Complete Streets

Kansas City Regional
Freight Study

CONNECTED FREIGHT KC 2050

A Plan in Action

Prepared for:

Mid-America Regional Council

In coordination with

Lawrence-Douglas County Metropolitan Planning Organization

And

Pioneer Trails Regional Planning Commission

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Acronyms and Abbreviations

DOT	Department of Transportation
FHWA	Federal Highway Administration
ITS	intelligent transportation system
LDCMPO	Lawrence-Douglas County Metropolitan Planning Organization
MARC	Mid-America Regional Council
NACTO	Natgional Association of City Transportation Officials
PTRPC	Pioneer Trails Regional Planning Commission
SUV	sport utility vehicle

1. Introduction

As part of Connected Freight KC 2050: A Plan in Action, sponsored by the Mid-America Regional Council (MARC), Lawrence-Douglas County Metropolitan Planning Organization (LDCMPO), and the Pioneer Trails Regional Planning Commission (PTRPC), this white paper defines complete streets concepts, policies, and strategies as they apply within the greater Kansas City freight planning region, and the potential challenges with complete streets applications with respect to freight movements and delivery. Networks that offer a complete streets approach are crucial to improving mobility and efficiency for all users. Urban and rural complete streets strategies and three case study locations are included as sample policy and strategy applications within this white paper.

In addition to the information discussed in this document, refer to the first mile last mile white paper that highlights strategies and implementation in detail. This document supports first mile last mile policies and identifies key overlapping elements of first mile last mile and complete streets design practices.

2. Complete Streets Design

Complete streets are designed to ensure safe and efficient mobility for all users including drivers, pedestrians, bicyclists, and public transit riders of all ages and abilities. These streets incorporate various design elements such as sidewalks, bike lanes, bus stops, crosswalks, and accessible signals tailored to the community's context. Supported by state, regional, and local policies, complete streets aim to reduce crashes, improve safety, and encourage walking and biking as part of an active lifestyle. More information regarding policies can be found through the Federal Highway Administration (FHWA) website (https://highways.dot.gov/complete-streets) as well as The Smart Growth America National Complete Streets Coalition and the publication "Complete Streets Complete Networks: A Manual for the Design of Active Transportation" website (https://atpolicy.org/resources/design-guides/complete-streets-complete-networks-design-guide) published by the Active Transportation Alliance and supported by the National Association of City Transportation Officials (NACTO). Additional information can also be found on the U.S. Department of Transportation, FHWA website (https://highways.dot.gov/complete-streets/plan-and-analyze-complete-streets) and the American Planning Association website (www.planning.org/planning/2014/may/completestreets.htm).

2.1. Urban, Suburban, and Rural Complete Streets Applications

The design process for complete streets emphasizes creating safe, accessible, and efficient transportation systems by considering the broader context and purpose of streets. Streets are categorized into context zones based on development patterns of urban, suburban, and rural zones. The adjacent land uses must also be categorized into commercial, residential, or mixed-use, which guide design decisions and prioritize specific transportation modes. A "context sensitive" design approach is recommended, focusing on the overall network context rather than individual roadways.

Streets can be classified into typologies including boulevards, avenues, streets, and alleys, each tailored to accommodate different modes of travel. Specific zones and overlays (school zones, parks, pedestrian-priority areas, green streets) receive unique design considerations to address specific community needs. Overall, the goal is to balance multimodal transportation demands, enhance safety, and integrate sustainable design principles across urban, suburban, and rural environments. It is crucial that the primary objectives focus on mobility needs (planning and design phase public input) is vital to ensure public funds are representative and consistent with community needs.

A well-designed complete street consists of two primary components, pedestrian and travel. Pedestrian includes frontage zones, pedestrian pathways, and buffer areas to ensure safety and accessibility for walkers. Travel incorporates bikeways, parking areas, vehicle lanes, and medians supporting a diverse mis of transportation modes. These two elements must be integrated carefully to address local needs and enhance functionality. **Figure 1** displays a typical complete streets cross-section.

