OFFICE OF THE MAYOR
LOUISVILLE, KENTUCKY

GREG FISCHER
MAYOR

June 12, 2017

Elaine Chao, Secretary
U.S. Department of Transportation (USDOT)
1200 New Jersey Avenue, SE
Washington DC 20590

Dear Secretary Chao and Members of the Selection Committee:

It is with great excitement that I submit Louisville Metro Government's proposed Connection 21 application for the U.S. Department of Transportation's Advanced Transportation and Congestion Management Technologies Deployment Initiative grant. USDOT is committed to ensuring that cities prepare and embrace emerging corridor management technologies to improve the efficiency and safety of the surface transportation network. Louisville has engaged community partners in the development of related projects and the identification of priority corridors experiencing traffic congestion issues. The proposed project targets these corridors in a multifaceted and strategic approach to facilitate transit use, improve congestion problems, and ease access to employment hubs across the community.

The 2016 launch of *Move Louisville*, the city's 20-year strategic multimodal transportation plan, sets the goal to fix existing transportation assets and reduce vehicle miles traveled (VMT). Making the shift to lowering our VMT will be challenging, but can be stimulated through the deployment of advanced transportation technologies. To do this, we must enhance our traffic operations, improve data-sharing and communications, and intensify integration at all levels. Louisville's Connection 21 initiative seeks to leverage existing investments for the large scale installation and operation of advanced transportation technologies that will improve safety, efficiency, system performance, and infrastructure return on investment.

Project partners, including the University of Louisville, the Kentuckiana Planning and Development Agency, the Kentucky Transportation Cabinet, the Kentucky Communications Network Authority, Traffic Response and Incident Management Assisting the River City, and the Transit Authority of River City, collectively determined appropriate technologies for all identified corridors. Each partner is committed to facilitate the implementation of said technologies in a directed and efficient manner, leveraging the growing Kentucky Wired network of fiber connectivity.

Connection 21 makes the best use of existing and future transportation infrastructure to improve traffic flow, deliver environmental and economic benefits, measure operational performance, and better integrate transportation system management technologies. Our commitment to improving safety, air quality, and operations is a winning combination to modernize our transportation network and prepare us for emerging trends in transportation.

Sincerely,

Greg Fischer
Mayor

Project Name	*Connection 21: Louisville's Strategy to Improve Integrated Corridor Management for a 21st Century Transportation Network*
Eligible Entity Applying to Receive Federal Funding	Louisville / Jefferson County Metro Government ("Louisville")
Total Project Cost	$10,761,121
ATCMTD Request	$5,361,672
Are matching funds restricted to a specific project component? If so, which one?	Yes – matching funds are restricted to the installation of fiber optic infrastructure to support technologies to be acquired through the proposed project.
State in which the project is located	Kentucky
Is the project currently programmed in the:	
• Transportation Improvement Program (TIP)	No, but would be added upon award of the ATCMTD grant.
• Statewide Transportation Improvement Program (STIP)	No, but would be added upon award of the ATCMTD grant.
• MPO Long Range Transportation Plan	No, but would be added upon award of the ATCMTD grant.
• State Long Range Transportation Plan	No – Kentucky's Long Range Transportation Plan is policy-focused and does not include specific projects.
Technologies proposed to be deployed (briefly list)	*Operational:* Real-Time Origin-Destination (ROD) data collection and city traffic status estimation; Real-Time Traffic Information System (RTI) based on radar sensors; Traveler Information Computation and Distribution System (TICD) ; Automatic Traffic Signal Performance Measures (ATSPM)
	Operational Pilots: Eco-Freight Signal Priority (FSP); Carpooling Signal Priority (CSP); Transit Signal Priority
	Safety: Advanced Red-light running protection system with Freight priority; Red-light running and speeding data collection
	Environmental: Real-Time Vehicle Emission Monitoring System (RVEM); Eco-Driving (ED) through Vehicle to Infrastructure (V2I) connected applications; Real-time vehicle emission heat map system

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I. Introduction

Louisville, Kentucky is proposing a multifaceted project to improve overall integrated corridor management. This initiative, known as **Connection 21**, will leverage planned upgrades to the city's fiber optic network to provide much-needed enhancements for Louisville's transportation management infrastructure. **Connection 21** will establish Louisville as a 21st century community connected by a reliable transit system and smoother traffic flows. Five corridors traversing diverse sections of Louisville/Jefferson County have been selected – Cane Run Road, Hurstbourne Parkway, Shelbyville Road, West Broadway, and Westport Road – based on traffic counts, transit routes, and a high presence of freight haulers and large industrial bases. By targeting these areas, the proposed project will better connect often isolated neighborhoods. Technologies selected for each corridor were chosen based on needs identified by project partners over a series of meetings focused on data analysis and literature reviews. **Figure 1** showcases the technologies designated for each identified route, while the maps in **Appendix 1** offer a visual within the wider context of Jefferson County.

Figure 1: Proposed Technologies to Be Deployed

Route	Technologies
Cane Run Road (from Terry Road to Hudson Avenue)	Traffic signal priority; real-time traffic information system; traveler information distribution system; automated traffic signal performance measures; advanced red light running protection; real-time vehicle emission monitoring; emergency response signal priority
Hurstbourne Parkway (from Shelbyville Road to Taylorsville Road)	Traffic signal priority; real-time traffic information system; traveler information distribution system; automated traffic signal performance measures; advanced red light running protection; real-time vehicle emission monitoring; emergency response signal priority
Shelbyville Road (from Frankfort Road/Lexington Road to Gene Snyder Freeway (I-265))	Traffic signal priority; real-time traffic information system; traveler information distribution system; automated traffic signal performance measures; advanced red light running protection; real-time vehicle emission monitoring; emergency response signal priority; transit communication system
West Broadway (from 18th Street to Shawnee Park)	Traffic signal priority; advanced red light running protection; real-time vehicle emission monitoring; emergency response signal priority; transit communication system
Westport Road (from the Watterson Expressway (I-264) to Old LaGrange Road)	Traffic signal priority; real-time traffic information system; traveler information distribution system; automated traffic signal performance measures; advanced red light running protection; real-time vehicle emission monitoring; emergency response signal priority

The project will leverage work being completed by the Kentucky Communications Network Authority's **Kentucky Wired** Program, which, in partnership with Louisville Metro Government, is installing 96.6 miles of fiber optic cable throughout the community to increase internet connectivity. Along each identified corridor, traffic signal controllers will be upgraded and connected to this fiber network. Sensors will be added for data collection at key intersections; collected data will be stored in a cloud-based **data warehouse** to be hosted by a consortium of Louisville Metro Government departments. Analysis of collected data will improve future planning and current operational efforts, and will facilitate engagement with the public. Data will also be used to feed real-time digital displays offering information on arrivals and departures of public buses along West Broadway and Shelbyville Road.

Serving a population of 760,000, **Louisville Metro Government**, hereafter referred to as "Louisville," was formed in 2003 by the merger of the City of Louisville and Jefferson County and anchors a metropolitan area of 1.2 million people. Louisville hosts two major Ford Motor Company plants employing nearly 13,000 people; a GE Appliance & Lighting plant employing 6,000; and the UPS World Port employing over 22,000 – these major community assets utilize the local transportation network on a daily basis to haul valuable freight and sustain the economic vitality of the region[1]. Jefferson Riverport International, along the Ohio River, hosts an industrial park employing over 8,000 in logistics, distribution, and retail warehouses. A strong private sector based on banking and insurance draws thousands of employees downtown while a robust healthcare industry located just east of downtown provides sustainable livelihoods for many of the area's citizens. The five identified routes are vital conduits for freight, citizens, and visitors throughout the community, providing links to employment centers, retail hubs, and public services.

A **Project Manager** will be hired to oversee and manage project components, including financial and reporting requirements. This position will be housed in the Louisville Metro Department of Public Works and Assets. Project components and technology upgrades will be coordinated by a project team formed by staff representing the following community partners:

- ***Kentucky Communications Network Authority (KCNA)*** – the Commonwealth's Authority dedicated to managing the planned Kentucky Wired fiber network serving government locations across the state; includes a public-private partnership with Macquarie Capital to design, build, operate, and maintain the network for thirty years.
- ***Kentucky Transportation Cabinet (KYTC)*** – the state's transportation agency, whose mission is to "provide a safe, efficient, environmentally sound and fiscally responsible

[1] "Major Employers," Greater Louisville, Inc.
http://www.greaterlouisville.com/EconomicDevelopment/TheGreaterLouisvilleRegion/Major_Employers/

transportation system that delivers economic opportunity and enhances the quality of life in Kentucky."[2]

- ***Louisville Metro Government*** – including the Office of the Mayor, Public Works and Assets, Traffic Control Center, Air Pollution Control District, Information Technology, Office of Management and Budget, Louisville Forward, Louisville Metro Police Department, and the Office for Performance Improvement and Innovation.
- ***Traffic Response and Incident Management Assisting the River City (TRIMARC)*** A project of the Kentucky Transportation Cabinet focusing on improving the performance of the existing freeway system in the Louisville Metropolitan Area, which includes Interstates 64, 65, 71, 264, and 265.
- ***Transit Authority of River City (TARC)*** – the public transit provider for the Louisville region, serving Jefferson County and four surrounding counties in Kentucky and Indiana.
- ***University of Louisville Department of Civil and Environmental Engineering*** – department staff will provide valuable research to inform the project and will undertake an overall evaluation of project components.
- ***Kentuckiana Regional Planning and Development Agency (KIPDA)*** – the metropolitan planning agency for Jefferson County and four surrounding counties in Kentucky and Indiana.

