JANUARY 22, 2019

SERVICE CHOICES REPORT

UTA

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Table of Contents

Executive Summary

The Utah Transit Authority (UTA), in partnership with the Wasatch Front Regional Council (WFRC), the Utah Department of Transportation (UDOT), and Mountainland Association of Governments (MAG), is launching a new project. UTA Service Choices seeks to help the communities that UTA serves form a clear view on what priorities should determine how to plan bus service.

This study is short-term, focusing on things that can be accomplished in the next few years. The report focuses mostly on bus services because those services are relatively easy to develop or revise quickly. A separate process is considering longer range issues, such as rail development. However, the goals articulated by the public, stakeholders and elected officials through UTA Service Choices will be carried forward into future long-range plans.

Before we do any planning, UTA needs to hear from the public about what the priorities for bus service should be.

What should UTA service be trying to do?

Public transit agencies are asked to serve many different goals at the same time. For example, people often mention one of these goals:

- Reduce traffic congestion on the busiest corridors.
- Reduce air pollution.
- Provide a 'permanent' service to stimulate dense development in urban centers.
- Provide an affordable transportation option for people with limited or no access to personal cars.
- Get workers to their jobs.
- Be available near the homes of everyone who pays taxes to support the service.
- Support future development opportunities.
- Connect clients to social service agencies.
- Get students to class.

UTA receives many different comments requesting changes to the service in order to pursue these goals, but UTA has a limited budget, so doing more of one thing can mean doing less of another. That's why we need hear what your priorities are.

Ridership or Coverage?

The many different goals of transit service can be sorted into two major categories: ridership goals and coverage goals.

Ridership means attracting as many riders as possible. When we do this, we also achieve these goals:

- Compete more effectively with cars, so that more people can travel down a busy road.
- Collect more fare revenue, increasing the share of our budget paid for by fares, assuming that fares don't change.
- Make more efficient use of tax dollars by reducing the cost to provide each ride.
- Improving air quality by replacing single-occupancy vehicle trips with transit trips, reducing emissions.
- Support dense and walkable development and redevelopment.
- Provide the most useful and frequent services to more people.

When we concentrate our most useful services in the places where the most people can take advantage of them, we do all of these things at once.

Coverage means being available in as many places as possible, even if not many people ride. When we do this, we also achieve these goals:

- Access for people without other travel options. This can include low income people, elderly people, and disabled people, among others.
- Providing some service to everyone who pays taxes to support UTA.
- Support for lower density development, such as new low-density suburbs around the edge of the region.

These goals lead us to spread service out so that everyone gets a little bit, which is different than what we do when we are seeking ridership.

Why not? **Spreading service out means spreading it thin.** If UTA buses need to go absolutely everywhere in the region, we have to run lots of routes. When we spread our limited budget over all those routes we can't afford to run very much service on each of them. That means those routes won't be very effective, because they won't run often enough, or late enough, to be there when you need them.

Ridership goals and coverage goals are both very popular. But no transit agency can pursue both goals with the same dollar, because the goals require very different kinds of bus networks. UTA, like every agency, has to decide how much of its budget it will spend pursuing ridership goals, and how much it will spend on coverage goals. There's no right or wrong answer to this question: It depends on what your priorities are.

This report, and this summary, are about helping you think about this choice.

What does planning for ridership mean?

Suppose, for a moment, that we planned the network for high ridership. This network would seek to be useful to the greatest number of people. What would that mean?

When a store or restaurant opens in new town, it will often fail or succeed based on its location. You want to open your business in a place with many potential customers, where it will be easy for people to make the decision to come into the store and buy your products. This is why you so frequently see a fast food restaurant or coffee shop at the intersections of busy streets, and not tucked away in neighborhoods. These businesses know that their best markets are where many people are always passing by, and where its quick and convenient to stop in to pick up a cup of coffee or lunch.

When we're asked to plan for high ridership, we're being asked to think like a business; to identify the best markets with the most potential customers, where useful transit services can compete for the greatest number of trips. We'd concentrate cost-effective, useful service where lots of people can benefit.

So, what is cost-effective, useful service?

To be cost-effective, transit needs to carry many people. It costs the same to send a bus out to drive 10 miles whether 1 person or 100 people ride it. If 100 people ride that bus, the cost to the public to provide each of those 100 trips is 1/100th of what we would spend on that single person.

When we say we want high ridership, we are also saying that we want transit to carry as many people as possible for each hour we pay someone to drive. To do that, the bus must be doing something useful and convenient for a lot of people!

Useful Service Attracts High Ridership

Transit service can only attract riders efficiently if people find it useful for many different types of trips; if it provides freedom to move about the city or region. Where you can go determines what you can do: which jobs you can hold, which grocery stores you can shop at, who you can visit, which schools you can attend, and ultimately how well you are able to share in the opportunities your city can provide to you.

Transit that provides a high degree of freedom is frequent, so that you are never stuck waiting for a bus for long. It is reliable, so that you can be sure you'll make it to your shift or to your appointment on time. It is safe, so that you never have to feel that you are taking a risk by choosing to use it. Finally, it takes you where you need to go.

Useful transit is expensive. To provide high frequency and short waits, we have to pay for more drivers and more buses driving each route. To ensure reliability, we make investments in the design of transit streets and facilities to protect transit and buses from traffic congestion. For people to feel safe, we need highly-qualified, professional staff; vehicles and facilities that are designed to feel open and visible; and, stops and sidewalks that protect riders from cars. We have to focus these expensive elements of usefulness in places where the most people will benefit from them.

Community Geometry

Where can the most people benefit from useful transit service? The key is the geometry of each community. That geometry determines whether many people will be able to use any service that we offer.

- Density - having many people nearby - is the single most important factor determining whether many people will choose to ride transit, but density alone does not make a strong transit market.
- The surrounding area must be walkable, since almost all transit trips begin and end with a walk to or from the stop.
- Transit streets must be linear, so that buses don't spend a lot of time driving circuitous paths that increase the cost of service and travel times.
- Finally, strong transit markets are in close proximity to other dense, walkable areas and important destinations, so that buses don't have to drive through long, low-demand stretches where few people are getting on or off.

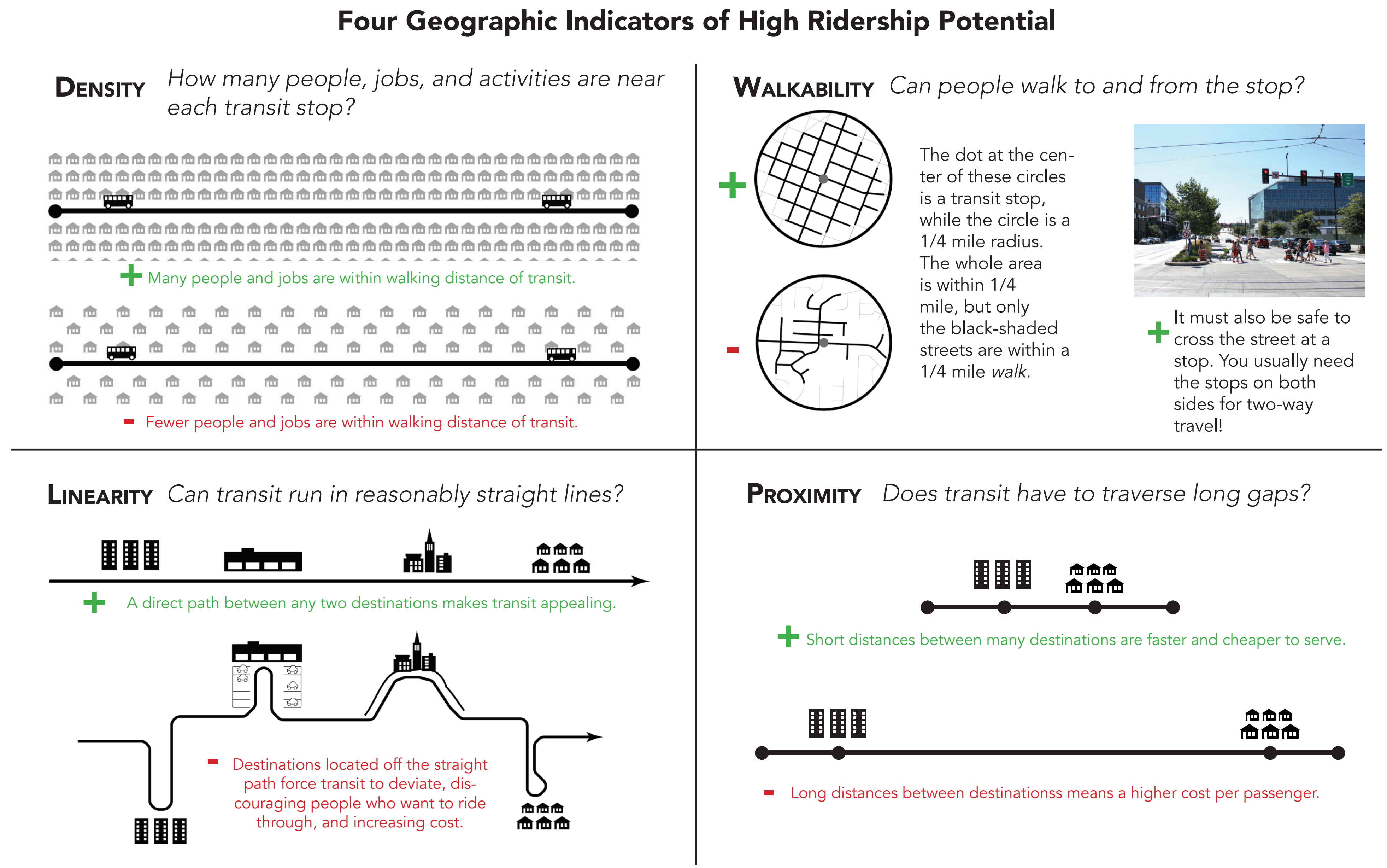


Figure 1: Community Geometry - Four Geographic Indicators of High Ridership Potential

These geometric indicators of high ridership potential are illustrated in Figure 1. Where you see a plus sign, this arrangement is better for transit, because it means more people can get to transit and transit can run more cost-effectively.

Does it sound like we're saying your neighborhood is good or bad? We aren't, but your community's geometry determines whether people can get to the service easily, and that determines how many people are likely to find our service useful. If we are pursuing a ridership goal, we will send more service to places where these factors are positive, and less where they are negative.

So if your community's geometry isn't favorable for high ridership transit but you still want some transit to be available for any of the specific reasons described on the last page, you may want a coverage goal.

Why are Coverage goals important?

Coverage services are not about ridership, they are about availability. For example, we might measure coverage as the percentage of the population that's within 1/2 mile of some service. The goal of coverage service is to make that number high, even if the result is low ridership.

When people demand coverage services, they usually give one of three reasons.

Transportation Options for People Who Can't Drive

The first of these, "access for people who can't drive", is about what people often call the social service function of transit: a transportation option for people with few other choices, who are located in places where high-ridership service would not go.

This could include sites like senior living communities in suburban or rural areas, isolated lower-income communities with low vehicle ownership rates, and important destinations like community colleges or social service agencies that have chosen to build facilities in environments that are difficult for transit to serve efficiently. These are all places where some people need the service badly, but this doesn't mean that many people would use the service compared to higher-density areas that are more efficiently integrated into the rest of the transit network.

Some Service for Everyone Who Pays

Everyone who pays taxes into UTA could reasonably expect some service in return. This is the second common argument for coverage services.

You could also argue that even people who don't have a bus route close to home are benefiting from UTA through reduced traffic congestion and other benefits to the economy.

Still, some people want service to everywhere that pays taxes, and this is a common reason for coverage services to exist.

Supporting Future Development

The last reason is about the future. Sometimes, transit agencies are asked to offer a service today in places that are expected to develop in a way that will generate high ridership in the future. Developers of new neighborhoods often want transit to be there early, before there are many people, so that it is available right as people move in. This is a low-ridership service until there are enough people there.

Do door-to-door or "flexible" services serve ridership or coverage goals?

You may have heard about new service concepts consisting of small vehicles that pick you up when and where you request them, rather than running fixed routes. You may hear these called "microtransit" or "TNC partnerships," where "TNC" (Transportation Network Company) refers to companies like Uber and Lyft.

The basic idea isn't new. Taxis have always responded to customer requests, and shared-ride demand-response services, often called Dial-a-Ride, have been used for decades by US transit agencies. Special services for the disabled, called paratransit, also work this way. UTA's Flex services are also a variation on the same idea.

Smartphone apps have made these service more responsive, so that they can be called on shorter notice. But the app doesn't change the fact that this kind of service carries very few people for every hour of a driver's time, compared to fixed route services.

If these services go to or near each person's door, they will have to follow a meandering path, making many stops that are not in a straight line. This limits the number of people a single vehicle can expect to serve, to no more than about 5-7 passengers per hour at the most efficient. Most UTA fixed routes carry more than 10 passengers per hour, and routes designed for ridership carry well over 20. The busiest UTA bus route carries 36 passengers per hour.

Small vehicles are also not much cheaper to operate. As with all transit with human drivers, the cost of providing these services are mostly the wages paid to the driver. So running small vehicles isn't cheaper unless you pay the driver much less.

Demand-responsive services are never high-ridership services by UTA standards. These service may be relevant in low-demand areas, but only as coverage services, where maximum ridership is not the goal.

Dividing the Budget by Priorities

Every transit agency has to decide how much of its budget to spend on ridership goals as opposed to coverage goals.

Currently, about 55% of UTA bus service is designed to achieve ridership goals, and 44% to achieve coverage goals. The answer to the ridership/coverage question question can be thought of as a point on a spectrum.

A network that was 100% ridership 0% coverage would have excellent service in places where the community geometry supports high ridership transit, but there would be little or no service anywhere else. A 100% coverage network would spread routes across the entirety of the service area, but because spreading it out means spreading it thin, these routes would not be very frequent, and as a result not many people would find them useful.

Any decision regarding the balance of service between the two goals must be made at the level of UTA's three main service regions, internally referred to as "business units". Each region consists of UTA's services operated within one or more counties:

- Northern Region - Davis & Weber Counties & Portions of Box Elder County
- Central Region - Salt Lake County & Portions of Tooele County
- Southern Region - Utah County

Figure 2 shows the existing split between ridership and coverage purposes of bus service in each of UTA's three geographic regions. In the northern region, comprised of Weber, Davis, and Box Elder counties, we estimate the split to be approximately 30% ridership and 63% coverage (with the remaining 7% duplicative[1] service). In the central (Salt Lake and Tooele Counties) and southern (Utah County), this number is closer to 60% ridership, 40% coverage.

The network design of each of the three business units is quite different, as are the implications of shifting the balance on the ridership-coverage spectrum. Because of this, public and stakeholder consultation will ask people about their opinion on the balance in the part of the region where they live.

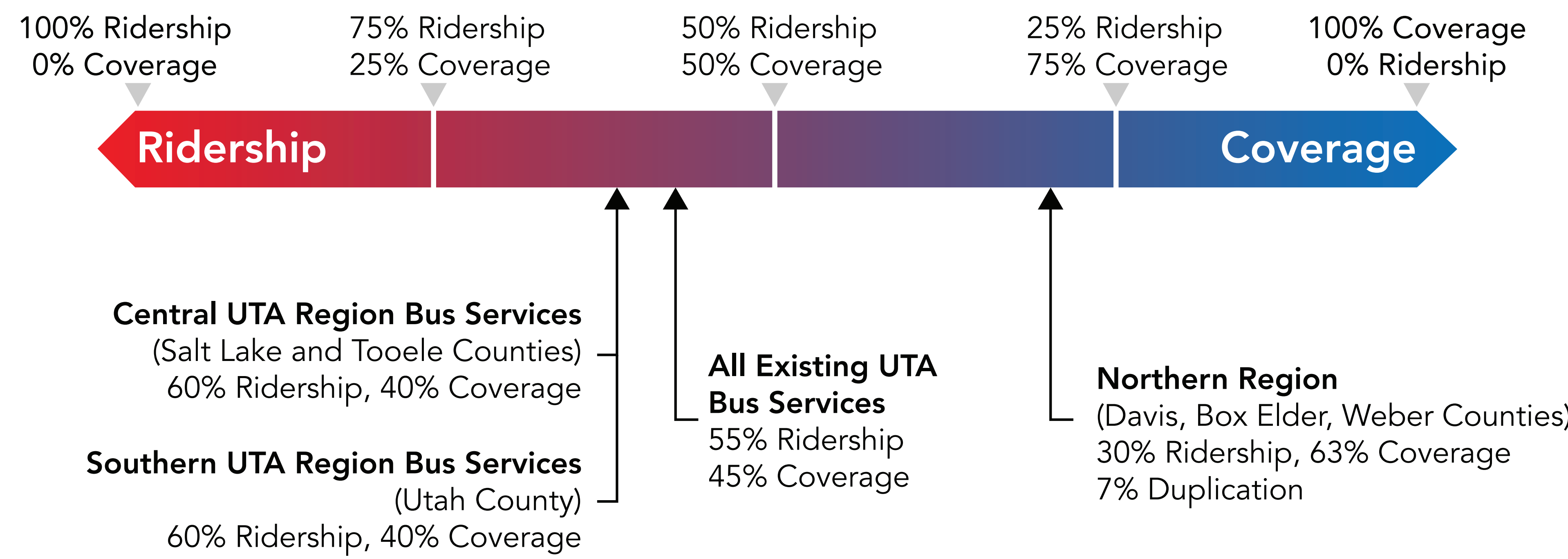


Figure 2: UTA existing services' ridership and coverage purpose

Perhaps today's ridership-coverage balance in each business unit is right for the future, or perhaps the community will value a shift in emphasis. The direction of that shift—either towards higher ridership or towards wider coverage—is a question for the public and stakeholders to discuss as part of this process.

1. By "duplication", we mean services that are at least in some degree redundant. For example, if two rush-hour express services operated along the same route, these two routes would be providing duplicative service.

Two Questions for the Public

For these reasons, we have two questions that this study will ask the public to think about. These are hard questions, because they are about setting priorities.

1. What should the balance between ridership goals and coverage goals be? Divide 100% between these goals:

a. **Maximizing ridership by providing high-frequency, useful services to dense places.** This will put more people near the most useful services, but the number of people across the region with access to transit may be reduced.

b. **Maximizing coverage by extending lower-frequency services to reach more of UTA's service area.** This will increase the number of people across the region with access transit service, but reduce the number of people with access to frequent services.

Figure 3 illustrates how transit networks designed to achieve either of these goals might look different using a fictional geography.

In this image, different shades of brown indicate different densities of development. The darkest brown areas are the densest parts of the region, where many people are in close proximity imagine a major downtown core business area, or a large university's campus and surround commercial and residential areas. Lighter shades mean larger residential lot sizes, less intense commercial development, and a lower overall level of travel demand.

In the High Ridership Network, high-frequency services are concentrated in the densest areas (shown with the darkest two shades of brown). Very little service is available outside of these dense markets, but inside of them, service is very useful, and most places accessible by transit can be reached by frequent services where you'll never be waiting long.

In the High Coverage Network, service is extended to much more of the developed area of the region, but at much lower frequencies. Only one route operates every 15 minutes. As a result, the number of people for whom some transit is nearby is much greater, but the number near very useful service that can compete with driving is much lower.

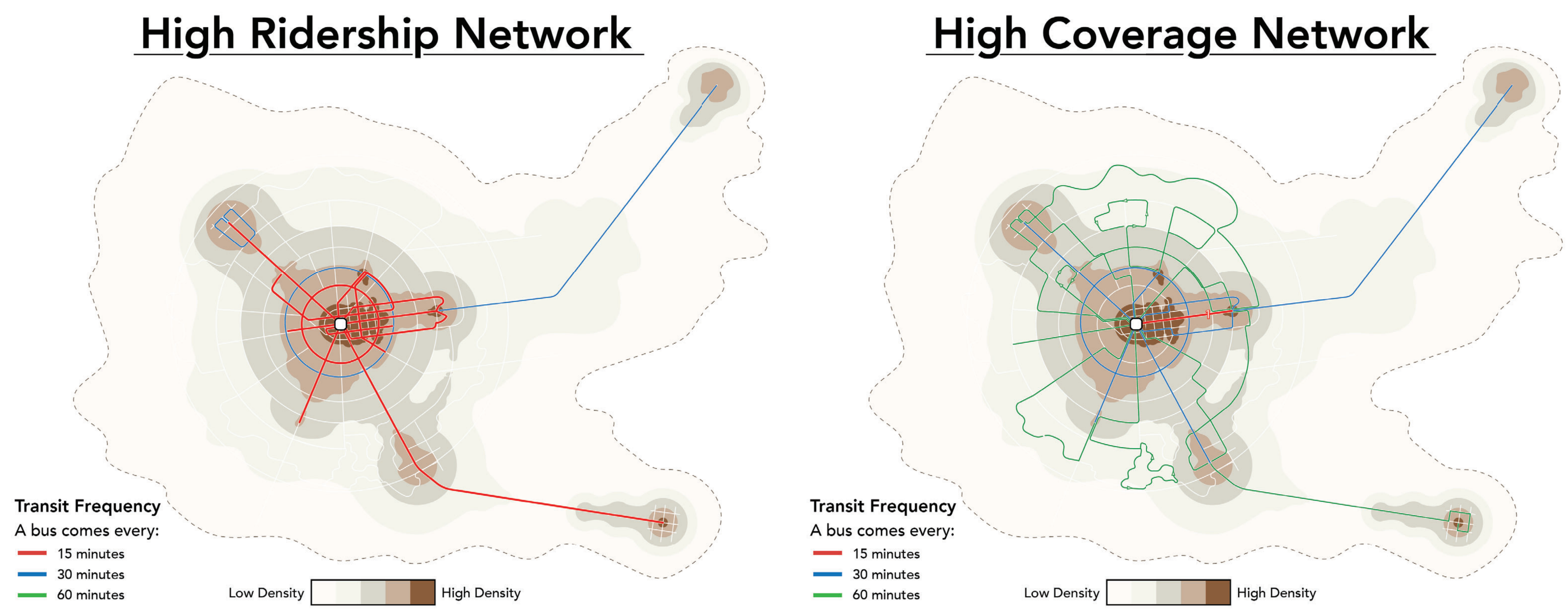


Figure 3: What do transit networks designed to for high ridership or high coverage goals look like?

2. If you think we should run coverage service, what goals for that service are most important to you?

a. **Transportation options for people who can't drive.** This goal would cause UTA to put coverage services only in places where many people don't own cars -- especially places with large numbers of low income, elderly, or disabled persons.

b. **Service to everyone who pays taxes.** If this is the goal, UTA would try to serve every part of its district, even where there are relatively few people who need the service.

c. **Service to newly developing areas, where the community geometry will support ridership eventually.** If this is the goal, coverage service would focus on places where denser development is occurring.

The rest of this report fills in the details, but those are the questions. Once we know the community's priorities, UTA's Board of Trustees will provide direction on the tradeoffs to the agency's planning staff to design a Draft Network Plan based on these principles.

Next Steps

The first phase in this project will gather input from the public and stakeholders about these critical questions. In June or July 2019, UTA's board will provide direction on these decisions, which will guide us as we draft the detailed plan later that year. That detailed plan would be the subject of a second round of public outreach. The earliest possible implementation date for changes resulting from this study is August, 2020.

1 Market Assessment

The Community Geometry section of the Executive Summary explains how the layout of communities helps to determine their ridership potential. We identified four factors: density, walkability, linearity, and proximity, all of which make it easier for more people to get to a transit service, and for that service to run more cost-effectively. Ridership oriented transit planning starts with those considerations. This chapter explores some of those factors in the UTA service area.

Other facts about the people in an area also matter to a degree. The total number of people in a space controls the overall size of the market that transit can compete for, while demographic factors such as income, car ownership and density of seniors can indicate the presence of populations with a higher propensity for transit use, provided the service meets their needs.

Planning for coverage goals also requires examination of demographic and land use factors. A transit network plan is only going to be able to meet an objective like "provide affordable travel options for people with limited access to personal cars" if we know where those populations are.

Understanding the distribution of people with lower incomes and minorities is also critical to anticipating the potential equity impacts of any possible future changes to the transit network and identifying opportunities to better reach historically underserved populations.

Activity Density

One way of visualizing the overall size of the potential transit market is to combine population and employment density into a single measure called "activity density". Figure 4 maps activity density across the region served by UTA.

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 orange signify places with varying degrees of mixed residential and employment density levels.

The areas of highest population and employment density, with the most intense mixture of uses, are found primarily near the centers of the major cities of the region. These are the absolute strongest markets, capable of generating substantial travel demand throughout the day and weekends:

- In Salt Lake City, the densest residential and employment areas are found along the corridor through downtown from I-215 to the University of Utah, including the Avenues neighborhoods northeast of the downtown core.
- While much smaller in extent than the developed area in and around Salt Lake City itself, the central areas of Provo and Orem, especially around Brigham Young University, are developed at density levels comparable with the inner areas of SLC outside downtown.
- The northern portion of UTA's service area is less densely developed than Salt Lake City or Provo and Orem, but it has a more extensive moderately dense residential area, particularly east of I-15 around Clearfield. In Ogden, the Weber State University campus itself is extremely dense, as is downtown Ogden, and the residential areas of the city north of the campus.

