FINAL REPORT

TTA Transit Impact Study

KYOVA Interstate Planning Commission

April 2018

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1 EXECUTIVE SUMMARY

The Tri-State Transit Authority (TTA) Transit Impact Study began in January 2017 and concluded in April 2018. Focusing on TTA's fixed-route network and coverage area, the study conducted a comprehensive market analysis, analyzed fixed-route ridership and performance metrics, and developed an extensive public engagement campaign. The result was the identification of multiple service improvement opportunities.

TTA's service area is expansive, and topographical challenges and dispersed population centers complicate public transit service in Huntington. Additionally, commercial activity has shifted from downtown Huntington to the US-60 Corridor, concentrated at shopping centers anchored by Walmart, Target, and the Huntington Mall. TTA operates 14 fixed-routes, providing service to the greater Huntington region, including Barboursville, Culloden, Kenova, and Milton. Demand for TTA's fixed-route service has risen in recent years. In 2015, TTA's fixed-route service provided over 900,000 passenger trips, a 16% increase from 2010.

The Transit Impact Study conducted a market analysis of the Huntington region and analyzed population and employment densities, as well as the location of population subgroups such as older adults, low-income individuals, young adults, and people with disabilities. Key findings from the market analysis included:

- The highest density neighborhoods in TTA's service area are located adjacent to Marshall University's campus, along 3rd Avenue, and between 5th Avenue and 7th Avenue. Moderately high population density levels also exists in downtown, Southside, and downtown Kenova. Huntington contains large areas of moderate population density (8-16 people per acre) intermixed with both lower and higher density neighborhoods. Outlying communities generally feature lower population densities (fewer than eight residents per acre).
- The highest concentrations of employment in Huntington are located at Marshall University, Cabell Huntington Hospital, and downtown. The Huntington Mall and adjacent commercial developments feature moderate-to-high levels of employee density. All of these areas are currently served by TTA.

The Transit Impact Study conducted comprehensive public engagement in April and November of 2017, including public meetings and outreach at the TTA Center, meetings with bus drivers, and in-person surveys with TTA users and Marshall University students that engaged over 300 respondents. Key findings from the survey the survey efforts and public outreach are listed below:

- TTA supports a wide range of non-discretionary and discretionary trips. TTA riders predominately use the service for store/shopping (63%) and work trips (52%). Nearly half of Marshall University respondents that ride TTA use the service to reach campus.

- TTA is the primary means of transportation for 83% of TTA riders and 26% of Marshall University students.
- Combined, survey respondents express a strong preference for more frequent bus service (59%), instead of longer service hours (41%); favor TTA improving existing services (57%), as opposed to serving new areas (43%); and prefer more weekend service over more weekday service by a margin of two-to-one (68%).

TTA staff and consultants collaborated to produce recommendations that accurately reflect the demands and needs of TTA's customers and are feasible given TTA's existing service constraints and limitations. The study team was aiming for a cost-neutral redesign of TTA's transit network; proposed service operates approximately 188 weekday revenue vehicle hours, and 172 revenue vehicle hours on Saturdays. Overall, nearly every route still serves its existing markets and areas. Recommendations fall into three different categories:

- Improve directness of service to address on-time performance (most routes)
- Reduce uncoordinated duplication of service on US-60 (Routes 5, 7, and 9)
- Improve frequency to every 30 minutes (Routes 6 and 7)

Service along US-60 should be modified to streamline service, provide direct access to major commercial destinations, and to operate more frequently. Coordinating service on US-60 between Routes 5, 7, and 9 will allow TTA to reallocate resources to improve Route 6, and enable 30-minute frequency during the morning and afternoon/evening peak periods.

Given the many barriers to operating transit service in areas with low density, and low existing demand, fixed-route transit is not the best option for providing public transportation to several neighborhoods and destinations. Removing fixed-route service and substituting demand-response service is proposed for multiple destinations.

Ultimately the study determined that Sunday service, while desired by many passengers, is not feasible without severe cuts to weekday or Saturday service or a significant increase in funding. Additional recommendations include:

- **Piloting designated bus stops:** Creating dedicated fixed stops on TTA's highest ridership corridors—Madison Avenue (Route 6) and US-60 (Route 5, Route 7B/7T, and Route 9)—should improve speed and reliability as well as improve bus and passenger safety.
- **Consider demand-response service:** Increasingly, transit providers and Transportation Network Companies (TNCs) such as Uber and Lyft are collaborating to provide innovative and cost-effective transit solutions for low-density areas. TTA should monitor the progress of these initiatives and consider future pilots with TNCs that may help expand service to underserved locations.
- **Improve pedestrian infrastructure:** To ensure this objective is met, it is key to work closely with the public departments that have jurisdiction over the rights-of-way being used for TTA service to ensure that stops are placed both where they are needed and where they are safe, and that complementary pedestrian improvements are considered in the roadway planning and maintenance processes.

2 OVERVIEW OF TTA

The Tri-State Transit Authority began fixed-route bus service in Huntington in 1972, and the system continues to act as a critical mobility service for residents and students. Streetcar service began in Huntington in 1888 and was the city's first form of mass transit. Private operators maintained multiple local and interurban streetcar lines in Huntington, Ashland, Kentucky, and Ironton, Ohio. The introduction of buses to Huntington in 1925 precipitated a shift in travel modes. Since 1937, fixed-route bus service has been the primary form of public transit in the region, first operated by the Ohio Valley Bus Company and then by The Tri-State Transit Authority (TTA).[1]

Today, TTA operates 17 fixed-routes that begin service at the TTA Center in downtown Huntington, as well as Dial-A-Ride paratransit service for people with disabilities. TTA opened the TTA Center, the agency's main passenger terminal, in 1994 at the downtown Greyhound bus terminal. TTA offers local service throughout downtown Huntington and operates service to many surrounding communities. With routes that stretch from Kenova to Culloden, a span of over 30 miles, TTA offers a large service area in a constrained operating environment.

TTA last conducted a system-wide service assessment in the early 1990s. The TTA Impact Study is an opportunity to carefully assess existing services, introduce potential efficiencies, and ensure limited resources are directed where they are most needed. New potential service markets will also be explored.

TTA and the KYOVA Interstate Planning Commission are jointly conducting this comprehensive operations analysis. KYOVA oversees regional transportation planning for five counties in Kentucky, Ohio, and West Virginia: Boyd County, Cabell County, Greenup County, Lawrence County (OH), and Wayne County. The Impact Study will provide TTA and KYOVA with a clear understanding of current ridership patterns, identify areas underserved by transit, and will provide recommendations for a restructured network that more efficiently serves transit users in TTA's service area.

FIXED-ROUTE SERVICE

Prior to July 2017, TTA was comprised of two separately funded systems, TTA-WV (though officially named simply "TTA") and TTA-Ohio. TTA-WV is the funding designee for federal transit funds in the greater Huntington area and operates fixed-route transit and paratransit service. All fixed-route service originates and terminates at the TTA Center in downtown Huntington. TTA-WV operates Monday through Saturday, from 5:45 a.m. to 11:30

[1] "Lost Huntington: Ohio Valley Bus Co.": http://www.herald-dispatch.com/features_entertainment/lost-huntington-ohio-valley-bus-co/article_166c5977-5da1-5586-a08a-3b8cf08a0051.html

p.m. Route 20, Route 30, and Route 40 are the only routes that operate late-night service, from 7:15 to 11:30 p.m.

Though there are designated time points on the published schedules, TTA operates as a flag stop system. Users can flag the bus at any point along a route or ask to be dropped off at any time, and the driver will stop at a nearby safe location. Figure 1 is a map of TTA's system as it operated when TTA and KYOVA initiated the TTA Impact Study. Routes 1-10, 20, 30, and 40 still operate on the same alignments today. Figure 2 and Figure 3 provide an overview of TTA service, including a description and the operating characteristics of each route.

TTA-Ohio was formed in 2007 and sponsored by the Lawrence County Port Authority. Prior to July 2017, TTA-Ohio routes offered fixed service between Huntington and various communities along the Ohio River Valley, including Proctorville, Ironton, and Burlington, Ohio, and Ashland, Kentucky. TTA-Ohio officially ceased operation on June 30, 2017. The Lawrence County Port Authority will begin operating new routes and service on July 1, 2017, utilizing funding through the Congestion Mitigation and Air Quality Improvement Program (CMAQ).

Figure 1 | TTA System Map (Early 2017)

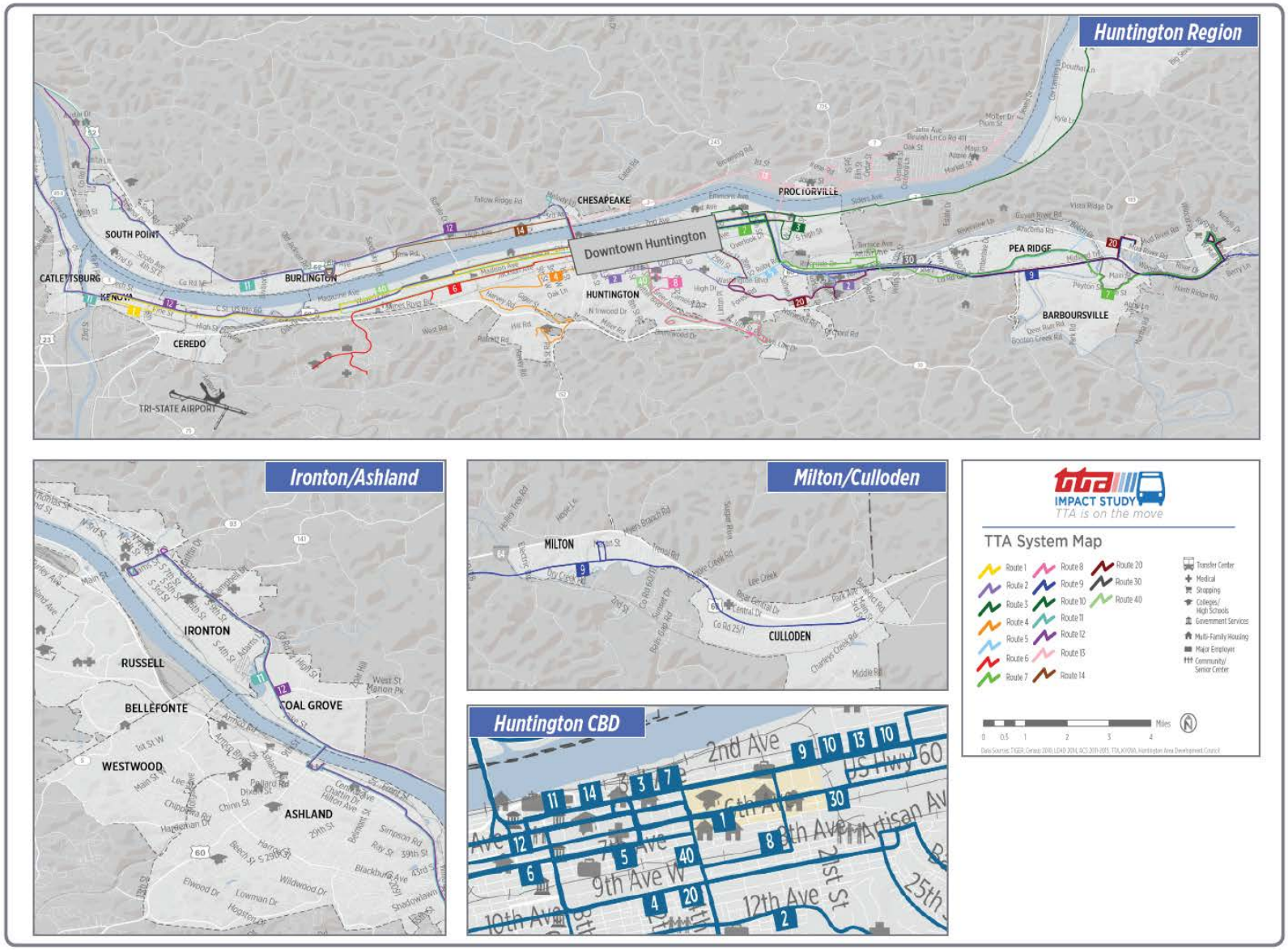

Figure 2 | TTA Routes and Destinations

Route	Service Description
Route 1 – Ceredo/Kenova	Connects downtown Huntington to Ceredo and Kenova
Route 2 – Southside	Connects downtown Huntington to Huntington State Hospital and Cabell County Career and Technical Center
Route 3 – Third Avenue	Connects downtown Huntington to Marshall University and St. Mary's Medical Center
Route 4 – 9th Avenue / Harveytown	Connects downtown Huntington to Mountwest Community & Technical College
Route 5 – Walnut Hills	Connects downtown Huntington East Hills Mall and East Hills Professional Center
Route 6 – Madison Avenue	Connects downtown Huntington to the VA Medical Center and the Department of Human Services
Route 7 – Barboursville / Altizer	Connects downtown Huntington to Huntington Mall
Route 8 – Hal Greer Boulevard / 18th Street	Connects downtown Huntington to Cabell Huntington Hospital, Kinetic Park, and Huntington High School
Route 9 - Milton	Connects downtown Huntington to Huntington Mall, the Western Regional Jail, Milton, and Culloden
Route 10 – Marshall Shuttle	Connects downtown Huntington to Marshall University and MU Stadium
Route 10.1 – Marshall Shuttle	Connects downtown Huntington to Marshall University and MU Stadium
Route 11 – Ohio Valley Commuter Express (discontinued)	Connects downtown Huntington to Burlington, Ironton, Ashland, and The Point Industrial Park
Route 12 – Ohio Valley Commuter Express (discontinued)	Connects downtown Huntington to Burlington, Ironton, Ashland, and The Point Industrial Park
Route 13 – Proctorville (discontinued)	Connects downtown Huntington to Marshall University and Proctorville
Route 14 – Chesapeake (discontinued)	Connects downtown Huntington to Chesapeake and Burlington
Route 20 – PM South Late Service	Connects downtown Huntington to Huntington Mall and Cabell Career Technical Center
Route 30 – PM North Late Service	Connects downtown Huntington to Huntington Mall
Route 40 – PM West Late Service	Connects downtown Huntington to Kinetic Park and Huntington High School

Figure 3 | TTA Routes and Service Characteristics

Route	Service Span	Service Frequency
Route 1 – Ceredo/Kenova	Monday-Saturday: 6:08 AM – 7:10 PM	60 minutes
Route 2 – Southside	Monday-Saturday: 6:10 AM – 7:15 PM	60 minutes
Route 3 – Third Avenue	Monday-Friday: 5:45 AM – 7:15 PM Saturday: 6:45 AM – 7:05 PM	60 minutes
Route 4 – 9th Avenue/ Harveytown	Monday-Saturday: 7:45 AM – 6:10 PM	60 minutes
Route 5 – Walnut Hills	Monday-Saturday: 6:45 AM – 8:10 PM	60 minutes
Route 6 – Madison Avenue	Monday-Saturday: 6:45 AM – 7:10 PM	60 minutes
Route 7 – Barboursville / Altizer	Monday-Friday: 6:45 AM – 8:15 PM Saturday: 7:45 AM – 8:15 PM	60 minutes
Route 8 – Hal Greer Boulevard / 18th Street	Monday-Saturday: 6:45 AM – 7:15 PM	60 - 110 minutes
Route 9 – Milton	Monday-Saturday: 5:45 AM – 8:50 PM	70 minutes
Route 10 – Marshall Shuttle	Monday-Friday: 7:30 AM – 4:20 PM Saturday: 3:00 – 4:20 PM	20 minutes
Route 10.1 – Marshall Shuttle	Monday-Thursday: 5:00 PM – 12:00 PM Friday-Saturday: 5:00 PM – 3:00 AM	20-30 minutes
Route 11 – Ohio Valley Commuter Express (discontinued)	Monday-Friday: 6:25 AM – 6:20 PM	AM and PM peak period only
Route 12 – Ohio Valley Commuter Express (discontinued)	Monday-Friday: 6:45 AM – 7:00 PM	AM and PM peak period only
Route 13 – Proctorville (discontinued)	Monday-Friday: 7:20 AM – 5:40 PM	AM and PM peak period only
Route 14 – Chesapeake (discontinued)	Monday-Friday: 6:45 AM – 6:15 PM	AM and PM peak period only
Route 20 – PM South Late Service	Monday-Saturday: 7:15 PM – 11:15 PM	60 minutes
Route 30 – PM North Late Service	Monday-Saturday: 7:15 PM – 11:05 PM	60 minutes
Route 40 – PM West Late Service	Monday-Saturday: 7:15 PM – 11:15 PM	60 minutes

MULTIMODAL CONNECTIONS AND AMENITIES

Greyhound intercity bus service is available from the TTA Center. Greyhound's Route 215 provides service to Detroit, MI, Toledo, OH, Columbus, OH, and Charleston, WV.