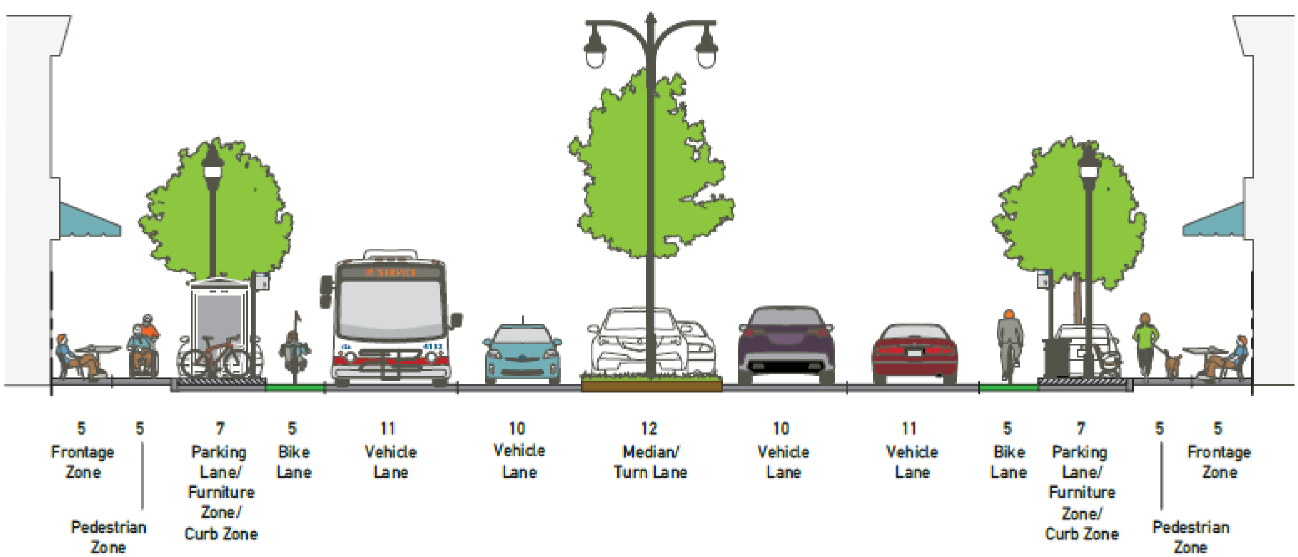

Figure 1. Typical Complete Streets Cross-Section Application

2.1.1. Rural Complete Streets Characteristics

Special consideration should be given to applying complete streets concepts in rural areas because design elements that accommodate all users and modes are often not considered necessary in these less populated areas. Complete streets are essential in rural areas because they enhance safety, foster economic growth and equity, improve connectivity, empower local communities, and promote public health. By addressing the unique needs of rural environments, complete streets ensure that all users (pedestrians, cyclists, drivers, others) have safe and efficient access to transportation networks.

Implementation of complete streets in rural areas involves navigating complex jurisdiction (specific land use and local policy frameworks). Multiple entities, including departments of transportation (DOT), municipalities, townships, and county governments, must work together to oversee and manage corridors to ensure design consistency across jurisdictions at a regional scale. Each jurisdiction plays a specific role, requiring coordination to ensure cohesive planning and well executed network capabilities.

Rural areas typically feature diverse land uses including residential, commercial, industrial, open spaces or agricultural, and overlay zones such as campuses or main streets. The intensity of development varies by location. Areas outside towns often have low-intensity development, while the edges of towns experience moderate-intensity growth. Town centers, where activity is most concentrated, are characterized by high-intensity development patterns. These diverse land uses and densities affect the complete street network greatly and need to be considered on a case-by-case basis to prioritize all modes of travel necessary for personal and commercial mobility.

Source: FHWA Complete Streets Design

Figure 2. Typical Rural Street/Highway without Complete Streets Application (left) and Rural Highway with Widened Shoulder for Cycling (right)

Planning agency jurisdictions covering the rural areas in the broader Connected Freight KC 2050 study area, which include the PTRPC and LDCMPO, do not have formal complete streets policies to evaluate for better freight policy integration with rural complete streets policies and design.

However, the following sections discuss urban, suburban, and rural challenges with integrating freight considerations with complete streets policies and designs.

2.2. Challenges When Incorporating Freight into Complete Streets Applications

The primary purpose of local streets is to allow circulation rather than higher speed travel between places. Local travel is more likely to take place on foot or by other non-motorized means, especially in downtowns, densely populated residential neighborhoods, or suburban shopping and retail centers where destinations are close together. Local street networks are often designed with narrow lanes, on-street parking, and block-by-block intersections, all of which slow traffic and are inhospitable to many freight vehicles. The biggest vehicles that local streets are typically expected to accommodate are fire trucks, trash trucks, school buses, and sometimes transit buses.

Introducing large freight shipping or delivery trucks onto local streets designed for smaller vehicles, and where pedestrians, bicyclists, and other active transportation users may create numerous conflicts. Large delivery trucks with many drivers blind spots create a danger to pedestrians, especially when making turning or backing maneuvers. This can also be true for smaller trucks and sport utility vehicles (SUV). Trucks generate noise and emissions, which can make the pedestrian environment unpleasant. Delivery vehicles may impede and obstruct local traffic when they try to negotiate tight turns, they block lanes while backing into loading docks or stop in travel lanes to unload. Low overhead clearances or a bridge with weight limits create conflicts and limit navigation. Trucks create more damage on road surfaces through wear and tear, which can compound quickly on streets and infrastructure that were not constructed with appropriate pavement.

Additional challenges that generally apply to rural, suburban, and urban complete streets applications include:

- **Navigation Challenges:** navigational challenges include restricted turns, conflicts with vulnerable roadway users, navigating speed bumps, tables, and other traffic calming techniques, and maintaining reasonable route access on typical and alternative paths.
- **Parking and Loading Challenges:** finding adequate space for parking and loading and finding safe and efficient paths to access sidewalks and buildings.
- **Incompatibility with pedestrian movements:** narrow lanes, raised median islands, intersection corner bulb-outs, and neckdowns for traffic calming all pose substantial challenges for freight movements and deliveries along complete streets corridors.
- **Other specific freight movement challenges:** intersection turning movements such as unprotected left turns and right turns on narrow streets, entry to driveways, loading

docks, and alleys, and entry to, navigation of, and exit from traffic circles and roundabouts.