While these areas are the main continuous, densely-developed portions of UTA's service area, there are numerous smaller pockets of dense residential or commercial/employment activity, mainly along I-15. For instance, the commercial areas along I-15 between Clearfield and Layton boast quite high employment density; similarly, other isolated employment centers can be found throughout Salt Lake County, particularly around large shopping centers and business parks.

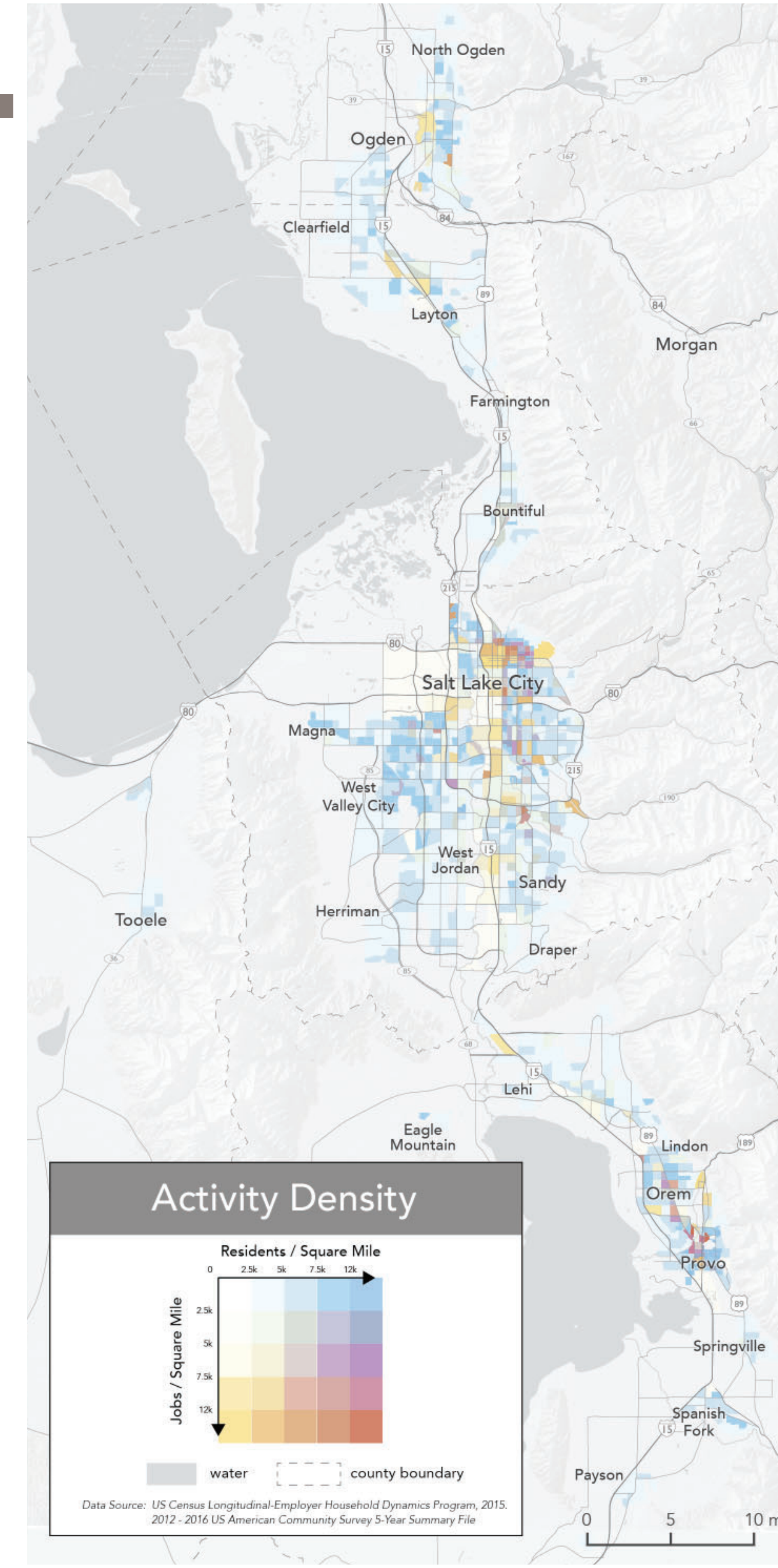


Figure 4: Regional Activity Density

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. Transit designed to achieve high ridership will seek to offer very useful services in places with high residential densities, while coverage services will seek to reach all or most of the inhabited residential area, even if the development pattern is such that few people live near any given stop. Figure 5 maps residential density across the region served by UTA.

In Salt Lake County, residential densities are relatively high (over 5,000 people per square mile) throughout much of Salt Lake City, particularly in the Avenues north of 200 South and east of State Street.

Similar density of residential development (though not quite as dense as the most compact areas around downtown Salt Lake City) exists from I-80 south to I-215, and in West Valley City, especially along the 3500 S, 4100 S, 4700 S and 5400 S corridors. Residential density declines gradually south of I-215, and areas of moderate density are more isolated and less continuous.

In the northern area of the region, the highest densities are found in Ogden, particularly in the portion of the city between Weber State University and the downtown core (near Washington Blvd./US-89 and 24th St). The cities south of Ogden and west of I-15 are mainly developed at lower densities (under 5,000 people per square mile), with some agricultural areas remaining between successive residential areas.

In Utah County, the highest residential densities are the central areas of Orem and Provo, particularly near the major universities. While the continuous developed area of Orem and Provo is limited, residential densities here are comparable to those of much of Salt Lake City or West Valley City.

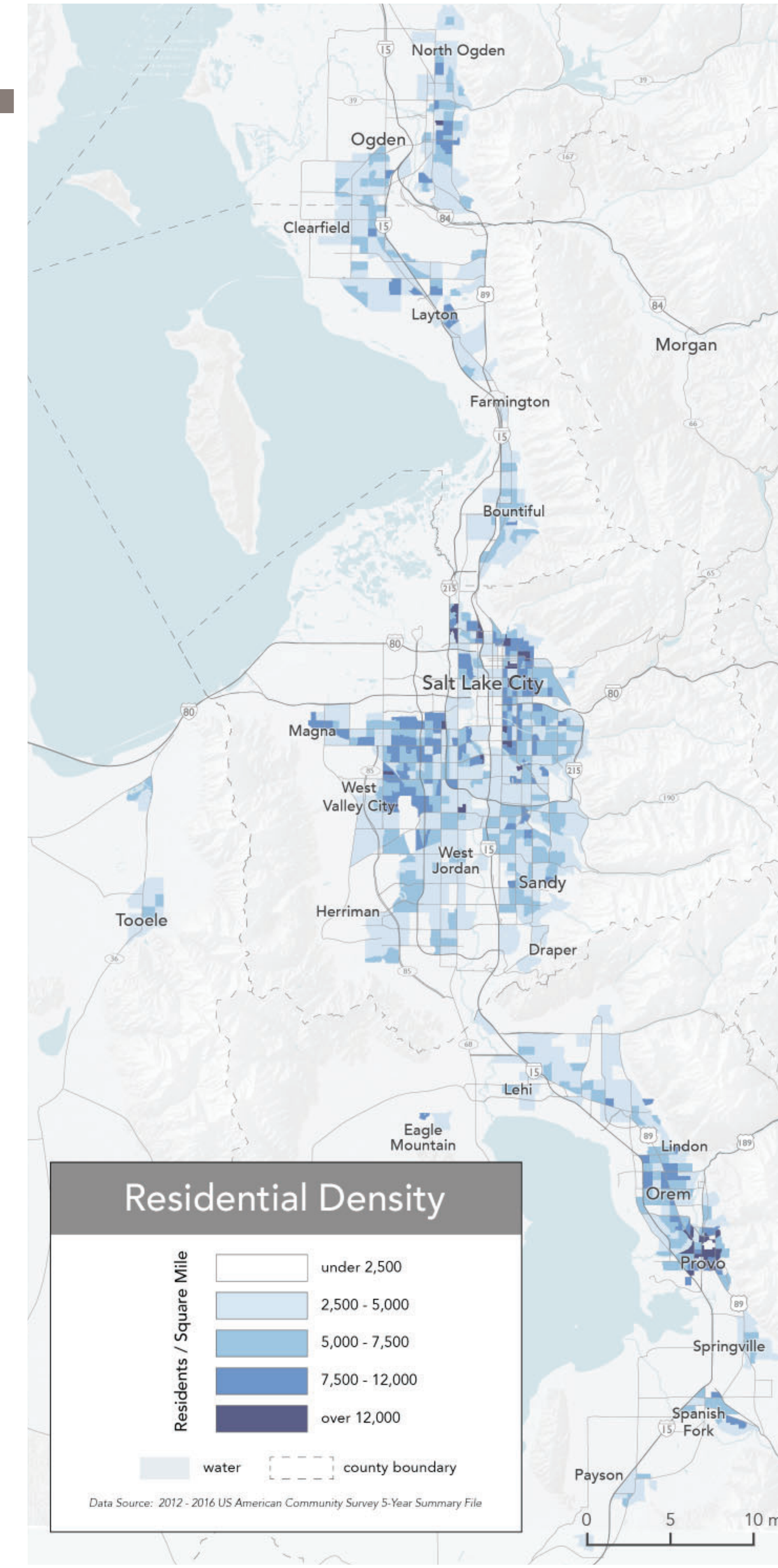


Figure 5: Regional Residential Density

Employment Density

Commute trips do not make up the majority of all trips, journeys to work are the most common overall type of trip, so if transit is to present a useful travel option, it must be an effective means to reach employment centers.

Employment tells us about more than workers' commute trips. In the retail and service sectors, high employment density also indicates places that are likely to attract many clients or customers.

Figure 6 maps employment density across the region served by UTA. In Salt Lake City, Downtown Salt Lake City, the University of Utah, and around Sugar House are the densest employment centers. Some of the other major employment concentrations within Salt Lake County include:

- Along 7200 S, the Fort Union shopping center near 900 E, as well as the Cottonwood Corporate Center at the east end of the road before it enters Big Cottonwood Canyon.
- The corridor between I-15 and State Street from downtown Salt Lake extending to the south end of I-215.
- Large shopping centers, such as The Shops at South Town (State and 10600 S).
- Within the industrial areas, the highest employment densities are found around the I-215 / Highway 201 interchange, an area that is home to a number of large shipping facilities, as well as retail, service and office uses.

In the northern portion of the region, the highest employment densities are found around Weber State University, downtown Ogden, and the commercial nodes off I-15 in Clearfield and Layton. In southern Davis County, the main concentration of employment is the commercial area of Bountiful along US-89.

Employment density in Utah County is greatest around the university campuses within Orem and Provo. Other employment centers in the southern part of the region include:

- The Riverwoods office and commercial area of northeast Provo, near the intersection of University Ave and 4800 N. Riverwoods includes a number of large office buildings, a midsize hospital, and an outdoor shopping center.
- The central commercial area of Provo.
- The Thanksgiving Point commercial area of Lehi off I-15 near the interchange with Timpanogos Highway.
- The retail node within American Fork adjacent to where State St. (US-89) intersects I-15.

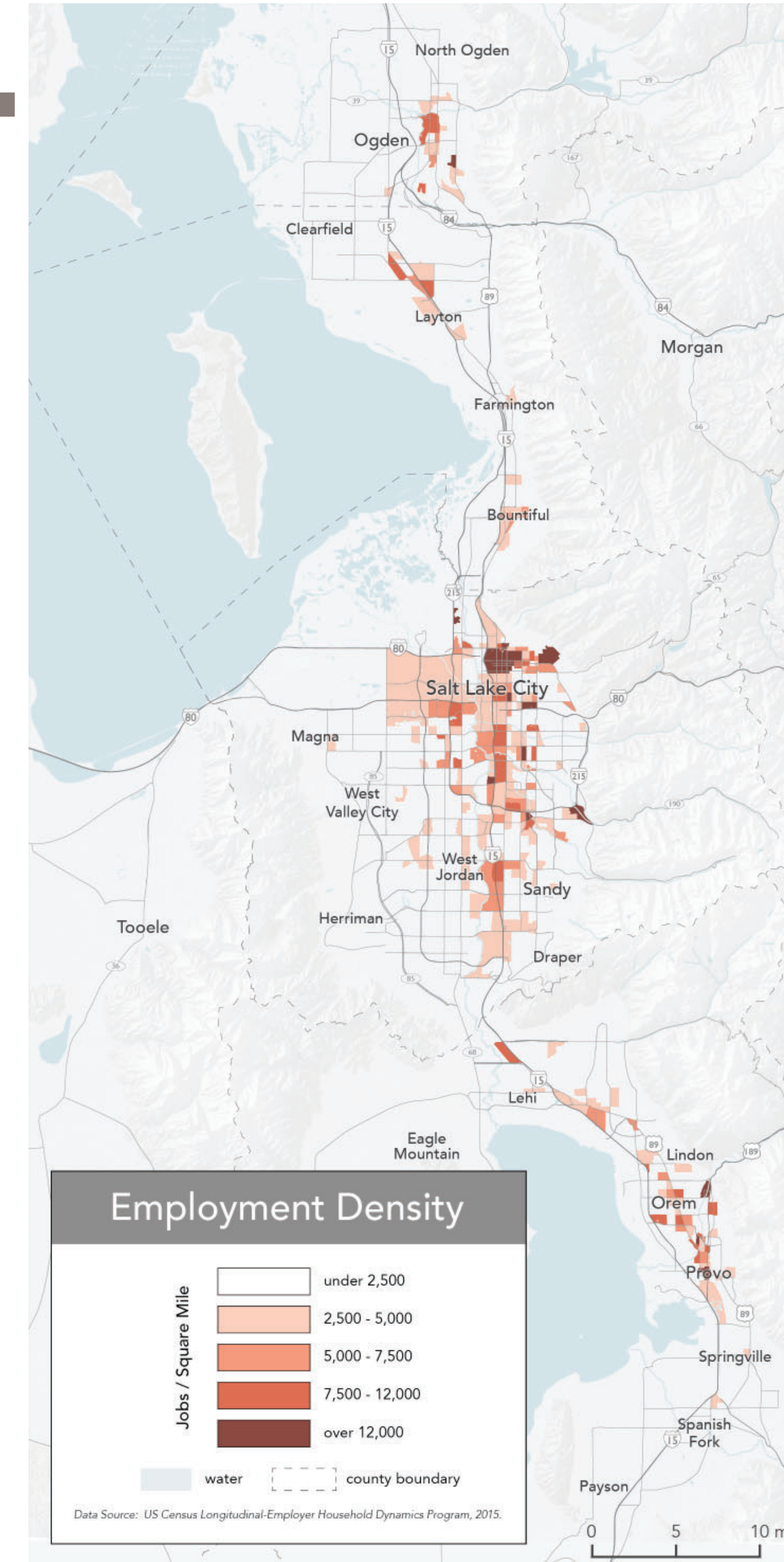


Figure 6: Regional Employment Density

Walk Network Connectivity

In almost all cases, transit trips begin and/or end by walking. Therefore, the ability to walk to transit is very important.

Walk network connectivity is a way of assessing how complete a place's pedestrian and street network is. To do this, the area accessible "as the crow flies" in a given distance from a location is compared to how far you can go in the same distance along the street and pedestrian network.

Figure 7 provides an illustration of this concept. In each image, a transit stop is at the center and the circle is the distance within 1/2 mile "as the crow flies." The shaded area is where you can reach the stop by walking no more than 1/2 mile.

In the "Low Accessibility" example, a disconnected street network allows access to just 31% of the 1/2 mile radius around a transit stop, while in the "High Accessibility" image, over 60% of the radius is reachable. We call this measurement "effective walk radius". In purely grid street networks like that in the second example, the maximum effective walk radius is usually in the range of about 60-65% of the "as the crow flies" distance, though it can be higher if more direct paths are available.

In the map on this page, we show where the effective walk radius, created by a well-connected street network, is relatively high or low[2]. The darker the contour on this map, the more the walk network resembles that in the "High Accessibility" example; the lighter, the more it looks like the "Low Accessibility" example.

The highest walk network connectivity is found in the Avenues neighborhoods of Salt Lake City, which is laid out as a grid of regular 400 ft blocks. The small block length and complete grid combine to produce walkable areas similar to that in the High Accessibility example.

The inner areas of Salt Lake City, as well as Ogden, Provo and Orem each boast relatively high walkability as well. In Salt Lake outside of the Avenues, as well as in Orem, the 1/2 mile arterial grid is complemented by an extensive, though less regular, local street network within each superblock. In Provo and Ogden, smaller, regular grids of 500 and 750 ft provide a high degree of connectivity, similar to that found in the Avenues but slightly lower due to the longer block length.

Because most developed areas of the region are organized as a grid of widely spaced arterials, walk network connectivity largely depends on the extent of local residential streets and pedestrian networks within each arterial block. Local street patterns in much of West Valley City, Sandy, and the Clearfield and Layton areas are not grid networks, but most areas are penetrable on foot, even if the path used to traverse a particular subdivision or neighborhood is more circuitous than in other places.

> Walk network connectivity does not measure the difficulty of crossing streets, which is often a major barrier to access. Some of the areas shown as having moderate walk network connectivity actually include major barriers to walking due to the small number of places where it is safe to cross a major street.

Most of the smaller towns within UTA's district center around a small extent of short-block, high-connectivity grid street network. Examples include Santaquin, Payson, Spanish Fork, Springville, and Bountiful. Long-distance services between towns depend on a decent walkshed around their stops, because deviating the bus off the shortest available path in any single community increases both the cost of the service and travel time for those riding through.

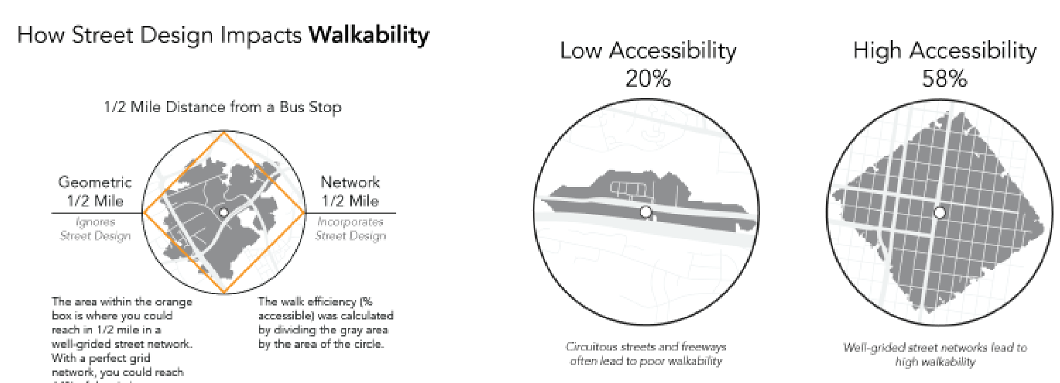


Figure 7: Walk Network Connectivity

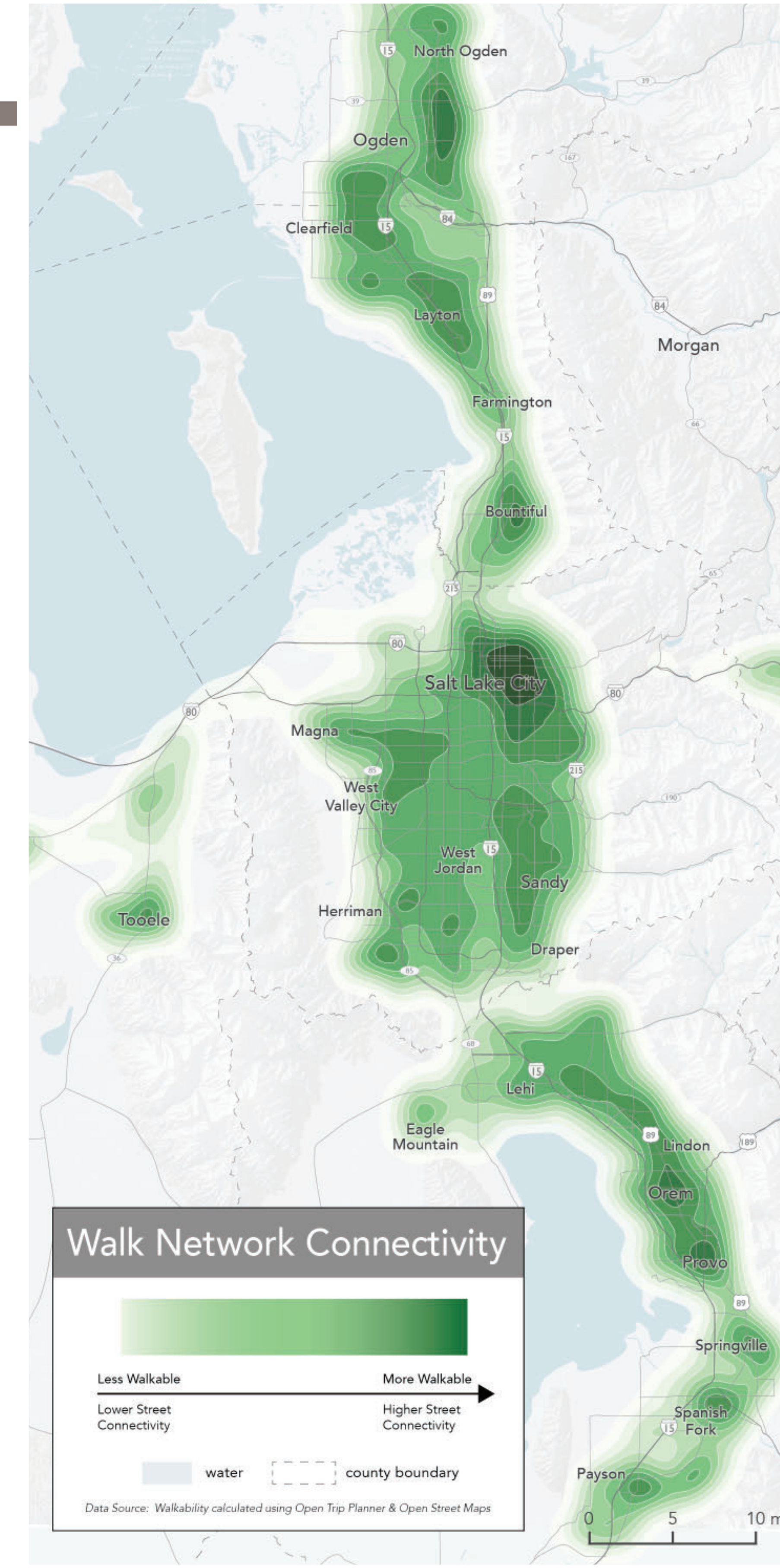


Figure 8: UTA Service Area Street Connectivity

2. This map is created by taking an effective walk radius measurement for each of a finely spaced grid of points, then generating a heatmap and plotting based on relatively high or low values.

Poverty

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

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, so long as other viable options are available, even if those other options require personal or financial tradeoffs (e.g. driving a worn-out vehicle that breaks down frequently, or relying on friends and family for rides).

Figure 9 shows the density of residents in poverty[3] in each census block group throughout UTA's service area, while Figure 10 shows the same measure, but for people living in households with combined income below 150% of the federal poverty level. We show both measures here because in many places, the federal poverty level is set at an income level far below that of a livable wage for the region (for example, in 2018, the federal poverty level for a family of 4 is just $25,100).

In Salt Lake County, the highest densities of people in poverty are found in Salt Lake City itself, as well as in the northwest part of the developed area of the county in and around West Valley City. Less-dense clusters of lower-income people are present in the east of I-15, particularly in the Midvale area just east of I-15 and south of 7200 S.

In the northern and southern portions of the service area, density of people in poverty is concentrated in the larger cities. In Utah County, Orem and Provo both have substantial poverty density, particularly in the areas around the universities. It is worth noting that large student populations often skew the distribution of people in poverty due to the large number of students who do not work, or only work part-time. The same thing is true of Ogden in the north. In the north, there are also notable clusters along I-15 in Layton and Clearfield, as well as around Bountiful in the south part of Davis County.

In addition, understanding where low-income populations are located is key to adhering to the Federal Transit Administration's Guidance regarding the Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994), referred to as Environmental Justice (EJ), which requires transit providers incorporate environmental justice and non-discrimination principles into transportation planning and decision making processes as well as environmental review for specified initiatives.