Amtrak operates intercity passenger rail service to Huntington. The Cardinal runs three days a week between New York, Washington, D.C., Cincinnati, Indianapolis, and Chicago. Huntington's Amtrak station is located on 8th Avenue and features an enclosed passenger waiting area and restrooms.

TTA and Kanawha Valley Regional Transportation Authority (KRT) in Charleston jointly operated the Intelligent Transit route from 2009 to 2015, which provided twice-daily service between Huntington and Charleston. Although the Intelligent Transit route served approximately 13,400 passengers in 2014, it was discontinued in August 2015 due to lack of funding.[2]

Huntington installed bi-directional bike lanes in 2012 on 4th Avenue from Hal Greer Boulevard to Eighth Street to provide greater connectivity between downtown and Marshall University.[3]

PASSENGER FACILITIES

The TTA Center is located in downtown Huntington and is the origin for all TTA routes. The TTA Center is an accessible customer service center; along with a passenger waiting area and rest rooms, TTA staff are available to provide customer assistance. Discounted bus passes are also available for purchase at the TTA Center. The TTA Center is open Monday-Friday from 8 a.m. to 5:15 p.m. Several TTA stops in downtown Huntington feature three-sided shelters and benches.

TTA has 34 buses, 6 replica trolleys, and 12 paratransit vans in active operation. Accessible vehicles operate on all TTA routes, and feature wheelchair lifts and wheelchair securement systems. All TTA transit vehicles are equipped with a kneeling feature, which lowers buses to curb level. All buses feature designated priority seating for older adults and people with disabilities. Additionally, large print and braille schedules are available upon request. Implemented in spring 2017, an automatic vehicle announcement (AVA) system will enhance passenger education and information.[4]

DEMAND-RESPONSE SERVICE

TTA operates Dial-A-Ride paratransit service for people with disabilities that prevent them from using fixed-route services. Curb-to-curb service is provided to locations within three-quarters of a mile from fixed-route service operated by TTA. In the greater Huntington area, Dial-A-Ride operates Monday through Saturday, from 5:45 a.m. to 11:30 p.m.

FARES AND MARKETING

TTA's service area in West Virginia is divided into three fare zones. One-way fare within the City of Huntington (Zone 1) is $1.00. An additional $0.25 zone fare is charged for routes traveling to Zone 2 (east of the Kmart Plaza on U.S. 60) or Zone 3 (service between Milton and Culloden). Marshall University students may use TTA services free of charge through an

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[2] "Huntington-Charleston bus line ends Aug. 28": http://www.herald-dispatch.com/news/huntington-charleston-bus-line-ends-aug/article_2f713306-eadb-5cd4-a3ab-b8199a031869.html

[3] "New Bike Lanes Open in Huntington": http://www.wsaz.com/home/headlines/New_Bike_Lanes_in_Huntington_149913105.html

[4] "As The Wheel Turns", Winter 2016: http://www.tta-wv.com/wp-content/uploads/2015/08/wheelwinter2016.pdf

agreement between the university and transit authority. Day passes and monthly passes offering unlimited service are also available; day passes are $4.00, 31-day monthly passes are $35.00. Additionally, TTA customers can pay fares via electronic "Value Cards," which are available for $5.00 and $10.00. Though this policy has changed at various times in TTA's history, transfers between bus routes are currently an additional regular fare when paying cash or with a Value Card. This fare policy has greatly increased the popularity of the daily and monthly passes since rides are unlimited for that day or month.

The base fare for trips made through TTA's Dial-A-Ride is $2.00, with an additional $0.50 zone fare charged for trips that travel to Zone 2 (east of Kmart Plaza on Route 60) and Zone 3 (service between Milton and Culloden). The maximum Dial-A-Ride fare is $3.00.

TTA's recently redesigned website follows the blue and red color scheme from TTA's logo (Figure 4). Information on routes, schedules, fares, and Dial-A-Ride policies are available on the website. System users can view and download individual TTA route maps and schedules, as well. The route maps are simplified versions of the actual route alignment, with many geographic features removed and are generally not to scale or oriented accurately. Some maps also do not show the time points listed on the schedules. Users unfamiliar with the system may find them hard to interpret. TTA does not make a printable system map available.

Figure 4 | TTA Logo

TTA operates multiple customer service, engagement, and marketing initiatives. In-person customer service is available during operating hours at the TTA Center, and the authority operates informational phone hotlines in West Virginia. TTA's Twitter handle (@RideonTTA) communicates service alerts, route alterations, and traffic conditions to over 350 followers on a daily basis. TTA also publishes a quarterly newsletter, "As the Wheel Turns," which is posted on the TTA website (www.tta-wv.com). The newsletter includes a review of the system's revenues and expenses, ridership, service milestones, and messages from TTA's administration. Lastly, the agency proactively engages with local stakeholders and community organizations to increase awareness and maintain support for the system.

TTA features an interactive GPS bus tracker on their website, which provides real-time updates on the location of all TTA buses in service (Figure 5). Passengers with mobile phones can also access the bus tracker on mobile phones by downloading the RouteShout app, which provides real-time arrival information for all routes in the TTA system (Figure 6).

Figure 5 | Real-time Bus Tracker on TTA Website

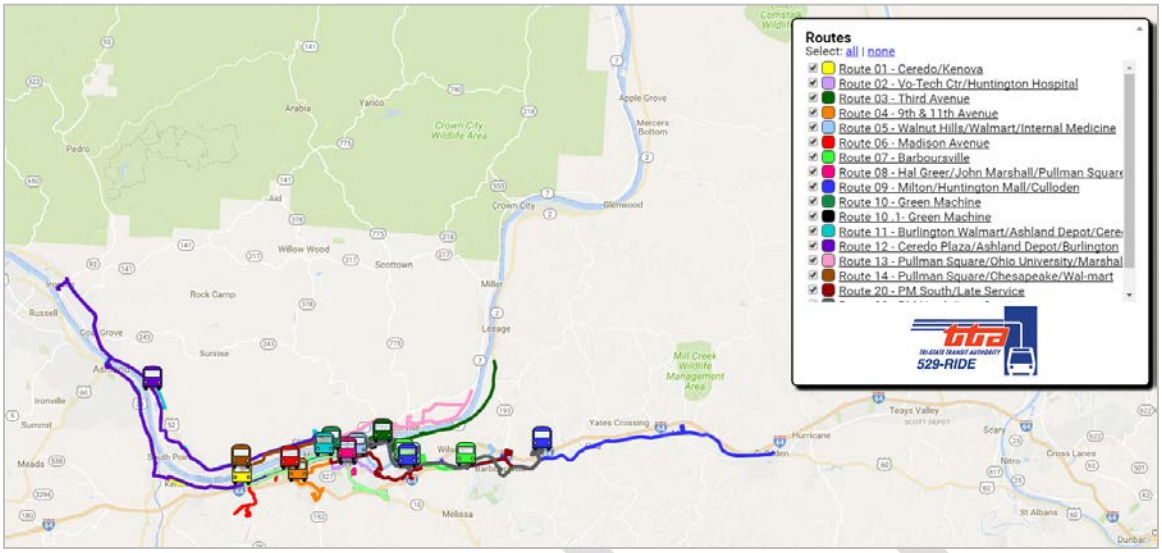
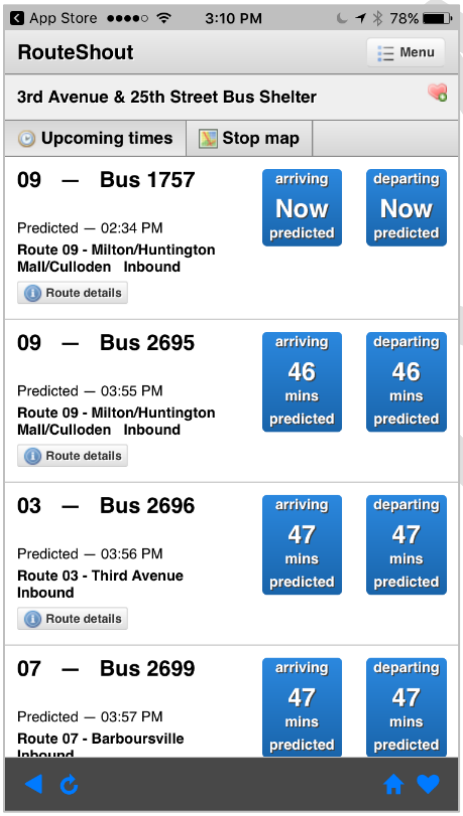


Figure 6 | RouteShout Mobile App

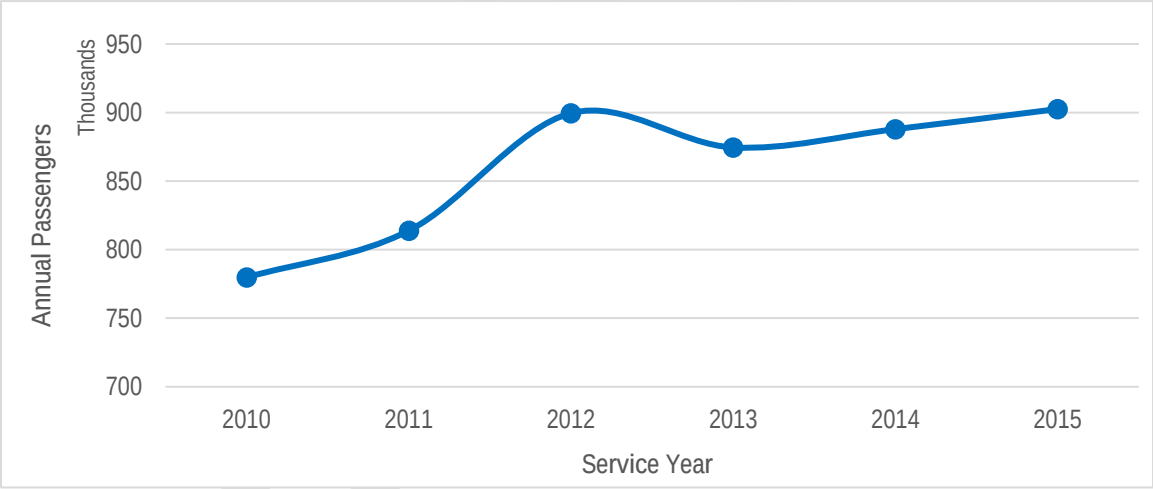


3 SERVICE TRENDS AND SYSTEM PERFORMANCE

RIDERSHIP AND PERFORMANCE SUMMARY

Ridership on TTA-WV's fixed-route system has steadily grown, increasing by 21.4% from 1984 to 2015. Since 2010, the system has experienced strong year-over-year growth: ridership increased by 15.7% in a six-year period, from 779,768 passengers in 2010 to 902,565 in 2015 (Figure 7). In 2015, TTA-WV's demand-response service provided 37,617 passenger trips, a 20% increase in the six-year period from 2010 to 2015. Ridership peaked in 2014, at 40,003 passengers.[5]

Figure 7 | TTA Fixed-Route Ridership: 2010 - 2015



Critically, TTA-WV is accommodating more passengers while limiting costly hikes in operating and maintenance expenses, and improving efficiency and effectiveness measures for fixed-route service. From 2010 to 2015, the authority reduced the number of full-time employees while increasing fixed-route vehicles operated in maximum service by 12.5%. Additionally, TTA-WV's fixed-route operating expense per passenger trip dropped by $0.39, from $6.68 in 2010 to $6.29 in 2015.[6]

Vehicle miles and revenue miles for fixed-route service increased during the same period, by 13% and 9% respectively. However, fixed-route service hours were marginally lower: vehicle hours declined by 1% from 2010 to 2015 and revenue hours decreased by 4%. These figures

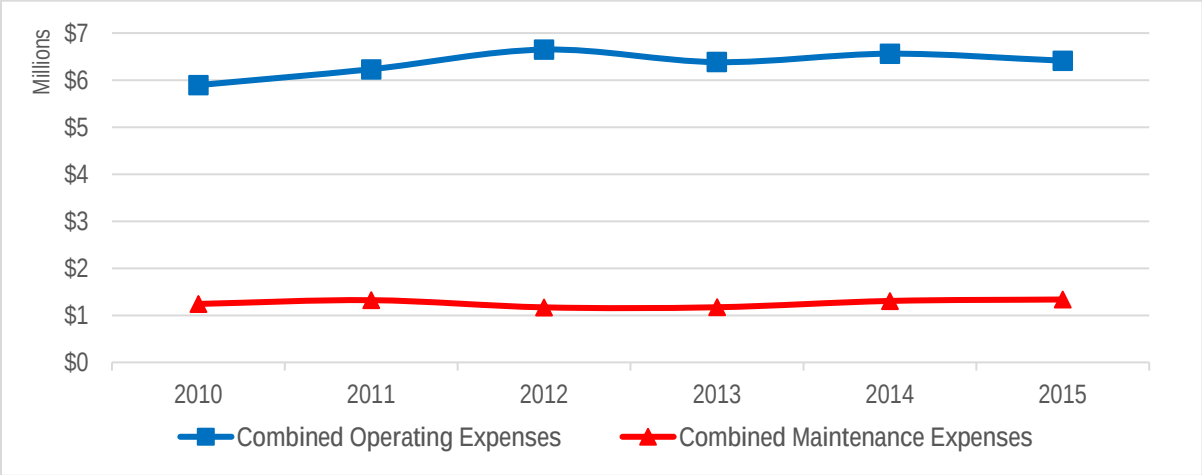
[5] Urban Integrated National Transit Database, 2015

[6] Urban Integrated National Transit Database, 2015

represent an emphasis on increased vehicle frequency, supported by a 16-minute reduction in the average vehicle headway for fixed-route service.[7]

TTA-WV's combined operating expenses for fixed-route and demand-response service totaled $6.4M in 2015, a 9% increase from 2010, but $150,000 lower than 2014's combined operating expenses. Combined maintenance expenses rose by 8% over the same period, from $1.24M in 2010 to $1.33M in 2015 (Figure 8).[8]

Figure 8 | TTA Operating and Maintenance Expenses: 2010 - 2015



FUNDING AND FINANCIAL SUMMARY

TTA-WV is funded by passenger fares, operating grants from the Federal Transit Administration (FTA), a five-year tax levy to Huntington and Cabell County residents, the Surface Transportation Program, and through partnerships with private institutions, such as Marshall University (MU). TTA-WV receives no funding from the State of West Virginia.

FTA operating grants account for nearly one-fifth of TTA-WV's annual expenses. In 2015, the authority received $1.2M from Section 5307, Urbanized Area Formula Grants. Additionally, TTA-WV received $280,000 through the FAST Act, the current federal surface transportation program. TTA-WV's farebox recovery rate increased from 10.8% in 2010 to 13.9% in 2015—a jump of 28.5%. The average fixed-route fare was $0.84 in 2015, a $0.10 increase from 2010.

