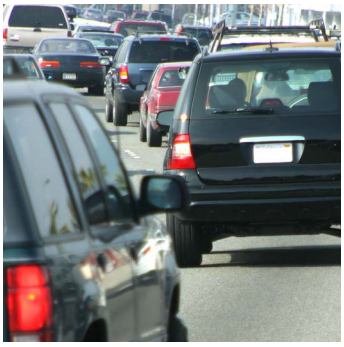
Preparing for the Future in Troup County, Georgia

Assessment Report 2008



Transportation Assessment

Center for Quality Growth and Regional Development

PREPARING FOR THE FUTURE IN TROUP COUNTY, GEORGIA

Transportation Assessment

Produced for

Troup County and the Cities of LaGrange, West Point, and Hogansville

Prepared by

Georgia Tech's Center for Quality Growth and Regional Development (CQGRD)

Catherine Ross, Ph.D., Director
Jason Barringer, Research Scientist
Amy Danner, Research Scientist
Molly Allen, Research Assistant
Elise Barrella, Research Assistant

With support from Karen Leone de Nie, AICP, Federal Reserve Bank of Atlanta

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ABOUT THIS REPORT

In June 2007, leaders in Troup County and the cities of LaGrange, West Point, and Hogansville kicked off a two-year strategic planning initiative to create a framework for sustainable development. The goal of the effort is to develop innovative strategies for promoting quality growth, fostering healthy economic development, enhancing the quality of life of residents, and protecting Troup County's natural environment, sense of place, and community. Troup County leadership wants to preserve and enhance places for area residents and businesses by proactively, progressively and fairly directing the community's growth and development to shape its future.

Georgia Tech—through its Enterprise Innovation Institute and Center for Quality Growth and Regional Development—conducted research, assessments, and strategy development in support of this initiative. This report is one in a series of reports entitled *Preparing for the Future in Troup County, Georgia* produced by Georgia Tech.

Georgia Tech
Center for Quality Growth and Regional Development
760 Spring Street, Suite 213
Atlanta, GA 30308
P 404.385.5133
F 404.385.5127
E cqgrd@coa.gatech.edu
W www.cqgrd.gatech.edu

EXECUTIVE SUMMARY

Transportation systems shape the choices we have to go to work, school and shopping, how we get to the doctor or to a friend's house. They include the physical infrastructure like roads and sidewalks, as well as the services available, like public transportation. These systems encompass all modes of travel, from driving, to walking, biking and taking transit. As such, transportation decisions touch our everyday lives in ways that we often take for granted. If they function well they are an asset to a high quality of life, including our abilities to access health promoting goods and services, gainful employment, social networks, educational opportunities, and recreational and entertainment options. When the system struggles to meet a community's needs it can lessen quality of life and reduce economic prosperity.

Transportation infrastructure often acts as the skeleton or supporting structure of a community. As such it is important that communities ensure that this infrastructure functions adequately in the present, and will remain functional. This focus on functionality should go beyond moving goods and people to look at the impact of transportation infrastructure on communities, community design, land use, and quality of life. This becomes increasingly important in areas like Troup County expecting rapid future growth. What is a functioning transportation infrastructure now will likely not be sufficient in the near future. New industrial and residential development has the potential to overlap and may create land use and transportation conflicts that reduce efficiency, create safety issues, and have a negative impact on resident's quality of life.

With the addition of KIA, associated suppliers, and the anticipated increase in large scale residential developments, it is expected that Troup County will see an increase in inter- as well as intra-county traffic. Troup County and its cities will need to plan, in the short- and long-term, for the expected local increases in traffic from expected residential, industrial, and commercial development and the effects that those increases will have on congestion, land use, and quality of life and place.

This report, the *Transportation Assessment,* models future transportation demand, provides a street typology for primary roadways, discusses ways to address special issues such as public transportation and freight movement and railroads, and presents a photo gallery of best practices for alternative transportation strategies. This assessment is meant to be used as an additional resource to the *Troup County Multi-Modal Transportation Study* which was completed by HNTB Corporation for GDOT in 2006[1]. The key findings and recommendations of the *Transportation Assessment* are listed below [the full text of the recommendations can be found in the Conclusions and Key Recommendations section of the *Transportation Assessment]*:

Observation:	**Troup County lacks the mechanisms and tools to ensure desirable corridor development.**
Strategy:	Develop land use and transportation policies that elevate design standards, manage traffic flows, and increase opportunities for alternative modes of travel.
Recommendation(s):	Troup County and the cities should adopt complementary land use, transportation, and design visions and policies to create quality, efficient corridors. The City of LaGrange should continue to support Georgia Department of Transportation's long-range plan to address south Hamilton Road (SR 27).

[1] The *Troup County Multi-Modal Transportation Study* can be accessed on-line at http://www.dot.state.ga.us/INFORMATIONCENTER/programs/studies/Pages/TroupCountyMultiModal.aspx

Observation: **Troup County will experience increasing demand for a more robust public transportation system as the population increases.**

Strategy: Troup County, working in conjunction with the Cities and human service partners, should develop an incremental exploration to expand public transportation services.

Recommendation(s): Troup County should convene a task force composed of representatives from the cities and county, Georgia Department of Transportation, and key human services and workforce development professionals to explore opportunities to expand the public transportation system.

Observation: **Troup County's ability to ensure efficient transportation flows around industrial districts will be challenged by the significant ongoing and anticipated industrial growth.**

Strategy: Troup County and the cities should establish a long-range vision for industrial development and establish policies that protect important infrastructure and suitable land.

Recommendation(s): As a growing industrial center, Troup County and the cities should adopt policies and plans to secure land and systems that support the community's vision for future economic development.

Observation: **With the introduction of Kia Motors and the associated businesses, Troup County is becoming a major industry center in the southeast. As such, broader regional questions about effective and efficient transport will become increasingly important to the county and cities.**

Strategy: Troup County and the cities should continue to expand their role in regional, state, and multi-state discussions about highway and railroad infrastructure.

Recommendation(s): As previously mentioned, it is important that Troup County and the cities regularly assess the potential local and county-wide transportation impacts of anticipated developments. This should be expanded beyond just the potential effects of traffic congestion on freight movement, and should include the potential for traffic congestion from commercial development, freight traffic, and large-scale residential developments of regional impact (DRI).

Observation: **All of the downtown districts are traversed by active rail lines, some of which create automobile flow issues and create less desirable pedestrian and bicycle access from the residential neighborhoods to the downtown.**

Strategy: The cities should seek to improve railroad crossings at key locations in concert with the Federal Railroad Administration.

Recommendation(s): The cities should examine the origins and destinations of potential pedestrian and bicycle travel.

The cities should continue to advocate for improved traffic signalization technology and timing improvements.

INTRODUCTION

This transportation assessment takes a multifaceted approach. It is intended to augment the *Troup County Multimodal Transportation Plan* prepared for the Georgia Department of Transportation by HNTB in 2006. Study efforts produced a Long Range Transportation Plan (LRTP) that guides the efficient movement of people and goods within and through the County through the year 2035. As part of this effort, existing and future operating conditions were documented for the following modes: highways, bicycle and pedestrian improvements, freight, transit, railways, and airports.

Since that plan was completed more information has become available about future employment and residential growth; therefore, this assessment includes an abridged modeling exercise to more explicitly identify trip demand. Next, the transportation assessment examines the intersection of transportation and land use by outlining a street typology for key corridors throughout the county. The typology suggests design strategies to support a multimodal (drive, walk, bike, take transit) transportation environment. Specifically, this element of the assessment proposes roadway design, streetscape standards, land use, and urban design approaches to provide transportation choices. The third section of the assessment examines special issues, including public transportation and freight movement. The conclusions and key recommendations enumerate overarching observations based on the assessment and present strategic approaches to prepare for future needs.

The assessment also includes an appendix, with a galley of best practices and a detailed table illustrating freight impacts. Because images are often the best way to understand concepts, the gallery provides photographs and drawings of various approaches described in the assessment. Concepts which are illustrated in the gallery are followed with 📷. The freight impact tables identifies various potential community impacts.

MODELING FUTURE TRANSPORTATION DEMAND

Over the past several years, Troup County has seen an increase in residential development and with the location of Kia and its suppliers in the county this residential growth is expected to continue and will be accompanied by an increase in business development. These increases will have impacts on the transportation infrastructure needs of Troup County and its cities. In an effort to understand some of the potential impacts of this increase in development, analyses were done to estimate future growth in AADT (Average Annual Daily Traffic) on selected thoroughfares throughout the county and to incorporate into that analysis the cumulative impact of the planned large scale residential developments (DRIs) and opening and growth of the Kia plant and its suppliers.

Base line estimates for AADT were made in five-year increments 2010, 2015, and 2020 for selected roadways. Estimates were then made for how much traffic each proposed DRI and supplier would add in each of those five years and then the results were aggregated to show the potential county-wide impact of these developments on the transportation infrastructure. Figure 1 shows the percentage increase in 2020 AADT over base line projections that can be attributed to new development. This map shows that significant increases in daily traffic volume can be expected on corridors to the north and southeast of LaGrange. The map also shows future improvements being pursued by GDOT.[2]

This analysis shows the potential magnitude of growth in traffic volumes that can be expected as the current residential and industrial developments in the planning and construction stage come to fruition. As Troup County and its cities continue to grow, these areas of traffic volume increase should receive more in-depth analysis to ensure that appropriate infrastructure investments and improvements are made to alleviate congestion and to promote connectivity throughout the county. Going forward, it is important for the county and cities to not only analyze the impacts of individual developments, but of all anticipated developments together to ensure a better understanding of potential aggregate impacts.

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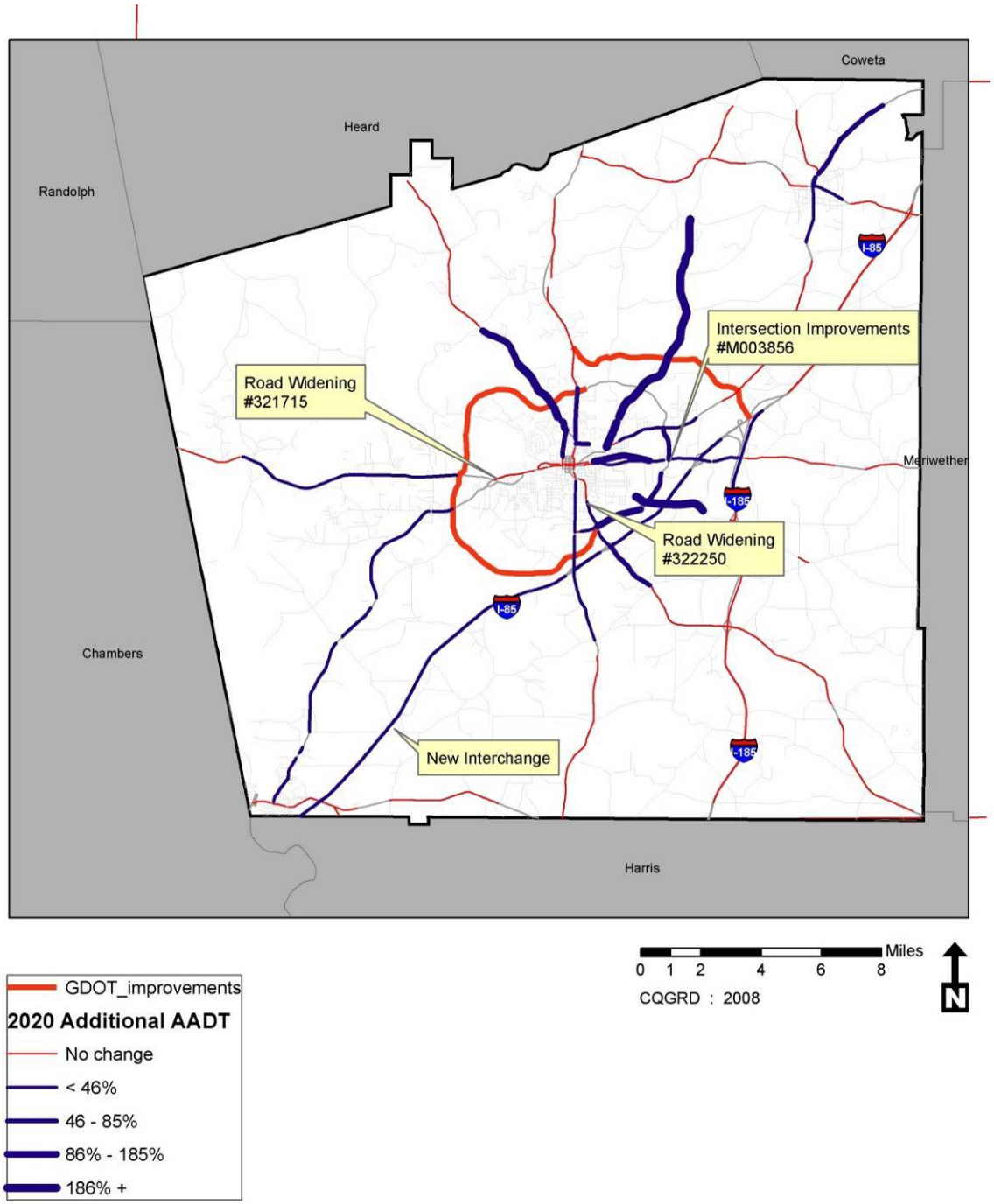
[2] Information on future road improvements was obtained from the following GDOT websites:
http://tomcat2.dot.state.ga.us/STIP/index.cfm &
http://tomcat2.dot.state.ga.us/tpro/ext_intro_page.cfm?CFID=111338&CFTOKEN=24072619

Figure 1- Impacts of DRIs and Kia/Kia Suppliers on 2020 AADT



Methodology for Estimating Future AADT

The Average Annual Daily Traffic (AADT) for 2010, 2015, and 2020 planning horizons was estimated by adjusting 2005 AADT. The 2005 AADT traffic counts for selected road segments in Troup County were obtained from the Georgia Department of Transportation. The AADT for each segment was forecast based on background county growth and then on concentrated growth from Developments of Regional Impact (DRIs), Kia's plant, and confirmed Kia suppliers. Background growth was estimated at 3 percent per five-year period, based on baseline population projections for the county. This growth rate was applied to each segment for which 2005 AADT traffic data was available.

Development-related traffic growth was allocated to specific roadway segments by first estimating the number of trips generated by land use type and then assigning those trips to the nearest segment with an AADT count. At an intersection, trips were distributed to subsequent segments based on the proportional share of 2005 traffic that they carried. This distribution method was taken through two iterations.

The number of trips generated by the DRIs and Kia/Kia suppliers was determined using the Trip Generation 5 software. The software utilizes average trip generation rates from ITE's Trip Generation 7th Edition (2003) to calculate trips produced by different land uses. DRIs were classified based on anticipated unit types as single-family residential, multi-family residential, or a combination. For simplification, single-family was calculated using "Single-family Detached" rates while all multi-family was estimated as "Apartment." The only exception to this was LaGrange Commons, for which multi-family was calculated using the "Residential Condo/Townhome" rate. Kia and Kia suppliers were classified as "Manufacturing." For each development, the number of weekday (24-hour period) two-way trips was calculated. The inputs used for Trip Generation 5 are summarized in Table 1.

Table 1- Inputs used for Trip Generation 5

	Land Use Category	Land Use	Variable
DRI Single-Family	Residential	Single-Family Detached	Number of units
DRI Multi-Family	Residential	Apartments*	Number of units
Kia/Kia Supplier	Industrial/Agricultural	Manufacturing	Number of employees

*Exception noted above for LaGrange Commons

STREET TYPOLOGY

As Troup County continues to grow, the interactions between transportation facilities and their surrounding land uses will become increasingly important. One way to address these interactions is through a descriptive street typology. The goal of a descriptive typology is to classify a network of streets and arterials in terms of their uses and features. This classification gives purpose and distinction to the neighborhoods in which the networks exist. The street typology presented in this document defines streets by considering their effect on adjacent land uses and serves as a guide to future development in Troup County. The design features presented in this report are recommendations—the features are based on ITE's Context Sensitive Solutions (CSS) Manual, on best practices, and on typologies created for comparable communities. CSS is a flexible approach to roadway standards and development practices that considers the total context within which a transportation improvement project will exist. This approach is sensitive to community values and better balances the economic, social, and environmental objectives.