3. Here, "poverty" means a family income below the federal poverty level for each size of household.

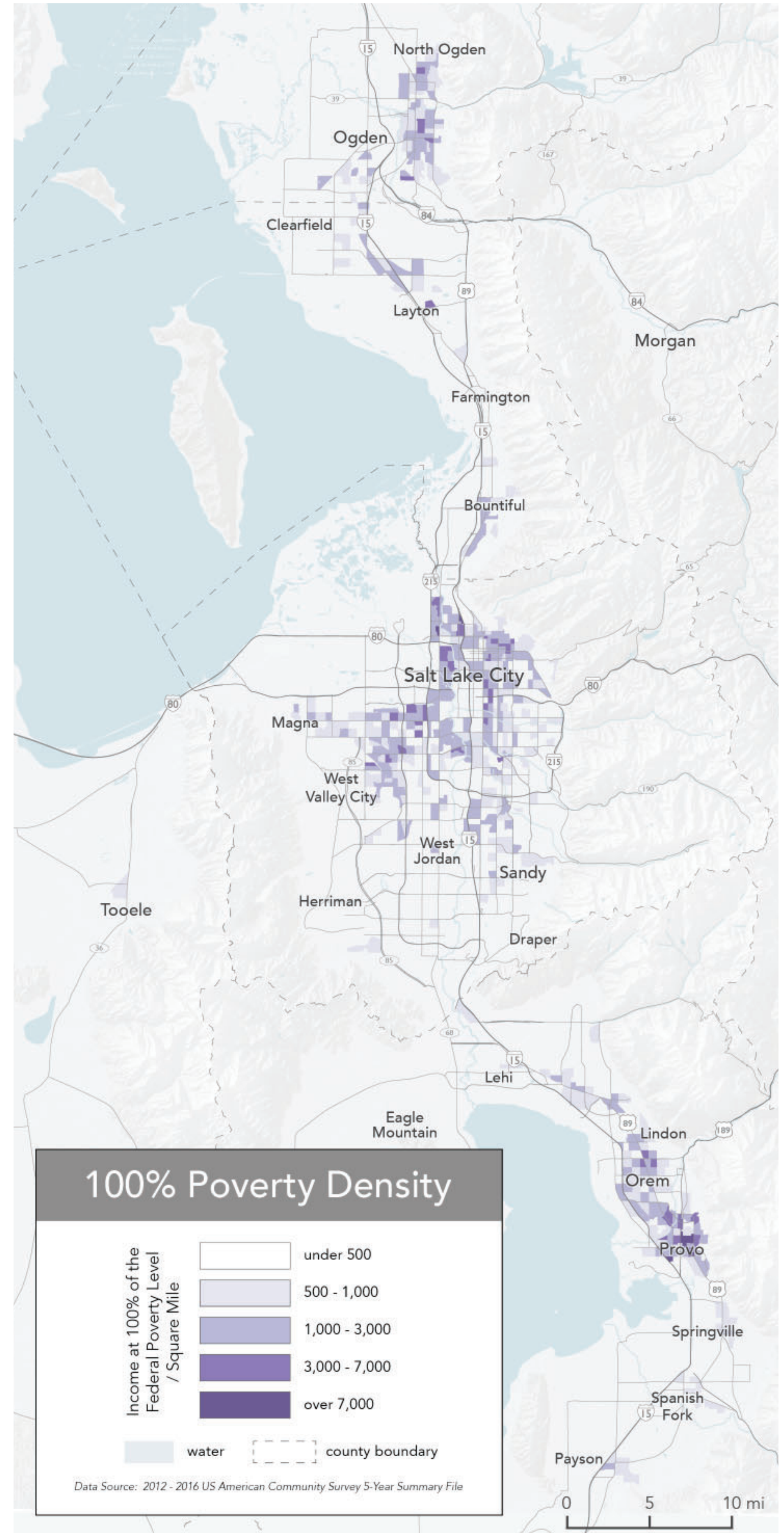


Figure 9: Regional Density of People in Poverty (100% of federal poverty rate)

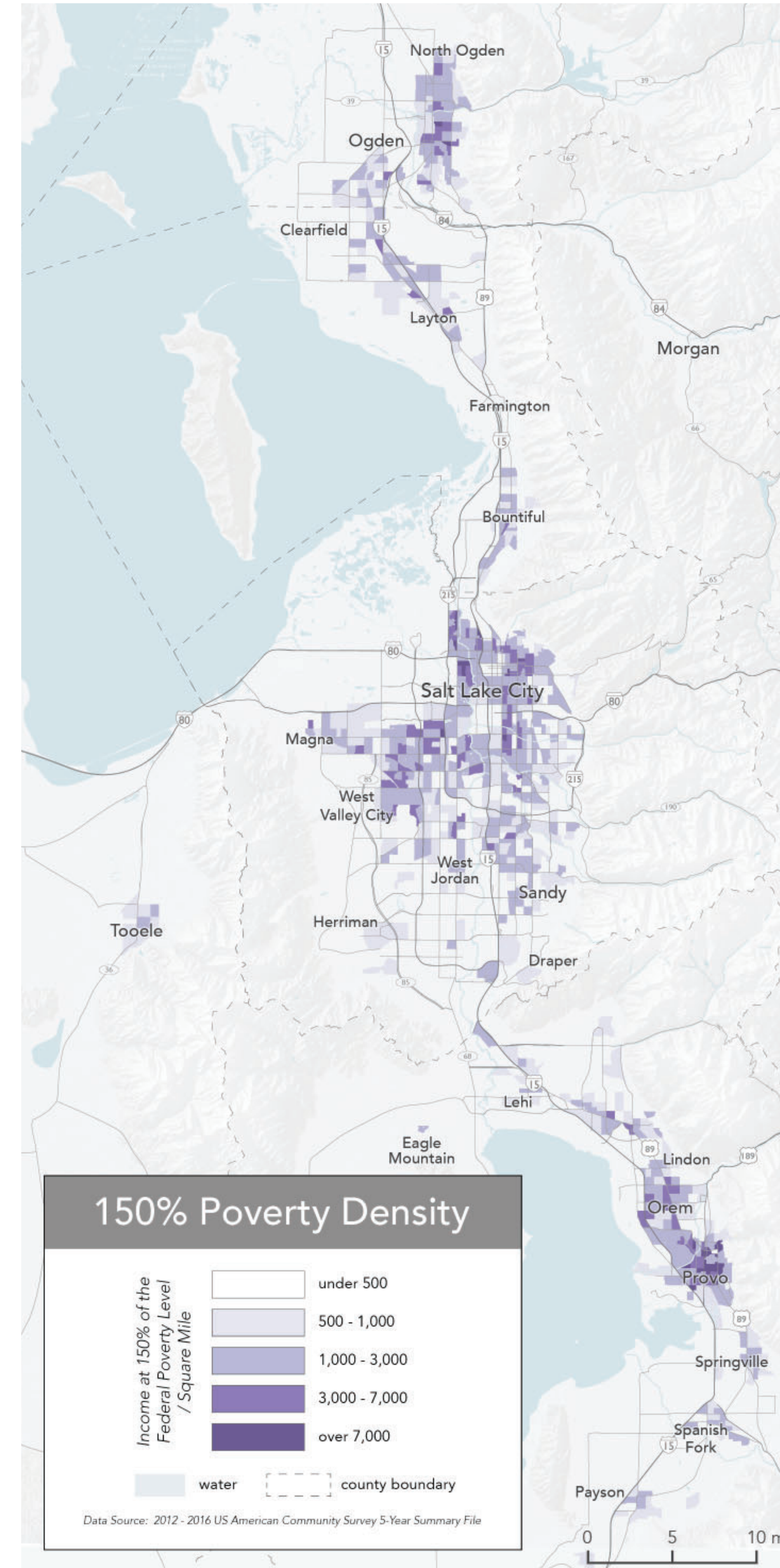


Figure 10: Regional Density of People in Poverty (150% of federal poverty rate)

Zero-Vehicle Households

While people who don't own cars don't use transit by default, they have fewer options than those who do have access to personal vehicles. As a result, if transit is a useful (fast, reliable, available when they need it) method of reaching the places they need to go, it can be a compelling option. Figure 11 maps the regional density of households with zero vehicles.

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.

Density of zero-vehicle households is minimal across most of the service area. The highest levels are found within and immediately around downtown Salt Lake City, where non-car options (transit, bike share and bike infrastructure, etc) are richest. Beyond this area, zero-car household densities are slightly higher within the I-215 / I-80 loop, where the frequent transit network grid is richest and most useful, and within central Ogden and Provo near the Weber State University and Brigham Young University campuses.

Seniors

Seniors (persons age 65 and above) are an important constituency for transit. As a demographic group, senior-headed households 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. Furthermore, people over the age of 65 are much more likely to have a disability than the general population, (although many disabiliites do not necessarily impact the ability to drive).

In UTA's service area, the distribution of seniors is generally quite similar to the general population, but with a few notable differences. The places with the absolute highest densities of seniors are very different than where overall population density is highest (typically around universities). Within Salt Lake County, density of older residents is generally higher east of I-15 than west, the opposite of the distribution of the general population.

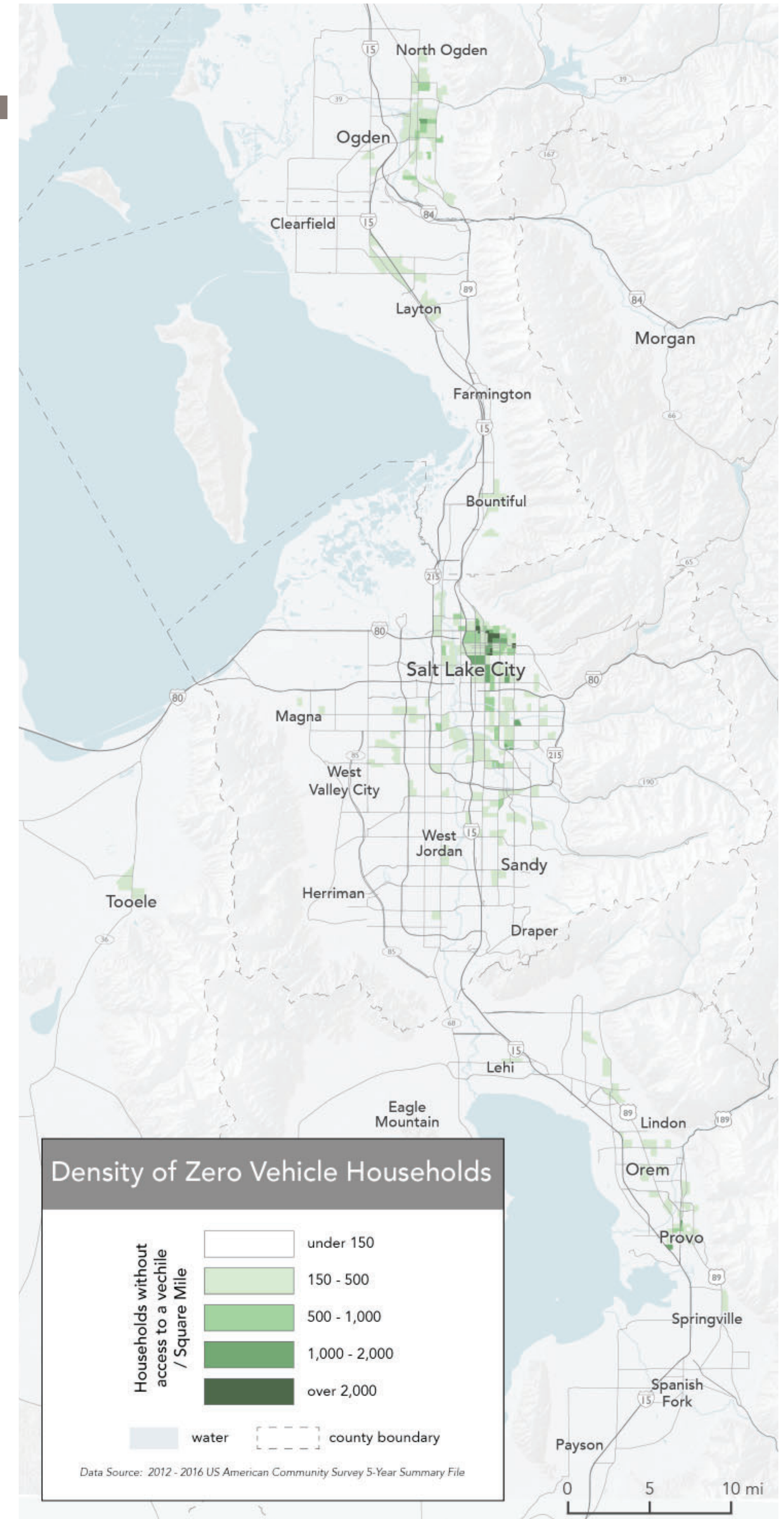


Figure 11: Regional Density of Zero-Vehicle Households

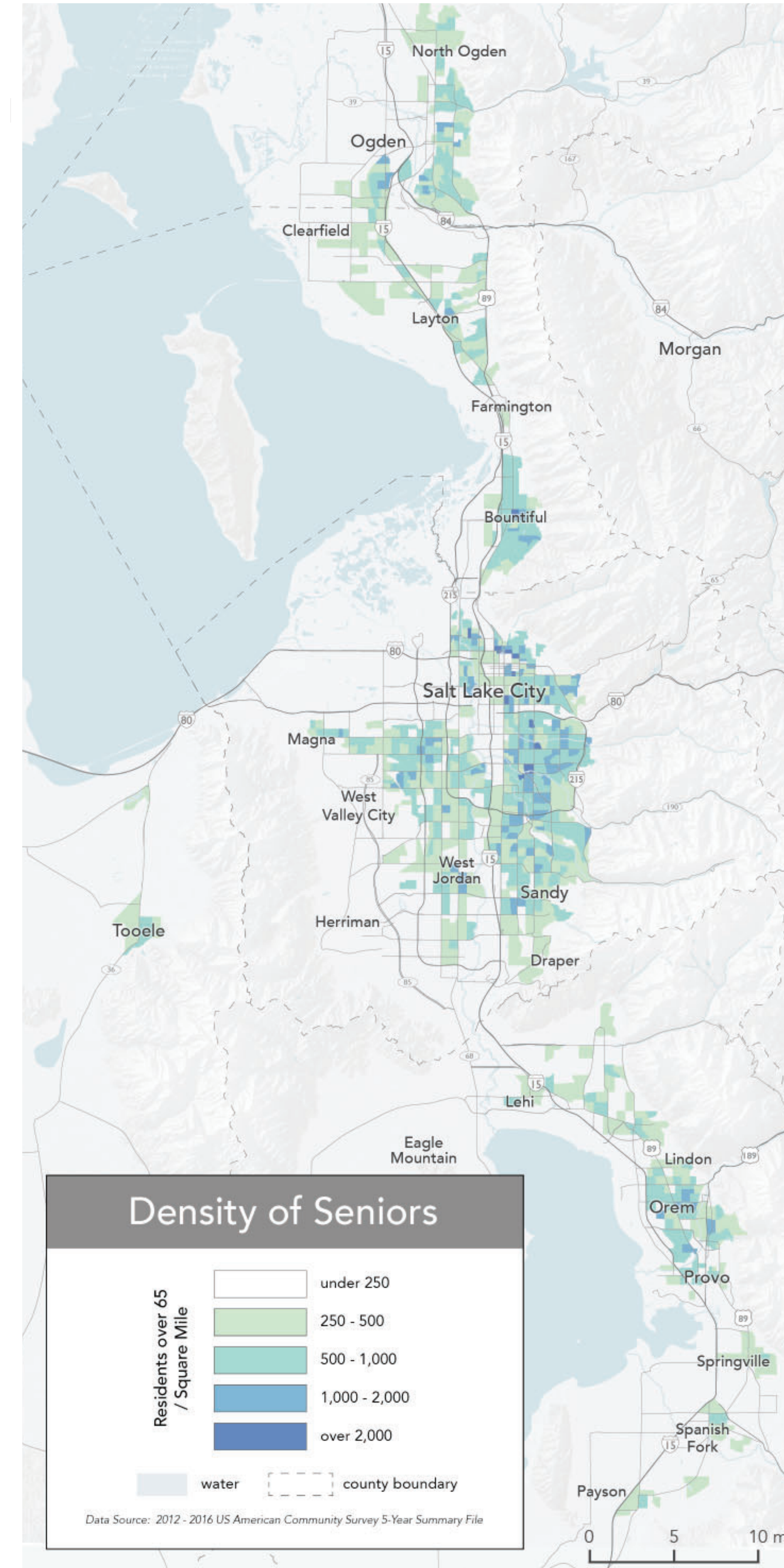


Figure 12: Regional Density of Seniors

Minorities

According to numerous surveys conducted by transit agencies throughout the country, people of color are generally more likely to use transit[4]. In the United States, race and ethnicity are also strongly correlated with various economic factors relate to transit use (such as living in larger metropolitan areas with more developed transit networks).

Transit agencies are also required by Title VI of the Civil Rights Act of 1964 to ensure that services they provide do not discriminate on the basis of race, color or national origin.

Additionally, equity-based transit goals are often articulated in terms of improving mobility or transit access for people of color, particularly in places where the existing development patterns and transportation network contribute to disparities in access to jobs and other opportunities.

Figure 13 maps race and ethnicity data at the block group level across UTA's service area. In this map, dots are distributed across block groups at a ratio of one dot per one hundred residents, and then color coded based on the proportion of residents of each race.

Hispanic or Latino people make up the single largest racial or ethnic population group within UTA's service area[5], at approximately 15% of the population of the 6 constituent counties and 18% within Salt Lake County and Weber County, according to the US Census. No other single group makes up more than 3% of the overall population of the UTA member counties, or 4% of any single county.

The hispanic/latino population is shown as orange dots in Figure 13, and makes up the most significant racial or ethnic concentration throughout the service area western and northwestern of Salt Lake City and West Valley City. There are also smaller concentrations in northern Ogden, southwestern Provo and several block groups within Orem.

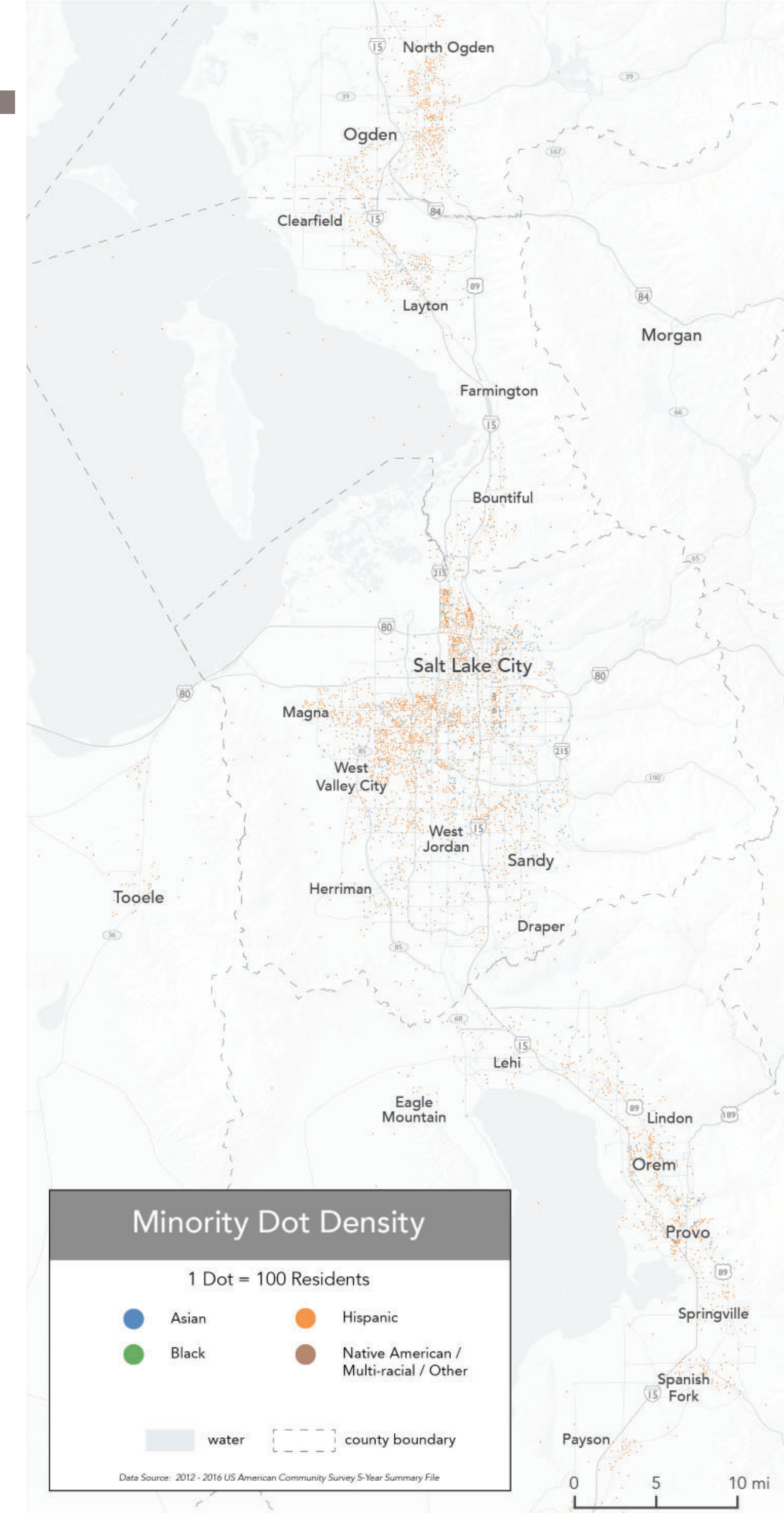


Figure 13: Regional Minority Dot Density Map

4. American Public Transportation Association, "Who Rides Public Transportation", January 2017.

5. US Census American Community Survey, 5-Year Summary File 2016.

2 The Existing Transit Network

Transit generates high ridership when it concentrates useful (frequent, long span) service with in where lots of people are nearby to use it. It achieves high coverage by spreading out service so that more people can access it, but at the cost of reducing the frequency and span of service. This chapter examines UTA's existing network to understand the degree to which it is oriented towards either of the ridership or coverage goals today, and how well it provides useful service to people within the service area.

Is the existing bus network's goal ridership or coverage?

One of the most important questions this study poses to the public and elected officials is whether to change the balance of resources within UTA's network between these two important goals. In order to have an informed opinion on this question, it is helpful to first develop a sense of how the network's resources are divided today.

To do this, we examined key land use and performance indicators for each route in UTA's network, and divided the cost of each route (in terms of its weekly total hours in service) into three categories: ridership, coverage, and duplicative service. We then summed the resources assigned to each category to arrive at a goal split for each business unit's bus service, shown in Figure 15.

Across the entire bus network, we estimate that approximately 55% of service is focused on generating high ridership, and 43-44% on high coverage. Around 2% overall is made up of duplicative service that a detailed network planning process could potentially streamline to improve efficiency.

Region	Ridership %	Coverage %	Duplication %	% of all UTA bus service
Central	62%	37%	1%	64%
Southern	63%	37%	0%	11%
Northern	31%	63%	6%	16%
Full System (Bus only)	55%	44%	2%	100%

Figure 15: UTA Service Purpose by Business Unit

In the central and southern regions of the network, approximately 60% of bus service is focused on the goal of high ridership, and approximately 40% on the goal of providing coverage. In the northern region, the situation is somewhat different - approximately 30% of service is where it would be if high ridership were the goal, and 60% focused on high coverage. The northern counties also have a fairly substantial (5-6%) degree of duplicative service.

Any changes to the ridership-coverage balance as a result of this process would happen at the level of the business unit. For example, Utah County could decide to stay at 60/40, and Salt Lake County could decide to move to 70/30, without impacting each other's local services.

Why is the northern region so much more coverage-oriented than the rest of the network? While the next sections of this chapter will describe each business unit's network in detail, the short answer is that in the northern region of the network, there is a lot of all-day 30-minute or hourly bus service spread out serving residential areas along I-15. This contrasts with the network in the southern region (Utah County), where comparable areas (for example, east of I-15 near Lehi) are only served by limited peak-only routes. As a result, resources in the southern area are more concentrated in Orem, Provo and the US-89 corridor.

Where is useful service today?

The most fundamental element of transit usefulness is frequency. Frequency determines how long you have to wait for a bus, to make a transfer, or for the next bus if you make it to the stop a little too late. More frequent services reduce travel time as a result, and are more reliable for the customer, because the penalty for a late or missed trip is reduced. Most frequent services are 100% focused on generating high ridership, unless they serve very low density land uses.

Figure 14 highlights the portion of UTA's service area within 1/2 mile of a service that operates every 15 minutes or more frequently, all day. Nearly 750,000 people are within 1/2 mile of frequent service, about 50% of the total number of people near a UTA service of any kind. The area with access to frequent service includes almost all of Salt Lake City and its immediate surrounding area, West Valley City, most of the dense portions of Orem and Provo, and the corridor between downtown and Weber State in Ogden.