In May 2016, Huntington and Cabell County voters renewed a five-year excess levy for TTA-WV, with 72% supporting the renewal.[9] The city and county levies provide $8.8 million to TTA-WV from fiscal year 2017 to 2021, and remain active through 2022.[10]

TTA-WV and Marshall University jointly fund the Green Machine Shuttle. The shuttle debuted in August 2016, and operates between downtown Huntington and MU's campus. In March 2016, MU students approved a $16 per-student, per-semester administrative charge

[7] Urban Integrated National Transit Database, 2015

[8] Urban Integrated National Transit Database, 2015

[9] "Cabell County levies renewed": http://www.herald-dispatch.com/elections/cabell-county-levies-renewed/article_b3dfa915-d969-574b-b939-499327bf2525.html

[10] "Huntington City Council read to take up TTA levy": http://www.herald-dispatch.com/news/huntington-city-council-ready-to-take-up-tta-levy/article_3b8cd546-b07a-50ef-bb90-fe22d7480f7e.html

to support the system. The Green Machine Shuttle is free to MU students and provided service to more than 3,000 passengers in the first month of operation.[11]

[11] "Shuttle makes debut during celebration of campus and community partnership": http://www.herald-dispatch.com/news/marshall_university/shuttle-makes-debut-during-celebration-of-campus-and-community-partnership/article_4915c1ad-e987-523e-b0b9-8f9821eab541.html

4 MARKET ANALYSIS

Successful public transit systems typically serve dense population and employment centers, while also providing mobility for individuals that lack other means of transportation and depend on public services. As TTA looks towards the future, the authority must understand where existing and potential customers live and work, and align transit services and programs with those markets. The market analysis helps determine the need and potential for transit service by examining the following characteristics:

- **Population and Employment Density**: The market for transit is strongest in areas with greater numbers of people living and working in close proximity. Population and employment density are thus the strongest indicators of transit demand.
- **Socio-Economic Characteristics:** Factors such as income, auto availability, age, and disability status are often directly related to the likelihood that an individual will use transit.
- **Activity Centers and Major Employers:** Many riders rely on transit to commute to and from work, and large employers oftentimes serve as transit destinations. Major employers may also act as partners for funding existing and additional transit services.

Urban form and topography, land use, the pedestrian environment, and the convenience and price of other alternatives further affect transit ridership. Nearly all transit riders are also pedestrians at some point during their trip. Therefore, ridership is directly affected by how safe and comfortable riders feel when walking between transit services and destinations and while waiting for public transit. The analysis presented in this section broadly identifies neighborhoods, activity centers, and corridors that may support increased transit frequency or expanded transit service. However, the analysis is not intended to provide enough detail or precision to lead to service recommendations on its own. Local knowledge and guidance, along with field work, will provide context and detail that data and maps cannot. All information sources will be considered together, and recommendations and final decisions will reflect a holistic view of the transit landscape throughout the TTA service area, KYOVA boundary, and the City of Huntington.

The population and socio-economic maps included in this section rely on Census and American Community Survey data. To collect and distribute data, the Census breaks up the United States into small geographic areas that have similar populations but can vary widely in area and shape. Though we use the smallest geographic unit available – blocks for population and employment, block groups for all other socio-economic data – people are distributed evenly across the geographic area regardless of where they are actually located. In addition, the employment data from the Census can lack locational accuracy for businesses with multiple locations. Often, employment locations will be reported at the headquarters when the employee actually travels to a satellite location, such as with school teachers and city government employees.

Data sources for this analysis include the 2010 U.S. Census, the 2010-2014 5-year American Community Survey, TTA and KYOVA data, and economic development data provided by the Huntington Area Development Council.

TRANSIT POTENTIAL

The market for transit is strongest in areas with a high concentration of people and businesses. As such, residential and employment density is analyzed to develop a transit potential index. This index illustrates where the conditions are most suitable for transit service based on the number of people and jobs per acre.

Population Density

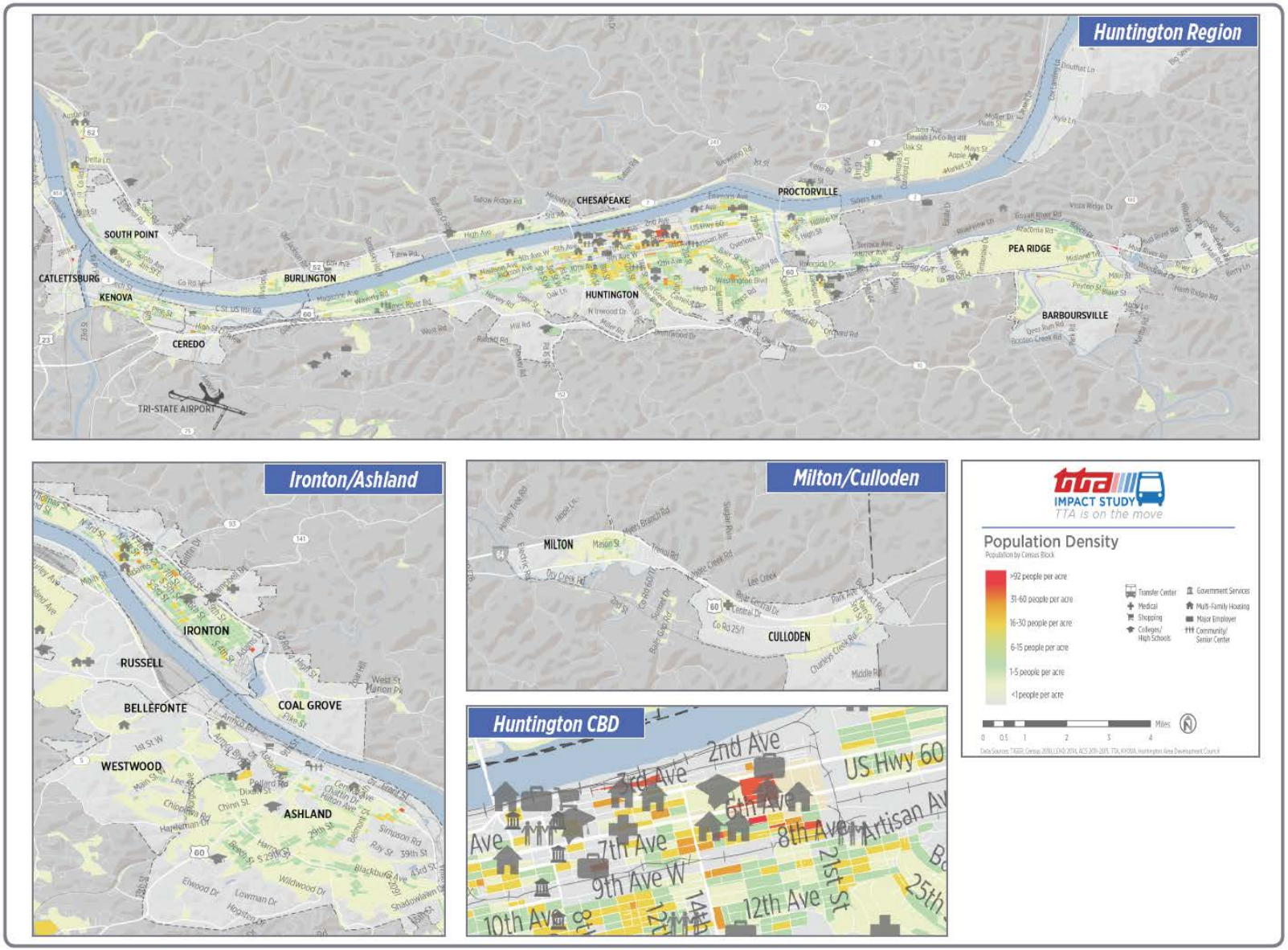
As most riders must walk between their origin/destination and the nearest bus stop, population distribution and density is a key factor influencing transit service viability. Higher density communities have more people within walking distance of bus routes, and are thus strong markets for transit.

Most people are willing to walk up to 10 minutes, or between ¼- and ½-mile, to access a transit service. The size of a transit market is therefore directly related to the population density within ½-mile of a potential transit corridor. The density needed to support hourly fixed-route transit service is generally about 6-15 people per acre. Higher density areas can support higher service frequency, while lower density areas may only be able to support demand response service.

Figure 9 shows population density in the TTA service area. Key findings from the population density analysis include:

- The highest density neighborhoods in TTA's service area are located in the City of Huntington adjacent to Marshall University's campus, along 3rd Avenue, and between 5th Avenue and 7th Avenue. Moderately high population density levels also exists in downtown and Southside Huntington.
- The City of Huntington contains large areas of moderate population density (8-16 people per acre) intermixed with both lower and higher density neighborhoods.
- Clusters of high population density exist in eastern Ashland, downtown Ironton, and downtown Kenova.
- Outlying communities such as Milton, Culloden, Burlington, Chesapeake, and Proctorville generally have lower population densities (fewer than eight residents per acre).

Figure 9 | Population Density Map



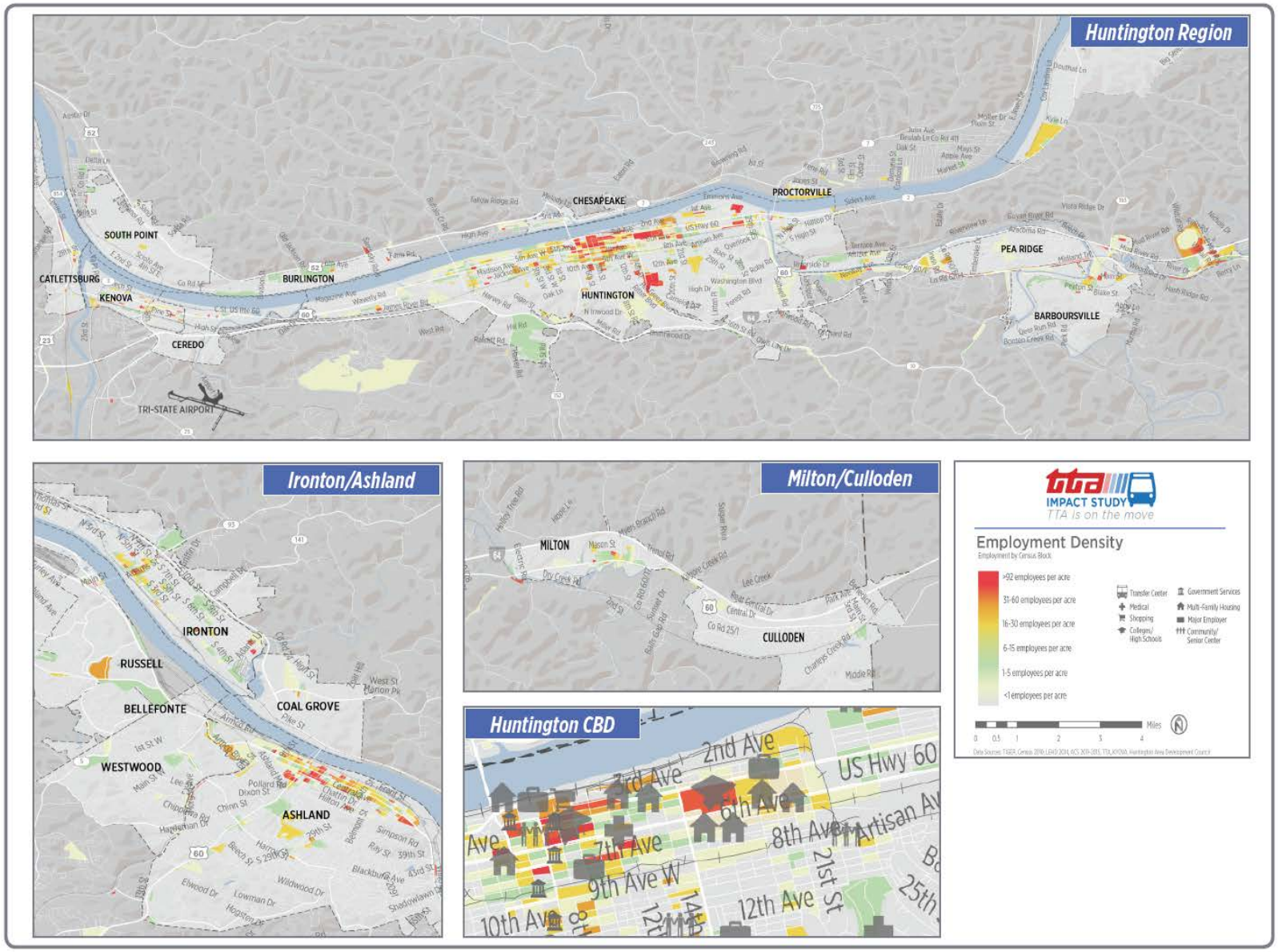
Employment Density

The location and density of jobs is another strong indicator of transit demand. In most markets, traveling to and from work is the single largest segment of transit trips. Commute trips are typically repetitive and predictable, often attracting riders who would otherwise not use transit. As with population density, areas with six or more employment positions per acre can usually support hourly fixed-route transit service. Places with higher employment densities may support greater frequency service.

Figure 10 shows employment densities within the TTA service area. Key findings from the employment density analysis include:

- The highest concentrations of employment in Huntington are located at Marshall University, Cabell Huntington Hospital, and downtown. All of these areas are served by TTA.
- Pockets of high employment density exist in downtown Ashland along Winchester Avenue.
- The Huntington Mall and adjacent commercial developments feature moderate-to-high levels of employee density.
- Downtown Ironton, downtown Kenova, and downtown Milton feature moderate, centralized employment density levels.
- Employment density in Culloden, Burlington, Chesapeake, and Proctorville is decentralized.

Figure 10 | Employee Density Map



MAJOR EMPLOYERS

Healthcare is Huntington's largest employment sector. The region is served by eight hospitals and Marshall University's Joan C. Edwards School of Medicine. Huntington's two largest employers are medical centers—St. Mary's Medical Center and Cabell Huntington Hospital. Combined, the four medical centers included among the 10 largest employers in Huntington represent approximately 6,800 employees (Figure 11).

Huntington was founded as the western terminus of the C&O Railroad and remains a vital freight hub. CSX is the city's fourth largest employer but the consolidation of the Huntington Division administrative office, announced in January 2016, will likely reduce the number of CSX employees based in Huntington.[12] One of seven headquarters of the US Army Corps of Engineers' Great Lakes and Ohio River Division is based in Huntington and employs nearly 800 workers. National retailers and customer service companies form a tertiary employment sector in Huntington: in addition to Walmart, Amazon employs 700 workers, DirecTV has 730 employees, and GC Services employs 650 workers.