The typology is meant to be interpreted broadly. It should also be considered flexible in that as growth occurs, street designations can and should change. It can be used as a tool to define how Troup County's streets should function based on community needs and the needs of future development. The typology can be used to guide and inform future planning efforts (like the Atlanta Regional Commission's Transportation Improvement Programs and Georgia Department of Transportation (GDOT) projects). The recommended design features may also be incorporated into future Community Benefit Agreements[3] with developers. Because the typology can be used as a guide for developers and for future GDOT projects, the zoning ordinances should be consistent with it. A typology could be applied as an "overlay" that is applicable to lots located within 500 feet (or some other distance) of the roadway centerline. If the zoning requirements of an underlying district are stricter than the typology's requirements, the zoning requirements should be used.

Street Classification

The traditional way to define a street network is through a functional classification system, which assigns street types based on the type of traffic, volume of traffic, and origins and destinations that the route serves. This offers a very car-oriented view of the streets. But a street network should provide for the safe and efficient movement of cars, trucks, buses, pedestrians, and bicyclists alike. And further, not every street should look or feel the same.

A descriptive street typology provides an alternative way to look at the street network. It shapes the streets to fit with the surrounding land use character (neighborhood, retail, industrial, etc.) while providing for the needs of all road users. Often, the land use and the street design are not compatible. For example, there could be a very wide street that does not carry high volumes of traffic or there could be a very busy street going through a residential area with high pedestrian use. The descriptive typology reflects the idea that "design dictates use." Meaning, street design can encourage road users to act in a certain way—like driving slowly through residential or commercial areas and more quickly through industrial areas.

[3] A Community Benefits Agreement, or "CBA," is a legally enforceable contract, signed by community groups and by a developer, setting forth a range of community benefits that the developer agrees to provide as part of a development project. See http://www.goodjobsfirst.org/pdf/cba2005final.pdf for more.

GDOT's Functional Roadway Classification System

The Georgia Department of Transportation's (GDOT) Design Manual was written to serve as a general guideline of the commonly used policies and procedures for the preparation of road and construction plans. Chapter Two of the document describes a Functional Roadway Classification System. The Federal Highway Administration (FHA) requires that each state categorize state routes by functional classification. According to the GDOT manual, streets and highways are grouped into major classes based on the type or kind of service they provide. There are three general classes of streets:

- **Freeways** are distinguished from other systems by being labeled as having "uninterrupted flow." Interrupted flow and uninterrupted flow relate to the type of facility in question rather than the quality of traffic flow at any given time. Because freeways have interactions with other freeway facilities, its performance may be affected by the demand and capacity of nearby road systems. Freeways also have several interacting components such as ramps, HOV lanes, and weaving sections. The performance of these components must be evaluated separately.

- **Arterials** are street transportation facilities intended to provide through trips that are generally longer than trips on collector facilities and local streets. Arterial systems are generally sub-classified into Principal or Minor Arterials, both having fundamentally different characteristics with regards to land use density, travel patterns, and the number of networks within the arterial.

- **Collectors and Local Streets** fall under the major and minor arterial classifications. Their purpose is primarily to provide property access.

Based on differences in land use density, travel patterns, and density of the street network, urban and rural systems are classified separately. Urban areas, [4] described as areas with a population of 50,000 or more, have four functional systems. The systems are: urban principal arterials, minor arterial streets, collector streets, and local streets. The four urban functional classes are described as follows:

- **Urban Principal Arterial-** A street that carries most of the trips entering and leaving the urban area, as well as most of the through movements bypassing the central city (these are usually long-distance trips). The system typically carries important intra-urban and intercity bus routes as well. Finally, it provides continuity for all rural arterials that intercept the urban boundary. Two specific types of urban principal arterials are:

    - **Urban Interstate Principal Arterial-** A principal arterial that is designated as an Interstate highway.

    - **Urban Freeways and Expressways-** A principal arterial highway with full control of access (with preference given to through traffic) that is designed to provide high levels of safety and efficiency in moving high volumes of traffic at high speeds.

- **Urban Minor Arterial-** A street that intersects and supports the urban principal arterial system, accommodating moderate-length trips and providing greater levels of mobility and limited access to local development.

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[4] Metropolitan Statistical Areas (MSAs) are the official term for urban areas and are defined by the U.S. Census as "A metro area contains a core urban area of 50,000 or more population." More about MSAs can be found at http://www.census.gov/population/www/estimates/metroarea.html.

- **Urban Collector Street-** A street that provides land access and traffic circulation within residential, commercial, and industrial areas. It distributes trips from the arterial system to destinations and also collects traffic from local streets in residential neighborhoods and channels it into the arterial system. It may also carry local buses. Any facility not within the higher systems falls into the collector system.

- **Urban Local Street-** Any street not included in one of the higher systems that permits direct access to local land uses. It offers the lowest level of mobility, usually does not contain a bus route, and discourages through traffic.

Rural classification consists of a network of routes with specific lane widths, level of service, and trip lengths. Rural routes are classified as follows:

- **Rural Principal Arterial-** A road serving as the predominant route between major activity centers and provides service to most large urban areas. Its purpose is to support long trip lengths and heavy travel densities. As with the urban system, Rural Principal Arterials often have interstate or intrastate significance.

- **Rural Minor Arterial-** A road, often with intrastate and/or inter-county significance, that links cities and larger towns. They are distributed throughout the county so that all developed areas are within a reasonable distance of an arterial. Further, they interconnect the network of arterial highways.

- **Rural Collector Street-** A street designed for travel at lower speeds and for shorter distances. They are typically two-lane roads that collect and distribute traffic from the arterial system. They are further classified as:

    - **Major Collector-** A street that primarily serves intra-county travel and connects important travel generators like municipal facilities, schools, recreation areas, et cetera.

    - **Minor Collector-** A street that primarily facilitates land use access. The density of minor collectors should be consistent with population density.

- **Rural Local Street-** All remaining roads not classified under a higher system are part of the local street network. A local street provides basic access to adjacent land over short distances.

Table 2 provides characteristics of the corridors studied for the typology and how the roadways are classified according to the Functional Classification System.

Table 2- Characteristics of Key Corridors

ROADWAY	ROUTE TYPE	TRUCK ROUTE	FUNCTIONAL CLASSIFICATION	
			RURAL	URBAN
I-85 Corridor	SR	Y	Interstate Principal Arterial	Interstate Principal Arterial
Hogansville Road	SR	Y	Major Collector	Minor Arterial
West Point Road (HWY 29)	SR	Y	Minor Arterial	Minor Arterial
Davis Road Corridor	SR	N	N/A	Minor Arterial
Hamilton Road (HWY 27)	SR	Y	Principal Arterial	Principal Arterial/ Minor Arterial
Greenville Road	SR	N	Minor Arterial	Minor Arterial
I-185 Corridor	SR	Y	Interstate Principal Arterial	N/A
Whitesville Road (HWY 219)	SR	Y	Major Collector	Minor Arterial
Lafayette Parkway	SR	Y	N/A	Principal Arterial/ Minor Arterial
Roanoke Road	SR	Y	Major Collector	Minor Arterial
Mooty Bridge Road	SR	N	Major Collector	Minor Arterial
10th Street (HWY 18)	SR	Y	Minor Arterial	N/A
Greenville Street	CS	Y	N/A	Minor Arterial
Vernon Road	SR	Y	N/A	Principal Arterial
Commerce Avenue	SR	Y	N/A	Minor Arterial
Colquitt/Upper Big Springs Road	CR	N	Major Collector	Minor Arterial
Hammett Road	CR	N	Major Collector	Minor Arterial

Note: SR = state road, CR = county road, CS = city street

Troup County's Descriptive Street Typology

Vision and Goals

The street typology was developed with the following strategic goals in mind:

- **The ATTRACTIVE Community:** Fostering appealing gateways into the community; retaining the "small town" charm; encouraging aesthetically pleasing development; promoting ongoing beautification.
- **The ENTERTAINING Community:** Providing a diverse menu of recreational, cultural, dining, shopping, and other amenities for families and residents of all ages.
- **The NAVIGABLE Community:** Fostering the ease of mobility throughout the community; gearing transportation infrastructure according to future growth plans; providing alternative and viable solutions beyond the automobile.
- **The WELL PLANNED Community:** Carefully, deliberately and strategically planning for the future; determining where growth and development should go and then allocating resources and available infrastructure to support it. Inherent in this strategic goal is the allocation of future land use.

Purpose

As explained earlier, a functional classification emphasizes vehicular road users (particularly personal vehicles and trucks). A descriptive street typology is a complimentary classification system that relates the roadway and roadside features to the character of the corridor. For this reason, descriptive classifications can be applied to streets with different functional classifications. This can help to provide smoother transitions between streets with different functional classifications but similar land uses. It also allows for continuity of pedestrian and bicycle infrastructure. The typology is not meant to replace the functional classification but rather to supplement it by further considering the interactions between the roads and adjoining land uses, and providing consideration for all potential road users.

Methodology

The descriptive typology presented in this report was designed specifically for the Troup County and the Cities of Hogansville, LaGrange, and West Point to represent the range of corridor types found there. The street typology provides a framework for creating a more seamless transportation system that facilitates multi-modal travel. Developing the typology began with a survey of existing conditions on the key corridors, including a windshield survey, to understand street characteristics and how the roadways and land uses interact. Transitions between urban and rural areas and between different land use configurations were also noted. Because the typology should be a guide for future development, the team also considered projected growth and development patterns. This involved consideration of the County's and Cities' existing and future land use maps and planned future developments. The street types were developed to capture both the existing and proposed development patterns. Street assignments were made based on the corridor's predominant land use pattern and on the street characteristics. Design recommendations are based on principles of context sensitive design and Universal Design (or designing for all users, see Gallery for more). The assignments reflect the design team's professional opinion and feedback from the community on their vision for specific roadways.

The Typology

The Troup County descriptive street typology assigns one of eight classifications to roadways. Because land use can change frequently along the corridors and because these corridors pass through both rural and urban areas, segments of the same roadway may have different designations.

The eight street types developed for Troup County and its cities are:

- **Interstate-** A network of highways also referred to as freeways or expressways
- **Regional-** An area of land that is part of a larger whole
- **Connections-** A means of transition from one roadway network to another
- **Gateway-** A network point that acts as an entrance to another network
- **Downtown-** The city's core or central location
    - Downtown, Priority 1
    - Downtown, Priority 2
- **Nodes-** A point in the network in which lines intersect or branch
- **Rural-** A settled area outside of the central city
- **Residential-** A settled area outside of the central city

The following pages offer design recommendations and sample cross-sections for the eight street types. Table 3 below provides an explanation for the recommended design features. Detailed descriptions of the purpose, character, and basic design of each of the street types listed above are provided in Tables 4-11 and Figures 6-11 in the following pages. Maps showing the application of these street types to Troup County and the cities are provided after the detailed descriptions.

Table 3- Typology Design Features

CHARACTERISTICS		DEFINITION/DESCRIPTION
ROADWAY	Travel Lanes	Number of travel lanes, related to capacity needs
	Lane Widths[5]	Number of feet from shoulder to inside of lane
	Median Priority	Importance of separating travel lanes with a median, either for vehicular safety or to provide pedestrian refuge
	Targeted Operating Speed	Ideal operating speed for vehicles on roadway

[5] Due to high volumes of truck traffic on most of the key corridors, a minimum 11-foot lane width is recommended. Ideally, downtown roadways would have 10-foot travel lanes in order to give priority to pedestrians and cyclists. Higher volume (including trucks) and higher speed roadways are recommended to have 12-foot lanes for safety and comfort reasons.

	Traffic Calming	Set of strategies aimed at reducing traffic volumes or speed . Includes physical measures like speed humps (vertical) or bulb-outs (horizontal), but also design measures like narrow lanes (10-11 feet) and streetscaping.
	Transit Service[6]	Availability of public transit such as bus, vanpool, shuttles, et cetera.
	Bicycle Accommodations	Provision of bike lanes and bike facilities along roadway
	Pedestrian Way	Portion of the right-of-way designated for the use of pedestrian travel
	Access Management	**High:** Access points are limited by number and width (ex: 1 curb cut per 150 feet of frontage up to a maximum 2 per lot, located at least 45 feet apart); Consolidated driveways and interparcel connectivity are required when practicable **Moderate:** Access points are limited but at a higher density (still at least 45 feet apart); consolidated driveways and interparcel connectivity are encouraged. **Low:** Few restrictions
	On-street Parking Priority[7]	Importance of providing on-street parking
LAND USE	**Land Use Types**	Residential, Commercial, Mixed-Use at Interchanges (see Nodes)
	Setback[8]	Distance between street right-of-way and building fronts
	Building Heights[9]	Low-rise (1-3 stories, 35 feet max); Mid-rise (4-7 stories, 45-75 feet; High-rise (greater than 7 stories, 75 feet)
	Density[10]	Density of land uses (maximum number of units or minimum lot size) **Low:** 1 unit per acre (R); 22,500 square foot lot (C) **Medium:** 4 units per acre (R); 10,000 square foot lot (C) **High:** 6-10 units per acre (R); no minimum size (C)
	Building Design Standards	Requirements for construction materials and other aesthetic considerations to promote a consistent character
	Streetscaping	Landscaping, furniture, lighting, et cetera to make the pedestrian way more inviting and comfortable

[6] See Appendix for transit service options in Troup County and the Cities.
[7] In downtowns or commercial areas, on-street parking can encourage people to park once and walk to multiple destinations. It can also provide traffic calming effects, thereby promoting a more pedestrian-friendly environment.
[8] Distances were based on Troup County and city zoning regulations and CSS recommendations.
[9] Heights are based on a 15-foot first floor and 10-foot floor height above that. From an urban design perspective, mid-rise development is considered ideal for pedestrian-scale urban development.
[10] The Low, Medium, and High designations are relative to one another. They were approximately based on existing zoning regulations for the county and cities. Rural areas would be designated as low density, with larger minimum lot sizes and a smaller number of units per acre. Densities in commercial districts should also be related to setback requirements and a maximum or minimum unit size.

Table 4- Interstate Typology

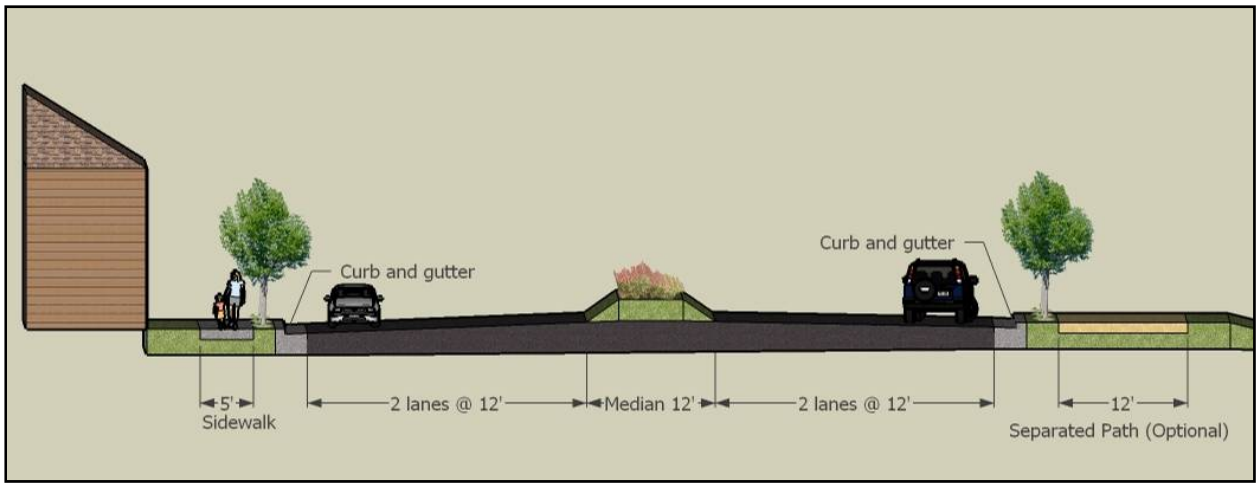
CHARACTERISTIC		DESIGN RECOMMENDATION
ROADWAY	Travel Lanes	4-6+ lanes
	Lane Widths	12 feet
	Median Priority	Required
	Targeted Operating Speed	45-65 miles per hour (mph)
	Traffic Calming	None
	Transit Service	Express
	Bicycle Accommodations	No
	Pedestrian Way	No
	Access Management	Limited Access
	On-street Parking Priority	None
LAND USE	Land Use Types	Industrial, Commercial, and Mixed-Use at Interchanges (see Nodes)
	Setback	100-120 feet
	Building Heights	N/A
	Density	Low density
	Building Design Standards	Yes
	Streetscaping	Landscaped median and/or shoulder area[11]

[11] Georgia Wildflower Program is administered by the GDOT. For more information, see http://www.dot.state.ga.us/informationcenter/programs/environment/wildflower/pages/default.aspx.