- **Freight supportive actions and policies to integrate into complete streets policies**

While generally not an initial consideration as part of implementation of complete streets strategies, complete streets policies and designs should include factors for freight transportation and goods movement. A first mile freight concept is the transportation of completed goods or products from the factory or production plant to a distribution center. Last mile transport operations include moving these products or goods from a warehouse or distribution center to the desired delivery location, such as retail stores, office and business centers, and residential communities. First and last mile connections link 'truck-generating' facilities to mainline routes of travel. Specific freight first mile and last mile considerations and factors that complete streets polices should accommodate include:

- **Truck route networks:** many roadways that are under consideration for complete streets applications are also designated truck routes where freight is intended to be picked up, shipped, or delivered. Complete street applications on truck routes may benefit from time-of-day turn restrictions to reduce vehicle, pedestrian, and bicycle conflicts and arterial restrictions that maximize the use of the arterial roadway network as truck routes. Arterial restrictions may also allow for non-arterial street use for pick-ups and deliveries. Before designating truck routes where complete streets applications are planned or present, it is critical to study current trends in truck movement and identify routes with appropriate geometry to ensure efficient connectivity.
- **Last-mile strategies:** last mile delivery represents the final leg of the supply chain as goods are delivered from production to consumption, generally at building loading docks, driveways, or curbside. Complete streets applications should consider curb management, parking arrangement, or designated loading/unloading spaces in coordination with time-of-day strategies.
- **Technology:** intelligent transportation systems (ITS) can support the management of urban road freight transportation. ITS supports and enables efficient infrastructure use and policies. For complete streets applications, ITS can provide real-time information to freight (and other) users such as traveler information, truck parking, ramp metering, and incident management directives.
- **Land use policies:** multiple land use applications, tools, and policies can be implemented to support and accommodate freight, including:
  - Reinvestment in existing industrial spaces
  - Scenario and regional planning that bring stakeholders together for common understating

- Zoning tools to preserve industry and limit freight impacts
- Promoting context sensitive site and building design features
- Develop collaborative relationships among cities for effective road freight transportation management
- Public-private partnerships that promote urban road freight transportation management in metropolitan areas that involve national and municipal governments, multimodal freight carriers using railways and roads, researchers, and consultants.

3. First Mile Last Mile and Complete Streets

3.1. Collaborative Approach

Policies and strategies for first mile last mile infrastructure often vary depending on infrastructure development opportunities and constraints, geographical conditions, and the specific needs of surrounding land uses, industries, and manufacturing, with a focus on enhancing movement efficiency and reducing transportation costs. In collaboration with complete streets recommendations, the following are some policies and/or strategies to consider:

- Prioritizing corridor-enhancing strategic multi-jurisdictional, efficiency and safety enhancing roadway and rail infrastructure investments identified through comprehensive freight network planning efforts.
- Investing in sustainable freight planning and infrastructure improvements that result in reduced greenhouse gas emissions by providing connected and safe active transportation networks for non-vehicular mobility.
- Enhancing vehicular, bicycle, and pedestrian safety by providing alternative routes for reducing freight delivery and shipping in higher density areas.
- Development of zoning codes that promote economic development and growth that is in alignment with the core functions of adjacent roadways (freight and vehicular corridors, multimodal biking and walking corridors, transit corridors).

Typical freight first mile last mile strategies for implementing freight system improvements are mentioned in the first mile last mile white paper previously prepared and provided as part of the Connected Freight KC 2050 Plan. A summary of first mile last mile considerations, design standards, and policies for urban and rural applications include:

- Urbanized or densely developed geographies:

- **Curb space management:** providing adequate curb space for trucks through signage, enforcement, and geometric design details such as curb space lengths, height, and type (rolled/sloped versus raised/high-profile).
- **Micro freight hubs:** allowance for consolidating similar freight generators and receivers with similar small-package freight shipping and delivery needs into hubs that provide reductions in pick-ups and deliveries resulting in fewer freight vehicles.
- **Off-peak deliveries:** allow for pick-ups and deliveries during non-peak congestion periods, including early morning and late-night arrival and departure windows.
- **Autonomous vehicles (cars, vans, drones):** use of driverless vehicles that reduce the impact on congestion and provide efficiency by reducing the number of drivers.
- **Vehicle size limits:** restricting large vehicles to certain delivery windows (often off-peak periods) or prohibiting congestive-type vehicles from utilizing certain roadway segments, forcing the use of smaller, nimbler, and less congestion-causing vehicles.
- **Coordinate traffic signal timing:** conduct traffic signal timing studies for urban arterials, placing an emphasis on identifying strategic first mile last mile corridors to provide optimal signal timings and detection for truck operations and reductions in engine idling that result in improved air quality.
- **Freight design requirement training:** support municipal training on design requirements of freight-intensive development to accommodate freight needs in central business districts.
- **Freight parking:** develop plans and policies to identify and accommodate safe freight vehicle parking during deliveries without creating additional traffic congestion. Examples of this include middle two-way left turn lanes (in an otherwise two-lane area) that double as short-term or temporary parking lanes and temporary staging lots that allow for metered freight delivery flow in areas of high-density shipment receiving.