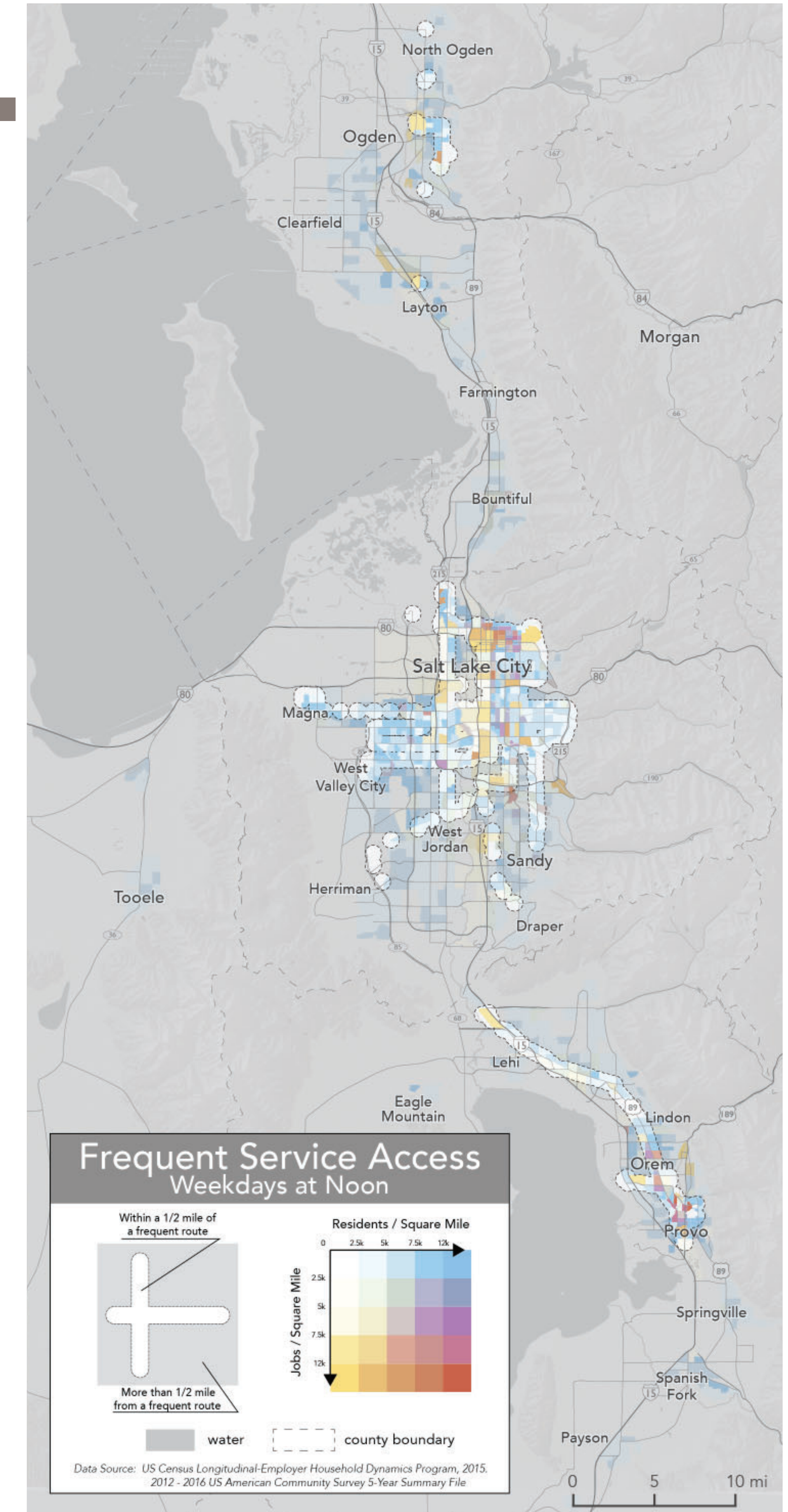


Figure 14: UTA Frequent Service Access Map - Weekdays

Where is productive service today?

High ridership arises from the alignment of useful service and supportive land use. The result is high ridership per cost of service, or *productivity*. Figure 16 shows how frequency and productivity related UTA's existing network. In this chart, the x-axis shows how frequently each route comes at midday, while the y-axis shows how many passenger boardings each route generates per hour in operation. Each route is color-coded by its business unit. A few extremely high-performing routes (the rail system) are beyond the limits of the y-axis.

In UTA's network, the highest-productivity services are the TRAX and FrontRunner rail lines. Each of these generate over 130 boardings for each revenue hour they are in operation. Several factors are key to why the rail lines are able to achieve such high productivity. TRAX and FrontRunner use high-capacity vehicles capable of carrying many more passengers per trip. In the case of the TRAX system, these are high frequency services mainly serving supportive, dense land uses. In the case of FrontRunner, the route serves many important destinations at high speed over great distances, and is very competitive with driving for longer regional trips.

Beyond the rail lines, the highest-productivity routes in the network are mainly frequent services in dense, high-demand places. This is a common trait in many transit agencies, since frequent services are both much more useful than infrequent service, and thus capable of competing for users, and consciously designed to serve the strongest markets.

Lower-frequency, high-productivity outliers are often routes that operate in similarly dense environments, but at a lower service level. Low-frequency, high-productivity routes are often good candidates for improved service in the future.

Among bus routes, some of the notable high-performers include:

- In Salt Lake County, routes 2, 200 and 39 are examples of high-productivity, frequent network services operating on continuous, relatively dense commercial corridors. On these routes, over 30 people board the bus each hour.
- In Ogden, Route 603 generates ridership very efficiently, connecting Weber State University with the dense downtown area and FrontRunner station.
- The UVX BRT in Provo is not listed because it began operation too recently to provide data for this report, but it is a high-frequency, high-performing route averaging over 40 boardings per revenue hour.

Figure 16: UTA Route Productivity and Midday Frequency

- Among infrequent routes, the absolute best performer is Route 841, a very short connector between FrontRunner and UVU.
- Interestingly, despite the presence of the frequent 35M - MAX service , Route 35 is also a strong performer within the 30-minute category at just over 20 boardings per hour.
- There are several very high-productivity routes operating at low frequency. These routes carry a small number of passengers compared to more frequent services, but they do so very efficiently. Route 650 is a seasonal service that generates most of its ridership by providing a connection between Ogden Station and WSU timed to FrontRunner's schedule. Route 72 connects two major employment areas along 7200 S to TRAX. Finally, Route 201 serves the southern segment of the State St. corridor, which though it is not as dense as the northern portion, still links several of the largest employment areas in the southern part of Salt Lake County.

Network Frequency

Figure 17 maps the frequency of each of UTA's services in Salt Lake County (similar maps for the northern and southern portions of the district are located on the following pages). In this map, the prominent red lines are the most frequent bus services, operating every 15 minutes or better throughout the rush hours and middle of the day, while the blue lines run less frequently. Tan lines represent routes that do not operate during the middle of the day (approximately 11:00 a.m. to 1:00 p.m.), or which run a very limited number of trips throughout the day.

Central Region (Salt Lake & Tooele Counties)

The TRAX light rail system makes up the backbone of the transit network in Salt Lake County, serving major destinations like the University of Utah, downtown Salt Lake, the airport, Intermountain Medical Center, and the various other commercial and employment areas along the combined Blue and Red lines traveling south.

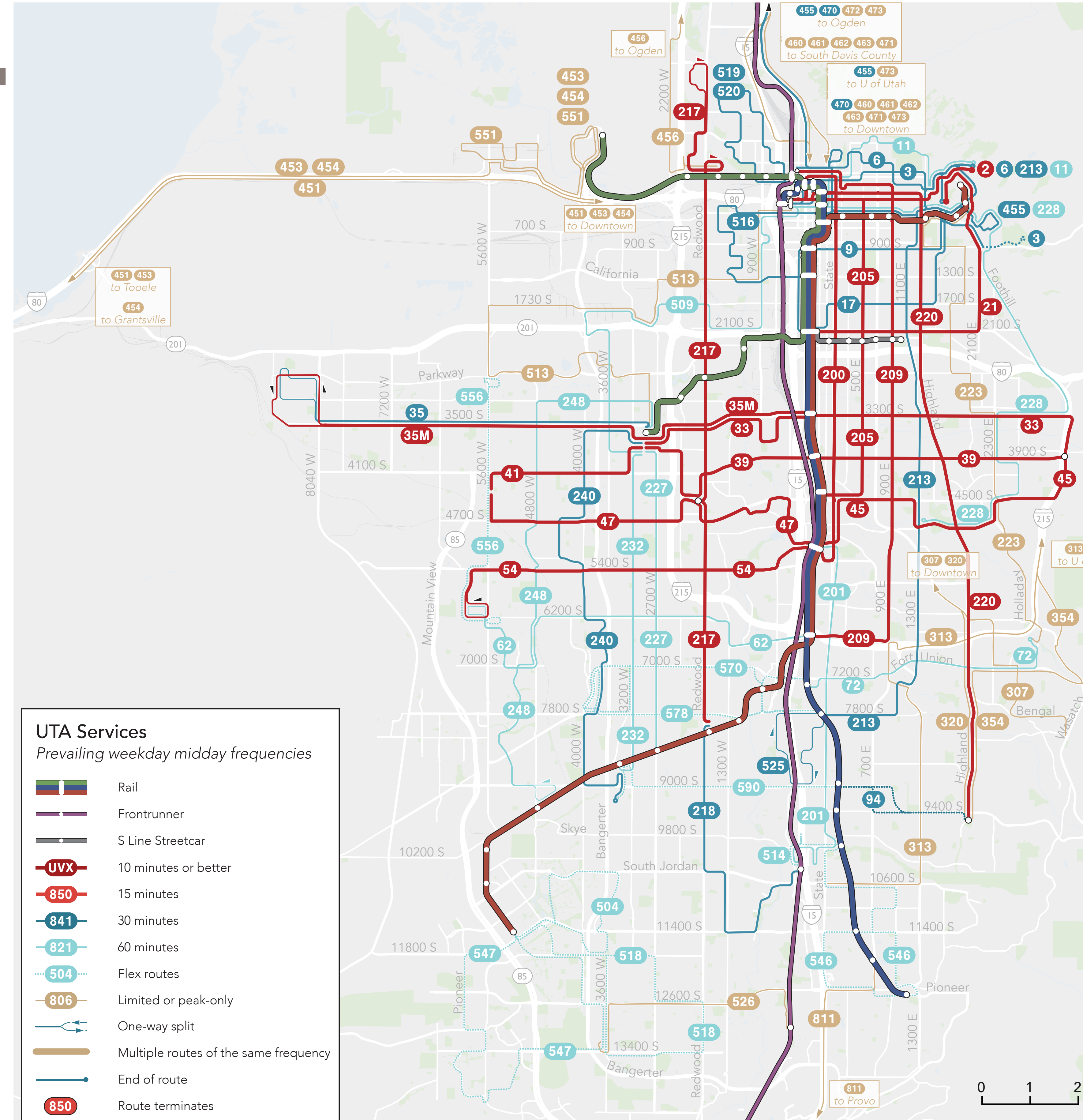
UTA operates an extensive grid of frequent services across most of Salt Lake City, West Valley City, and the various cities north of I-215. This grid is made up of lines 21, 33, 35M, 39, 41, 45, 47, 54, 200, 205, 209, and 220, all of which run every 15 minutes throughout the day on weekdays. All east-west frequent services connect to rail.

When frequent services are arranged in a grid, travel times are reduced because trips between any two points within the grid typically can be made with only one connection between routes. Because these routes operate at high frequency, waiting times to make transfers are much more tolerable (an average of 7.5 minutes for a 15 minute service) than on 30-minute or hourly routes.

Outside of the existing frequent grid, lower frequency service is on most major arterials until around 7200 S. South of this point, most fixed-route, all-day service travels north-south, connecting into the grid, but not providing east-west movement. Much of the southern part of the county is served by low-frequency Flex routes, which can deviate from their route to pick up passengers at their request, or by peak-only or limited routes that are only available for a few trips in each direction per day. Most of these services operate a very limited weekend schedule, if at all.

A portion of Tooele County (which includes most of the county's population) pays into the UTA district, and a limited number of peak-only trips of routes 451, 453 and 454 connect the communities of Tooele, Grantsville, Stansbury Park and Lake Point to Salt Lake City. UTA also operates two all-day Flex routes within Tooele City, and another connecting Grantsville to the Benson Grist Mill Park & Ride.

Figure 17: Central Region (Salt Lake & Tooele Counties) Transit Network Frequency



Northern Region (Davis, Weber, Box Elder Counties)

UTA's northern business unit consists of routes mainly operating in Davis, Weber and Box Elder counties. The network design in this region has several major defining characteristics:

- Most all-day services connect to FrontRunner in at least one place.
- High-frequency services serve most major destinations, employment areas and most residential areas within and around Ogden.
- An extensive set of rush-hour-only routes travel between the southern portion of Davis County and downtown Salt Lake City. This group includes the various peak-only or limited routes entering Salt Lake from the north via I-15, such as 460, 461, 462. Every route in this group provides a limited number of direct trips to and from downtown Salt Lake, but not to the University of Utah.
- Several bus routes connect Ogden directly to Salt Lake City. Route 470 provides all-day, infrequent service from Ogden to Salt Lake City via Main St. Route 472 is a peak-only express service using I-15 from the Riverdale park-and-ride just east of the Riverdale Rd. overpass crossing I-15. Route 455 and 473 perform a similar function via US-89 to the east, with 455 providing all day service from Ogden to Salt Lake City by this route, and 473 supplementing that service during rush hours.
- Most of the developed areas within 2-3 miles of I-15 are served by at least one all-day transit route. For example, residential areas on either side of I-15 between Clearfield and Ogden are served by routes 626, 604, 640, and 470, all operating throughout the day at 30 or 60 minute frequencies.

Because so much of the transit network in the northern part of the region is oriented towards serving lower-density, suburban residential land uses, we estimate that the overall goal split of services in this area is much more weighted towards coverage (70%) than ridership (30%) compared to the networks in Salt Lake or Utah counties.

The northern region also has a degree of duplicative service (5-6%), mainly due to the southern Davis County network design. This provides many direct peak-only routes into downtown Salt Lake, each serving a small unique market, despite the presence of the high-capacity FrontRunner service. The long-distance peak-only express Route 473 from Ogden to Salt Lake City along the I-15 corridor is also somewhat duplicative of FrontRunner. This is much less true of Route 455 due to its function as the main local service along Main St. connecting many towns in the northern part of the service.

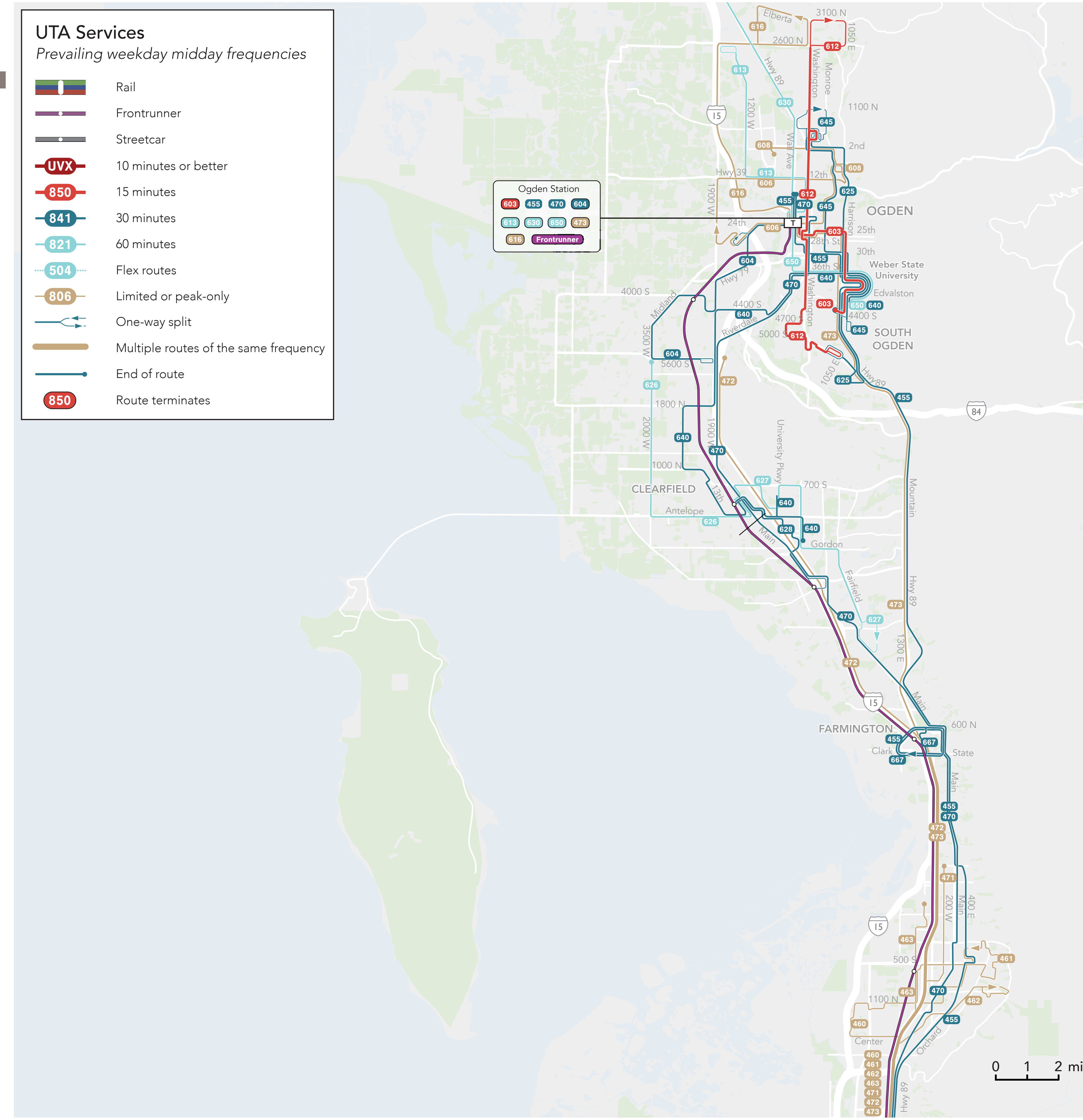


Figure 18: Northern Region (Weber, Box Elder & Davis Counties) Transit Network Frequency

Downtown Salt Lake City

The area encompassing Downtown Salt Lake City and the campus of the University of Utah is the largest employment center and travel destination within UTA's network. It concentrates large-scale government, educational, institutional, retail and entertainment employment in a small area that is connected by commuter and light rail, frequent bus and express bus services to most other places in the region. Figure 19 shows a detailed view of the network in this area

The Downtown Salt Lake network's central node is Salt Lake Central station, where FrontRunner, the TRAX Blue line, and various bus services converge. From here, FrontRunner can be used for long-distance travel north and south throughout the region. TRAX and UTA's frequent bus routes (here shown in red) provide useful connections to many parts of Salt Lake County.

In downtown itself, the TRAX Red Line and frequent Route 2 connect the University east-west across downtown. However, ony Route 2 actually provides a direct connection from the center of the campus to Salt Lake Central. There is also a peak overlay service, Route 2X, that performs a similar function. Each other frequent service spans the west side of downtown to its north-south corridor; for example, Route 205 provides a frequent service from Salt Lake Central along 200 S, and then turns south at 500 E.

Downtown serves as the destination for many of UTA's express services. Routes like 460 or 461 beginning in southern Davis County, operate only during rush hour, and terminate in downtown. Similar peak connections are available from Utah and Tooele counties. Some of the express network terminates in downtown itself (includes route 453 and 454 from Tooele County, and routes 462 and 471 from the northern counties), while others continue through downtown to terminate at the University.

No east-west frequent services are available in this central area south of Route 209 on S Temple and north of the TRAX Red Line on 400 S. Areas like Greater Avenues, Capitol Hill, or the neighborhoods west of I-15 and north of I-80 current lack frequent connections. However, many of these inner areas of Salt Lake City that do not currently have frequent services are high priorities for future improvement in Salt Lake City's recently completed Transit Master Plan (TMP). The TMP includes investments in high-frequency service on 6th Avenue, 900 S, and 600 N, and several other corridors that would put nearly all of Salt Lake City within a short walk of very useful service.

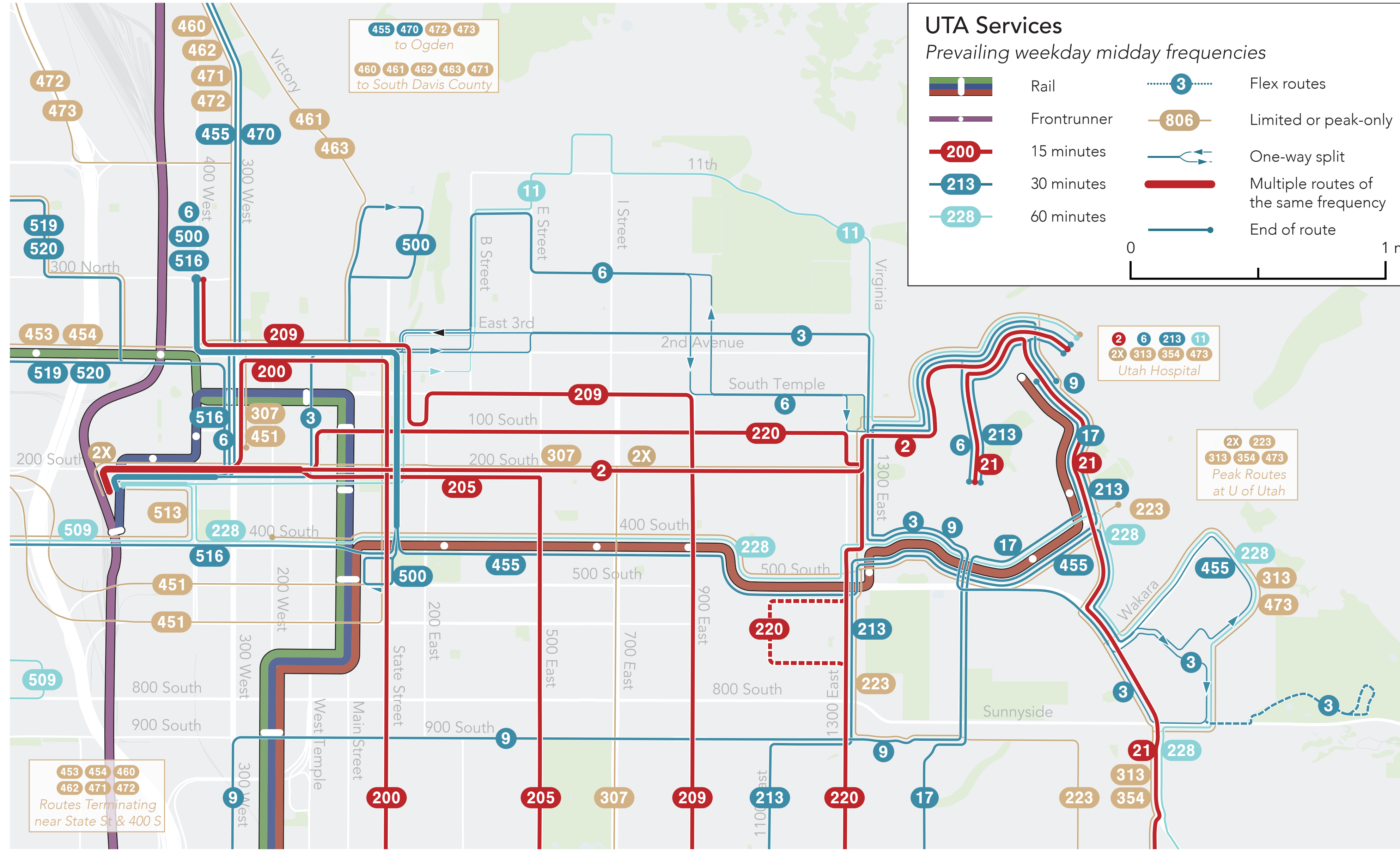


Figure 19: Downtown Salt Lake City Transit Network Frequency

Southern Region (Utah County)

This southern region of UTA's network is characterized by the concentration of service in the relatively densely developed Provo and Orem, as well as along the State St. / US-89 corridor. The split between ridership and coverage-goal services is quite similar in this area to that of Salt Lake County: approximately 60% of transit service resources are where they would be if ridership were the only goal, while 40% are focused on providing coverage.

Within Provo and Orem, the UVX BRT (bus rapid transit), and high-frequency Route 850 provide frequent service and connections between FrontRunner, the universities, and most of the dense residential and employment areas of the two cities. Routes 831, 833 and 834 provide lower-frequency coverage service to areas away from the main corridor.

Only three all-day services operate outside of Provo and Orem in this part of the network:

- FrontRunner.
- Route 850, which provides frequent service along State Street / US-89 between Lehi and Provo.
- Route 821, which operates hourly south of Provo through Springfield, Spanish Fork, Salem, and Payson.

Other than those three routes, the remainder of the network outside Orem and Provo operates on a much more limited basis. For example, Routes 805 and 822 south of Provo run only during rush hours on weekdays. Route 811, which connects Utah County to the south end of the TRAX Blue Line in Salt Lake County, offers morning and afternoon service approximately every hour during weekdays, but adds trips throughout the day on weekends. On Sundays, when FrontRunner does not operate, Route 811's 6 round trips are the only transit connections between Utah County and Salt Lake County.