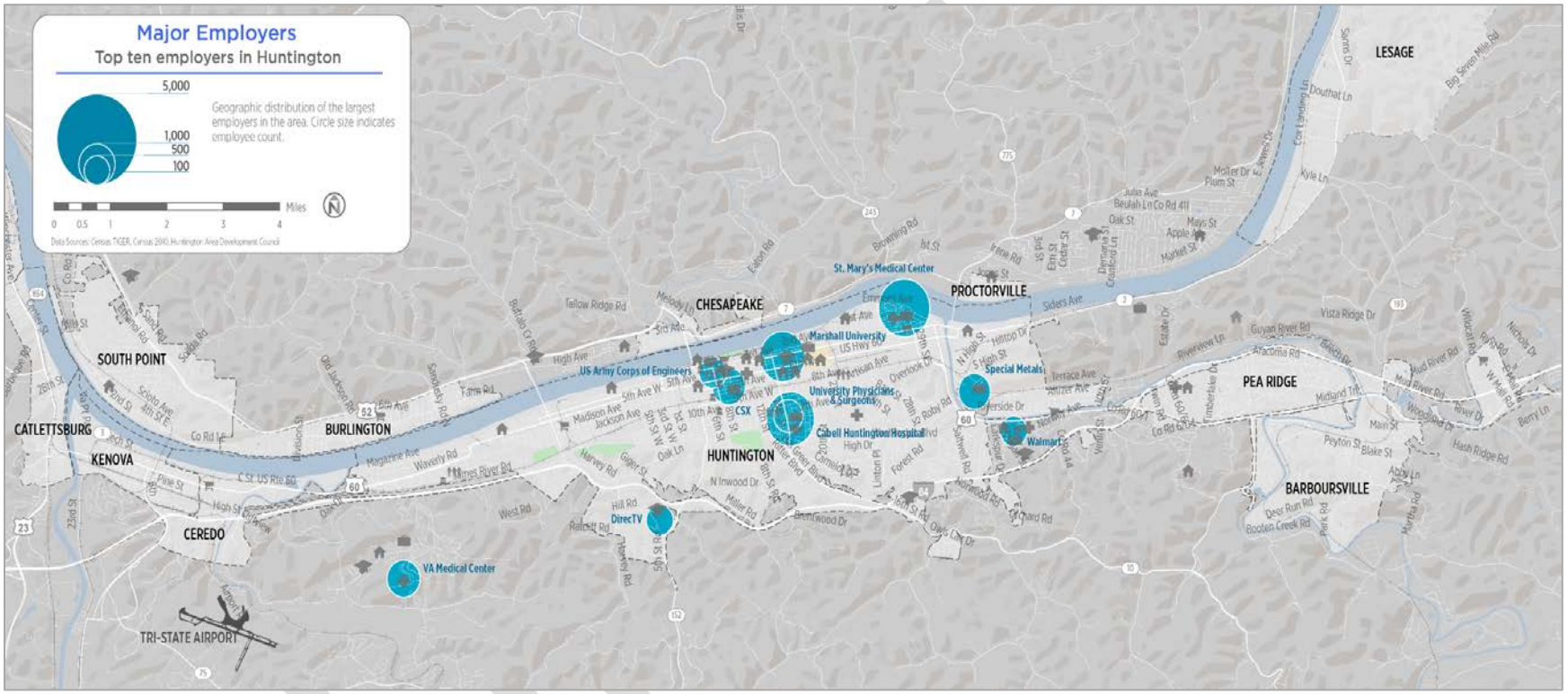
Figure 11 | Largest Employers in Huntington, WV

Employer	Industry Sector	Employees
St. Mary's Medical Center	Healthcare	2,600
Cabell Huntington Hospital	Healthcare	2,300
Marshall University	Education	2,000
CSX, Huntington Division	Transportation and Warehousing	1,100
VA Medical Center	Healthcare	1,078
Special Metals	Industrial and Manufacturing	996
University Physicians & Surgeons	Healthcare	850
Marathon Petroleum Corporation	Utilities	800
US Army Corps of Engineers	Government	775
Walmart	Retail	750

Huntington Area Development Council: http://www.hadco.org/community-profile/business-and-industry/

[12] CSX: https://www.csx.com/index.cfm/about-us/media/press-releases/csx-to-consolidate-operating-divisions/

Figure 12 | Huntington's Major Employers



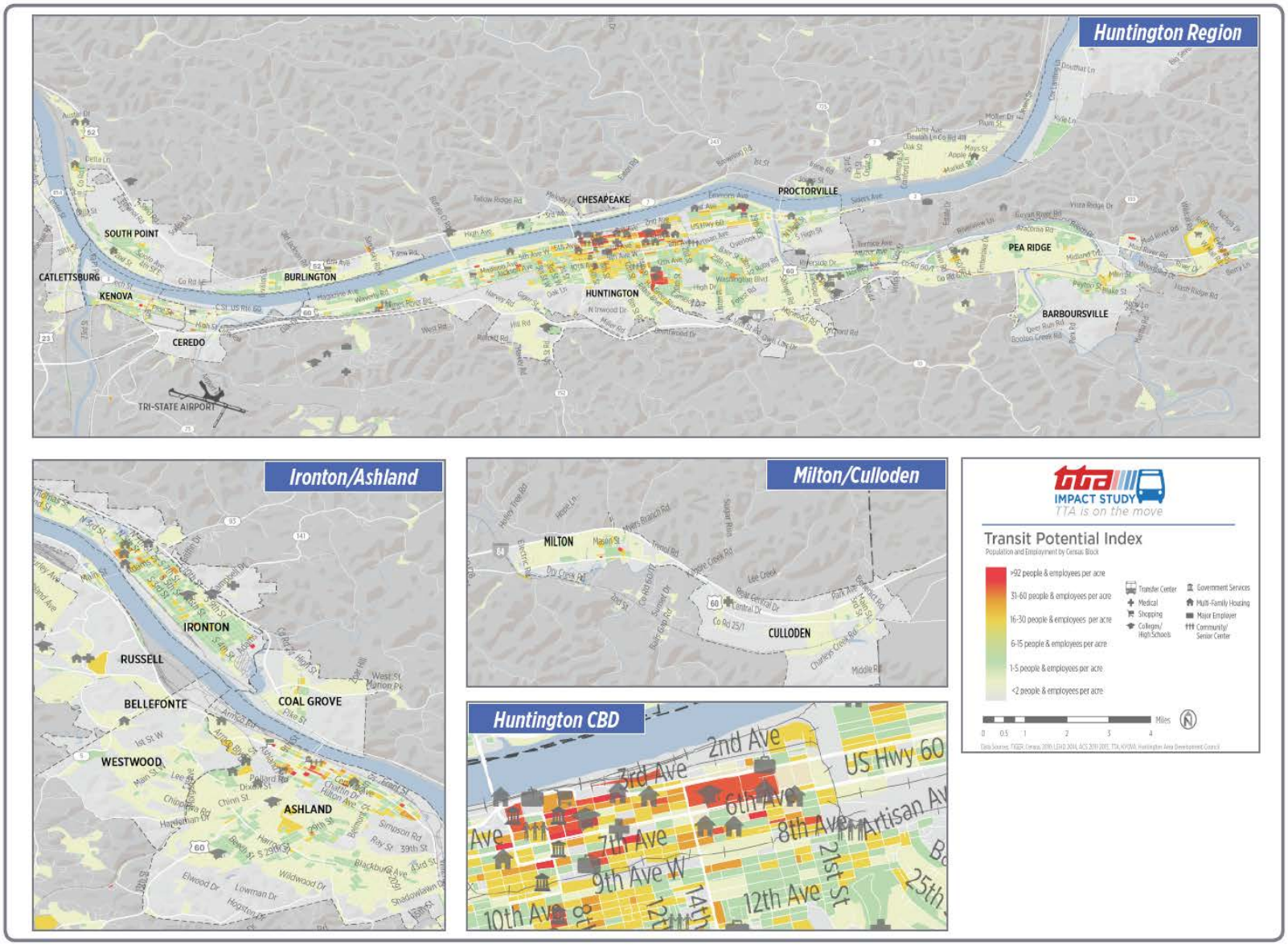
Transit Potential Index

The Transit Potential Index is a composite of population and employment density that helps identify potential transit-supportive neighborhoods and corridors. Areas with higher Transit Potential Index scores are more likely to support fixed-route transit services. To reach their full potential, however, high-scoring areas must also have transit-supportive land uses and infrastructure.

Figure 13 shows the Transit Potential Index scores for neighborhoods in the TTA service area. Key findings from the Transit Potential Index analysis include:

- Transit potential in Huntington is particularly high within downtown, on and near Marshall University's campus, and at Cabell Huntington Hospital.
- Downtown Ashland and downtown Ironton feature moderate-to-high transit potential.
- The majority of the TTA service area features low transit potential.

Figure 13 | Transit Potential Index



TRANSIT NEED AND TRAVEL FLOWS

Above all else, public transportation is a mobility tool. Certain population subgroups are more likely to rely on transit for mobility than the general population. The primary groups include:

- **Older Adults**, who often become less comfortable or less able to operate a vehicle as they age.
- **Individuals in Poverty**, who often rely on transit as a less expensive alternative to owning a car.
- **People with Disabilities**, who may not be able to drive or have difficultly driving.
- **Young Adults**, who in general have a significantly higher interest in using a range of transportation options, including transit, walking, and biking, rather than relying exclusively on driving.
- **Persons Living in Zero-Vehicle Households**, who often regularly or exclusively rely on transit for mobility.

Identifying areas with relatively high concentrations of these groups can help determine which neighborhoods and corridors have the greatest need for transit service. High transit need does not necessarily mean that traditional fixed-route services will work in a given area. Some locations have a high transit need, but low population or employment density. These areas might benefit from demand response or flex route service but cannot support fixed-route options. Ultimately, each community must set their own priorities for balancing service to transit-need and transit-supportive areas.

Overall, densities of transit need groups in the TTA service area are low, between one and five people per acre, or under one person per acre. Key trends and findings from the transit need analysis are listed below:

- Neighborhoods adjacent to Marshall University exhibit higher densities of young adults and people living in zero-vehicle households.
- In Huntington, the neighborhood along Davis Street and Hall Street west of 28th Street exhibits the highest densities (five to 15 people per acre) in the TTA service area of low-income individuals, people with disabilities, and people living in zero-vehicle households.
- Central Ironton has low densities of people with disabilities, low-income individuals, older adults, and people living in zero-vehicle households.
- Midtown Ashland also has low densities of low-income individuals and older adults; smaller pockets of the city contain concentrated densities of people with disabilities and people living in zero-vehicle households.
- Kenova has concentrated areas of low densities of young adults, older adults, low-income individuals, people with disabilities, and people living in zero-vehicle households.
- The riverfront neighborhoods in Burlington, Chesapeake, and Proctorville have low densities of low-income people, people with disabilities, and people living in zero-vehicle households.

Older Adults

Older adults (65 and older) are more likely to use transit than the general population but also tend to use transit less frequently than a regular transit rider under 65. Many seniors are retirees, and as a result, take fewer daily trips. Some must, or choose to, stop driving due to health issues. Others simply prefer a car-free lifestyle. Transit provides an important means for older adults to remain as active and independent as possible, and to age in place.

No sections of the TTA service area feature densities of older adults greater than five people per acre. However, several neighborhoods in Huntington have low densities of older adults (one to five per acre), including swaths of west Huntington, downtown Huntington, the neighborhoods adjacent to Hal Greer Boulevard, and Anita Heights. Additionally, sections of central Kenova, downtown and eastern Ashland, downtown and south Ironton, Pea Ridge, and Barboursvile, also contain low densities of older adults. No sections of Milton or Culloden have densities greater than one older adult per acre.

Individuals in Poverty

Many individuals living in poverty do not have consistent access to a personal vehicle, often because they lack the financial resources to purchase, fuel, and maintain a car. Individuals with low incomes may also live in households with fewer cars than higher-income households. Public transportation can therefore significantly enhance mobility for people living in poverty, and can be essential for ensuring reliable access to employment opportunities.

Nearly half of Huntington has low densities of low-income people (one to five people per acre). The greatest densities of low income individuals in Huntington, containing between five to 15 people per acre, are located in two neighborhoods: between 7th Avenue and Cabell Huntington Hospital (bounded by Hal Greer to the west and 20th Street to the east), and along Davis Street and Hall Street west of 28th Street. Outside of Huntington the following sections of the TTA service area contain low densities of low-income people: the riverfront neighborhoods of Chesapeake, central Kenova, sections of midtown Ashland and areas west of 13th Street, and multiple areas of Ironton. All neighborhoods in Huntington with greater than one person in poverty per acre are served by TTA.

People with Disabilities

People with disabilities often primarily rely on public transit and other specialized transportation resources for mobility. Most individuals classified as disabled are eligible for TTA service. In recent years, many transit agencies have worked to enhance the accessibility of fixed-route services for the disabled population, reducing reliance on paratransit services. Increased fixed-route accessibility allows disabled riders to travel more spontaneously, but also requires that they are able to navigate to a nearby bus stop and onto a transit vehicle. For transit operators, shifting more trips from paratransit to fixed-route services can reduce costs and increase service productivity. For these benefits to occur however, transit agencies must work to ensure that fixed-route services are both physically and geographically accessible to the disabled population.

The area featuring the highest density of people with disabilities is in Huntington along Davis Street and Hall Street, west of 28th Street (five to 15 people per acre). Large portions of downtown, western, and central Huntington contain low densities of people with disabilities.

The following sections within the TTA service area also contain low density of people with disabilities: the Willowvale neighborhood in Burlington, Proctorville's riverfront neighborhoods, between 29th Street and Belmont Street in Ashland, central Ironton, central Kenova, and sections of Pea Ridge and Barboursville. All neighborhoods in Huntington with a notable disabled population are currently served by TTA.

Young Adults

Many young adults (15 to 21 years old) lack access to private vehicles and are therefore more likely to rely on public transportation. Some young adults are not legally able or choose not to acquire a driver's license. Young adults are also increasingly seeking alternative transportation options, such as walking, biking, and transit. A recent survey by Transportation for America and the Rockefeller Foundation (April 2014) reported that more than half of Millennials prefer to live in a place where they are not required to rely on cars to get around. Two-thirds of those polled said access to high quality transportation options will be one of their top three criteria when deciding where to live.

The highest density of young adults (five to 15 people per acre) is concentrated on Marshall University's campus, as well as in residential neighborhoods directly surrounding campus. Low density pockets of young adults (one to five people per acre) exist along Davis Street and Hall Street west of 28th Street, Southside, east of MU's campus, in Barboursville along Merritt Street and Lee Street, and in central Kenova. All neighborhoods with a notable young adult population are served by TTA.

Persons Living in Zero-Vehicle Households

Individuals living in a household that does not own a private vehicle have a high propensity to use transit services. While many of these individuals rely on borrowing a private vehicle or carpooling as their primary means of transportation, they also typically use transit for a significant proportion of trips. For individuals without consistent private vehicle access, nearby public transit services are frequently the only mobility option.

The majority of downtown and central Huntington contain low densities of people living in zero-vehicle households (one to five people per acre), including the neighborhoods west and south of Marshall University. The highest density of people living in zero-vehicle households in the TTA service area is along Davis Street and Hall Street west of 28th Street, containing densities of five to 15 people per acre. Additional areas with low densities of people living in zero-vehicle households include: the riverfront neighborhoods in Burlington, Chesapeake, and Proctorville, central Kenova, downtown Ashland along 29th Street and between 13th Street and Westwood, and a large section of central Ironton. All neighborhoods in Huntington with greater than one person living in a zero-vehicle household per acre are served by TTA.

Travel Flows

Travel in the Huntington region occurs primarily within each individual city or town rather than between municipalities. Within Huntington, a significant number of trips can be attributed to Cabell Huntington Hospital and Marshall University. Outside of internal Huntington or Ashland trips, most daily trips occur between Huntington and an external

zone to the east of the KYOVA planning region, likely Charleston, WV. The average daily flow to or from Huntington headed east is approximately 8,200 in 2015 and 11,150 in 2040. Travel patterns remain very similar between 2015 and 2040, as shown in Figure 14 and Figure 15.