Table 5- Regional Typology

CHARACTERISTIC		DESIGN RECOMMENDATION
ROADWAY	Travel Lanes	4-6 lanes
	Lane Widths	12 feet
	Median Priority	High
	Targeted Operating Speed	40-55 miles per hour (mph)
	Traffic Calming	Trees, landscaping, or a median would visually narrow the roadway to reduce speeds
	Transit Service	Express
	Bicycle Accommodations	Optional separated path
	Pedestrian Way	Sidewalks (urban) or optional separated path (rural)
	Access Management	Moderate
	On-street Parking Priority	None
LAND USE	Land Use Types	Commercial, Mixed-Use, and Residential
	Setback	0-20 feet (urban); 100 feet (rural)
	Building Heights	Low-rise
	Density	Low- and medium-density
	Building Design Standards	Yes, for Commercial and Mixed-Use
	Streetscaping	Natural vegetation

Figure 2- Regional Typology Street Section

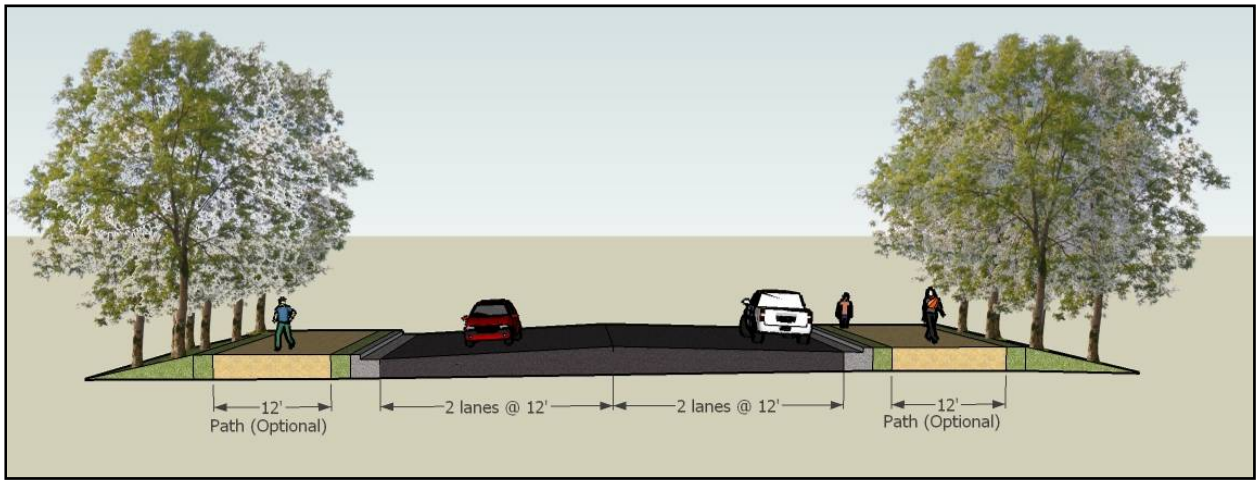


Source: Center for Quality Growth and Regional Development (CQGRD)

Table 6- Connections Typology

CHARACTERISTIC		DESIGN RECOMMENDATION
ROADWAY	Travel Lanes	2-4 lanes
	Lane Widths	12 feet
	Median Priority	Low
	Targeted Operating Speed	40-55 miles per hour (mph)
	Traffic Calming	None
	Transit Service	Local
	Bicycle Accommodations	Optional separated path
	Pedestrian Way	Optional separated path
	Access Management	Moderate
	On-street Parking Priority	Low
LAND USE	Land Use Types	Commercial and Residential
	Setback	15-20 feet (Commercial); 60-100 feet (Residential)
	Building Heights	Low-rise
	Density	Medium-density
	Building Design Standards	Yes, for Commercial
	Streetscaping	Natural vegetation

Figure 3- Connections Typology Street Section

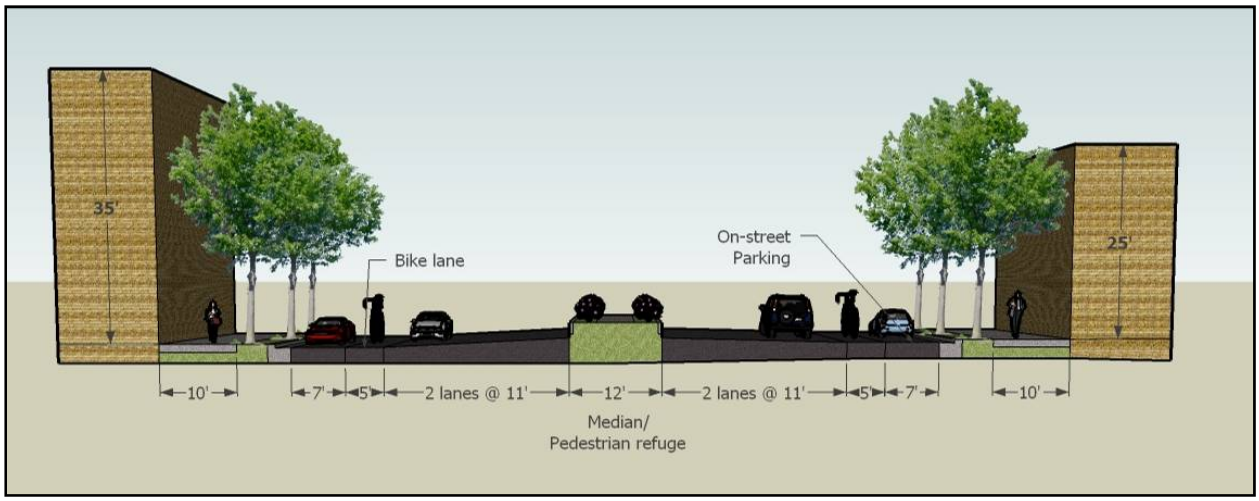


Source: Center for Quality Growth and Regional Development (CQGRD)

Table 7- Gateway Typology

CHARACTERISTIC		DESIGN RECOMMENDATION
ROADWAY	Travel Lanes	2-4 lanes
	Lane Widths	11 feet
	Median Priority	High
	Targeted Operating Speed	25-40 miles per hour (mph)
	Traffic Calming	Use of narrower lanes and vegetative buffer
	Transit Service	Local
	Bicycle Accommodations	Bicycle lane/shared path
	Pedestrian Way	8-10 foot sidewalk
	Access Management	High
	On-street Parking Priority	Moderate
LAND USE	Land Use Types	Commercial, Mixed-Use and High-Density Residential
	Setback	0-20 feet
	Building Heights	Low- to mid-rise
	Density	Medium- to high-density
	Building Design Standards	Yes
	Streetscaping	Street trees/shrubs, street lighting, street furniture, and wayfinding signage

Figure 4- Gateway Typology Street Section

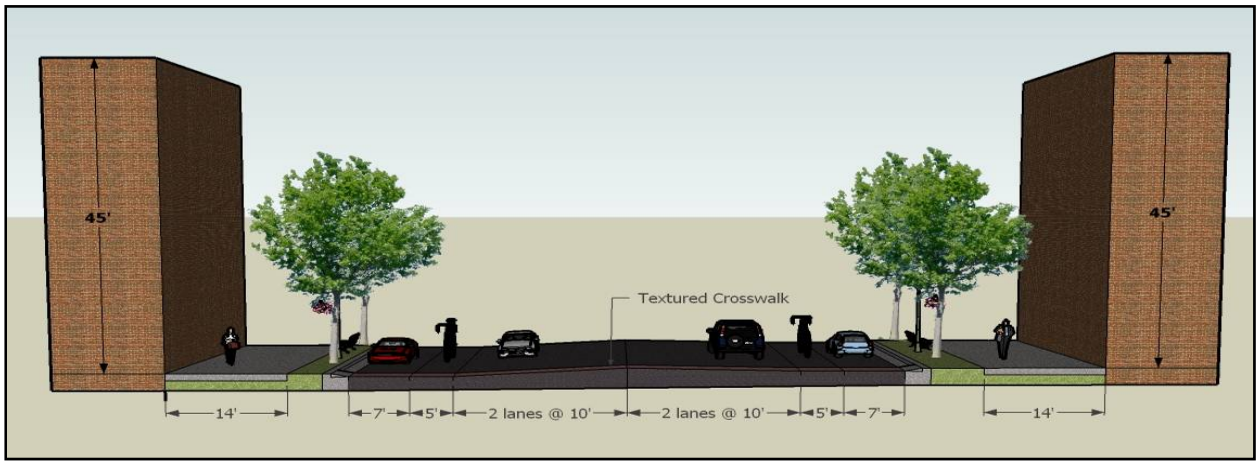


Source: Center for Quality Growth and Regional Development (CQGRD)

Table 8- Downtown Typology

CHARACTERISTIC		DESIGN RECOMMENDATION
ROADWAY	Travel Lanes	2-4 lanes
	Lane Widths	10-11 feet
	Median Priority	None
	Targeted Operating Speed	25 miles per hour (mph)
	Traffic Calming	Narrow lanes, textured crosswalks, signage, and horizontal measures (like bulb-outs)
	Transit Service	Local
	Bicycle Accommodations	Bicycle lane/shared path
	Pedestrian Way	12-16 foot sidewalk, 6 foot furniture zone/tree pits (where feasible)
	Access Management	High
	On-street Parking Priority	High
LAND USE	Land Use Types	Commercial and Mixed-Use
	Setback	0 feet (with minimum frontage requirement)
	Building Heights	Mid-rise
	Density	High-density
	Building Design Standards	Yes
	Streetscaping	Street trees/shrubs, street lighting, street furniture, wayfinding signage, and public art

Figure 5- Downtown Typology Street Section

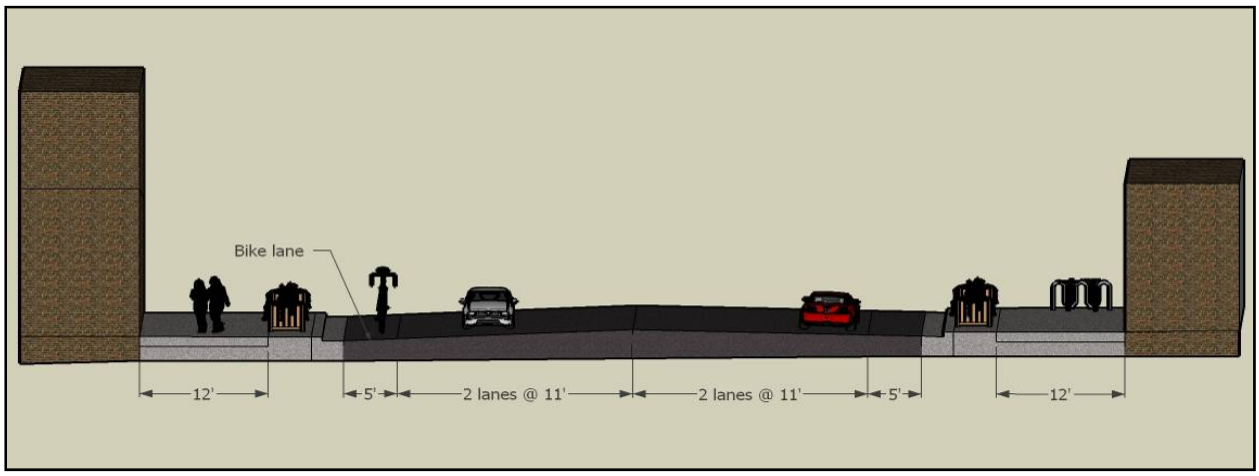


Source: Center for Quality Growth and Regional Development (CQGRD)

Table 9- Node Typology

CHARACTERISTIC		DESIGN RECOMMENDATION
ROADWAY	Travel Lanes	2-4 lanes
	Lane Widths	11-12 feet
	Median Priority	Low
	Targeted Operating Speed	25-35 miles per hour (mph)
	Traffic Calming	Limited to horizontal measures (like bulb-outs) and textured crosswalks
	Transit Service	Local
	Bicycle Accommodations	Bicycle lane (where possible) to connect with a larger network
	Pedestrian Way	10-12 foot sidewalk, 3-6 foot furniture zone or vegetative buffer
	Access Management	High
	On-street Parking Priority	Moderate
LAND USE	Land Use Types	Commercial and Mixed-Use
	Setback	0 feet (with minimum frontage requirement)
	Building Heights	Low- to mid-rise
	Density	Medium- to high-density
	Building Design Standards	Yes
	Streetscaping	Street trees/shrubs, street lighting, street furniture, wayfinding signage, and public art

Figure 6- Node Typology Street Section



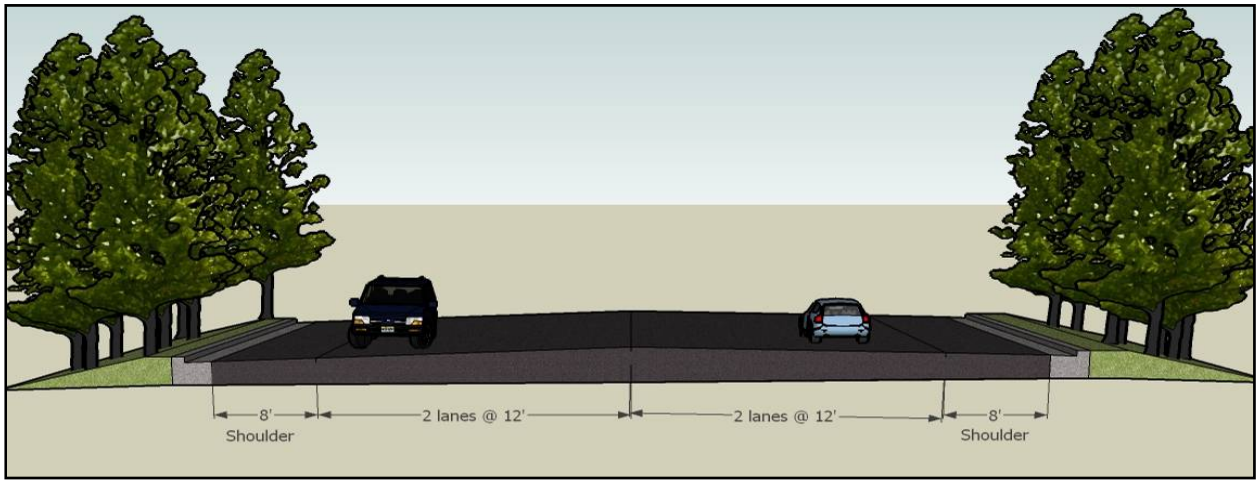
Source: Center for Quality Growth and Regional Development (CQGRD)

Table 10- Rural Typology

CHARACTERISTIC		DESIGN RECOMMENDATION
ROADWAY	Travel Lanes	2-4 lanes
	Lane Widths	12 feet
	Median Priority	None[12]
	Targeted Operating Speed	35-50 miles per hour (mph)
	Traffic Calming	None
	Transit Service	Local
	Bicycle Accommodations	Optional separated path/shoulder/shared lane
	Pedestrian Way	Optional separated path
	Access Management	Low
	On-street Parking Priority	None
LAND USE	Land Use Types	Residential, Agricultural, Conservation, Institutional, and Commercial at Nodes
	Setback	100-125 feet[13]
	Building Heights	Low-rise
	Density	Low-density to none
	Building Design Standards	Yes, for building envelope
	Streetscaping	Natural vegetation

[12] The exception to this is I-185 which should have a median.
[13] Based on Troup County zoning districts.

