

RTA SYSTEM REDESIGN STUDY

Learn about the Network Concepts

September 19, 2019



What is the GCRTA System Redesign Study?

What should RTA be trying to do? Different people tell us to do opposite things. We only have so much money, so we need your help figuring out what our priorities should be.

We want everyone's opinions about this. RTA works for all taxpayers, and needs to deliver benefits to the whole region, so everyone has a valid point of view.

This study is about what we should focus on in the next three years, which is why it's mostly about bus service. Many US transit agencies are rethinking their bus services, and sometimes expanding them.

Bus service is important. It carries most of RTA's customers and is our only way to get service to most people. Good bus service can help people who don't have cars, or choose not to rely on them. It can also relieve the impacts of traffic congestion and is better for the environment. Useful transit service, bus or rail, can help influence where people live and businesses locate.

NOTE: Anytime you see a symbol like **A or **B** in this document, look for the corresponding symbol on the map or image on the same page!**

What has happened so far?

In February 2019 **A**, we surveyed the public on the priorities RTA should focus on when it designs its network, and designed two alternatives illustrating how the network could look if we emphasized different priorities than today. These budget-neutral network alternatives show how the transit network might look if it were designed to focus more on generating higher ridership, or on extending coverage, than it does today.

Then, in May and June 2019 **B**, we presented these two networks to collect feedback from the public. You can learn more about the **High Frequency** and **Coverage** alternatives here:

<http://www.riderta.com/sites/default/files/pdf/presentations/jw/2019SystemRedesignAlternatives-JW.pdf>

What Happens Next

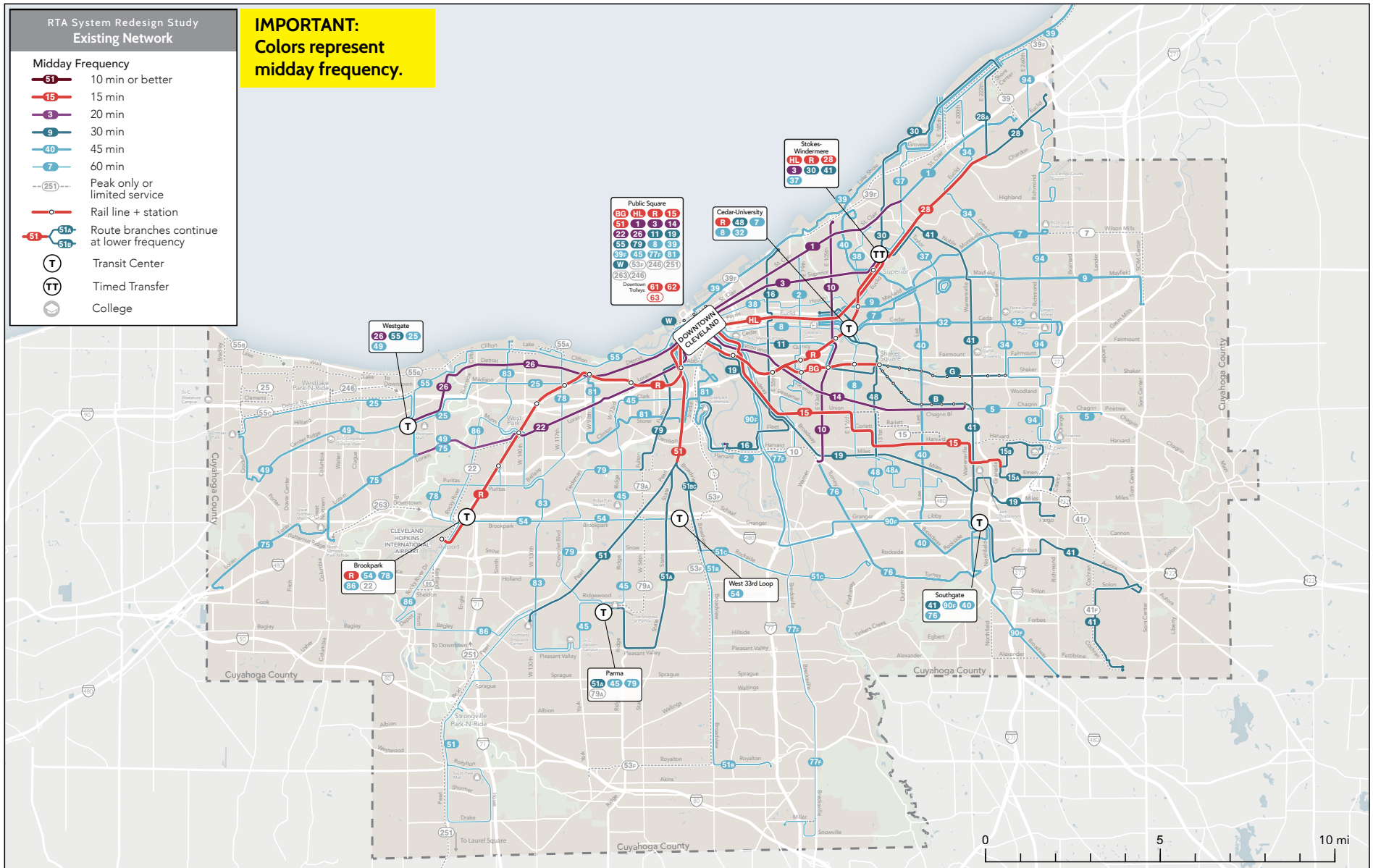
In Summer 2019, RTA and the study team used input from the first two surveys to design two network concepts with different levels of funding available for transit.

Now **C**, we want to hear what you think about these network concepts!



Review the Existing Network

Figure 1: Existing Network Map



Here is the existing RTA network, mapped by frequency (how often the bus comes).

Line colors indicate frequency, with red lines meaning frequent service (every 15 minutes or better).

Some routes have reduced frequency further out from the city center, as indicated by a change in line color. This does not mean passengers have to transfer to another vehicle.

Some routes split into branches, as indicated by the "A" or "B" suffix. As long as the route number remains the same, passengers can ride through the branch without transferring.

Help RTA Decide!

Like all transit agencies, RTA is asked to pursue opposite goals:

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

- Reduced air pollution from car and truck traffic, including emissions that cause climate change.
- Lower tax subsidy per rider.
- Better bus service for anyone in denser areas with more people.
- More economic activity without more traffic congestion.
- Support for new dense and walkable development.

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:

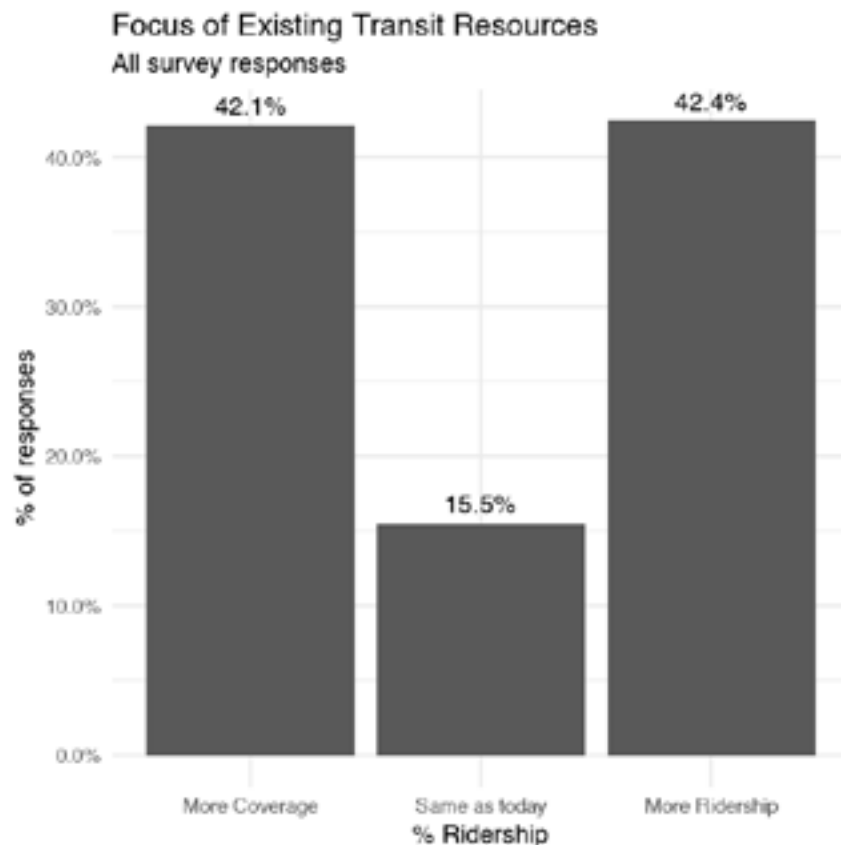
- Bus service to emerging suburban employment and residential areas.
- Mobility options for people who are located in hard-to-serve places and can't drive or don't have access to a car.
- Bus service to every city, town or neighborhood in Cuyahoga County.

What we have heard so far

From February 6 to March 18, 2019, we asked the public in an online survey, what high-level priorities they think RTA should focus on.

With existing resources, respondents were evenly split on whether to refocus service design towards ridership (42%) or coverage (41%).

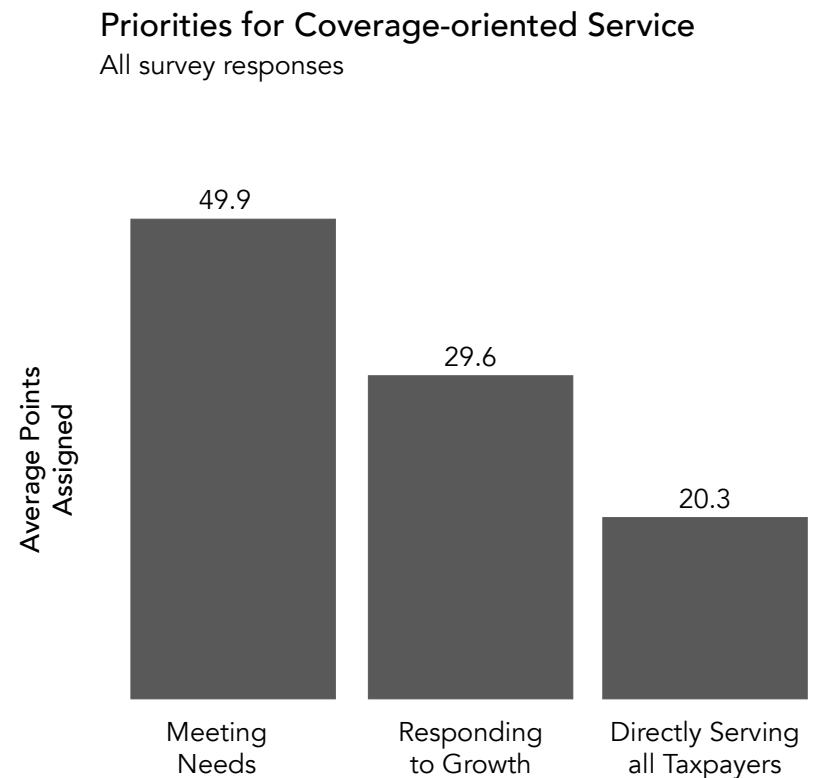
Only 15% chose to maintain the existing balance (60/40 ridership/coverage).