Figure 14 | 2015 Travel Flows in the KYOVA Planning Region

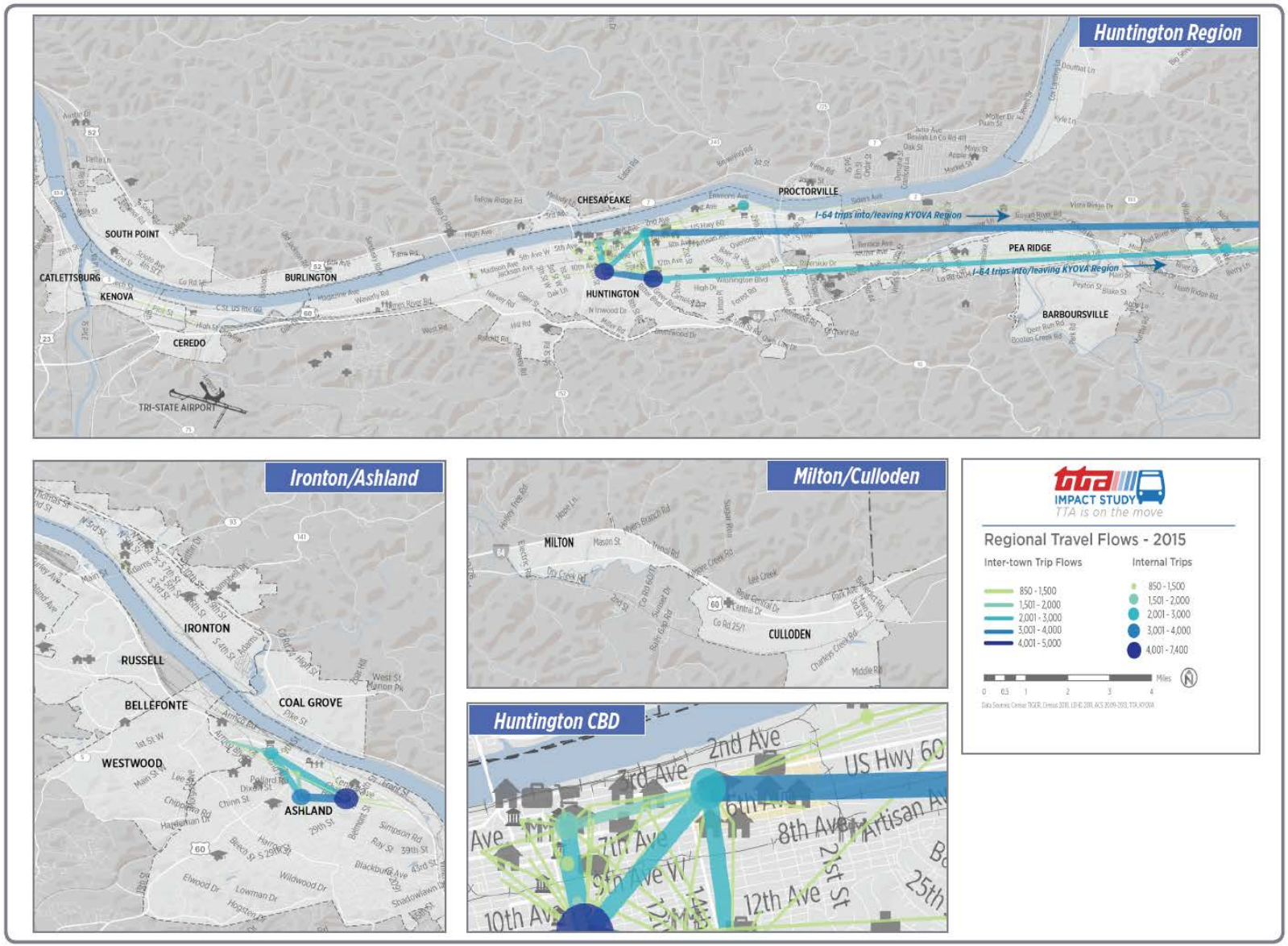
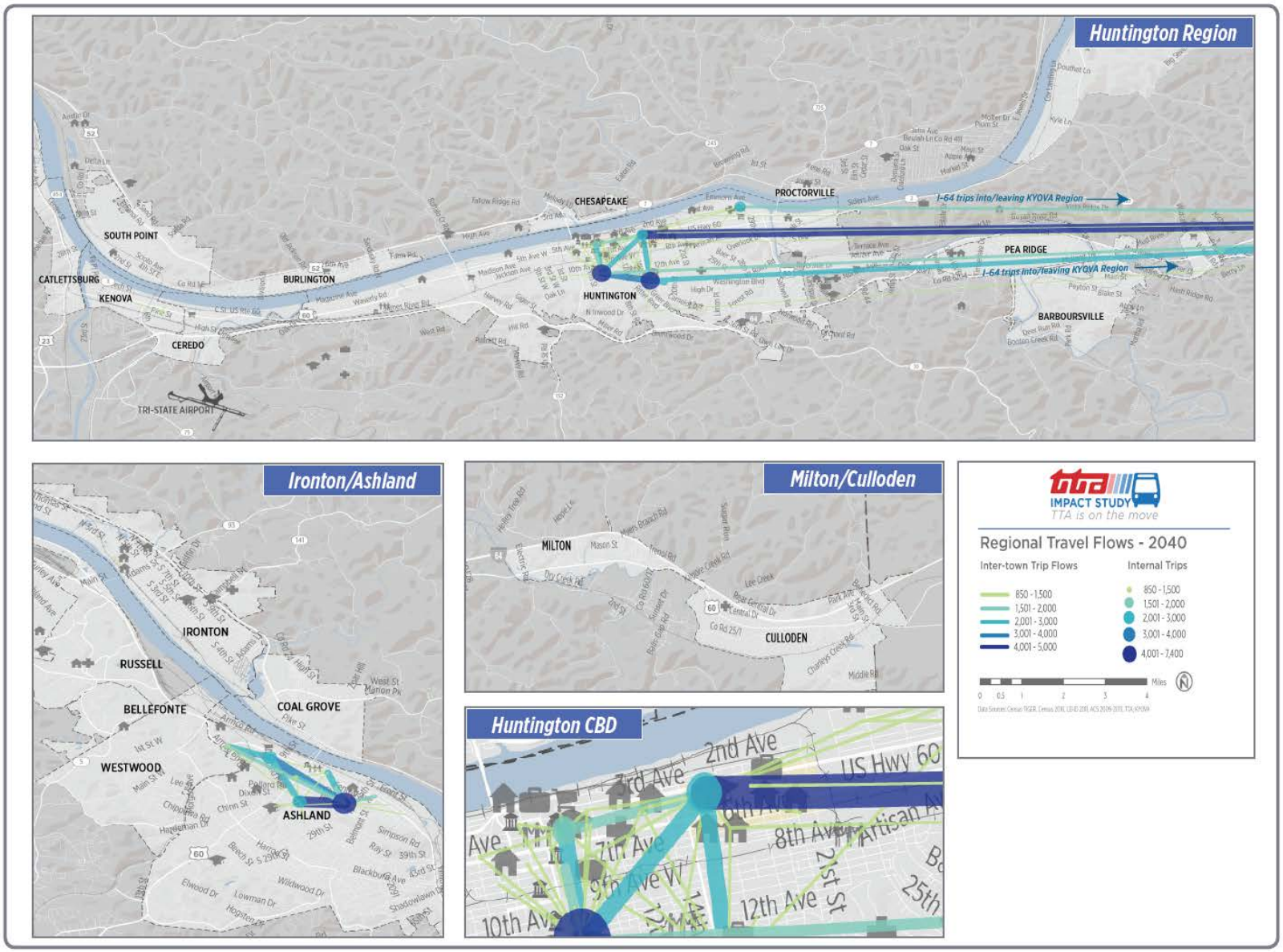


Figure 15 | 2040 Travel Flows in the KYOVA Planning Region



5 DEVELOPMENT OF SERVICE RECOMMENDATIONS

Huntington's existing transit network has seen ridership growth since 2010 and community support has been strong when local funding for the system must be renewed every five years. With no funding from the state, TTA has adeptly served the community given its resources and navigated the continuous challenges associated with sprawl that cities nationwide face. Transit in Huntington is also very constrained by natural and man-made physical obstacles, including the Appalachian Mountains to the south, Ohio River to the north, tributaries, railroad lines and yards that break the street network, major one-way arterials, low bridges/viaducts, brick streets that cannot handle heavy transit vehicles, and low-density suburban-type development along major corridors. Like any transit system, TTA service still has some room for improvement. For example, while significant changes to route alignments may not be feasible, previous study work has shown demand for more service on certain corridors and other small improvements to make a route more productive.

The aim of this study was to point out the strengths and weaknesses of the existing system in terms of ridership and productivity, and to make recommendations to sustain the strongest areas while improving the weakest. TTA generally operates under the directive to provide a "coverage" service, meaning that service should have a broad geographic coverage to ensure that it is available to most residents should they choose to use it. However, by committing resources to serve areas of the city with low transit potential, TTA's ability to provide more robust service in areas that have the strongest potential to support it is limited. Still, the study team's goal was not to move away from the coverage model necessarily – indeed, the footprint of the existing system is very nearly the smallest footprint the city should maintain – but to understand what, if any, balance between a coverage and productivity focus could co-exist to improve service for most riders and potentially attract new riders. Ultimately, the decision to change or eliminate some fixed-route service coverage will require consensus among TTA, KYOVA, and possibly City leadership to allow TTA to consider productivity as well as coverage in their service design decisions.

GUIDING PRINCIPLES

Transit services are most successful when they are simple, easy to use, and intuitive to understand. While each operating environment is unique, adherence to the general guiding principles described below has proven to improve the quality of transit services and reduce the barriers to access for prospective riders.

Service Should Operate at Regular Intervals

In general, people can easily remember repeating patterns but have difficulty remembering irregular sequences. Transit riders may find transit routes that operate at different times each hour cumbersome to use. Irregular schedules increase the likelihood a rider will miss a trip or a transfer, thus decreasing the utility of the service. In many cases, operating a service at regular intervals provides a better transit experience for riders, even if doing so results in slightly decreased service frequency.

Ideally, transit routes that operate less frequently than every 15-minutes should utilize clockface scheduling. With a clockface schedule, each bus arrives at the same time or times each hour. For example, a bus route with 20-minute frequency might arrive at :00, :20, and :40 each hour throughout a service period.

Clockface scheduling is especially important in systems with less frequent service. Passengers can easily remember when their bus will come without having to rely on a paper or online schedule. Regular clockface schedules can also help simplify transfers between routes. Even if two routes do not arrive at a stop at the same time, clockface frequencies will ensure that wait-times between buses are consistent and predictable.

Routes Should Operate Along a Direct Path

The fewer directional changes a route makes, the easier it is to understand. Routes should also give riders the sense of continuous forward progress most of the time. Circuitous alignments are disorienting and difficult to remember. Some deviations from the most direct path of travel are necessary and justifiable given that major destinations are sometimes located off of major roadways. However, frequent deviations from the most direct path of travel will increase travel times for the majority of passengers and should be avoided unless there is a strong justification.

Routes Should be Symmetrical

Routes should operate along the same alignment in both directions to make it easy for riders to know how to get back to where they came from. Providing service on different streets depending on direction can make it difficult for passengers to find the bus stop or route for their return trip. Splitting service between two streets is sometimes unavoidable due to one-way traffic patterns, but to the extent possible, bus stops for service in opposite directions should be across from one another on opposite sides of the same street.

Large one-way loops can also frustrate riders by forcing out-of-direction travel on either the outbound or return trip. In most circumstances, transit riders prefer bi-directional services that they have to walk somewhat further to access over a close but one-way route.

Routes Should Serve Well Defined Markets

As a network, transit should provide riders with access to a wide range of destinations throughout the city. However, a transit network is strongest when each individual route includes strong anchors and serves a mix of origins and destinations (other than transfer hubs). This gives riders the opportunity to reach a variety of destinations without making a transfer and minimizes unproductive segments of a route.

Service Should be Well Coordinated

At major transfer locations, schedules should be coordinated to the greatest extent possible to minimize connection times between services. In general, there are two approaches to coordinating transit service:

- The first approach is to establish clockface service frequencies on all routes. This ensures a certain predictability for transfers as passengers know when to expect each route regardless of the hour of the day. Clockface schedules can also facilitate pulsing, which is when several routes are designed to arrive at a particular transfer location at the same time. Pulsing is usually used when a transit network has a single primary hub.
- The second approach to coordinating transit service is simply to maximize service frequencies on all routes. High frequencies reduce the need to pulse services at a particular location because passengers who miss a connection anywhere in the system can catch the next bus in a relatively short time. If service frequencies cannot be increased at all times due to budget constraints, it is best to increase frequencies during peak-periods when the majority of transfers between services occur.

TTA primarily uses the first approach, with most buses pulsing every 60-minutes at the downtown TTA Center.

PUBLIC FEEDBACK

Public outreach for the TTA Impact Study was conducted in April and November of 2017. In April, consultants held a public meeting at the TTA Center, met with TTA bus drivers, and conducted an in-person survey with TTA users and Marshall University students. In November, consultants interacted with TTA users at the TTA Center and discussed proposed recommendations. Findings from the survey efforts and public outreach are summarized below.

TTA Impact Study Survey

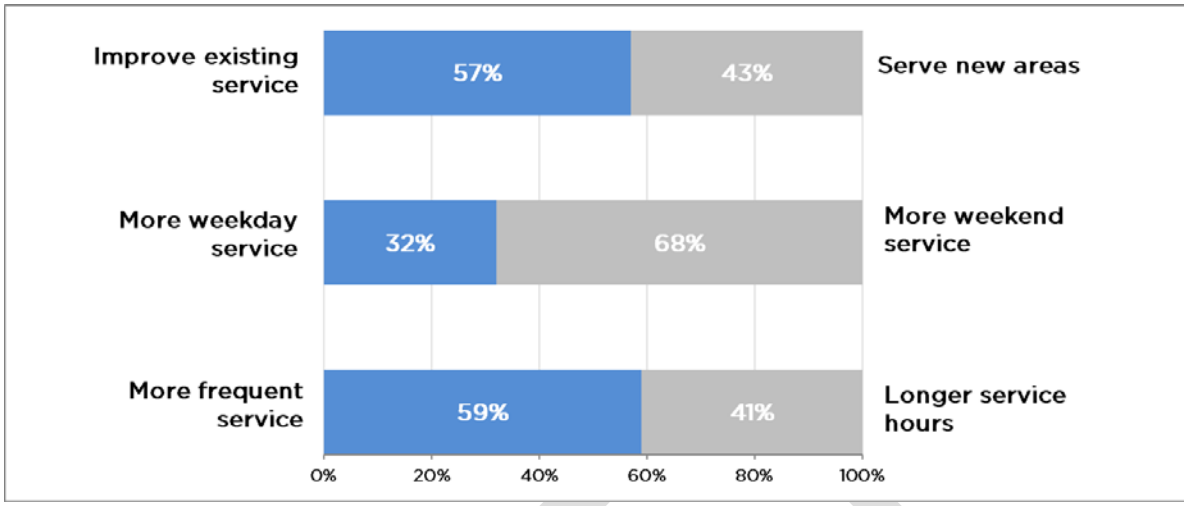
The study team conducted an in-person survey of active TTA users and Marshall University students to gain a better understanding of trip characteristics and priorities of current riders, and to provide an opportunity to speak directly with riders and non-riders and learn why they do or do not ride TTA. The survey was administered in-person in April 2017 at the TTA Center, on-board select TTA routes, and at Marshall University. The survey effort focused on information gathering rather than an unbiased, representative sample. The single-day outreach at the TTA Center and MU Student Center engaged nearly 300 residents and students, significantly greater participation than typical public meetings or input sessions.

The survey solicited opinions of riders about service improvements and new service opportunities, and asked riders and students to identify their transit priorities. The survey also include questions on trip purpose, transit use, final destination, and employment status. Survey results were analyzed by respondents that actively ride TTA, MU student status, and combined. The survey was completed by 288 respondents: 66% were TTA riders and 34% were Marshall University students.

Survey results helped guide and develop the final recommendations for the TTA Impact Study. The following results are representative of respondents – the sample gathered of TTA riders and Marshall students – not necessarily the entire rider and student population. Key takeaways from the survey include the following:

- **Frequency:** Over 60% of TTA riders use the service almost daily and 79% use the service at least once a week; 10% of Marshall University students ride TTA at least several times per week.
- **Purpose:** TTA supports a wide range of non-discretionary and discretionary trips. TTA riders predominately use the service for store/shopping (63%) and work trips (52%). Nearly half of Marshall University respondents that ride TTA use the service to reach campus.
- **Means of Transportation:** TTA is the primary means of transportation for 83% of TTA riders and 26% of Marshall University students. Among survey respondents that ***do not rely solely on TTA's services***, driving is the most popular mode of transportation—selected by 73% of Marshall University respondents.
- **Travel Patterns:** Trips within Huntington are the most common among both TTA riders (50%) and Marshall University respondents (54%). Trips between Huntington and towns east (Milton and Culloden) is the second most common trip pattern.
- **Employment Status:** Nearly 50% of TTA riders are employed either full- or part-time, while 16% are unemployed. In addition to being students, over one-third of MU respondents are also employed part-time.
- **Service Preferences:**
    - Combined, respondents express a strong preference for more frequent bus service (59%), instead of longer service hours (41%). TTA riders are evenly split between preferring more frequent service (52%) and longer service hours (48%). MU respondents prefer more frequent service (73%) at a much higher rate than TTA riders (Figure 16).
    - Combined, respondents are in favor of TTA improving existing services (57%), as opposed to serving new areas (43%). TTA riders expressed more preference for improving existing service (60%); MU students are closely split between improving service (51%) and expanding TTA to new service areas (49%).
    - Combined, respondents prefer more weekend service over more weekday service by a margin of two-to-one (68%). Both TTA riders and MU respondents agree that TTA should prioritize additional weekend service.

Figure 16 | Service Preferences (All Respondents)



November Outreach

During the November outreach period consultants shared proposed recommendations with TTA users at the TTA Center and Marshal University students at the Memorial Student Union. The majority of the feedback was positive and is summarized below.