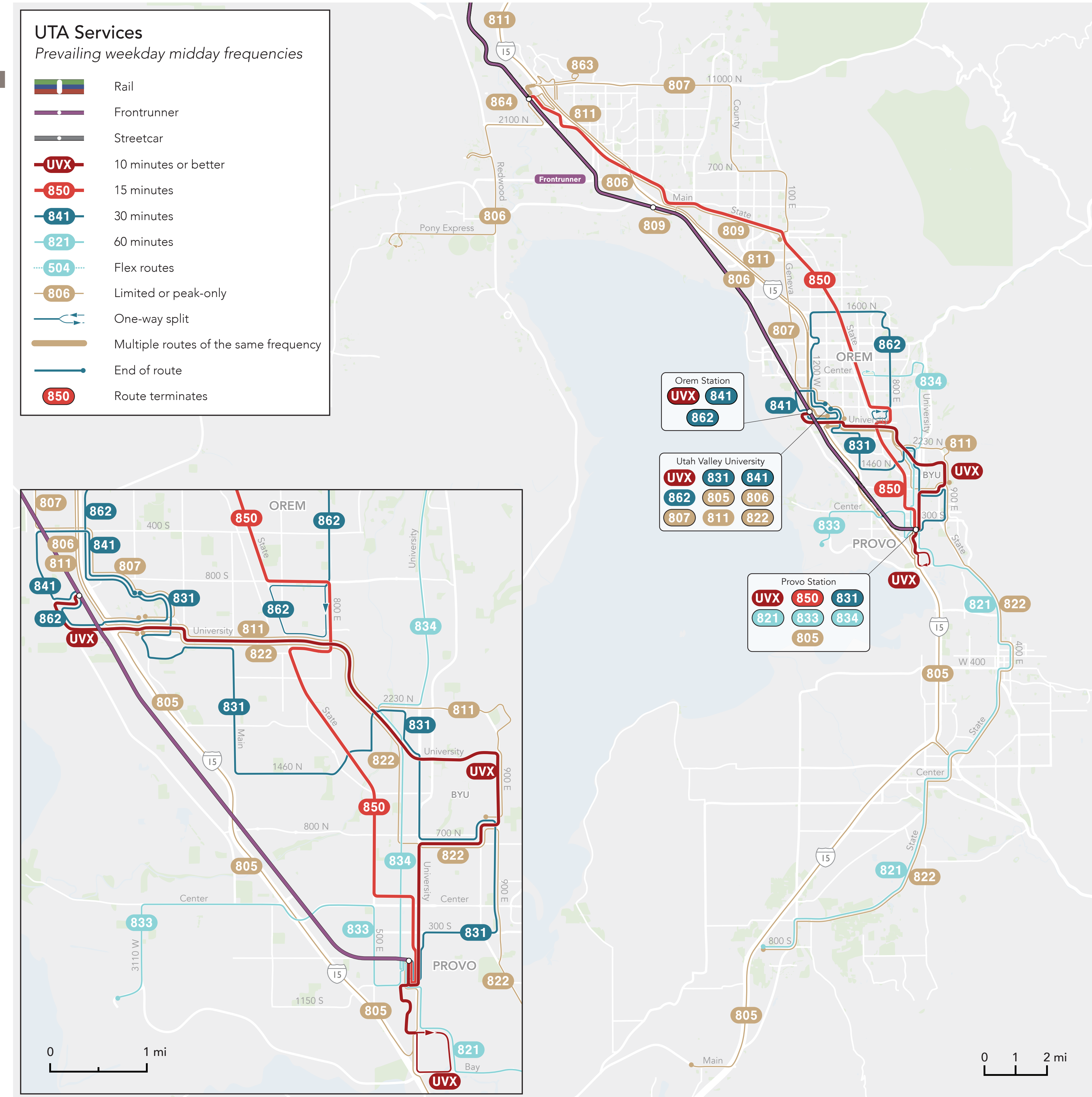


Figure 20: Southern Region (Utah County) Transit Network Frequency

Service Types

Most people think of UTA service types in terms of FrontRunner, TRAX, and buses, but bus services fall into several distinct categories. These bus service types have distinct features, are suited to different situations, and may reflect different priorities. Because the total network is so complex, thinking in terms of service types makes it easier to talk about big picture priorities without getting lost in detail.

Figure 21 provides a simple framework for thinking about the different types of transit service. Here, we are not interested in technology, propulsion system, or the type of wheels a vehicle runs on. Instead, we are focused on sorting the differences in terms of the attributes most relevant to the customer: frequency, speed, span of service, and capacity. More frequent, faster, higher-capacity services are capable of generating higher ridership more efficiently, so long as they serve places with a large potential market of travelers and connect to destinations lots of people want to travel to.

We recommend that UTA develop and refine a set of policy service types, with associated service commitments, and use these as the basis for service planning and service standards.

Frequent Transit Network

The Frequent Transit Network (FTN) is the subset of routes operating so often that a bus is always coming soon, from the rider's perspective. In most cases this means a frequency of every 15 minutes or better, sustained throughout the day.

Many transit agencies have found that this is a critically important category to distinguish because a) while it is expensive to offer it is also very productive in ridership terms, and b) it has the potential to be relevant to urban development decisions. UTA already identifies frequent bus lines on its map. Salt Lake City has identified a proposed set of frequent lines in its Transit Master Plan, and identified other policies tied to the presence of frequent service.

Many US transit agencies brand these routes to communicate the higher tier of service, and some offer a policy commitment to a particular service level - for example, "12 hours of 15 minute service, 7 days per week". At UTA, most frequent routes do not run every 15 minutes on weekends. If necessary, the network can be defined based on weekday service, but ultimately the brand should refer to a weekend service commitment as well.

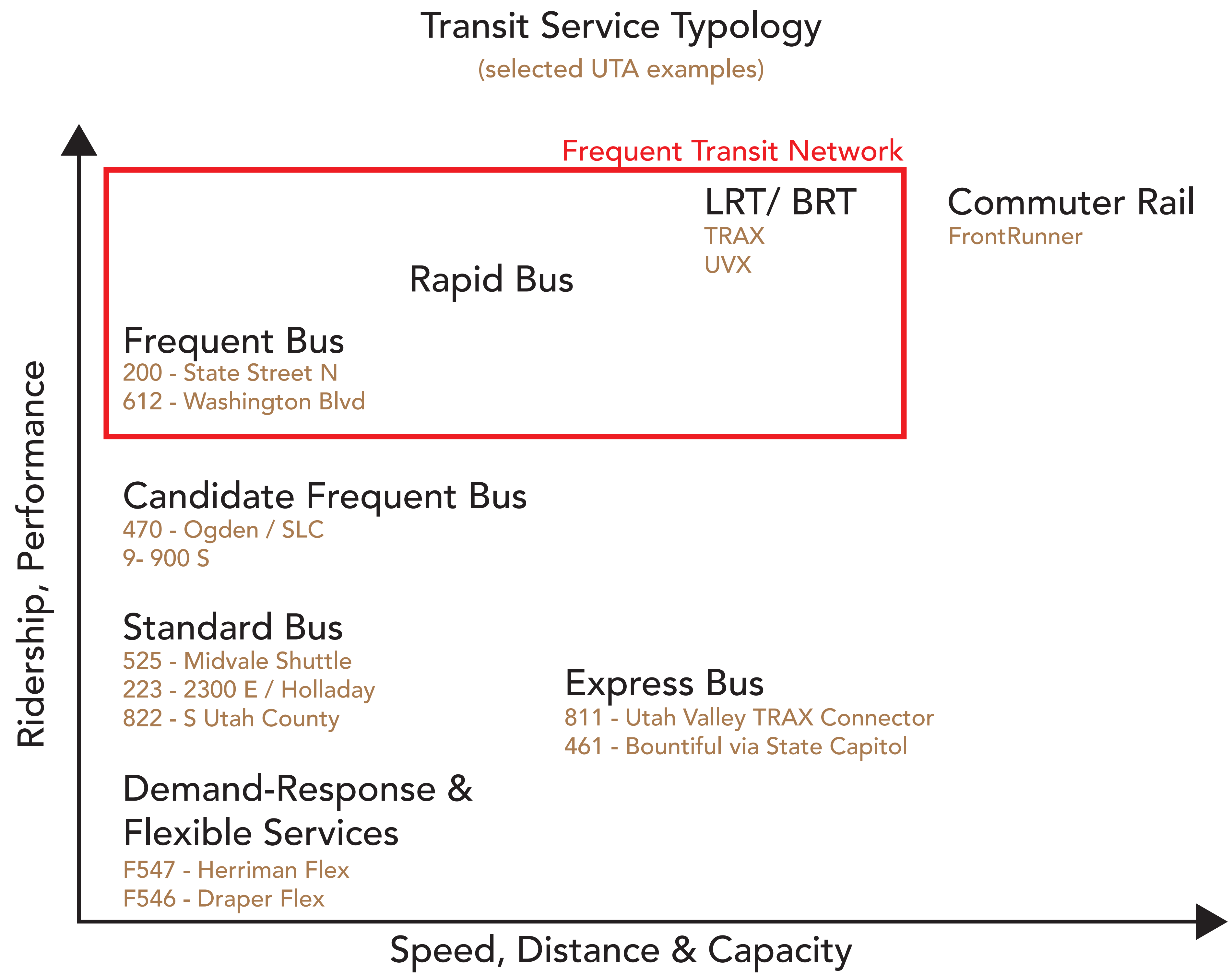


Figure 21: Transit Service Typology

In most US transit agencies, high-frequency routes are the most productive bus services offered. Figure 22 plots route-level frequency and productivity for UTA and 24 agencies across the US. While there is considerable variation in both the effectiveness of service design and the maximum degree of productivity possible given the land use environment, there is a clear link between high frequency and high productivity. A defined Frequent Transit Network brand makes this connection explicit, which is why is can be a very useful category in ongoing service evaluation.

The Frequent Transit Network (FTN) incorporates both services operating in mixed traffic, and services operating in fixed infrastructure. Within the FTN, we can identify the following divisions:

- BRT and LRT routes (such as UVX or TRAX in UTA's network) are typically separated from general traffic for all or a substantial portion of their extent, enabling higher speeds and reliability. Often, these services are provided with larger vehicles that can carry more passengers, raising the upper limit of the ridership they can generate per hour required to operate them.
- Frequent bus routes (such as Route 200 on State St. in Salt Lake, or Route 612 on Washington Blvd. in Ogden) are mixed-traffic bus routes meeting the standard for inclusion into the FTN category. Some agencies accent this with branding, stop infrastructure, and other efforts to communicate that frequent bus services are providing a distinctive and superior level of service than other infrequent bus routes.
- In between those two tiers, some agencies define a third tier of FTN service, often branded with terminology like "Rapid Bus". Rapid bus routes are frequent, and usually have some infrastructure investments to improve speed and reliability, such as queue jump lanes at busy intersections, or transit signal priority (though typically no or minimal exclusive right-of-way is provided). Sometimes these infrastructure improvements will be complemented by a more widely-spaced stopping pattern, specialized vehicles, and improved station-style stops.

Service plans designed to expand ridership enrich or expand the Frequent Transit Network, making existing FTN services more useful, or extend the most useful tier of route to additional strong markets.

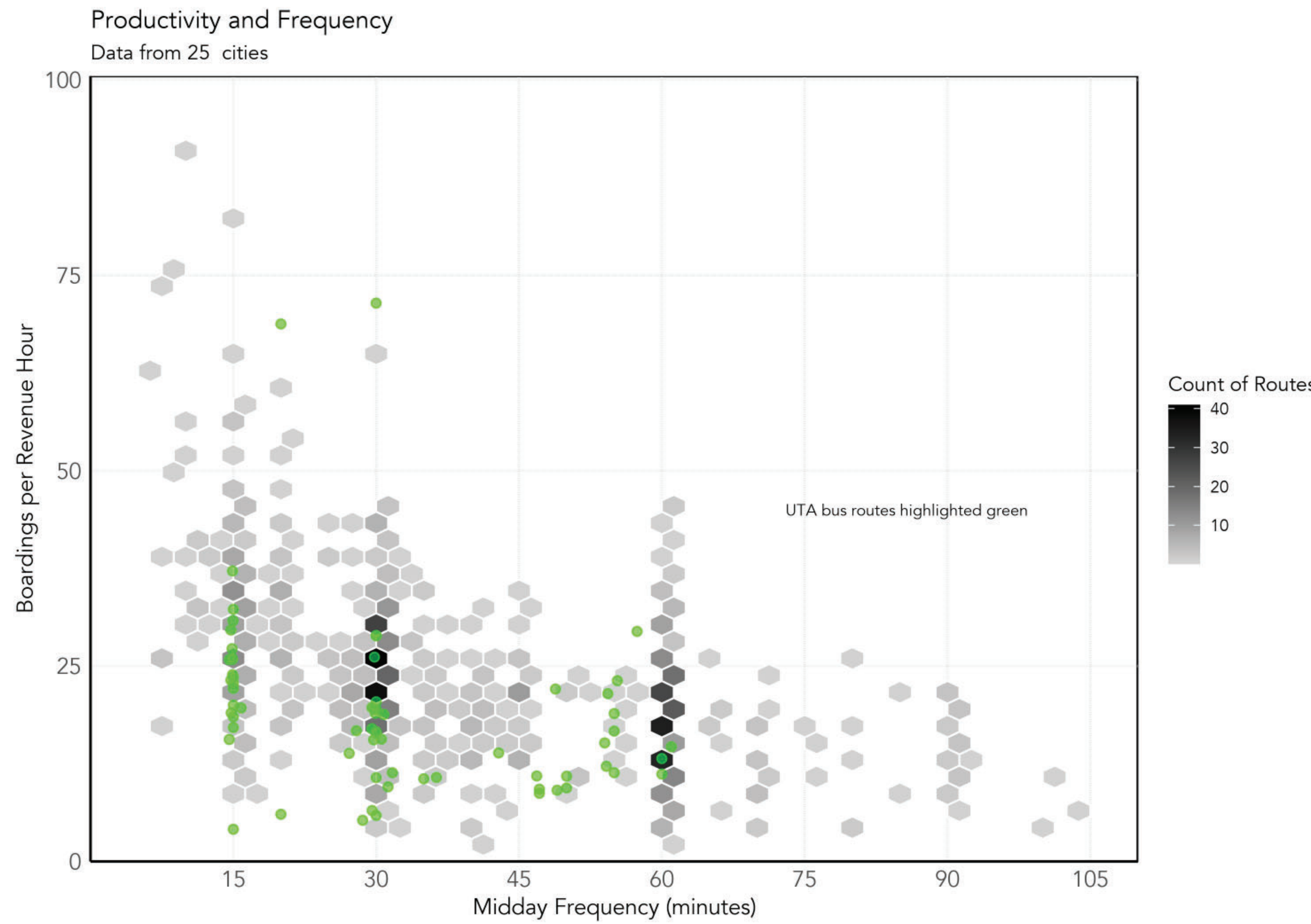


Figure 22: Frequency and Productivity - Data from UTA and 24 other US transit agencies

Commuter Rail

The FrontRunner commuter rail line is not part of the Frequent Transit Network, because it does not operate a high frequency, but it is part of the group of UTA services capable of generating the highest levels of ridership and productivity. Infrequent commuter rail services are most productive when they offer an affordable, time-competitive alternative to driving over long distances, connecting major destinations. FrontRunner does this by linking nearly all major population centers of the region together at a speed that is very comparable to driving, with a greater degree of reliability due to its dedicated right-of-way.

Because commuter rail vehicles can carry many more passengers than buses, and because connecting services are often designed to optimize bus-to-rail transfer times, commuter rail is capable of generating very high ridership at lower frequency.

Candidate Frequent Bus Services

Candidate Frequent Bus Services operate in places that have some or all of the prerequisites for high frequency, but where not all of the necessary conditions are present. Those conditions could include levels of development, a better pedestrian network, or better priority for speed and reliability. This designation can be used to highlight these places where frequent service is possible if some necessary conditions improve.

A highly productive 20-minute route in a dense urban setting would be considered a candidate FTN service until the resources were able to upgrade it. A route which ran every 15 minutes on weekdays but didn't run on Sundays would be considered a candidate until service could be added to meet the FTN standard for weekend service. A 30-minute service in a densifying area may also be a future FTN candidate as land uses become more transit-supportive.

Standard Bus Services

Bus routes without high productivity or supporting land use features that suggest that additional investment would immediately be rewarded with additional ridership fall into the "Standard Bus" category. This tier includes all fixed routes operating for the purpose of coverage alone, serving lower-density areas, or places that are very disconnected from the rest of the network.

This category also includes fixed-routes in outlying or low-density areas like 822 - South Utah County, 626 - West Roy, or 223 - 2300 E / Holladay Blvd. None of these routes are expected to grow into major ridership generators based on current levels of development, but they provide important local access and connections to the rest of the network.

Express Bus Services

Express routes connect neighborhoods and major destinations over long distances, usually with a limited number of trips, widely spaced stopping patterns, and often making use of freeways. Service of this type is used to provide connections between distant places at a lower cost, since express services, by virtue of their limited number of stops, can often travel at higher average speeds. Express routes are often designed with the needs of peak commuters in mind and the majority of their trips typically occur during the rush hour window.

UTA's network includes a number of express services, but in many markets FrontRunner provides a similar level of access to the region's highest demand areas. For example, in the northern part of the service area around Ogden, only two true express services operate into Salt Lake City: Route 473, which provides direct service in places far from FrontRunner, and Route 472, which stops at a number of Park & Rides between FrontRunner stations. Thanks to FrontRunner, Ogden itself doesn't need express service to Salt Lake; instead, peak-only shuttles like Route 616 and the local all-day network help connect the whole town to FrontRunner.

Elsewhere, peak-only express services connect places like Tooele to Salt Lake City, or Santaquin to Provo and FrontRunner. In Utah County, Route 811 offers a fast and direct connection to the end of the TRAX Blue line (although this route runs a local stopping pattern in Provo).

Demand Response & Flexible Services

The last category includes the broad range of travel options driven by the individual user's travel needs. This includes services like UTA's Flex routes, which operate along relatively fixed paths but make deviations in response to individual rider's requests, as well as vanpool and on-demand taxi and van services.

Demand-responsive services have the lowest capacity and lowest potential ridership, because they must spend a good portion of their time-in-service on the trip segments needed to pick people up at their doors.

The highest productivity within this service type can be achieved by routes like UTA's Flex routes, which travel along fixed paths and make short deviations at passenger request. Above a certain ridership threshold, deviations cannot be supported (since one vehicle can't make more than 1-2 deviations and hope to remain on time), and so extremely productive deviated services tend to turn into standard bus routes.

Access to Jobs

We can talk about elements of the service like frequency and span, but the best test of a network is the question: "Where can people get to quickly?" Access analysis is a way of looking at this. For each point in the region, an access analysis shows how many jobs you could reach in a given amount of time.

A transit system that is useful for going more places is more likely to be useful to anyone traveling to the areas it makes accessible, so high access tends to mean better ridership. Being able to go to a wider variety of places is also a good thing in itself; it means you have more options of all kinds: professional, educational and social.

We measure access to jobs because we have good data on job locations, but better access to jobs means more than potential places of employment. It also tends to mean more shopping, social, and other opportunities can be reached, allowing for a richer life for people who choose to rely on transit.

How do we calculate travel time?

In these access analyses, travel time estimates include:

- The walking time from the origin point (center of hexes) to all nearby stops.
- Initial waiting time equal to 1/2 of each route's scheduled frequency.
- In-vehicle travel time based on current schedules.
- Waiting time equal to 1/2 of a route's headway for all possible transfers.
- Walking time equal to the remainder of the travel time budget after arriving at each stop.

More detail on access analysis methods is available at the end of this section.

Access analysis will become important in later phases of this project where we compare the existing system to various possible network options. Those options may increase or decrease access in various parts of the region, and that will be an important basis for judging the value and impact of each option.

Existing UTA Network Access

Figure 24 shows the average number of jobs accessible at noon within 60 minutes of travel time by transit and walking from the center of each hexagon on the map. Analysis was conducted on hexagon center points spaced at one-mile intervals, across the entire area within 2 miles of any UTA route.

Midday weekday access is a good starting point for understanding where the transit network is capable of linking people to more opportunities, since it represents the base level of service available throughout the workday.

The areas with the maximum access to jobs are those near central Salt Lake City, where the region's two largest job centers (downtown Salt Lake City and the University of Utah) are both within a 60-minute trip. This highest level of access is mainly available within the area bounded by I-15 and the south end of I-215, where the high-frequency bus network is most intensive and most useful. However, a modest level of access corresponds to the full area of the frequent transit grid, covering most of West Valley City and extending south to Sandy on the east side of the valley.

Outside of Salt Lake county, access is generally higher along the I-15 corridor, and within the central areas of Ogden, Orem and Provo. Each of these cities have frequent services that put most of their local jobs within easy reach by transit. In Utah County, UTA's Route 850 also provides frequent access up and down the State Street (US-89) corridor, which helps improve the access to Orem and Provo jobs enjoyed by residents living in the northern part of the corridor, and to jobs along the corridor from people living further south.

Region	Average jobs accessible at noon per person in... 30 minutes	45 minutes	60 minutes
Central (Salt Lake County)	7,700	34,100	87,100
Central (Tooele County)	600	1,400	2,000
North	1,800	6,000	13,700
South	5,100	16,900	33,800

Figure 23: 60-Minute Access to Jobs (Weekday)

Figure 23 shows the average number of jobs accessible in 30, 45 and 60 minutes in UTA's six counties. Because Salt Lake County has many more jobs than the rest of the region, its absolute access levels will always be higher. Here, we have separated Tooele and Salt Lake Counties, because the extremely low access level available in Tooele produces a somewhat misleading figure when combined (this is because midday service in Tooele County is only available within Tooele City).

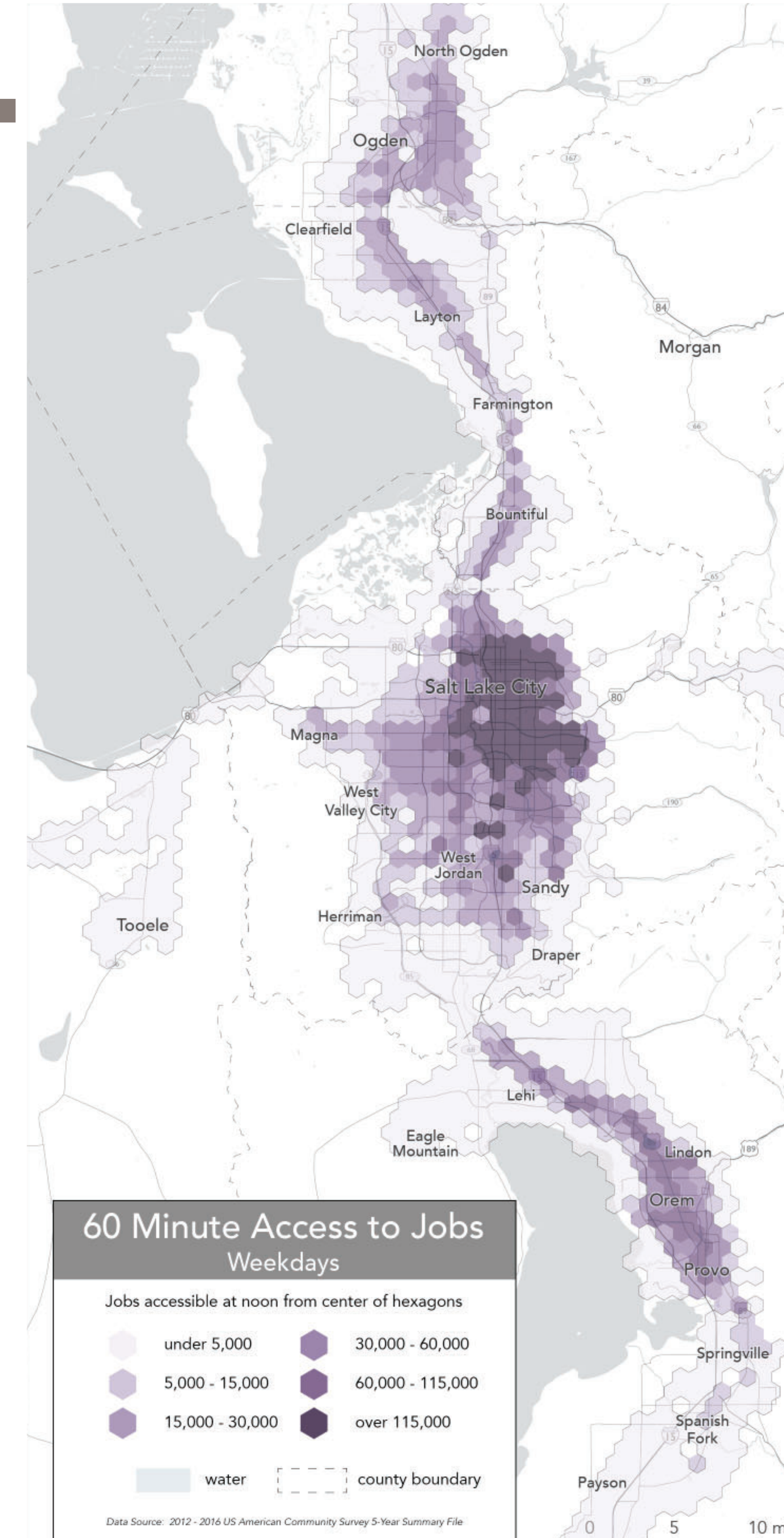


Figure 24: 60-Minute Access to Jobs (Weekday Midday)

Peak Period Access

How much more useful are UTA's services at rush hour than in the middle of the day? Access is often greater during the rush hours, when many routes operate more frequently, but this enhanced level of access is only available for a few hours, and often is optimized by direction to meet the needs of rush hour commuters.

