STRATEGIC PLANNING & TECHNOLOGY SUBCOMMITEE BOARD OF DIRECTORS MEETING

Meeting Notice:

Due to the COVID-19 pandemic, state of emergency and Governor Beshear's Executive Orders regarding social distancing, this meeting of the TARC Board of Directors will be held via video-teleconference pursuant to Senate 150 (as signed by the Governor on March 30, 2020) and Attorney General Opinion 20-05, and in accordance with KRS 61.826, because it was not feasible to offer a primary physical location for the meeting.

The next meeting of this subcommittee of the TARC Board of Directors will be:
Tuesday, April 13, 2021 at 3:00 p.m.

Pursuant to the Americans with Disabilities Act, persons with a disability may request a reasonable accommodation for assistance with the meeting or meeting materials. Please contact Ashlie Woods at 502.561.5108. Requests made as early as possible will allow time to arrange accommodation.

Meeting Instructions:

Join Zoom Meeting:

https://zoom.us/j/92228535784?pwd=cTdicGlvZVpnalY0aHFJY20zZGxhUT09

Meeting ID: 922 2853 5784

Passcode: 978202

One tap mobile: +19292056099,,92228535784#

Audience and/or TARC staff can join via Zoom; public comments may be submitted in the Chat feature of Zoom, or by calling 502-585-1234 or at www.ridetarc.org

STRATEGIC PLANNING & TECHNOLOGY SUBCOMMITEE
BOARD OF DIRECTORS MEETING

Agenda

I.	Call to Order	3:00
II.	Presentation on TARC's Comprehensive Operations Analysis By Rob Frazier from HDR Engineering	3:05 – 3:25
III.	Discussion on Next Steps and Action Items from COA	3:25 – 3:50
IV.	Proposed Agenda Items/Next Meeting Date	3:55 – 4:00
V.	Adjourn	4:05

TARC
Comprehensive Operations Analysis
DRAFT

Contents

Figures

Tables

Chapter 1: Introduction

A healthy transit network is critical not only for the riders who depend on that service every day, but also to foster the continued growth and change that communities experience. In Louisville, public transportation has been part of the urban landscape since 1891 when Union Station was formally dedicated. During that time, there were a mix of services operated by private entities. External pressures such as the rise in personal automobile ownership and suburbanization in the 1950's and 1960's resulted in ridership losses in public transportation forcing private operators to cease their operations. Recognizing that public transportation was an asset to the Louisville community, legislation was authorized in 1970 by city and county governments to operate a mass-transit system using local funding, laying the foundation for the Transit Authority of the River City (TARC).

In the years that followed, the local transit agency was facing revenue constraints which led to voters approving an increase the occupational tax to fund transit in 1974. Since that time, Louisville has experienced significant changes including development (both commercial and residential) outside of the urban core. That change in land development has resulted in a vastly larger service area compared with the original service area that existed in the mid-1970s. At that time, TARC averaged 2.17 passengers per revenue mile compared to now averaging about 1.07 passengers per mile. Overall TARC has worked hard to support the growth of Louisville, but that growth has caused a strain on the system, making it harder to provide effective service to the community.

Additionally, similar to what other transit agencies have experienced across the country, ridership has declined in the past several decades. The decrease in ridership is related to a variety of factors including development patterns, land uses, and changing commuter trends. To help TARC maintain its mission to "implement transportation opportunities enhancing social, economic and environmental well-being of the Greater Louisville Region", the agency initiated the Comprehensive Operations Analysis (COA) project. The focus of the project is to evaluate the current system and develop a range of improvements to help meet the changing transit needs in the greater Louisville region. A COA examines existing transit services and identifies opportunities for improving system efficiency and effectiveness. It is a planning level tool used to develop potential near-term operational changes to help deliver more effective and useful service to the community.

Figure 1: Project Partners

Project Team

The COA project was completed by TARC with partnership support from key agencies (as shown in **Figure 1**) including: Metro Louisville, the Kentucky Transportation Cabinet (KYTC) and the Kentuckiana Regional Planning and Development Agency (KIPDA) and analysis performed by a consultant.

Project Overview

The COA process for this project was composed of four steps, which were completed in an integrated manner (**Figure 2**), although the timing and process were somewhat disrupted by the COVID-19 pandemic. The following discussion offers a brief overview of these steps. They are also discussed further in other chapters of the document.

Establish Goals & Objectives

The first step in the process included discussions with TARC and other project partners to identify the project goals. During those discussions, it was determined that the main goals for the project included:

- Improving efficiency and effectiveness of existing service
- Providing an equitable and performance driven transit system
- Offering seamless services for the Louisville region
- Improving customer experience and communications

By their very nature, COA projects reveal inherent tradeoffs for transit agencies that must strive to serve the community as comprehensively as possible, while also seeking to make effective use of limited public funds. This tension between competing objectives is a challenge all transit agencies face, with clear goals serving as a guide to steer the COA effort over its development.

The first step also included identifying metrics to assess the performance of the system:

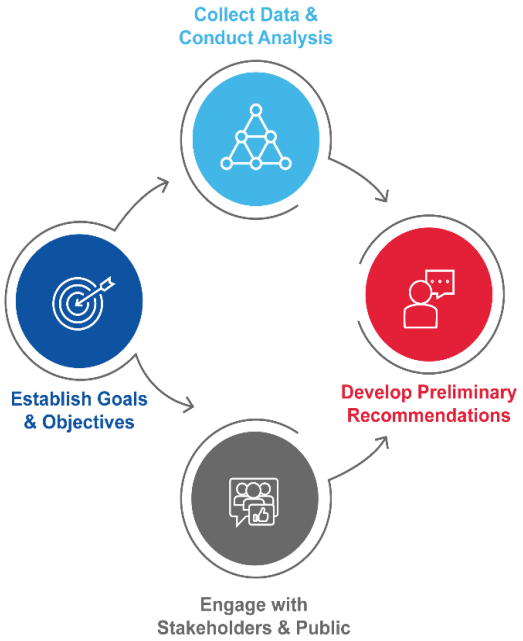
- System efficiency and effectiveness
- On-time performance
- Missed trips
- Ridership
- Customer satisfaction
- Employee satisfaction

The six metrics selected for this effort are intended to provide the agency and the public a clear picture of system performance, providing insights into where the agency stands initially as well as how the COA, once implemented, affects overall service delivery to the community.

Collect Data & Conduct Analysis

The next step in the COA project was an existing conditions evaluation which involved examining available data associated with the system. This included a review of ridership data, field observations, discussions with TARC staff, and evaluations of route performance. Discussions were also help with peer agencies to understand how TARC's operations compare with those of similar cities.

Figure 2: Project Process Overview



Stakeholder Engagement

The COA included discussions with partners, stakeholders and the public. Input came from Technical Advisory Committee meetings, Community Advisory Committee meetings and public outreach activities. Additional details regarding stakeholder engagement activities can be found in **Chapter 3** and **Appendices G, H, I, and J**.

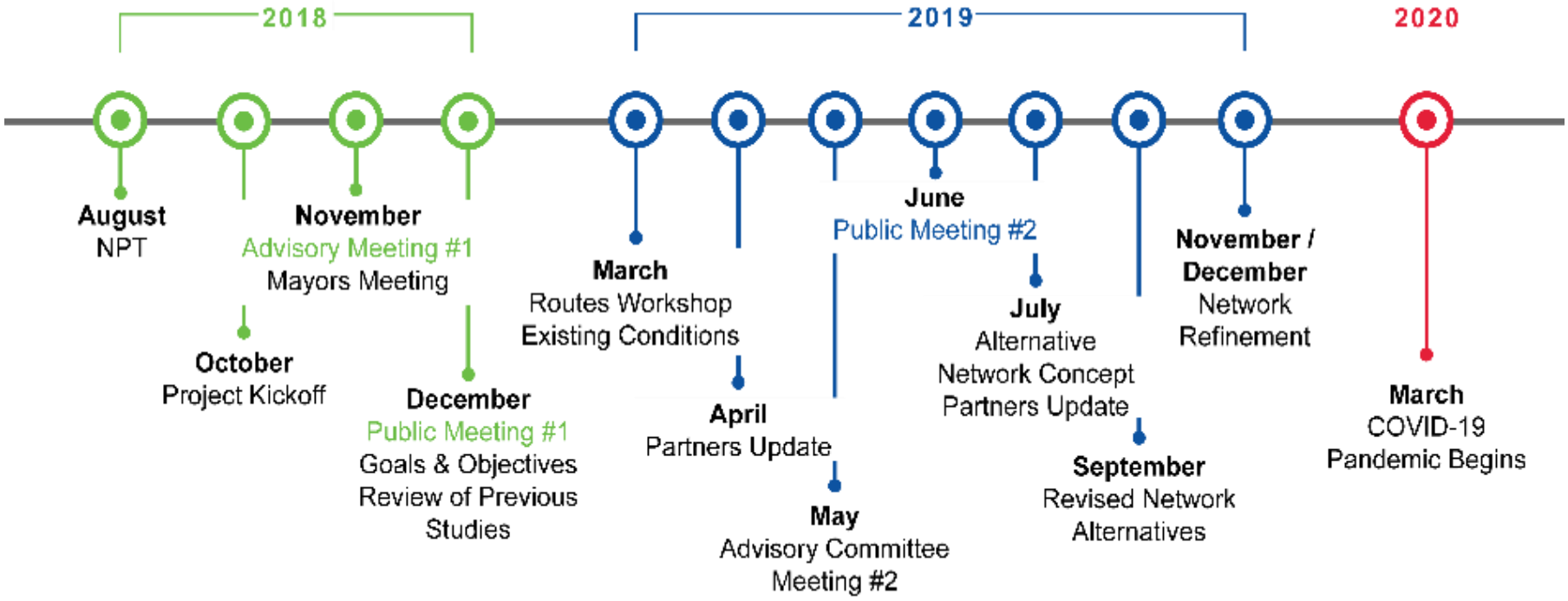
Develop Recommendations

Information gathered during the first three steps was used to guide the development of potential system improvements including system level modifications, route-specific modifications, schedule and service hour changes and customer experience focused changes.

Project Timeline

The project began in the summer of 2018. The length of the project was extended from what was originally anticipated due to organizational changes within TARC and the impacts of COVID in 2020. **Figure 3** provides a project timeline including key activities.

Figure 3: Project Timeline



Chapter 2: System Overview

The project team reviewed a variety of data sources (including previous reports) and completed field assessments to develop an understanding of the existing performance of the current system. These activities were completed during 2018 and 2019.

Data Collection

Various data sources were examined to assess the system and develop recommendations. A more extensive summary of the data sources evaluated is included in **Appendix B.** Some of the data examined included:

- Service level data by route
- Farebox revenue and operating cost data by route
- Automatic Passenger Count / ridership data
- On-time performance by route, zones, timepoints
- Recent On-board Survey
- Current GTFS (General Transit Feed Specification) feed
- Revenue and platform hours, miles, and peak vehicles operated
- Route schedules
- Asset inventory

Summary of Prior Studies

Several relevant large-scale transit and mobility studies completed in the region in the last 10 years were reviewed to help inform the COA project. Detailed findings from the review of each study can be found in **Appendix C**. The following studies were reviewed as part of the COA:

- Louisville Transportation Tomorrow Light Rail Project
- TARC Long-Range Plan
- Oldham County Comprehensive Plan
- KIPDA 2035 Metropolitan Transportation Plan
- Bullitt County Comprehensive Plan
- Dixie Corridor Bus Rapid Transit Plan
- Move Louisville: 2035 Transportation Plan
- Floyd County Comprehensive Plan
- KIPDA Downtown Mobility Study
- TARC's Transit Asset Management Plan
- Jefferson County Comprehensive Plan
- Clark County Comprehensive Plan

The summary below is a list of key points observed from previous studies that directly relate to proposed changes or improvements to the transit system in Louisville. These points helped inform concepts, recommendations and next steps proposed in the COA.

- Support for Transit - TARC needs financial, community and political support to maintain and expand service including development of advanced transit modes.
- Louisville area residents desire convenient, fast, frequent and affordable transit.
- There is a need to build stronger relationships between regional partners and TARC to improve and grow walking, bicycle, and public transportation as convenient, safe and useful modes of travel.
- There is a need to plan for continued growth and to manage congestion by reducing automobile dependency.
- TARC provides good network coverage but making transfers within the system is difficult.

Field Observations

To gain an understanding of the overall transit system, the project team completed field and windshield observations of multiple routes within the system. To identify which routes should be observed in the field, the team took into consideration ridership by service type, span of service and ridership by route.

The following is a summary of key field observations, many of these were used as a framework for recommendations that can be found in Chapters 6 and 7. Additional details on the observations noted can be found in **Appendix D**.

System Observations

Routes are Circuitous - Within and outside of the downtown area, many local fixed routes traverse a variety of neighborhood streets, at times doubling back to reach certain destinations, impacting passenger travel time. Circuitous routes make the system more difficult to understand and navigate, add travel time for riders, and can increase operational costs.

Routes are Duplicative - There are numerous instances where multiple routes converge on the same corridors and serve them for a significant distance. There are instances when such overlaps are beneficial, i.e. augmenting service within a particular corridor, but this approach should be coordinated with the larger system to effectively space headways within the corridor.

Multiple Route Variants - Many routes have multiple route variants, typically fanning out at one end of the route (generally outside of the downtown area) to serve multiple destinations, but not serving any single destination at that (typically outside of the downtown area). While there can be advantages to having routes with variants or branches, this also can lead to reduced frequency on those sections and make the system more difficult to understand and use.

Customer Experience Observations

Bus Stop Placement - Stop spacing along many routes is very frequent, with many stops located 100 feet or less from each other. Bus stop signs are often attached to poles within the right-of-way and are not always in prominent view of riders. Industry best practice includes having stops spaced further apart (how far depends on context/density) to reduce travel time and improve system efficiency.

Pedestrian Amenities - Route alignments are supported by bus stops; however, many stops lack proper landing pads and sidewalk accessibility, a requirement under the ADA. Providing standardized bus stop amenities will help improve accessibility, convenience and safety for the rider, improving the customer experience and making the system more attractive to new riders.

Headsigns -Text was not consistent and did not consider those not familiar with the Louisville area. Many headsigns referenced neighborhoods the route served and not the key destinations at the end of line. Headsigns did not provide directional guidance as to which cardinal point the bus was heading to and, sometimes were not changed when the bus reversed direction. Improving headsign text to more effectively communicate route direction will help make the system easier to understand and use.

Real-Time Tracker Synchronization - During field visits, it was observed that the bus real-time tracker had a lag or was ahead or behind the actual schedule, negatively impacting customer service expectations. With the prevalence of “real-time” information available today (such as through the Uber or Lyft apps), the public expects a high-level of accuracy, and transit information needs to be able to meet these consumer expectations to maintain and grow ridership.