TTA Center Engagement Notes: November 8, 2017

- Service Changes
  - Overwhelming support exists for expanding service to Huntington Mall on Route 5 and increasing morning and evening service on Route 6
  - Buses are more crowded at the beginning/end of the month
- Route 4 – Harveytown
  - Earlier service in the morning to/from Harveytown
  - Student traveling from TTA Center to Mountwest CC is happy with service (takes it for evening classes)
- Route 5 – Walnut Hills
  - Many riders would appreciate extended service to Huntington Mall
  - Serve West Pea Ridge with Route 5, if Route 7 is being replaced
  - Service is needed to Forrest Bluff Apartments somehow
- Route 6 – Madison Avenue
  - Many riders support more service during the morning and evening hours
  - Designated stops would help the bus run on-time
  - More service around Spring Valley
- Route 7 – Barboursville

- Ridership in Barboursville/demand for TT seems limited

- **Route 8 – Hal Greer**
  - Service is frequently late in the evening at Amazon Customer Service
  - Need more service on Hal Greer in the evening
- **Route 9 – Milton**
  - Passenger that uses Route 9 daily expressed satisfaction with the current alignment and service
  - Outbound trips to Milton are sometimes crowded
- **Nighttime Routes**
  - Route 40 is too long
    - Serve Huntington High School as demand response
  - Route 20 PM South buses get crowded – buses are too small
- **General**
  - Real-time capability on RouteShout doesn't accurately display bus arrivals
  - Bus drivers sometimes pass passengers because they aren't visible
  - Add police call boxes to stops in unsafe neighborhoods
    - Example: Adams Avenue and 9th Street
  - Add service to the WIC office
  - Removing service to Lesage makes sense
  - For locations that are demand-response, need some sort of button or way to easily request a bus without calling each time
  - Certain stops need better amenities
  - Service is needed to Ceredo and Kenova in the evenings
  - Many riders requested the bus to Charleston return
  - Need Sunday service

Marshall University Engagement Notes: November 9, 2017

- **TTA Service**
  - Perception is that very few students take TTA or Green Machine
  - Route 6 is crowded in the morning, often standing room only
  - Most students unaware that the Green Machine is free to MU students
- **Green Machine**
  - Little awareness of the Green Machine among students
  - Some students use the Green Machine to travel between MU and Pullman Square

- Students request more frequent service late at night and to The Village at Sixth Avenue
    - Safety concerns traveling between 4th Avenue and student housing
- Would like to travel between MU and the Downtown Huntington Library
- Create "campaign style" posters to advertise the Green Machine on campus
- Green Machine often runs late, and RouteShout is not working to see when the next one will arrive
- Green Machine not frequent enough

- **Other**
    - A large percentage of MU students commute from outside of Huntington. These students often drive alone, park at MU, and rarely travel elsewhere in Huntington.
    - Areas that students would like to reach:
        - Ritter Park
        - Medical Center
        - Huntington Mall area (many cited for jobs at Target, Walmart, Texas Roadhouse, Olive Garden, etc.)

SERVICE IMPROVEMENT OPPORTUNITIES

Based on feedback from TTA and KYOVA staff and leadership, public input, analysis completed for this study, and an evaluation of existing service against the guiding principles of transit, the key service improvement opportunities are more heavily focused on operational characteristics rather than major alignment changes. TTA routes operate at regular intervals, are symmetrical where possible outside of the downtown core, mostly serve well-defined markets, and are well-coordinated. Where the routes fall short most are in operating along a direct path, but circuitous and deviating routes are often unavoidable given Huntington's land use development patterns and natural barriers. Key area for improvement include:

- **Reliability of Certain Routes:** Reliability, generally defined as how consistently riders are able to board their bus and reach their destination when scheduled, may appear simple in concept. However, people perceive reliability in different ways. For example, some riders may still consider a bus that is predictably behind schedule as reliable. Others put greater weight on factors such as the availability of seats and minimal route deviations when evaluating reliability. For TTA, we heard from many people that buses are often late and crowded on certain routes, especially at the beginning or end of the month when people receive their paychecks, Social Security benefits, and other regular income. We most often heard this feedback in regards to Route 6, but Route 5, 8, and 9 were also cited as having reliability and/or crowding issues.

  Many factors affect reliability, and the issue is not always an easy one to solve. Some factors are predictable and controllable, such as ensuring the bus has adequate

layover time and departs its origin on time, others are unpredictable and/or uncontrollable, such as road conditions and traffic congestion. Still others fall somewhere in-between; passenger loads and dwell times due to on-board fare payment, for example, can fluctuate and affect reliability.

- **Frequency of Service:** In general, routes that operate less than twice per hour are not perceived as being convenient. Those who ride still find the service useful and rely on the service as their primary transportation mode, and some riders who have other mobility options open to them may simply prefer transit, but evidence overwhelmingly suggests that people must find transit convenient for them to use it regularly. Frequency is one of the primary variables in convenience and is a major factor in job access. Accurate real-time information can in some cases make up for a lack of frequency since people know they can check their phone or computer to see when the bus will actually arrive at their stop rather than simply wait.

  With the exception of the Green Machine, TTA operates every route once per hour, so it is likely that most people in Huntington do not find transit convenient. This may also be one reason why TTA routes are more frequently used for shopping and non-work trips than for work trips. In most cities, work trips make up the largest percentage of trips taken on transit.

- **Span of Service and Days Operated:** How many hours transit operates during the day is another important variable in convenience. Generally, local transit needs to operate at least 13 or 14 hours per day for it to work with a wide-variety of schedules. With an overall economic and policy shift towards part-time jobs with atypical hours, "gigs", and other work that does not adhere to standard working hours, a long span of service is becoming more and more vital to a useful transit service. The same holds true for the days of the week operated. It is still very common nationwide for transit to not operate on Sundays, and somewhat less so to not operate on Saturdays, but this does not match well with the realities of daily life for many workers.

  TTA currently operates service for about 12-14 hours per day depending on the route, generally starting between 5:45 and 6:45 a.m. and running until between 7:00 and 8:15 p.m. The agency also offers three night routes that run between 7:15 and 11:15 p.m. Saturday service mirrors weekday service for the most part, and TTA does not operate any service on Sundays. Though the night routes are somewhat limited and some feedback reflected this limitation, TTA riders and Marshall students greatly preferred adding more weekend service over adding weekday service.

- **Simplify Downtown Circulation:** As with most transit agencies, how a TTA route operates today is in part due to how it was historically operated. This can be seen clearly in how the routes operate in downtown. Prior to 1994, when TTA bought and renovated the Greyhound Bus Depot, now known as the TTA Center, TTA's hub was further west on 4th Avenue near Pullman Square. With the revitalization of Pullman Square, and the fact that 3rd and 5th Avenues are mostly one-way, many routes do one of two different loops in downtown to serve both Pullman Square and the TTA Center. Pullman Square is an important origin and destination, but simplifying downtown circulation will help straighten and shorten routes that may prove easier to use for riders.

PROPOSED FIXED-ROUTE SERVICE PLAN

Proposed modifications to TTA's existing fixed-route services are outlined in Figure 17, Figure 18, and Figure 19, and were based on previous work, public input, project team feedback, and local context. Overall, nearly every route still serves its existing markets and areas. Recommendations fall into three different categories:

- Improve directness of service to address on-time performance (most routes)
- Reduce uncoordinated duplication of service on US-60 (Routes 5, 7, and 9)
- Improve frequency to every 30 minutes (Routes 6 and 7)

The most significant proposed changes are to Route 3, Route 5, Route 7, and Route 9. Route 5 is shortened to reduce duplication of service on US-60 with Routes 7 and 9. It would serve the Altizer area to help streamline Route 7 service. Route 7 service is upgraded to every 30-minutes with two different variations. The objective of creating two variations for Route 7 is to streamline service along the US-60 corridor, and provide direct service to major commercial destinations. Route 9 is truncated at the Huntington Mall and would only operate during peak times. Coordinating service on US-60 between Routes 5, 7, and 9 will allow TTA to reallocate resources to improve Route 6, and enable 30-minute frequency during the morning and afternoon/evening peak periods.

Given the many barriers to operating transit service in areas with low density, and low existing demand, fixed-route transit is not the best option for providing public transportation to several neighborhoods and destinations. Removing fixed-route service and substituting demand-response service is proposed for multiple destinations, including to Cabell County Career Technology Center (Route 2), GC Services (Route 5), Spring Valley High School and the Cabell County Human Services Department (Route 6), Huntington High School (Route 8).

To consolidate passengers at higher ridership stops, and create more consistent run times, fixed stops are recommended on Route 6, and potentially the US-60 corridor (Route 7B and 7T). Fixed stops should feature a bench, overhead shelter, trash receptacle, and safe pedestrian access. Higher ridership stops should include lighting and on-time arrival passenger information displays when possible. The next section discusses a pilot for establishing fixed stops on these routes.

Figure 17 | Proposed Fixed-Route Service Modifications

Route	Proposed Modifications
Route 1	• Slight modification to terminating loop in Kenova to serve highest ridership stops in both directions.
Route 2	• Terminate service at Eastern Heights Shopping Center. Travel into and out of downtown via 20th Street and 6th Avenue instead of Charleston Avenue, 8th Street, and 4th or 6th Avenue. • Demand-response deviation to the Cabell County Career Technology Center.
Route 3	• Service removed to Lesage; terminate buses at Edgemont. • Serve Guyandotte neighborhood in both directions on same alignment.

	• Minor modifications to downtown alignment.
Route 4	• Alignment shifted to 5th Street from 9th Avenue to offer more direct service to Mountwest Community College and DirecTV; fixed-route service removed from Harveytown. • Serve Charleston and 11th Avenues similar to existing Route 2 and travel into and out of downtown via Hal Greer Boulevard and 4th Avenue.
Route 5	• Service modified to operate between the TTA Center, Altizer, and Walmart (US-60). Departing TTA Center outbound, route operates on 4th Avenue, Hal Greer Boulevard, 9th Avenue, 25th Street, Oney Avenue, Marcum Terrace, Olive Street, and Roby Road, to reach US-60. Through Altizer, the route operates on Riverside Drive, Apple Street, Crane Avenue, High Street, Altizer Avenue, and 5th Street, returning to US-60. • Route 5 would not serve Pullman Square. • Consider operating demand-response service to GC Services. • Route alignment enables hourly frequency provided with one vehicle. • Altizer is served in either the outbound or inbound direction (but not both). • Transfers to service US-60 and the Huntington Mall area can be made to Route 7 in downtown and at the Walmart (US-60).
Route 6	• Increase weekday service by six hours to establish 30-minute frequency. Three trips added during the morning peak and three trips during the afternoon/evening peak. New trips will operate off-pulse. Remove extra peak period service on Saturdays. • Improve on-time performance by developing a pilot program for this route to implement stopping only at fixed-stops. Flag stops should be reduced to a minimum. • Consider operating demand-response deviation to Spring Valley High School. • Consider operating demand response service to the DHS on Park Avenue.
Route 7B (Barboursville)	• Route modified to operate from TTA Center to Huntington Mall, via HIMG, Walmart (US-60), Pea Ridge Shopping Center, and Barboursville. • Operates hourly frequency, with two vehicles • Service coordinated with hourly pulse from TTA Center • Four specific routing changes: 1) Route 7 would no longer serve Altizer. A modified Route 5 would cover this area. 2) Service modified to serve West Pea Ridge Road via Irwin Road 3) Consider discontinuing service to Pea Ridge Shopping Center due to K-Mart closing

	4) Inbound service returns to TTA Center on 13th Street, instead of serving Pullman Square
Route 7T (Target)	• Route 7T replaces Route 9 between TTA Center and Huntington Mall. The alignment is identical to Route 7B with one exception. Route 7T serves Target instead of Barboursville. • Operates hourly frequency, with two vehicles. The departure and arrival times at the TTA Center are offset by 30 minutes from Route 7B. This provides 30-minute service between TTA Center and Huntington Mall all day. • A truncated Route 9 would continue to provide peak only service between Huntington Mall, Milton and Culloden.
Route 8	• Serve all stops in both directions except InfoCision (outbound only); further modifications should be tailored to demands of shift workers. • Deviation around Cabell Huntington Hospital discontinued due to low ridership. Travel into and out of downtown via Hal Greer Boulevard and 4th Avenue instead of 8th Avenue, 20th Street, and 3rd or 5th Avenues. • Service coordinated (interlined) with Route 6.
Route 9	• Route 9 is currently not on the TTA Center pulse and ridership between Culloden and Huntington Mall is low. • Route 7T should replace the highest ridership segments of Route 9 with more frequent service that is coordinated with Route 7B. • Route 9 would continue to operate between Huntington Mall, Milton and Culloden, with three round trips during the morning peak and three round trips in the afternoon/evening peak. • Service will feature a timed transfer at Barboursville Walmart and Huntington Mall to Route 7B – which will provide all Route 9 riders with the ability to consistently transfer to other routes at TTA Center with minimal delays.
Route 10	• No changes to daytime service. • Offer one consistent evening and nighttime service to simplify service and enhance service to The Village.
Route 20	• Minor alignment modifications. • Only serve Fairfield East Community Center on the first round-trip of the evening.
Route 30	• Minor alignment modifications. • Service removed from E. Pea Ridge Road.
Route 40	• No modifications.

Sunday Service

This study determined that Sunday service, while desired by many passengers, is not feasible without severe cuts to weekday or Saturday service or a significant increase in funding. System-wide, current weekday service carries approximately 16 passengers per

revenue hour, and this drops to approximately eight passengers per revenue hour on Saturdays. This pattern is very common nationwide, with Saturday productivity at about half that of a weekday, and Sunday productivity at about half that of a Saturday. Thus, Sunday service is projected to serve around four passengers per revenue hour. Without a large increase in service and ridership, operating Sunday fixed-route service does not make sense for TTA at this time. Many modern, efficient demand-response services can handle this number of passengers per hour, discussed more below.