606 phone survey responses



When asked to divide 100 points between three priorities for how to deploy **coverage-oriented service**, respondents generally selected **"Meeting Needs"** as the top priority.



"Meeting needs" means transit service that reaches people who can't drive or have limited access to a personal car, even if they are located in a place that is hard to serve with transit.

What we have heard so far

In May and June 2019, we asked the public to react to transit network alternatives showing how RTA's network could look if it were redesigned to focus more on generating high ridership, or on expanding the coverage area.

The **High Frequency Alternative** showed how the network could look if it were designed to achieve higher ridership. This alternative concentrates service so that lines run more frequently where they would serve the most people. The network would reach fewer places, but where it does reach, waiting times (at the beginning of a trip, or to connect between routes) would be shorter than with the Existing Network.

The **Coverage Alternative** spreads out service across the county, However **spreading it out means spreading it thin**. Frequencies would be lower throughout the network. This means that the network reaches more places but some trips would take much longer.

You can read more about the alternatives, and view detailed maps, at **riderta.com/systemdesign**.

High Frequency Alternative

Figure 2: High Frequency Alternative



Coverage Alternative

Figure 3: Coverage Alternative



What we have heard so far

In the last survey, we asked the public to tell us what they thought of the **High Frequency** and **Coverage** alternatives.

When we asked respondents to tell us whether they preferred a network more like the High Frequency alternative, more like the Coverage Alternative, or somewhere in the middle, there was no majority suggesting that RTA should change in services in either direction.

However, more (47%) of respondents preferred an alternative more like the High Frequency Alternative than like the Coverage Alternative (33%).

While only 33% of respondents preferred a network that provides more coverage than today, when you include the 20% who preferred an option between the two alternatives, 53% voted for no reduction in the network's coverage area. Accordingly, neither of the Current Funding or Expanded Funding network concepts reduce the extent of the area served by transit from what it is today.



460 prompted
web survey
responses



1577 online
survey
responses

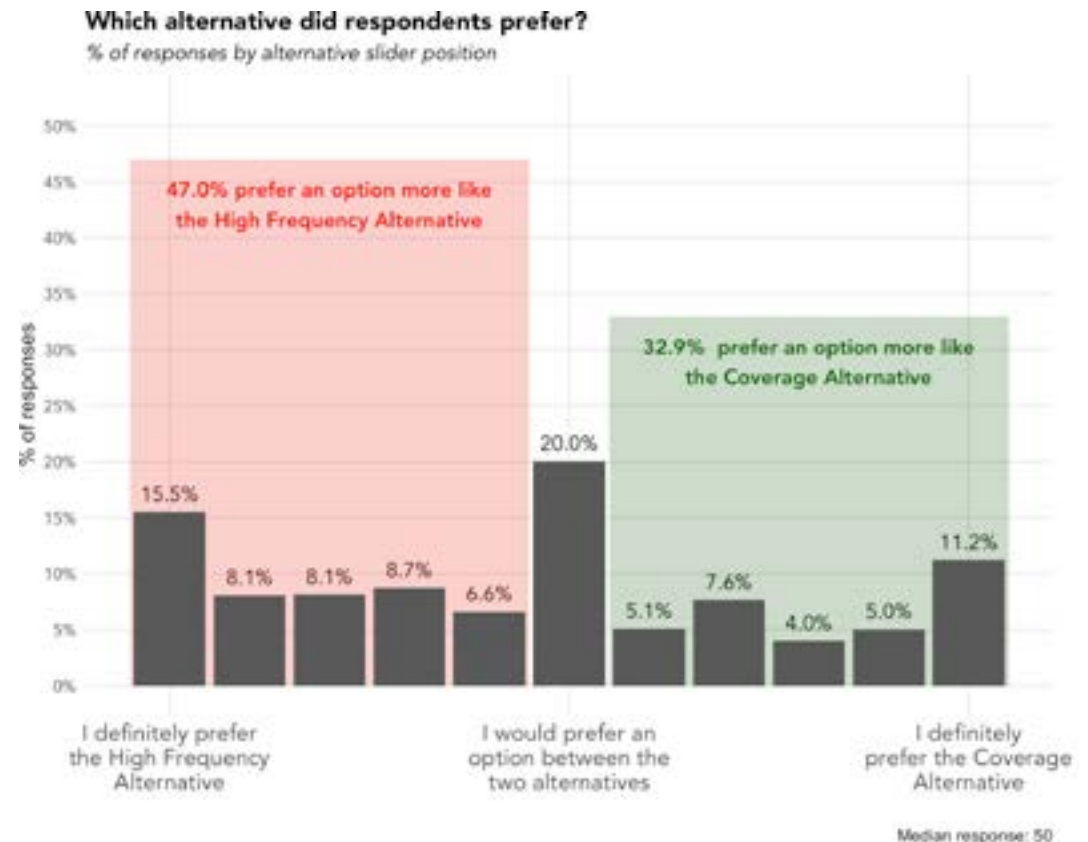


Figure 4: High Frequency and Coverage alternative preference

What we have heard so far

We also asked respondents to tell us whether they agreed or disagreed with several statements about each alternative. The charts below show the percent of respondents who agreed or disagreed with each statement regarding the benefits of the network.

Around 50 - 55% of respondents agreed or strongly agreed with each statement about the High Frequency Alternative, while approximately 20-33% disagreed or strongly disagreed.

About 30-40% agreed with the statements about the Coverage Alternative, and 30-40% disagreed.