Figure 25 shows how UTA's service level (as measured in terms of the number of bus and rail trips that begin during each hour of the day) varies throughout the day. The number of trips starting in each hour is notably higher in the morning and afternoon peak periods (approximately 7 a.m. to 10 a.m. and 3 p.m. - 6 p.m.), as many routes run at higher frequencies, and numerous peak-only express routes are in service.

The enhanced peak service level substantially increases the number of jobs that can be reached in a given travel time in many parts of the network. Figure 26 compares the number of jobs accessible in 30, 45 and 60 minutes during peak to the midday level. Throughout the network, access is higher in the peak. The level of access improvement on the peak is higher in Tooele County and the northern and southern regions of the network than in Salt Lake County because these areas gain more frequent direct connections into Salt Lake City and other job centers compared to midday.

While frequencies in the local network of Salt Lake County also improve, most of the frequent grid serving the densest, highest-population parts of the county stays at 15 minute service, so average access changes less in percentage terms (although the overall access level is still the highest among the various regions of UTA's service area).

Figure 27 shows the number of jobs accessible in 60 minutes throughout the service area during the AM rush hour. While the places with the highest and lowest access levels are similar,

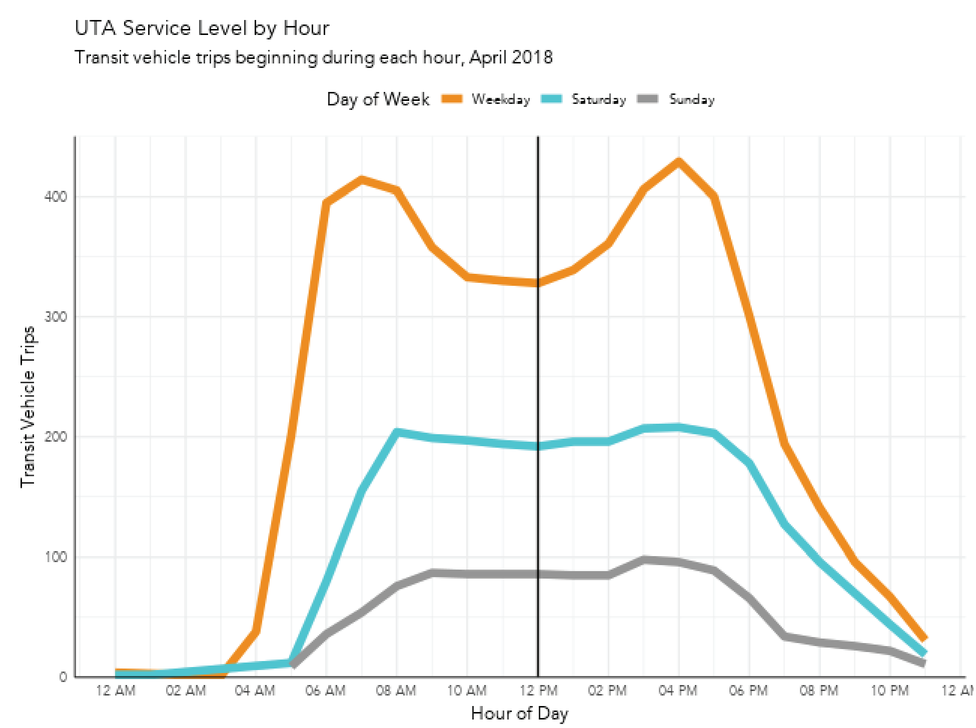


Figure 25: UTA Transit Vehicle Trips by Hour

Region	Average jobs accessible at 8 a.m. per person in... 30 minutes	45 minutes	60 minutes	% difference from midday access 30 minutes	45 minutes	60 minutes
Central (Salt Lake County)	8,400	37,600	98,400	+9%	+10%	+13%
Central (Tooele County)	600	1,500	2,500	+0%	+7%	+25%
North	2,100	7,600	18,100	+17%	+27%	+32%
South	5,900	19,400	39,900	+16%	+15%	+18%

Figure 26: Peak Job Access

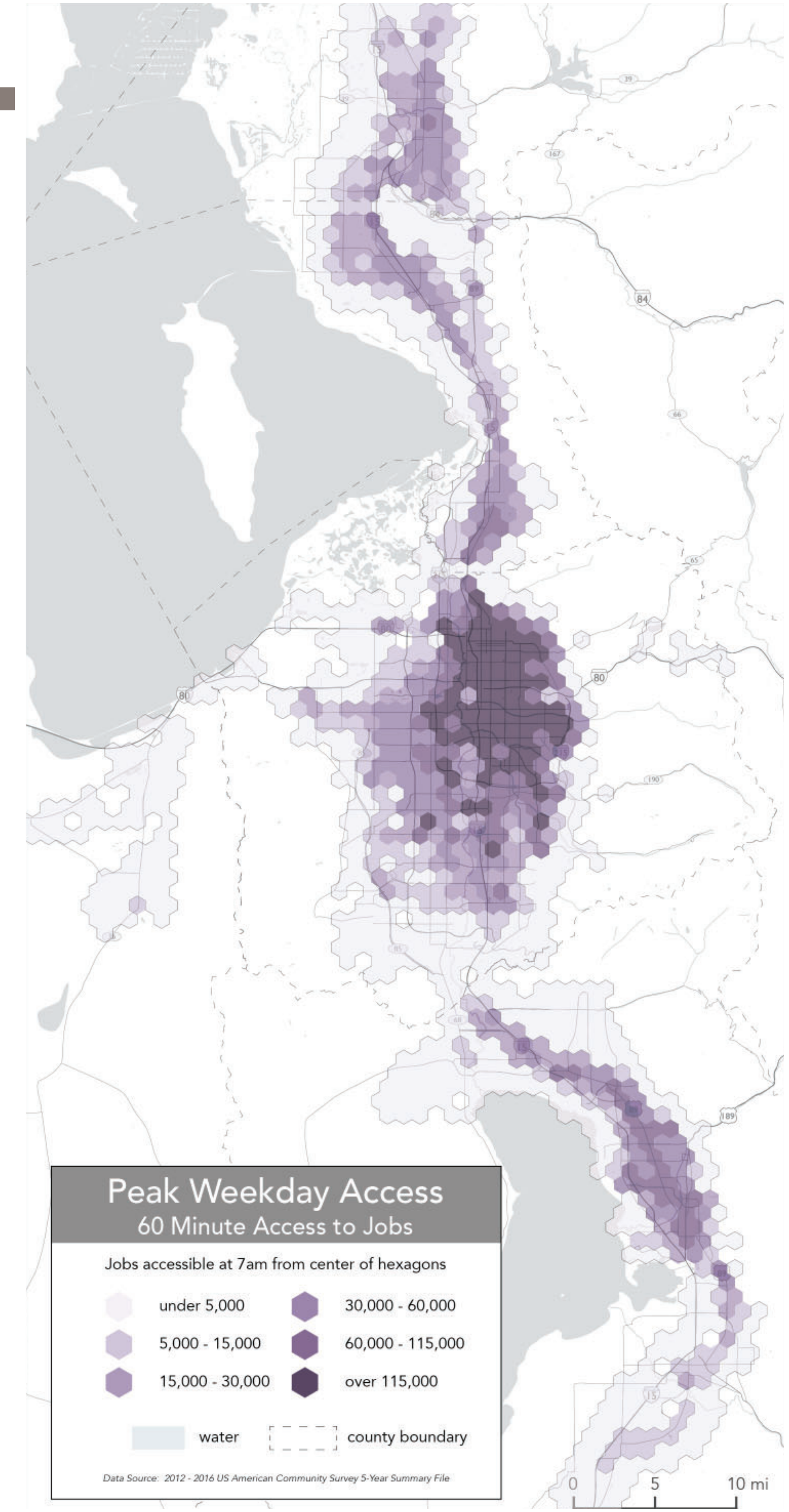


Figure 27: 60-Minute Access to Jobs (Weekday AM Peak)

Weekend Service Level

UTA's services, like those of many transit agenices, are much more useful on weekdays than on weekends. On weekends, TRAX and most frequent bus services run only every 20 or 30 minutes, and many other routes run only hourly, or not at all.

The Weekend Travel Market

Many more people travel to work on weekdays than on weekends, and to some extent a lower weekend transit service level is a natural outcome of travel demand. In some cases, the dropoff in weekend service levels can have such profound impacts on transit usefulness that it becomes challenging for the many people who still need to travel to work on weekends (in addition to all of the other possible trip purposes) to rely on it. Your overall ability to rely on transit and travel spontaneously is reduced if service isn't easy and reliable on the weekends, even if it is during the week.

Figure 28 shows the percentage of employed people in the United States who work on weekdays and weekends. While the overall number working on weekends is lower than on weekdays, over 1/3 of all workers reported working on the weekend. Weekend work is most common among people who hold multiple jobs or work part-time. As seen in Figure 29, workers in the retail and service sectors are much more likely to work on weekends than people working in other occupations.

The retail and service employment sectors where weekend work is common are also among those whose employees are most likely to commute using transit. According to the American Community Survey (ACS), in Salt Lake City, over 5% of employees in the service sector reported commuting using public transit, compared to just 3% among all employees. Similar trends can be observed in UTA's other counties, and among workers nationwide.

While the overall size of the weekend commute market is smaller, there are still a substantial number of people who need to move about the region on weekends for the purpose of work alone, and those who are traveling to work on weekends are more likely to work in occupations that already have a higher propensity for transit use.

Beyond work commutes, travel for most other trip purposes doesn't change much, or is actually more common on weekends than on weekdays, as data from the Bureau of Labor Statistics (BLS) reproduced in Figure 30 show. Just as on weekdays, if transit doesn't present a competitive travel option on weekends, or isn't available where or when its needed, its unlikely that many people will use it if they have other more convenient choices available.

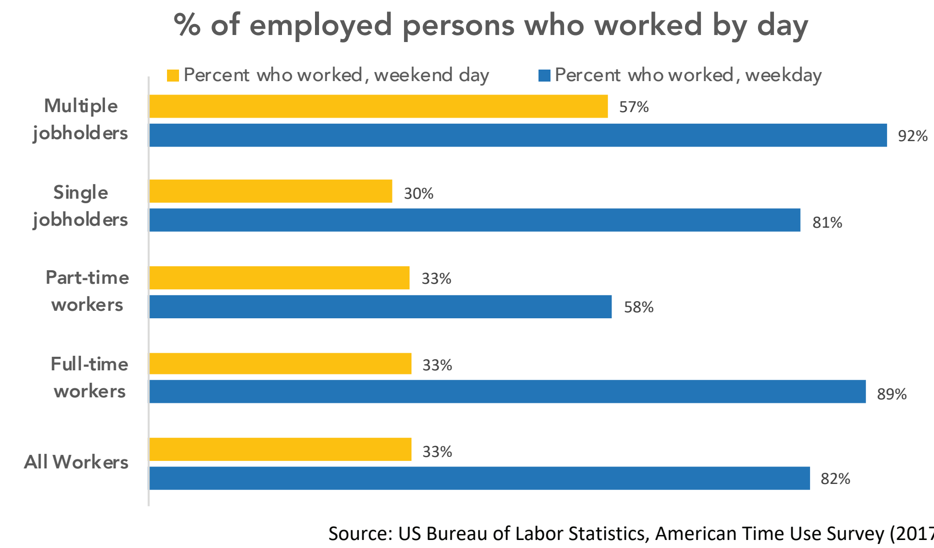


Figure 28: % of workers working by day

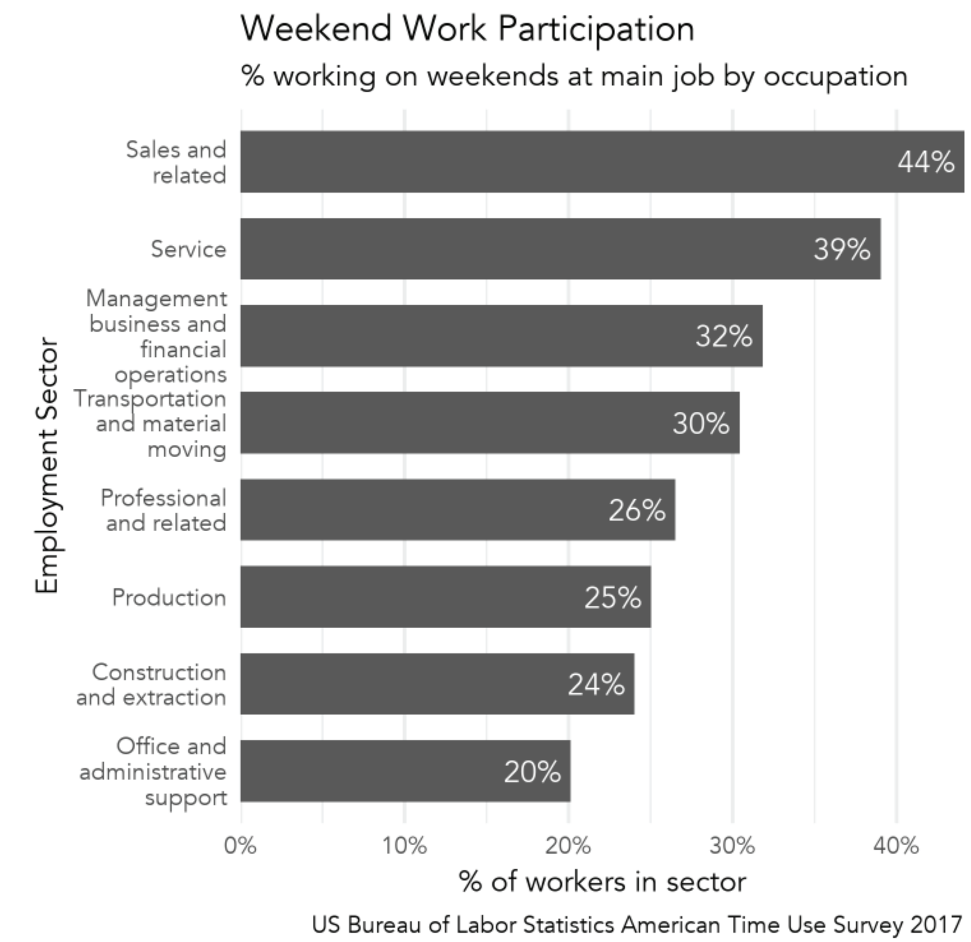


Figure 29: Weekend work by employment sector

Travel Related to Activity	% of people age 18+ traveling on Weekdays	Weekend Days	Difference
Work	47%	14%	-71%
Purchasing Goods And Services	43%	44%	+2%
Leisure And Sports	29%	38%	+32%
Eating And Drinking	20%	27%	+33%
Caring For And Helping Household Members	16%	8%	-51%
Household Activities	9%	9%	0%
Caring For And Helping Nonhousehold Members	8%	9%	+21%
Organizational, Civic, And Religious Activities	5%	14%	+213%
Education	4%	1%	-79%
Personal Care	3%	2%	-19%

Figure 30: Travel for various activities by day

Source: US Bureau of Labor Statistics American Time Use Survey, 2017

Weekend Service Level

UTA currently operates a very limited level of weekend service compared to weekdays, particularly so on Sundays. Figure 31 shows Saturday and Sunday service and ridership from 2017 (the most recent year for which comprehensive data is available) for UTA and several other transit agencies either in comparable western US large metropolitan regions (RTD in Denver, RTC in Las Vegas), or which have recently implemented weekend-boosting service plans (Houston METRO and COTA in Columbus, OH).

Among these agencies, UTA's Saturday and Sunday service level is the lowest compared to its weekday level. The dropoff in Saturday ridership is quite similar to those of most of the other agencies, but Sundays are much lower.

The decision to provide a higher level of weekend service also varies based on the character of travel demand the region's economy produces. For example, RTC in Las Vegas operates nearly the same quantity of service on weekends as on weekdays, serving a tourism-driven economy whose largest employers (and visitor attractions) are busiest on weekends.

UTA's weekend services are extremely productive at a fraction of the weekday service level. This suggests that despite the diminished service quantity and usefulness, UTA is serving some people effectively enough to garner strong ridership per revenue hour, even compared to weekdays when many more people are commuting. Very productive weekends at a low level of service can sometimes indicate a strong potential market for further investment, at least for services that are useful for the type of trips people are making on weekends.

Houston METRO is one of the largest US agencies to undertake a major weekend service expansion in recent years, as part of its New Bus Network (implemented in September 2015) service redesign plan. One of the title achievements of this plan was to establish a comittment to 15-minute service for 15 hours per day, every day, on the most frequent routes. Meeting this goal required a substantial expansion of weekend service, as shown in Figure 32, but also produced a large increase in weekend ridership. In this case, METRO expected weekend productivity to decline somewhat (prior to implementation, productivity at the lower weekend was very close to the weekday level), but since implementation, these ridership gains have been generated efficiently enough for the agency to see fit to maintain the enhanced service level.

Figure 31: Service Level, Ridership and Productivity by Day Type

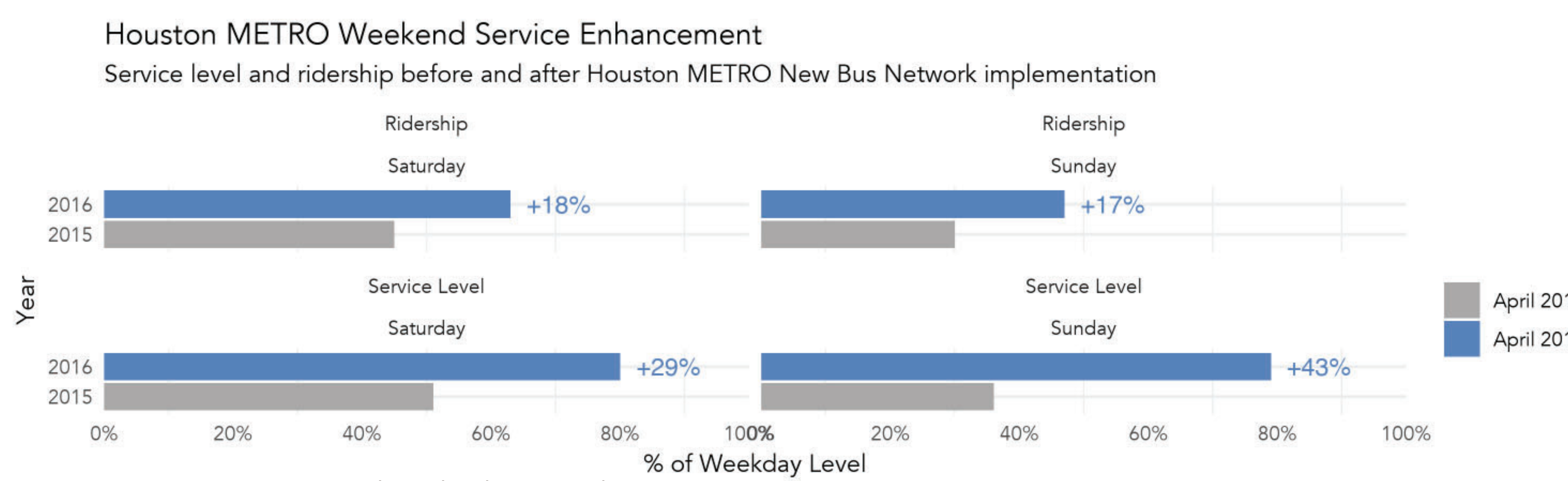


Figure 32: Houston Metro New Bus Network Weekend Service Enhancement

Weekend Access and Coverage

We can gauge the impact of the reduced weekend service level in the job access outcomes the network produces on Saturday and Sunday. At noon on a weekday, the average person within UTA's service area can access over 125,000 jobs in an hour, but the network's utility declines substantially on the weekends. On Saturdays, just over 100,000 jobs are accessible in 60 minutes, and on Sundays, fewer than 75,000 jobs are accessible on average per person.

Weekend access is lower because the network is less useful on weekends. On weekdays, the network provides an extensive grid of frequent services within Salt Lake County, and frequent or 30-minute connections to most major destinations in the northern and southern parts of the region, but on weekends, most routes come much less frequently, or don't run at all.

Imagine a person in Salt Lake County who wanted to make a trip to work beginning near Redwood and 4700 W and ending near the shopping area at 3300 S and Highland. Figure 26 shows the network illustrating this trip.

On weekdays, the fastest route to this destinations would be to take Line 217 on Redwood, transfer to Line 33 at 3300 S, and ride that east to Highland. On a weekday, this grid movement would provide for a relatively quick wait, since even in the worst case scenario, this traveler would never be waiting more than 15 minutes at the beginning of the trip or at the transfer point. Assuming they didn't take advantage of any trip planning apps, their average wait during each section of the trip would be just 7.5 minutes.

If this person wanted to take transit to work on a Saturday, the trip would look quite different. Since all of the weekday frequent grid routes they could use come only every 30 minutes on weekends, the average wait required during the trip would be 15 minutes for the first ride, and 15 minutes for the connection, a 30-minute wait overall. This might put work outside of a reasonable travel time for this person, who would then likely turn to other options, such as driving, rideshare, or getting a ride from a friend or family member.

While this is just a singular example, the utility of the frequent grid for all movements across it declines substantially during the weekend, even more so on Sunday than on Saturday. The maps of 60-minute access on the next page show how the network becomes less useful in all parts of the region on weekends.