Schedule/Route/Stop Changes or Temporary Adjustments - There are often situations that require adjustments to routes or schedules. During field visits, there was construction along one of the routes resulting in suspension of several of the stops on the route. At that time, the TARC website and mobile application still show established stops along the construction corridor as active. In general, when system changes must occur, they should be accurately communicated to riders so they can plan accordingly.

Peer Agency Discussions

As many agencies have faced challenges similar to TARC, the COA project included meetings with three peer agencies to

discuss challenges and successes with initiatives for their transit systems. The specific agencies were selected based on having similar features to the Louisville area, and also because these agencies had recently implemented significant changes to their transit systems. In 2019, the COA Team met with the following agencies:

- Indianapolis Public Transportation Corporation – IndyGo
- Central Ohio Transit Authority – COTA
- Jacksonville Transit Authority – JTA

A variety of topics were discussed with these agencies; some key discussion points are noted below. A more detailed summary of discussion topics can be found in **Appendix E**.

Implementing System Changes

The agencies provided some feedback on lessons learned regarding implementing system changes. A key issue discussed involved the timeline for implementing changes, with one agency indicating that providing a thoughtful timeline for implementation is important to prepare both operators and the public.

Partnership

In most circumstances, strong partnership between the transit agency and other city stakeholders has been a critical element involved in successfully implementing major system improvements.

Best Practices for System Adjustments

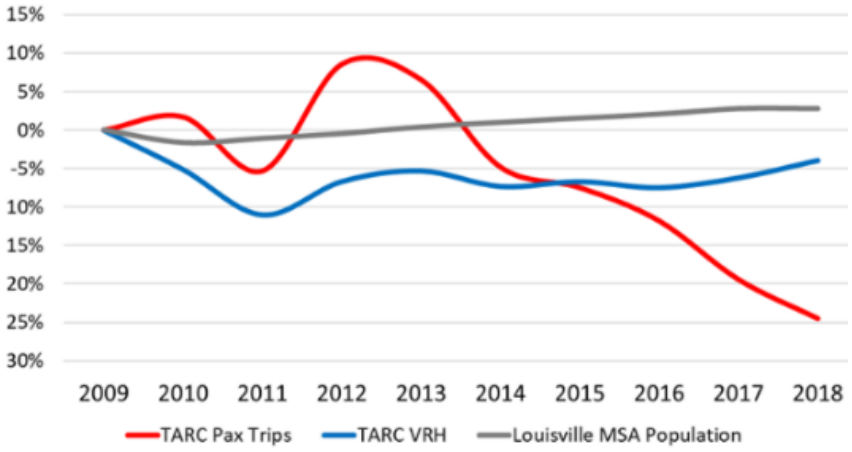
Many agencies across the country are now modifying the performance metrics they use to complete system planning and evaluate new service requests. For example, transit agencies are putting increased emphasis on access to jobs and opportunity within a reasonable amount of time and are able to measure that metric using advanced transit planning software systems. This metric can take the form of how many thousands of jobs are accessible within a given amount of travel time (typically 15, 30 or 60 minutes) via the transit system from a given location within the service area. Also, while transit agencies continue to place an emphasis on increasing service frequency as the best way to increase ridership (by making the service easier and more convenient to use), in the wake of recent social unrest and the pandemic, they are striving to balance that ridership focus with efforts to maximize service quality and availability for essential workers – many of whom work across the entire week and day in contrast to the traditional transit emphasis on designing service for weekday, peak period commuters.

System Discoveries

As mentioned previously, transit ridership has declined nationally over the past several years, as shown in **Figure 4**. That trend has been mirrored in the Louisville area, with ridership data showing a decline as shown in **Figure 5**.

Figure 4: Transit Ridership in the United States

Figure 5: Ridership, Vehicle Revenue Hours and Population Growth



There were also some additional findings related to the overall performance of the system.

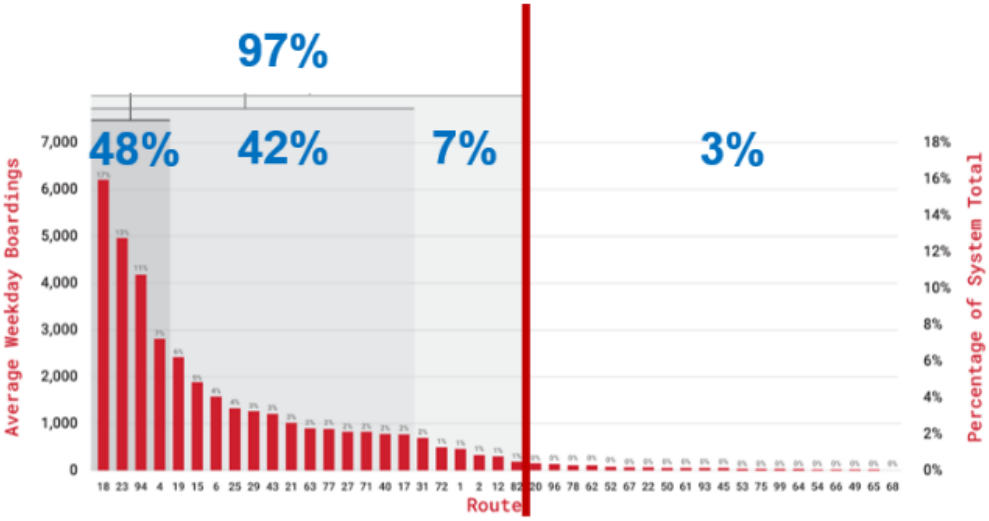
System Level

One key finding involved ridership distribution across the system. As shown in **Figure 6**, nearly 50% of TARC's ridership is on 4 routes. While it is not uncommon for transit agencies to have a handful of routes that carry a high percentage of system ridership, the long "tail" of very low ridership routes seen in the graphic is noteworthy.

Route Level

The COA team completed a route by route evaluation including assessing numerous Key Performance Indicators (KPI's) including items such as ridership activity compared with population and employment density by route. Complete details for each route can be found in **Appendix F**.

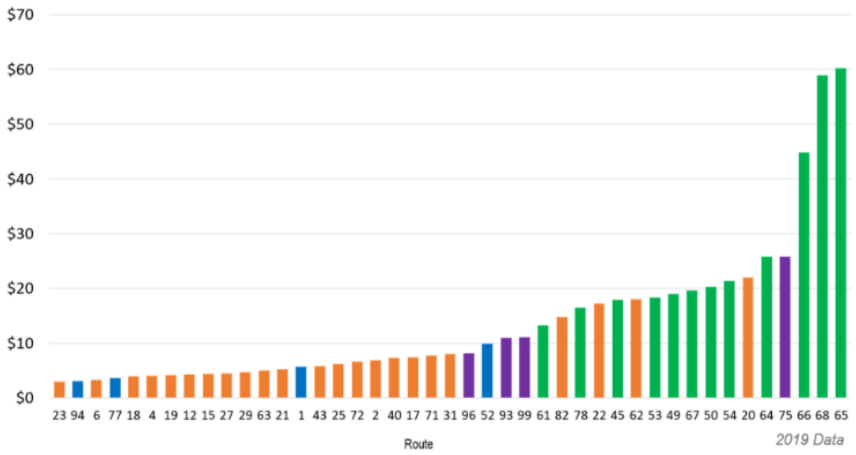
Figure 6: Average Weekday Ridership by Route (2019 Data)



Cost

An evaluation of cost per rider compared by route (**Figure 7**) demonstrates that some parts of the system are more expensive to operate because of the miles traveled and the number of riders using the service. These varying costs point to one of the most important trade-offs that COAs and transit systems must consider: is it justifiable to spend four, five or even close to ten times more to deliver a passenger trip on a low-ridership route when potentially those resources could be invested in improving a route where the cost per trip is dramatically lower? While not all of these challenging issues can be addressed in this COA, TARC should consider weighing these fundamental questions as it develops longer range plans.

Figure 7: Average Weekday Route Cost per Rider (2019 Data)



Service Area Review

The COA team reviewed the region's transit market, evaluating data that is frequently used to measure transit propensity – the potential for individuals to use transit. For example, zero-auto households typically rely on public transit to meet their mobility needs more than other households since they lack a personal automobile. Understanding where these groups of potential customers live, how concentrated are they in an area, and where they need to go is an important element in evaluating the potential transit market.

Categories

The project team evaluated the service area using the following categories. **Figures 8** and **9** display show the patterns of several of these categories at the census block group level, using ACS 5-year (2019) estimates and LEHD 2018 employment data. The existing TARC routes and current stop activity levels are shown for comparative purposes.

- Existing Population Density
- Existing Employment Density
- Minority Population Density
- Low-income Household Densit
- Zero-auto Household Density
- Persons with Disabilities Densi
- Population under age 18 densit
- Population over age 64 density
- Low wage job density
- Cumulative transit propensity
- Travel Demand Model
- Commute patterns

Figure 8: Existing Population and Employment Densities

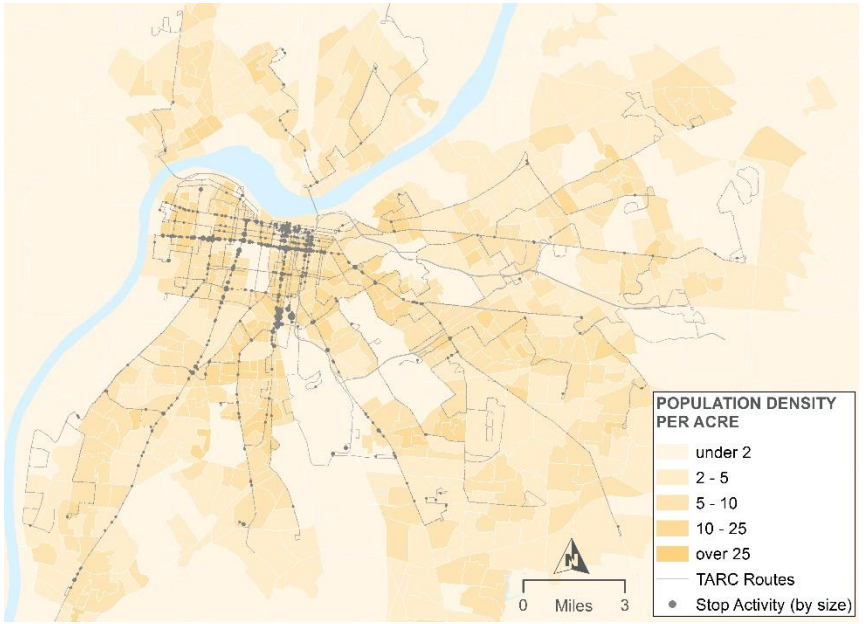
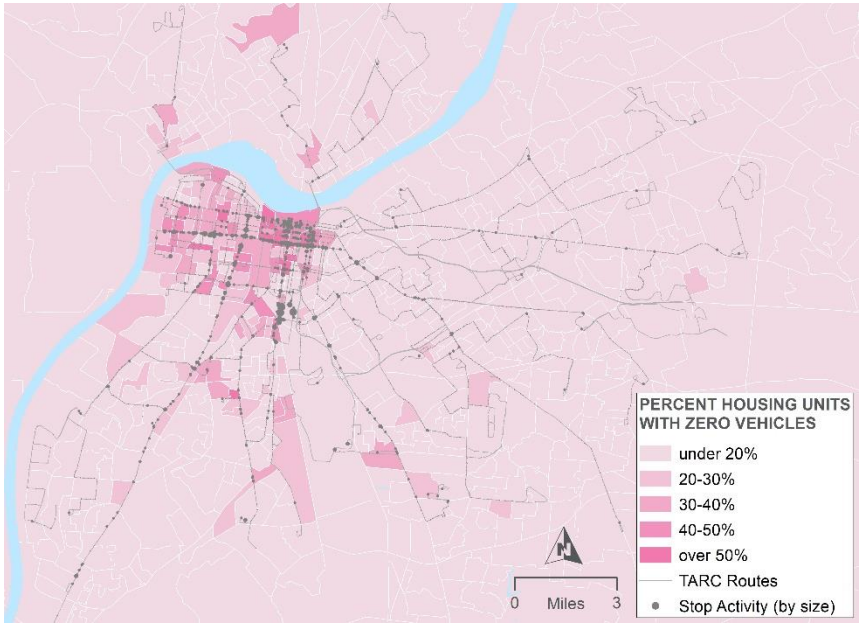
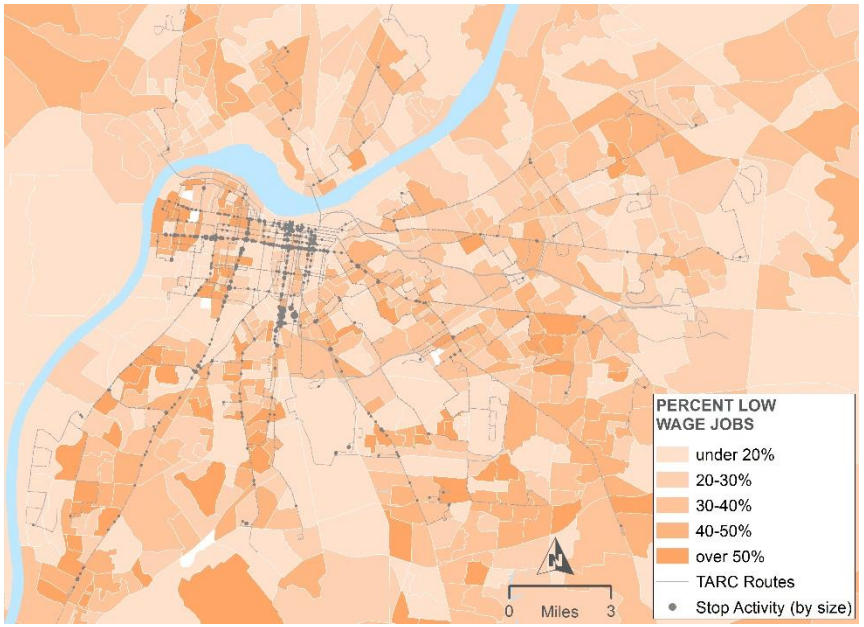
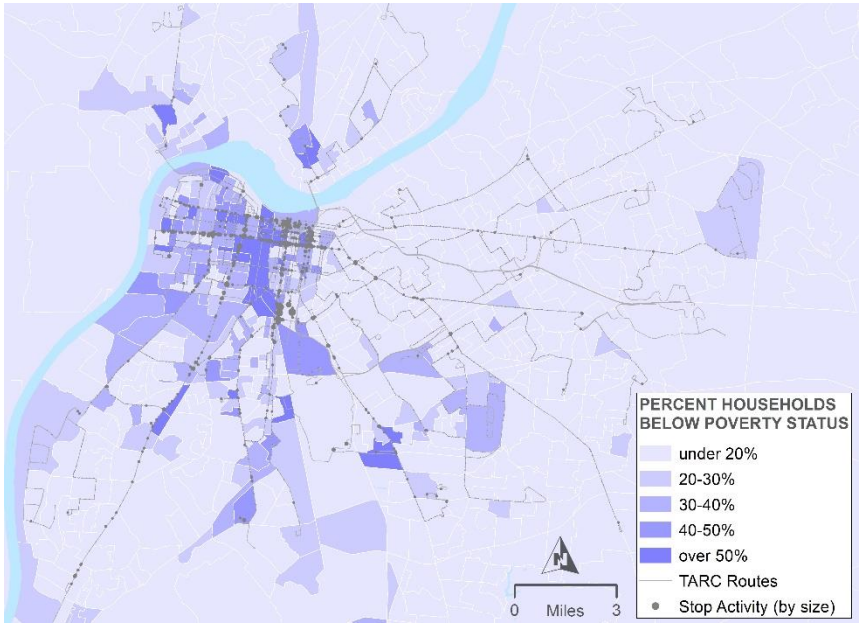
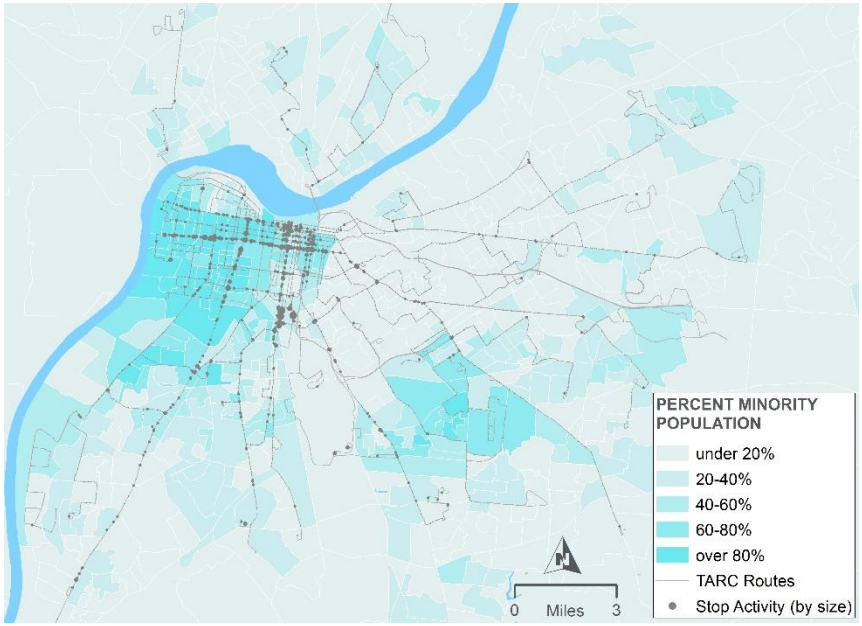