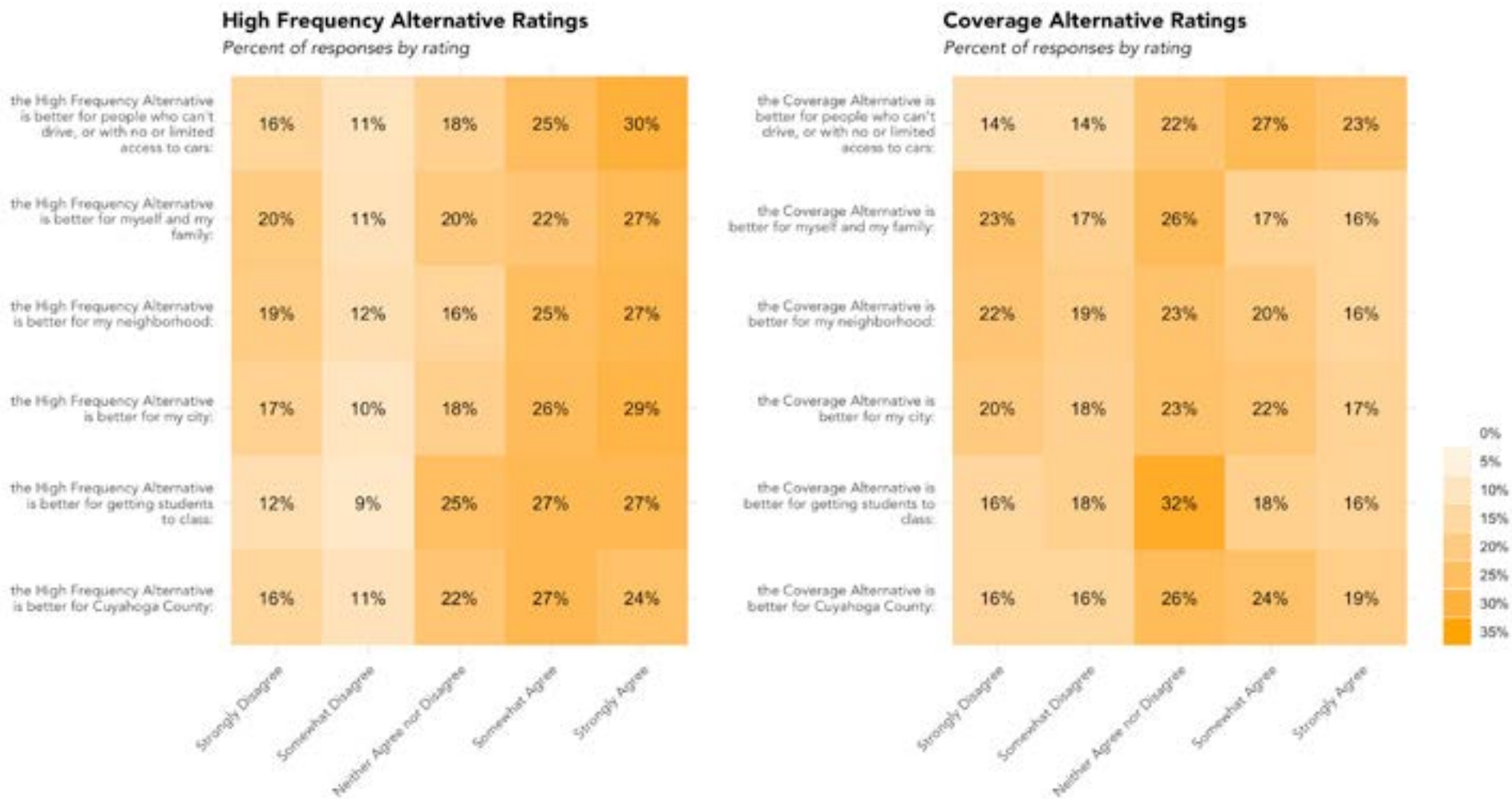


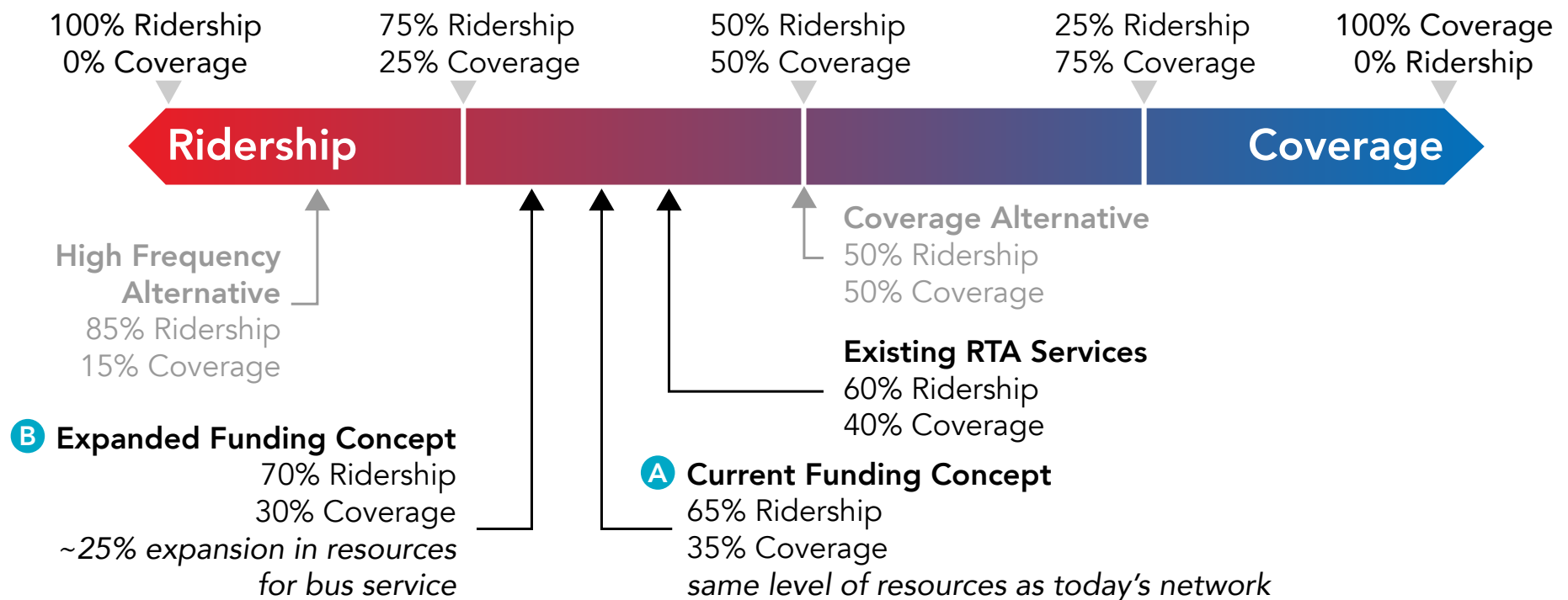
Figure 5: High Frequency and Coverage alternative ratings

Network Concept Parameters

Based on this input, the network concepts have been designed to focus more on generating high ridership, but more moderately than the High Frequency Alternative. They generally maintain coverage to areas that area currently served.

The Current Funding Concept (A) shifts the balance of service towards the ridership goal by about 5% compared to the Existing Network.

The Expanded Resources Concept (B), which shows what RTA could do if it had a 25% larger budget to run service, shifts the balance of service towards the ridership goal by about 10% compared to the Existing Network.



Current Funding Concept

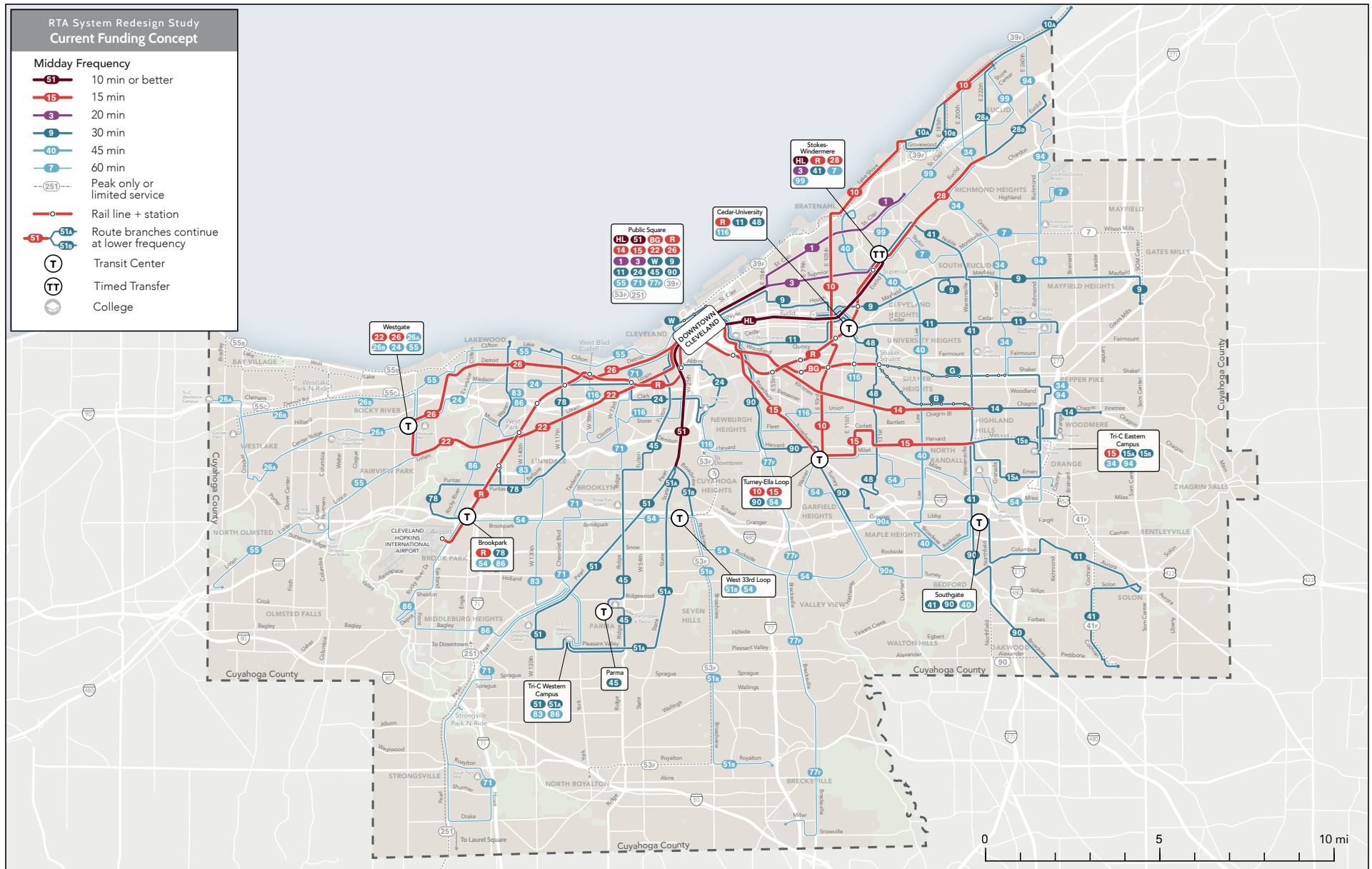


Figure 6: Current Funding Concept Map

To view an annotated, high-resolution version of this map, [click here](https://jarrettwalker.com/annotated-current-funding-concept-20190926/), or visit: <https://jarrettwalker.com/annotated-current-funding-concept-20190926/>

Current Funding Concept

In this network concept, no new resources are available for transit service, but the focus of the network is shifted slightly towards ridership.

The Current Funding Concept modestly expands the reach of the frequent network, with 15-minute service on major corridors like Detroit, Lorain, Kinsman, Broadway, and Harvard. It pays for these frequency improvements by simplifying some rush-hour services and reducing some current routes' frequencies from every 45 to every 60 minutes. The network generally covers all areas currently served

Design Principles

- Maintain the existing coverage area (the total area of the county within a 1/4 mile walk from a stop with transit service).
- Establish as much high-frequency service in dense, walkable areas as possible.
- Maintain lower frequencies on weekends than weekdays.

The **Current Funding Concept** would offer:

- shorter waits
- no reduction in the coverage area
- access to more jobs within 60 minutes
- quicker transfers
- higher ridership potential



Access to jobs with typical trips

2,700 more jobs would be accessible in 45 minutes for the average person, a **17% increase** compared to the Existing Network.

5,700 more jobs would be accessible in 60 minutes, a **11% increase** over the Existing Network.



Access to jobs with very long trips

7,200 more jobs would be accessible within 2 hours of travel time for the average person, a **3% increase** compared to the Existing Network.



People near high-frequency transit

167,000 more people would be within a 1/2 mile walk of frequent transit service, an **100% increase** from the Existing Network.

50,000 more jobs would be within a 1/2 mile walk of frequent service, a **25% increase**.



People near any transit

8,400 more people would be within a 1/2 mile walk of transit service, a **0.9% increase** from the Existing Network.

11,900 more jobs would be within a 1/2 mile walk of transit service, a **2.2% increase**.