Overall project funding will be coordinated by the Louisville Metro Office of Management and Budget, whose grant management capacity and experience has led to the successful management of thousands of local, state, and federal grants worth billions of dollars in investments for the community.

[2] "About Us," Kentucky Transportation Cabinet. http://transportation.ky.gov/Pages/AboutUsInfo.aspx

Challenges

Louisville recognizes the importance and value transportation routes play in creating a sense of place, opportunity, and choice. ***Move Louisville***, the city's twenty-year strategic multimodal transportation plan, sets the stage for how transportation initiatives will re-shape Louisville as a competitive, 21st century community. The plan identifies two top priorities: fixing and maintaining existing infrastructure and reducing the number of vehicle miles driven by Louisvillians by providing and improving mobility options. Improved technology serves as a key component to these strategies.

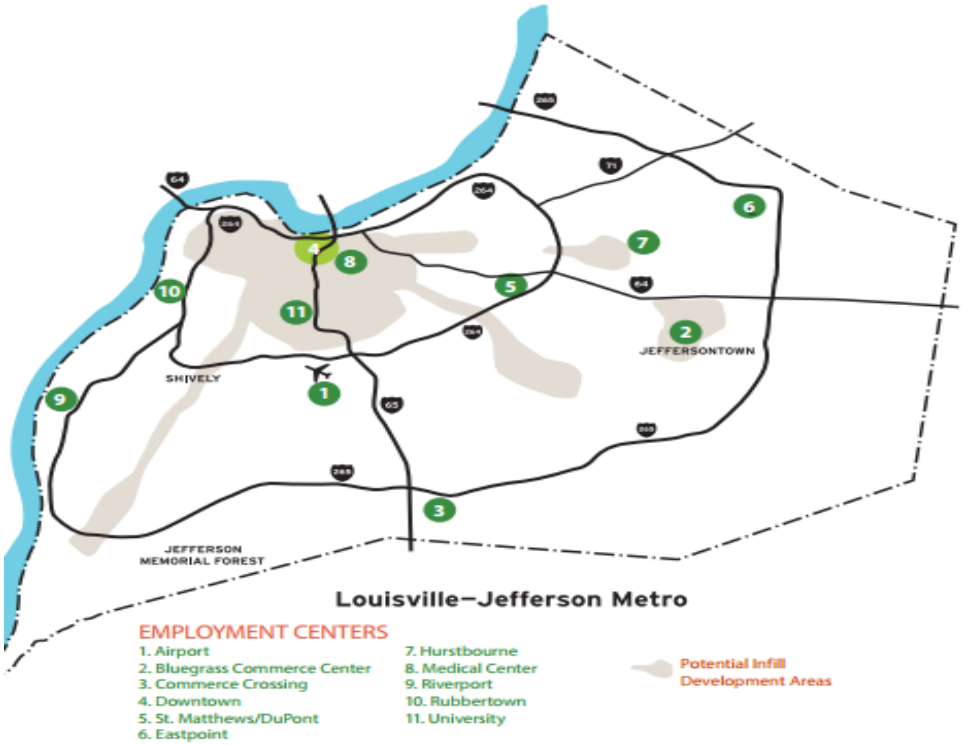
Louisville's existing transportation network features many opportunities for improvement, most notably a clear disconnect between where people live and where they work. As Jefferson County's population has grown, job centers have developed along identified corridors in areas often requiring a car to access such locations safely and efficiently. This has led to two distinct issues: (1) identified routes face congestion affecting the quality of life for those living along and traversing them on a daily basis; and (2) job opportunities along and around identified routes are increasingly difficult for disadvantaged populations to reach. Due to the density of population around such corridors, constructing alternative routes is not feasible; however, advanced technologies connected to a community-wide fiber network will increase the capacity of Louisville Metro Government and community partners to better manage traffic flows and enhance transit service.

Challenges identified by *Move Louisville* and the **Connection 21** project team are as follows:

- Unsustainable land use patterns;
- Excessive vehicle-miles traveled (VMT);
- Excessive idle times for vehicles in traffic jams;
- A rapidly growing urban heat island;
- Increased distances between residences and job centers; and
- A perception of unreliability regarding the local transit system.

Job centers, including retail districts, medical centers, office buildings, manufacturing plants, government facilities, and the like, are concentrated in roughly eleven areas of the county. The five routes to be targeted through **Connection 21** will address eight of the eleven employment areas captured in **Figure 2**, including Rubbertown; the Riverport; Downtown; the Medical Center; the Bluegrass Commerce Center; St. Matthews/DuPont; Hurstbourne; and Eastpoint.

Figure 2: Employment Centers in Jefferson County



Source: Move Louisville 2035 Transportation Plan

According to the Kentuckiana Regional Planning and Development Agency's Regional Traffic Count Database[3], the routes associated with this project handle up to 70,000 cars per day – especially along routes traversing suburban neighborhoods such as Shelbyville Road and Hurstbourne Parkway. Peak hours regularly usher in long wait times and heavy congestion at intersections. According to a study prepared for the National Cooperative Highway Research Program titled "The Benefits of Reducing Congestion," long travel queues increase accident rates, fuel consumption, and air pollution; as well, more traffic leads to an increase in the cost of shipping goods and disrupting production schedules. The human toll must be considered as well – more traffic means less time working or with families.[4]

[3] Regional Traffic Count Database: http://www.kipda.org/Transportation/TrafficCounts/
[4] "The Benefits of Reducing Congestion," January 2002 working paper prepared by Cambridge Systematics, Inc. for the National Cooperative Highway Research Program.

Solutions

Connection 21 proposes to enhance communication and coordination capabilities at every signalized intersection along each of the five identified corridors (90 in total). The following components will work in conjunction to address the challenges listed above and improve traffic congestion, emissions, and public safety across Louisville and Jefferson County:

- ***Fiber Network Backbone*:** the advanced technology components captured in this application will be directly connected to a community-wide 96.6 mile fiber network being installed across Louisville and Jefferson County as part of the Kentucky Wired project, in partnership between Louisville Metro Government and the Kentucky Communications Network Authority. The goal of Kentucky Wired is to "build and manage a Commonwealth-owned, leading-edge communication infrastructure service to provide affordable broadband connectivity, foster collaboration, and promote innovative use of digital technologies connecting the people of Kentucky to the world."[5] This project will leverage Kentucky Wired to improve government service delivery, promote economic development, and enhance public safety by installing and connecting smart traffic control technology along the identified corridors.

- ***Traffic Signal Preemption*:** the proposed project will purchase and install equipment at select traffic signals to allow for communication between the signals and transponders installed in emergency vehicles, public buses, and freight hauling vehicles. This smart technology will allow traffic lights to respond most efficiently to a given situation; for instance, a light can be triggered to remain green for an emergency vehicle on the way to an emergency scene. When public transit vehicles fall behind schedule, traffic signal preemption technology can adjust signal timing to improve transit service; this also applies to freight haulers that are set to make deliveries. Radars strategically located along the identified corridors can determine the speeds of such vehicles to extend green lights – this will work to prevent potential crashes and will decrease the 'dilemma period' of those deciding whether to speed up upon approaching a yellow light.

    - Rollout of traffic signal preemption technologies will be limited at first as part of a series of pilot projects focused on eco-freight and transit preemption. Technologies will be expanded upon as bus rapid transit routes

[5] "About Kentucky Wired," Kentucky Communications Network Authority. http://kentuckywired.ky.gov/about/Pages/kcna.aspx

are determined and deployed along certain routes. Such pilot programs are explored in detail in Section II of this application.

- ***Radar and Camera Technology:*** Internet protocol video blended with analytics software will assist Traffic Control staff in identifying the vehicle types that travel through a typical corridor, their average speeds, and directions of travel. Wireless equipment sending information to the data cloud will be utilized to catalog repeatable driver patterns of travel. This will provide an analytical and proven framework for the Louisville Metro Traffic Control Center to make informed decisions to decrease congestion and increase safety along identified corridors. Louisville Metro Police Department officers will utilize the data to identify intersections with high incidents of speeding and red light running and increase patrols in such areas.

- ***Data Warehouse:*** Information sent through transponders, radars, and camera technology, all connected by the fiber backbone, will be collected in a unified data warehouse to be utilized by project partners to make informed decisions. This warehouse will be housed and maintained by Louisville Metro Government and overseen by the Project Manager. Collected data will be used in conjunction with research and evaluation findings presented by the University of Louisville. Emissions information will also be collected to inform air pollution modeling carried out by the Louisville Metro Air Pollution Control District.