Figure 9: Additional Transit Propensity Factors









Key Findings of the Service Area Review

- Strong demand in and around downtown
- Several high transit propensity and use corridors (e.g., Dixie Highway, Frankfort Avenue)
- High concentration of transit markets inside and immediately adjacent to the Watterson Expressway
- Transit markets diminish radiating away from Downtown and the Watterson Expressway
- Service demand areas are concentrated (e.g. airport area, GE Appliance Park)
- Low-density commercial land uses result in large areas with many jobs that have low transit propensities
- Low-density residential areas also typically have low transit propensities

Chapter 3: Engagement

The COA project focused on engagement outreach tools and tactics intended to reach the agency's and community's numerous and stakeholders and residents. The team facilitated interactions with a variety of stakeholders both internal to agency and external. Those engagements included: an internal kick off with TARC management staff, an internal workshop with TARC management and operations staff examining existing route/system operations, two Technical Advisory Committee (TAC) meetings, two Community Advisory Committee (CAC) meetings, and two public open house meetings, and additional "pop up" meetings throughout the community. The project team also developed a project website "LINC" that included a Wikimaps exercise where the public was able to provide frequently traveled origin and destination points, points of interest, provide suggestions regarding modified or new routes and provide general route and/or agency comments. The following is a summary of each engagement activity, a more detailed summary of the public engagement plan for the project can be viewed in **Appendix G**.

TARC Agency Input

At the beginning of the project, the team held an internal kick off meeting with TARC management staff, including the executive leaders, department heads and others. The purpose of the meeting was to detail the scope, and schedule of the project, discuss expectations, roles and responsibilities and generally set expectations about what the project would accomplish to achieve "buy in" and ownership from all those involved. That workshop took place on October 1, 2018. (**Figure 10**)

A second internal day and a half workshop was held on March 26 – 27, 2019. That workshop focused on detailed route and system operations data across key metrics, such as: passengers per hour / mile, costs per mile / hour / trip, subsidy or farebox recovery ratios. The goal of the workshop was to understand in detail how and perhaps why each route operates the way it does based on data collection, field observations and the collective knowledge of the TARC system. This set the stage for the understanding of the system which would be helpful in developing options for improvement.

Advisory Committees

The project includes two advisory committees: The Technical Advisory Committee (TAC) looks to examine data, look at trends and make more technical decisions. The TAC is comprised of representatives / staff from TARC and partner agencies in the region such as, Louisville Metro, KIPDA, KYTC and INDOT. TAC meetings provided a forum for discussing broad reaching project data / findings and issues and to obtain feedback from other group members. A summary of TAC meetings is included in **Appendix H.**

Figure 10: Project Kickoff Meeting

A second group, the Community Advisory Committee (CAC) includes TARC riders, neighborhood advocates, local government

officials, business owners, and representatives from government, development, food and beverage, hospitality, healthcare, logistics, manufacturing, JCPS and post-secondary education institutions, churches, social service agencies, and others. CAC members are those interested in public transit or want to connect with the region in ways that increase mobility for the underserved in the region and will provide feedback to the project team. The CAC also vets data and findings similar to how the TAC does, but from a broader community based perspective. A summary of CAC meetings is included in **Appendix I.**

The first TAC Meeting was held on Thursday, November 15, 2018. The first CAC Meeting was held Tuesday, December 11, 2018.The purpose of both meetings was to kick off and introduce the project:

- Lay groundwork regarding expectations of the committee
- Outline how this committee will interact and help drive decisions
- Develop an understanding of the COA process and the LRP process
- Establish how interactions can be constructive and helpful
- Introduce TARC service information

During the meetings, participants learned about current transit trends and why TARC is doing the project. The team also provided general community/system background. A SWOT analysis was conducted to discuss TARC's strengths, weaknesses, opportunities and threats.

The second Technical Advisory Committee was held on Wednesday, April 24, 2019. (**Figure 11**) The second CAC meeting was held Monday, June 10, 2019. The purpose of these meetings was to review data about the community and the existing TARC system including:

- Review the transit market analysis
- Present route assessments and TARC system operational findings
- Discuss route level needs and opportunities
- Facilitate a discussion of the material presented
- Brainstorm possible route and system improvements

Participants learned about the current market analysis findings and service assessment findings, needs and opportunities and provided input on route-level needs and opportunities. Feedback from the TAC and CAC members informed the COA concepts included further in this document.

Figure 11: Technical Advisory Meeting

Public Open Houses

The following public meetings have occurred to-date. These meetings encouraged public participation and foster public awareness of the project and provided a forum for public comment collection.

Open House #1: December 13, 2018

This event introduced the public to the project in general and COA component in particular and gather participants' general sense of how TARC is or is not currently serving their needs. There were also comments collected about ideas to enhance service and upgrade amenities. (**Figure 12**)

Open House #2: June 25, 2019

This event updated the public on the project team's initial findings about TARC's route and system operations and sought input on TARC's service model, ideas to improve route alignment(s), service span and transfer opportunities. Some participants were introduced to WikiMaps and shared their frequent travel routes and places of interest using this online mapping tool.

Figure 12: Open House at TARC Headquarters

Comment Summary

Members of the community provided comments at the TAC, CAC and public open house meetings. Comments were also captured at in-person events around the community. Additionally, public comments came through the project website at tarclinc.org, a project WikiMaps at (https://wikimapping.com/tarc.html) and TARC's social media. Online and media analytics are included at the end of this summary. A summary of comments can be found in **Appendix J**.

The following is a summary and highlights by theme for the feedback received. Feedback provided is broken out into the following main themes:

- Model of Service
- Routes / Alignment
- Service Type / Frequency / Coverage
- Transfers
- Infrastructure
- Customer Service
- Fare Cards
- Wikimaps
- General Concerns

Model of Service

There seems to be acceptance that a more frequency-oriented model (generally with more frequent service on fewer routes covering dense parts of the community) will improve service overall, while there is also acknowledgement that – based on the city's infrastructure, land use, and development patterns – considerations for geographic coverage cannot be ignored. For example, there is desire and need for more east-west connections, as well as a general sentiment to improve transfer options.

Routes / Alignment

- Express routes: Both the project team's assessment and public comments related to express routes indicate interest and need to further assess these routes. On one hand, the public accepts that the current usage and ridership is inefficient and costly. There is some interest in completely eliminating them. Others suggest there is a need to move riders from the core of the city to the outer areas/regions (and vice-versa) for access to jobs, retail (especially grocery stores) and other personal services (i.e. medical services), and want the express routes to do a better job of serving these needs.

- Southern Indiana: Comments suggested routes are not sufficient. Service needs to start earlier in the day and move throughout Southern Indiana communities, not just to downtown Louisville and back. Similar comments from the other side of the river mirror the desire for more east-west connections. Places of interest include: Ivy Tech University, shopping centers, and retail corridors and jobs.

- Offer special weekend routes for entertainment purposes: concerts, sporting events, shopping centers, festivals, etc.

- Work sites: More assessment is needed to understand the demand for service to work sites, especially large ones, and how to best serve the needs of workers and employers. UPS, Humana, Riverport, destinations in Southern Indiana and area colleges are places that could further use analysis to better match needs.

Service Type / Frequency / Coverage

- Core routes: Feedback indicated a desire to increase frequency and simplify routes. The buses on the routes tend to be overcrowded and especially challenging with multiple riders with wheelchairs, grocery carts or baby strollers. Recommended changes include:
    - Increasing frequency
    - Eliminating routes on one-way streets that have adjacent parallel routes
    - Dividing long routes into multiple route (i.e. #18 and #23)
    - Renumbering routes with variations (i.e. 23a, 23b, 23c) or make them different numbered routes
- Bus service should ideally be faster and more efficient than automobile options
- Frequency
    - every 15/20 minutes
    - earlier start times
    - later ending times
    - expanded weekend hours
- Geographic and specific areas
    - Near I-264 and I-265
    - Conflicting comments suggest expanding service around expressways, while others suggest limiting service within I-264.
    - To and from downtown, and within southern Indiana communities: expand and increase frequency (comments suggest bunching and stacking on some routes causes these routes to be inefficient)
- To meet workforce needs: increase efficiency
- Within Core of City: increase efficiency
- Add circulators (Baxter/Bardstown Road, Frankfort Ave/Lexington Road, West Louisville)

Transfers

Transfers are of concern to some riders. Riders indicate buses are sometimes late due to traffic, trains, or construction – making transfers challenging to use.

- Consider expanding transfer window.
- Move transfer stops downtown to the edges of downtown
- Bardstown Road and Taylorsville Road: increase efficiency
- Dutchman's Lane/Dupont Circle

Infrastructure

Respondents identified ways to strengthen the TARC system, its effectiveness and accessibility through infrastructure investments:

- Sidewalk quality and whether or not they exist – in order to access a bus stop
- Placement of bus stops, benches, shelters and schedules
- Smaller, more environmentally friendly buses
- Parking facilities in suburban locations for park-and-ride opportunities
- More BRT lanes
- Light-rail

Fare Card

The project team received fare card comments, especially from those without a card. Some suggest loading cards on-board buses slows them and many agree that there need to be other ways to purchase and add funds to the cards: ATM-like kiosks, banks, community centers/Metro Parks, Kroger and other grocery and retail stores.

Wikimaps Entries

WikiMaps users have identified points of interests and map travel routes using this online mapping tool. For the points of interest, users identified the point and described the use of the point. The users identified routes and indicated the frequency of usage. A summary of the input received from WikiMaps entries is included in **Appendix J**.

General Concerns

At every public engagement activity, people expressed concern about their own or someone else's ability to depend on public transit to get to work. Several civic and non-profit initiatives exist and are being formed to fill the need(s).

There is public interest in learning more about how to improve TARC's funding model. Some conversations about funding are related to how funds are currently being used (i.e. equity concerns in MPO funding and programming for projects, reassessing TARC's partnerships with employers, seeking more employer investments in public transit). Other interests are related to long-term funding for infrastructure, sidewalks, more Bus Rapid Transit (BRT) routes and light-rail.

Chapter 4: COVID-Related System Changes

In this section, the impact of COVID-19 on transit in the United States and Louisville will be reviewed, as well as the associated changes to the local transit system. The section reviews TARC's response to the pandemic, ridership trends, and the changes TARC implemented as a result of budget and ridership constraints

COVID Impacts

In December 2019, the novel coronavirus, COVID-19, emerged as a global pandemic due to its fatality rate and high rate of transmission (1). By March 2020, transit agencies across the United States began to stop or curtail public transportation services to prevent the spread of the virus while government-implemented quarantine measures led to dramatic declines in travel demand across all modes of transportation.

Public transit has been particularly vulnerable to the consequences of the pandemic due to its nature as a mobility service to thousands of people. Nationwide, public transit ridership dropped by nearly 80% in April 2020 and remained 60% below 2019 ridership levels throughout the rest of the year (2). Unfortunately, declines in service and overall decreases in mobility have resulted in drops in farebox revenue, further leading to cuts in services. As local governments also struggle with decreases in revenue, transit agencies have become subject to budget cuts and/or reduced institutional support.

Transit and Mobility Impacts

On March 4, 2020, TARC made their first announcement describing COVID-19 and on March 6, established a COVID-19 task force that was charged with providing a rapid, controlled and effective response to the virus. The following critical changes were announced throughout the year to combat the spread of COVID-19 and adjust to ridership changes (3):

- *March 18, 2020:* TARC Announces Changes to Service in Response to COVID-19
- *March 26, 2020:* TARC Requires Drivers to Request an Additional Bus for their Route Once 15 Passengers are Onboard, Not to Exceed 25 Passengers per Bus
- *April 26, 2020:* Passengers Required to Wear Face Coverings and Exit Bus through Rear Door
- *July 29, 2020:* TARC Returns to Weekday Schedules to Support Efforts of Social Distancing, will Continue to Operate for Essential Trips Only

In August 2020, TARC discontinued 15 routes, as discussed later in this section.