Expanded Funding Concept

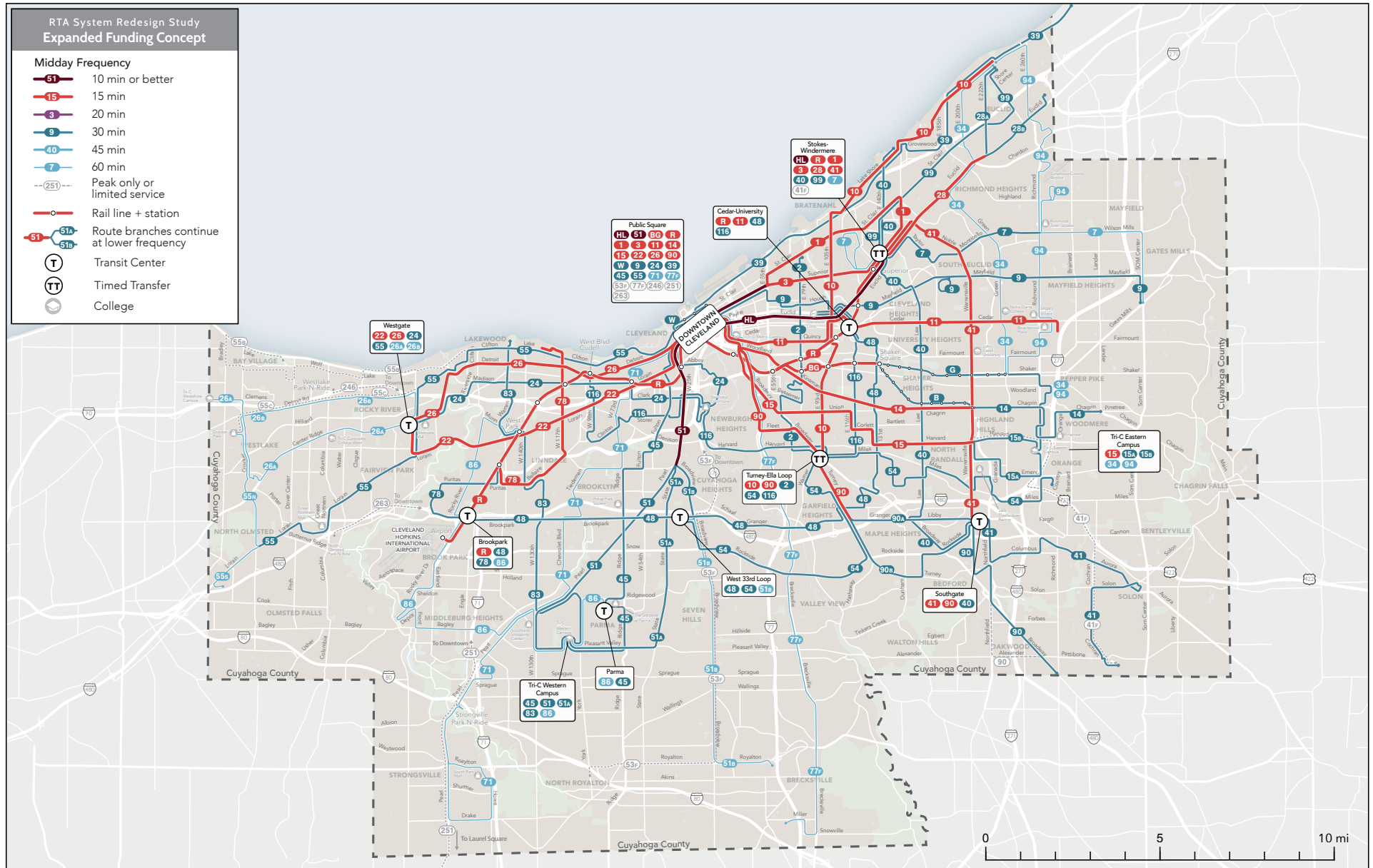


Figure 7: Expanded Funding Concept Map

To view a high-resolution version of this map, [click here](https://jarrettwalker.com/annotated-expanded-funding-concept-20190926/), or visit: <https://jarrettwalker.com/annotated-expanded-funding-concept-20190926/>

Expanded Funding Concept

The Expanded Funding Scenario shows what could be possible for RTA's network if there were around 25% more resources to run bus service. Almost all new resources are spent on ridership-generating services, so the overall focus of the network shifts to about 70% ridership / 30% coverage.

In this network concept, the split of *existing* resources between ridership and coverage is similar to today, but more ridership-focused services come every 15 minutes, and more coverage-focused services come every hour. However, most *new* transit resources are spent on generating high ridership, and not on extending the coverage area.

Design Principles

- Maintain the existing coverage area.
- Upgrade service on dense, walkable corridors or to major destinations to every 15 minutes.
- Establish multiple 15-minute north-south crosstown services, for quick connections in all directions.
- For people located in moderately dense areas, that don't have high-frequency service, upgrade current 45 or 60 minute routes to every 30 minutes.
- Significantly improve weekend service with frequent routes that operate every 15-minute or better 7-days a week.

The **Expanded Funding Concept** would offer:

- shorter waits for many more trips
- no reduction in the coverage area
- access to many more jobs within 60 minutes
- shorter waits when transferring
- higher ridership potential



Access to jobs with typical trips

6,600 more jobs would be accessible in 45 minutes for the average person, an **42% increase** compared to the Existing Network.

16,700 more jobs would be accessible in 60 minutes, a **38% increase** compared to the Existing Network.



Access to jobs with very long trips

38,000 more jobs would be accessible within 2 hours of travel time for the average person, an **16% increase** over the Existing Network



People near high-frequency transit

340,800 more people would be within 1/2 mi walk of high-frequency service, a **200% increase** compared to the Existing Network

125,500 more jobs would be within 1/2 mi walk of high-frequency service, a **62% increase** compared to the Existing Network



People near any transit

12,600 more people would be within a 1/2 mile walk of transit service, a **1.3% increase** from the Existing Network.

15,000 more jobs would be within a 1/2 mile walk of transit service, a **2.7% increase**.

Scenario Outcomes

How would a network design like those in the financial scenarios change how people are able to move around Cuyahoga County, compared to the Existing Network? To understand this, we've analyzed five key factors:

1. How many residents or jobs are within walking distance of a bus stop with each scenario?
2. With each scenario, how many residents or jobs are within walking distance of a bus stop served by a high-frequency route running every 15 minutes or better?
3. How many jobs can an average person reach using transit with each scenario?
4. How does each scenario change how easy it is to travel to CMSD high schools?
5. How does each scenario change how easy it is to travel to Tri-C campuses?

How do we measure access?

When we measure access to jobs, we calculate travel times based on the following factors:

- The walking time to and from each stop along the street network
- $\frac{1}{2}$ headway initial wait (the time you spend waiting for your bus to arrive). So for a 15-minute route, on average you will wait 7.5 minutes. For a 30-minute route, your average wait would be 15 minutes.
- In-vehicle travel time (the time you spend sitting on the bus).

We assume that if you need to make a transfer, your wait will be half of the frequency of the route, unless the transfer occurs at a dedicated timed transfer point, where shorter coordinated transfer times are assumed.

Your "access" is the number of jobs located within the area you could reach using transit by this formula, in 45, 60, 75 or 120 minutes.

How many people are near transit?

Transit must be present for it to be useful. The graphs on this page show how the number of people and jobs within a 1/2-mile walk of transit and high-frequency service with each concept.

Each network concept reaches about the same total number of people with transit service as the existing network. However, both the Current Funding Concept and Expanded Funding Concept extend frequent service (shown in red) to many more people than today.

The **Current Funding Concept** doubles the number of people within 1/2 mile of frequent (15-minute) service compared to the Existing Network. It also increases the number of people who have access to service that comes every 30 minutes or better, because most 45-minute services are converted to 30-minute routes. However, some 45-minute routes would run every 60 minutes with this concept, so more people have access to only 60-minute service than in the existing network.

The **Expanded Funding Concept** triples the number of people within 1/2 mile of frequent service. It expands the number of people with access to 30-minute or better service, and reduces the number of people who have access to only 60-minute service.

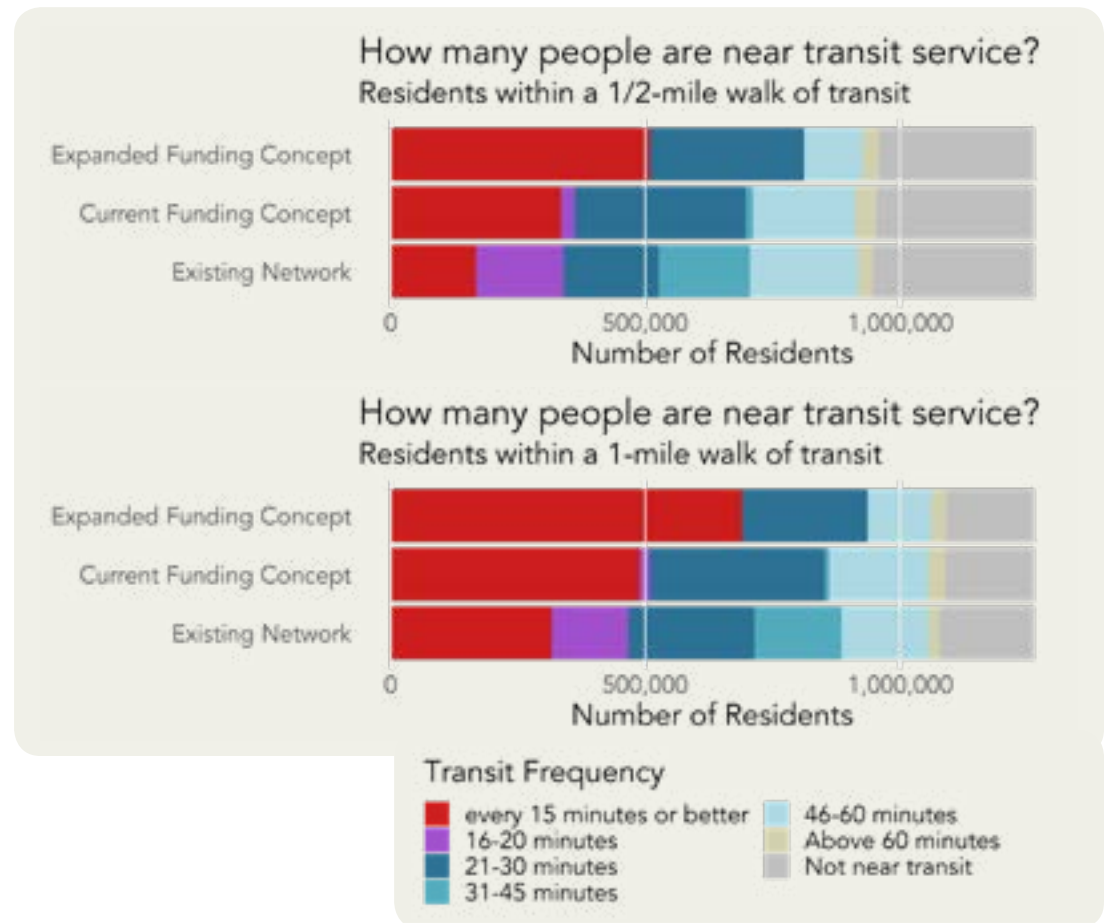


Figure 8: How many people are near transit?