    - A Smart City Data Integration System to be completed and managed by Louisville Metro Government is captured as a goal in the KIPDA Regional Intelligent Transportation Systems Architecture plan.[6]

- ***Smart Communication and Application Software:*** collected information will also be utilized to enhance existing applications used by the public in several ways: real-time traffic information will be presented to community-based real-time traffic information providers such as Waze and Google to suggest best routes for drivers; real-time transit information will be displayed at select bus stops along West Broadway and Shelbyville Road to inform users of accurate departure and arrival times for transit vehicles; emissions information will be presented to inform air pollution modeling projects and determinations of air quality alerts. Partnerships with Waze and Google will be leveraged to disseminate and verify collected information.

[6] "Operational Concepts: Louisville Metro Government." KIPDA, 2016, http://www.consystec.com/kipda/web/html/opscon/ops10.htm

II. Technologies and Benefits

The five identified routes targeted by the proposed project were strategically chosen by the project team, as they contain high concentrations of freight and retail establishments, frequent traffic congestion, and high transit usage. Traffic signals along each route are scheduled to receive distinct combinations of technologies to address identified concerns in each area. This section explores each route and offers tables showcasing the potential time travel reductions, cost savings, and environmental benefits to be realized by the project. Information was calculated based on modeling performed by the Louisville Metro Department of Public Works and Assets.

Certain technologies will be deployed at traffic signals along all five routes. These technologies are explored below:

Radar sensors, mounted on traffic signal arms, utilize radar waves to scan oncoming vehicles, and have the capability of detecting vehicles up to 500 feet from the stop line. Instant speeds of vehicles are computed based on a scan of each vehicle's horizontal and lateral positions. Unlike loop detectors placed at limited fixed locations, radar sensors serve as a series of virtual detectors between minimum and maximum detection ranges – allowing them to accurately estimate each vehicle's real-time position and speed. **Video technology** will be applied to certain signals to compare effectiveness to that of radar sensors – both will be equipped with analysis software to provide meaningful data to the data warehouse.

An **advanced radar detection system** will be connected to sensors along each route to assist public safety and law enforcement agencies in determining areas with high rates of speeding and red light running. This will inform law enforcement efforts and will allow traffic control personnel to alert authorities on speeding and red light running 'hot spots.'

Pilot Programs

By leveraging the planned extension of the fiber optic network in Louisville and Jefferson County, advanced technologies will be easier to install and utilize. The proposed project provides a valuable opportunity to pilot a series of initiatives targeted toward improving the efficient movement of goods, people, and services. Both involve the use of **transponders** to communicate with traffic signals in order to manipulate them.

- ***Eco-Freight Signal Priority (FSP)*** – freight signal priority software will be installed along both Cane Run Road and Westport Road, which contain high concentrations of industrial parks, warehouses, manufacturing outfits, and logistics and distribution centers. The project team will host a **summit** upon commencement of the proposed project to inform businesses and companies located along both routes of this technology and to inspire them to invest in transponder equipment.

Signals will respond to oncoming freight vehicles with installed transponders to ensure that chosen routes are most efficient to deliver goods and services. This provides incentives for private companies to support the project and will open the door for private investments in the proposed technologies to ensure sustainability and maintenance.

- ***Transit Signal Priority (TSP)*** – traffic signals along Shelbyville Road and West Broadway will be equipped with signal priority software to communicate with TARC buses serving both routes. This will allow signals to respond to the needs of buses by coordinating in order to move buses in the most efficient manner. Because TARC buses are utilized where needed and are not dedicated to specific routes, the project team determined that equipping each bus in the TARC fleet with transponders would not be cost-effective. The proposed project will instead invest in limited amounts of portable transponders in order to pilot the technology; as bus rapid transit routes are planned for both Shelbyville Road and West Broadway, dedicated buses will be equipped with transponders – this will become a standard requirement when ordering new buses.

  TARC uses Automatic Vehicle Location (AVL) systems on its bus fleet, allowing for the collection of real-time bus data. This data is utilized by TARC's Trip Planner application, Google Maps, and other private smartphone applications. Signal priority technology can be utilized to link communication between traffic lights and TARC's AVL system, enhancing the efficacy of both.

  Better transit service was expressed as one of the most common desires by Louisville residents during the *Move Louisville* planning process. As well, area employers frequently request better transit service to job centers according to Develop Louisville, the city's community development agency. Enhanced transit service along West Broadway is captured in the *Move Louisville* plan as a priority project, due to the route's increasing transit ridership and its connection to other major corridors such as Bardstown Road – which is also slated for transit enhancements in coming years. The intersection of 18th Street (Dixie Highway) and West Broadway is becoming a vital employment center, hosting the new headquarters of Passport Health and a new branch of the Greater Louisville YMCA.

Routes and Projected Benefits

Cane Run Road

From Terry Road to Hudson Avenue, Cane Run Road connects hundreds of industrial and manufacturing outfits, including Coca-Cola Consolidated and Kentucky Trailer, to Jefferson Riverport International. Coca-Cola is expanding its location by 105,000 square feet and adding 150 jobs to its operations. Businesses and companies along Cane Run Road employ nearly 7,000 and generate $6 million in payroll and property taxes.[7] These establishments require the transport of tons of freight materials to and from their facilities to continue and increase operations.

As mentioned above, a pilot eco-freight signal priority initiative will take place along Cane Run Road as part of the proposed project. A model will be developed by the project team to install transponders on select freight vehicles to communicate with traffic signals. Lights can remain green if it is determined that a freight hauler is reaching a potential dilemma zone at a high speed. This will increase safety along the corridor, which also features several residential areas with high usage of personal automobiles.

A six-mile stretch of Cane Run Road will not be directly connected to the fiber optic network. The proposed project has budgeted for a Wi-Fi mesh system to connect this area to the network and the data warehouse. This should provide the same amount of reliability as the fiber optic network in terms of connectivity and speed.

Figure 3: Annual Benefits for Cane Run Road

Average Volume		Travel Time Reduction (sec.)	Annual Vehicle Hours Saved	Time Factor*	Dollars	Fuel Consumption		Total
						Annual Gallons Saved	Dollars	Dollars
Northbound								
AM Peak	1700	92.40	10,908.33	2.00	$424,050.55	13,090.00	$29,452.50	$453,503
PM Peak	1400	15.00	1,458.33	2.00	$56,691.25	1,750.00	$3,937.50	$60,629
Southbound								
AM Peak	900	15.00	937.50	2.00	$36,444.38	1,125.00	$2,531.25	$38,976
PM Peak	1800	190.80	23,850.00	2.00	$927,144.90	28,620.00	$64,395.00	$991,540
Total Annual Benefits for Cane Run Road								**$1,544,647**

Figure 4: Projected Emission Reductions for Cane Run Road

Total Annual Reductions in GHG emissions (g CO2 /year)	3,388,876,205

[7] Jefferson Riverport International, "About Us." http://www.jeffersonriverport.com/about-us.html

Total Annual Reductions in GHG emissions (g CO /year)	20,334,937
Total Annual Reductions in PM NOx Emissions (g/year)	3,154,230
Total Annual Reductions in PM Emissions (g/year)	328,460
Total Annual Reductions in NOx Emissions (g/year)	4,656,792
Total Annual Reductions in VOC Emissions (g/year)	1,720,660

Hurstbourne Parkway

Though less than one mile in length, the corridor of Hurstbourne Parkway to be addressed by the proposed project (from Shelbyville Road to Taylorsville Road), constitutes one of the most congested areas of the city. The section features two high-traffic intersections as well as a connection to a frequently-traveled portion of Interstate 64. In addition to one of the region's largest concentrations of manufacturing and industrial jobs found in Bluegrass Commerce Park, numerous apartment complexes, hotels, and suburban neighborhoods are located along the route, as are several retail centers.

Figure 5: Annual Benefits for Hurstbourne Parkway

Average Volume		Travel Time Reduction (sec.)	Annual Vehicle Hours Saved	Time Factor*	Dollars	Fuel Consumption		Total
						Annual Gallons Saved	Dollars	Dollars
Northbound								
AM Peak	3220	87.00	19,454.17	2.00	$756,261.28	23,345.00	$52,526.25	$808,788
PM Peak	1500	15.00	1,562.50	2.00	$60,740.63	1,875.00	$4,218.75	$64,959
Southbound								
AM Peak	1500	15.00	1,562.50	2.00	$60,740.63	1,875.00	$4,218.75	$64,959
PM Peak	3220	127.20	28,443.33	2.00	$1,105,706.14	34,132.00	$76,797.00	$1,182,503
Total Annual Benefits for Hurstbourne Parkway								**$2,121,209**

Figure 6: Projected Emission Reductions for Hurstbourne Parkway

Total Annual Reductions in GHG emissions (g CO2 /year)	349,937,200
Total Annual Reductions in GHG emissions (g CO /year)	1,719,854

Total Annual Reductions in PM NOx Emissions (g/year)	159,543
Total Annual Reductions in PM Emissions (g/year)	37,209
Total Annual Reductions in NOx Emissions (g/year)	337,406
Total Annual Reductions in VOC Emissions (g/year)	218,364

Shelbyville Road (US Highway 60)

Shelbyville Road starts at the busy intersection of Frankfort Avenue and Lexington Road and remains heavily utilized to the county line, traversing Interstates 264 and 265, Hurstbourne Parkway, and several congested auxiliary routes. Daily vehicle counts top 70,000 in certain sections. As well, Shelbyville Road is home to retail centers, two large shopping malls, and entrances to numerous suburban neighborhoods and small cities.