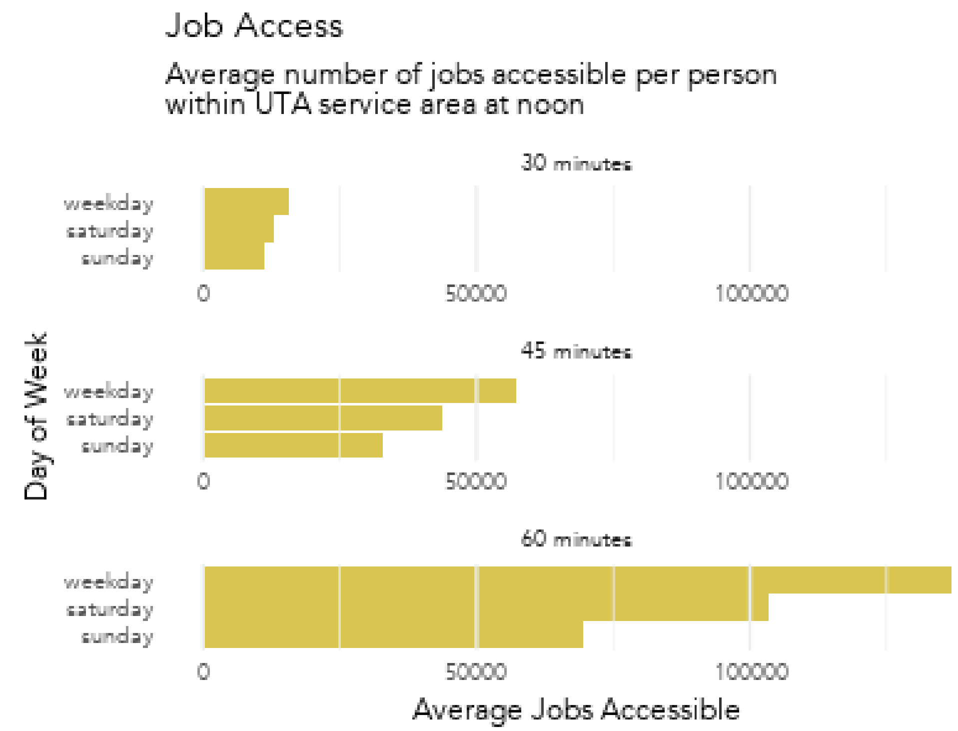


Figure 33: Average Jobs Accessible by Day of Week

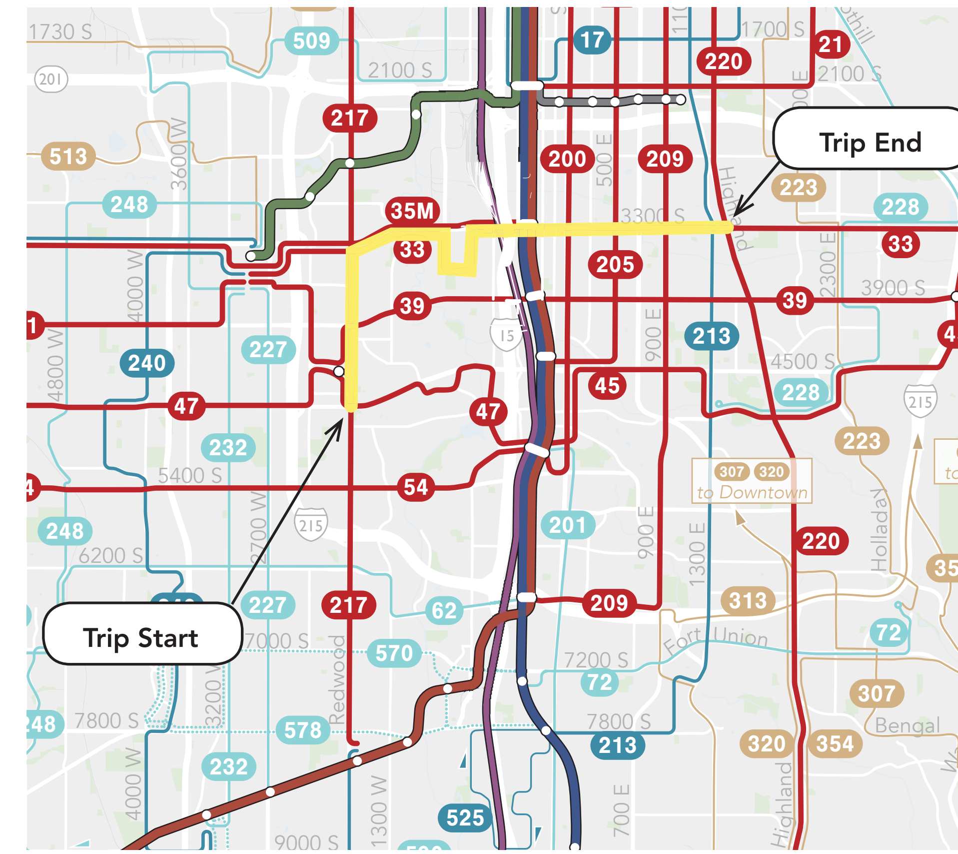


Figure 35: Central Salt Lake County Network Grid Movement Example

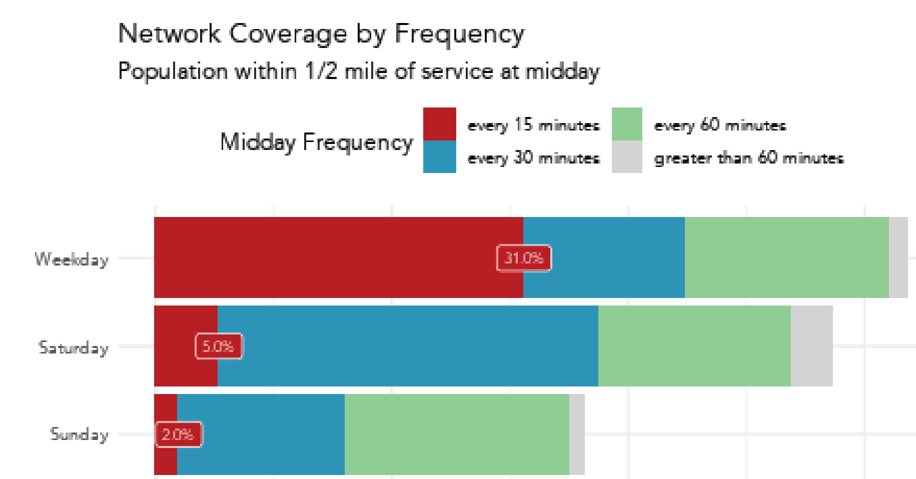


Figure 34: UTA Network Coverage by Frequency

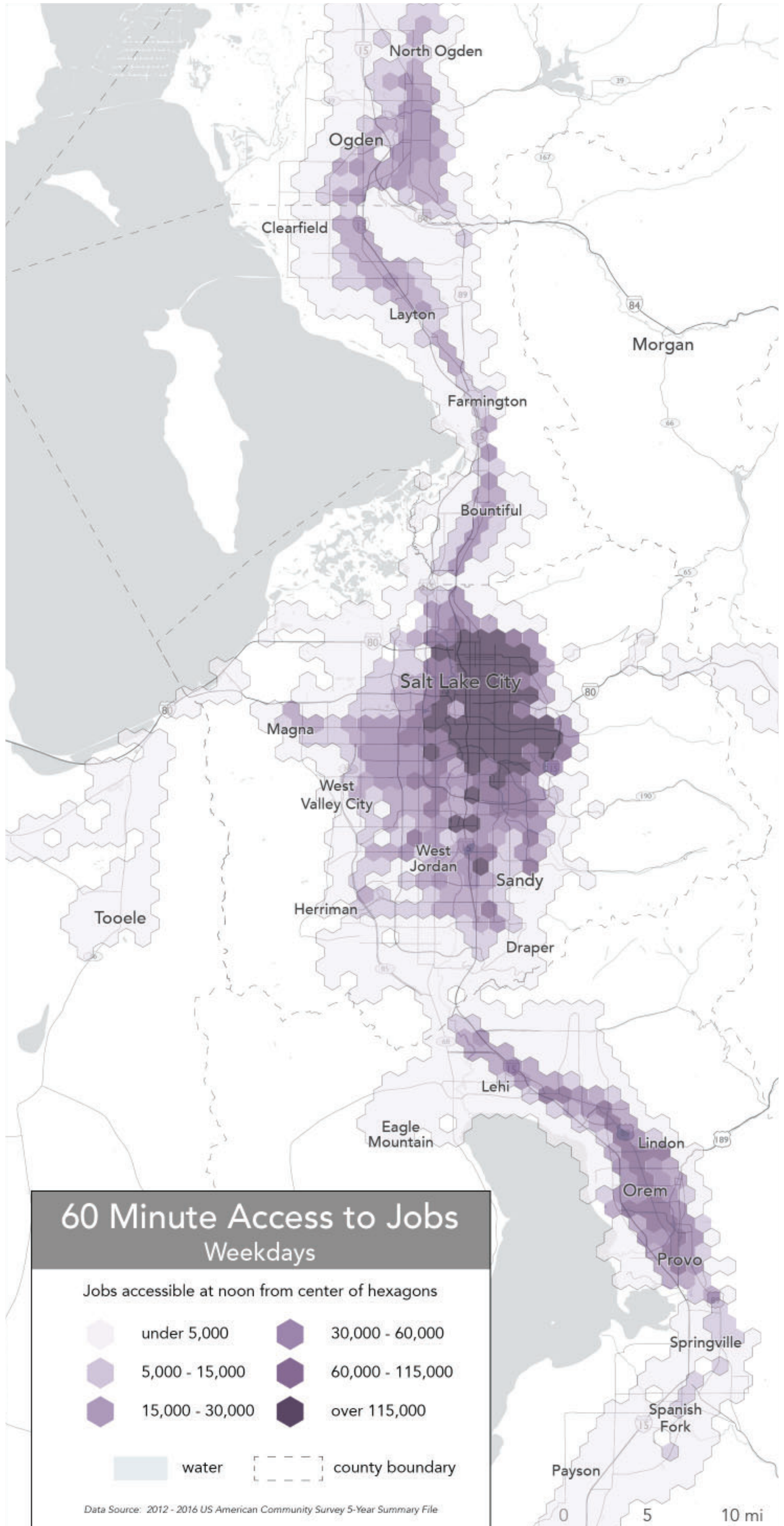


Figure 36: 60-Minute Access to Jobs (Weekday Midday)

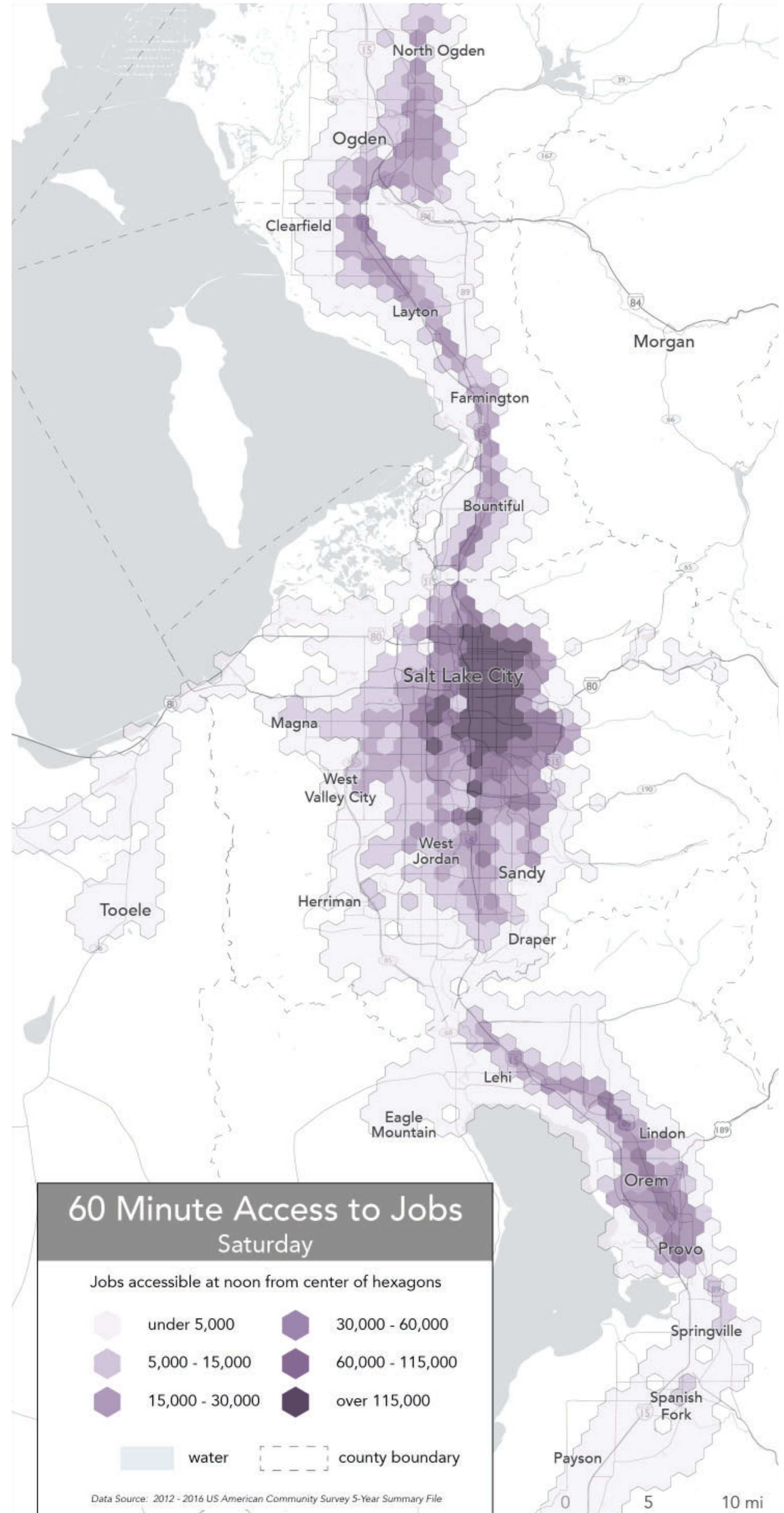


Figure 37: 60-Minute Access to Jobs (Saturday Midday)

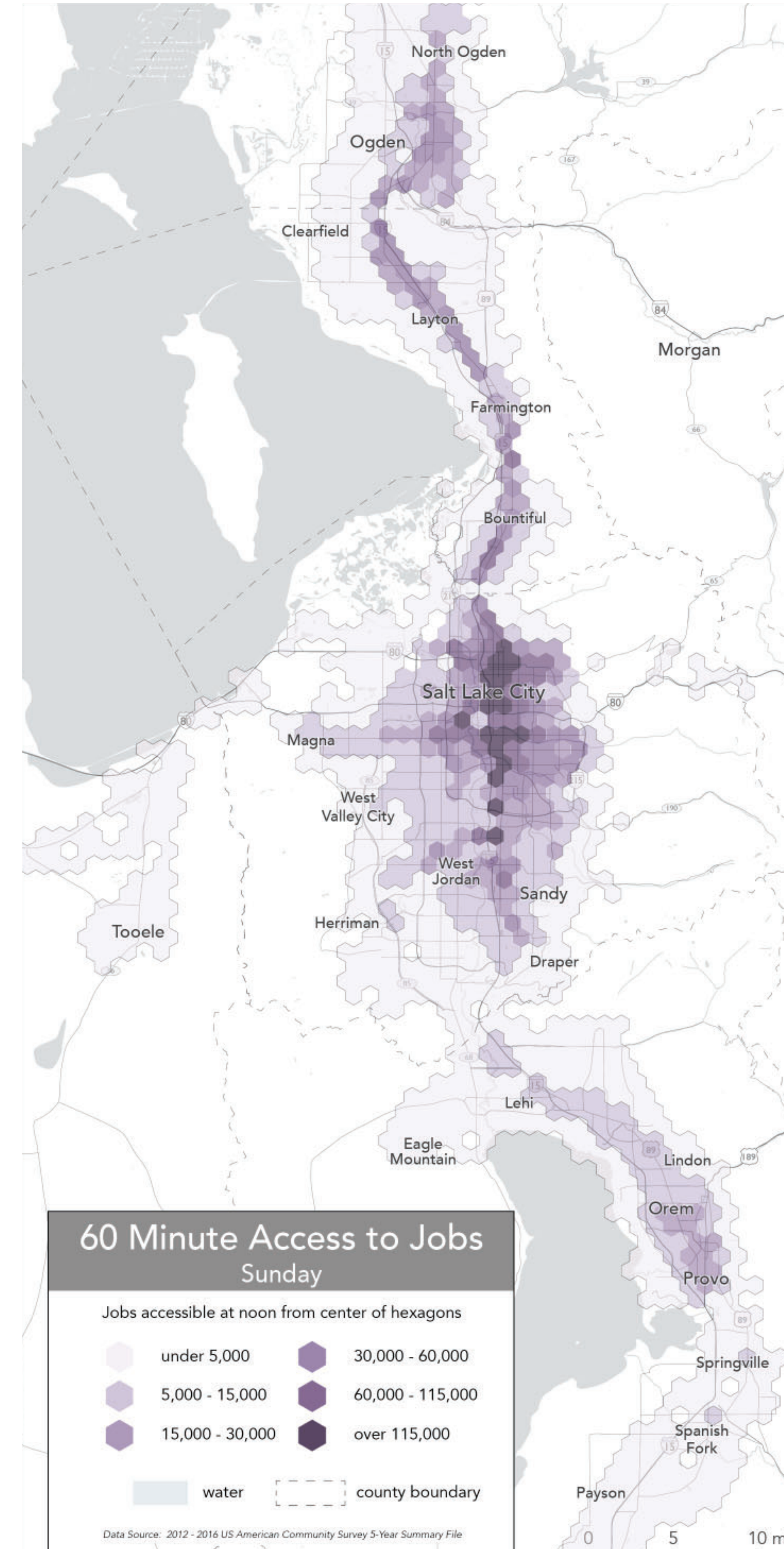


Figure 38: 60-Minute Access to Jobs (Sunday Midday)

Measuring Transit Usefulness

The access analyses shown in this chapter were produced using a transit routing tool called OpenTripPlanner, originally developed as an open-source project sponsored by TriMet, the transit agency for the Portland, Oregon metropolitan region. OpenTripPlanner provides a wide variety of trip planning and analysis functions; this access analysis primarily depends on its ability to generate travel time isochrones. An isochrone is a shape on a map that represents all areas that can be reached from a given starting point.

This analysis examines transit usefulness in terms of the number of jobs reachable from different places in the region. Employment access is both an indicator of which workplaces you could commute to in a given travel time, and which major concentrations of employment you might travel to in order to patronize businesses or services located there.

To compare transit usefulness in terms of access to jobs, we generate a grid of hexagon cells across the entire region, create travel time isochrones from the center of each cell, and then estimate the number of jobs within each of those cells. Figure 39 provides a simple illustration of this process.

This analysis has three main steps:

- First, a frequency-based GTFS[6] file is constructed for the midday existing network. To do this, we import the existing GTFS into the transit planning software Remix. Then, we identify all segments in the network where higher frequencies are produced by the overlay of multiple routes during the midday, and create new dummy "overlay routes" with the combined frequency in their shared segments.
- Second, the processed Remix model is exported as GTFS. A routable network graph is generated using OpenTripPlanner and OpenStreetMap data, which provides the ability to query transit and walking trips based on the frequency-based GTFS and OpenStreetMap road and pedestrian network data. The walking component of these trips is routed along the street and pedestrian network.
- Last, 30, 45, and 60 minute isochrones are queried using OpenTripPlanner from the center points of each hexagon. These isochrones are intersected with LEHD[7] workplace location data, and jobs are assigned to the isochrone based on the proportion of the area of each aggregation unit within the isochrone. A simple diagram of this method is shown in Figure 40.

6. General Transit Feed Specification", a data format used to publish transit schedule information for use in trip planning and analysis applications.

Measuring Transit Usefulness

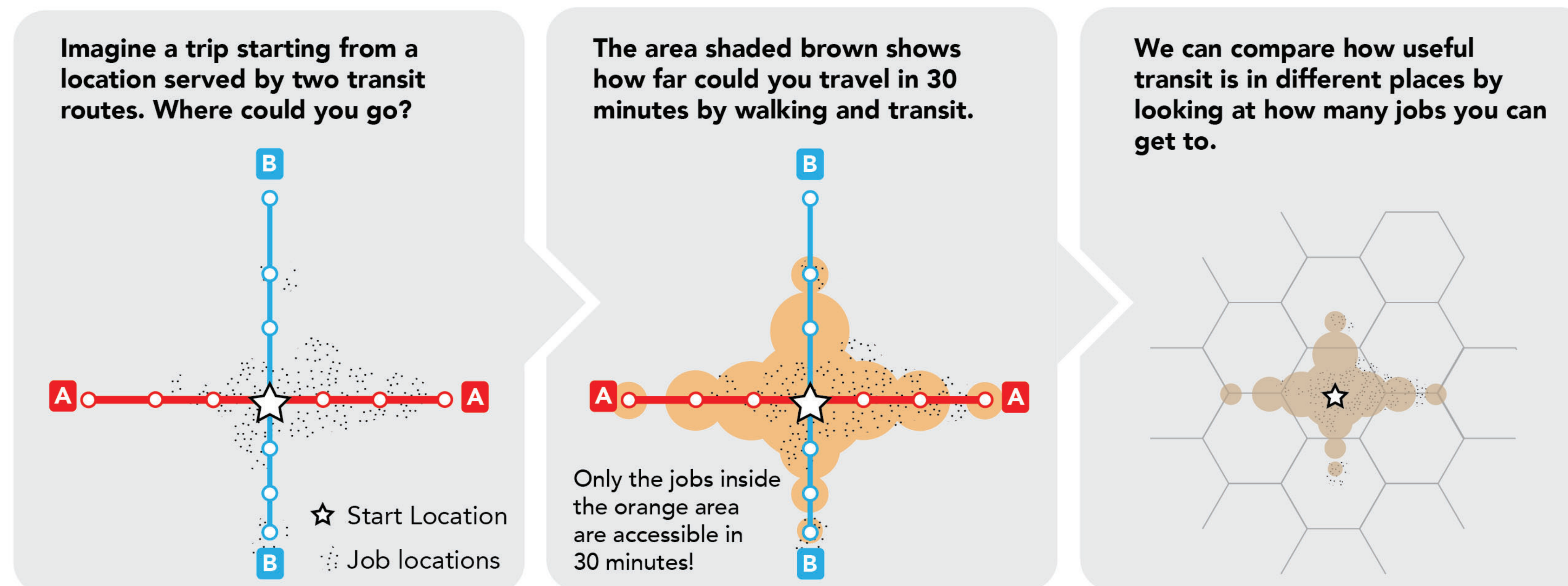
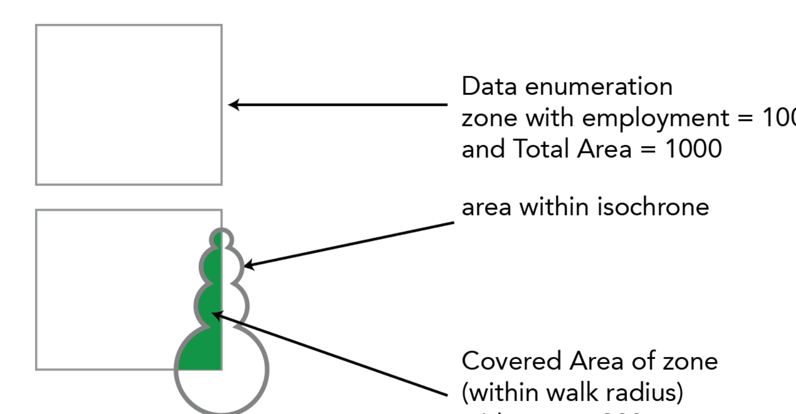


Figure 39: Measuring transit usefulness

The end product is a database of isochrones and their associated job access estimates for each hexagon center point throughout the region. This dataset is then used to produce job access maps like those on the preceding pages. We can also estimate the number of people residing in each hexagon based on census data, and use that to generate the aggregate "average access" scores shown in Figure 23 on page 27 and Figure 33 on page 31.

7. "Longitudinal Employer-Household Dynamics", a United States Census program that produces detailed local information on workers' home and workplace locations by combining federal, state and Census bureau data on employers and employees.

How job access is calculated for each zone, block group or other enumeration area



Employment× ((Covered Area)/(Total Area)) = ***Jobs in Zone Covered***

Figure 40: How job access is calculated for each zone

3 Key Questions

The next phase of the UTA Service Choices project will seek input from the public, stakeholders, and elected officials on the most important policy decisions that will shape future service planning:

- To what extent should service be focused on generating high ridership, or maximizing coverage?
- With resources dedicated to providing coverage, should those services prioritize a) access for people who can't drive (or have no access to a car), b) service to newly developing areas, or c) service near as many taxpaying residents of the district as possible?

Based on public input on these questions, UTA's Board of Trustees will direct the agency to design a Draft Network Plan.

These ideas are explained briefly in the Executive Summary, and more fully here.

Ridership or Coverage?

UTA Service Choices is a unique opportunity for the region to consider and clearly define the basic purpose of the transit system.

The current transit network is a legacy of past generations, and has accrued years of good intentions, good ideas, stop-gap measures, and special requests. Much of the existing network may be worth keeping as is, perhaps because it suits the region and its values, or perhaps because it is known and familiar to riders, which is a value in and of itself.

It is also possible that since this transit network was last re-designed the region has changed and grown enough to justify a fresh start. Transit networks are intricate, interwoven, living things, and adapting them incrementally over time is very difficult.

The most difficult choice for the public, elected officials, and stakeholders within UTA's service area will be between providing high frequency, long-span services in order to attract high ridership and providing wide coverage.

Recall that high ridership serves several popular goals for transit, including:

- Competing more effectively with cars, so that more people can travel down a busy road.
- Collecting more fare revenue, increasing the share of the transit budget paid for by fares.
- Making more efficient use of tax dollars by reducing the cost to provide each ride.
- Improving air quality by replacing single-occupancy vehicle trips with transit trips, reducing emissions.
- Supporting dense and walkable development and redevelopment.
- Extending the most useful and frequent services to more people.

On the other hand, many popular transit goals do not require high ridership in order to be achieved, and instead are achieved through transit coverage of many places. These include:

- Ensuring that everyone in the service area has access to some transit service, no matter where they live.
- Providing access for people without access to personal vehicles.
- Serving newly developing places, even if they don't yet have the size or density to constitue a large tranist market.

A transit agency can pursue high ridership and extensive coverage at the same time, but the more it pursues one, the less it can provide of the other. Every dollar that is spent providing very high frequency along a dense commercial corridor is a dollar that cannot be spent bringing transit closer to each person's home or reaching residential areas of the edge of the network, and vice versa.

A Transit Network Designed for High Ridership...

- Maximizes fare revenue and minimizes public subsidy per trip.
- Competes more effectively with cars.
- Supports dense and walkable development and redevelopment.
- Puts the most frequent and useful services near more people.

A Transit Network Designed for Maximum Coverage...

- Provides an affordable transportation option for people who can't drive.
- Serves everyone who lives in the district, regardless of where they live.
- Serves newly developing lower-density places.

How does a network designed for high ridership look different than one designed for high coverage?

Planning for either the ridership goal or the coverage goal produces very different networks, and decisions to shift the balance of service today or in the future could produce different types of changes to UTA's network.

To illustrate the general outcomes of this tradeoff, we've created a fictional city, shown in Figure 41. This is an urban region centered around a large, very dense downtown core, with serveral other towns at different distances from the city core.

In this image, different shades of brown indicate different densities of development. The density legend illustrates the type of land use that could be encountered in each area. The darkest brown places are the densest parts of the region, where many people are in close proximity; imagine a major downtown core business area, or a large university's campus and surround commercial and residential areas.