Figure 18 | Proposed Daytime Service

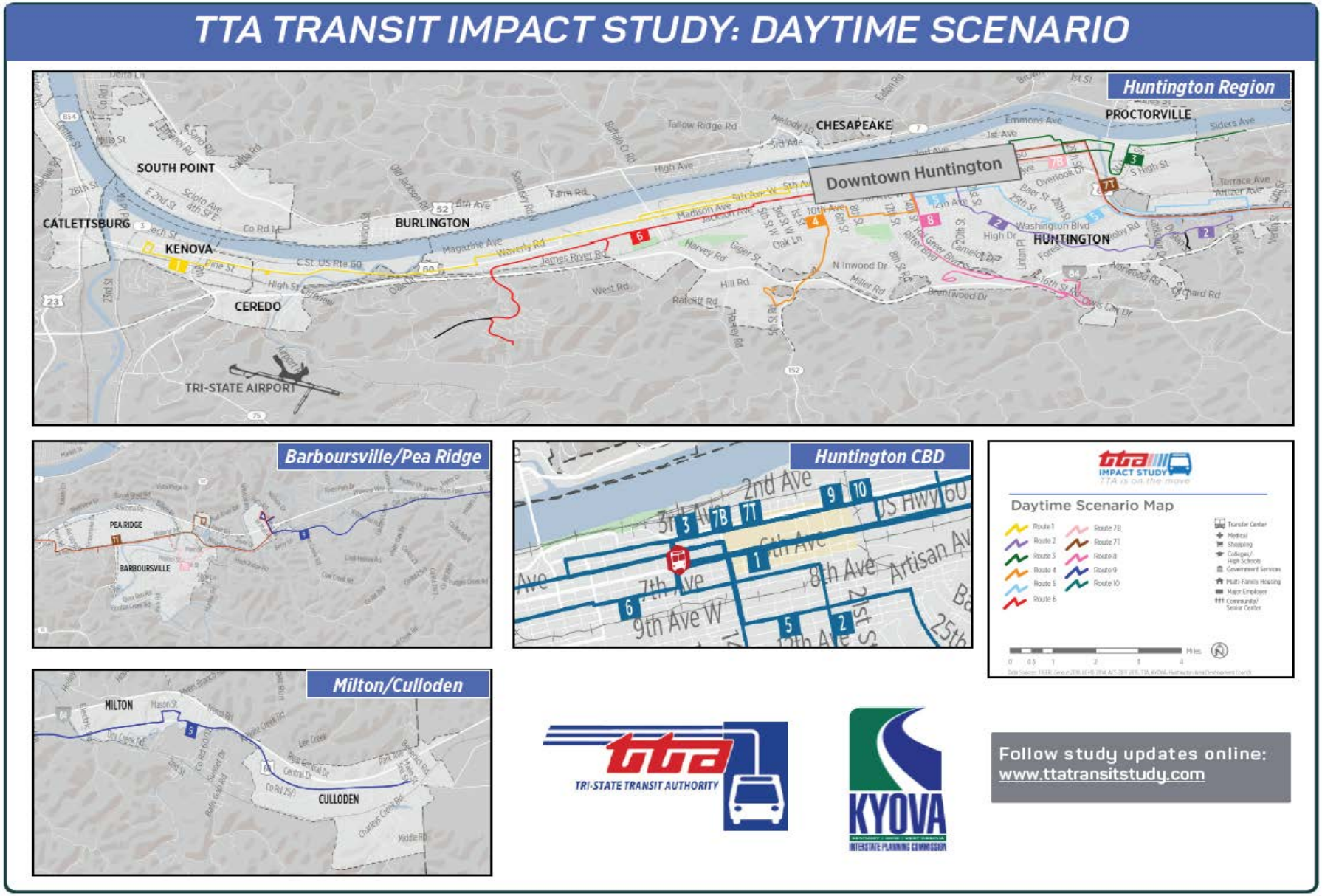
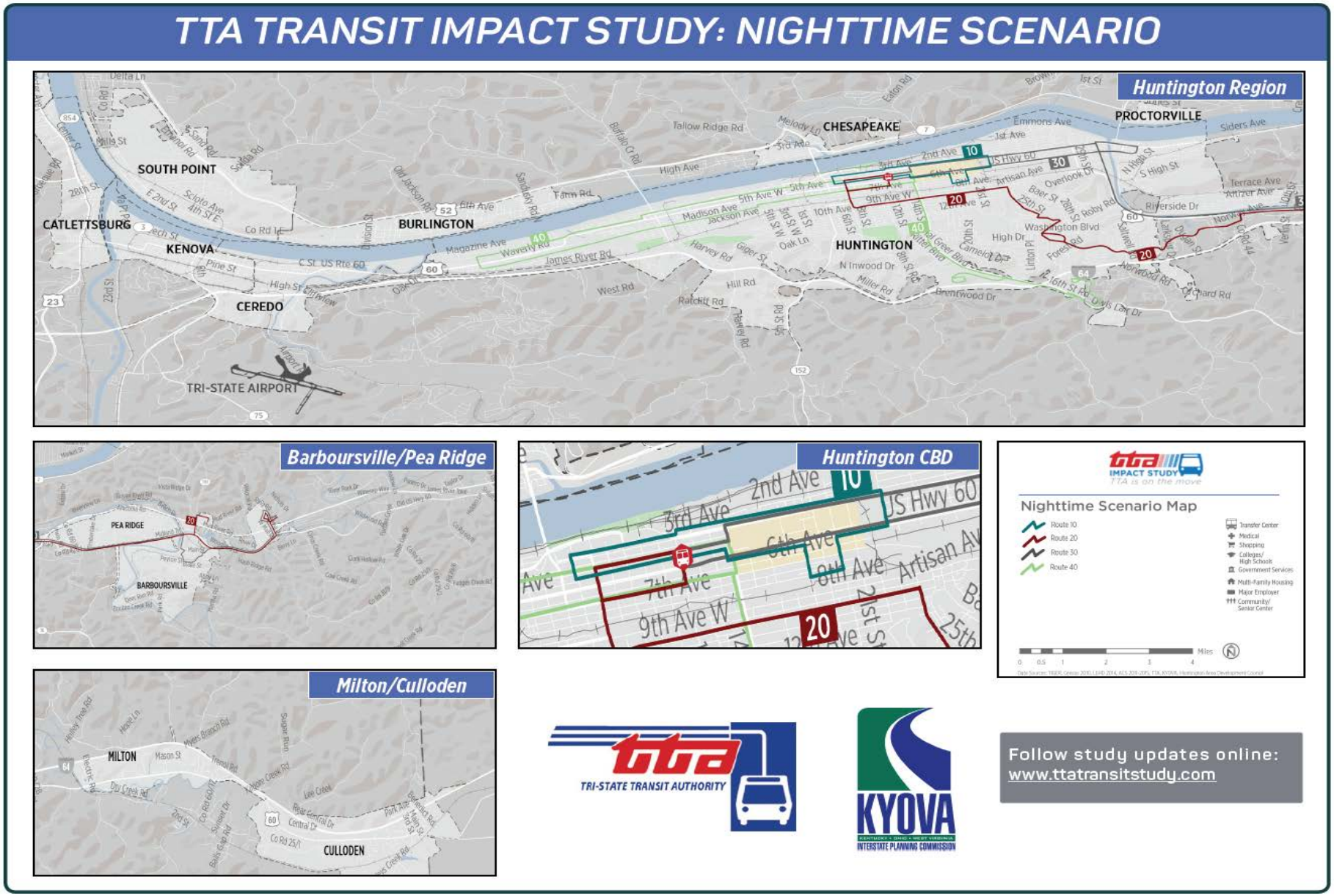


Figure 19 | Proposed Nighttime Service



Revenue Hour and Cost Estimates

Figure 20 and Figure 21 below show the proposed service characteristics of each route, including frequency and daily revenue hours for weekdays and Saturdays. The study team was aiming for a cost-neutral redesign of TTA's transit network. Data from TTA indicated that on typical weekdays, TTA operates about 188 revenue vehicle hours, and 172 revenue hours on Saturdays. The National Transit Database (NTD) reported around 58,930 annual revenue vehicle hours in 2015. The proposed service characteristics below maintain 188 hours of revenue vehicle service on weekdays and 172 hours on Saturdays. However, assuming around 250 weekdays and 52 Saturdays per year, the proposed characteristics total about 55,944 revenue hours per year, representing a 5% reduction in service hours. TTA staff will need to determine if the number of daily revenue service hours is feasible given today's resources, and adjust spans and frequencies accordingly.

Total costs were based on 2015 NTD data that showed a $96.29 operating cost per vehicle revenue hour, and speeds were estimated based on how the service runs today and expert knowledge. Clock-face schedules are proposed for all of the recommended routes, and recovery times are projected to fall between 10 and 20% of total cycle time for most routes. When recovery time is less than 10% of total cycle time, there is a high risk of poor on-time performance because of insufficient buffering between trips. With insufficient recovery time, one late trip leads to another, causing a bus to get further and further behind schedule. On the other hand, if more than 20% recovery time exists on a route, buses are sitting unproductively for long periods.

Cycle times that are multiples of 60 allow for the greatest range of clock-face schedules. Clock-face schedules are schedules that result in buses serving a particular stop at the same time or times past every hour (e.g. 1:10, 2:10, 3:10, etc.). Clock-face frequencies make it easy for riders to remember schedules, and make it easier to coordinate connections at key hubs. These factors are most important for transit services that operate less often than every 15 minutes. When service runs more frequently than every 15 minutes, riders tend to pay little attention to schedules at all, since buses are expected to arrive within a short time. Additionally, clock-face frequencies are less critical for systems that provide real-time bus arrival information at bus stops or via mobile application. However, even with real-time information, passengers tend to prefer the simplicity of clock-face schedules, especially those who may not have access to a mobile device or who have limited-use cellular plans.

Routes that are shown together in one row are proposed for interlining. Interlining – the practice of operating a single bus or group of buses on multiple routes – is often used to optimize cycle times and recovery times.[13] For example, if one route has insufficient recovery time while another has excessive recovery time, interlining the routes can result in a cycle with an optimal mix of running time and recovery time. Interlining is proposed between Route 6 and Route 8. Adjustments to these interlines may be necessary as typical speeds and cycle times become clearer.

[13] Recovery time is the time between trips that allows a driver to use the restroom or just prepare for the next trip. For a given trip, cycle time is the running time plus recovery time.

Figure 20 | Proposed Weekday Service Operating Characteristics

Weekday																
Proposed Route	Average Round Trip Miles	Estimated Average Speed	Run Time	Recovery (min)	Cycle (min)	Cycle Time	Recovery Time (min)	% Recovery	Frequency (min)	Headway (hours)	Service Hours	Daily Round-Trips	Total Vehicles	Daily Revenue Vehicle Hours	Cost Per RH	Daily Cost
1	18.01	20	0:54	0:05	0:59	1:00	0:05	10.0%	60	1	13	13	1	13	$96.29	$ 1,251.77
2	11.71	13	0:54	0:05	0:59	1:00	0:05	9.9%	60	1	13	13	1	13	$96.29	$ 1,251.77
3	12.01	14	0:51	0:05	0:56	1:00	0:08	14.2%	60	1.0	14	14	1	14	$96.29	$ 1,348.06
4	9.57	13	0:44	0:04	0:48	1:00	0:15	26.4%	60	1	7	7	1	7	$96.29	$ 674.03
5	11.80	13	0:54	0:05	0:59	1:00	0:05	9.2%	60	1	13	13	1	13	$96.29	$ 1,251.77
6+8	27.74	16	1:44	0:10	1:54	2:00	0:15	13.3%	60	1	14	14	2	28	$96.29	$ 2,696.12
6 Peak	14.43	16	0:54	0:05	0:59	1:00	0:05	9.8%	60	1	6	6	1	6	$96.29	$ 577.74
7B	28.30	20	1:24	0:08	1:33	2:00	0:35	29.3%	60	1	14	14	2	28	$96.29	$ 2,696.12
7T	30.40	20	1:31	0:09	1:40	2:00	0:28	24.0%	60	1	14	14	2	28	$96.29	$ 2,696.12
9	27.10	30	0:54	0:05	0:59	1:00	0:05	9.7%	60	1	6	6	1	6	$96.29	$ 577.74
10	3.83	13	0:17	0:01	0:19	0:20	0:02	11.6%	20	0.33	9	27	1	9	$96.29	$ 866.61
10.1	4.97	13	0:22	0:02	0:25	0:30	0:07	23.5%	30	1	7	14	1	7	$96.29	$ 674.03
20	33.86	20	1:41	0:10	1:51	2:00	0:18	15.4%	60	1	3	3	2	6	$96.29	$ 577.74
30	31.16	20	1:33	0:09	1:42	2:00	0:26	22.1%	60	1	3	3	2	6	$96.29	$ 577.74
40	18.28	21	0:52	0:05	0:57	1:00	0:07	13.0%	60	1	4	4	1	4	$96.29	$ 385.16

Daily Revenue Vehicle Hours	188
Daily Service Hours	140
Daily Round Trips	165
Total Vehicles	20

Daytime Total	$ 15,887.85
Evening Total	$ 2,214.67
Combined Total	$ 18,102.52

Figure 21 | Proposed Saturday Service Operating Characteristics

Saturday																
Proposed Route	Average Round Trip Miles	Estimated Average Speed	Run Time	Recovery (min)	Cycle (min)	Cycle Time	Recovery Time (min)	% Recovery	Frequency (min)	Headway (hours)	Service Hours	Daily Round-Trips	Total Vehicles	Daily Revenue Vehicle Hours	Cost Per RH	Daily Cost
1	18.01	20	0:54	0:05	0:59	1:00	0:05	10%	60	1	13	13	1	13	$96.29	$ 1,251.77
2	11.71	13	0:54	0:05	0:59	1:00	0:05	10%	60	1	13	13	1	13	$96.29	$ 1,251.77
3	12.01	14	0:51	0:05	0:56	1:00	0:08	14%	60	1	14	14	1	14	$96.29	$ 1,348.06
4	9.57	13	0:44	0:04	0:48	1:00	0:15	26%	60	1	7	7	1	7	$96.29	$ 674.03
5	11.80	16	0:44	0:04	0:48	1:00	0:15	26%	60	1	13	13	1	13	$96.29	$ 1,251.77
6+8	27.74	16	1:44	0:10	1:54	2:00	0:15	13%	60	1	14	14	2	28	$96.29	$ 2,696.12
7B	28.30	20	1:24	0:08	1:33	2:00	0:35	29%	60	1	13	13	2	26	$96.29	$ 2,503.54
7T	30.40	20	1:31	0:09	1:40	2:00	0:28	24%	60	1	13	13	2	26	$96.29	$ 2,503.54
9	27.10	30	0:54	0:05	0:59	1:00	0:05	9.7%	60	1	6	6	1	6	$96.29	$ 577.74
10.1	4.97	13	0:22	0:02	0:25	0:30	0:07	24%	30	1	10	20	1	10	$96.29	$ 962.90
20	33.86	20	1:41	0:10	1:51	2:00	0:18	15%	60	1	3	3	2	6	$96.29	$ 577.74
30	31.16	20	1:33	0:09	1:42	2:00	0:26	22%	60	1	3	3	2	6	$96.29	$ 577.74
40	18.28	21	0:52	0:05	0:57	1:00	0:07	13%	60	1	4	4	1	4	$96.29	$ 385.16

Daily Revenue Vehicle Hours	172
Daily Service Hours	126
Daily Round Trips	136
Total Vehicles	18

Daytime Total	$ 14,058.34
Evening Total	$ 2,503.54
Combined Total	$ 16,561.88

Approximate Annual Operating Cost	$ 5,386,848
Approximate Weekdays per Year:	250
Approximate Saturdays per Year:	52

Americans with Disabilities Act (ADA) Impacts

The service area footprint for the current and final recommended route network are very similar. Primary areas where fixed-route service has been reduced include Altizer (Route 7), Pea Ridge (Route 7), Harveytown (Route 4), and along Ohio River Road from Hillview Drive to Lesage (Route 3). Still, many of these areas remain in part or in full within the required buffer zone of a proposed route.

PILOT: DESIGNATED BUS STOPS

TTA currently operates as a "flag stop" system: routes follow a fixed-route and passengers "flag" buses to stop, board, or alight as needed. Approximately 50 bus shelters currently exist, mostly at existing time points, intersections, and shopping centers. Increased frequency is proposed on TTA's highest ridership corridors, Madison Avenue (Route 6) and US-60 (Route 5 and Route 9). Creating dedicated fixed stops on these priority corridors will consolidate boarding opportunities at high-ridership stops, establish reliable cycle times, and improve the overall passenger experience.

Fixed stops should feature superior passenger amenities, including a bus shelter, benches, lighting, maps and signage, trash receptacles, and safe pedestrian access. On US-60, fixed stops should include bus turnouts, a designated loading zone removed from the primary travel lane. Turnout zones provide a safer boarding and alighting process for passengers while minimizing traffic congestion. Bus bulbs, which extend outward from the sidewalk, can be considered on roadways with lower traffic volumes. As fixed route stops are adopted, they can eventually replace time-consuming deviations into shopping centers in the US-60 corridor.

Based on a preliminary analysis of current land use, existing ridership demand, and roadway configuration, bus turnouts should be considered at the following proposed fixed stops:

- HIMG on US-60 westbound (Route 5 and Route 9)
- ValleyHealth East Huntington on US-60 eastbound (Route 5 and Route 9)
- Eastern Heights Shopping Center on US-60 eastbound (Route 5 and Route 9)
- East Hills Professional Center on US-60 eastbound (Route 5 and Route 9)
- Pea Ridge Shopping Center on US-60 eastbound (Route 5 and Route 9)
- Kroger on US-60 westbound (Route 5 and Route 9)
- 6th Avenue at 6th Street (Route 6)
- 6th Avenue at 1st Street (Route 6)
- Madison Avenue at the Department of Motor Vehicles (Route 6)
- Madison Avenue at 13th Street (Route 6)
- Park Avenue at DHHR (Route 6)
- Piedmont Road at Vinson Middle School (Route 6)

The results of this pilot program on the US-60 and Madison Avenue corridors should be used to inform TTA as the authority considers transitioning to a fixed-route system. Key metrics

to inform the pilot's success should be total route cycle time, boarding and alighting patterns; and feedback from frequent passengers on Route 5, Route 6, and Route 9.

ADDITIONAL RECOMMENDATIONS

Additional opportunities exist to improve and expand transit service in Huntington. The additional recommendations described below are derived from the market analysis, service analysis, and public comments. These recommendations are not cost-constrained and would require additional analysis (and funding) before implementation. A timeline for implementing these strategies has also not been defined, with some needing very little planning and forethought and others likely needing years of work before being feasible.