- Rural or non-urbanized geographies:
  - **Increase signage and wayfinding:** designate truck routes and provide enhanced signage emphasizing routes providing first mile last mile routing for major freight generators in rural areas so that the first mile last mile network is readily known to providers.
  - **Increase truck parking capacity:** provide additional overnight, rest, and respite facilities for long-haul freight shipping vehicles to service outlying rural areas.
  - **Rural-focused freight vehicle design requirements:** Ensure adequate lane and shoulder widths, pavement thickness, and appropriate load ratings on roads, bridges, and parking areas through training and design manuals.

- **Environmental enhancements:** local and regional policies and ordinances focused on reducing engine idling and engine braking will improve air and noise pollution. Signage and other notification methods for drivers are essential to successful reduction or mitigation of noise and air impacts.
- **Manage conflicts:** protect rural freight generator clusters and areas of high importance and implement "freight-first" policies to reduce conflicts at those clusters and at ports, airports, and intermodal hubs.
- **Educate and train:** educate and train local and regional rural planning stakeholders about freight operations and economic and quality of life impacts resulting from inefficient operations.
- Coordinate freight plans and programs of municipalities.
- Prioritize freight focused projects.
- Encourage consolidation of freight focused land developments into a freight hub and with rail access.
- Preserve deteriorating roads, rails, and bridges.
- Maintain a minimum vertical clearance on first and last mile designated routes.
- Locate value added services (logistics, packaging, labeling) and employee housing close to new freight focused land developments.

4. Complete Streets Case Studies

4.1. Harrisonville, Missouri – Rural and Urban Mix

Harrisonville is in Cass County, Missouri with a population of approximately 10,000 residents. The city is part of the larger Kansas City metropolitan area and is connected by Interstate 49 which serves as part of a major national truck corridor network. The other two major routes located in the city offer more local freight corridors located primarily on MO-7 (Mechanic Street) and MO-2 (South Street). A map of the case study area is shown in **Figure 3**.