Ridership Impacts

Matching nationwide ridership trends, TARC ridership remained, on average, at 40% of 2019 levels throughout 2020 (**Figure 10**). Service was discontinued for several routes from April 2020 to July 2020. In some cases, this was due to voluntary changes made by TARC, and in some cases, it was due to moving routes to Saturday schedules (some routes do not offer Saturday service). For the ridership comparison of these routes, April through July was excluded to prevent skewing of the results. Additionally, due to the timing of COVID-19's insurgence into daily life, ridership was analyzed from March through December, excluding ridership in January and February for both 2019 and 2020.

For the purpose of this section, the ridership of several express routes and circulators that follow local routes were combined to comprehensively understand the changes in ridership across the network.

Seven routes experienced a 50% or less reduction in ridership from 2019 to 2020 (see the bottom right graph in **Figure 13** in red). In 2019 (between March and December), these seven routes served 3.15M passengers, approximately 41% of the total ridership for routes that continued throughout 2020 (routes that were not discontinued). **Table 1** details the ridership and changes for each route between 2019 and 2020.

Stop Analysis

An analysis of boardings and alightings at TARC stops was conducted to understand which stops have lost activity or are no longer serving TARC passengers. Using ArcGIS Pro software, weekday boardings and alightings for Fiscal Years 2019 and 2020 (FY19 and 20) were compared to see the changes in ridership across the system; see **Figure 14**.

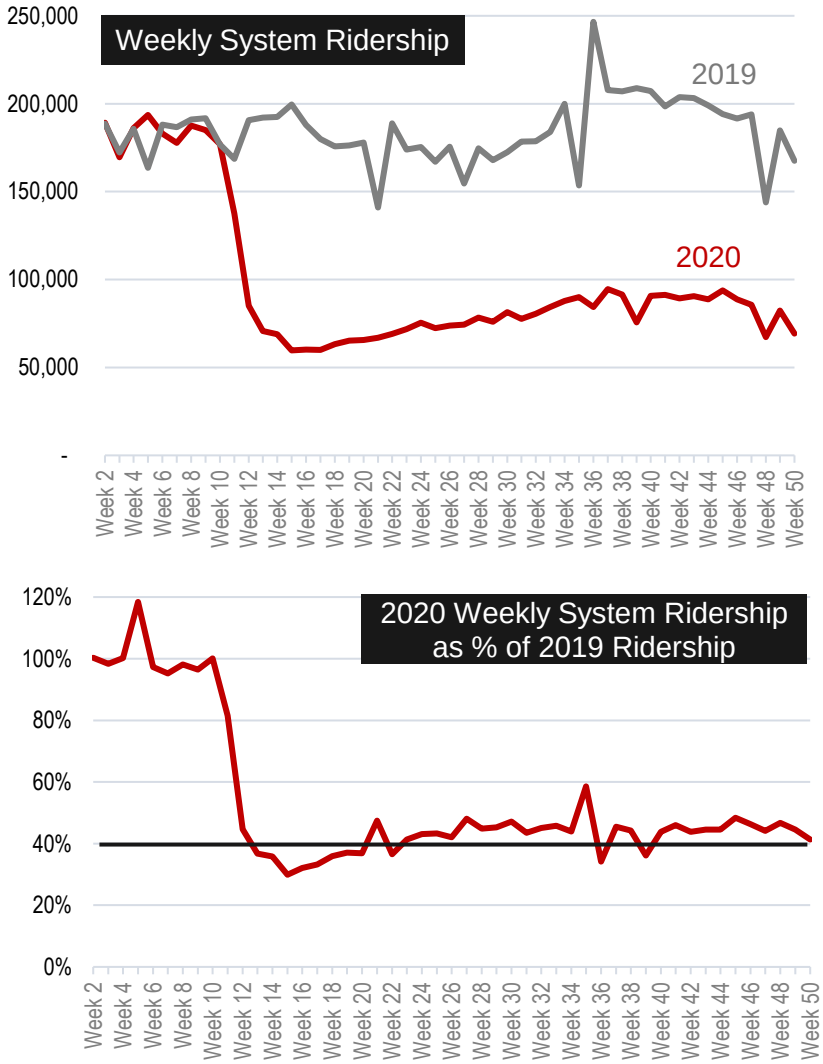
According to data provided by TARC, in FY19 there were 1.96M combined boardings and alightings throughout the system. In FY20 there were 1.37M boardings and alightings. The vast majority of stops experienced decreases in boardings and alightings in 2020; however, dozens experienced almost no change, and a few experienced minimal increases.

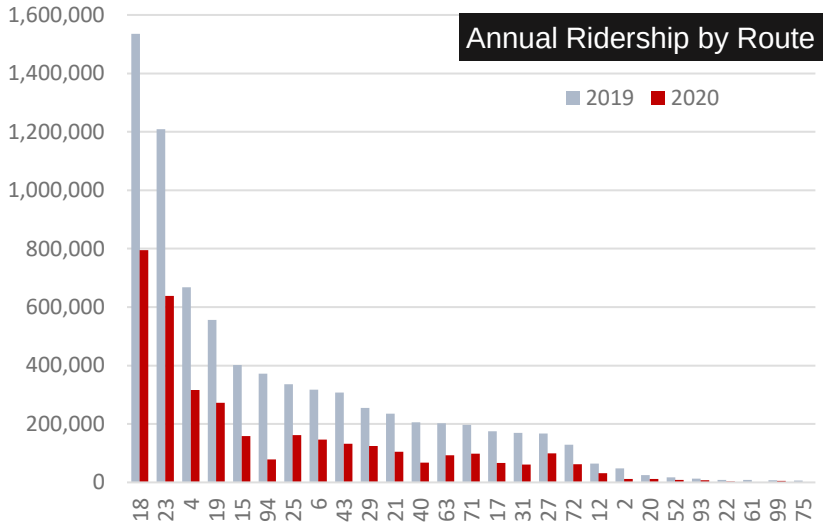
It is important to note that there are dozens of stops that experience zero, or less than ten, boardings and alightings every year.

Table 1: Route Ridership Comparison by Percent Change

Route No.	2019 Ridership	2020 Ridership	Change in Ridership	% Change in Ridership
61	8,503	1,090	-7,413	-87%
75	6,188	926	-5,262	-85%
94	372,438	78,382	-294,056	-79%
2	48,454	11,657	-36,797	-76%
40	205,618	68,001	-137,617	-67%
31	169,918	61,534	-108,384	-64%
17	174,842	66,781	-108,061	-62%
22	8,702	3,378	-5,324	-61%
15	401,290	158,219	-243,071	-61%
43	307,887	131,720	-176,167	-57%
21	235,073	104,432	-130,641	-56%
63	202,693	93,261	-109,432	-54%
6	317,852	146,852	-171,000	-54%
4	667,400	316,632	-350,768	-53%
20	24,807	11,842	-12,965	-52%
12	64,394	31,016	-33,378	-52%
72	129,209	62,331	-66,878	-52%
25	336,098	162,197	-173,901	-52%
29	255,194	124,304	-130,890	-51%
19	556,098	272,884	-283,214	-51%
52	17,111	8,526	-8,585	-50%
71	196,973	98,695	-98,278	-50%
18	1,535,701	794,882	-740,819	-48%
23	1,208,728	638,546	-570,182	-47%
93	12,862	6,988	-5,874	-46%
27	167,051	99,937	-67,114	-40%
99	7,873	4,950	-2,923	-37%

Figure 13: Ridership Trends (2019 and 2020 Data)





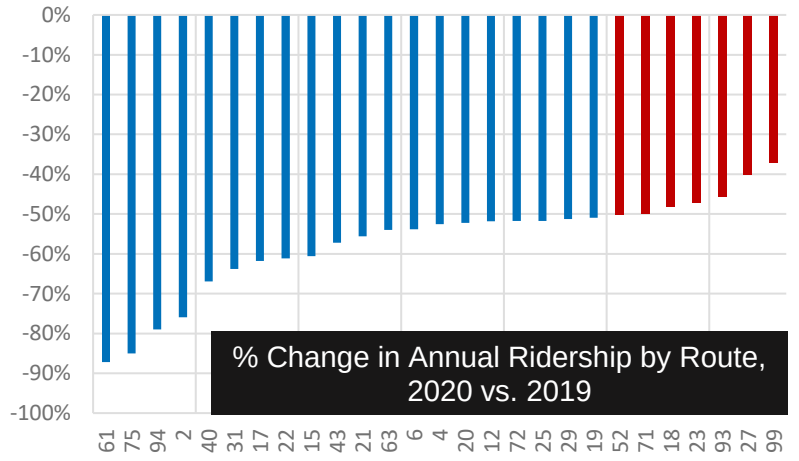


Figure 14: Combined Boardings and Alightings (2020 vs. 2019)

System Changes

Due to COVID-19-related economic challenges, US transit agencies are facing a funding shortfall of $48.8B between CY 2020 Q2 and the end of CY 2021. These budget shortfalls have caused routes to be discontinued or modified to limited service schedules – particularly express routes, which were no longer serving enough commuting passengers to justify operation. In August 2020, TARC discontinued fifteen routes due to a combination of budget shortfalls and lack of ridership: two local routes, three circulators, and ten express routes. Discontinuing these routes was necessary from a budget standpoint and better positions TARC to provide sustainable service in the future. Minor changes were made to eight additional routes.

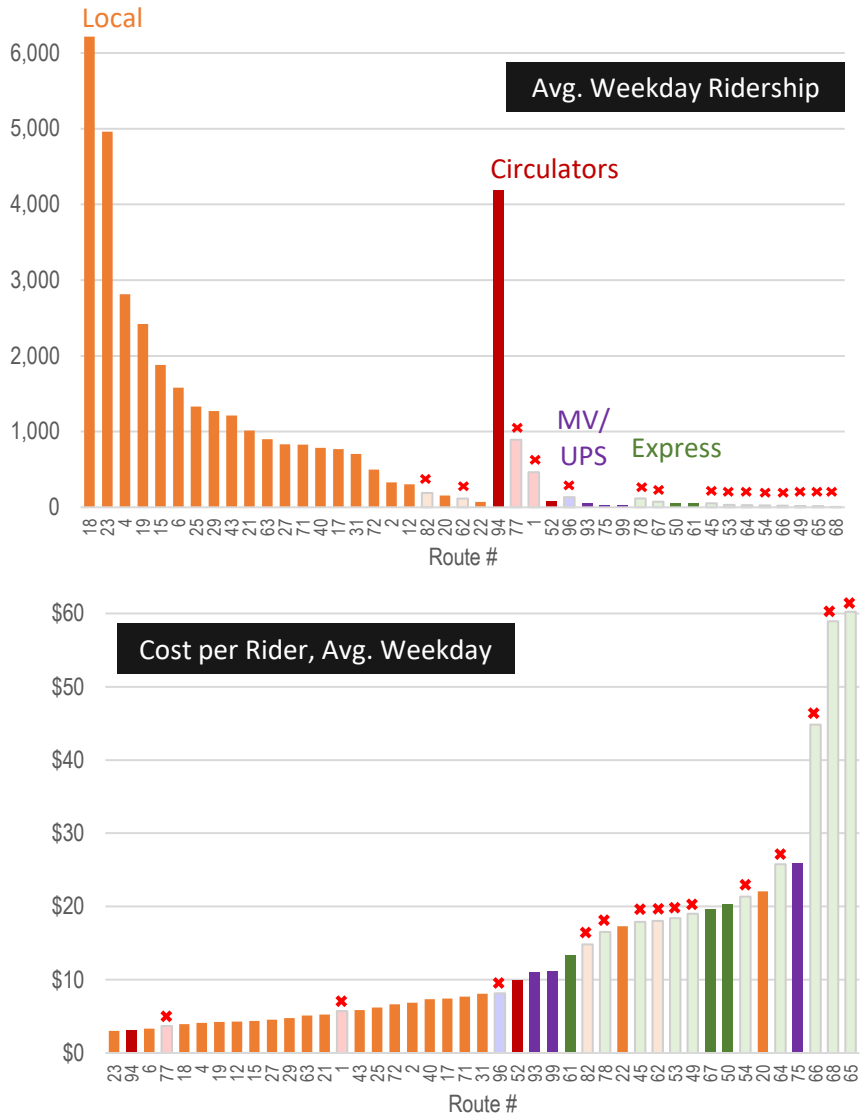
As **Figure 15** illustrates, the routes that were discontinued had exhibited some of the poorer metrics within the TARC system:

- *Ridership* – Thirteen (13) of the routes, including all ten (10) express routes, were among TARC's 21 lowest-ridership routes.
- *Cost-Efficiency* – Twelve (12) of the routes, including all ten (10) express routes, were among TARC's 16 routes with the highest per-rider costs.

This analysis by the COA team indicates that the route discontinuations were generally supported by the data examined as part of the COA project.

In order to maintain social-distancing measures (no more than 25 passengers on a bus at one time), TARC deployed "shadow buses". A "shadow bus" follows a bus already in-route so that when the passenger limit is met, passengers can board the trailing bus without waiting for the next scheduled bus. This technique has been used for heavy commuter traffic, but functions well for maintaining a safe environment for both passengers and operators. While shadow buses offer the benefit of maintaining distancing measures, the increased cost of operating additional buses have added strain to TARC's budget.

Figure 15: COVID Related Route Discontinuation (x) vs. Transit Metrics



Chapter 5: System Improvement Concepts

This chapter describes three potential improvement concepts which could be phased in over time.

- The first concept recommends immediate enhancements through *Route Optimization (Concept 1)*.
- The second concept, *System Restructuring (Concept 2)*, builds on the first concept and would be phased in over the next five years.
- Finally, the *System Vision (Concept 3)* concept sets forth a set of expansion goals for the mid-to-long term future of the system.

Major Considerations

In development of the concepts, the team considered several system elements:

- Service Type and Frequency
- Route Modifications
- Schedule Modifications

Service Type and Frequency

One fundamental consideration in developing an effective transit system is to strike the right balance between service coverage and frequency.

Coverage systems offer routes and stops closer to people's homes, jobs, and schools. This provides service throughout the community and reduces walking distances. However, the cost of serving many locations means that buses also come less frequently and travel along routes that are more circuitous. This can lead to long wait and travel times or even an inability to reach the destination due to a lack of service (e.g. a stop nearby but no buses on that day or at the needed time).