Innovative Demand-Response Service

As noted, some areas of Huntington lack the density to support traditional fixed-route service. Other areas possess the needed density but lack the street network to support efficient transit operations. In both cases, demand-response service can provide a viable mobility solution in place of fixed-route service. In Huntington, the potential for demand-response service exists in Harveytown and Alitzer, and potentially pockets of other neighborhoods such as Pea Ridge, East Pea Ridge, Southside west of 5th Street Road, and along parts of Washington Boulevard. Route 4 currently operates in Harveytown, but only records 80 daily passengers—most of which occur at TTA Center or Mountwest Community College. Route 7 provides service to Altizer, but proposed modifications will eliminate service to Special Metals and on Riverside Drive.

Historically, demand-response service is provided by transit operators using smaller (15-22 passenger) vehicles dispatched via a centralized call center. Increasingly, though, demand-response service is being provided through partnerships between transit providers and Transportation Network Companies (TNCs) such as Uber and Lyft. Uber launched service in Huntington in July 2016 and Lyft began operating in the city in February 2017.

TNCs operate a technology platform that connects drivers of privately owned vehicles with potential passengers via a smartphone application. Passengers are charged a fare, and drivers are charged a service fee for use of the TNC platform. Some cities and transit agencies have begun subsidizing specific TNC trip types, such as late-night service, or first/last mile connections to and from fixed-route transit hubs. Subsidies can make TNC trip costs comparable to transit fares.

The Pinellas Suncoast Transit Authority (PSTA), in St. Petersburg, FL has been a pioneer in the use of subsidized TNC service. In 2016, PSTA launched a pilot program called DirectConnect that allows residents of two designated service zones to request either Uber or an authorized taxi service to a nearby transit center or bus stop where they can transfer to the regional fixed-route network. PSTA covers half of the fare for these trips, up to a maximum of $3. To receive the subsidized fare, passengers must enter a special code into their Uber app, or call the authorized taxi provider and request the special fare. The option of requesting either Uber or a taxi allows PSTA to balance convenience and accessibility, as some residents may not have access to a smart phones or other mobile device.

While subsidized TNC service can be a viable replacement for unproductive fixed-route service, it can also complement transit service more generally. For example, the subsidy can be offered on certain days, or at certain hours when the demand for transit service is too low

to justify fixed-route operations but some transit need still exists. A second PSTA pilot program called TD (Transportation Disadvantaged) Late Shift gives low-income residents up to 23 free Uber trips per month between the hours of 9:00 PM and 6:00 AM, when bus service is not available. Subsidized trips must be between a place of employment and residence.

Besides the PSTA programs, there are several other innovative demand-response pilot programs underway. Each takes a slightly different approach to subsidized demand-response service:

- In Denton County, Texas, the Denton County Transportation Authority (DCTA) is offering $2 discounts off Uber trips taken within the town of Highland Village, a suburban bedroom community that lacks the density or land-use to support fixed-route service. The discount is available during regular DCTA service hours only.
- In Philadelphia, the Southeastern Pennsylvania Transportation Authority (SEPTA) is offering a 40 percent discount off Uber fares to select SEPTA rail stations, up to a maximum subsidy of $10. The program is aimed at facilitating first/last mile connections to and from suburban transit hubs with parking capacity issues.
- In Dublin, California, the Livermore Amador Valley Transit Authority (LAVTA) is subsidizing Uber trips in two designated zones to guarantee that trips costs do not exceed $5 for passengers. The pilot program has allowed LAVTA to eliminate an unproductive bus route serving the same area.

A key benefit of subsidized TNC service, as compared to more traditional demand-response service, is that TTA would only be responsible for subsidizing trips that actually occur. TTA would not be responsible for the procurement and maintenance of vehicles, or for the salaries and benefits of drivers. Indeed, the primary barriers to overcome in such partnerships are regulatory and ensuring that adequate numbers of drivers exist to handle the demand for trips. For example, some communities require that TNCs follow the same driver vetting process as transit operators. However, if agreements on these issues can be reached, subsidized TNC service can provide TTA with an invaluable tool for expanding mobility, as well as for gauging the demand for future fixed-route service. Areas with high demand for subsidized TNC service are strong candidates for future fixed-route service expansion. In growing areas, subsidized TNC service can be a precursor to fixed-route service, allowing TTA to study the emerging travel patterns before strategically expanding the fixed-route network.

Figure 22 | Subsidized TNC Service in Pinellas County, FL

Expand TTA Frequency, Span of Service, and Days of Service Offered

Throughout the TTA Impact Study the desire for more frequent service and improving existing service were common themes among survey and public meeting participants. Results from the TTA Impact Study Survey conducted in April 2017 were heavily considered as service was redesigned. Specifically, tradeoff questions between two service concepts helped the study team identify and prioritize service needs. In trade-off questions, survey participants overall prefer more frequent service (59%), but active TTA users are more evenly split—52% prefer more frequent service and 48% favor longer service hours. However, nearly 70% of respondents preferred adding more weekend service to adding more weekday service. During public outreach at the TTA Center in November 2017, many TTA users offered frequency and span-related free-response comments, as well. In general, if additional resources become available, TTA should work towards offering many routes twice per hour instead of once, prioritizing Routes 5 and 6 first and Routes 1, 2, and 8 second. This would greatly enhance the convenience of the system.

A review of five peer systems with similar community characteristics to Huntington, showed that only two—Fayetteville Area System of Transit and Southeast Area Transit District—offer weekday service past 9:00 p.m. on at least some routes (Figure 23). Weekday service hours on transit systems in Fayetteville (NC) and Preston (CT) are similar to TTA's, as service on the majority of routes in these systems terminate service by 8 p.m. By comparison, TTA Routes 20, 30, and 40 end service at after 11:00 p.m. This assessment did not include special "night owl" service that many communities with large universities offer. If ridership continues to increase, TTA should consider converting some of the resources devoted to these evening routes into extended hours on daytime routes and offering additional coverage through other means. This would improve access and mobility during the evenings and nighttime and make non-traditional work trips more feasible.

As shown in Figure 23 as well, Sunday service is by no means universal. Though greatly desired by many riders, the demand for Sunday service is often low in reality and the productivity does not always materialize. For now, TTA should focus on adding frequency during the weekdays and providing Sunday service through innovative ways rather than trying to implement Sunday fixed-route service. In the future, if ridership grows and more resources become available, implementing a few routes such as those currently offered in the nighttime along with additional demand-response coverage may be possible.

Figure 23 | Latest Service on Transit Systems Comparable to TTA

City	Service Provider	End of Service	Sunday Service?
Athens, GA	Athens Transit System/University of Georgia Transit System	8:45 PM	Yes
Fayetteville, NC	Fayetteville Area System of Transit	10:30 AM	Yes
Lakeland, FL	Lakeland Area Mass Transit District (Citrus Connection)	7:15 PM	No
Waco, TX	Waco Transit System	8:15 PM	No
Preston, CT	Southeast Area Transit District	10:50 PM	Yes

*Not including Night Owl service.

Passenger Amenities and Facilities

Higher-frequency service improves the transit experience for riders in two important ways. First, it reduces the wait time for passengers using the service in general, and secondly it reduces the inconvenience of transfers. When service is infrequent, most transfers occur at designated hubs where routes can be "pulsed" to the greatest extent possible. Pulsing is the scheduling of multiple routes to arrive at the same hub within a very small time window in order to facilitate transfers between routes. When service is more frequent, transfers outside of key hubs become more viable. For example, if two routes operate every 30-minutes, the maximum wait time to transfer between them at any point where they intersect is 30 minutes, but may be much less depending on where along their respective alignments they intersect. Thus, higher service frequency makes passenger amenities such as benches and shelters more important since passengers are more likely to make transfers away from designated hubs.

The design features of the proposed redesign scenario, including consolidating service on key corridors to improve effective service frequency, are likely to generate higher transfer activity at key corridors in the network, including US-60 and on Madison Avenue. These corridors, in addition to key ridership generators such as Walmart, or potential transfer stops (8th Street and 9th Street) should be the focus for future passenger amenity investments.

New fixed bus stops, at a minimum, must have a bus stop sign and a landing pad that meets ADA requirements. Additional work that can be completed at smaller stops to help distinguish bus stops from street space or parking is to paint the bus stop area, also known as the "bus pad". This can either be a box with the words "BUS STOP" or "BUS ONLY" or additional elements such as striping or colored paint.

Figure 24 | Bus Stop Amenities including Bus Stop Signs, Landing Pad, and Shelter

At heavily used stops, passenger amenities such as shelters and benches can further enhance the passenger experience for existing riders, and create a more inviting image for prospective transit users. Shelters and other amenities improve both the visibility and perception of transit service in a community, which can help drive further ridership growth. A secondary consideration for shelter installation is the presence of sensitive population groups such as older adults or small children. In these cases, passenger amenities are often installed even if ridership volumes are relatively light compared to other stops.

Passenger amenities enhance the transit experience, decrease perceived wait times for transit services, and can contribute to increased ridership. Well-designed amenities are also an important marketing tool by increasing the visibility of transit service and projecting a positive image of the user experience. Overall, a strategic investment in passenger amenities is relatively low-cost, high-reward strategy for TTA to pursue in the long-term. The estimated cost for an individual bus stop without a shelter is $5,000; the estimated cost for an individual bus stop with a shelter is $20,000.

Ensure Reliability of Real-Time Information App

RouteShout operates TTA's real-time bus arrival smartphone app, which allows current and prospective transit users to track fixed-route buses and view scheduled arrival times on mobile devices. However, multiple users indicated that departure and arrival times are not accurate, with the estimated arrival time at many stops reading "120 minutes" regardless of the route, day, or time.

Updating the real-time information app will help better inform Huntington residents of their available transit options. Providing reliable real-time transit information is key to providing the transit experience expected by the current generation of Marshall University students and transit riders in general. Continuously improving the local transit app should remain a top long-term priority of TTA.

Branding and Marketing Improvements

TTA is well-recognized in Huntington, but opportunities exist to strengthen TTA's brand through targeted marketing initiatives. Public engagement conducted at Marshall University revealed that the majority of MU students are unfamiliar with TTA's services, and are unaware that the service is fare-free for students. Although student awareness of the Green Machine is generally higher, most students do not realize the service is operated by TTA.

Raising awareness for TTA's services and the Green Machine at MU can be achieved through better communication with the university, including educating students at freshman orientation, advertising TTA's services in dorms, dining halls, gyms, and off-campus apartments, and through mass emails. A substantial percentage of MU students are commuters. TTA and MU can target commuter students by advertising TTA's services through the university's parking permit purchasing process and working directly with student groups such as the Commuter Student Organization.

Additionally, the maps included in TTA's route schedule brochures do not always accurately convey where the route travels. While this may not be an issue for regular users, it makes it more difficult for new residents, visitors, and Marshall University students to use the system. Updating the maps and providing more passenger information, such as possible transfer points, will improve the overall passenger experience.

Commuter Service to Charleston

TTA and the Kanawha Valley Regional Transportation Authority (KRT) previously operated public bus service between Huntington and Charleston from 2009 to 2015. The Intelligent Service route operated twice-daily ($3 one-way) and served approximately 13,400 passengers in 2014.

Regional travel flow data from 2015 indicates that approximately 4,000 to 6,000 daily trips occur between downtown Huntington and Cabell Huntington Hospital and the greater Charleston area. Although Greyhound provides limited service from Huntington to Charleston, reestablishing commuter service between West Virginia's two most-populous cities should be strongly considered as TTA continues to strive for better service.

Comprehensive Fare Study

TTA's fare structure is confusing for new users and should be simplified. TTA's existing service area is divided into three fare zones: one-way fare within the City of Huntington (Zone 1) is $1.00; an additional $0.25 zone fare is charged for routes traveling to Zone 2 (east of the Kmart Plaza on Route 60) or Zone 3 (service between Milton and Culloden). TTA does not allow for free transfers between routes, which is considered a best practice within the industry. However, TTA users are increasingly purchasing monthly passes ($35) and daily passes ($4) to avoid paying "transfer fees" when switching between routes. This practice may prove fiscally unsustainable for TTA and should be comprehensively studied.

With the revised downtown circulation patterns suggested, and transfers costing an extra fare, one fare policy TTA should consider is making all trips between Pullman Square and the TTA Center fare-free. If the pulse is working well, this policy reduces the need for most routes to serve both destinations as they do today. And, it may allow both existing and new riders to consider transit more often when visiting downtown, which in turn may generate additional ridership outside of downtown. While implementation of this policy will need careful planning to avoid negative side effects, TTA can look to many cities and towns that offer fare-free transit in downtown to learn ways to mitigate problems.

Fare payment policies and mechanisms is a rapidly changing aspect of transit service that has the potential to transform how people interact with the system and attract new riders. Two examples include: 1) Mobile and off-board fare payments that make the service more widely accessible and reduce dwell times, and 2) capped fares that allow more people to receive the bulk discount of buying monthly or daily passes. Many other innovations exist that can improve the attractiveness of the service at a relatively low cost to TTA.

TTA should conduct a comprehensive fare study to help reevaluate and potentially restructure the current fare structure, determine the optimal price point for fares and passes, and gain a better understanding of the impact pass products have on TTA's farebox recovery. A simplified fare structure and modern payment mechanisms may result in higher ridership and increased fare revenues.

Improve Pedestrian Infrastructure

Existing land use patterns in Huntington present challenges both to service design and bus stop placement. Sidewalks and protected crossings are not always present at bus stops, even in key TTA corridors serving major destinations. Long blocks sometimes require multiple mid-block stops and long walk distances to access crosswalks. Deep building setbacks, such as off US-60, put pressure on TTA operators to provide time-consuming route deviations into shopping centers and parking lots.

TTA's current "flag stop" policy provides flexibility to TTA users but inherently complicates further investment in passenger facilities. Fixed stops are proposed on several corridors (Route 6 and Route 9) to expedite service and improve passenger amenities at high ridership TTA bus stops. As such, providing direct and safe pedestrian access to bus stops is critical.

To ensure this objective is met, it is key to work closely with the public departments—City of Huntington, Cabell County, and WVDOT—that have jurisdiction over the rights-of-way being used for TTA service. This ensures that stops are placed both where they are needed and where they are safe, and that complementary pedestrian improvements are considered in the roadway planning and maintenance processes. TTA should also consult with developers constructing new projects near existing TTA routes. This includes Tanyard Station, a planned mixed-use development off US-60 in Barboursville. Tanyard Station's first phase of development includes a grocery store, several retailers, and a gas station, and is expected to open by the fall of 2018. Concurrently, KYOVA Interstate Planning Commission is working to safely integrate pedestrians and bicyclists in the corridor.

Figure 25 | Example of Pedestrian-Supportive Street Treatments

Improve Regional Transportation Connections

TTA ended their partnership with Lawrence County Transit (LCT) in June 2017. As of December 2017 LCT's four routes operate primarily in Ohio and Kentucky; Route 2 provides weekday service to the TTA Center and Marshall University.

The Ashland Bus System (ABS) operates five fixed-routes in Ashland, Catlettsburg, and Summit, Kentucky. All five routes begin and end service at the Ashland Transportation Center, located on Front Street in downtown Ashland. Additionally, LCT's Route 1 provides seven weekday trips to/from the Ashland Transit Center. To improve regional connectivity, TTA and ABS should study the impact of a regional weekday commuter route, operating peak-period service between the Ashland Transit Center and the TTA Center. The route should be timed to provide passengers with an adequate window to transfer to LCT Route 1.

Expanding service to Huntington Tri-State Airport is currently not recommended, as the airport's flight schedule does not warrant TTA service. As of December 2017, American Airlines operates three daily flights to Charlotte and Allegiant Air operates one daily flight to Orlando and one to St.Pete/Clearwater; Allegiant Air also operates seasonal service to Fort Myers/Punta Gorda and to Myrtle Beach. Expanding service to Huntington Tri-State Airport would likely require funding from the airport or other partners. Additionally, this market is already well-served by rental car companies, local taxis, and TNCs, such as Uber and Lyft.