Figure 7- Rural Typology Street Section



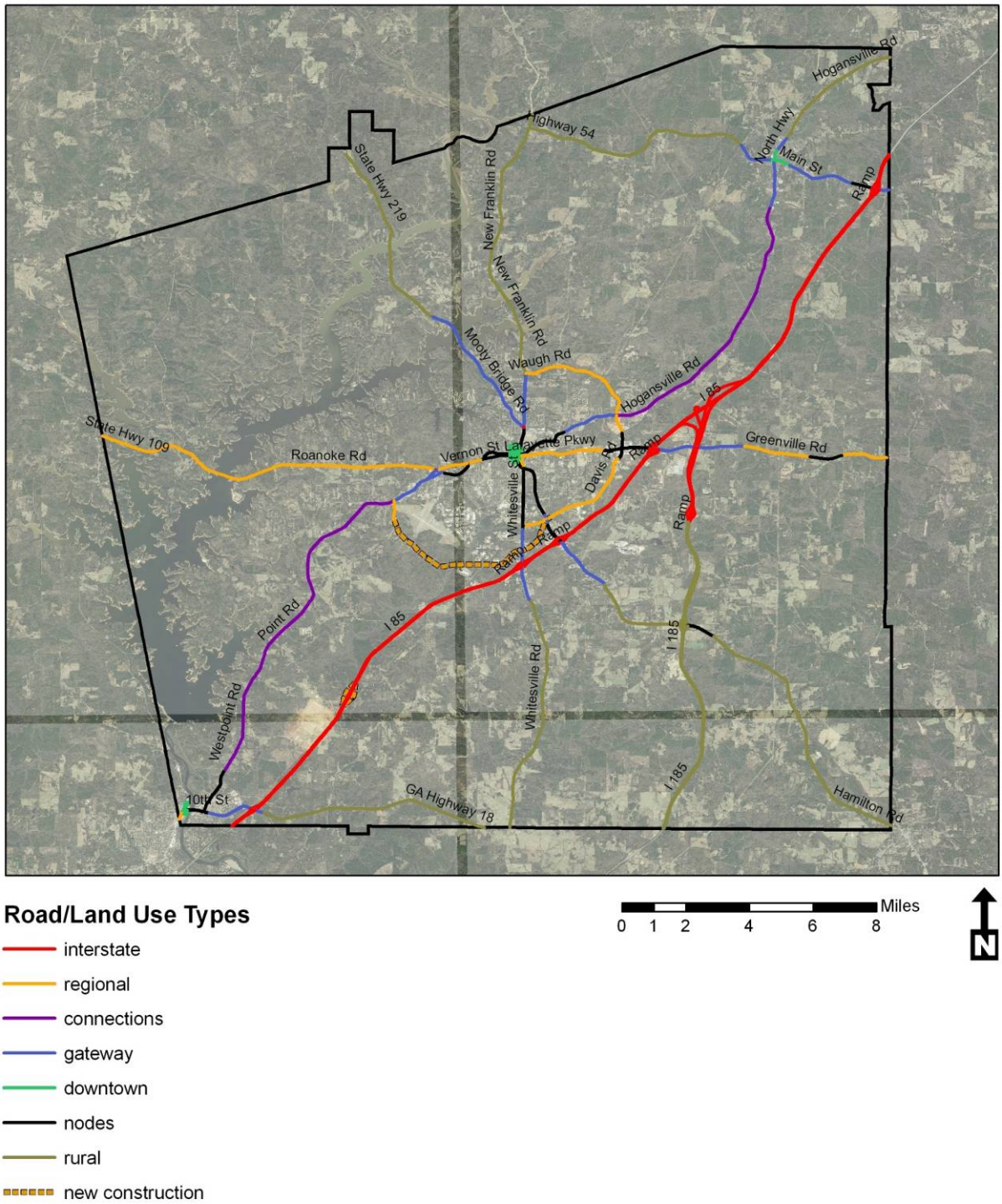
Source: Center for Quality Growth and Regional Development (CQGRD)

Table 11- Residential Typology

CHARACTERISTIC		TRADITIONAL RESIDENTIAL	LOW-IMPACT RESIDENTIAL
ROADWAY	Travel Lanes	2 lanes	1-2 lanes
	Lane Widths	12 feet	10-11 feet
	Median Priority	None	None
	Targeted Operating Speed	20-30 miles per hour (mph)	20-30 miles per hour (mph)
	Traffic Calming	N/A	N/A
	Transit Service	N/A	N/A
	Bicycle Accommodations	Shared lane	Shared lane
	Pedestrian Way	Sidewalk (optional	N/A
	Access Management	Low	Low
	On-street Parking Priority	N/A	N/A
LAND USE	Land Use Types	Residential	Residential
	Setback	Varies (per zoning regulations)	Varies (per zoning regulations)
	Building Heights	Low-rise	Low-rise
	Density	Low- to medium-density	Low- to medium-density
	Building Design Standards	N/A	N/A
	Streetscaping	No requirement	N/A

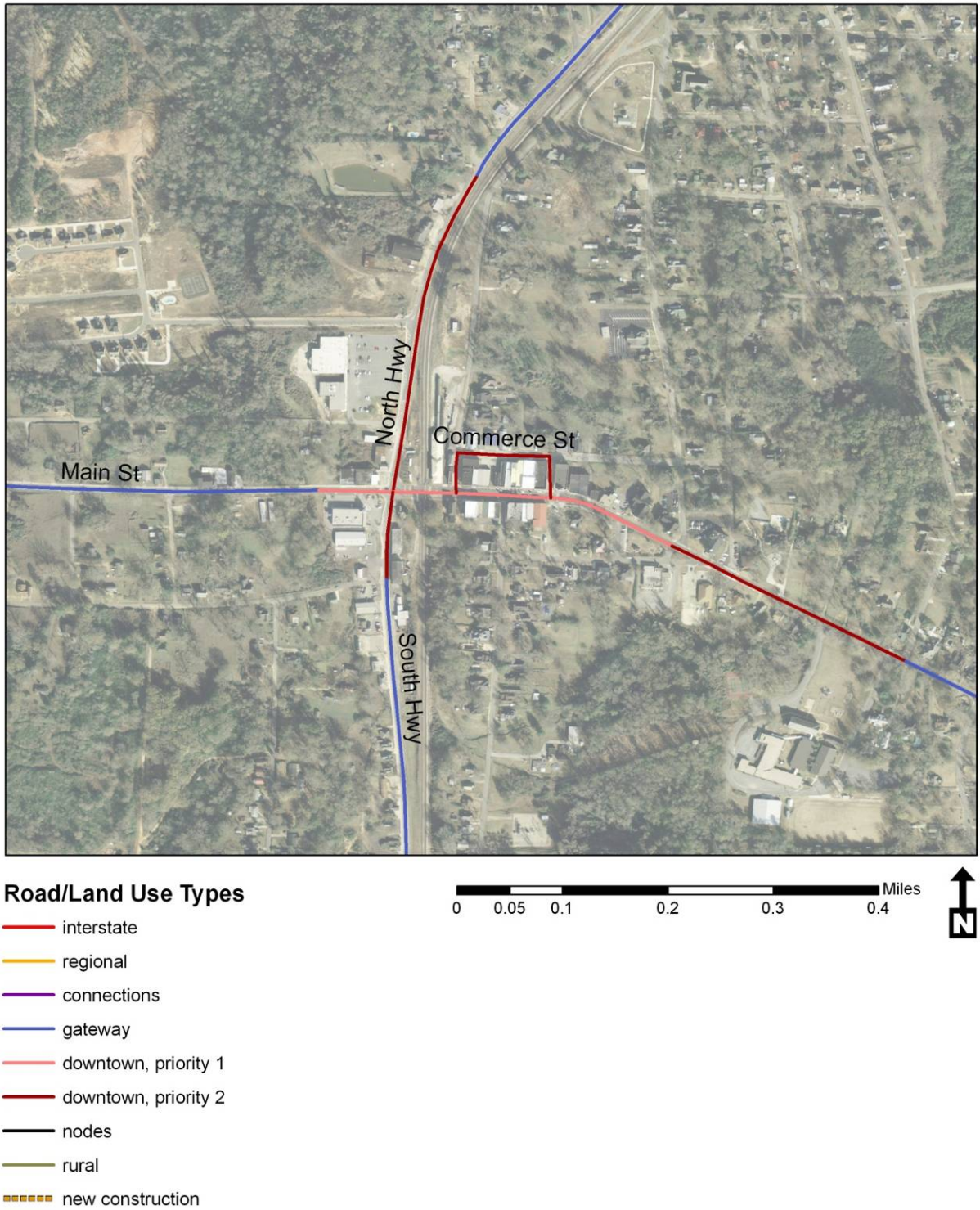
The maps on the following pages (Figures 8-11) illustrate how the typology can be applied to key corridors throughout the county and in the cities. The residential street typology is not displayed on the map because the corridors considered in this study cannot be classified as purely residential. Nevertheless, the residential typology is widely applicable in the study area, particularly for new developments.

Figure 8- Street Typology Assigned to Key Corridors in Troup County



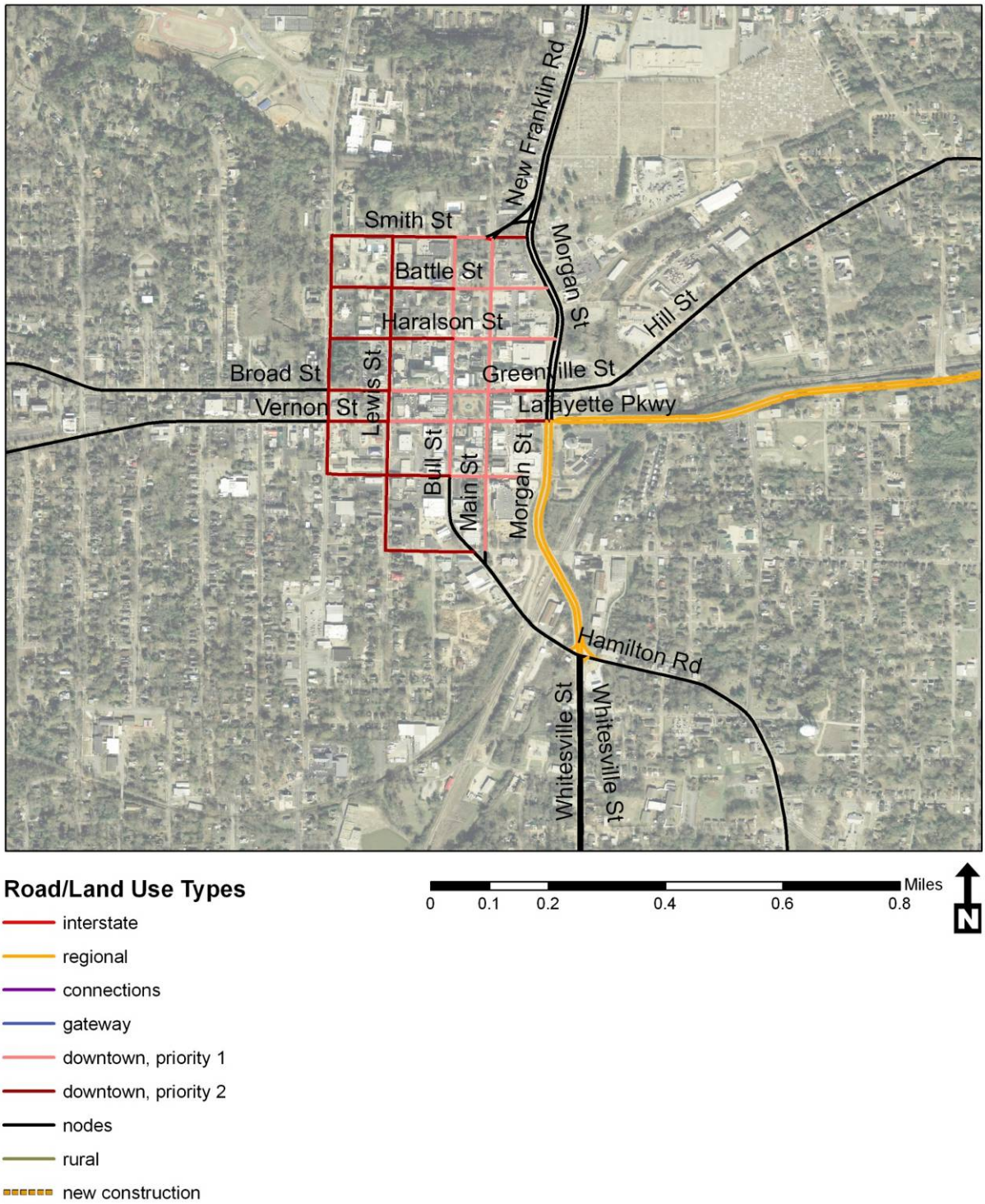
Source: Center for Quality Growth and Regional Development (CQGRD)

Figure 9- Street Typology in Downtown Hogansville



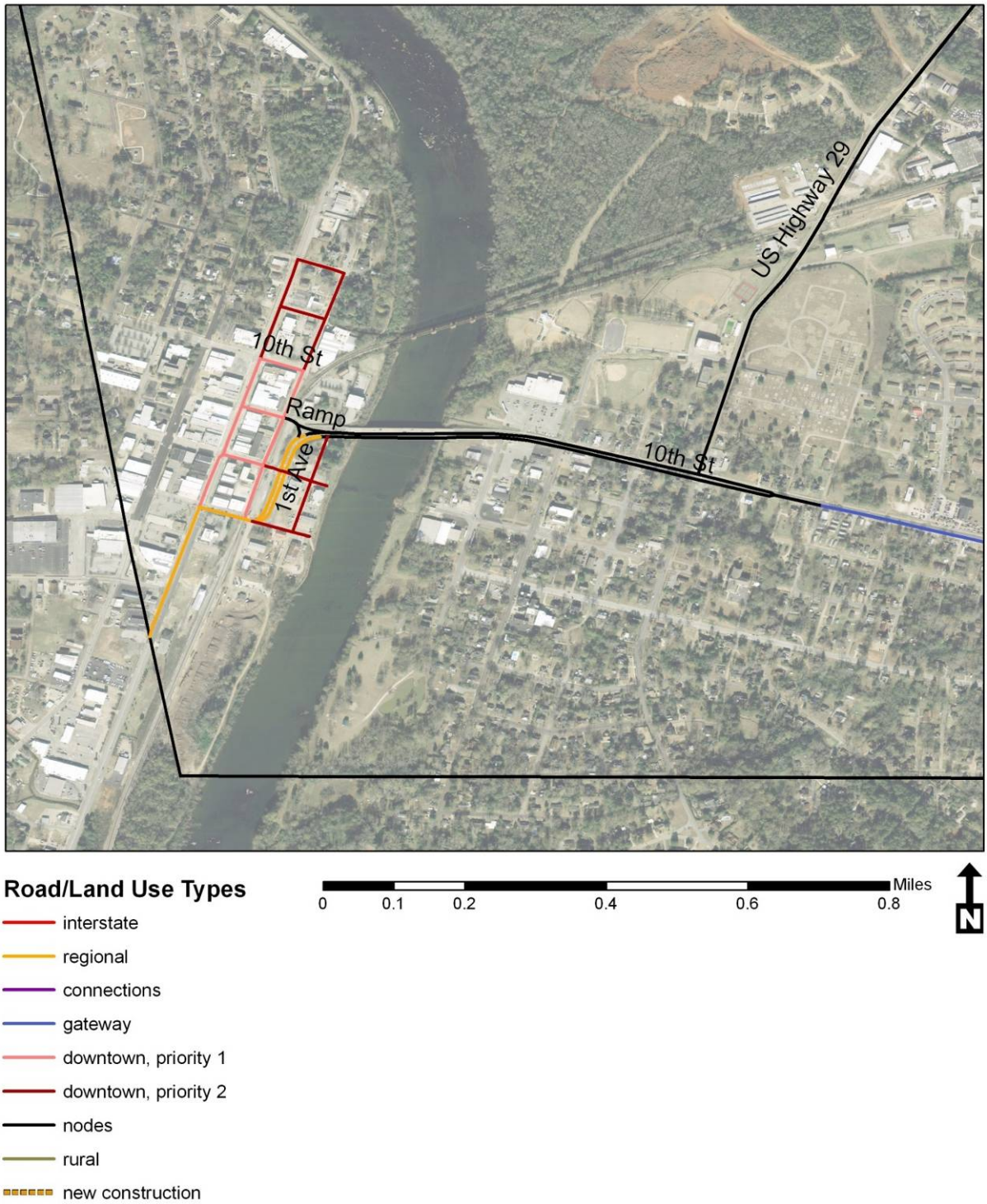
Source: Center for Quality Growth and Regional Development (CQGRD)

Figure 10- Street Typology in Downtown LaGrange



Source: Center for Quality Growth and Regional Development (CQGRD)

Figure 11- Street Typology in Downtown West Point



Source: Center for Quality Growth and Regional Development (CQGRD)

SPECIAL ISSUES

This special issues section provides brief overviews of and suggestions of how to address issues related to public transportation and freight movement in Troup County and its cities. Each of these components will help Troup and its Cities to maximize opportunities with regard to transit options and connectivity.