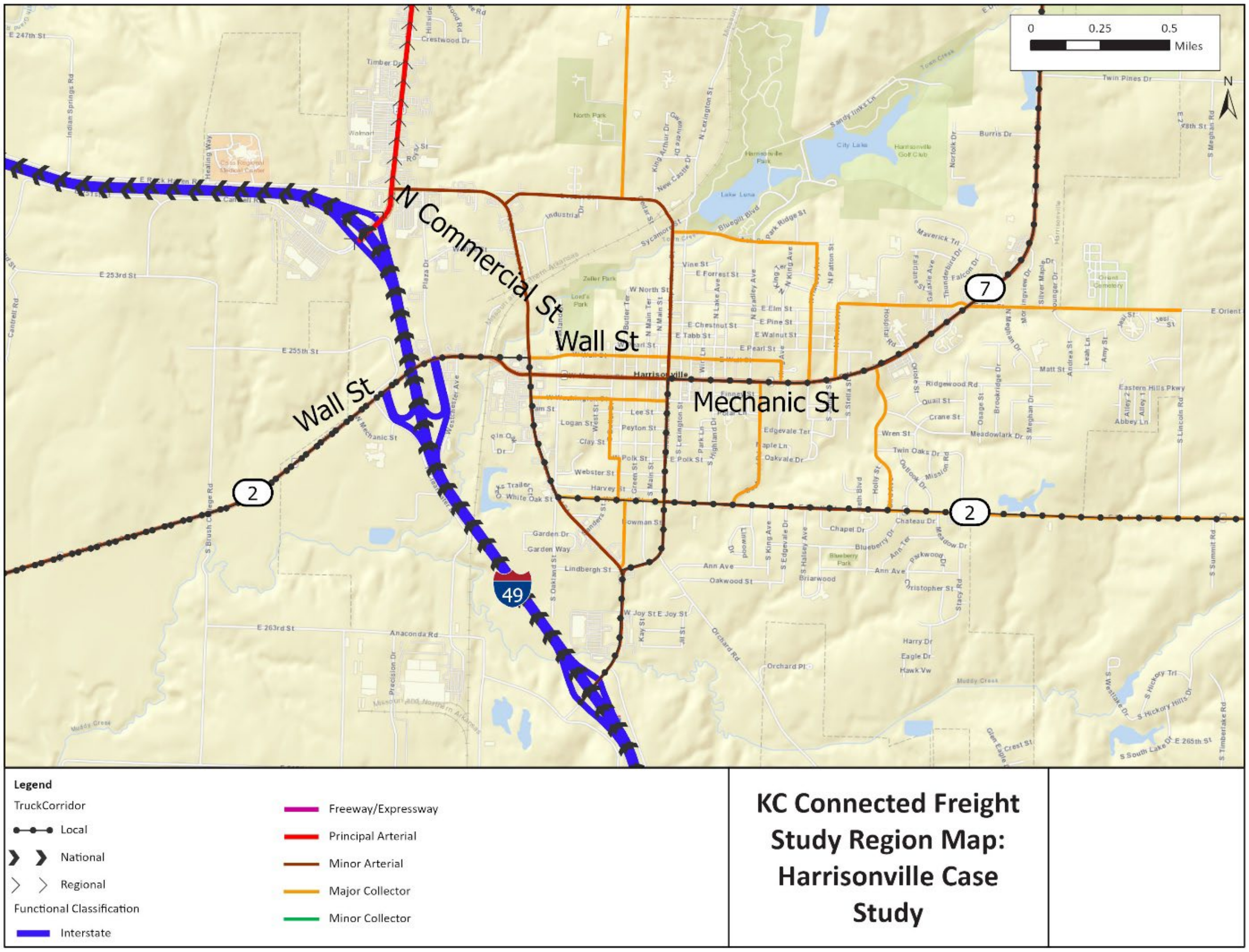

Figure 3. Harrisonville Case Study Area Map

Due to the importance of avoiding geometric constraints on heavy truck corridors, these routes should include wider 12-foot lanes for heavy truck traffic as shown in **Figure 4** and **Figure 5**. The wider paved shoulder would accommodate lower volumes and lower speeds, although higher volumes or higher speeds could warrant a buffer for active transportation modes. **Figure 5** demonstrates a typical cross-section for cycling with a buffer from traffic.

Looking at the classification of the roadways within city limits, a reasonable approach would be to assume that North Commerce Street, one of the few minor arterials not covered with truck corridor routes, will not require wider lanes for freight and can utilize the extra width for possible bike lanes or wider shoulders. Similarly, the major collector routes around the city connect more local traffic and would be potentially adequate to provide pedestrian, vehicle, and bike travel ways in the roadway elements along these corridors to best accommodate shorter distance trips as shown in **Figure 4** through **Figure 6**. The existing right-of-way varies along these corridors, but as an example, along North Commerce Street, the cross-section includes a two-way left turn lane with two lanes in each direction, thus adding a paved sidewalk with a buffer would be an example of a low cost change that could provide pedestrian safety for local residents who currently use these routes. It is crucial to remember public involvement to receive feedback related to cross-section element changes will help identify key areas that are lacking the physical elements to provide safe movement around the community.