A two-mile stretch of Shelbyville Road as it traverses through St. Matthews will not be directly connected to the fiber optic network. The proposed project has included a fortified Wi-Fi mesh system to connect this area to the network and the data warehouse. This should provide the same amount of reliability as the fiber network.

Radar sensors connected to traffic signals along Shelbyville Road will provide real-time information on bus arrivals; this information will be displayed at select bus stops along the route to inform users of arrivals, departures, and delays.

Figure 7: Annual Benefits for Shelbyville Road (US 60 East through Middletown)

Average Volume		Travel Time Reduction (sec.)	Annual Vehicle Hours Saved	Time Factor*	Dollars	Fuel Consumption		Total
						Annual Gallons Saved	Dollars	Dollars
Westbound								
AM Peak	2850	5.50	1,088.54	2.00	$42,315.97	1,306.25	$2,939.06	$45,255
PM Peak	3300	1.90	435.42	2.00	$16,926.39	522.50	$1,175.63	$18,102
Eastbound								
AM Peak	1000	102.70	7,131.94	2.00	$277,247.21	8,558.33	$19,256.25	$296,503
PM Peak	2300	140.90	22,504.86	2.00	$874,853.97	27,005.83	$60,763.13	$935,617
Total Annual Benefits for Shelbyville Road (US 60 East)								**$1,295,478**

Figure 8: Annual Benefits for Shelbyville Road (US 60 West through St. Matthews)

				Dollars	Fuel Consumption	Total

Average Volume		Travel Time Reduction (sec.)	Annual Vehicle Hours Saved	Time Factor*		Annual Gallons Saved	Dollars	Dollars
Westbound								
AM Peak	2600	67.80	12,241.67	2.00	$475,882.55	14,690.00	$33,052.50	$508,935
PM Peak	1400	15.00	1,458.33	2.00	$56,691.25	1,750.00	$3,937.50	$60,629
Eastbound								
AM Peak	2600	15.00	2,708.33	2.00	$105,283.75	3,250.00	$7,312.50	$112,596
PM Peak	1400	88.80	8,633.33	2.00	$335,612.20	10,360.00	$23,310.00	$358,922
Total Annual Benefits for Shelbyville Road (US 60 West)								**$1,041,082**

Figure 9: Projected Emission Reductions for Shelbyville Road (US 60 East)

Total Annual Reductions in GHG emissions (g CO2 /year)	281,773,662
Total Annual Reductions in GHG emissions (g CO /year)	840,929
Total Annual Reductions in PM NOx Emissions (g/year)	92,578
Total Annual Reductions in PM Emissions (g/year)	40,250
Total Annual Reductions in NOx Emissions (g/year)	221,913
Total Annual Reductions in VOC Emissions (g/year)	184,471

Figure 10: Projected Emission Reductions for Shelbyville Road (US 60 West)

Total Annual Reductions in GHG emissions (g CO2 /year)	356,364,069
Total Annual Reductions in GHG emissions (g CO /year)	2,242,733
Total Annual Reductions in PM NOx Emissions (g/year)	314,351
Total Annual Reductions in PM Emissions (g/year)	33,670
Total Annual Reductions in NOx Emissions (g/year)	462,536
Total Annual Reductions in VOC Emissions (g/year)	166,176

West Broadway

West Broadway is an east-west route that crosses the historic west-end neighborhoods of Shawnee, Parkland, and California. Enhanced transit service along West Broadway is captured in the *Move Louisville* plan as a priority project, due to the route's high transit ridership and its connection to other major corridors such as Bardstown Road and Frankfort Avenue/Shelbyville Road. In April 2017, Passport Health announced plans to develop a 20-acre site for its headquarters and a surrounding healthcare campus at the intersection of West Broadway and Dixie Highway, a move that will bring 500 jobs to the area. As well, the Greater Louisville YMCA will build a $28 million branch at the same intersection. Transit routes connect citizens to Louisville Metro's Nia Center, a one-stop career center and small business facility promoting financial empowerment – TARC's overnight service for UPS employees in West Louisville stops at the Nia Center.

Traffic signals along West Broadway will be equipped with sensors that will communicate with transponders placed in buses traversing the route; such sensors will determine the length of green light cycles in order to most efficiently serve delayed buses. The proposed project will equip a limited amount of buses with transponders, as TARC buses in its current fleet are not dedicated to certain routes. Data collected from the pilot period will be utilized to justify future transponder purchases for Bus Rapid Transit vehicles as part of the wider Broadway transit enhancement project.

Radar sensors connected to traffic signals along West Broadway will provide real-time information on bus arrivals; this information will be displayed at select bus stops along the route to inform users of arrivals, departures, and delays.

Figure 11: Annual Benefits for West Broadway

Average Volume		Travel Time Reduction (sec.)	Annual Vehicle Hours Saved	Time Factor*	Dollars	Fuel Consumption		Total
						Annual Gallons Saved	Dollars	Dollars
Westbound								
AM Peak	350	48.00	1,166.67	2.00	$45,353.00	1,400.00	$3,150.00	$48,503
PM Peak	1000	72.00	5,000.00	2.00	$194,370.00	6,000.00	$13,500.00	$207,870
Eastbound								
AM Peak	950	72.00	4,750.00	2.00	$184,651.50	5,700.00	$12,825.00	$197,477
PM Peak	400	48.00	1,333.33	2.00	$51,832.00	1,600.00	$3,600.00	$55,432
Total Annual Benefits for West Broadway								**$509,282**

Figure 12: Projected Emission Reductions for West Broadway

Total Annual Reductions in GHG emissions (g CO2 /year)	50,545,355
Total Annual Reductions in GHG emissions (g CO /year)	337,219
Total Annual Reductions in PM NOx Emissions (g/year)	39,928
Total Annual Reductions in PM Emissions (g/year)	6,351
Total Annual Reductions in NOx Emissions (g/year)	61,029
Total Annual Reductions in VOC Emissions (g/year)	31,800

Westport Road

The section of Westport Road from Interstate 264 to Old LaGrange Road serves the suburban communities of Graymoor-Devondale, Bancroft, Briarwood, Langdon Place, Murray Hill, Creekside, Hickory Hill, Rolling Hills, Fincastle, and Worthington Hills in eastern Jefferson County. The Ford Kentucky Truck Plant, employing 8,000, is located on Westport Road near its intersection with Interstate 265. As well, several retail centers and schools line the route.

Eco-signal freight priority technology will be piloted at select traffic signals along Westport Road, targeting freight haulers associated with the Ford Kentucky Truck Plant and other area businesses and industries.

Figure 13: Annual Benefits for Westport Road

Average Volume		Travel Time Reduction (sec.)	Annual Vehicle Hours Saved	Time Factor*	Dollars	Fuel Consumption		Total
						Annual Gallons Saved	Dollars	Dollars
Westbound								
AM Peak	2000	87.00	12,083.33	2.00	$469,727.50	14,500.00	$32,625.00	$502,353
PM Peak	1500	15.00	1,562.50	2.00	$60,740.63	1,875.00	$4,218.75	$64,959
Eastbound								
AM Peak	1500	15.00	1,562.50	2.00	$60,740.63	1,875.00	$4,218.75	$64,959
PM Peak	2800	114.00	22,166.67	2.00	$861,707.00	26,600.00	$59,850.00	$921,557
Total Annual Benefits for Westport Road								**$1,553,828**

Figure 14: Projected Emission Reductions for Westport Road

Total Annual Reductions in GHG emissions (g CO2 /year)	4,239,565,560
Total Annual Reductions in GHG emissions (g CO /year)	17,787,300
Total Annual Reductions in PM NOx Emissions (g/year)	4,529,772
Total Annual Reductions in PM Emissions (g/year)	640,559
Total Annual Reductions in NOx Emissions (g/year)	5,104,080
Total Annual Reductions in VOC Emissions (g/year)	2,097,638

Environmental Benefit Projections

Vehicles idling at intersections emit the same hazardous pollutants as moving cars. The difference is that a queue of idling vehicles generates a concentrated hot spot of pollutants that increase the risk of negative health impacts for those in the immediate vicinity; this intensifies the urban heat island and negates emission improvement efforts. Wait times at the busiest intersections along routes captured in this project – including Shelbyville Road and Hurstbourne Parkway; Shelbyville Road and Breckinridge Lane; Shelbyville Road and Evergreen Road; Shelbyville Road and English Station Road; Hurstbourne Parkway and Westport Road; Hurstbourne Parkway and Taylorsville Road; and Cane Road and Lees Lane feature idling times over five minutes during peak traffic periods.