Rural Public Transportation

Background

The Human Services Assessment identified a serious need for enhanced public transportation in Troup County. Almost 12 percent of households do not have access to a vehicle while another segment is unable to drive because of age, disability, or other concerns. While there are services that offer on-demand transport for older or disabled residents and special-events transport for school children, there is a need for a wider range of options to serve all residents. Local human service professionals identified a particular need for fixed-schedule public transportation, and for enhanced accessibility to health care services for non-emergency services.

Due to Troup County's low residential densities and suburban/rural development patterns, traditional urban transit would not be appropriate in most places. There are a variety of more flexible transit options that can be combined to create a robust public transportation system. Strategies include flexible routes, use of smaller vehicles (shuttles or vans), demand responsive service, a guaranteed ride home program, and commute options like vanpools. It may also be appropriate to establish fixed-route, fixed-schedule transport to serve activity centers in urbanized areas. To improve connections within and to urbanized areas, flexible route services could incorporate scheduled stops that tie into the fixed-routes.

Public transportation is available in approximately sixty percent of all rural counties nationwide, for a total of about 1,200 systems. Many rural transit systems are funded under Section 5311 of the Federal Transit Act, a formula grant program that authorizes both capital and operating assistance grants to public transit systems in areas with populations less than 50,000. Such "5311" transit systems are county-based and tend to be found in the more populated rural areas. Few are found in the most rural, isolated areas. These systems range in size from one to over 50 vehicles. According to a recent survey, the average fleet size in rural areas increased by 60 percent and ridership increased by 62 percent from 1994 to 1999.[14]

The following case studies illustrate how flexible transit strategies can be combined into an efficient and effective public transportation system for a predominantly rural county.

Examples of Successful Smaller Transit Systems

Tables 12 and 13 below provide details on a variety of smaller public transit systems that may be appropriate for use in Troup County and its cities.

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[14] Excerpted from the report "Public Transportation on the Move in Rural America," by Dennis Brown. Report available at http://www.nal.usda.gov/ric/ricpubs/publictrans.htm

Table 12- Examples of Successful Smaller Transit Systems

AREA AND TRANSIT SYSTEM	ROUTES	FREQUENCY	POPULATIONS SERVED	PLANNING	FUNDING	RESOURCES
Hall County, GA/ City of Gainesville, GA Hall Area Transit (HAT)	**"Red Rabbit" bus service.** Three fixed routes in the city. 130 bus stops located in the city. **"Dial-a-ride" van service.** Four HAT vans serving the outlying areas of Hall County.	System operates from 6:30 am- 6:00 pm Monday-Friday. Each stop served every 65 minutes. Van requests made 48 hours in advance.	Open to the public with a focus on low-income residents, students, and the elderly. The standard one-way fare is $1.00. The fare is $0.50 for seniors, children, students, and Medicare cardholders.	HAT van system in place since 1983. In 2000, the community asked for an expanded system connecting human service agencies. By 2004 the population had grown enough to qualify for urban funds and its own MPO. Focused routes along major corridors. GHMPO bases routes on community need. GHMPO is currently working on the Transit Development Plan process; a strategic guide for public transit in Hall County over the next five years. Considering six new routes. Input has been gathered from stakeholders via surveys and outreach meetings.	FTA GDOT Georgia Department of Human Resources City of Gainesville Hall County Rider fares	http://www.hallcounty.org/transport/redrabbit_info.asp http://www.ghmpo.org http://www.gainesville.org/citydepartments.communityservicecenter.ridetheredrabbit.asp
Southwest GA Dooly-Crisp Unified Transportation system (DCUTS)	**Dooly:** within the city limits, immediate county, distant county, Cordele, Unadilla to Cordele, and Dooling to Cordele. Fares are priced according to distance. **Crisp:** within city	System operates from 7:00 am- 5:00 pm Monday–Friday (excluding holidays). Available by appointment only. Group and charter trips	All populations are served with a focus on the elderly. Over 375,000 trips to date, including trips to healthcare facilities, employment, school, and child care	Began in Dooley County and expanded to serve Crisp County, both of which have large elderly populations without access to cars. Many groups were pulled together to help with the funding and planning of the system. Consultants from Renaissance, Inc. were brought in to develop a	DCUTS operates as a 501c3. Rural development provided $99,999 in RBEG funds through the Dooly County board of commissioners for technical assistance. Georgia Department of	http://www.rurdev.usda.gov/rd/stories/ga-20031216-dcuts.html http://dcuts.com/

AREA AND TRANSIT SYSTEM	ROUTES	FREQUENCY	POPULATIONS SERVED	PLANNING	FUNDING	RESOURCES
	limits, immediate county, distant county, extreme county, and Vienna. Fares are priced according to distance Currently have 12 employees and 10 vans.	are available for holidays and weekends with advance notice.	facilities.	transportation advisory committee.	Transportation Georgia Department of Human Resources Dooly County Commission Cities of Vienna, Unadilla, Lily, Dooling, and Pinehurst. Southwest Georgia United Empowerment Zone (RCDI program).	
Lower Columbia County, Rural Washington State Part of Columbia Community Action Council (CAP)	Vancouver and Longview and Longview and Tumwater. Curb-to-curb transportation is available by appointment.	Set bus schedule with several daily trips (Monday-Friday). Saturday trips now available between Longview and Vancouver (See resources for link to full schedule).	Students and senior citizens targeted. $1.00 one-way fare for general public. Students ride free with id, and free service is made available to some senior groups. CAP also works with Medicaid	Route ideas stem from the statewide Intercity Network Plan seeking complete connectivity between rural and urban areas.	Primary funding from 2-year grants provided by WSDOT.	(scheduling) http://www.lccac.org/3_7.html http://www/lccac.org/3_6.html http://apta.com/links/state_local/wa.cfm http://www.cubs-bus.com

Table 13- Other Examples of Successful Smaller Transit Systems

AREA	CHARACTERISTICS
South Central Tennessee	Rural public transportation is available for everyone. TennCare, Families First, and Job Access approved. Examples of trip destinations include: medical appointments, social service agencies, shopping, personal business, senior citizen center, and work. Passengers must call their county transportation office at least 24-hours in advance for a reservation request. Service is provided within each county at a minimum of Monday through Friday from 8 a.m. until 4 p.m. Passengers must call their county transportation office to inquire about possible additional days and hours of service. Transportation service is provided based upon van and driver availability. Each county is equipped with a minimum of one van that is equipped with a wheelchair lift and tie-downs. All passengers are required to use their seat belt. Children under the age of 8 must be in a child restraint device. General public passengers must pay their fare to the driver upon boarding the van.
Missouri Rural Public Transportation Providers	OATS (Older Adults Transportation Services) o Information found at http://www.oatstransit.org/ o Available to all residents- must call for pick-up service o OATS is a non-profit entity o Serves 87 counties with a combination of set and rotating schedules. o Last year, OATS provided 1,461,988 one-way trips with a fleet of over 625 vehicles and a staff of 600 SMTS (Southeast Missouri Transportation Service, Inc.) o Information found at http://www.ridesmts.org/ o Serves southeast area that OATS does not cover o Non-governmental, non-profit, public transportation service o SMTS is funded by a variety of sources: The Missouri DOT provides money for operation and administration in the form of direct grants, other sources of revenue include contracts for service with Southeast Missouri Area Agency on Aging, Central Missouri Area Agency on Aging, and Southwest Missouri Office on Aging- these contracts provide each rider with the opportunity to make a donation toward their ride. All rider donations are confidential. SMTS sponsors an annual campaign to raise money for new "replacement" vehicles. o Types of service: Long distance medical service, local service, "special" service

Freight Movement

Background

Freight movement is the transportation of goods from manufacturing, warehousing and distribution locations to consumers by air, rail, truck, water or pipeline. Nationally, freight is the fastest-growing segment of travel with expected increases in growth by 2020 in both truck volumes and truck ton-miles.

As the 2006 transportation plan indicated, truck traffic is already an issue in each of the three cities. With the opening of the Kia plant and the associated suppliers both inside and outside of the county, Troup County and its cities can expect an increase in freight traffic and freight operations throughout the county. This could present substantial challenges as freight mobility and volumes increase. There are currently seven designated truck routes (I-85, I-185, US 27, US 29, SR 18, SR 109, and SR 219) in Troup County. As shown earlier in this chapter (see Figure 8), these routes are expected to see increases in AADT over the next 20 years due to increased residential development. This could lead to the exacerbation of congestion problems in these areas. Additionally, the increase in both residential construction and freight activities could lead to land use conflicts if the new residential and commercial developments encroach on industrial corridors.

Community and Health Impacts

Freight movement has often invoked negative reactions from communities concerned about noise, air quality, traffic, safety, and land use issues leading to concerns about the location of freight facilities and the movement of cargo.[15] Trucking, which is the primary mode of freight transportation in Troup County, generates the greatest number of community concerns. Issues related to truck movements include inadequate infrastructure, wear and damage to pavement, insufficient loading space at customer facilities, and heavier truck movements adversely affecting automobile speeds on roadways. There are also a number of health impacts on communities in proximity to freight facilities and pollution. Air pollution issues stemming from diesel emissions, hazardous materials spills, accidents caused by truck movements, noise pollution and vibration, and safety issues can have serious health implications for community residents.

Despite community apprehension, there is a mutual understanding that freight transportation plays a vital role in the economic well-being of communities and businesses. National efforts have been made to balance the movement of freight with community goals by making freight transportation operations and facilities "good neighbors".[16] There is no one-size-fits-all approach to making freight a good neighbor for a community, but a wide range of practices to balance or mitigate the presence of freight facilities and operations have been developed and implemented. These include modifying the hours of freight operations to reduce noise impacts, incorporating low emission technologies and practices, and creating buffer zones to transition between freight/industrial uses and residential uses in an effort to address land use conflicts.[17]

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[15] Transportation Research Board of the National Academies, *Integrating Freight Facilities and Operations with Community Goals: A Synthesis of Highway Practice,* National Cooperative Highway Research Program Synthesis 320, 2003, pg 3 and 41.
[16] *Ibid.*

Environmental Impacts

Freight transport enables trade and offers a wide range of benefits including accessibility to goods and services in Troup. However, freight transport is also identified as one of the main consumers of fossil fuels and the resultant emissions, which cause negative impacts on the environment and human health.[18] Freight vehicles emit a substantial amount of pollutants and the transport sector is a significant contributor to air pollution at the local, regional, and global scales.[19] The main pollutants emitted from freight transport are carbon dioxide, carbon monoxide, nitrogen oxides, particulate matter, volatile organic compounds, and sulfur dioxide. Emissions of these pollutants:

- Increase the greenhouse effect and acid rain;
- Cause acidification, eutrophication, and formation of ozone and photochemical smog that lead to fish kills, soil damage, and other adverse environmental effects; and
- Result in various human health effects including respiratory problems, cancer, hindrance of oxygen transport to the cells through the blood, and damage to reproductive systems.[20]

In addition to air pollution, freight movement induces other environmental problems such as water pollution and stormwater runoff issues, consumption and fragmentation of land, light pollution that can confuse animal navigation, noise pollution, generation of waste, and disruption of the delicate balance of ecosystems, among others.

Appendix C provides a table of potential impacts of freight movement and best management practices for mitigating those impacts.[21]

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[18] Andersson, J. Reducing environmental impacts of freight transport sector: The case of the Czech Republic, January 2005, pg 10-12.
[19] *Ibid.*
[20] *Ibid.*
[21] The table located in Appendix C, the community and heath impacts section, and the environmental impacts were summarized from the "Community & Environmental Impact Scan Report" created by CQGRD for the Atlanta Regional Commission's *Atlanta Regional Freight Mobility Plan.* The report and complete plan are available online at http://www.atlantaregional.com/FreightMobility/reports.htm

CONCLUSIONS AND KEY RECOMMENDATIONS

The NAVIGABLE Community

OBSERVATION:	Troup County lacks the mechanisms and tools to ensure desirable corridor development.
STRATEGY:	Develop land use and transportation policies that elevate design standards, manage traffic flows, and increase opportunities for alternative modes of travel.
STRATEGIC GOAL(S):	The Navigable Community The Attractive Community
REFERENCE(S):	Transportation Assessment Quality Growth Audit

Several key transportation corridors and nodes (many of which are largely commercial in character) serve as gateways to Troup County and the cities. In many instances the corridors suffer from inconsistent development patterns and substandard materials and design. Due to the anticipated residential development throughout the county, these corridors are likely to attract new and unprecedented commercial development, and in some cases redevelopment, which can several as a catalyst to create a more attractive and function corridor.

Troup County and its cities should adopt complementary land use, transportation, and design visions and policies in order to create quality, efficient corridors. Both function (efficient traffic flow) and form (quality and durable materials, flexible building design, appropriate landscaping) are important to ensure these corridors serve as a community asset. The county and cities should consider:

- Developing an Access Management Plan for corridors and nodes where higher intensity development is anticipated and desirable. Access management is the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway. The purpose is to integrate land use planning and transportation engineering practice to maintain high-performing corridors in accordance with the county's preferred alignments.

- Amending the comprehensive plans of the county and cities to include the Street Typology conducted as part of this Strategic Planning Process. The street typology provides a range of appropriate road design and land use standards for each type of corridor, be it downtown, parkway, regional, inter city, or others. In some corridors a "Complete Streets" approach is given priority to encourage walking and biking, and future transit expansion. In other corridors the focus is on congestion reduction. After review and revision of the typology it can serve to create an explicit link between the design and operation of transportation system and their adjacent land uses, and can be used to encourage Georgia Department of Transportation funded projects to implement the community's vision for the particular corridor.

- Establishing consistent design and streetscape standards for key gateway corridors. Standards would address building materials, signage, setbacks, building orientation to street, landscaping, lighting, and signage. This may be best accomplished in a corridor overlay that is implemented across all jurisdictions, since many corridors traverse incorporated and unincorporated areas. See the street typology recommendations in the *Preparing for the Future in Troup County, Georgia: Transportation Assessment* for details.

The City of LaGrange should continue to support Georgia Department of Transportation's long-range plan to address south Hamilton Road (US 27). As the *Preparing for the Future in Troup County, Georgia: Transportation Assessment* shows, anticipated development southeast and south of LaGrange, including Kia and its suppliers, will continue to put traffic pressure on this area. With relatively dense population and lower vehicle access rates in this area, it is important that this corridor also serve pedestrian, bicycle, and public transportation modes of travel.

OBSERVATION:	Troup County will experience increasing demand for a more robust public transportation system as the population increases.
STRATEGY:	Troup County, working in conjunction with the Cities and human service partners, should develop an incremental exploration to expand public transportation services.
STRATEGIC GOAL(S):	The Navigable Community The Good Habitat Community The Prosperous Community
REFERENCE(S):	Human Services Assessment Transportation Assessment Workforce Development Assessment

Several stakeholders expressed a need for enhanced public transportation services. Approximately 12 percent of households in the county do not have access to a vehicle and in some areas it is as much as 46 percent.[22] Furthermore, population projections show a growing older adult population segment, which will have greater need of transportation services.