How many jobs can a person reach using transit?

These maps illustrate an example of how each network concept would impact where you could go with transit, starting from University Circle.

In each map, purple shows the area that would be reachable by transit in 60 minutes with either concept, while blue areas are newly accessible with each concept. Red areas are places reachable with the Existing Network that are out of reach with the concepts.

The tables below each map show how the number of jobs or residents reachable from this location changes compared to the Existing Network.

With the **Current Funding Concept**, the effect of the enhanced frequencies provided on key corridors is evident. For example, Routes 9 and 11 (Mayfield and Cedar, respectively) are upgraded from 45 to 30 minutes, so blue areas along those corridors could be reached faster from University Circle **A**. Because Route 7 serving Monticello and Wilson Mills would run only every 60 minutes (compared to 45 minutes today), this corridor **B** shows up red because it would take longer to reach.

Where could I travel to in 60 minutes from Euclid & East Blvd (University Circle)?

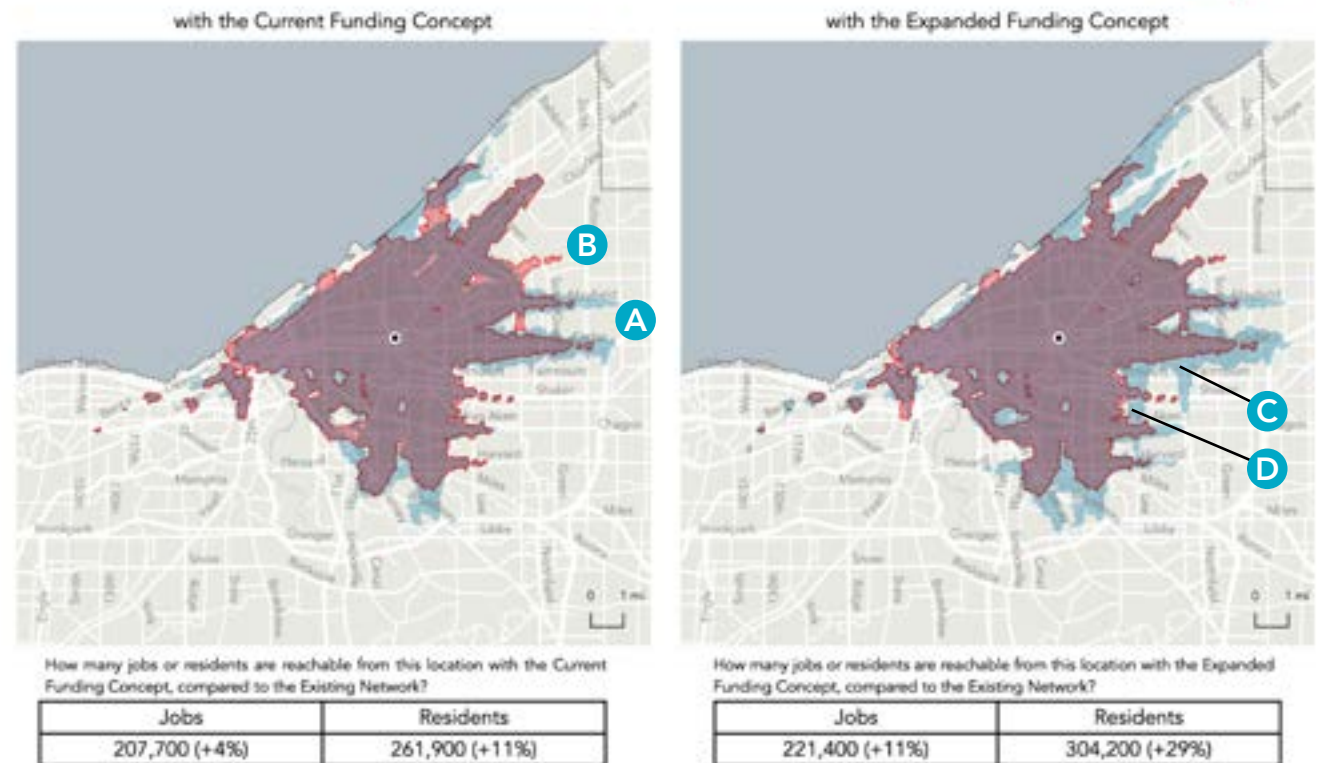


Figure 9: Where could I travel to in 60 minutes from University Circle?

With the **Expanded Funding Concept**, the frequent network is more expansive, and more lower-frequency routes run every 30 minutes. As a result, more corridors show up in blue, including Warrensville Rd. (**C**, new 15-minute service) and Lee Rd. (**D**, new 30-minute service).

How many jobs can a person reach using transit?

Measuring Usefulness

One of the most important measures for how well a transit system can compete with other modes for riders is how useful it is for taking people to jobs. The graph on this page shows how job access would change at different travel times compared to the Existing Network with each concept.

Comparing the Funding Concepts

Both of the concepts broadly increase access for people in Cuyahoga County. The Current Funding Concept would provide access to an average of 18% more jobs in an hour, while the Expanded Funding Concept would allow the average person to reach over 42% more jobs.

Because neither concept substantially expands the overall coverage area of the network, access benefits are greatest for shorter travel times. That said, both concepts offer some access benefits for very long trips as a result of frequency and travel time improvements within the existing network's extent.

With a travel time budget of 2 hours (sufficient to travel between most parts of the City of Cleveland and the outer limits of the transit network), 4% and 16% more jobs are accessible by transit with the Current Funding and Expanded Funding concepts, respectively.

On average, how many more jobs can people get to in:

	45 minutes	60 minutes	75 minutes	120 minutes
Existing	15,700	43,800	85,300	235,500
Current Funding	18,400 (+17%)	49,500 (+13%)	94,900 (+11%)	242,700 (+3%)
Expanded Funding	22,300 (+42%)	60,500 (+38%)	115,000 (+34%)	273,500 (+16%)

Figure 10: Access to Jobs

Change in Job Access

Average Number of Jobs Reachable by Transit in 45 - 120 minutes, compared to the Existing Network.

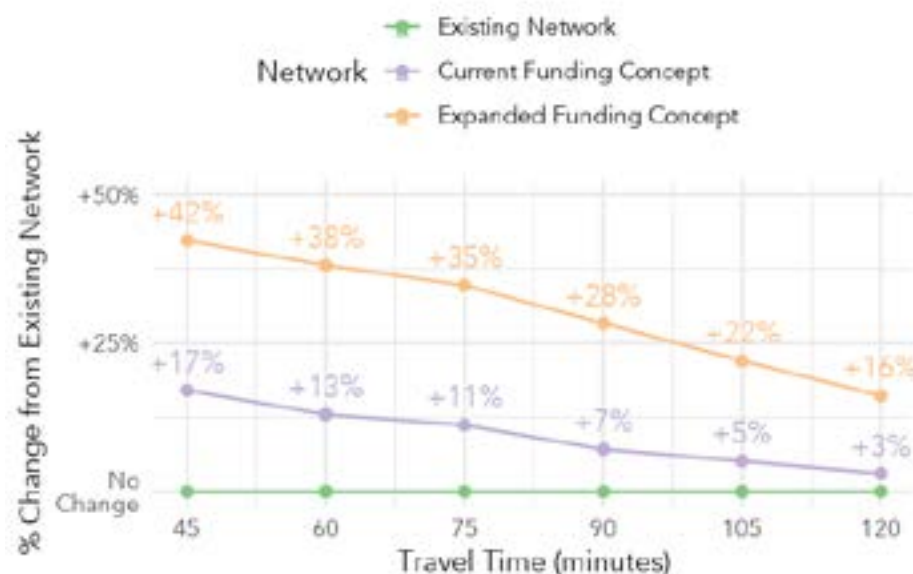


Figure 11: Access to jobs by travel time

How many jobs can lower-income residents of Cuyahoga County reach using transit?

One of the most important equity benefits of transit is serving as a mobility option to connect lower-income people to jobs and other opportunities.

The tables on this page shows the number of jobs and lower-wage jobs that would be reachable at different travel times by people living in households earning up to 100% of the federal poverty level **A** (\$25,750 for a family of four in 2019), and between 100% and 200% of the poverty level **B**, with the different concepts.

Lower-income people in Cuyahoga County are more likely to reside in the City of Cleveland and other inner areas where more transit service is available, so job access for lower-income people is higher than for the general population.

The improvements for lower-income people provided by both concepts are comparable to those of the entire population. The average person could access about 12% more jobs in an hour with the Current Funding Concept than with the Existing Network, while the average person living in a household below the poverty level could access about 10% more.

A

On average, how many more jobs can people living in households below 100% of the poverty line get to in:

		45 minutes	60 minutes	75 minutes	120 minutes
Existing	all jobs	31,100	79,900	139,100	322,600
	<\$3333 / mo	15,500	40,100	71,600	178,800
Current Funding	all jobs	35,600 (+14%)	87,800 (+10%)	149,600 (+8%)	327,000 (+2%)
	<\$3333 / mo	17,900 (+16%)	44,600 (+12%)	78,100 (+10%)	182,400 (+2%)
Expanded Funding	all jobs	42,300 (+36%)	103,600 (+30%)	176,700 (+28%)	363,900 (+12%)
	<\$3333 / mo	21,400 (+38%)	53,300 (+34%)	93,700 (+30%)	203,800 (+14%)

Figure 12: Access to jobs by people living below the poverty line

B

On average, how many more jobs can people living in households at 100% - 200% of the poverty line get to in:

		45 minutes	60 minutes	75 minutes	120 minutes
Existing	all jobs	18,800	54,500	104,700	277,000
	<\$40k/year	9,800	28,000	54,500	152,600
Current Funding	all jobs	21,900 (+16%)	60,800 (+12%)	114,600 (+10%)	283,800 (+2%)
	<\$40k/year	11,500 (+18%)	31,500 (+12%)	60,300 (+10%)	157,700 (+4%)
Expanded Funding	all jobs	26,600 (+42%)	74,000 (+36%)	138,700 (+32%)	319,400 (+16%)
	<\$40k/year	14,100 (+44%)	38,900 (+38%)	74,100 (+36%)	178,400 (+16%)

Figure 13: Access to low-wage jobs by people living in households between 100% and 200% of the poverty line

How does each network concept help people travel to CMSD high schools?

