springfield, Cottage Grove, Creswell, Junction City and Veneta.

GROUP PASS PROGRAM
The Group Pass Program allows employers to purchase highly discounted transit passes (around $6 per month per employee) to businesses, in exchange for providing these passes to all employees free of charge. Students at middle and high schools can also purchase bus passes half-price or have their school participate in the Group Pass Program at an even lower cost per student ($3.15 per month per student).

REGIONAL CAR SHARE PROGRAM
Through an agreement with Enterprise Carshare, eight cars are available in the community program including a pickup truck. Enterprise also has made available the University of Oregon program (5 cars) and the Oregon State University program (2 cars) to Eugene/Springfield community members.

Partnerships with Outside Agencies

Point2point staff support and extend the reach of the two following projects through various outreach and information sharing activities.

DRIVELESSCONNECT
Drive Less Connects is Oregon's web based ride matching program, catering to carpool and vanpool trips of all types. Point2point promotes Drive Less Connect as a ridesharing resource throughout Lane County.

BIKE PROGRAMS: BIKE PARKING AND LOCKERS / BIKE SHARE
Since the Regional Bike Parking Study in 2013, efforts have been underway to develop a regional electronic bicycle locker program at key sites along transit corridors or popular areas in the City of Eugene and increase the availability of short- and long-term bike parking racks/cages at school and employer sites.

Point2point can increase its reach by embracing more new technology tools.

Promoting Point2point programs

Point2point staff currently use four program websites and several Facebook pages to promote their programs, in addition to other face-to-face and paper communication tools.

Other useful tools that Point2point could promote include newer ride matching software, such as Ride Amigos and SCOOP, now available as smart phone apps.

An important feature of these modern platforms is that they present customers with a range of multi-modal options, allowing them to compare travel time, cost and benefits. Also, and equally important, they help potential shared ride users connect with others beyond their own employer's commuters.

Promoting LTD fixed route services

Expanding Point2point's entrée into technology makes sense, particularly for outreach to young people. For example, it would be possible in the Safe Routes to Schools programs to introduce children and teenagers to tools like LTD's trip planner, Google Transit or the Transit app to help them become independent users of the transit network.

Because LTD currently publishes General Transit Feed Specification (GTFS) schedule data, it may elect to publish GTFS-real-time data (e.g., arrival predictions, vehicle positions and service advisories). When available, this data is used by Google Maps and other apps to provide travelers with transit trip planning and information.

This strategy encourages capitalizing on these existing free, customer-focused tools by promoting their use by commuters to make mode decisions based on which mode is faster, costs less and/or is most environmentally friendly. Point2point can play an important role in promoting the availability of these app-based, information resources.

- **Google Maps** — desktop and mobile versions — is already used by most of the population. However, many Google Maps users have never noticed the transit icon or realized that they can get detailed transit directions. In focus groups, when individuals are shown this feature, they say that it makes them more likely to at least consider transit since the information is right at hand.
- The **Transit App** is primarily for those using transit, Transportation Network Companies (TNCs), biking or walking. Opening the app brings up the bus stop location and the departure time for the closest transit services. While it does not compare transit to driving, it greatly increases the ease of using transit in a multi-modal environment.

Integrating LTD's trip planner, Google Transit and/or Transit App into all marketing pieces can strengthen linkages between Point2point initiatives and LTD's cores fixed-route services.

7 Key Choices

How should we balance high ridership and extensive coverage?

Transit Tomorrow is a unique opportunity to rethink the purpose of LTD's transit system, and how it relates to other ways of getting around such as walking, cycling and driving.

The most basic choice is the degree to which the transit system should be pursuing ridership or coverage. As explained in Chapter 2, planning for high ridership or high coverage leads to substantially different outcomes.

Why Plan for Ridership?

Designing a transit system for high ridership serves several popular goals, including:

- Giving large numbers of people more personal and economic freedom by expanding the range of trips for which transit is a useful option.
- Limiting growth in car traffic as the region develops, and the related growth in pollution and greenhouse gas emissions.
- Reducing the public subsidy required for each rider.

Planning for high ridership means focusing service on places where many people go, and designing service so the bus is always coming soon. This means designing a connected network of frequent routes, with buses coming every 15 minutes or better all day, and where service remains available and as frequent as possible in the evening and on weekends. Because this type of service is expensive to provide, it can't be available everywhere. A high ridership systems wouldn't serve every neighborhood.

Transit systems designed for high ridership increase people's travel options and reduce dependence on driving in the most populated and congested places. This is because frequent service with long hours, focused on the places where people travel most, can provide a convenient experience for many different types of trips.

Why Plan for Coverage?

On the other hand, many other popular goals for transit don't require high ridership. Coverage goals are achieved when transit service is designed to reach as many places as possible. They include:

- Ensuring that every neighborhood has access to the transit system.
- Providing lifeline access to critical services to all.