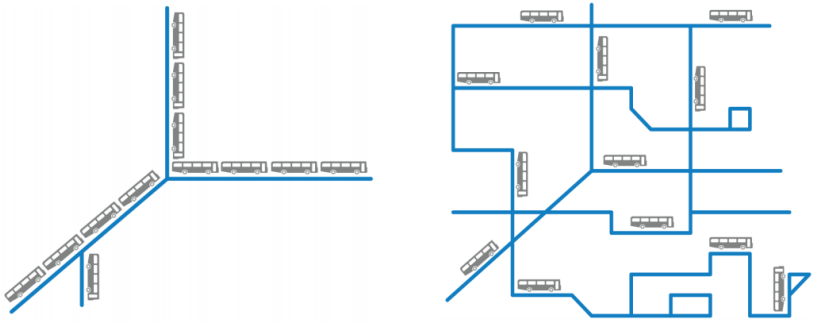
Frequency-focused networks invest in robust high-frequency core routes, typically operating on major roadways with more direct routing. They often improve midday and weekend service and generally focus on connecting the strongest transit trip attractors and generators in the region. However, this frequency comes at the expense of a reduced service area. This means that portions of the community do not have transit service or must walk long distances to reach a stop.

Typically, due to people's travel needs and decision-making, low frequency coverage systems have lower ridership than systems with higher frequencies and fewer routes, though the right balance between the two looks different in each community.

Figure 16: Frequency (Productivity) and Coverage Systems

The **productivity model** concentrates service on a handful of streets that have the highest density of development; and service is more direct, faster, and more productive. Because the bus stays on a handful of main streets, most people will have to walk to and from their bus route. Productivity-oriented services also tend to have higher frequencies and operate for longer hours, and also typically carry more riders as compared with coverage services. Examples include light rail and bus rapid transit, but also high frequency bus corridors ("key corridor") routes.

The **coverage model** puts service on a lot of streets, even if service is not very frequent. This model ensures the maximum number of people have nearby access to bus service at least some times and is more likely to provide door-to-door service, even if the overall trip time is longer. Coverage services tend to have lower frequencies on each street, because more streets are served. As a result, they tend to carry fewer riders as compared with capacity/productivity-oriented services. The main advantage of coverage services is that they increase the geographic accessibility of the system, particularly for people unable to walk longer distances.



Source: MOVE Louisville, Draft TARC Service Guidelines, 2016

TARC's current (2021) system has evolved over decades. It has some high frequency corridors but is mainly considered a coverage system. In the last year, however, TARC made major changes that shifted the balance from coverage toward frequency with the removal of several low productivity, high cost-per-rider

routes. Over the long-term this should make those resources available for re-investment in higher frequencies or new services.

The balance between service coverage and frequency was a major factor in the development of the three system improvement concepts. The team made efforts to maintain as much of the current coverage as possible, while still proposing some changes to eliminate route deviations or extensions that negatively impact riders and the system. The restructuring and vision concepts also introduce a new on-demand service model to maintain coverage at a lower cost-per-rider. All three concepts re-invest a portion of the savings from route changes in the core routes to increase weekday and weekend frequency.

Route Modifications

The team's examination of the TARC routes (both before and during Covid) identified several primary challenges. Several of these items are described below:

Circuitous Routes - Many routes in the TARC network are indirect, negatively impacting passenger travel time. The team looked at ways to eliminate circuitousness and improve efficiency include focusing route resources on the most productive portions of the route and shifting routes to more direct pathways.

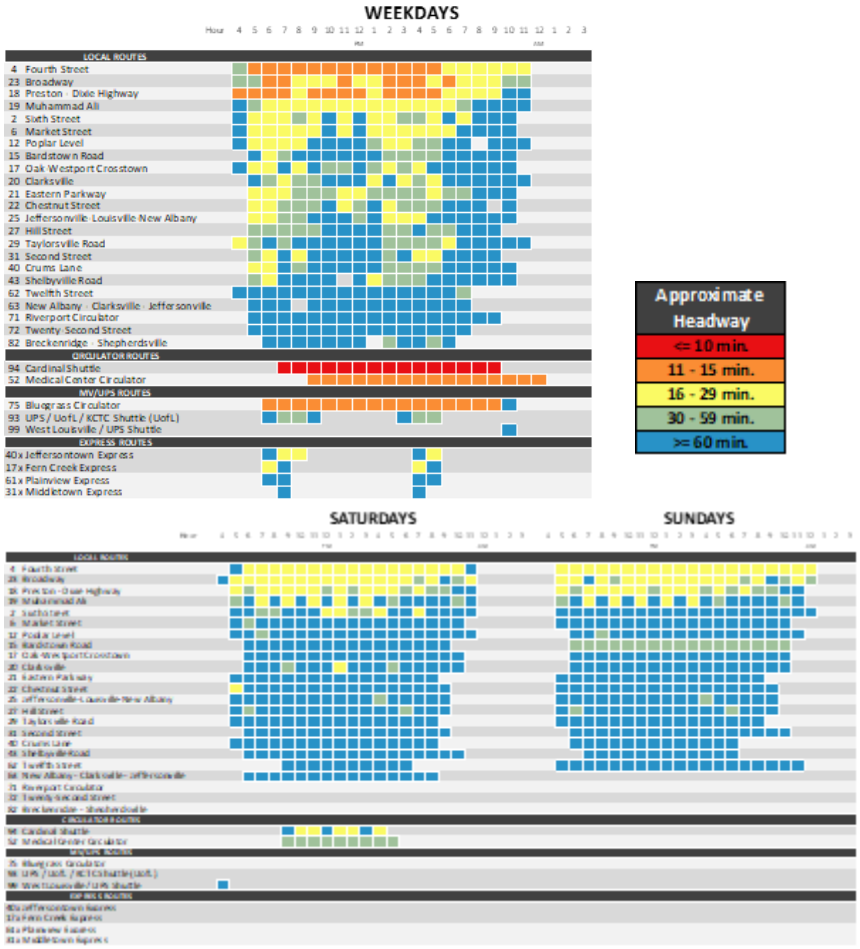
Duplicative Routes - There are many examples of routes that are duplicative: routes that converge on or serve a significant distance of the same corridor. The team looked at ways to reduce this potentially unneeded redundancy including evaluating passenger travel patterns and determining if service could be better utilized on another corridor.

Complex Routes - Several routes in TARC's system have multiple route variants, typically at the end of their lines. The team looked at minimizing the number of route variants and focusing on areas of highest demand as well as providing alternate mobility options like vanpool could better serve passengers.

Schedule Modifications

This section outlines potential schedule modifications that were considered when developing the concepts. The current schedule reflects TARCS's efforts to stretch service throughout the region as well as a focus on typical morning and afternoon peak periods. **Figure 17** shows the schedule complexity and long headways facing bus riders today.

Figure 17: Schedule Profiles ***Profiles***



Note: 2019 Schedule without routes removed during Covid

The current schedule presents several opportunities for enhancement. The following are suggested schedule elements.

Consistent End Times – Service on some routes ends before others in a manner that makes it hard to complete transfer trips that involve those lines. For example, on weekdays the 27, 31, and the Indiana routes could be extended by one or two hours. There are many other routes that could be extended by one to three hours on weekends. Service could be hourly but would allow for late connections to/from these routes.

Consistent Clockface Headways – The COA team discussed several options for making the entire schedule consistent across all routes. This included options with consistent 15-min, 30-min, and 60-min schedules for all routes. The aggressive headway proposals that eliminated 60-minute service would either greatly increase the cost of the system or require a dramatic reduction in route coverage or service times. The more moderate proposal to emphasize 15-min and 30-min service while maintaining 60-minute service to provide coverage and off-peak service was more achievable, though it still required service reductions to compensate for the increased frequency.

Improved Weekend Service – One of the topics explored at length was providing similar service frequencies for all routes on all days, including Saturdays and Sundays. This simplifies service from a customer perspective as there is only one schedule, and it also reflects changing workforce and overall travel patterns. It would also attract new weekend riders, assuming that the weekend frequencies are improved to match the current weekday frequencies. However, the demands on the weekends are not as high on weekdays, and the cost of higher frequency service across the network on 100 additional days would be substantial.

Improved Evening/Night Service – Extending service later into the night would help some employees that work second shift or in the restaurant/retail industry to be able to get home. The return-from-work trip is an issue at present, as many routes stop around 10 to 11PM.

Conclusions

There are opportunities for improving core route frequencies and system efficiency, while maintaining a high level of service coverage. There are also opportunities for simplifying routes and schedules, and for extending more service to off-peak times. The schedule and frequency changes, however, can quickly drives up costs. Therefore, it is important to focus TARC's limited resources on the routes and times that will yield the most benefits to existing and new customers. The three system concepts present a phased plan for accomplishing that.

Route Optimization Concept (Concept 1)

The *Route Optimization (Concept 1)* proposes a "modified existing" network that could be implemented in the immediate future with a neutral impact to the existing 2021 operating budget. The goals of Concept 1 include:

- Maintain existing service coverage
- Improve service quality and reliability
- Simplify complex routes and timetables
- Adjust routes to provide cost savings
- Increase frequency on key routes

The Route Optimization Concept maintains the general structure and coverage of the routes in service today (Figure 19), but with several route simplifications (eliminating patterns or deviations) and changes to route schedules. It also includes the CMAQ routes. A key feature of optimizing route schedules was setting frequencies to 20, 30, or 60-minute intervals to improve reliability and make it easier for riders to understand the schedule.

Eliminating route conjugations, or "patterns", also makes it easier for riders to understand the routes and schedules. Currently, there are routes with 10 or more patterns. This makes it difficult for riders to understand the schedule and select the right bus. It can even lead to errors in the published schedule. While some routes were simplified, others were determined to be effective and were not changed.

Route simplifications also included removing several inefficient route deviations. For example, Route 29 deviates through the Highlands neighborhood in the middle of the route. Few passengers are picked up in this area and most are within walking distance of the high-frequency Bardstown Road corridor. This deviation causes delay to riders already on the bus as well as increased cost to TARC. The funds saved by eliminating this unwarranted routing can be invested in higher frequencies or other routes. Figure 20 shows the proposed changes with Concept 1.

Figure 19: Route Optimization (Concept 1) – Weekday Frequency

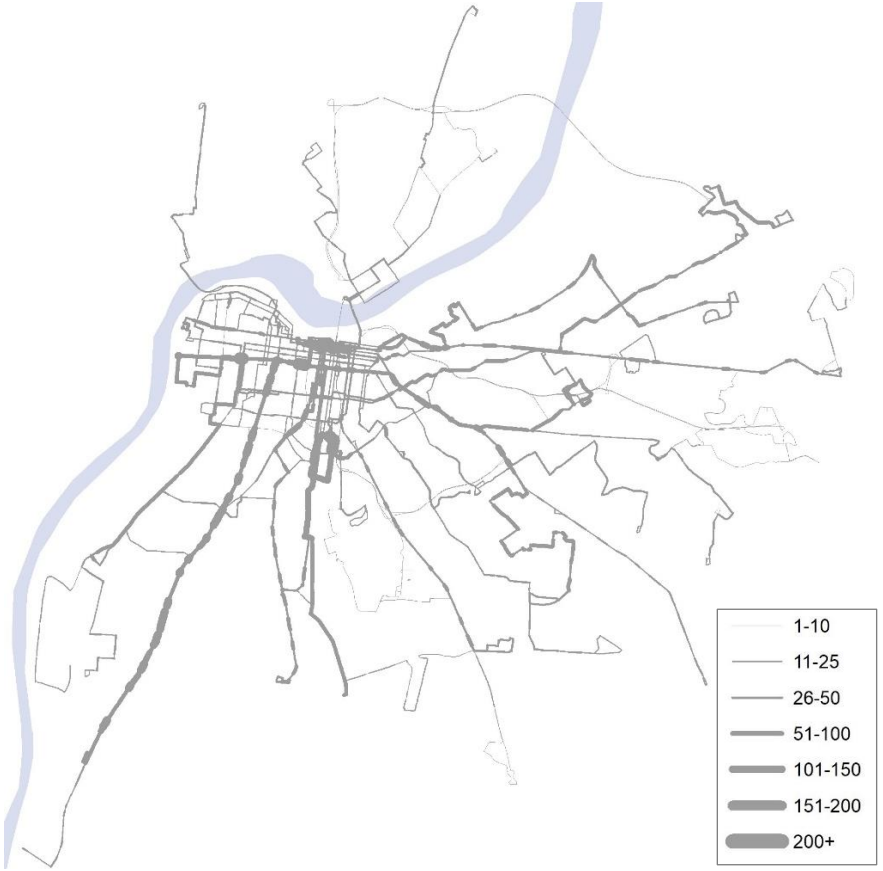
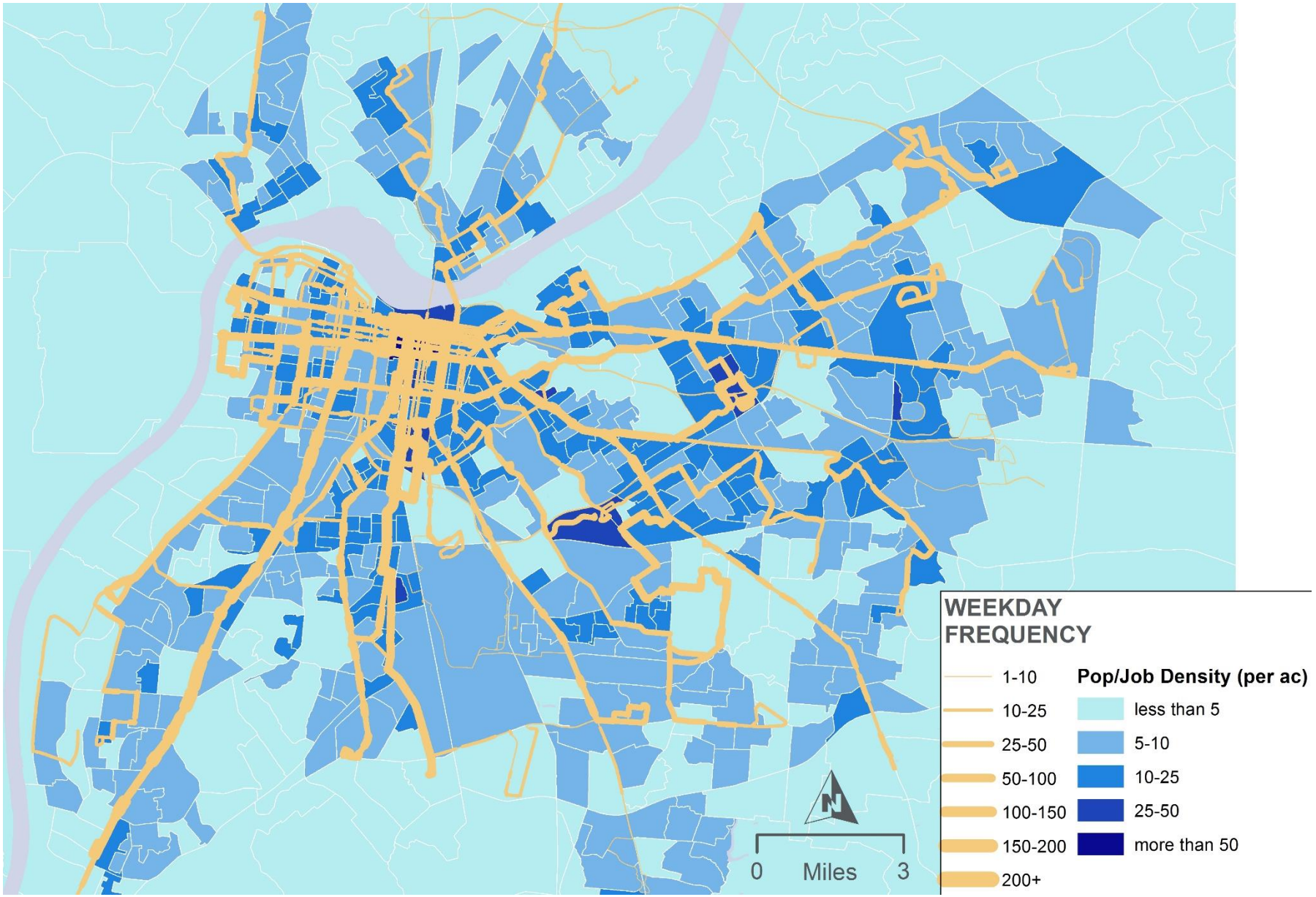


Figure 20: Route Optimization (Concept 1) Compared to Existing Routes

Figure 21: Concept 1 with Population and Employment



Population and Employment Coverage

The Route Optimization Concept continues to serve the main population and employment centers in the urban area. (Figure 21)

Ridership Coverage

The Route Optimization Concept also continues to serve 99.9% of existing riders (see Figure 22).