In the Cleveland Metropolitan School District, students can choose to attend one of many high schools, but whether or not a particular school is a realistic choice for a student may often depend upon whether they can easily travel to and from school and home using transit.

The chart on this page shows the percent of residents within the CMSD boundaries who can reach different numbers of high schools.

While the school district is large enough that very few people can reach **every** school in an hour, these network concepts would increase the number of schools within a viable transit trip for many people.

Both the Current Funding and Expanded Funding concepts establish frequent service through most of the area of the CMSD, which means that travel within it (including trips to and from high schools) would enjoy the benefit of shorter waits at the beginning of the trip and at transfers to other frequent services.

With the **Current Funding Concept**:



31,900 more people within the district would have access to at least 10 CMSD schools in 60 minutes, a **23% increase** over the Existing Network

With the **Expanded Funding Concept**:



71,000 more people within the district would have access to at least 10 CMSD schools in 60 minutes, a **51% increase** over the Existing Network

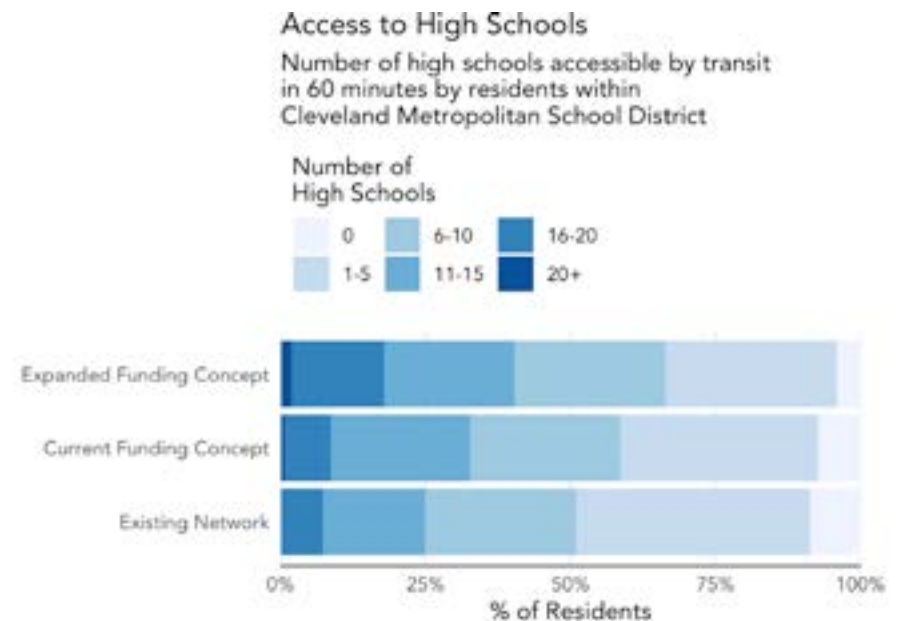


Figure 14: Access to CMSD high schools

Access to Tri-C Campuses

Tri-C's campuses are an important educational resource for people in Cuyahoga County. One way of measuring the performance of each network concept is to assess how well each network connects people to Tri-C campuses. The following campuses were included:

- Metropolitan Camp
- Western Campus
- Westshore Campus
- Eastern Campus

The Existing Network puts approximately 20% of Cuyahoga County residents within a 1-hour travel time of a Tri-C campus.

The chart on this page shows the percent of county residents who would have access to 0, 1 or 2 Tri-C campuses with each concept. Each concept expands the number of people who are within a 60 minute ride of a Tri-C campus.

However, even the Expanded Funding Concept puts only 36% of residents within reach of a Tri-C campus. This is primarily because most of Tri-C's campuses are located in suburban settings at the edges of the country, which means they require long drives to reach.

With the **Current Funding Concept**:



134,000 more people would have access to at least 1 Tri-C campus within 60 minutes, a **52% increase** over the Existing Network

With the **Expanded Funding Concept**:



179,000 more people would have access to at least 1 Tri-C campus in 60 minutes, a **70% increase** over the Existing Network

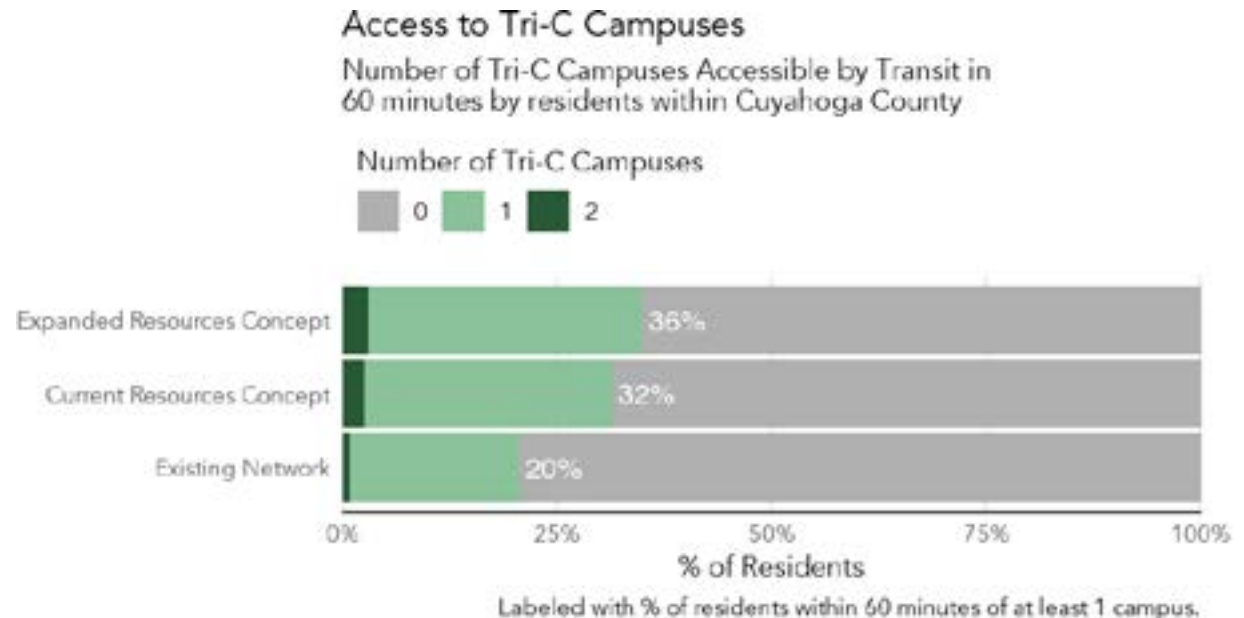


Figure 15: Access to Tri-C campuses

Outcome Summary

The table below provides a summary of the key measures gauging the potential impact of each concept.

Figure 16: Outcomes Summary Table

Measure	Current Funding Concept	Expanded Funding Concept
Access to jobs with typical trips	<p>2,600 more jobs would be accessible in 45 minutes for the average person, a 17% increase compared to the Existing Network.</p> <p>5,800 more jobs would be accessible in 60 minutes, a 13% increase over the Existing Network.</p>	<p>6,600 more jobs would be accessible in 45 minutes for the average person, an 42% increase compared to the Existing Network.</p> <p>16,600 more jobs would be accessible in 60 minutes, a 43% increase compared to the Existing Network.</p>
Access to jobs with very long trips (2 hours / 120 minutes)	7,100 more jobs would be accessible within 2 hours of travel time for the average person, a 3% increase compared to the Existing Network.	38,000 more jobs would be accessible within 2 hours of travel time for the average person, an 18% increase over the Existing Network
Access to CMSD high schools (in 60 minutes, by people living within the district)	31,900 more people within the district would have access to at least 10 CMSD schools in 60 minutes, a 23% increase over the Existing Network	71,000 more people within the district would have access to at least 10 CMSD schools in 60 minutes, a 51% increase over the Existing Network
Access to Tri-C campuses (in 60 minutes)	134,000 more people would have access to at least 1 Tri-C campus within 60 minutes, a 52% increase over the Existing Network	179,00 more people would have access to at least 1 Tri-C campus in 60 minutes, a 70% increase over the Existing Network
Number of people near high-frequency transit service (service every 15 minutes or better)	<p>167,000 more people would be within a 1/2 mile walk of frequent transit service, an 100% increase from the Existing Network.</p> <p>50,000 more jobs would be within a 1/2 mile walk of frequent service, a 9% increase.</p>	<p>340,800 more people would be within a 1/2 mile walk of frequent transit service, a 200% increase from the Existing Network.</p> <p>125,000 more jobs would be within a 1/2 mile walk of frequent service, a 23% increase.</p>
Number of people near transit service of any kind	<p>8,400 more people would be within a 1/2 mile walk of transit service, a 0.9% increase from the Existing Network.</p> <p>11,900 more jobs would be within a 1/2 mile walk of transit service, a 2.2% increase.</p>	<p>12,600 more people would be within a 1/2 mile walk of transit service, a 1.3% increase from the Existing Network.</p> <p>15,000 more jobs would be within a 1/2 mile walk of transit service, a 2.7% increase.</p>

We want to know what you think!
Visit riderta.com/systemdesign
to take our survey on the network
concepts!

Detailed Outcomes

Detailed Access Tables

The tables on the following pages show the average number of total, low-wage and middle-wage jobs Cuyahoga County residents could reach under each of the Existing Network, Current Funding Concept, and Expanded Concept, in 45, 60, 75 and 120 minutes.

Each table provides a breakdown for the following demographic groups:

- All residents
- Lower-income residents (living in households with income below the federal poverty level, approximately \$51,000 per year for a family of four in 2019)
- Low to moderate income residents (living in households with income 100% to 200% of the federal poverty level, approximately \$51,000 per year for a family of four in 2019)
- Non-white residents
- Residents living in households without access to a car

More about employment data

All job access analyses in this project rely on workplace location data drawn from the US Census' Logitudinal Employer-Household Dynamics (LEHD) program. This dataset provides nationwide estimates of the number of employees working in each census block, block group, tract, and other geographies.