As you move away from the core areas, density drops off, though as in most real cities in the United States, there are pockets of dense development capable of generating substantial transit demand outside of the center. For example, the very dense areas north and east of downtown could be major shopping centers, hospitals, or educational campuses. Just as in UTA's service area, while the area encompassing downtown Salt Lake City and the University of Utah is the single largest trip generator, there are lots of other important places around the region that many people need to travel to.

The next ring out from the darkest brown might consist of pre-World War II, small-lot residential areas, with some mixture of apartment buildings and continuous commercial development along major roads. Or, a comparable level of density could be found in recently developed mixed-use areas, feature mid-rise residential buildings and storefront retail.

In the lower three density categories, residential lot sizes would increase as would the distance between homes, and density would decline towards the dashed line indicating the edge of the metropolitan region. Multifamily residential buildings would become less and less common the further down the density gradient you go, and because there are fewer people nearby, commercial nodes are likely to be smaller.

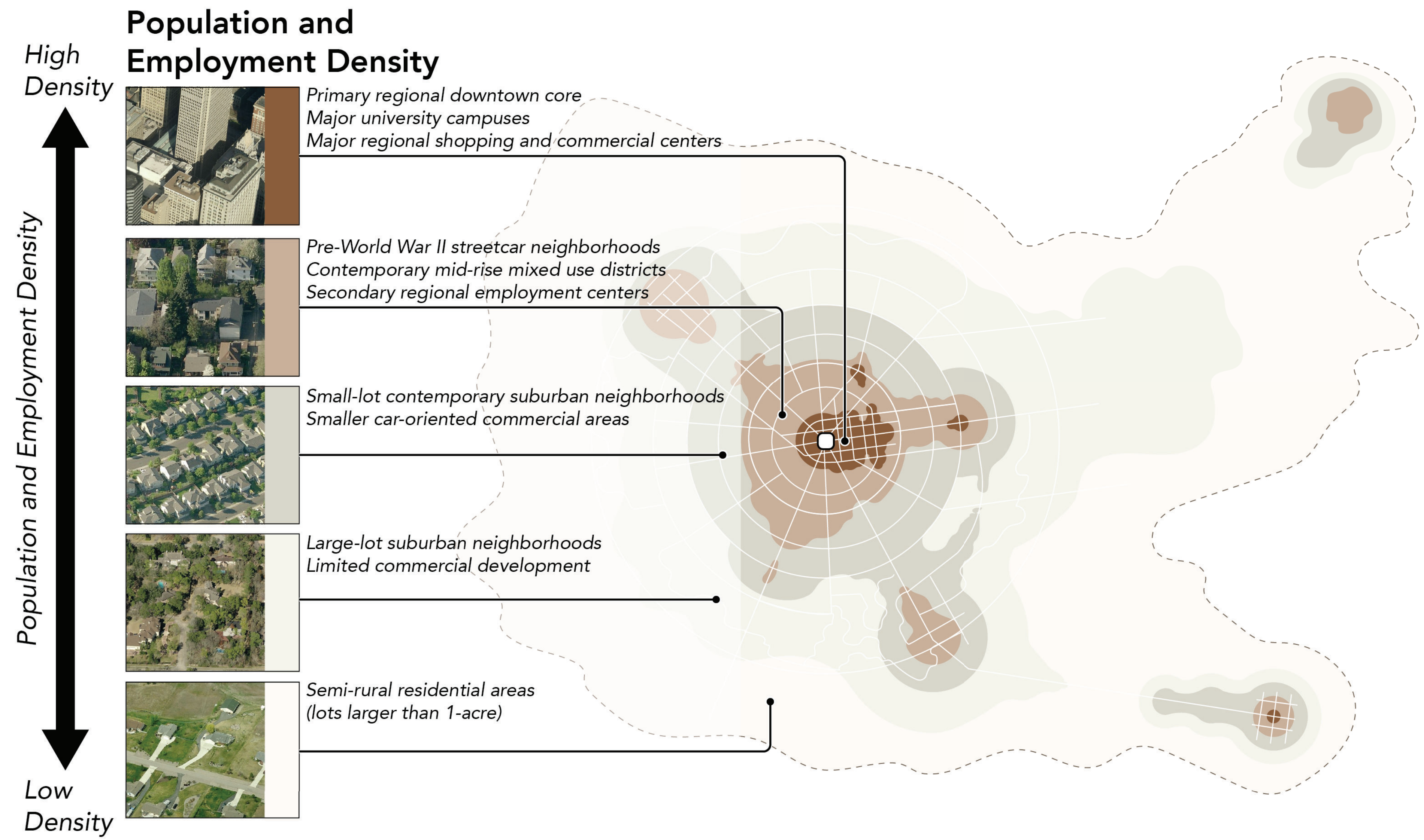


Figure 41: A fictional city

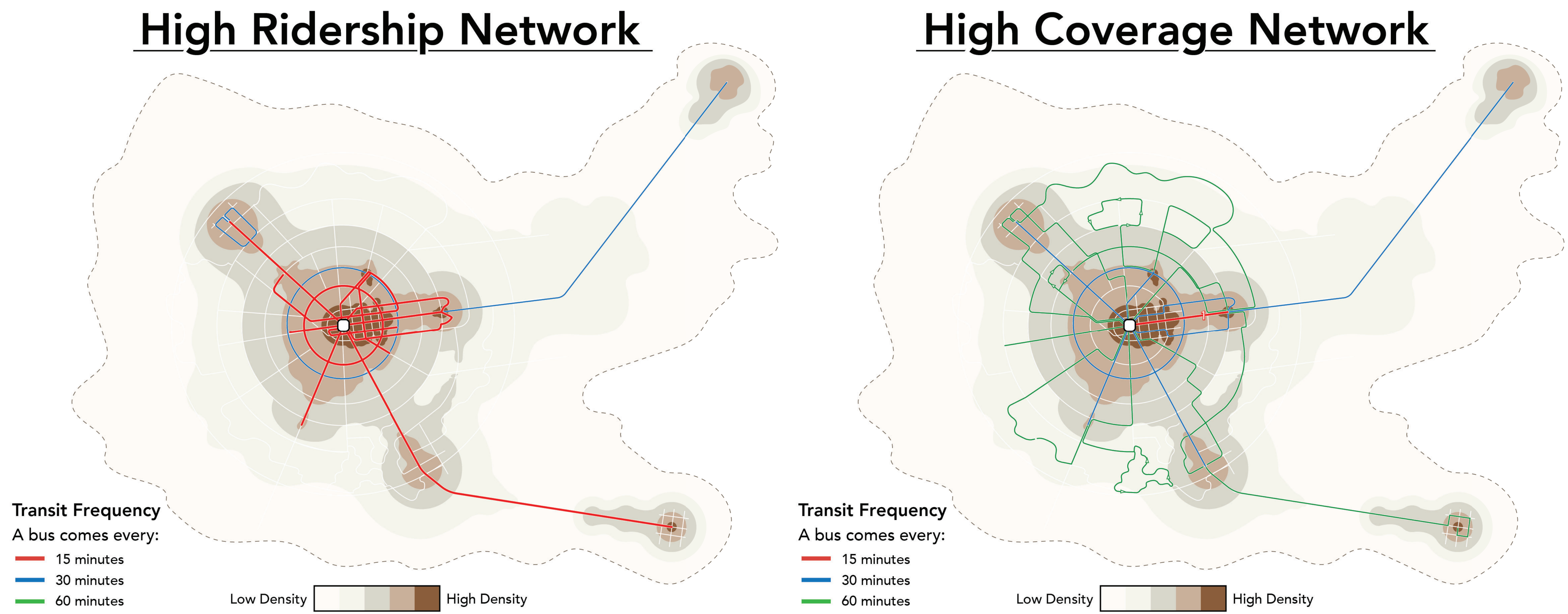


Figure 42: Planning for either the ridership or coverage goal produces different transit networks

Figure 42 illustrates the difference between a transit network designed for high ridership and a network designed for high coverage serving the fictional city shown on the previous page.

In the network designed solely for high ridership, almost all routes are concentrated in the highest density places, providing very frequent, convenient service. A few routes are extended to other dense areas in the region, but most low-density palces have no transit service at all.

In the network designed solely to maximize coverage, many routes serve almost the whole developed area of the city, but none of them come very often. Most routes in the coverage network come only ever 30 or 60 minutes, save for one route serving the densest corridor east of the downtown core.

No public transit agency focuses solely on either of these goals. Most transit agencies have some direct, frequent, long-span routes on which ridership and productivity are high, and others which run at lower frequencies and more limited times, for specific coverage purposes. This is the case in UTA's existing network, which covers most (but not all) dense parts of the service area, but also provides high frequency service to the various dense regional centers.

Making the Decision

We suggest that people think about this choice not as binary, "yes-or-no" decision, but as a point on sliding scale that the community can help to set:

> How much of UTA's budget should be spent on the most useful service, in pursuit of high ridership? How much should be spent providing coverage?

This is not a technical question, but one that relates to the values and needs of a community.

One way to manage the conflict between ridership and coverage goals is to define the percentage of a fixed route budget that should be spent in pursuit of each one. Every agency spends a certain percentage of its budget pursuing these goals, even if the percentage is unstated. This project is an opportunity for UTA staff to think about how it currently balances these goals, and to hear from the public about how they might handle this question in its future planning.

Figure 43 shows the existing split between ridership and coverage purposes of bus service in each of UTA's three geographic regions. We estimate that about 55% of the existing UTA bus network is designed as it would be if maximizing ridership were its only goal. The other 45% has predictably low-ridership, suggesting that it is being provided for other purposes.

For UTA, this question must be asked and answered geographically. While we estimate that the split between ridership and coverage-goal services across the whole network to be approximately 55% ridership, 45% coverage, it varies substantially across the different regions in which UTA operates service. In the northern region, comprised of Weber, Davis, and Box Elder counties, we estimate the split to be approximately 30% ridership and 70% coverage, while in the central (Salt Lake and Tooele Counties) and southern (Utah County), this number is closer to 60% ridership, 40% coverage.

The network design of each of the three business units is quite different, as are the implications of shifting the balance on the ridership-coverage spectrum. Because of this, public and stakeholder consultation will ask people about their opinion on the balance in the part of the region where they live.

Are UTA's existing services focused on the ridership or coverage goal?

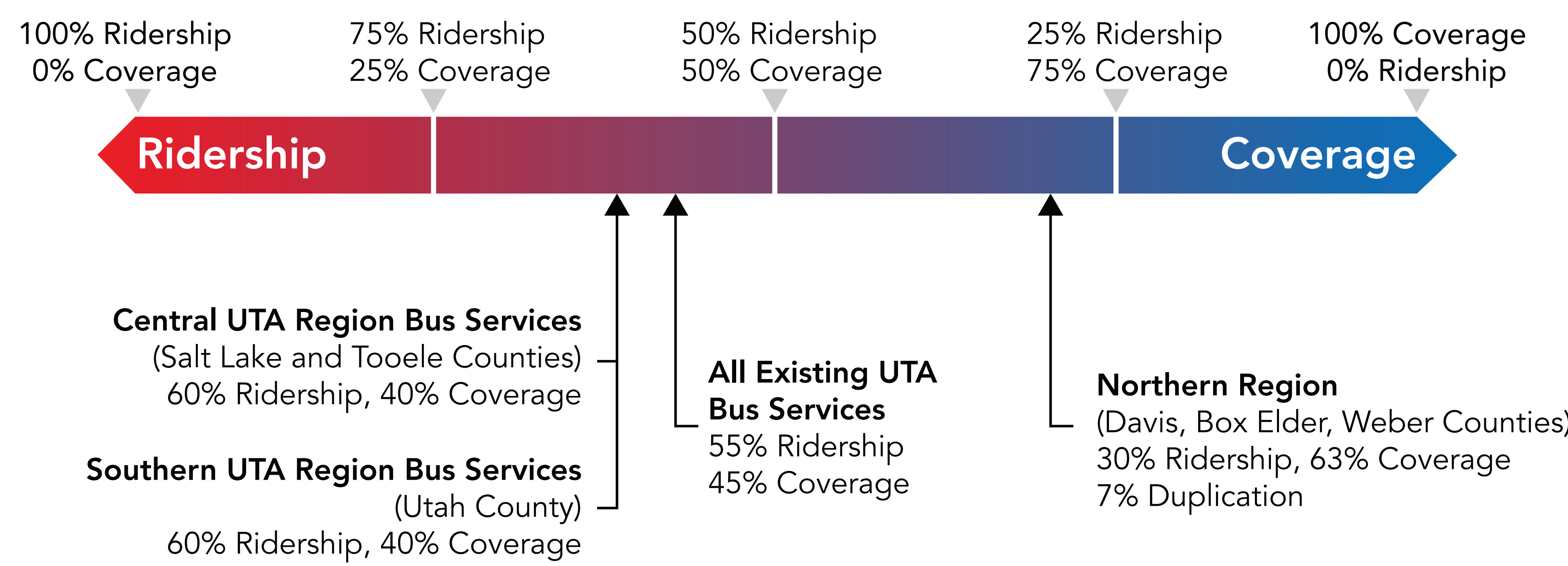


Figure 43: UTA existing services' ridership and coverage purpose

Perhaps today's ridership-coverage balance in each business unit is right for the future, or perhaps the community will value a shift in emphasis. The direction of that shift—either towards higher ridership or towards wider coverage—is a question for the public and stakeholders to discuss as part of this process.

The UTA Board of Trustees' decision, which will be taken after the close of all engagement efforts and be informed by their results, will decide the balance of ridership and coverage-focused service for the Draft Network Plan. This in turn will determine how much of a role high-frequency routes play in that plan.

A network plan designed for higher ridership would have fewer total routes, but with higher frequencies, over longer spans, with better weekend service. This would make it possible to operate a frequent grid, and provide everywhere-to-everywhere mobility on that grid with a single quick transfer.

A network plan designed to prioritize a high-coverage network for UTA would not concentrate service into fewer, more frequent routes. It would instead extend service to places within the contributing counties that currently have no access to the transit network, and provide all-day service in communities that currently are only served during rush hours or occasionally.

When we run coverage service, what should our priorities be?

The second critical question in this process is about the purpose of coverage service. There are many important social objectives of transit that can be served through coverage focused planning. None of these are goals that can be expected to generate high ridership, but all of them are important and valuable functions that the transit network can provide, if the public directs it to do so. But, a network plan's coverage component will look very different depending upon which coverage goal is the focus.

Transportation Options for People Who Can't Drive

The first of these, "access for people who can't drive", is about what people often call the social service function of transit: providing a transportation option to people with few other choices, and who are located in places where high-ridership service would not go.

This could include sites like senior living communities in suburban or rural areas, isolated lower-income communities where vehicle ownership rates are low, or important destinations like community colleges or social service agencies that have chosen to build facilities in environments that are difficult for transit to serve efficiently. These are all places where some people need the service, however fewer would use the service compared to higher-density areas that are more efficiently integrated into the rest of the transit network.

The design process for a coverage network focused on this goal would identify the factors most associated with critical mobility needs, and design services targeting those places. That means a plan that is designed around the goal of providing access for people who can't drive. This includes responding to the density of seniors and senior-living facilities, zero-vehicle households, lower-income people, and places like sheltered workshops for people with disabilities, social service facilities, and other destinations located in places that would not otherwise be served if maximizing transit ridership were the only goal.

Some Service for Everyone Who Pays

Everyone who pays taxes into UTA could reasonably expect some service in return. One of way of evaluating how fairly public transit resources are distributed is in terms of how many people direct access to service (regardless of whether that service is very useful), within a reasonable walking distance of their home. This is the second common argument for coverage services, and many agencies define a minimum coverage standard in response to this goal.

For example, services could be designed to try to ensure that 85% of all residents within UTA's contributing counties are within 1/2 mile of a bus stop. That would be a measurable outcome of the success of network designed to meet this goal.

A service plan designed around this goal would be focused only on population density. It would seek to draw the most efficient lines to get as near to as many people as possible, even if frequencies were very low. This would have the impact of expanding the overall coverage area and number of people near a transit stop, and also potentially expanding the area within which UTA is obligated to provide complementary paratransit services.

Supporting Future Development

The last reason is about the future. Offering a transit service today in places that are expected to develop in a way that will generate high ridership in the future. Developers of new neighborhoods often want transit to be there early, before there are many people, so that it is available right as people and jobs move in. This is a low-ridership service until there are enough residents or employees there.

A service plan intended to support future development would be designed in response to information on where that development is likely to occur. That could include future land use projections arising from documents like Wasatch Choice 2050, real estate market activity data, unbuilt zoned capacity, and other indicators of planned or potential future development. Transit meant to support future development must serve places where UTA has good reason to believe that development is likely to occur with or without transit service.

Next Steps

In the next phase of this project, the public, stakeholders and regional elected officials will have a chance to weigh in on these questions. UTA will open an online survey in early 2019 specifically focused on the two choices described here, which will be complemented with a number of open-house events later in the spring. Separate presentations will be made to elected officials and committees convened by partner agencies, and all of this material will be summarized and presented to UTA's Board of Trustees so that the Board is able to make a decision informed by as much input from the public as possible.

Glossary

Access	The number of jobs or residents reachable from a starting location by transit and walking. Access is often calculated for many starting points in a network, based on some assumed travel-time "budget," and summarized on a map.
Arterial road	A high-capacity through road.
Bus Rapid Transist (BRT)	Bus-based transit providing enhanced speed and capacity comparable with rail-based transit modes, typically incoporating a degree of infrastructure such as exclusive lanes, transit signal priority, improved stops/stations, and queue jump lanes.
Business Unit	UTA's services are organized into three geographic administrative areas: in the northern part of the region, the Mt. Ogden unit includes Weber, Davis and Box Elder counties. In the central parto f the region, the Salt Lake business unit includes Salt Lake County and Tooele County. In the souther part of the region, the Timpanogos business unit consists of Utah County.
Circulator	Circulator is often used to describe a service that provides transit coverage to a low-density area, because the travel paths that result are so often circular in shape. In some places a circulator is also operated downtown. Large circular transit routes that offer high speed or high frequency and serve high demand areas, however, are generally referred to as loops.
Connection	A connection or transfer takes place when a person uses two transit vehicles to make a trip.
Coverage	Coverage can refer to the amount of geographic space, the proportion of people or the proportion of jobs that are within a certain distance of transit service. An assumption about how far people will walk to a given transit service—often ranging from 1/4 to 1/2 mile—must be made in order to estimate coverage.
Deadhead hours	The time a vehicle spends between the garage and the start or end of revenue service, or between the end of a trip on one route and the beginning of a trip on another route.
Dial-a-ride	Demand response service, usually requires booking a day in advance, over the phone.
Duplication	A characteristic of a transit network where multiple routes provide similar services along the same corridor or between the same set of destinations, without coordinating schedules to provide a higher level of frequency.
Express	Express can have a range of meanings when applied to transit. It most often describes a route with a long non-stop segment. It can also be used to describe a route with wide stop spacing and overall faster speeds, though that is more commonly called a rapid.
Farebox recovery	Farebox recovery is a measure (typically expressed as a percentage) of how much of a transit system, network or route's operating cost is recovered through fares.
Feeder	A local route that connects or feeds into a radial route. Low-frequency feeders sometimes pulse so that transferring is more convenient
Fixed route transit	Fixed route transit describes any transit service that is operated on the same predictable route. In contrast, paratransit and demand-responsive service may always or often follow different routes for each vehicle trip, as they serve different customers and their trips.
Frequency	The time interval between succeeding transit trips. Frequency is often expressed in minutes, i.e. a transit service where a bus comes every 15 minutes has "15 minute frequency." A more technical term for frequency is headway.
Grid Network	A network of routes that intersect all over the city. Grid networks are best suited for places with many activity centers, as opposed to radial networks, where most people are traveling to a central location.
Headway	Headway is the time between successive trips at a stop, a more technical transit term for frequency. A service that comes every 15 minutes can be said to have a "15 minute headway."
Investment	Service or revenue hours per capita, a measure of the relative level of transit service.
Isochrone	An illustration to help visualize where someone can go from a location, in a certain amount of time, using transit or by walking.
Land use	Land use describes the way a parcel of land is being used, for example as commercial, industrial or multi-family residential. Land use descriptions can be general or very specific. Land use is distinct from zoning, as land may be rezoned under existing uses and buildings long before changes to its use take place.
Layover	Time for driver breaks between trips. Usually included in revenue hours. Unlike recovery time, layover time sometimes cannot be skipped even when a bus is behind schedule.
Longline	Some routes have a more frequent inner segment and a less frequent outer segment. At the end of the inner segment, some buses turn around and come back, while others continue on to a more distant turnaround point. The outer, less-frequent segment is often called the "longline," though technically the longline is the longest path that buses on that route travel, and its length is the inner segment plus the outer segment. The inner segment is called the "shortline."
Microtransit	Demand response service, usually distinguished by same day or instant booking, often using a smartphone application.
Mobility	Mobility is generally used to express the ease with which people can move from place to place. It is distinct from access, which describes the extent to which people can meet their needs nearby. In some places, people have high access (they are able to meet all of their needs without travelling very far or at all) and low mobility (because traveling long distances is difficult or slow). In other places, mobility is high and access is low.
Mode share	Mode share is a technical term for the percentage of a population that uses a particular mode (e.g. transit, walking, driving) for traveling. Mode share information in the U.S. is generally reported for commute trips.
National Transit Database	The National Transit Database is a federal clearinghouse of general information about transit in the U.S. and information specific to each transit agency. Agencies of a certain size are required to submit financial and performance data to the NTD each year. https://www.transit.dot.gov/ntd/
One-seat-ride	A trip that requires boarding only one transit vehicle (no transfers).

Paratransit	Paratransit is a transit service that provides on-demand curb-to-curb travel for people with disabilities, per the American's with Disabilities Act. It is required by this U.S. law to be provided to people who have a disability that prevents them from using fixed route transit service, within 3/4 mile of fixed route transit, during all times when fixed route transit is operating.
Peak	The periods of the day with the absolute highest level of travel demand: typically during the morning and afternoon rush hours, as people travel to and from work and school. However, in many places travel demand peaks only once, in the midday or afternoon, as service shifts change and students leave school.
Peak-only	A transit service that is peak-only operates only during the morning and afternoon travel peaks.
Productivity	The word productivity is often used in transit to describe the number of people served per unit of cost. Productivity can be expressed for an entire transit system, a subset of the system, individual lines or even for segments of lines.
Pulse	A pulse takes place when two or more transit services arrive together at the same place at the same time, so that their passengers may transfer among them with minimal waiting.
Radial	A route or network design where most routes go to and from a central point (typically a downtown). As opposed to a grid network.
Rapid	Rapid can have a range of meanings when applied to transit. It most often describes a route with wider stop spacing and overall faster speed.
Recovery time	Extra time between trips to make up for a delay. Unlike layover, which is a driver's break time, recovery time can be cut short so that the next trip can depart on-time.
Relevance	Boardings per capita, a measure of how relevant transit is to the population it serves.
Revenue hours	The time a transit vehicle and its operator spend out in public, available to passengers and (potentially) collecting revenue. Usually includes layover and recovery time, but excludes deadhead.
Ride check	The National Transit Database requires that transit agencies regularly sample on all of their services to collect ridership and on-time performance information. This is often performed using surveyors on transit vehicles, though increasingly it is performed by automated counters and GPS devices on transit vehicles. It is sometimes called a ride check.
Ridership	Ridership refers informally to the number of boardings or trips taken on a transit system or a particular transit service.
Shortline	Some routes have a more frequent inner segment and a less frequent outer segment. At the end of the inner segment some buses turn around and come back, while others continue on to a more distant turnaround point. The outer, less-frequent segment is often called the "longline," though technically the longline is the longest path that buses on that route travel, and its length is the inner segment plus the outer segment. The inner segment is called the "shortline."
Span	The span of a transit service is the number of hours it operates during the day, e.g. a service that runs from 6:00 am to 11:30 pm would have a 17.5 hour span. Span can also describe the number of days per week and per year that a service is operated.
Street connectivity	The degree to which streets connect to one another, and multiple paths exist between any two points, is describe as that place's connectivity. Areas with many cul de sacs or loops and few through routes have low connectivity; areas with grid-like street patterns have high connectivity. Low connectivity discourages trips by slower modes (such as walking or bicycling), and presents challenges for transit routing.
Transfer	When a person uses more than one transit vehicle to make a trip, they transfer in between vehicles. This is also often called a connection.
Transit orientation	As with transit dependency, transit orientation is a spectrum, not a category. People who are living or working around higher activity densities, in places where walking to transit is safe and appealing, or who do not have easy access to an automobile may have some degree of transit orientation. Transit orientation can exist among poor and affluent populations alike.
Tripper	A tripper is a special type of transit service that makes only a few or a single trip each day. Transit agencies often send one or more trippers to relieve crowding on certain routes, or to provide direct service where none exists at other hours. Trippers often run at the start and end of school days or work shifts.
Vehicle hours	The time during which a transit vehicle is away from the garage, whether providing revenue service (represented by "revenue hours"), driving between the garage and the start or end of service (represented by "deadhead hours") or in layover and recovery time.