Planning for high coverage means designing a transit system where a basic level of service reaches as many places as possible. Of course, the more service is spread out, the more it must be spread thin. As a result, most bus routes in a transit system focused on coverage will operate at 30 to 60 minute frequencies, and many routes will operate less frequently - or not at all - on evenings and weekends.

Transit systems designed for high coverage don't provide a viable transportation option for many people. Low frequency and limited hours mean that service designed for coverage is only useful for a small set of trips. Most people who live near a "coverage" route won't consider transit when making their decisions about how to get around.

How This Relates to LTD

The current LTD transit system is the legacy of decades of planning and incremental adjustments, reflecting two key choices:

- **The EmX, and the Frequent Transit Network (FTN) are targeted at high ridership.** These seek to provide a higher level of service in corridors with the highest densities of jobs and residents. They are also associated with infrastructure investments that have improved pedestrian and bicycle access.
- **The remainder of LTD's system provides coverage.** As seen in Chapter 1, nearly all of the Eugene/Springfield area is within 1/2-mile of some form of transit service. Most of the metro area is served by routes that come infrequently, typically every 30 minutes, and every 60 minutes on evenings and weekends. Outside the metro area, every town gets service a few times a day.

LTD can pursue ridership and provide coverage within the same budget, but not with the same dollar. The more it does of one, the less it does of the other.

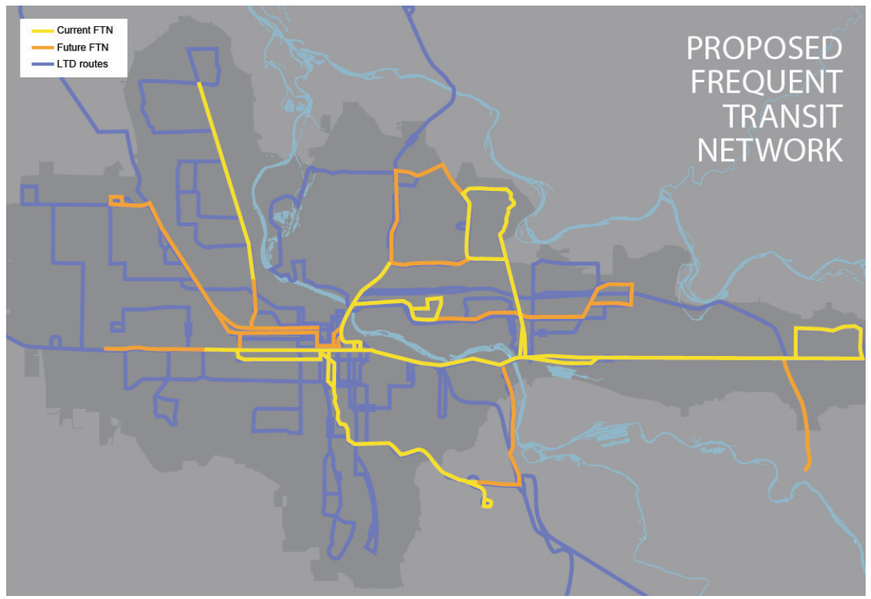


Figure 55: LTD Frequent Transit Network, as adopted in the 2014 Long Range Transit Plan. At the moment, LTD focuses investments in high-ridership, high-frequency service on the streets identified in yellow and orange. Service on streets shown in blue is provided mostly for coverage purposes. In a fixed budget, any additional service on the Frequent Transit Network must be paid for by reducing service elsewhere. Or, any more blue lines on this map mean that the "Frequent" parts of the network become less frequent. Which is more valuable?

How should we balance walking and waiting?

Another way to think about the question of ridership and coverage is to think specifically about how far a person should have to walk to reach a bus stop, and how long they should have to wait, on average, before the next bus comes.

Walking and waiting are important to consider on their own, because both of these activities add time and inconvenience to any transit trip, and different people have a wide variety of preferences regarding each.

For example, a young and fit person in a hurry might have no problem walking over a half-mile to a bus stop if the bus is always coming soon. An older or differently-abled person might prefer to have a bus stop much closer to their front door, even if it means they need to memorize the bus schedule or risk waiting a long time.