LEHD defines three job wage levels:

- Jobs with earnings \$1250/month or less (referred to here as "low-wage jobs")
- Jobs with earnings \$1251/month to \$3333/month (referred to here as "middle-wage jobs")
- Jobs with earnings greater than \$3333/month

Because the low and middle wage classes include only jobs with wages up to an equivalent of around \$40,000 / year, we have combined the "below \$1250/month" and "\$1251/month to \$3333/month" classes.

Average Access by Transit to All Jobs per Person in Cuyahoga County

Travel Time (min)	<i>All Residents</i>				<i>Non-white Residents</i>				<i>Zero-Vehicle Households</i>			
	45	60	75	120	45	60	75	120	45	60	75	120
Existing Network	15,700	43,800	85,300	235,500	25,200	69,200	126,800	309,100	34,200	84,300	143,400	326,000
Current Funding	18,400 (+17%)	49,500 (+11%)	94,900 (+11%)	242,700 (+4%)	28,700 (+14%)	75,400 (+10%)	135,400 (+6%)	313,000 (+2%)	38,600 (+12%)	91,800 (+8%)	153,600 (+8%)	329,800 (+2%)
Expanded Funding	22,300 (+42%)	60,500 (+38%)	115,000 (+34%)	273,500 (+16%)	35,000 (+40%)	91,300 (+32%)	163,300 (+28%)	350,100 (+14%)	45,300 (+32%)	107,000 (+26%)	178,800 (+24%)	364,600 (+12%)

Figure 17: Detail Table - Access to All Jobs

Travel Time (min)	<i>People living in households with income below 100% poverty level</i>				<i>People living in households with income 100-200% of poverty level</i>			
	45	60	75	120	45	60	75	120
Existing Network	31,100	79,900	139,100	322,600	18,800	54,500	104,700	277,000
Current Funding	35,600 (+14%)	87,800 (+10%)	149,600 (+8%)	327,000 (+2%)	21,900 (+16%)	60,800 (+12%)	114,600 (+10%)	283,800 (+2%)
Expanded Funding	42,300 (+36%)	103,600 (+30%)	176,700 (+28%)	363,900 (+12%)	26,600 (+42%)	74,000 (+36%)	138,700 (+32%)	319,400 (+16%)

Figure 18: Detail Table - Access to Jobs by People Living in Lower-Income and Low-to-Moderate Income Households

Average Access by Transit to Low/Mid-Wage Jobs per Person in Cuyahoga County

Travel Time (min)	All Residents				Nonwhite Residents				Zero-Vehicle Households			
	45	60	75	120	45	60	75	120	45	60	75	120
Existing Network	8,300	22,800	44,700	129,500	12,700	34,900	65,300	170,300	17,000	42,200	73,800	180,800
Current Funding	9,700 (+18%)	25,900 (+14%)	50,200 (+12%)	134,700 (+4%)	14,500 (+14%)	38,400 (+10%)	70,800 (+8%)	173,800 (+2%)	19,300 (+14%)	46,500 (+10%)	80,200 (+8%)	184,100 (+2%)
Expanded Funding	11,900 (+44%)	32,100 (+42%)	61,700 (+38%)	152,500 (+18%)	17,900 (+42%)	47,300 (+36%)	86,600 (+32%)	195,100 (+14%)	22,800 (+34%)	55,000 (+30%)	94,700 (+28%)	204,200 (+12%)

Figure 19: Detail Table - Access to Low-Wage Jobs

Travel Time (min)	People living in households with income below 100% poverty level				People living in households with income 100-200% of poverty level			
	45	60	75	120	45	60	75	120
Existing Network	15,500	40,100	71,600	178,800	9,800	28,000	54,500	152,600
Current Funding	17,900 (+16%)	44,600 (+12%)	78,100 (+10%)	182,400 (+2%)	11,500 (+18%)	31,500 (+12%)	60,300 (+10%)	157,700 (+4%)
Expanded Funding	21,400 (+38%)	53,300 (+34%)	93,700 (+30%)	203,800 (+14%)	14,100 (+44%)	38,900 (+38%)	74,100 (+36%)	178,400 (+16%)

What is a Low/Mid-Wage Job?

Because the low and middle wage classes in the LEHD employment data source include only jobs with wages up to an equivalent of around \$40,000 / year, we have combined the "below \$1250/month" and "\$1251/month to \$3333/month" classes.

Figure 20: Detail Table - Access to Low/Mid-Wage Jobs by People Living in Lower-Income and Low-to-Moderate Income Households

Average Access by Transit to High-Wage Jobs per Person in Cuyahoga County

Travel Time (min)	All Residents				Nonwhite Residents				Zero-Vehicle Households			
	45	60	75	120	45	60	75	120	45	60	75	120
Existing Network	7,500	21,000	40,600	106,000	12,400	34,200	61,500	138,700	17,200	42,100	69,600	145,200
Current Funding	8,700 (+16%)	23,600 (+12%)	44,700 (+10%)	108,000 (+2%)	14,100 (+14%)	37,000 (+8%)	64,600 (+6%)	139,200 (+0%)	19,300 (+12%)	45,300 (+8%)	73,400 (+6%)	145,700 (+0%)
Expanded Funding	10,400 (+40%)	28,300 (+34%)	53,300 (+32%)	121,100 (+14%)	17,100 (+38%)	44,000 (+28%)	76,600 (+24%)	154,900 (+12%)	22,400 (+30%)	52,000 (+24%)	84,100 (+20%)	160,500 (+10%)

Figure 21: Detail Table - Access to Low-Wage Jobs

Travel Time (min)	People living in households with income below 100% poverty level				People living in households with income 100-200% of poverty level			
	45	60	75	120	45	60	75	120
Existing Network	15,600	39,800	67,500	143,800	9,000	26,500	50,300	124,400
Current Funding	17,700 (+14%)	43,200 (+8%)	71,500 (+6%)	144,600 (+0%)	10,400 (+16%)	29,200 (+10%)	54,300 (+8%)	126,100 (+2%)
Expanded Funding	20,800 (+34%)	50,200 (+26%)	83,100 (+22%)	160,100 (+12%)	12,500 (+38%)	35,000 (+32%)	64,600 (+28%)	141,100 (+14%)

Figure 22: Detail Table - Access to Low/Mid-Wage Jobs by People Living in Lower-Income and Low-to-Moderate Income Households

What is a High-Wage Job?


The highest wage classification in the LEHD employment data source includes all jobs with wages about \$3333/month. We have used that wage class for the high-wage job access analysis shown on this page.

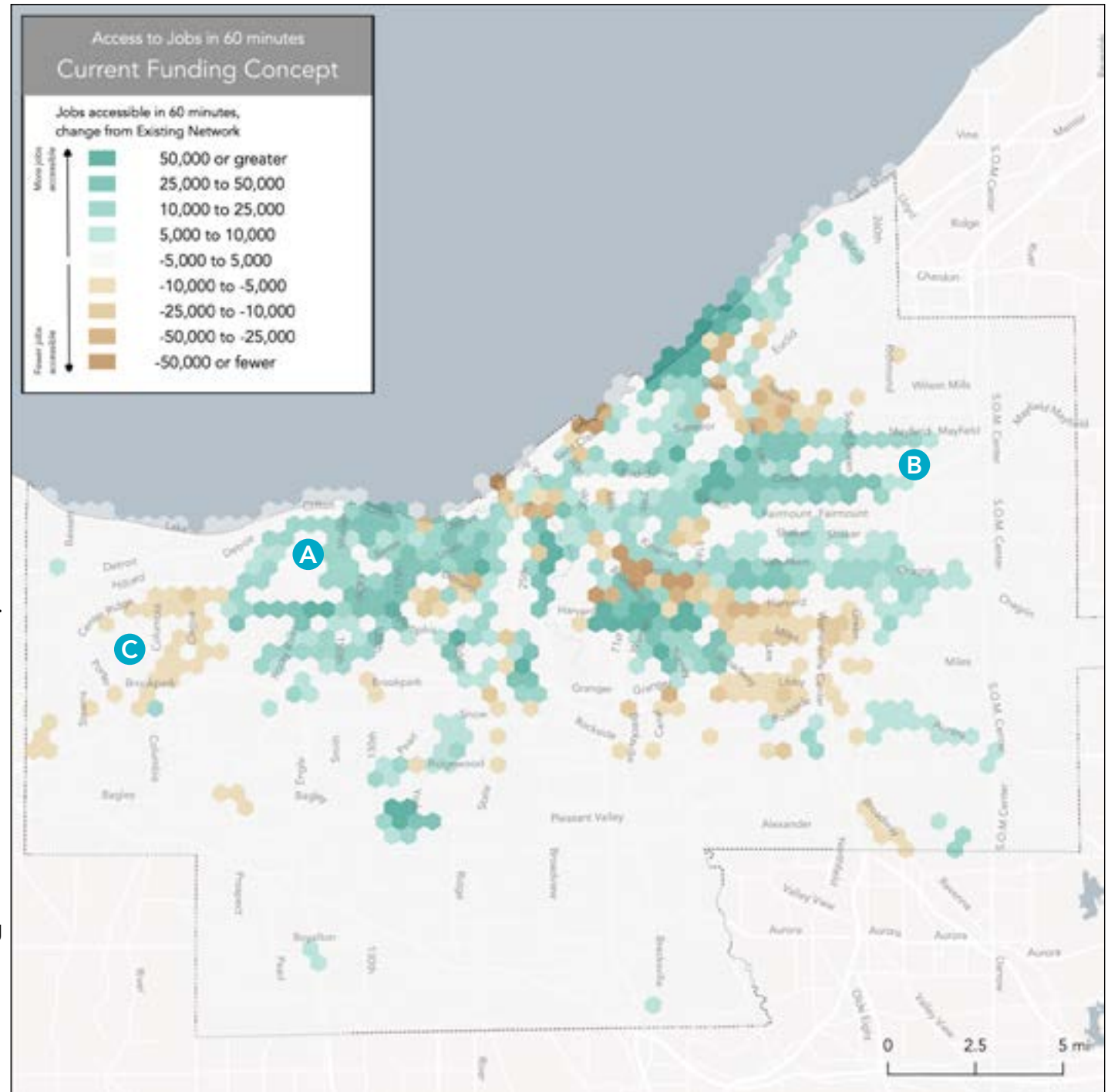
Where does access change?