The lack of reliable or public transportation was the most pervasive concern raised by human service professionals serving Troup County. This critical issue affects everything from a person's ability to access jobs, training and education opportunities, to health care services, and to other basic human service needs. Troup County must determine a suitable option for creating a public transit service.

Troup County should convene a task force composed of representatives from the cities and county, Georgia Department of Transportation, and key human services and workforce development professionals to explore opportunities to expand the public transportation system. The county should consider:

- Assessing the adequacy of the current public transportation system and services provided by individual agencies and explore where the current dial-a-ride system could be expanded

[22] Or Housing Units, as described by the U.S. Census Bureau, 2000 Census.

to satisfy unmet needs, or if a flexible-route or fixed-route system warrants exploration. The task force should explore the pros and cons of a single-coordinated system, which can benefit from shared vehicle, staff, and administrative responsibilities. If a joint system is favorable, then careful consideration should be directed to whom—public sector, non-profit, or private sector—would operate the system. Depending on which entity operates the system, different requirements, funding sources, and demands will apply to the entity.

- [If the task force sees the need for a flexible-route or fixed-route system], conducting a feasibility analysis that examines areas of demand (where residents in need of such service live), destinations (e.g. hospitals, pharmacies, grocery stores, job centers, community facilities). Care should be taken in examining requirements pertaining to compliance with the Americans with Disabilities Act in relation to the type of service being operated. Depending on who operates the system and the style of operation, an expanded public transportation system may require wheelchair-accessible vehicles and specially trained personnel, which may be cost prohibitive. In addition, consideration should be given toward exploring environmentally friendly alternatives such as alternative fuel vehicles and electric shuttles. The *Preparing for the Future in Troup County, Georgia: Transportation Assessment* includes case studies of communities with various levels of public transportation services and sources of funding.[23]

OBSERVATION:	Troup County's ability to ensure efficient transportation flows around industrial districts will be challenged by the significant ongoing and anticipated industrial growth.
STRATEGY:	Troup County and the cities should establish a long-range vision for industrial development and establish policies that protect important infrastructure and suitable land.
STRATEGIC GOAL(S):	The Navigable Community The Well Planned Community The Good Habitat Community
REFERENCE(S):	Transportation Assessment A Spatial Strategy for Sustainability Quality Growth Audit

Troup County industry is currently well served by transportation systems and land that are available and suitable for industrial development. New non-industrial development has the potential to encroach on industrial areas and may create land use and transportation conflicts that reduce efficiency and create safety issues.

[23] Jon E. Burkhardt, Charles A. Nelson, Gail Murray, David Koffman., 2004. *Toolkit for Rural Community Coordinated Transportation Services*. Transportation Cooperative Research Program, Report 101, Transportation Research Board.

As a growing industrial center, Troup County and the cities should adopt policies and plans to secure land and systems that support the community's vision for future economic development. The county and cities should consider:

- Developing an Industrial Districts Park Management Plan and address industrial land needs for the long-term future. Such a plan can establish policies and guidelines for design and siting of businesses, as well as set environmental guidelines that may be related to the Green Ribbons strategy outlined earlier.

- Carefully evaluating residential and commercial development proposals near existing and future industrial areas to ensure that such development will not create traffic congestion that will inhibit freight movement, and the freight routes and noise and light pollution from industrial areas will not negatively impact residential areas. For a full examination of community impacts of freight see the Transportation Assessment.

OBSERVATION:	With the introduction of Kia Motors and the associated businesses, Troup County is becoming a major industry center in the southeast. As such, broader regional questions about effective and efficient transport will become increasingly important to the county and cities.
STRATEGY:	Troup County and the cities should continue to expand their role in regional, state, and multi-state discussions about highway and railroad infrastructure.
STRATEGIC GOAL(S):	Navigable Community Quality Governance Community
REFERENCE(S):	Transportation Assessment A Spatial Strategy for Sustainability

With the addition of KIA, associated suppliers, and the anticipated increase in large scale residential developments, it is expected that Troup County will see an increase in inter- as well as intra-county traffic. Troup County and cities will need to plan, in the short- and long-term, for the expected local increases in traffic from expected residential, industrial, and commercial development. It is expected that increases will be seen in commercial (freight) as well as non-commercial traffic.

As mentioned in Recommendation N-3, it is important that Troup County and its cities regularly assess the potential local and county-wide transportation impacts of anticipated developments. This should be expanded beyond just the potential effects of traffic congestion on freight movement, but should include the potential for traffic congestion from commercial development, freight traffic, and large-scale residential developments of regional impact (DRI). This could be integrated into the planning and governance coordination suggested in Recommendations Q1- Q3.

Additionally, there will be traffic impacts, both commercial (freight) and non-commercial, from future development occurring in adjacent counties. Similar to the suggestion in E-6, Troup County and the cities should work with surrounding counties to communicate expected large scale commercial, residential, and industrial developments and potential infrastructure improvements that could have a cross-jurisdictional effect on traffic congestion.

OBSERVATION:	All of the downtown districts are traversed by active rail lines, some of which create automobile flow issues and create less desirable pedestrian and bicycle access from the residential neighborhoods to the downtown.
STRATEGY:	The cities should seek to improve railroad crossings in concert with the Federal Rail Authority at key locations.
STRATEGIC GOAL(S):	Navigable Community Quality Governance Community
REFERENCE(S):	Transportation Assessment A Spatial Strategy for Sustainability

To become a multimodal community, any deterrence to walking and biking, especially to destinations like downtown districts, should be considered for improvements. Real and perceived safety issues can decrease the likelihood of people using alternative modes of travel. Railroad crossings that do not explicitly provide for pedestrian and bicycle safety or that create burdensome automobile backups can create challenges. The following are recommendations:

The cities should examine the origins and destinations of potential pedestrian and bicycle travel. Several methodologies are available to undertake this effort, including latent demand analysis, bike and pedestrian level of service, and community surveys. Once key routes are identified, engineering studies should be undertaken to improve key railroad crossings.

The cities should continue to advocate for traffic signal technology and timing improvements. Such improvements can have a dramatic impact on automobile cueing and can relieve congestion in the downtowns and around railroad crossing.

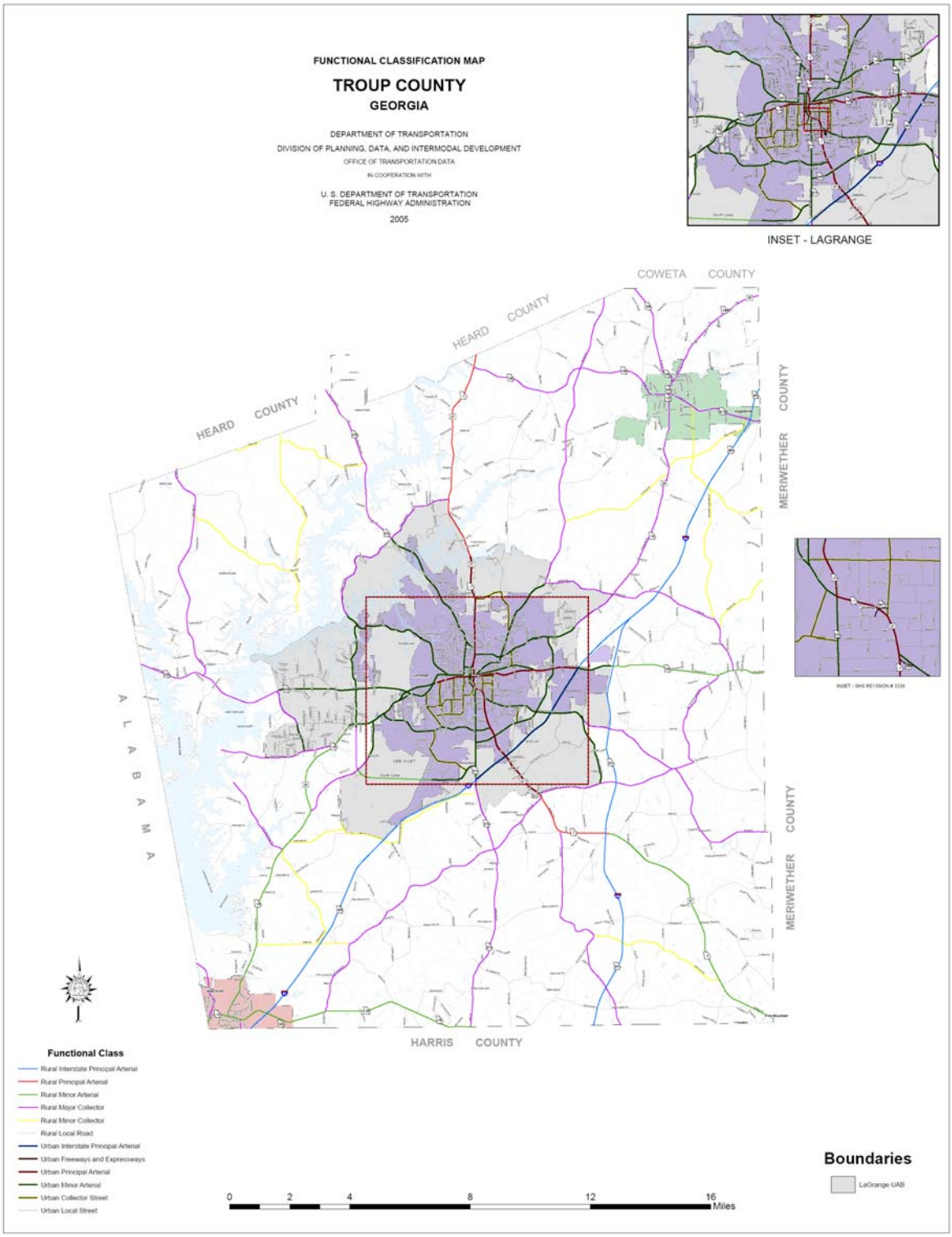
APPENDICES

APPENDIX A: Troup County Functional Classification Map

APPENDIX B: Gallery of Best Practices

APPENDIX C: Freight Impacts and Mitigation

APPENDIX A: Troup County Functional Classification Map



Source: U.S. Department of Transportation, Federal Highway Administration

APPENDIX B: Gallery of Best Practices

Throughout the typology several topics were marked with . This icon identifies concepts that can be better understood with visual depiction. For example, concepts like interparcel connectivity, bicycle accommodations and pedestrian ways, and traffic calming can be better illustrated through the images and drawings contained in this gallery.

Traffic Calming

Traffic calming is a set of strategies aimed at reducing traffic volumes and speeds at which drivers move through an area. The following images show examples of several of the many strategies used in traffic calming.

Figure 12- Illustration of curb cut outs that help to reduce traffic volumes and travel speeds.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden and PBIC[24]

Another strategy used to reduce traffic speeds are medians placed between travel lanes. This is shown in Figure 13 below.

[24] Available online at http://www.pedbikeimages.org/.

Figure 13- Medians are placed between traffic lanes to slow traffic speeds.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[25]

A third strategy for traffic calming is speed bumps. Speed bumps are often placed in residential areas.

Figure 14- Speed bumps as a traffic calming strategy.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[26]

[25] Available online at Available online at http://www.pedbikeimages.org/.
[26] *Ibid.*

Bicycle Accommodations

Having provision for bike lanes and bike facilities along roadways promotes a sense of safety for riders. The following figures illustrate ways to accommodate cyclists.

Figure 15- Designated bicycle and pedestrian crossings.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[27]

Figure 16- Designated bicycle lanes on urban roads.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[28]

[27] Available online at http://www.pedbikeimages.org/.
[28] *Ibid.*

Figure 17- Bicycle lanes located on rural roads.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[29]

Figure 18- Bicycle facilities in urban settings.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[30]

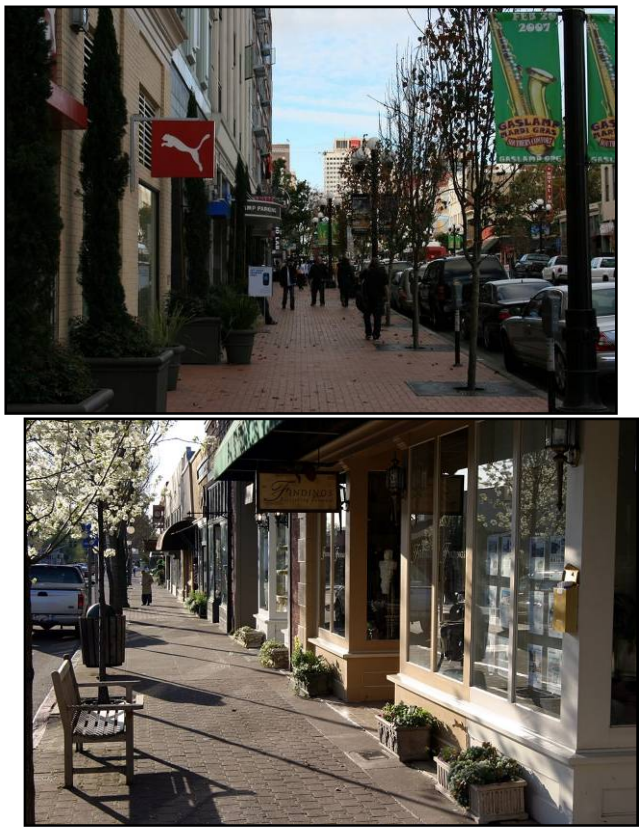
[29] Available online at http://www.pedbikeimages.org/.

[30] *Ibid.*

Pedestrian Way

A pedestrian way is a term used to describe the portion of the right-of-way designated for the use of pedestrian travel. The following figures illustrate this design feature.

Figure 19- Widened sidewalks, street and store signage, landscaping, and street furniture contribute to an enjoyable pedestrian environment.



Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Reed Huegerich and Dan Burden[31]

[31] Available online at http://www.pedbikeimages.org/.

Figure 20- Outdoor patios contribute to an enjoyable pedestrian streetscape.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[32]

Figure 21- ADA compliant sidewalks.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[33]

Interparcel Connectivity and Access Management

Interparcel connectivity is a component of better access management. It involves consolidating vehicular access points and removing barriers to free movement of vehicles and pedestrians between adjoining parcels.

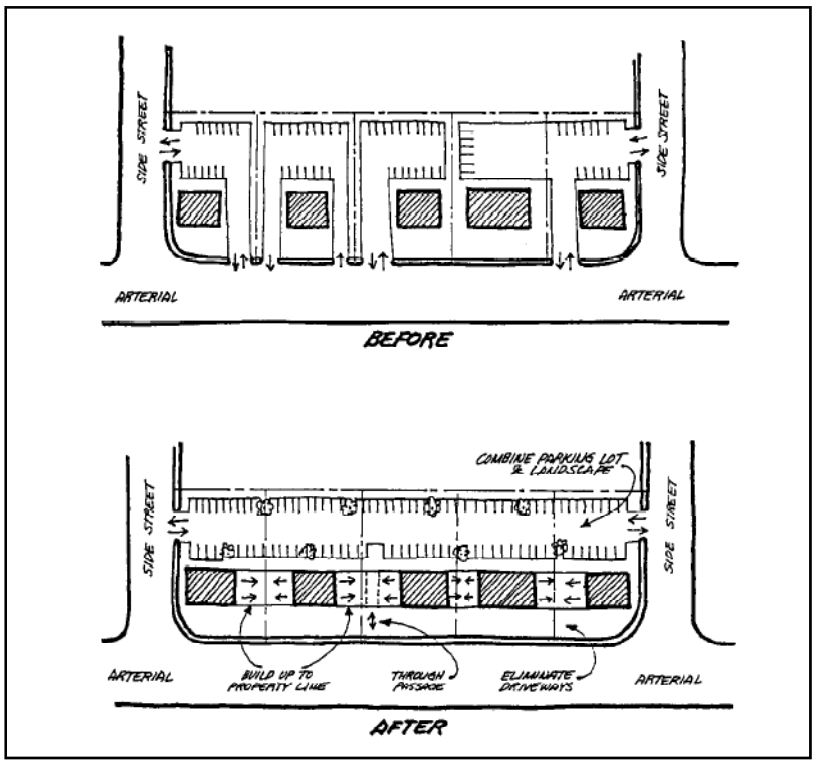
The images below show examples of improvements in access management and the creation of more pedestrian/bicycle-friendly environments.