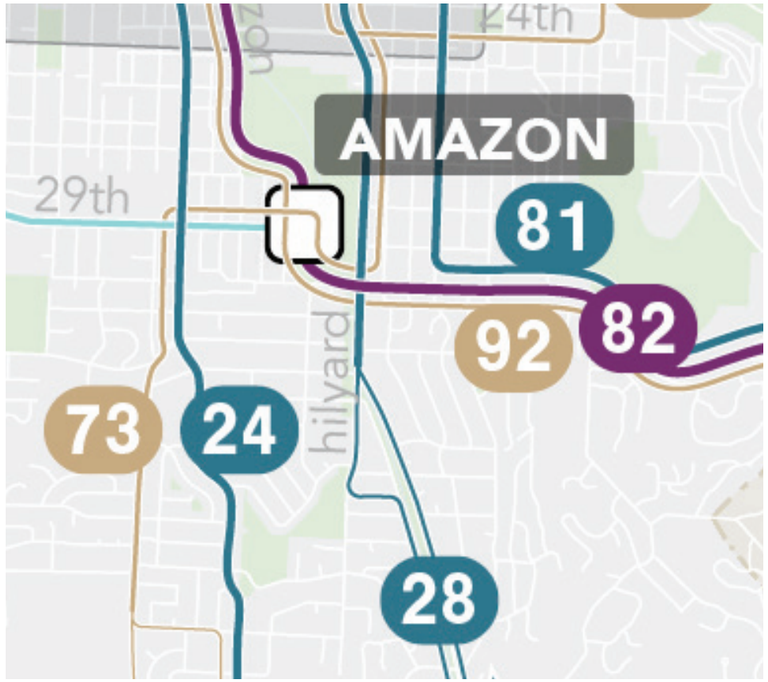


Figure 56: Existing LTD routes in inner South Eugene. Many infrequent routes operate very near each other. As a result, it's a very short walk to any bus route going to Downtown Eugene or UO, but usually a long wait for a bus. If there were fewer routes on fewer streets, each route could be more frequent. That would require many people to walk further, but the wait for each bus would be much shorter. Which is more valuable?

Many routes, or frequent routes?

As an example, consider the southern approach to Downtown Eugene[1], in the vicinity of Amazon Station, as shown in Figure 56. There is lots of bus service in this area, operating on many different very nearby streets. From east to west:

- Route 73 comes from Willamette Street, turns toward Amazon Station, and continues to the University of Oregon on Hilyard Street.
- Route 24 comes from Donald Street, and continues on Willamette Street to Eugene Station.
- Route 28 comes from Amazon Parkway, then turns onto Hilyard Street and continues to the University of Oregon and Eugene Station.
- Routes 82 and 92 come from Lane Community College, then continue onto Amazon Parkway to Eugene Station.
- Route 81 comes from Lane Community College, then turns onto Harris Street and continues to the University of Oregon.

Except for Route 82, all of these routes operate at frequencies at or below every 30 minutes. This many crisscrossing routes also can't have fully coordinated schedules, so don't provide a higher combined frequency to either the University of Oregon or Eugene Station, even on streets where they meet.

As a result it's a very short walk from anywhere in inner South Eugene to a bus going to Downtown Eugene or UO, but going to either place on transit requires a long wait, or advance knowledge of the schedules. This limits the number of people who will ride transit in this area: many of those with shorter trips will likely walk or cycle, and many of those who are trying to get across town will likely drive.

This illustrates a fundamental truth: **a transit system designed to minimize how far people walk requires many routes near each other. That means most of these routes will be infrequent.**

Conversely, a transit system designed to minimize waits requires high frequencies. That means many people will need to walk longer distances to reach service. For the average wait to be 5 minutes, a bus has to come every ten minutes. Service every 10 minutes is very expensive to provide, and can only exist on a limited number of streets.

1 Somewhat similar situations exist on the northwestern approach to Downtown Eugene (many routes crisscrossing from River Road and Highway 99E) and north of Downtown Springfield (Routes 13, 17 and 18 are all very close to each other).

How far apart should stops be located?

In a transit system designed for high coverage, it makes sense that stops should be located at short intervals, to minimize the amount of walking required from anywhere to a bus stop. Consistently with this notion, bus stops on most LTD fixed routes are located every 700 to 1,000 feet, or every two to three blocks.

In a high ridership system, many riders get on and off the bus at any given stop. This slows down service, so it makes sense to place bus stops farther apart. This principle is well illustrated by EmX, which is LTD's highest-ridership route by far, and where stations are limited to every 2,000 feet[2].

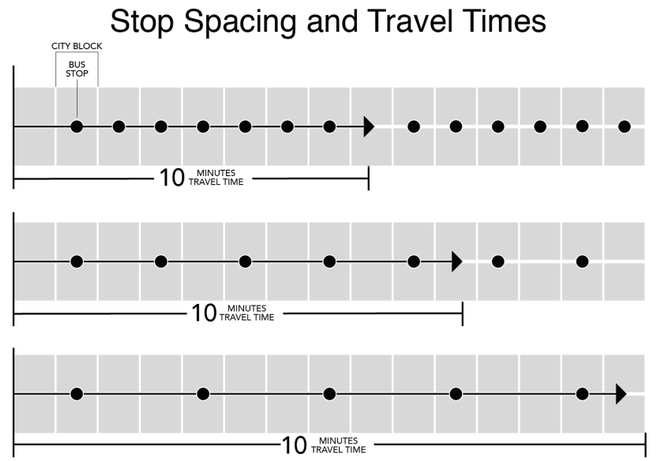


Figure 57: A bus with fewer stops spaced farther apart can operate faster, but passengers will need to walk farther to reach their bus stop. Which is more valuable?