Figure 23: Change in 60 minute access map - Current Funding Concept

This map shows how access to jobs in 60 minutes would change in different areas of Cuyahoga County with the Current Funding Scenario. **Areas shown in green would gain access to more jobs; areas in brown would have access to fewer jobs. Areas in grey would see very little change.**

The map shows the benefits of added frequency on routes serving Detroit and Lorain on the west side, and on Kinsman, Broadway (south of Union) **A**, Cedar and Mayfield **B** in the east.

There are also some areas where access is diminished as a result of changes in frequency or route structure. On the west side, there is a loss of access on Center Ridge and Outer Lorain , because routes 49 and 75 are reduced to 60 minute frequency. On the east side, there is a loss of access along Miles and Harvard west of E 131st, because Miles would be served every 60 minutes instead of every 30 minutes today.



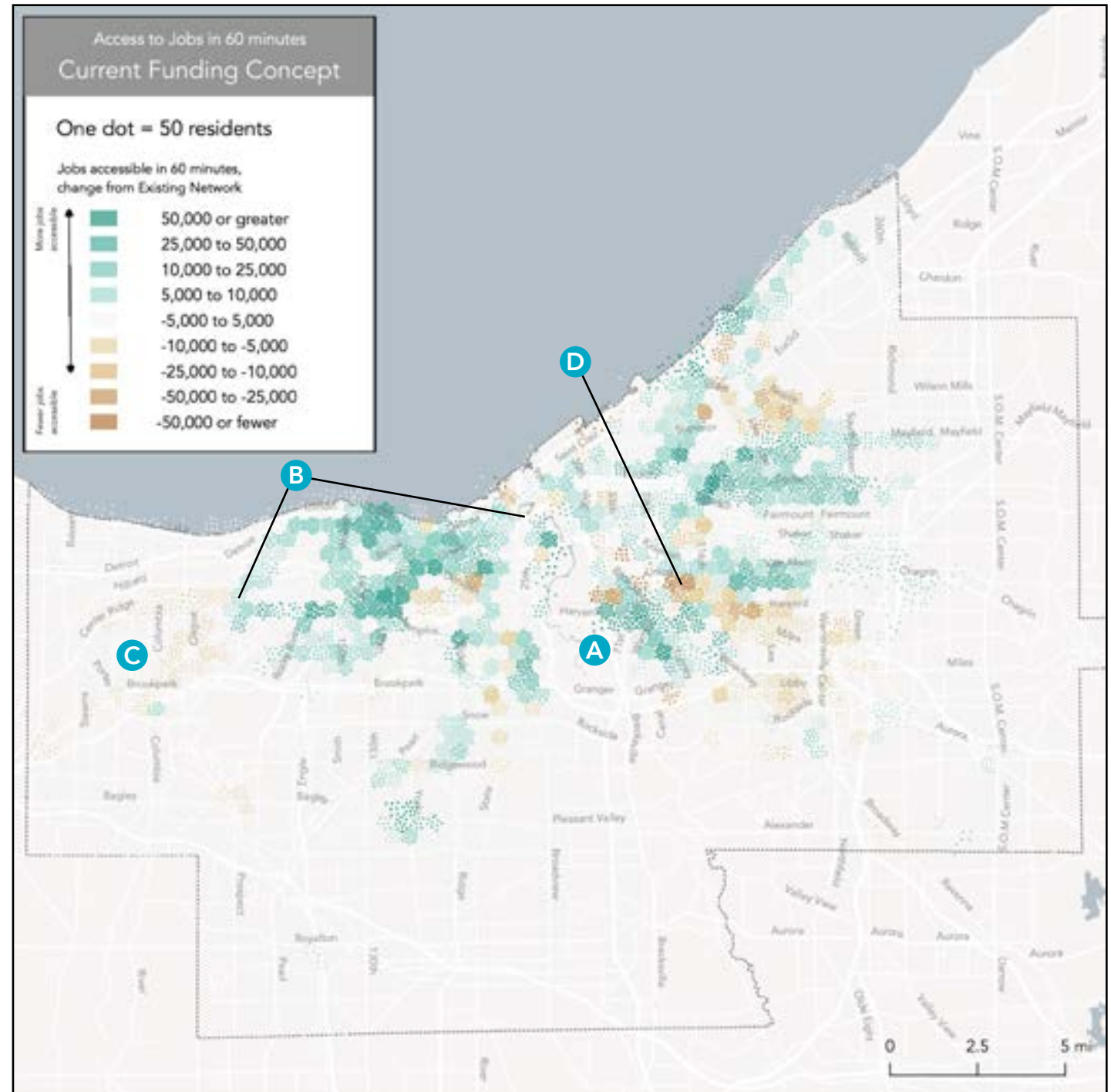
Where does access change?

Figure 24: Change in 60 minute access dot density map - Current Funding Concept

It's also important to consider how many people are impacted by access changes. The image on this page puts a dot on the map for every 50 people living in each hexagon, and color-codes those dots by how access changes. The closer the dots are together, the more people live in an area and the greater the density is.

From this map, we can see that most of the areas of access improvement are places where many dots are close together, like in Slavic Village **A**, or around the Detroit and Lorain **B** corridors on the west side.

Most places where access decreases are lower-density areas like the Center Ridge or outer Lorain corridors **C**. However, there are a few moderately dense places where access declines with this concept, as along Union near E 93rd **D**, where the 15-Harvard is rerouted off Union in this concept.



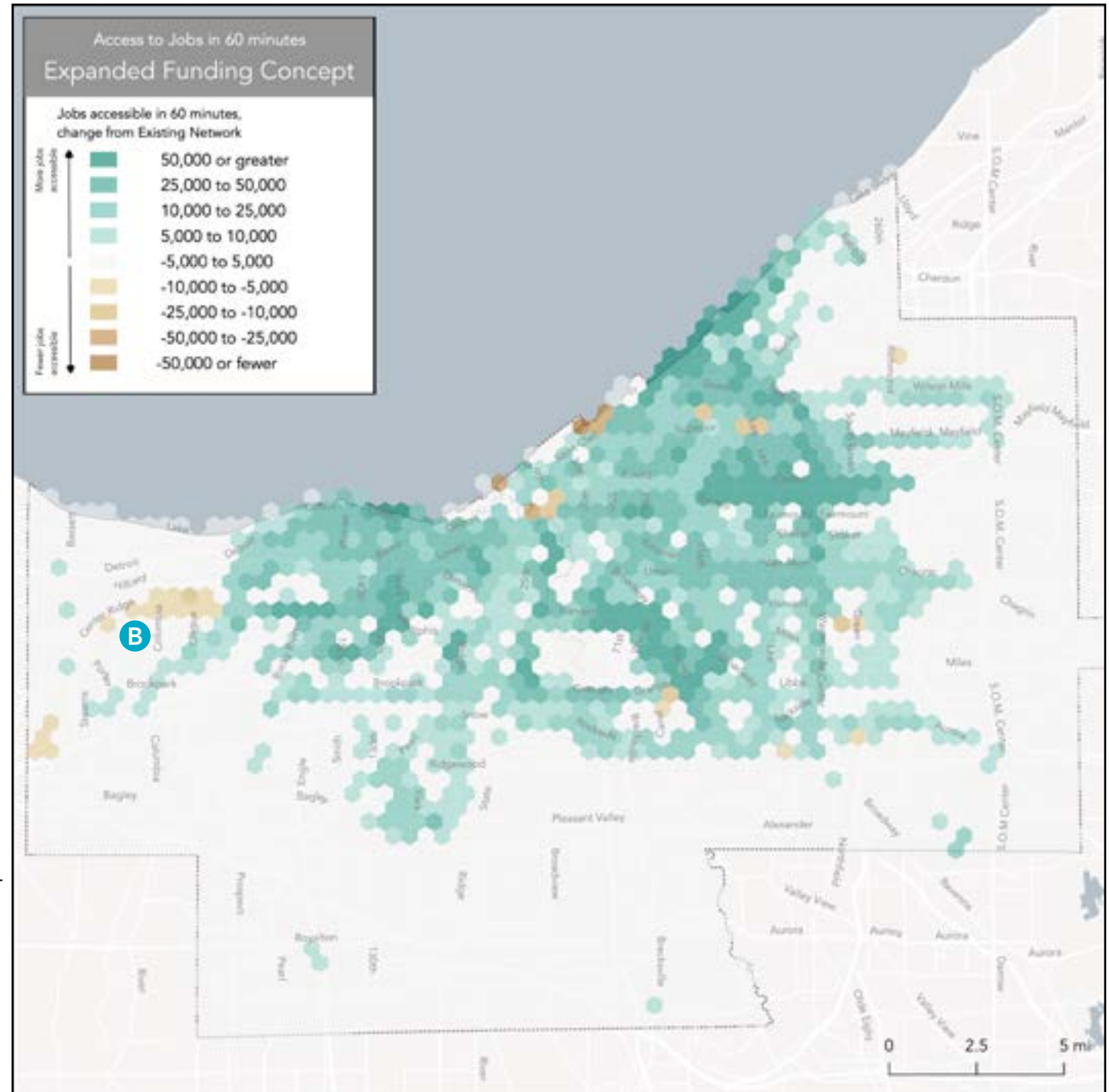
Where does access change?

Figure 25: Change in 60 minute access map - Expanded Funding Concept

Most areas would gain access to jobs with the Expanded Funding Concept. The benefits of the frequent network in the inner eastern and western sides of the City of Cleveland and inner ring suburbs is intensified by the introduction of frequent service on crosstown routes like 41-Warrensville, and 78-W 117th, and an extended 10-E 93rd.

The only continuous corridor where access would decrease is along Center Ridge **B**, which is served only every 60 minutes in this concept.

There are a few other spots around the map which show a decrease in access, but as these are all adjacent to or surrounded by areas where access improves, its likely that these issues that would be resolved in implementation with some attention to stop siting, or else artifacts of the particular points at which access was sampled.



Where does access change?

Figure 26: Change in 60 minute access dot density map - Expanded Funding Concept

In the Expanded Funding Concept, nearly all areas of the county with substantial residential density gain in access to jobs. The only corridor where a loss of access is visible for an extended distance is Center Ridge **A**, where service would run every 60 minutes (rather than every 45 minutes as in the existing network).