[32] *Ibid.*
[33] Available online at http://www.pedbikeimages.org/.

Figure 22- Illustration of how consolidating driveways improves pedestrian environment and aesthetics.

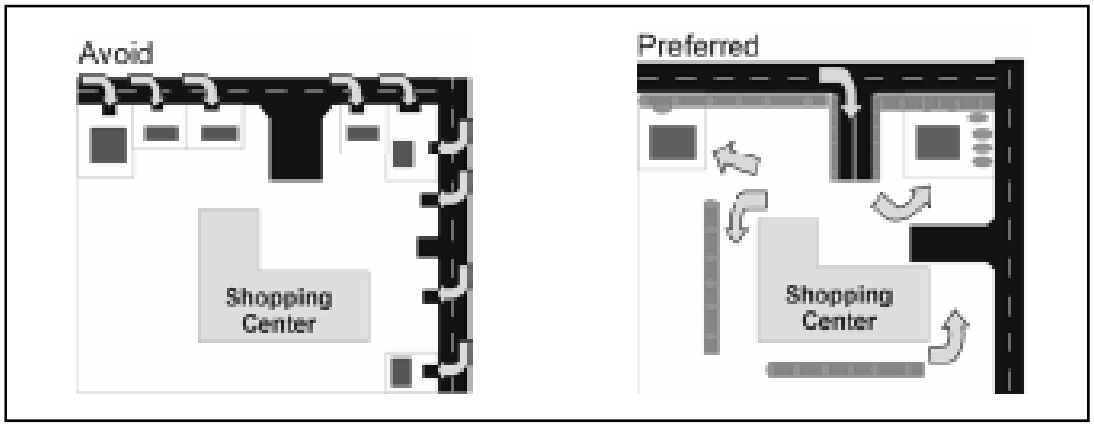
Source: Glatting-Jackson Kercher Anglin

Figure 23- Improved pedestrian and bicycle environment by connecting parcels and consolidating entry points.



Source: *Guide to Driveway Consolidation*[34]

Figure 24- Improved access management.



Source: *Effective Strategies for Comprehensive Corridor Management*[35]

[34] George Jackquemart Associates, "Guide to Driveway Consolidation," 1989
[35] Available online at www.cutr.usf.edu.

Figure 25- Good example of pedestrian path through a parking area.

Source: Leicestershire County Council[36]

Interparcel connectivity is also important in a residential setting, as cul-de-sacs and neighborhood boundaries often create barriers to schools, parks, and other destinations. The images below provide examples of pedestrian and bicycle cut-throughs.

Figure 26- Pedestrian cut-throughs in a residential setting.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[37]

[36] Available online at www.leics.gov.uk/index/highways/road_improvements/htd/highway_req_development_part3.htm.
[37] Available online at http://www.pedbikeimages.org/.

Figure 27- Bike and pedestrian path connecting a cul-de-sac to a local school.

Source: Safe Routes to Schools Program[38]

Streetscaping

Streetscaping is used as a design feature to make the pedestrian way more inviting and comfortable. Streetscaping can include but is not limited to landscaping, street furniture, and lighting.

[38] Available online at http://www.saferoutesinfo.org/guide/engineering/connectivity.cfm.

Figure 28- Illustrates a combination of lighting and greenscaping for street beautification.

Source: Creative Hardscape[39] and Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[40]

Figure 29- City center streets provides landscaped gateways as pedestrian crossings.

Source: TDM Encyclopedia[41] and Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[42]

[39] Available online at http://www.creativehardscape.com.
[40] Available online at http://www.pedbikeimages.org/.
[41] Available online at http://www.vtpi.org/tdm/.
[42] Available online at http://www.pedbikeimages.org/.

Figure 30- Sitting benches are provided for pedestrian passer-bys.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[43]

Figure 31- Well-lit areas make pedestrians feel safer when walking.

Source: University of Idaho Community Design and Planning Research[44] and Pedestrian Bicycle Image Center (PBIC) Image Library, Annie Lux and Dan Burden[45]

Public Art

The following images provide examples of innovative forms of public art.

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[43] *Ibid.*
[44] Available online at http://www.class.uidaho.edu/communityresearch/sidewalks.htm.
[45] Available online at http://www.pedbikeimages.org/.

Figure 32- Creative and proper bicycle rack.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[46]

Figure 33- Public Art in downtowns.

Source: University of Idaho Community Design and Planning Research[47]

[46] *Ibid.*
[47] Available online at http://www.class.uidaho.edu/communityresearch/sidewalks.htm.

Figure 34- Public art in the form of benches.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden and Reed Huegerich[48]

Figure 35- Public art and proper lighting creates a more inviting environment.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden and Mike Cynecki[49]

[48] Available online at http://www.pedbikeimages.org/.
[49] Available online at http://www.pedbikeimages.org/.

Figure 36- Decorative light posts.

Source: Living Streets[50] and Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[51]

[50] Available online at www.livingstreets.org.uk.
[51] Available online at http://www.pedbikeimages.org/.

Wayfinding Signage

Often, pedestrian and bicycle routes to destinations differ from those used by automobiles. For this reason, wayfinding signage should differentiate between these routes and include details like distance estimates (see Figures 38-42).

Figure 37- Traditional wayfinding signage.

Source: City of Atlanta[52]and Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden[53]

[52] Available online at www.atlantadowntown.com.
[53] Available online at http://www.pedbikeimages.org/.

Figure 38- Directional signage routes and approximate distances to destinations.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Michael Cynecki and Bruce Nesbitt[54]

[54] Available online at http://www.pedbikeimages.org/.

Figure 39- Bicycle route designation and directional signage.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Michael King[55]

Wayfinding signage could also be used to direct drivers toward public facilities as shown below.

Figure 40- Directional signage to public facilities.

Source: Pedestrian Bicycle Image Center (PBIC) Image Library, Dan Burden and ITE Pedestrian Bicycle Council[56]

[55] Available online at http://www.pedbikeimages.org/.
[56] *Ibid.*

Figure 41- Parking location and availability.

Source: Congress of New Urbanism, Stephen Filmanowicz[57]and IEEE Spectrum Online, Robert Charette

Universal Design

Troup County residents and visitors represent a diverse population that varies in age, income, culture, and ability. Users include older adults, children, people with disabilities, non-English speakers, and others whose mobility can be affected by short- or long-term limitation in ability. According to the National Institute on Aging (2006), almost 80 percent of people over age 65 have at least one chronic health condition, and 50 percent have at least two chronic health conditions, which often lead to disability, which requires accommodations in the built environment to allow for mobility. Low levels of physical activity and failure to meet the required activity levels have significant health consequences for children such as obesity, low bone density, and low physical fitness.[58] Thirty-five percent of children in the U.S. do not meet the minimum physical activity requirements, while 14 percent are totally inactive.[59] Active forms of travel can help children get the recommended levels of physical activity.

Older adults, children, and people with long- and short-term disabilities have specific needs in order to effectively function within the community. Historically, specialized design for each of these groups has often resulted in segregation and stigmatization of these populations and increased the costs. A better solution can be found in the principles of Universal Design, which is design of "products and environments to be usable by all people, to the greatest extent possible, without the need for

[57] Available online at www.cnu.org/search/imagebank.
[58] Trost, S.G., L. M. Kerr, D. S. Ward, and R. R. Pate. 2001. Physical Activity Determinants of Physical Activity in Obese and Non-Obese Children. International Journal of Obesity and Related Metabolic Disorders 25 (6): 822-829.
Bailey, D. and A. Martin. 1994. Physical Activity and Skeletal Health in Adolescents. Pediatric Exercise Science 6 (4): 330-347.
[59] U.S. Department of Health and Human Services (HHS). 2000. *Healthy People 2010* and *Healthy People 2000.* Washington, DC: Government Printing Office.

adaptation or specialized design." [60] Such a design philosophy can accommodate all people with different age and ability levels by the same design to become as inclusive as possible. Seven principles of Universal Design advocate equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, and size and space for approach and use.[61]

The Principles of Universal Design:

- **Equitable use** means that designs need to be useful and marketable to people with different levels of ability. The main goal is to provide one design to accommodate all users. If it is not possible, then equivalent options should be available.

- **Flexibility in use** recommends that products, buildings and environments should accommodate a wide range of individual preferences and abilities through various methods of use. Access and use should be possible by both left and right handed users. Products and environments should be compatible with the user's pace to accommodate the use by various ability levels. For example, traffic lights should be timed to give people, especially older adults, children, and people carrying loads or using assistive technology, enough time to cross the streets comfortably and without any hazard. In addition, traffic and pedestrian signals may be designed to provide more information to assist pedestrians and drivers in achieving a safe environment within a shared right-of-way.

- Universal design also advocates for products and environments that enable **Simple and Intuitive Use.** This means that places should be simple enough to understand regardless of an individual's experiences, knowledge, language skills, or concentration level. The transportation system should be designed to eliminate complexity, organize information based on importance, and be consistent with an individual's expectations and intuition. Putting clear signage at appropriate places for the streets, stops, transit destinations, miles walked or remaining for trails, and maps is important for all users.

- **Perceptible Information** should be provided in diverse modes (e.g., auditory, visual, tactile) to match the skills of different users. For example, signs should use contrasting colors for the information and the background (e.g., white on black) to improve legibility, and signage and maps should have big enough letters and Braille for vision impaired users. Furthermore, travelways should use varying texture and color for pavement of streets, sidewalks, and bike paths to provide navigational guidance to older adults and others with vision loss, as well as provide additional locational information for the general public.

  Sidewalks, trails, and public pedestrian routes can better serve elderly, people with visual impairments, and people using wheelchairs by adding common types of information that can be perceived with several senses. For example, raised tactile surfaces, materials with contrasting sound properties, grooves, contrasting colors, and audible pedestrian signals can be used as detectable warnings and for wayfinding, Raised tactile surfaces contain textures detectable with the touch of a foot or sweep of a cane to warn for upcoming hazards or changes in the pedestrian environment. Raised tactile surfaces include truncated domes, patterned panels, and other textured designs.

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[60] Mace, R., G. Hardie, C. Stephanidis, S. Iwarsson, and W. Preiser. 1991. *Accessible Environments: Toward Universal Design. Innovation by Design.* E. White. New York: Van Nostrand Reinhold.
[61] Center for Universal Design (CUD). 1997. The Principles of Universal Design. North Carolina State University. Accessible online at http://www.design.ncsu.edu/cud/about_ud/udprinciplestext.html.

- **Tolerance for Error** requires designs that minimize hazards and accidents through warnings and the elimination, isolation, or shielding of hazardous elements. The design should seek to minimize unconscious actions for tasks requiring attention, and to encourage users to be aware of their environments. Sidewalks and crossings are important to maximize mobility and minimize hazards for individuals who use wheelchairs, walkers and canes as well as those with an irregular or unsteady gait.

- According to the **Low Physical Effort** principle, buildings and environments should be designed to be used efficiently and comfortably without the need of an extra operating force, awkward body position, unnecessary repetitive actions, or sustained physical effort. For example, the connectivity of neighborhoods through a web of streets and trails will decrease the time and effort spent reaching destinations compared to conventional community development with dead-end streets and cul-de-sacs. Another opportunity to provide amenities that require low physical effort can be found in seating features.

- The principle of **Size and Space for Approach and Use** states that a design should be an appropriate size for the intended use (i.e., sufficiently large or small) and provide enough space for approach and use by people with different body sizes, assistive devices, or personal assistants. Components should be reachable by all heights and can be operable by all hand and grip sizes. Several design guidelines require adherence to applicable Americans with Disabilities Act (ADA) standards. However, there are points where ADA is not sufficient to enable mobility to wheelchair users due to recommended widths of the sidewalks and cross slopes.

APPENDIX C: Freight Impacts and Mitigation Practices

Freight Impact	Freight Type	What Contributes to or Exacerbates the Impacts	Who is Impacted	Impacts on the Community and/or Environment	Prevention and Mitigation Methods	Best Practices and Case Studies
Air Pollution	Truck Rail	**TRUCK:** ▪ Idling of engines ▪ Traffic congestion ▪ Emission rates of equipment **RAIL:** ▪ Car and truck idling at grade crossings ▪ Idling train engines and handling equipment ▪ Emission rates of equipment ▪ Moving locomotives produce 50% of emissions ▪ Idling produces 45% ▪ Locomotive testing produces 5%	Community Environment	Exposure to ozone, directly emitted (primary) diesel particulate matter and particulate matter formed in the atmosphere (secondary) from goods movement emissions can cause: ▪ Premature death ▪ Cancer - increased risk ▪ Respiratory illnesses o Asthma o Chronic bronchitis o Reduced lung function and capacity ▪ Heart disease – increased risk ▪ Neurotoxicity ▪ Effects on the immune system ▪ Can exacerbate the effects of heart disease and diabetes in people who suffer from those illnesses	**ALL FREIGHT:** **Technological**: ▪ Integrate Intelligent Transportation System (ITS) Technologies. ▪ Utilize cleaner fuels and lower emission producing equipment. ▪ Phase out older equipment and replace with newer, cleaner equipment. ▪ Retrofit equipment with cleaner technologies. ▪ Employ filtering technologies where feasible. **Operational**: ▪ Schedule truck appointments to reduce idling. ▪ Reduce speeds. **Planning & Design**: ▪ Cluster industrial uses. ▪ Separate non-compatible and sensitive land uses to decrease exposure to air pollutants. ▪ Create/maintain buffer zones (vegetation, compatible land uses, open space, etc.) of at least 200 meters between diesel polluting freight and sensitive receptors (housing, schools, day cares, playgrounds, hospitals, nursing homes, etc.) **Regulations**: ▪ Develop and maintain truck-only access routes. ▪ Retain and build-upon existing industrial areas. ▪ Require that developers use building techniques and materials that mitigate impacts of air pollution in homes being built proximate to freight facilities. ▪ Limit idling of equipment. **Policy**: ▪ Encourage the use of alternatively fueled vehicles. ▪ Encourage re-use of brownfields. ▪ Provide incentives to encourage the acquisition of cleaner technologies **Educational**: ▪ N/A **TRUCK:** **Technological**: ▪ Utilize Truck-Stop Electrification (TSE) equipment as an alternative to idling. TSE equipment allows refrigeration units to continue operating without the truck idling. **Operational**: ▪ N/A **Planning & Design**: ▪ Replace at-grade rail crossings with grade separated crossings to limit idling. ▪ Develop and integrate an efficient and effective wayfinding signage program that reduces the likelihood of trucks traveling unnecessary distances, off designated truck routes, and through communities. ▪ Design the site so as to prevent the queuing of trucks and idling **Regulations**: ▪ Require staging areas for trucks at buildings. Staging areas are useful as "backing areas," waiting areas, when there is not a sufficient number of loading docks, and when trucks are longer than the design of the building allows. **Policy**: ▪ Advocate for mode shift from truck to rail where feasible. Such a mode shift can reduce truck traffic and increase vehicular flow.	Freight Action Strategy for Seattle-Tacoma-Everett Corridor (FAST Corridor) http://www.psrc.org/projects/freight/index.htm Alameda Corridor – Ports of Long Beach and Los Angeles - http://www.acta.org/ http://www.acta.org/PDF/Alameda%20Corridor%20AQ%20Benefits%20Report_061005.pdf Alameda Corridor (California) - Assessing Rail Freight Solutions to Roadway Congestion: Final Report. Transportation Research Board, NCHRP Project 8-42 http://www.trb.org/NotesDocs/NCHRP08-42_FR_Rev10-06.pdf California Environmental Protection Agency – *Goods Movement Action Plan* http://www.arb.ca.gov/gmp/docs/gmap-1-11-07.pdf Pacific Institute, West Oakland California - *Clearing the Air: Reducing Diesel Pollution in West Oakland, California* http://www.pacinst.org/reports/diesel/clearing_the_air_final.pdf