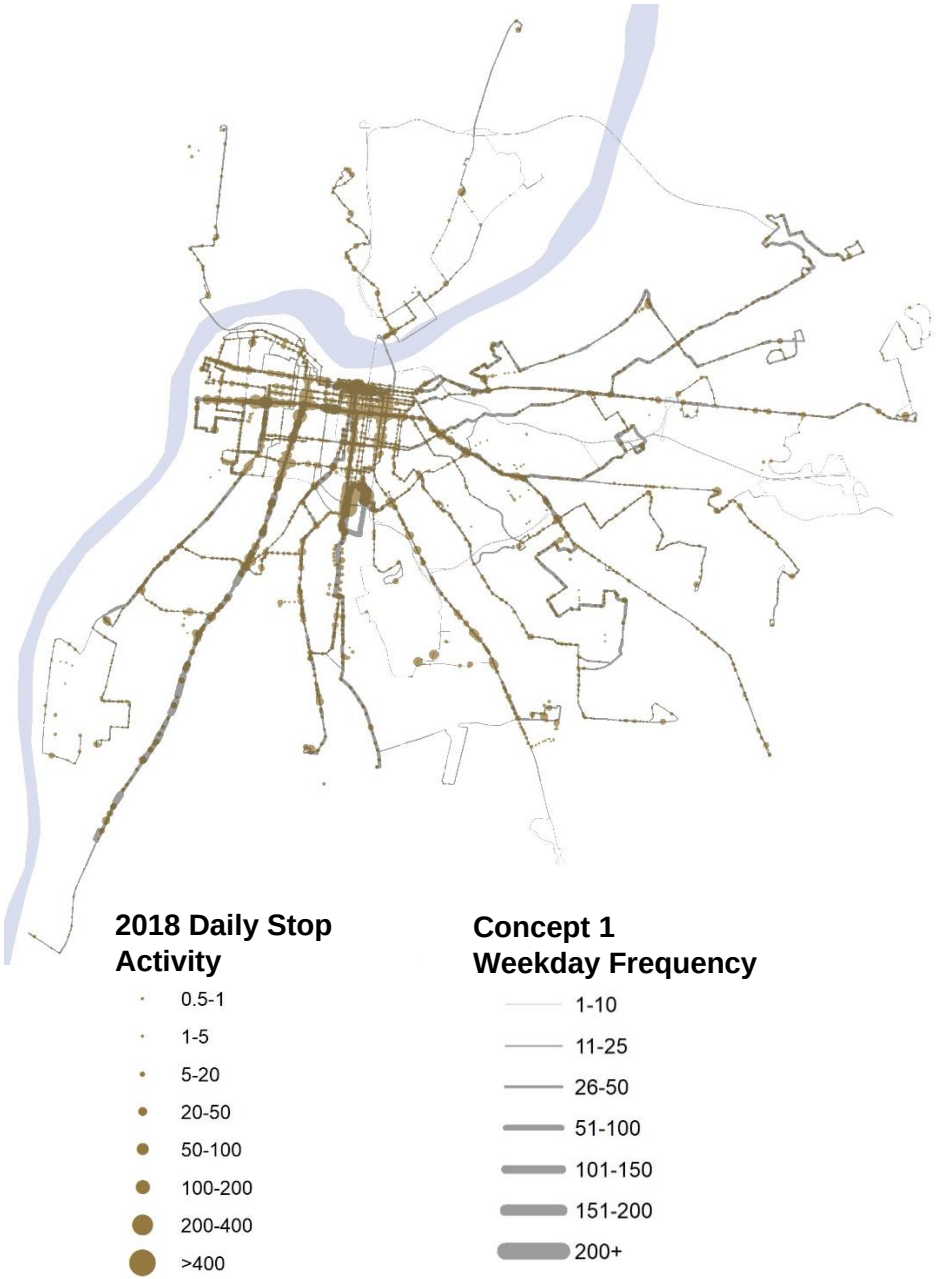
Service and Cost

Concept 1 reduces the hours and miles of service slightly (<1%). It also reduces the peak buses required from 134 to 125. The total cost is just under the cost of the current service (0.3% reduction).

Concept Benefits

Concept 1 will improve overall system efficiency, allowing TARC to operate more reliably. It will also simplify the system so that it is easier for riders to understand and use.

Figure 22: Concept 1 with Existing Ridership



System Restructuring Concept (Concept 2)

Within the next five years (2022-2026), the goal would be to build upon the improvements implemented under the Route Optimization phase, while continuing to maintain service coverage. The purpose of the *System Restructuring* is to create a blended version of the "Frequency" and "Coverage" networks presented in the Draft Network Alternatives from July 2019. This system could be implemented in the near term (<5 years) with some impact to the operating budget (existing 2021 Budget + 15% / +$7.5M). The restructuring of the existing system attempts to meet the following goals:

- Maintain existing service coverage either through modified fixed routes or on-demand zones
- Establish core frequent network
- Simplify network and improve legibility
- Streamline routes and reduce duplicative service

The System Restructuring Concept proposes new routes, an intuitive naming convention and a standardized operating schedule of 15-, 30-, and 60-minute intervals. While the overall system coverage is similar to the existing TARC system and the Route Optimization Concept, many of the existing routes would be modified or combined to create new routes, and a few new routes would be created to better connect the routes system-wide.

The naming of routes for the System Restructuring generally follows the convention below:

- 100 Routes: operate on 15-minute service intervals
- 200 Routes: operate on 30-minute service intervals
- 300 Routes: operate on 60-minute service intervals

For example, proposed **Route 120 – Shelbyville / Frankfort / Ali HF** would operate at 15-minute service intervals between 6:00 AM and 6:00 PM and would follow parts of the existing Routes 19, 29, and 31. Conversely, proposed **Route 300 – Watterson LS** would be a new connector route from Cane Run Road in the west to Norton Women's and Children's Hospital in the east. operating at 30-minute service intervals between 6:00 AM and 6:00 PM but at 60-minute service intervals in the first hour of service (5-6 AM) and after 6:00 PM.

Similar to Concept 1, this concept attempts to limit the number of route conjugations for ease of understanding. It also includes the CMAQ routes. Figure 23 below shows the coverage of Concept 2.

Figure 23: System Restructuring (Concept 2) – Weekday Frequency

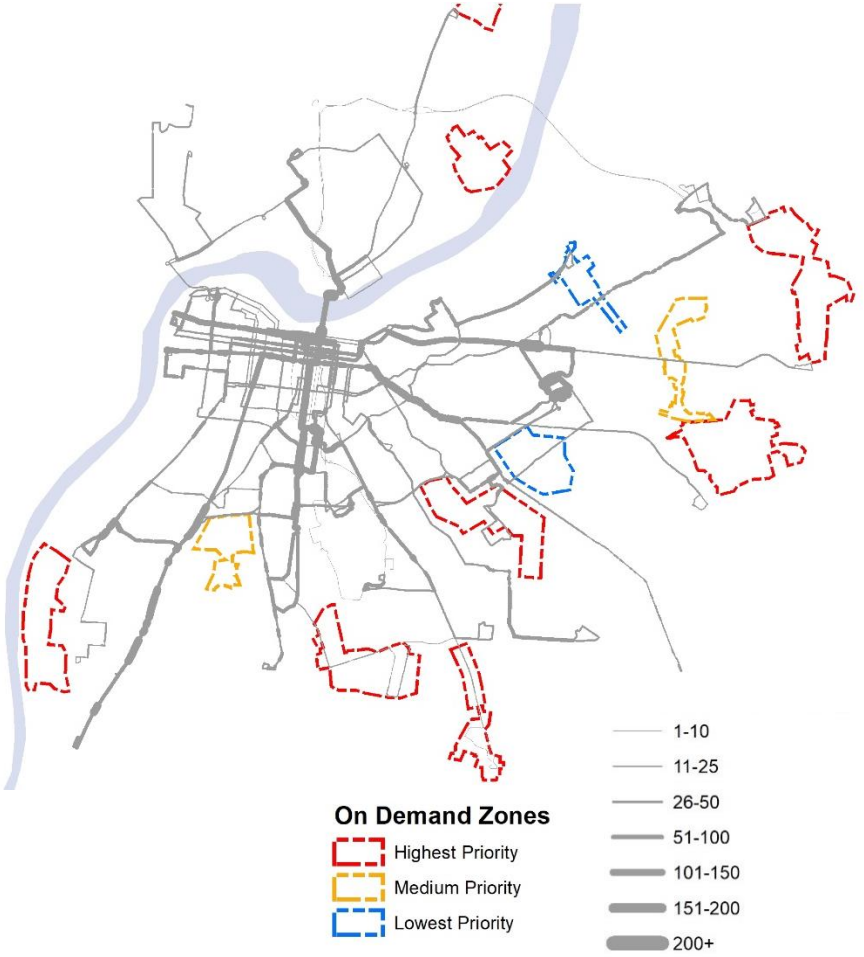


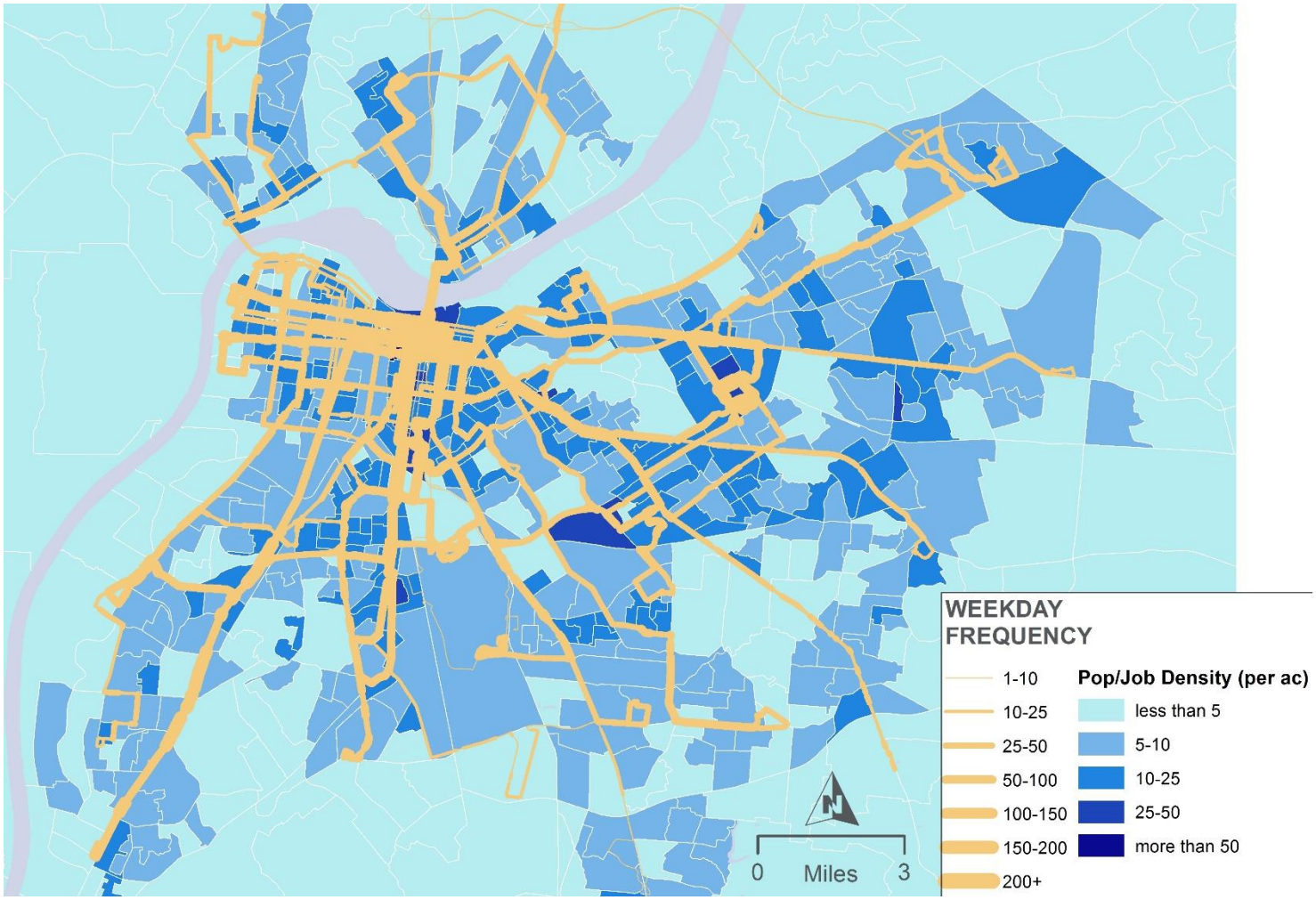
Figure 24 shows the proposed changes with Concept 2.