The proposed project will utilize radar sensor and camera technology to identify emissions hot spots along each identified corridor in order to influence the management of traffic signals from the Traffic Control Center. As well, data collected and stored in the data warehouse will be analyzed to determine intersections with frequent high idling times in order to implement long term solutions.

Figure 15: Annual Environmental Benefits for the Project (Total)

Total Annual Reductions in GHG emissions (g CO2 /year)	8,667,062,051
Total Annual Reductions in GHG emissions (g CO /year)	43,262,972
Total Annual Reductions in PM NOx Emissions (g/year)	8,290,403
Total Annual Reductions in PM Emissions (g/year)	1,086,499
Total Annual Reductions in NOx Emissions (g/year)	10,843,757
Total Annual Reductions in VOC Emissions (g/year)	4,419,110

Advanced technologies will allow the Louisville Metro Police Department to utilize collected data to discern areas along each route featuring high levels of speeding and red light running. Though this benefit is not yet quantifiable, public safety improvements are highly likely as a result of the proposed project.

III. Deployment Plan and Schedule of Project Deliverables

Figure 16 displays the planned deployment of identified technologies and offers a general schedule of project component initiation and completion. Suggested dates are based on the completion of the Kentucky Wired project in Jefferson County, which will install 96.6 miles of fiber optic cable to be connected to the proposed technologies.

Figure 16: Deployment Timeline

Item	Date	Description
Advertise for Project Manager position	September 2017	The description of the Project Manager position, responsible for overseeing the coordination of all project components and the data warehouse, will be advertised by Louisville Metro Government.
Hiring of Project Manager	October 2017	The Project Manager will be selected and hired; this position will be housed in the Public Works and Assets Department.
Project kick-off meeting	October 2017	The project team, including the Project Manager, will meet with USDOT staff to brief them on deployment and to provide technical updates and a clear timeline of project activities.
Hosting of informational summits	October 2017	The Project Manager and project team will host two distinct summits to inform stakeholders of project elements. The first will inform large freight haulers of the pilot eco-freight project and will be utilized to collect input on practical and effective deployment methods. The second will inform the general public of the project and will be utilized to collect general input on program elements.
Initiation of evaluation	October 2017	The University of Louisville Department of Civil and Environmental Engineering will initiate program evaluation, incorporating the project into the curriculum for one PhD student and two undergraduate students.
Framing of data warehouse	October 2017	The project team will solidify the parameters of the data warehouse and will initiate a data collection and dissemination plan.
Completion of Kentucky Wired project	December 2017	The Kentucky Wired project, in partnership with Louisville Metro Government, will complete 96.6 miles of fiber optic cable for government use. Proposed technologies will leverage this network.

Item	Date	Description
Equipment Procurement	October – December 2017	Providers of proposed equipment will be selected based on a bidding process following federal, state, and local procurement protocols.
Installment of equipment, Wi-Fi sensors, and hook-ups; upgrade of controllers.	January – June 2018	Appropriate hook-ups to the fiber network will be completed; equipment will be installed at appropriate locations; transponders will be installed in select vehicles; technologies will be deployed along all five corridors.
Technology testing period	August 2018	During the month of August, all program components will be tested and evaluated to ensure reliability once launched.
Soft launch of program components	September 2018	Limited services associated with proposed technologies will become available; technical issues with deployment will be resolved.
Completion of Report to the Secretary	September 2018	The Project Manager and project team will complete a report describing the deployment and operational costs compared to the benefits and savings, and how the project has met the original expectations projected in the deployment plan; this will be submitted to USDOT annually beginning one year after the project is awarded.
End of evaluation period	December 2018	University of Louisville students and staff will complete the evaluation and provide feedback and findings to the Project Manager and team.
Full launch of program components	December 2018	All deployed technology will go live and the continuous recording of data will commence in full.
Full initiation of data warehouse	December 2018	Collected data will be analyzed and disseminated to project partners and to traffic information providers such as Waze and Google.
Monthly Reports to USDOT	Ongoing	Progress reports to USDOT will be provided by the Project Manager on a monthly basis.

Louisville Metro Government's Department of Public Works and Assets will be responsible for long-term maintenance of the proposed technologies. A partnership of various Louisville Metro agencies, including Public Works and Assets, the Office of Performance Improvement and Innovation, and Information Technology will maintain the data warehouse, with input from identified project partners. Routine maintenance of deployed technologies and the data warehouse, including the continuation of the Project Manager position, will be incorporated in future budget requests from each agency; specifically, the Project Manager position will be included in the annual budget request for the Department of Public Works and Assets.

Proposed project components enjoy the full support of Metro Council members whose represented districts feature portions of the identified routes. Support of Metro Council members is found in both political parties represented on the Council, which is a strong indication of its continuation in future budget cycles. **Connection 21**'s link to the Kentucky Wired project, which brings added fiber connectivity to 25 of the 26 Metro Council districts, also increases its profile among Council members.

Obstacles to Deployment

Deployment of the proposed technologies should be relatively seamless and straightforward; however, adjustments to new technology may take time. Staff from the Department of Public Works and Assets as well as relevant partners must be trained on the functionality of the new technology. The project team will develop a training schedule to meet this need as equipment is procured.

Equipment installation may face scheduling challenges, as weather can be unpredictable in the region. As well, community events such as Light Up Louisville (the city's holiday celebration, lasting roughly two months from set-up to completion) and the Kentucky Derby will pull away some members of the electrical installation team. The project team is aware of these scheduling challenges and will be strategic in developing a sensible installation timeline upon award.

The project will be sustained via budget requests upon grant closeout. Though budget preparation can be an arduous and unpredictable process, the Kentucky Wired project enjoys solid political support from Louisville Metro Council members on both sides of the political spectrum. The benefits of the proposed project, verified by data collected and analyzed through the data warehouse, will be leveraged to supply further justification for continued maintenance of the deployed technologies.

IV. Vision, Goals, and Objectives for Deployment

The vision of **Connection 21** entails **enhancing the mobility, safety and efficiency of Louisville's transportation network through improved communication and coordination.** This vision will be achieved by instituting and deploying a series of advanced traffic control components to increase traffic network efficiency and communication between transportation agencies and systems – namely, the public, TARC, freight haulers, and emergency management and public safety agencies. This will be accomplished through a **multimodal integrated corridor management (ICM)** approach.

Goals and Objectives

- ***Increase accuracy and efficiency of public transit service along West Broadway and Shelbyville Road:*** both of these identified corridors are set to feature bus rapid transit lines as part of the city's *Move Louisville* plan. Both routes are characterized by dense populations and provide critical connectivity to employment centers. Each contains a large pedestrian presence with ample commercial and retail establishments. TARC has identified bus lines that traverse both routes with frequent stops to service the dense areas surrounding them. As such, this project proposes to utilize the high usage of both corridors to pilot enhanced communication techniques with transit users, including the installment of electronic real-time arrival and departure information for each bus as well as a real-time messaging application alerting users of delays.

- ***Facilitate the movement of goods along Cane Run Road and Westport Road:*** Cane Road Run services Jefferson Riverport International, which houses Kentucky Trailer, Coca-Cola Consolidated and more than one hundred manufacturing, logistics, and distribution companies; retail centers and small to mid-sized operations line the route as well. Westport Road features the Ford Kentucky Truck Plant, employing over 8,000 people, as well as several industrial and retail centers. Both routes manage continuous hauls of freight servicing these industries, supporting the economic vitality of the city. The proposed project will install technologies to allow for traffic signal preemption for freight haulers along these routes in order to create a more efficient flow of goods and increase safety.

- ***Reduce traffic congestion along all identified routes:*** the proposed technologies will allow for a real-time traffic monitoring system along each identified route to be managed by the Louisville Metro Traffic Control Center. Staff will have the ability to alter traffic signal patterns to better alleviate congestion 'hot spots,' which will lead to decreased idling times and therefore less travel time, a decrease in pollutants from idling vehicles, and more economic vitality.

- ***Establish a data warehouse based on a cloud model to evaluate project components and inform future advanced technology deployments:*** the proposed project will utilize installed technologies to create a continuous data feed, housed by Louisville Metro Government. Collected data will be leveraged by that offered by Waze and other applications, which will increase accuracy of results and allow for the development of an efficient, real-time communication system between the traffic technology network and its users – including the public, transit authorities, freight haulers, and public safety agencies.

Each of the objectives listed above will be made feasible by the installment of a state-of-the-art fiber backbone throughout Louisville and Jefferson County. The Kentucky Wired initiative offers the proposed project an affordable, manageable, and efficient method of installing the proposed technologies in a timely and effective manner to alleviate congestion and ease the movement of goods, people, and services.