2 Many other efforts have also been made to limit time at stops on EmX, such as off-board fare payment, level boarding on raised platforms, and all-door boarding. These are all typical of Bus Rapid Transit systems, where a high-frequency service is supported by significant infrastructure investment. Although such investments are useful to a high-ridership strategy, they are not necessary for all high ridership service. Through current efforts on the MovingAhead and Main/McVay studies, LTD and the cities of Eugene and Springfield are working to determine the right level of infrastructure investment on major streets to support possible future frequent service.

Does LTD's network need small adjustments, or a major overhaul?

Any change to transit services is naturally disruptive to existing riders, but different levels of change lead to different levels of disruption. This page describes three possible approaches to changing transit service as a result of Transit Tomorrow.

As a general rule, the bigger the service change, the more disruption it produces in existing riders' lives. On the other hand, a bigger change can make it possible to achieve much greater benefits for the community as a whole. Small service changes are much less disruptive, but they can achieve much less to address any deficiencies in the existing service.

It is always easier for transit agencies to make incremental changes when there is a growing supply of transit service. That way, the pain and disruption caused by moving a bus route, or removing a bus stop, or changing transfer arrangements, can be offset by the benefits of having more service.

There is some suggestion that LTD service may increase in future, due to new funding that will be made available to Oregon transit agencies thanks to House Bill 2017, the state's most recent transportation funding law. However, there are still limits to what those new funds can achieve: they will come associated with goals and requirements, and LTD continues to face the challenge of growth in operating costs.

Small Adjustments

If public feedback clearly states a preference for limiting the degree of change to the network, this study will likely result in a recommendations for a series of small changes. These may be implemented immediately or over time, but wouldn't fundamentally change the nature of LTD's existing transit system.

In a way, this would be similar to the way things already happen: LTD customers are used to seasonal adjustments to transit service, as small changes are made to schedules and routes three times per year.

Incremental Changes

Transit agencies sometimes implement major network changes incrementally through a series of small changes, working towards a new network vision over many years.

The advantages of evolving a network this way include:

- The costs of making changes can be substantial: writing new schedules, training drivers on new routes, designing and printing materials, moving bus stops, advertising, providing extra customer service, and more. Spread out over multiple years, these costs are easier for a transit agency to absorb.
- The transit agency can manage most of the work of implementation with in-house permanent staff, instead of hiring temporary crews to make a big implementation push.
- The risk of city-wide disruption is low, since any problems will be limited to the area or routes being changed.

However, there are major downsides to implementing a greater vision by making changes in just a part of the service area or just on certain routes:

- The major benefits of a transit network change arise from it working better as a network. This means every part of it is connected to every other part, and changes in one part of town are actually beneficial to people everywhere in the city. If a network change is driving toward a big increase in freedom and access, but most of those benefits won't show up for a few years, it is hard for people to see why early disruptions are worthwhile.
- Because incremental changes will target individual routes or areas, people will naturally feel as though they, their community or their neighborhood is being singled-out for disruption. The idea that everyone around the city will (eventually) be treated equally to disruption and benefit, over many years, is hard to convey.
- The public and media may develop the vague sense, over multiple years, that transit service "keeps changing" and is confusing.
- Service changes benefit from marketing campaigns. Launching a large campaign city-wide is more efficient than trying to build enthusiasm within subsections of the district, over multiple years.

Major Overhaul

Sometimes transit agencies decide to completely overhaul their networks all at once. This could be described as the "rip the band-aid off" approach. This is most common when the changes to the network are substantial, and are spread over many parts of town.

In this approach, the transit agency might change route names and numbers, bus stops, frequencies, spans, and even some transfer locations overnight. This type of effort can be worth the huge work effort and systemwide impact to riders because:

- Nowhere is spared from change, so every neighborhood and community can see that they are being treated equally.
- Huge increases in freedom and access are possible on Day 1. This makes it possible for public information and media coverage to be more focused on the ultimate benefits of the change than they otherwise would be.
- The benefits of the new network vision become obvious within weeks, rather than years, after the initial service change.

On the other hand, the downsides to such an approach include:

- Significant logistical challenges and of coordinating the vast scale of change necessary at one time.
- High one-time costs of implementation, including the likely need to hire out contractors or temporary employees to advertise the change, provide extra customer service, and perform other tasks.
- If advance planning for the one-time change misses any crucial details, there is the potential for the transit system to underperform for days or weeks as the kinks get worked out.