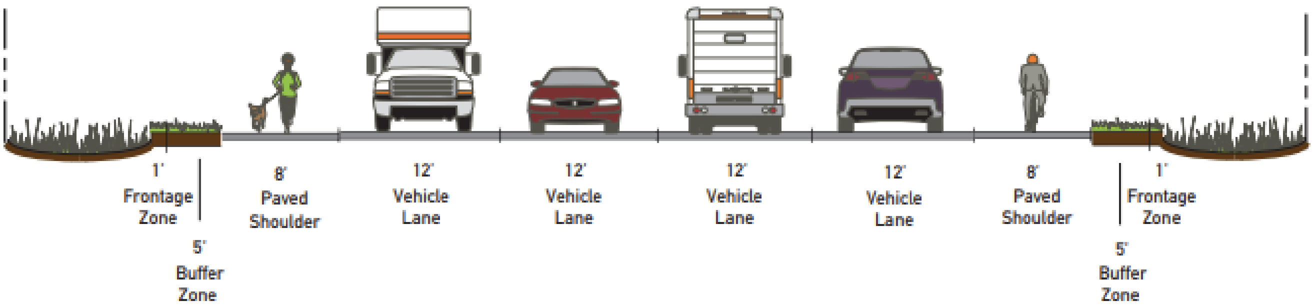

Figure 4. Boulevard with Low Density Cross-Section

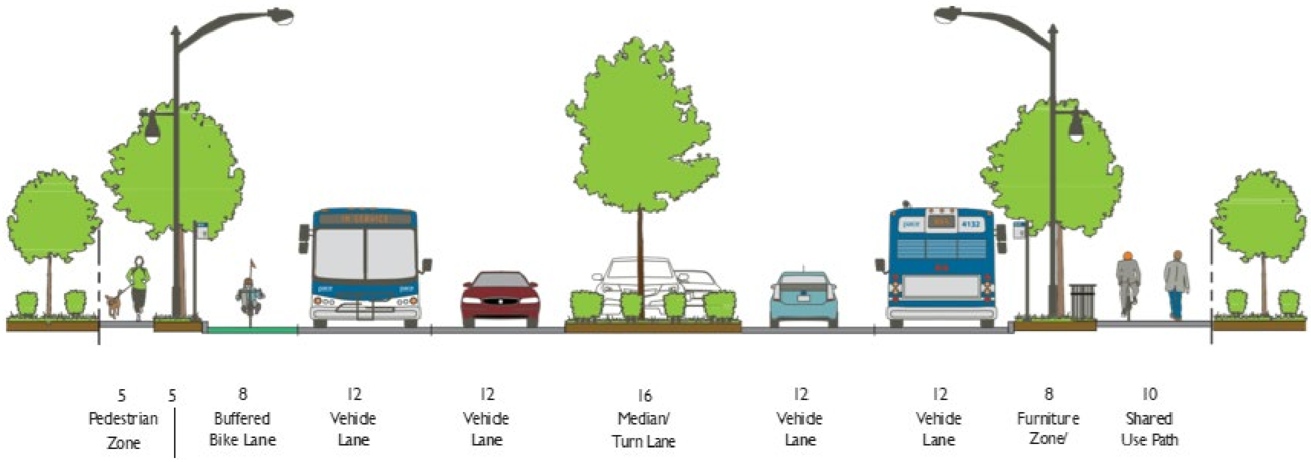

Figure 5. Boulevard with Buffer-Separated Spacing for Cycling

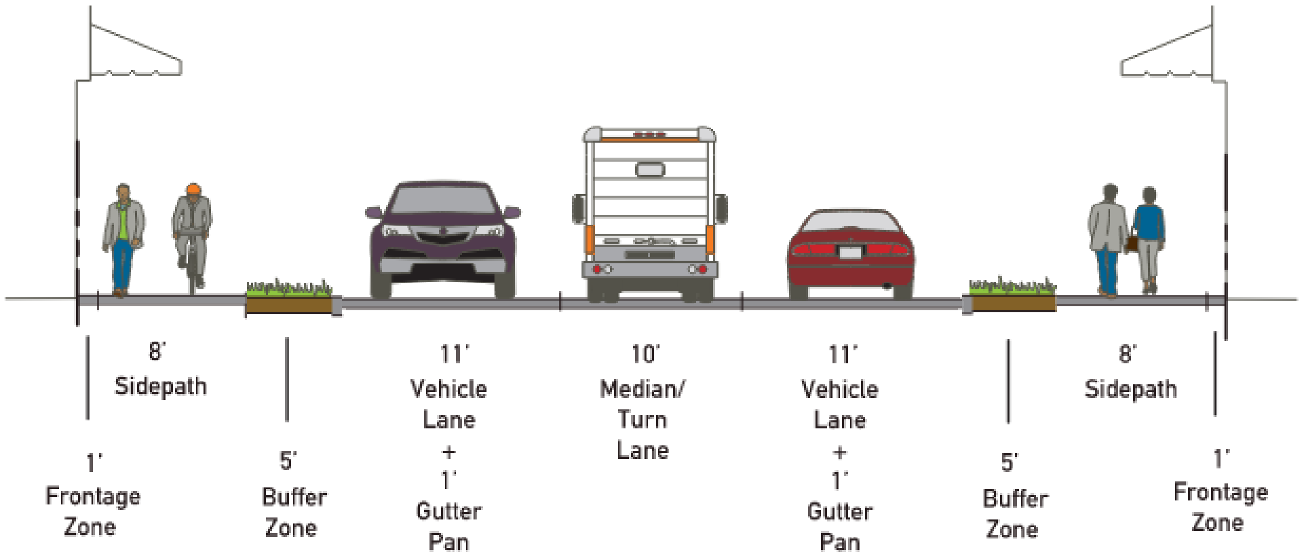

Figure 6. Commercial Street with Medium Density Cross-Section

4.2. Pleasant Hill, Missouri – Rural

Pleasant Hill is in both Cass County and Jackson County, Missouri and has a population of approximately 9,000 residents. The city is part of the larger Kansas City metropolitan area and is connected by state routes MO-7 and MO-58 which both primarily serve local truck traffic. Main Street is part of MO-7 and is adjacent to primarily commercial land uses within city limits. A map of the case study area is shown in **Figure 7**.