Figure 24: System Restructuring Compared to Existing Routes

Population and Employment Coverage

The System Restructuring Concept expands service to new employment centers in the urban area and increases high-frequency service to jobs by over 50%. Due to an improved focus on high-ridership areas and corridors, the total population served by this concept drops slightly (1%); but the number of people served by high-frequency routes increases by nearly 60%.

Figure 25: Concept 2 with Population and Employment



Ridership Coverage

The System Restructuring Concept also continues to serve 99.4% of existing riders – but is expected to attract many new riders with the investment in high-frequency service and on-demand zones (see Figure 26).

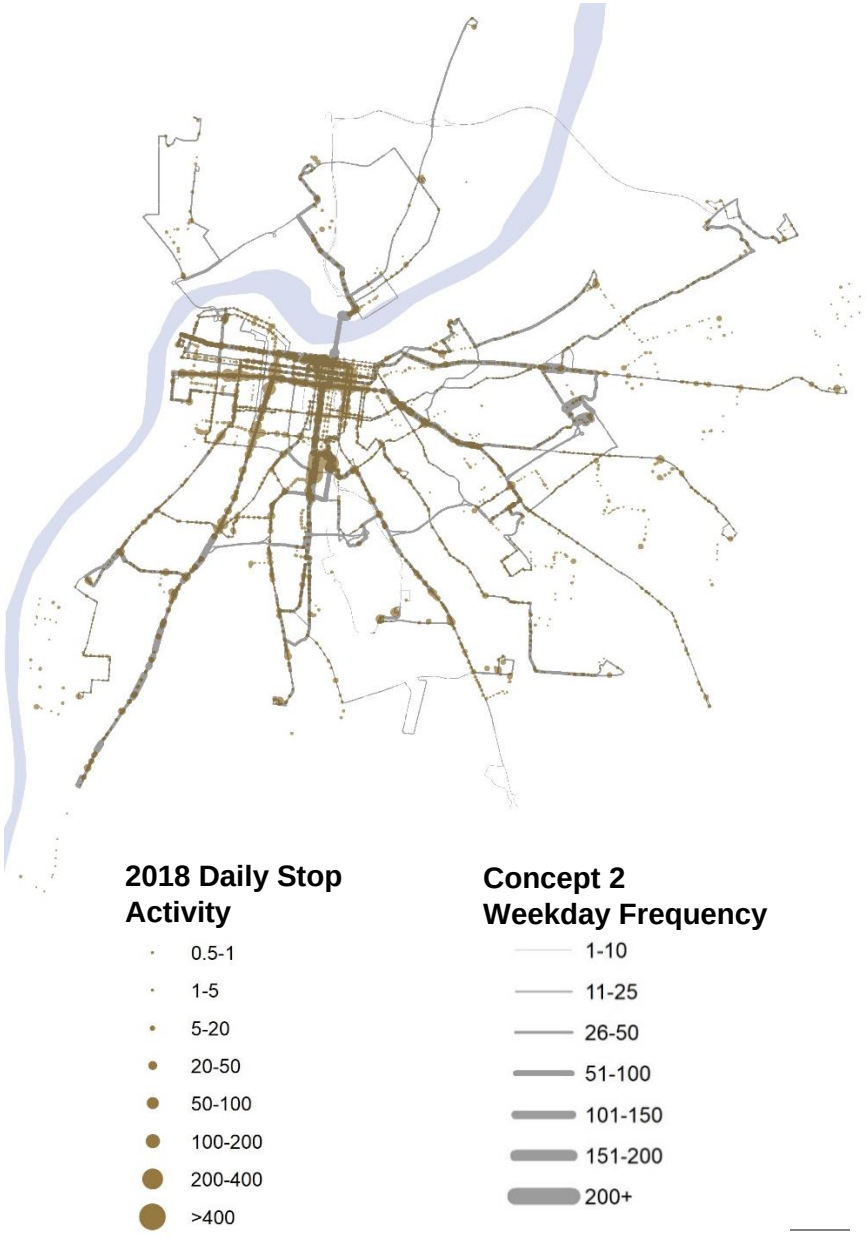
Service and Cost

Concept 2 increases the hours and miles of service by 13% and 10% respectively. It reduces the peak buses required from 134 to 130. The total cost is $62.9 million, which is 16% higher than the current service.

Concept Benefits

Concept 2 will significantly enhance TARC's high-frequency core service, while reaching additional employment areas. It will also reach low-density employment areas more effectively with on-demand service zones.

Figure 26: Concept 2 with Existing Ridership



System Vision Concept (Concept 3)

The mid to long-term concept (5+ years) would continue to build upon the prior improvements with expanded service coverage and route frequencies. An additional cost increase of approximately 30% over the 2021 budget would be required.

The purpose of the *System Vision* is to emulate the "Regional" network presented in the Draft Network Alternatives from July 2019. This system could be implemented in the mid/long-term (5+ years) and have a significant impact to the operating budget (existing 2021 Budget + 30% / +$15M). By building on *System Restructuring*, the *System Vision* attempts to meet the following goals:

- Expand service coverage
- Expand core frequent network
- Reintroduce express routes

It also became clear that many of the large population and employment areas outside the Waterson Expressway have very low densities making them very difficult and expensive to serve with transit. However, given the wide coverage of the current system, most major population and employment areas have some type of transit service. The team also determined that the major street network sets boundaries on what is possible and makes effective entirely new routes challenging.

Regardless, the team developed a set of new routes – focusing on higher density areas and attempting to serve as many employment areas as possible. It quickly became apparent that the available funding would not provide the desirable level of coverage and frequency for this new system. Therefore, to contain costs, a series of on-demand zones was developed. The idea for these zones was to serve the ridership in these areas in a new way and not with fixed route service. **Figure 27** shows the new service that was developed as part of this "From the Ground Up" service concept.

Figure 27: System Restructuring (Concept 3) – Weekday Frequency

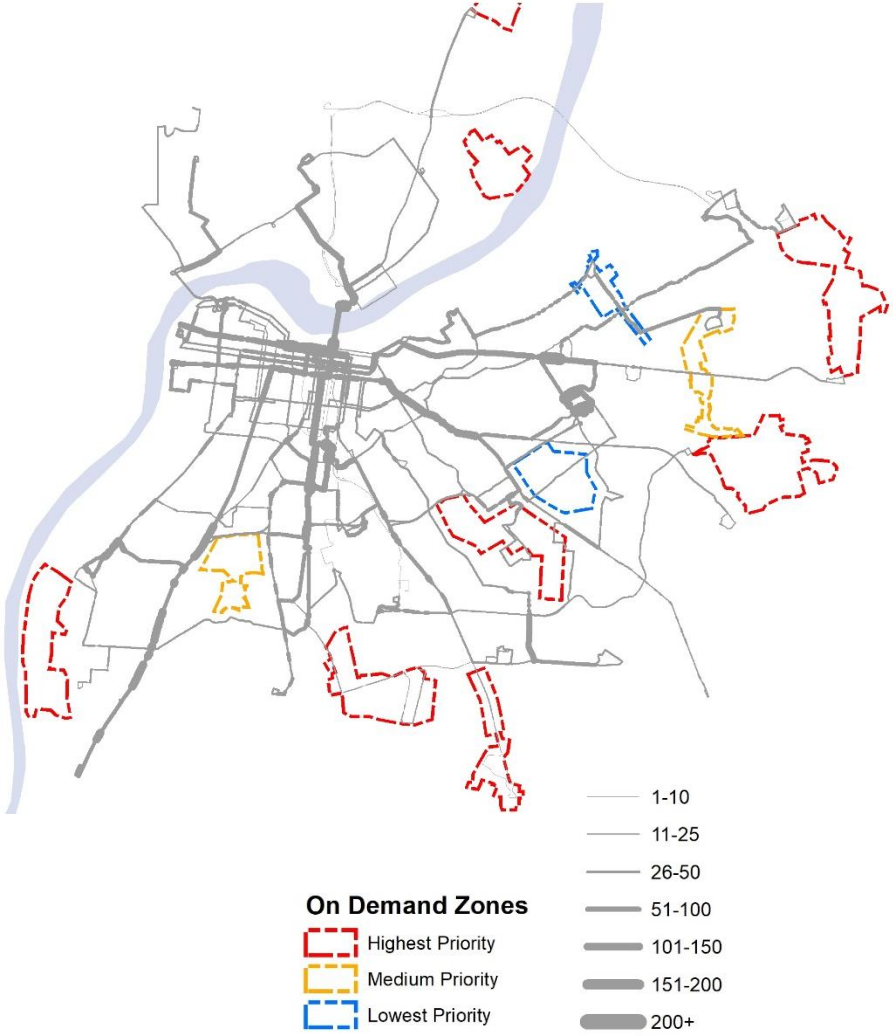


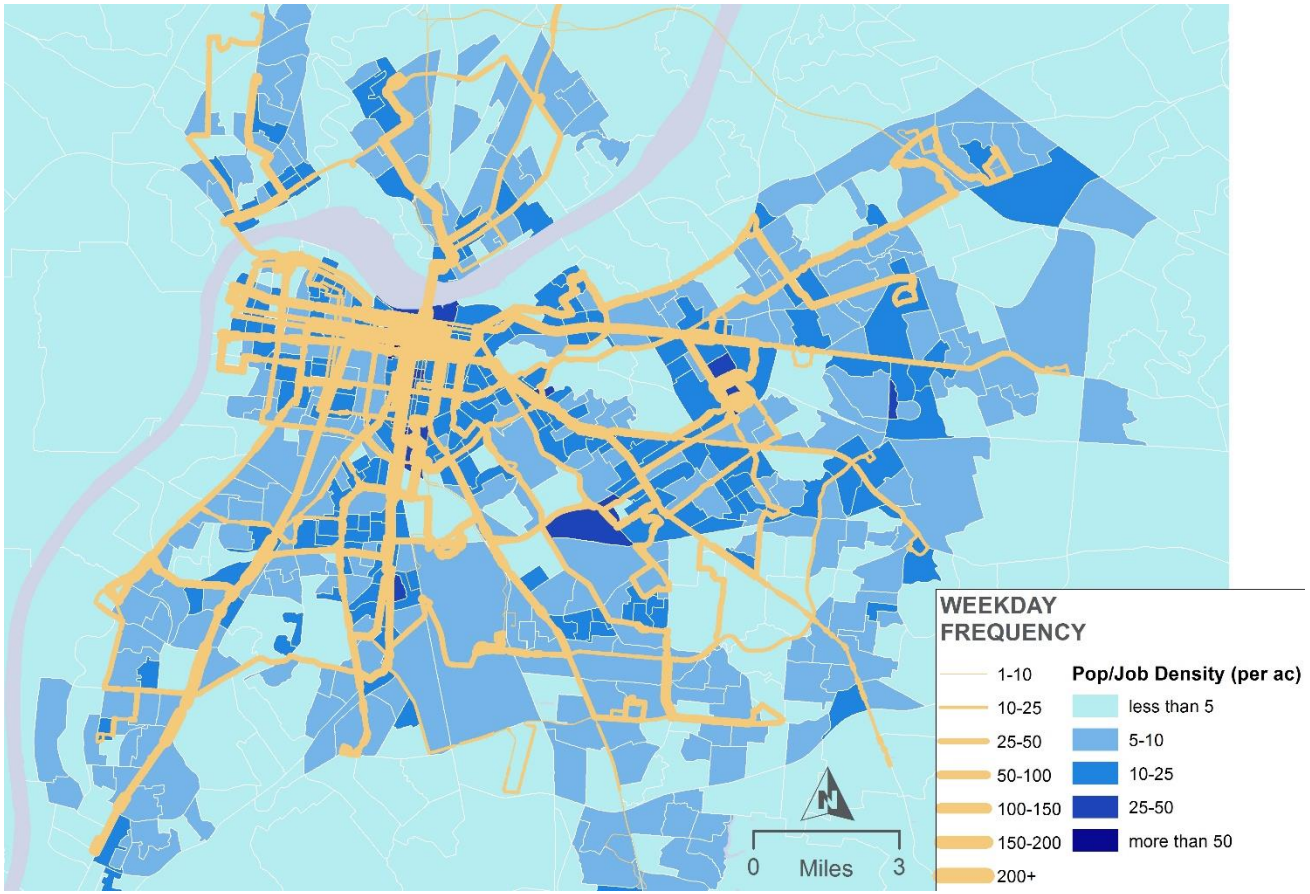
Figure 28 shows the proposed changes with Concept 3.

Figure 28: Route Optimization Compared to Existing Routes

Population and Employment Coverage

Due to expanded coverage and increased frequency, the total population served by the System Vision concept would increase by 10% and the number of jobs by 11%. High-frequency routes would serve the same amount of population and jobs as the System Restructuring concept (over 50% more people and jobs than served today). It would serve 6% more people in poverty, 8% more people who are non-white or of Hispanic/Latino origin, 5% more car-free households, 9% more people living with a disability, and 10% more people over the age of 65. (**Figure 29**)

Figure 29: Concept 3 with Population and Employment



Ridership Coverage

The System Vision Concept would serve 99.9% of existing riders – but is expected to attract many new riders with the investment in expanded service coverage and reintroduced express routes (**Figure 30**).