The proposed project will meet the following goals for the ATCMTD initiative, as stated in the Notice of Funding Opportunity document:

- Delivery of environmental benefits that alleviate congestion and streamline traffic flow;
- Measurement and improvement of the operational performance of the applicable transportation networks;
- Reduction in the number and severity of traffic crashes and an increase in driver, passenger, and pedestrian safety;
- Collection, dissemination, and use of real-time transportation related information to improve mobility, reduce congestion, and provide for more efficient and accessible transportation, including access to safe, reliable, and affordable connections to employment, education, healthcare, freight facilities, and other services;
- Delivery of economic benefits by reducing delays, improving system performance and throughput, and providing for the efficient and reliable movement of people, goods and services;
- Accelerated deployment of vehicle-to-infrastructure and automated vehicle applications;
- Integration of advanced technologies into transportation system management and operations;
- Demonstration, quantification, and evaluation of the impact of advanced technologies, strategies, and applications toward improved safety, efficiency, and sustainable movement of people and goods; and
- Reproducibility of successful systems and services for technology and knowledge transfer to other locations facing similar challenges.

V. Existing Advanced Transportation Technology Investments to Leverage

Below are brief descriptions of projects and initiatives managed by Louisville Metro Government and its partners currently under way; each project features advanced transportation technology investments that will empower **Connection 21**.

Traffic Database

In September 2015, Louisville was named as the fifth city in the United States to develop a partnership with Waze, the world's largest community-based traffic and navigation application. A team of staff from Public Works and Assets, Information Technology, and the Office of Performance Improvement and Innovation hosts a shared database in which collected traffic information can be sent directly to Waze. The Louisville Metro team is now partnering with KYTC, TARC, TRIMARC, and KIPDA to collect a vast array of data to be shared with Waze and other real-time traffic information providers such as Google. This initiative has led to two City on a Cloud awards from Amazon in 2015 and 2017.

Data acquired through this project can be verified against data collected from Waze and other community-based reporting applications, leading to a higher accuracy rate of real-time information. The newly created database will allow traffic engineers and transportation planners to complete more traffic studies to improve congestion along key corridors and will save taxpayers significant money as outside consultants are less frequently procured to provide hard-to-access data.

The **Connection 21** data warehouse will be informed by the developing Louisville Metro traffic database, which will in turn be strengthened by the data stored in the warehouse.

Kentucky Wired

As earlier stated, the Kentucky Communications Network Authority (KCNA) is installing over 3,000 miles of fiber optic cable serving over 1,000 network sites across the Commonwealth as part of the $324.4 million Kentucky Wired initiative. Louisville Metro Government is partnering with KCNA to install 96.6 miles of fiber optic cable throughout Jefferson County, which will be utilized to facilitate the deployment of the technological advances captured in this application. The majority of fiber cable in Louisville will be installed underground along strategic routes in order to provide effective and efficient service to the largest amount of customers.

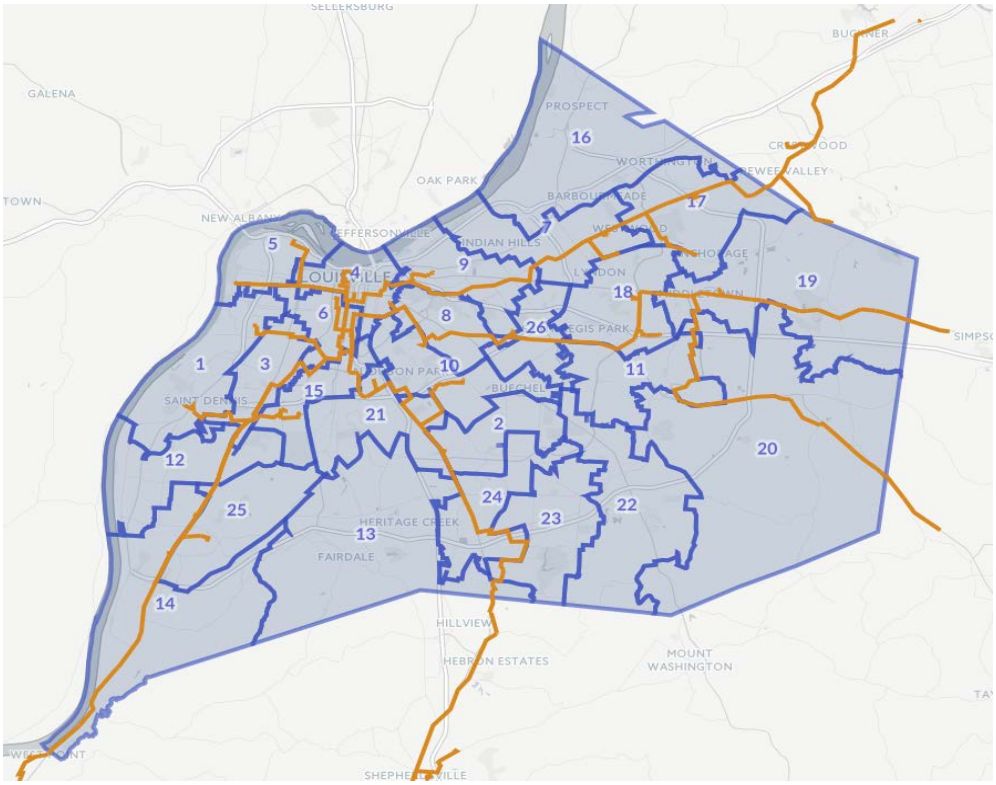
Fiber-based optical networking is the standard wireline technology. For several decades, fiber optic networks have consistently outpaced and outperformed other commercially available physical layer technologies. Advances in technology have made fiber architecture cost-effective for dense urban areas. Compared to other topologies, fiber-based optical networks will continue to provide the greatest overall capacity, speed, reliability, and resiliency. Fiber is not subject to outside signal interference, can carry signals for longer distances, and does not require amplifiers to boost signals in a metropolitan area broadband network.[8]

[8] "Fiber Feasibility Study" Prepared for Louisville Metro Government, June 2016. *Columbia Telecommunications Corporation.*

Upon completion, the expanded fiber optic network will increase the existing network by 400 percent. New fiber will be connected to 130 traffic signals, eighteen public safety cameras, and thirty-one Louisville Metro buildings. Smart City technology connected to the network will allow for increased government efficiency through fiscally-responsible deployment. Fiber optic cable not utilized has the potential to be leased to internet service providers and telecommunications companies; Louisville expects to generate at least $5.8 million in revenue annually from excess fiber.

Figure 17 displays the Kentucky Wired investment throughout Louisville Metro. The proposed project will directly utilize this investment and initiate a full-scale usage of advanced technologies to drive more efficient and effective traffic control measures.

Figure 17 – Kentucky Wired Investment in Louisville



Source: Kentucky Communications Network Authority, 2017

Traffic Signal Connectivity Pilot

Because of the mixed urban-suburban layout of Louisville and Jefferson County, running fiber optic cable to all intersections within the county is not financially feasible. Traffic signals outside of the fiber optic footprint must be manually adjusted on-site at each intersection as need arises. This re-timing process requires hands-on and on-site time for both traffic engineers and crews, removing them from their centers of work and wasting

time and fuel. Additionally, because many signals are not in direct communication with the control center located in downtown Louisville, the Traffic Control Center must rely on citizens to report when intersections are not properly functioning.

To address this dilemma, the Louisville Metro Office of Performance Improvement and Innovation (OPI2) partnered with the Department of Public Works and Assets to pilot a Smart City solution focusing on closing the capability gap of the Traffic Control Center. Working with Verizon and Digi, the partnership installed cellular communications platforms on fourteen signals on an outlying corridor of the city. Signals along the route now communicate with the Traffic Control Center in real time, and staff can respond to issues remotely without utilizing extra resources. Signal retiming in the area can now be completed rather than the previous time of two weeks. This project is scheduled to be scaled to over 300 signals across the county, giving the Traffic Control Center the ability to communicate in near real-time with thirty percent of the signals it previously had to manually mange.

New Dixie Highway

Dixie Highway, one of Louisville's busiest, widest, and most dangerous roads, carries over 60,000 vehicles daily and has a traffic fatality rate three times higher than comparable corridors. The New Dixie Highway project is a $30 million investment to improve safety, mobility and livability along the entire fourteen mile corridor, which intersects Interstate 264 and KY 841 (Gene Snyder Freeway). Construction will commence in 2017, thanks in large part to a $16.9 million TIGER grant from the US Department of Transportation.

Project components include roadway safety and design improvements such as raised medians and left-hand-only turn lanes, as well as high visibility bus stations and the region's first Bus Rapid Transit route. Dixie Highway serves over 4,800 transit customers daily. As well, a new Intelligent Transportation System is being implemented along the entire corridor to improve and coordinate traffic signal timing. Information collected from this system will influence the components of **Connection 21**, and data collected from traffic signal technology along Dixie Highway can feasibly be incorporated into the **Connection 21** data warehouse.