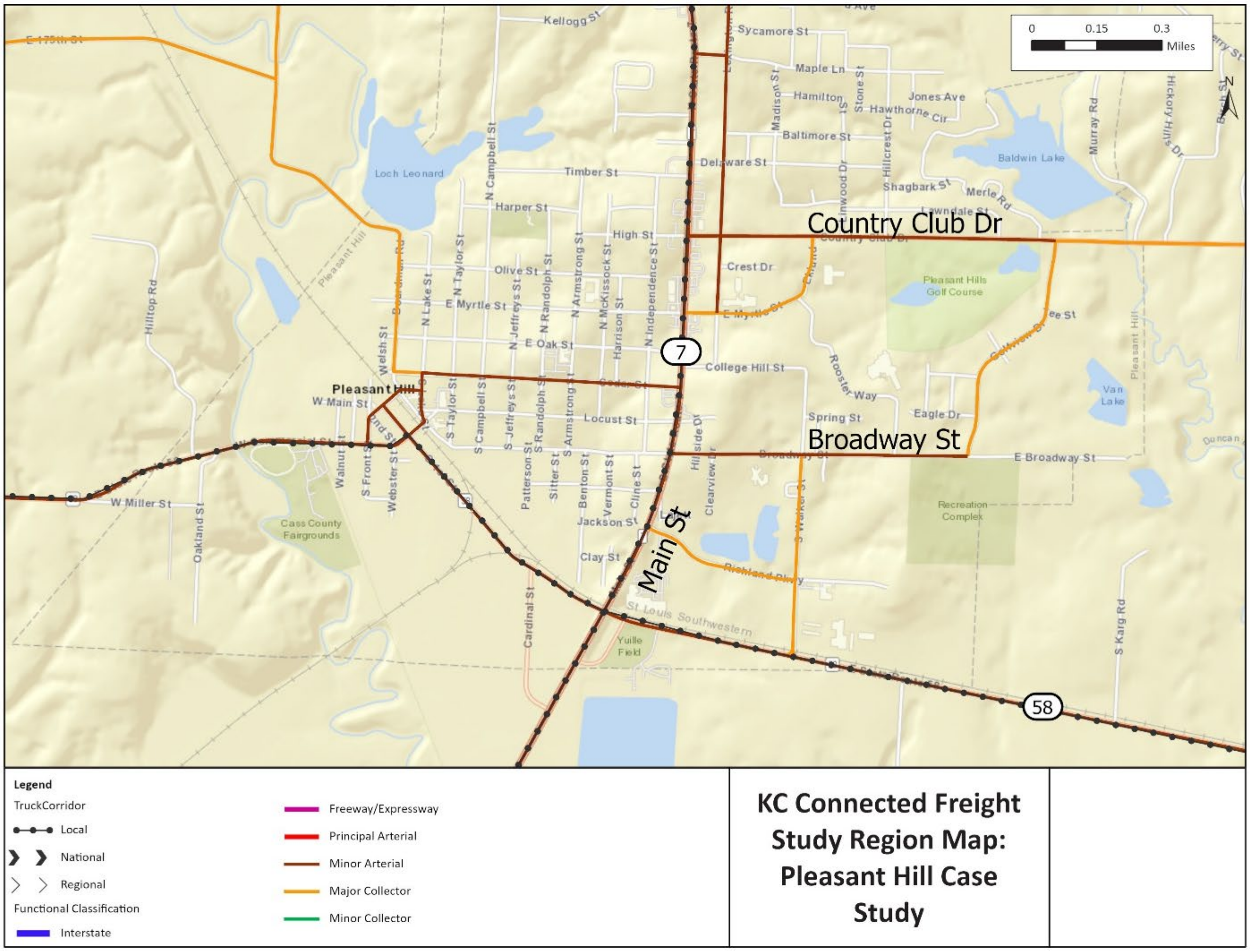

Figure 7. Pleasant Hill Case Study Area Map

For this segment it would be crucial to incorporate a Main Street overlay with truck lane widths ranging from 10 to 12 feet as shown in **Figure 8**. The minor arterials of Country Club Drive and Broadway Street both serve as collectors for less dense, primarily residential functions. The community would benefit from provision of vehicle, pedestrian, and bike lane access. On the west side of Main Street, Cedar Street provides access to higher density, primarily residential land uses that could be better served by the cross-section shown in **Figure 9**. All public schools are located along Myrtle Street, which could be an ideal location to provide dedicated pedestrian pathways along the street to increase safety and encourage active modes of transportation.