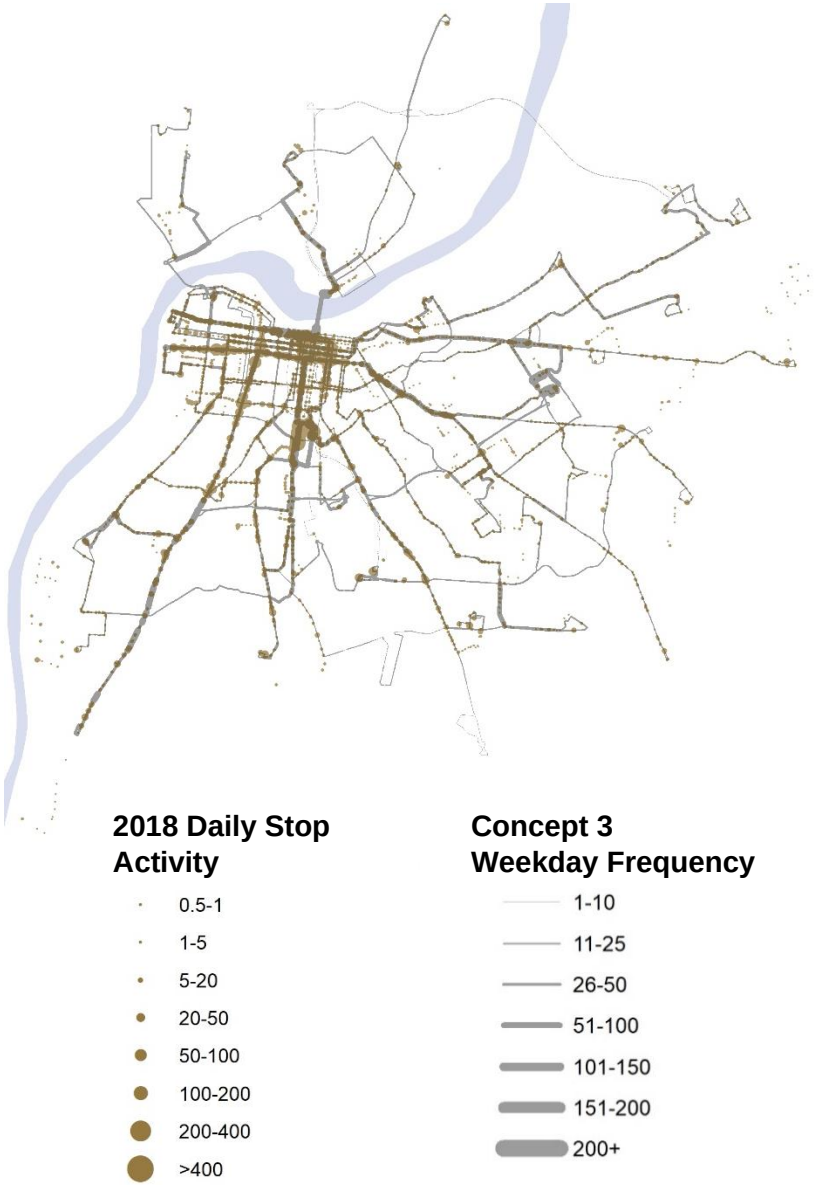
Service and Cost

Concept 3 would increase the hours and miles of service by 25% and 22%, respectively. It would increase the peak buses required from 134 to 142. The total cost would be $71.1 million, which is 31% higher than the current service.

Concept Benefits

Concept 3 would greatly expand coverage, serving more population and jobs – especially near high-frequency routes. while reaching additional employment areas. It would better serve transit-dependent populations.

Figure 30: Concept 3 with Existing Ridership



System Comparison

The three systems have been compared to the existing system to examine service coverage, impacts to existing riders, and costs.

Coverage Comparison

The coverage comparison examined the coverage provided by the high-frequency portion of the network and overall service coverage. The analysis included the fixed route service as well as the on-demand zones proposed in Concepts 2 and 3.

Jobs Coverage

The total number of jobs in the service area increase for all three concepts. The jobs served by high-frequency routes increase by over 50% for Concepts 2 and 3 (**Table 2**). In addition, the on-demand zones in Concepts 2 and 3 would provide much longer spans of service to those areas instead of the limited number of runs available today.

Table 2: Performance Metrics Summary Comparison

						Percent Change from Existing		
		Existing	Concept 1	Concept 2	Concept 3	Concept 1	Concept 2	Concept 3
Population	Total	582,000	588,000	576,000	639,000	1.0%	-1.0%	9.8%
	Near High-Frequency	133,000	133,000	211,000	211,000	0.0%	58.6%	58.6%
Jobs	Total	425,000	435,000	441,000	473,000	2.4%	3.8%	11.3%
	Near High-Frequency	117,000	117,000	180,000	180,000	0.0%	53.8%	53.8%
Existing Ridership	Total	100.0%	99.9%	99.4%	99.9%			
	Near High-Frequency	72.2%	72.2%	80.3%	80.3%			
Service	Annual Revenue Hours	519,481	518,414	584,942	648,476	-0.2%	12.6%	24.8%
	Annual Revnue Miles	6,597,929	6,558,668	7,251,211	8,041,982	-0.6%	9.9%	21.9%
	Peak Buses	134	125	130	142	-6.7%	-3.0%	6.0%
Cost (millions)	Fixed Route	$54.09	$53.90	$60.41	$66.98			
	On-Demand			$2.46	$4.10			
	Total	$54.09	$53.90	$62.87	$71.08	-0.3%	16.2%	31.4%

Note: Service metrics in this table are based on ½ mile stop coverage.

Population Coverage

TARC currently serves much of the population in the urban area. The three concepts maintain this high level of overall service coverage. Concepts 2 and 3 increase the population served by high frequency routes by well over 50%. Concept 1 maintains the current high-frequency coverage.

Existing Ridership

All three concepts would serve over 99% of the current ridership, and would increasingly expand opportunities for new ridership.

Service

Concept 1 would result in negligible slight decreases in annual hours and miles. Concept 2 would result in a 13% increase in hours and a 10% increase in miles. Concept 3 would roughly double Concept 2's increases, with a 25% increase in hours and a 22% increase in miles.

Cost

Concept 1 would cost slightly and negligibly less than existing service. Concept 2 would cost 16% more than existing service. Concept 3 would cost 32% more than existing service.

Infrastructure Improvements

This section outlines potential infrastructure improvements that would benefit TARC's operations.

Transfer Points and Transit Centers

Transfers are inherent in any transit network and have become increasingly important as employment and other activities in cities have decentralized over time. Making connections between routes simple and convenient is a function of both the infrastructure (sidewalks, safe street crossings, lighting, stop amenities, etc.) and service (primarily frequency as it can substantially affect wait times and overall trip times).

Rider data over the years has demonstrated the importance of transfers to many TARC customers. In fact, 24% of riders "always" transfer to make a trip and another 29% "sometimes" transfer to make a trip, leaving less than half in the "rarely to never" categories (IQS, 2016). There are many transfer nodes within the system, but they are not all clearly identified and easy to use. There is only one transit center in the system – the Nia Center on West Broadway, **see Figure 31**.

Figure 31: Nia Center on West Broadway

Study Finding: A potential improvement would be to implement several formalized on-street and off-street transfer locations. Potential on-street locations include:

1. Downtown on the block bounded by 5th Street, Jefferson Street, 6th street, and Market Street
2. Nulu near the intersection of Liberty Street and Chestnut Street
3. Bardstown Road and Goldsmith Lane
4. Dixie Highway and Crums Lane
5. Broadway at 4th Street

Recommendation: Consider upgrading these locations. Several already have shelters and other transit infrastructure elements. They could also be promoted as Mobility as a Service Hubs (MaaS Hubs, aka Mobility Hubs) with other modes encouraged at these locations.

There may be opportunities for off-street facilities as developers and public agencies navigate the post-COVID trends. As urban land-uses change, it may be possible to take advantage of new opportunities.

Mobility Hubs

Study Finding: These were discussed in the previous section. They could be created by TARC actively working with Louisville Metro and other public and private entities to create new and safe opportunities for pedestrian, bicycle, motorized bicycle, scooter, and on-demand services.

Recommendation: Consider a demonstration project either in the vicinity of the University of Louisville or in the Highlands could be a good test case for this concept in the near term (next three years).

Sidewalks and Safe Walking Routes

Study Finding: Sidewalks are a basic infrastructure element that many people expect; however, there are many TARC bus stops that cannot be reached or even waited at safety. While a long-term strategy and funding plan is needed to address this issue comprehensively, there are several important high demand routes around the City that could benefit from near-term upgrades.

Recommendation: TARC should coordinate with Louisville Metro, KYTC and other municipal agencies to prioritize certain walking routes.

Stop Level Infrastructure

Study Finding: TARC continues to improve the stop level infrastructure throughout the city, which leads to better waiting conditions for many customers. It also means improved opportunities for communicating with customers through static and dynamic signage. (The new Dixie Highway BRT Stations have real-time information displays.) However, it is very important that TARC focus resources on stop infrastructure and amenities on locations that are on priority corridors. This will reduce the likelihood that investments are made at stops that may be later removed or relocated.

Recommendation: Along with reaffirming the standards for providing service, it would also be a good idea to reaffirm the standards for providing stops. Additionally, TARC has continued to remove stops over the last several years. This stop consolidation is important in areas where buses make frequent closely spaced stops, but in lower density areas where sidewalks are limited, it is acceptable to have more stops, knowing that the bus will stop infrequently due not to the stop spacing but the rider density.

Additional BRT Stops

Study Finding: The funding for the Dixie Highway BRT was not sufficient to allow for construction of all the stops originally envisioned for the corridor.

Recommendation: To the extent capital funding can be obtained, there are several long stretches without stops that would attract more riders if they were constructed.

One-Way to Two-Way Street Conversions

Study Finding: Louisville Metro is proceeding to convert several one-way streets into two-way streets. This creates an opportunity for TARC to consolidate routes in both directions on the same street. Example streets include Chestnut Street and Muhammad Ali Boulevard.

Recommendation: These projects should be coordinated with Louisville Metro.

Operational and Marketing Changes

This section outlines potential operational and marketing changes or initiatives that could help improve the customer experience, retain current riders, and attract new riders. Several operational challenges have been identified through the COA evaluation and are summarized below. These changes will help improve customer experience and can be implemented along with system changes or individually.

Detour Routes

Study Finding: Field observations and informal interviews indicated that work zones and street closures are a challenge for TARC. For example, sometimes drivers do not have a complete detour route or do not know what it is. When they select their own route that can lead to skipped stops and customers. Likewise, customers are not always aware of the detour routes, making it hard to find the temporary stop.

Recommendation: TARC could benefit from increased coordination with local utilizes and public agencies (e.g. Louisville Water, Louisville Gas and Electric, Louisville Metro, KYTC, Jeffersonville, and other municipalities). A formal process is needed for these entities to inform TARC in advance for planned work zones and in a timely manner for emergency street work zones. Working with local municipalities and other public officials to develop detour paths and informing the public could prevent this from happening in the future.

Headsigns

Study Finding: The current headsigns are sometimes difficult to understand for riders who are new to the area or new to a specific route. This can lead to uncertainty and confusion on the part of the customer.

Recommendation: One option would be to select clear locally recognizable end points for all routes and use those endpoints on all maps and on the headsigns. This could be done in combination with the renaming of the routes.

Route Names and Numbers

Study Finding: Many of the route names and numbers date from quite some time ago, even as far back as the streetcar system. The names often are not as helpful as they could be given the actual route destinations.

In Louisville, route names were originally dictated by the old trolley names. The route naming is further complicated by the practice of dividing routes into branches so that two or more choices had to be depicted on route name. While the total number of branches provides coverage, it makes it very complicated for the user to decipher their trip. Simplified route naming provides all users, current and new, easy ways to recall a particular route and know its origin and destination.

Bus routes names are designed to provide boarding passengers, those that are frequent local users, new local users and out of towners, with enough information to know what route the bus is travelling and where the bus is destined. In some cities, information is limited to the single word of the principal street on which the bus travels. In other cities route names are very intricate and passengers are expected to know, from experience or transit information, where the bus goes, and its direction from seeing where the bus is heading.

Recommendation: For the user experience, a simplified route naming can create “muscle memory” for the passenger and quickly indicate which key roadway the bus uses. Given the geography of the TARC service area route naming could consist of one or two names of the key roadways on which the service travels, for example: Market St. / Bardstown Rd.

Another important route qualifier is route numbering. Route numbers can be assigned based on their level of service using a 100-1000 categorization series with the 100 routes being high

frequency routes, limited stop service being the 200 series routes, etc. **Table** 3 includes an example of such a concept.

Another concept that has not been applied in Louisville yet is to designate specific high frequency routes using color coding. This could be done on maps as well as on signs at stops. For example, Route 23 on Broadway/Bardstown could be designated as the Red Line and Route 28 on Preston Highway could be the Blue Line. Updating system maps to clearly indicate the level of service offered on each route is a best practice that shows the public (including current and potential riders) how the system is organized and simplifies decision making when determining how to travel.

Table 3: Example Route Renumbering

Route Number	Service Type	Sample of Existing Route
100	High Frequency Core*	23
200	Limited Stop / BRT*	Broadway BRT
300-350	Primary Local	2, 6
350-399	Secondary Local	
400	Circulator	1
500	On-Demand/Flex	N/A
600	Commuter / Regional Express	67

Chapter 6: Next Steps

This chapter provides the proposed next steps to finalize proposed service changes, assess budget and financial impacts, capital infrastructure improvements, stakeholder engagement, and FTA Policy Compliance. Several needed key steps are described below.

Advance Recommendations

The next step that will need to occur is for TARC staff, executive leadership and the Board to discuss what recommendations to advance. They should also re-engage the TAC and CAC to get their feedback on the proposed recommendations.

Complete Analysis of Recommendations

Once there is consensus on what recommendations should be advanced, since the concepts are preliminary, they will need to be refined based on updated run time calculations, scheduling and run-cutting.

Once the final network is identified and more formal operating costs for the recommendations can be quantified, TARC will need to evaluate those costs against their operating budget. The financials should include cost and expense parameters based on the most recent fiscal year, costs should also include an escalation factor to understand if the proposed changes are sustainable over the next few years.

FTA Policy Impacts

TARC will then also need to complete a Title VI and Environmental Justice (EJ) analysis for proposed changes to the system. The purpose of the analysis is to ensure that changes to transit service are consistent with Title VI policies defined by the Federal Transit Administration (FTA) and the TARC Board of Directors. Title VI, Section 601 of the Civil Rights Act of 1964, which states: “No person in the United States shall, on the grounds of race, color or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.”

EJ populations are defined as those populations that are considered minority and those that are below poverty level. A Title VI and EJ analysis focuses on populations within a half-mile of transit bus stops.

Prior to finalizing a network concept for implementation, TARC should complete a high-level Title VI and EJ analysis to understand if the proposed changes do not disproportionally impact key populations. A final, detailed Title VI and EJ analysis should be done on the final network to ensure that the recommendations made for this scenario do not have a disproportionate disparate impact on the low-income and minority populations in the area. This step may need to be revisited based on any changes that are proposed based on public feedback described in the next step.

Stakeholder Engagement

The next step would be to reach back out to TARC’s partners, the TAC, the CAC, and the public to present the recommendations and get final feedback.

Develop Comprehensive Implementation Plan

Ultimately, TARC will need to develop a comprehensive Implementation Plan that outlines concrete steps from the finalization of the recommendations to the roll-out of new service. This plan would include such elements as needed TARC board actions, coordination with member agencies and other relevant parties, a refined financial plan, final route details, schedules, capital improvements, public collateral materials and communications, operator procurement, and information technology updates.

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3. TARC, Responding to Developments of Novel Coronavirus https://www.ridetarc.org/tarc-safety-security-covid-19/

Appendices

Appendix A: Goals and Objectives
Appendix B: Data Collection
Appendix C: Summary of Prior Studies
Appendix D: Field Observations
Appendix E: Peer City Summary
Appendix F: Route Level Evaluations
Appendix G: Public Engagement Plan
Appendix H: Technical Advisory Committee Summary
Appendix I: Community Advisory Committee Summary
Appendix J: Public Meeting Summary
Appendix K: System Concept Details
Appendix L: 2020 Ridership Data