VI. Staffing Description

Proposed project components will be overseen and managed by a Project Manager, to be hired at the commencement of the grant period. This position will be housed in the Louisville Metro Department of Public Works and Assets and will answer to the Director of Transportation. A project team composed of staff from Louisville Metro agencies and community partners will coordinate the purchasing and installment of equipment and

develop a strategic deployment schedule based on the deployment plan included in this application.

A job description for the Project Manager is located in the appendix of this document.

The project team, whose resumes can be found in the appendix, is made up of personnel with combined decades of valuable transportation innovation experience. The team will meet biweekly during the first three months of the project period to ensure that all components are adequately coordinated. This will allow the Project Manager time to fully acclimate to the work environment and become familiar with each component. As equipment is purchased and installed, the project team will meet monthly to continue deployment coordination and advise the Project Manager.

A listing of project team members is found in **Figure 18:**

VII. Appendices

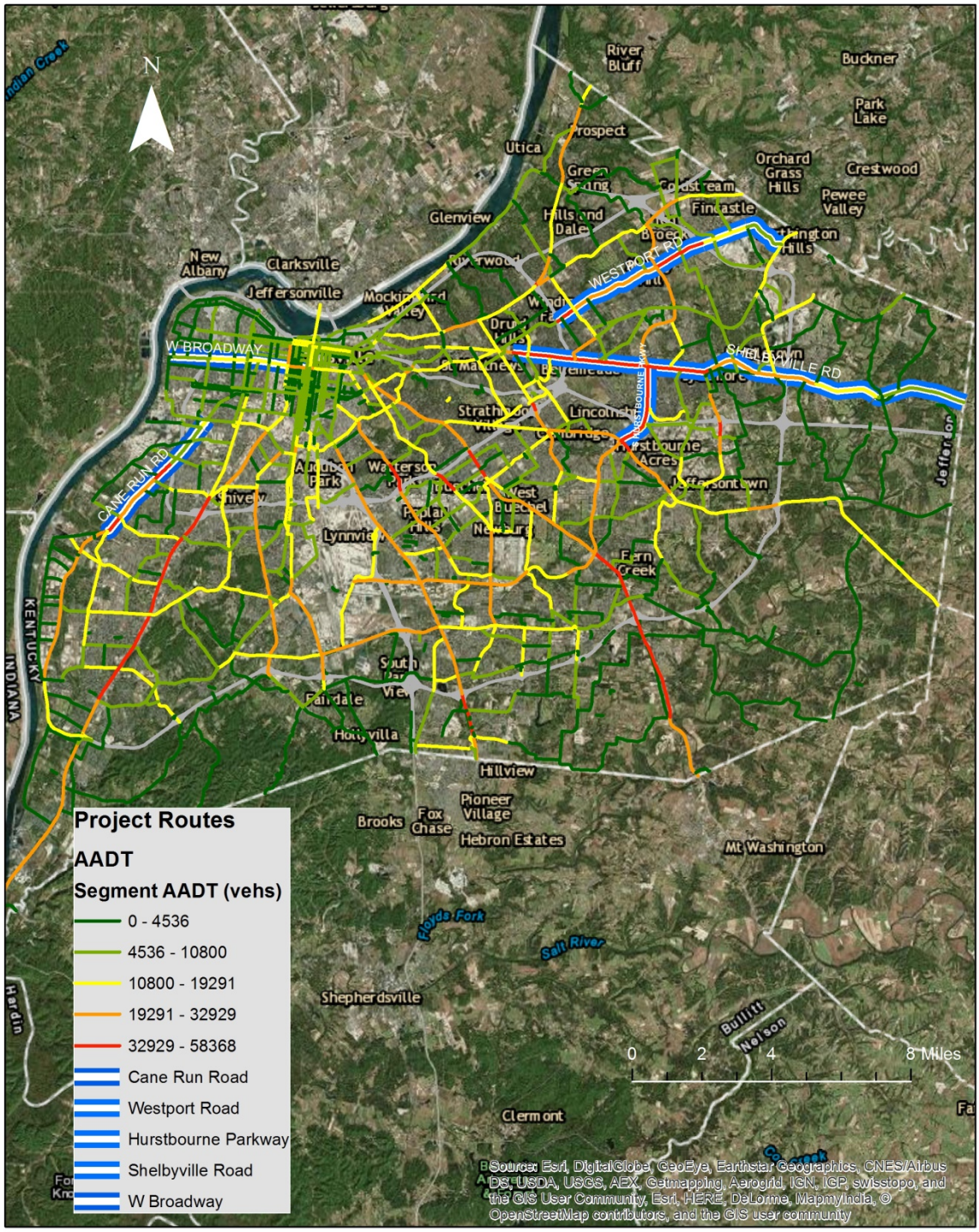
1. Project maps showcasing selected corridors

2. Project Manager job description

3. Resumes of key personnel

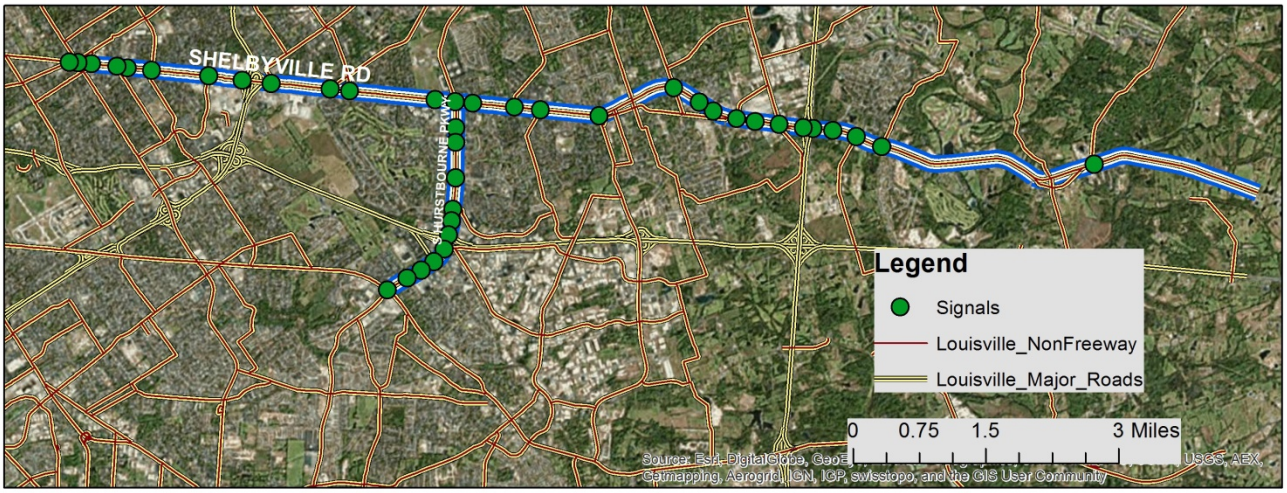
1. Project maps showcasing selected corridors