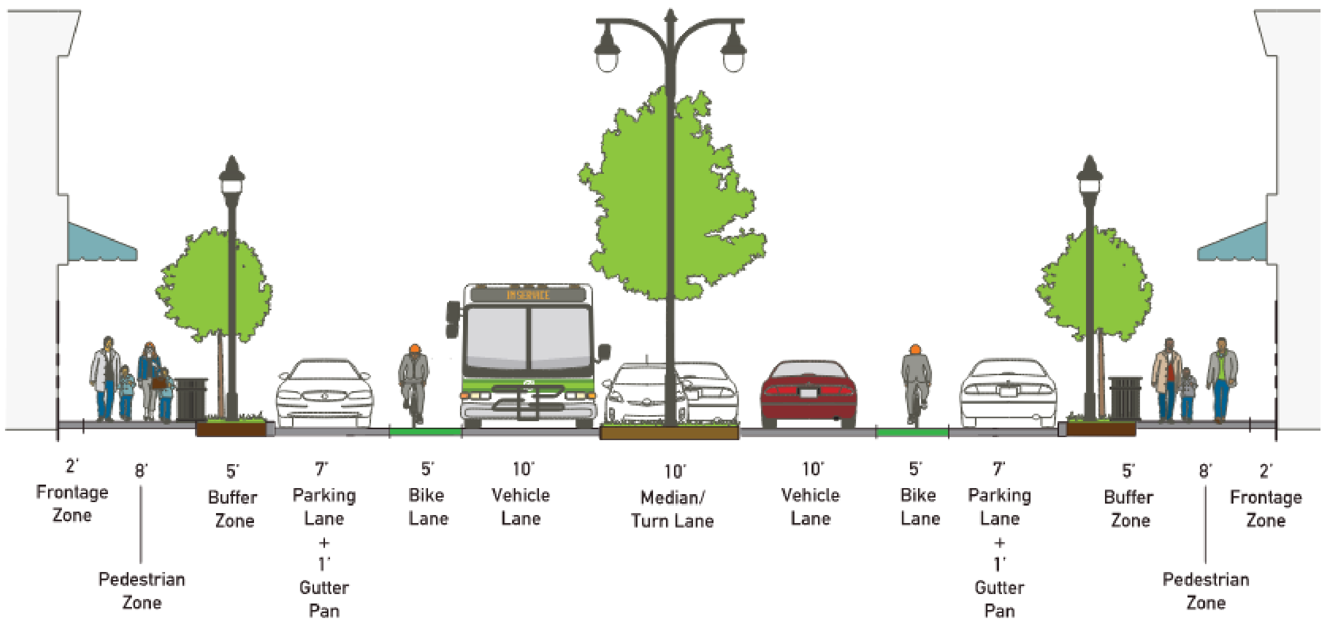

Figure 8. Main Street Overlay Cross-Section

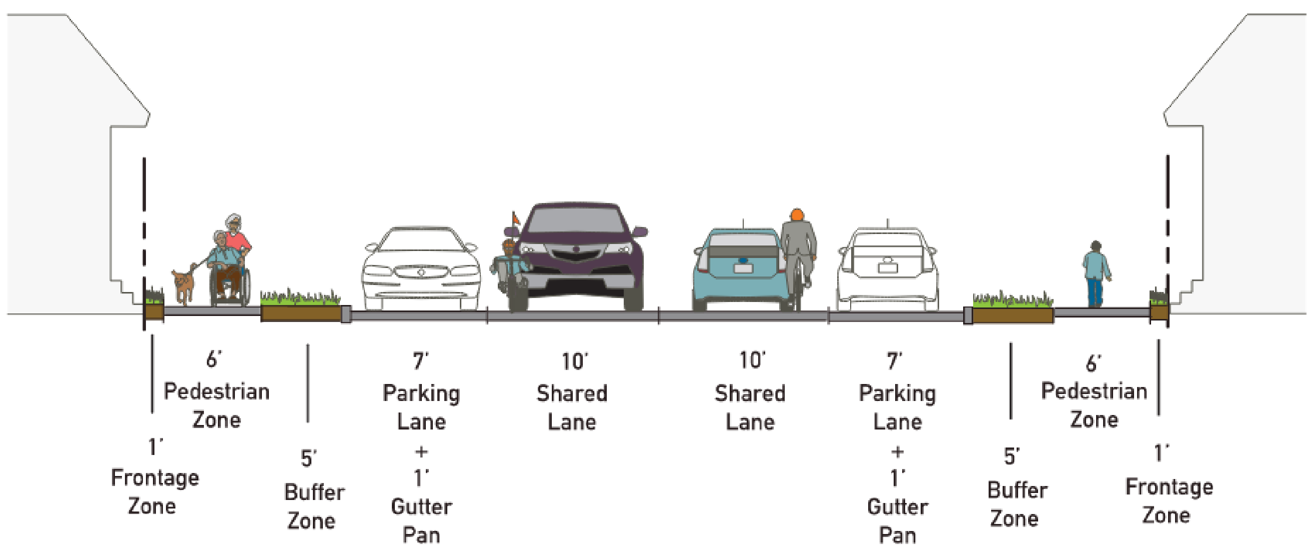

Figure 9. Residential Street Medium to High Density

4.3. Burlington Street Corridor, North Kansas City, Missouri – Urban

The Burlington Street Corridor serves the city of North Kansas City and is an important connection over the Missouri River to downtown Kansas City. This case study is an excellent example of an urban location with complete streets policy consistent recommendations implemented. The Burlington Complete Street Plan outlined the process, vision, and corridor implementation plan for establishing a unified vision to transform the route into a vibrant and sustainable complete street. This study highlights the importance of identifying existing bike/pedestrian walkways, transit paths, utilities, traffic signals, crosswalks, traffic, and lighting needs. The vision identified in the study was created with public input to highlight the potential of installing bike lanes, shared use paths, future transit needs, roadway and parking needs, and landscaping. Ultimately, this case study demonstrates how implementing complete streets goes beyond focusing on corridor vehicular traffic to place importance on elevating diverse mobility options that will enhance the adjacent communities.

Purposeful freight provisions and considerations found in the proposed vision for the corridor, illustrated in **Figure 8**, included a center turn lane that provided for left turning movements at key intersections, which were important for both first mile and last mile freight phases in the commercial and industrial corridor. Additionally, truck turning movements were considered at intersections to ensure turning movements were not inhibited while still providing expanded areas for pedestrian activity behind the back of the curb. On-street parallel parking was proposed to be maintained on the west side of the corridor to continue to facilitate both passenger and freight parking. Existing loading docks with direct access to Burlington Street would also be accommodated with ingress and egress coordinated with planned pedestrian sidewalk areas and cycle track.

For more information related to this study, refer to the City of North Kansas City's project website (https://www.nkc.org/government/community-development/current-projects/burlington-corridor-project).

Figure 10. Burlington Corridor Existing (above) and Proposed (below) Conditions at the Burlington Street and Armour Road Intersection

5. Freight Considerations for Complete Streets

This white paper highlights the pivotal role of complete streets in fostering safer, more accessible, and efficient multimodal transportation networks across urban, suburban, and rural settings, while also considering the importance and possibilities of accommodating freight in complete streets applications. While not all complete streets strategies and elements are compatible with freight (tight turning radii, cross-section, lane width reductions, on-street parking elimination), communities can and should consider freight vehicular, business, and residential needs when planning for complete streets applications. Integrating context-sensitive design principles can balance mobility needs, promote sustainability, and enhance community well-being while also allowing for continued freight deliveries, access, and accommodation with intentional consideration. The case studies of Harrisonville, Pleasant Hill, and the Burlington Corridor illustrate practical applications of integrating freight and complete streets principles, showcasing tailored approaches to meet local demands. Through public and local stakeholder engagement and strategic investments, complete streets can transform transportation networks into equitable, vibrant, and sustainable systems that serve the needs of all users.