Connection 21: Project Routes

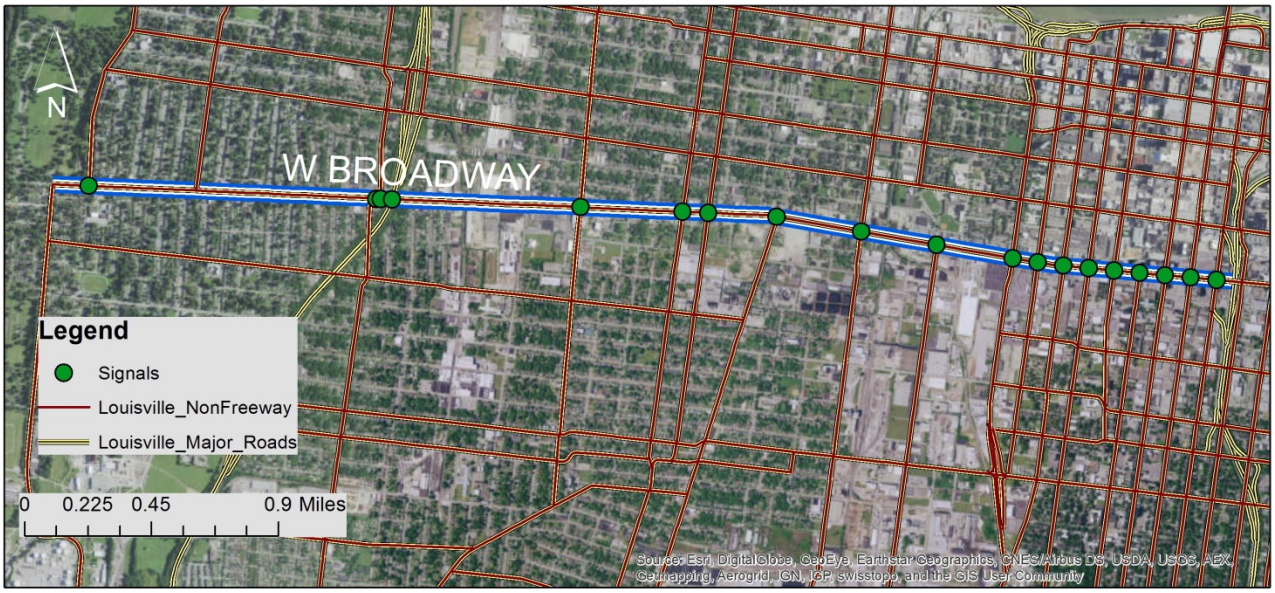


Cane Run Road Scope - Signalized Intersections

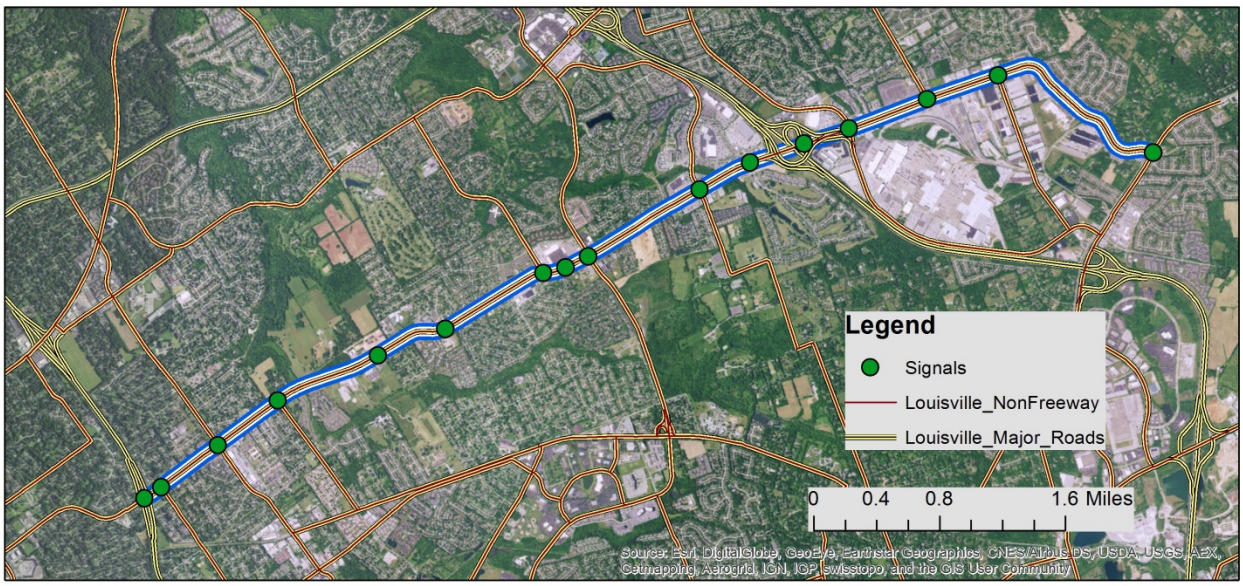
Shelbyville Road and S. Hurstbourne Parkway Scope - Signalized Intersections



West Broadway Scope - Signalized Intersections



Westport Road Scope - Signalized Intersections



2. Project Manager job description

JOB DESCRIPTION
Connection 21 Project Manager
Louisville Metro Government Department of Public Works and Assets

Effective Date:

October 15, 2017 to September 30, 2018; extension of appointment possible per budget allocation.

Essential Functions:

The Project Manager is responsible for the administration and coordination of all project elements under the US Department of Transportation 2017 Advanced Transportation and Congestion Management Technologies Deployment Initiative, including (but not limited to) direct oversight of all project components, review and reporting requirements, regular internal updates, and public outreach.

This position will direct the implementation and sustainability of the following project components:

- Management of city-wide traffic data warehouse;
- Oversight of advanced traffic control and modeling technology procurement;
- Oversight of advanced traffic control and modeling technology implementation and usage;
- Management of two informational summits to inform key stakeholders of project goals; and
- Analysis and evaluation of the project, in partnership with the University of Louisville Department of Civil and Environmental Engineering.

Project coordination will take place through monthly meetings of key project partners to ensure project milestones are met in a timely and efficient manner.

Minimum Requirements:

Bachelor's Degree in any of the following or related fields: Civil Engineering, Electrical Engineering, Public Administration, Urban Planning.

Three years of experience in project management, especially as it pertains to transportation and sustainability initiatives or local government planning efforts.

Skills and Abilities:

- Ability to handle multiple projects efficiently and to meet established deadlines
- Ability to work well as part of a team
- Ability to be flexible in meeting changing priorities
- Must be organized and able to prioritize workflow and competing demands
- Must work accurately with attention to detail
- Ability to communicate effectively and professionally
- Knowledge of and proficiency with Microsoft Office Suite and other software

Anticipated Salary: $100,000 with benefits

3. Resumes of key personnel (see attached)

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[redacted]

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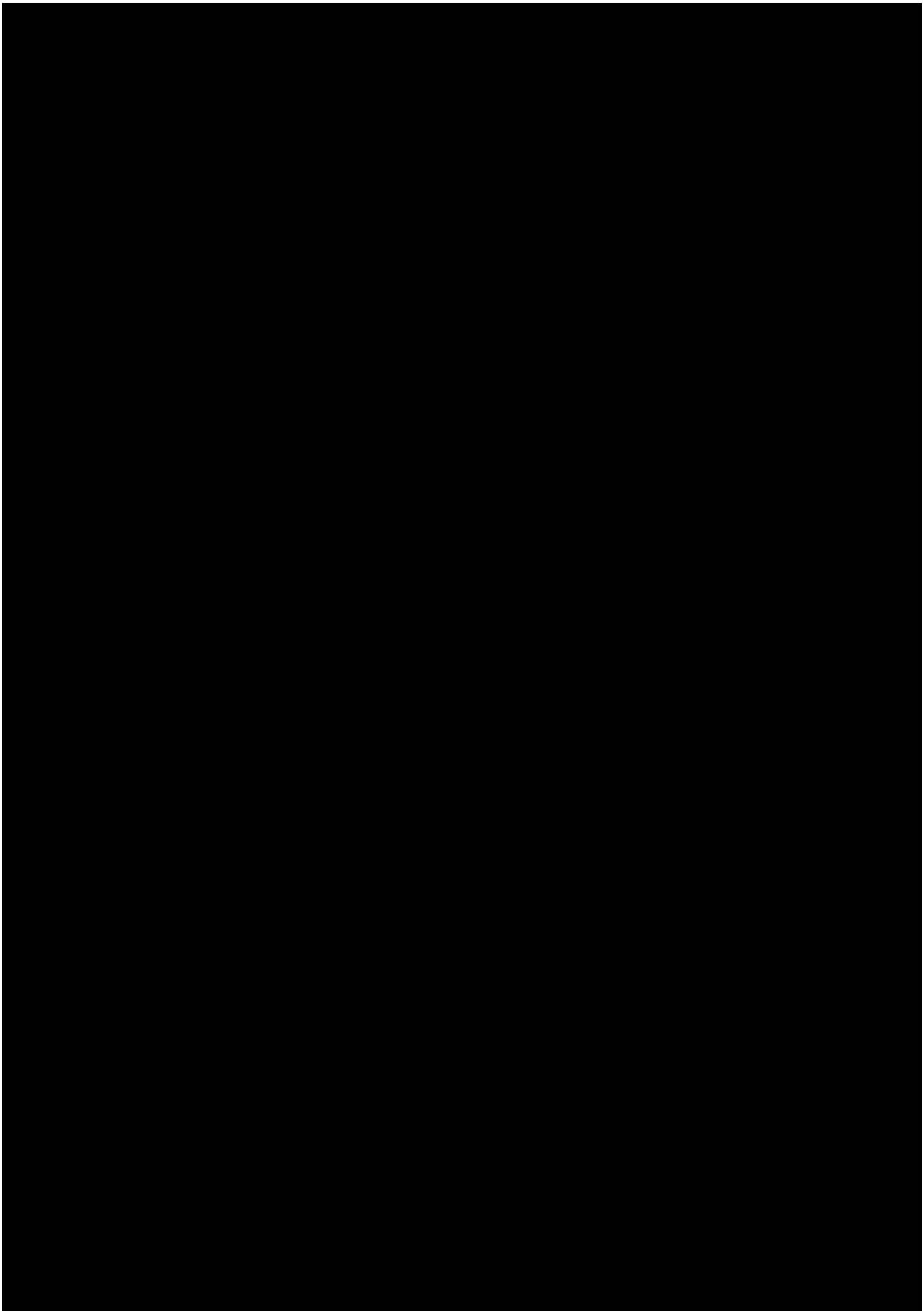
[redacted]



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Analysis of Roundabouts at Ramp Terminals

[redacted]

Ramp Terminals", Transportation Research Record: Journal of Transportation Research Board, No. 2637,

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