Freight Impact	Freight Type	What Contributes to or Exacerbates the Impacts	Who is Impacted	Impacts on the Community and/or Environment	Prevention and Mitigation Methods	Best Practices and Case Studies
					Educational ▪ Develop a driver training program in part to teach drivers about air quality issues and mitigation methods. **RAIL:** **Technological** ▪ N/A **Operational** ▪ Reduce locomotive idling times **Planning & Design** ▪ Develop rail spurs or connections to provide direct service to freight facilities removing the need for trucks and reducing truck traffic on roadways. ▪ Replace at-grade rail crossings with grade separated crossings to limit idling. **Regulations** ▪ Implement a Low Sulfur Diesel Fuel Rule. **Policy** ▪ Advocate for mode shift from truck to rail where feasible. Such a mode shift can reduce truck traffic and increase vehicular flow. **Educational** ▪ N/A	
Road Issues: ▪ Traffic flow ▪ Congestion ▪ Cut-through traffic ▪ Road/pavement conditions ▪ Connectivity & Access	Truck Rail	**TRUCK:** ▪ Hours of operation—can affect traffic flow ▪ Volume—affects available road capacity for other users causing congestion ▪ Operational characteristics—acceleration and deceleration rates of trucks differ from passenger vehicles adversely affecting automobile speeds ▪ Road geometries—trucks often require wider lane widths, turning radii, and turning lane requirements ▪ Trucks at commercial/retail establishments—can block traffic during loading and unloading or when backing into or pulling out of loading docks. Double-parking of trucks is also an issue ▪ Truck parking on shoulders and ramps—lack of	Community	Traffic congestion and delays have stress-related health impacts ▪ Headaches ▪ Hypertension ▪ Depression and anxiety ▪ Weakened immune system Sitting in heavy traffic congestion can place drivers and passengers at increased risk of exposure to traffic-related pollutants. Associated health impacts include: ▪ Asthma ▪ Cough ▪ Reduced lung Function ▪ Cancers ▪ Cardiopulmonary and stroke mortality ▪ Premature births and lower birth weights Roads heavily traveled by trucks, wide streets, traffic congestion, rail lines, and unsafe road conditions can all disrupt neighborhood or community cohesion resulting in negative health impacts and quality of life. Sitting in traffic congestion, particularly at grade crossings, can cause drivers to take risky maneuvers to avoid delays. Increased traffic volume can result in increased risk of accidents. The severing of formerly connected communities because of infrastructure or facility development can isolate people, create un-walkable environments, and limit access. A lack of walkability can reduce the opportunities for physical activity. Inactivity has the following health impacts: ▪ Coronary heart disease	**ALL FREIGHT:** **Technological** ▪ Integrate Intelligent Transportation System (ITS) Technologies. **Operational** ▪ Schedule truck appointments to reduce idling, parking, and circling while waiting for docks to open. **Planning & Design** ▪ Cluster industrial uses via an industrial area plan or a freight village concept. ▪ Create a warehouse and distribution zoning designation. **Policy** ▪ Encourage the re-use of brownfields. **Regulations** ▪ Develop truck-only access routes where appropriate. ▪ Retain and build-upon existing industrial areas. **Educational** ▪ N/A **TRUCK:** **Technological** ▪ N/A **Operational** ▪ Switch from truck to rail use where appropriate ▪ Restrict trucks to certain routes. **Planning & Design** ▪ Develop separate truck access routes where appropriate to increase public safety, re-route traffic from sensitive land uses, and relieve traffic congestion. ▪ Replace at-grade rail crossings with grade separated crossings to ease traffic flow issues. ▪ Develop and designate routes for heavy weight trucks which cause more wear and tear on road pavement and affect traffic flow because of their slower acceleration and deceleration. Such designated routes can ease traffic flow and roads can be especially designed to withstand the impacts of the heavier weight. ▪ Make spot improvements to transportation infrastructure where deemed inadequate for truck usage. Improvements include road geometry issues such as inadequate turning radii, lack of turn lanes, and ramp configurations. ▪ Participate in interjurisdictional corridor analysis to address issues that extend beyond political boundaries. **Policy** ▪ Advocate for mode shift from truck to rail where feasible. Such a mode shift can reduce truck traffic and increase vehicular flow.	Freight Action Strategy for Seattle-Tacoma-Everett Corridor (FAST Corridor) http://www.psrc.org/projects/freight/index.htm Alameda Corridor – Ports of Long Beach and Los Angeles - http://www.acta.org/ Alameda Corridor (California) - Assessing Rail Freight Solutions to Roadway Congestion: Final Report. Transportation Research Board, NCHRP Project 8-42 http://www.trb.org/NotesDocs/NCHRP08-42_FR_Rev10-06.pdf Guild's Lake Industrial Sanctuary – Portland, OR http://www.portlandonline.com/shared/cfm/image.cfm?id=58694 Sheffield Flyover, Kansas City, Missouri Assessing Rail Freight Solutions to Roadway Congestion: Final Report. Transportation Research Board, NCHRP Project 8-42 http://www.trb.org/NotesDocs/NCHRP08-42_FR_Rev10-06.pdf The North Jersey Transportation Planning Authority study– *Brownfields Economic Redevelopment: Preparing Modern Intermodal Freight Infrastructure To Support Brownfields Economic Redevelopment* http://njtpa.org/planning/brownfields/BERfinalreport.html

Freight Impact	Freight Type	What Contributes to or Exacerbates the Impacts	Who is Impacted	Impacts on the Community and/or Environment	Prevention and Mitigation Methods	Best Practices and Case Studies
		adequate truck parking can slow operations of other vehicles ▪ Damage to road pavement—could also damage curbs and sidewalks, telephone poles and street lights, and signage if turning radii are too tight or loading docks are too small. ▪ Access issues—inadequate truck routes can lead to cut-through traffic **RAIL:** ▪ At grade crossings—freight trains (particularly longer ones) can cause significant traffic delays		▪ Respiratory disease ▪ Stroke ▪ Stress ▪ Obesity ▪ Diabetes ▪ Cardiovascular disease ▪ Depression Lack of walkability can also result in social exclusion or a loss of social capital. Resulting health impacts can be: ▪ Depression ▪ Anxiety ▪ Reduced life expectancy ▪ Reduced resistance to infections ▪ Increased likelihood for recurrence of cancer Lack of access to people, destinations, and services can have health impacts: ▪ Stress ▪ Depression ▪ Anxiety ▪ Lack of access to a healthy diet	**Technological**: ▪ Working with local trucking associations, create an incident management program or a truck safety hotline to report and track unsafe trucking activity or conditions. ▪ Encourage freight facilities to schedule truck appointment times. **Regulations**: ▪ Require developers to make necessary highway access improvements as a condition for project approval. ▪ Establish a transportation enhancement district through which property owners and developers contribute to transportation improvements. ▪ Require staging areas for trucks at buildings. Staging areas are useful as "backing areas," waiting areas, when there is not a sufficient number of loading docks, and when trucks are longer than the design of the building allows. ▪ Develop and integrate an efficient and effective wayfinding signage program that reduces the likelihood of trucks traveling unnecessary distances, off designated truck routes, and through communities. **Educational**: ▪ N/A **RAIL:** **Technological**: ▪ N/A **Operational**: ▪ Suggest hours of operations to minimize traffic-related conflicts particularly with at-grade crossings **Planning & Design**: ▪ Replace at-grade rail crossings with grade separated crossings to ease traffic flow issues. ▪ Develop rail spurs or connections to provide direct service to freight facilities removing the need for trucks and reducing truck traffic on roadways. May also have the benefit of relieving at-grade crossings. **Policy**: ▪ Advocate for mode shift from truck to rail where feasible. Such a mode shift can reduce truck traffic and increase vehicular flow. ▪ Encourage freight facilities to schedule truck appointment times. **Regulations**: ▪ N/A **Educational**: ▪ N/A	NYCDOT - *NYCDOT Truck Route Management and Community Impact Reduction Study* http://www.nyc.gov/html/dot/html/motorist/trucks.html NYCDOT – Truck Route Management and Community Impact Reduction Study – Technical Memorandum 3: Truck Signage Program http://www.nyc.gov/html/dot/pdf/tm3trucksignprog.pdf NYCDOT – Truck Route Management and Community Impact Reduction Study – Technical Memorandum 1: Traffic Policies and Regulations http://www.nyc.gov/html/dot/pdf/tm1trafpolicies.pdf NYCDOT – Truck Route Management and Community Impact Reduction Study – Technical Memorandum 4: Education Program http://www.nyc.gov/html/dot/pdf/tm4eduprog.pdf Hunts Point Vision Plan - Hunts Point Peninsula, South Bronx, NY http://www.nycedc.com/Web/AboutUs/OurProjects/CurrentProjects/HuntsPointVisionPlan.htm Washington State Department of Transportation – *WSDOT Truck Parking Study: Final Report* http://www.wsdot.wa.gov/freight/Truck%20Study-Final.pdf Volpe National Transportation Systems Center & US Department of Transportation - *District of Columbia Motor Carrier Management and Threat Assessment Study* http://app.ddot.dc.gov/information/studies/Motor_carrier_study/pdf/Preliminary_Draft.pdf Vancouver Gateway Transportation System - Assessing Rail Freight Solutions to Roadway Congestion: Final Report. Transportation Research Board, NCHRP Project 8-42 http://www.trb.org/NotesDocs/NCHRP08-42_FR_Rev10-06.pdf

Freight Impact	Freight Type	What Contributes to or Exacerbates the Impacts	Who is Impacted	Impacts on the Community and/or Environment	Prevention and Mitigation Methods	Best Practices and Case Studies
Noise Pollution & Vibration	Truck Rail	**TRUCK:** ▪ Tire/roadway interaction ▪ Engine noise and exhaust; faulty equipment (mufflers) ▪ Steep inclines or other conditions that cause heavy laboring of truck engines ▪ Noise from loading and unloading ▪ Increase in truck volume in terms of numbers **RAIL:** ▪ Speed ▪ Idling ▪ Length of trains ▪ Horns and crossing bells ▪ Equipment: brakes, propulsion system, auxiliary equipment, wheel squeal ▪ Type of facility (i.e. storage or maintenance) ▪ Operational noise: moving & stacking containers, machinery, loading and unloading, coupling/uncoupling **AIR CARGO:** ▪ Number of arrivals and departures ▪ Schedule of operation- day versus night time operations ▪ Operational noise & vibration: Jet and propeller operation; pre-flight engine testing; auxiliary power units; taxiing; loading and unloading **PORTS:** ▪ Operational: ships,	Community Environment	Physical and mental health impacts in order of decreasing causal relationship: Causal links: ▪ Annoyance ▪ Performance by school children ▪ Sleep disturbance ▪ Mood ▪ Heat rate ▪ Hearing loss and tinnitus ▪ Ischemic heart disease Suggested links: ▪ Performance in adults ▪ Hormones ▪ Cardiovascular disease ▪ Biochemical effects ▪ Effects on the immune system Weak links: ▪ Psychiatric disorders ▪ Low birth weight ▪ Congenital defects	**ALL FREIGHT:** **Technological**: ▪ N/A **Operational**: ▪ Limit idling of equipment. **Planning & Design**: ▪ Cluster industrial uses. ▪ Employ buffering devices (parks, greenspace, open space, distance, compatible land uses) between incompatible land use types. ▪ Build noise barriers (walls & berms) where appropriate. ▪ Utilize acoustical planning techniques which include designing, siting, constructing, and utilizing building materials that minimize noise in a house or a building adjacent to noisy freight facilities. ▪ Utilize noise-compatible land use planning practices. **Policy**: ▪ N/A **Regulations**: ▪ Develop truck-only access routes where appropriate. ▪ Consider restrictions on the use of "jake-brakes" ▪ Retain "buffer zoning" around sensitive land uses that cannot be rezoned for more intense freight uses. **Enforcement**: ▪ N/A **Educational**: ▪ N/A **TRUCK:** **Technological**: ▪ N/A **Operational**: ▪ Modify hours of freight operation to coincide with normal waking hours of community members ▪ Limit the hours of loading dock operation when near noise sensitive land uses. **Planning & Design**: ▪ Utilize land use controls to determine road placement based on compatibility of uses ▪ Install quiet pavement ▪ Replace at-grade rail crossings with grade separated crossings to limit idling. ▪ Develop and designate routes for heavy weight trucks. ▪ Develop and integrate an efficient and effective wayfinding signage program that reduces the likelihood of trucks traveling unnecessary distances, off designated truck routes, and through communities. **Policy**: ▪ Require muffler devices in older vehicles. **Regulations**: ▪ Restrict truck access to certain roads or streets or to certain times of day ▪ Adjust timing of traffic signals (reduces idling) ▪ Reduce speed limits ▪ Incorporate a well-planned and coherent wayfinding signage system **Enforcement**: ▪ Enforce EPA regulations on noise limits for new trucks. **Educational**: ▪ N/A **RAIL:** **Technological**: ▪ Install continuous welded rail (CWR) which is more expensive but quieter. **Operational**: ▪ Maintenance of wheels and rails to mitigate noise production caused by age, wear-and-tear, and problems. ▪ Modify hours of freight operation to coincide with normal	Alameda Corridor – Ports of Long Beach and Los Angeles - http://www.acta.org/ Oakland International Airport – Noise Management Program http://www.oaklandairport.com/noise/index.shtml Guild's Lake Industrial Sanctuary – Portland, OR http://www.portlandonline.com/shared/cfm/image.cfm?id=58694 NYCDOT - *NYCDOT Truck Route Management and Community Impact Reduction Study* http://www.nyc.gov/html/dot/html/motorist/trucks.html Volpe National Transportation Systems Center & US Department of Transportation - *District of Columbia Motor Carrier Management and Threat Assessment Study* http://app.ddot.dc.gov/information/studies/Motor_carrier_study/pdf/Preliminary_Draft.pdf

Freight Impact	Freight Type	What Contributes to or Exacerbates the Impacts	Who is Impacted	Impacts on the Community and/or Environment	Prevention and Mitigation Methods	Best Practices and Case Studies
		container noise, machinery, loading and unloading.			waking hours of community members **Planning & Design**: ▪ Design/retrofitting of track support systems to incorporate quieter materials. ▪ Grade separation to muffle noise. ▪ Explore installing train whistles at grade crossings. Mounting horns at the crossing instead of utilizing the train's horns limits the target of the horn to a smaller area. ▪ Replace at-grade rail crossings with grade separated crossings to limit idling. **Policy**: ▪ Institute quiet zones for horn blowing by trains at grade crossings **Regulations**: ▪ N/A **Enforcement**: ▪ N/A **Educational**: ▪ N/A	
Light Pollution	Truck Rail	**ALL FREIGHT:** ▪ Light pollution generated by nighttime operation of facilities ▪ Inappropriate light equipment ▪ Improper installation ▪ Poor lighting design	Community Environment	Light pollution commonly classified as: ▪ Sky glow ▪ Glare ▪ Light trespass ▪ Over illumination ▪ Clutter Community and Environmental Impacts: ▪ Can cause adverse health effects o Visual acuity o Headaches o Carcinoma and other cancers o Sleep deprivation possibly causing: ▪ Decreased mental capacity and concentration ▪ Compromised immune system ▪ Diabetes type 2 ▪ Dizziness and fainting ▪ Depression ▪ Hypertension ▪ Impatience and irritability ▪ Weight gain ▪ Can be dangerous for nighttime drivers causing impaired vision or momentary blindness. ▪ Can disrupt delicate ecosystems, confuse animal navigation, change predator-prey relations, and alter animal physiology. ▪ Obscures stars and views of the night sky particularly for urban dwellers ▪ Interferes with astronomical observatories ▪ Wastes energy ▪ Can encourage criminal activity if poor lighting obscures rather than illuminates ▪ Can infringe upon ones sense of privacy particularly in the home. ▪ Can seem more acute in rural communities as opposed to urban environments.	**All Freight Types:** **Technological**: ▪ Use specialized "dark sky" fixtures to reduce light spillage. ▪ Avoid "over lighting" and use shields, reflectors, and baffles to keep light spill to a minimum and direct light below the horizontal. **Operational**: ▪ Modify hours of operation where feasible. Less work at night means less need for work lighting. ▪ Direct light downwards rather than into the sky. ▪ Use the minimum light level needed rather than the maximum. ▪ Turn lights off when and where not required. Consider installing motion sensor lights, lights on timers, etc. **Planning & Design**: ▪ Employ buffering devices: landscaping, parks, greenspace, openspace, distance, and compatible land uses ▪ Cluster industrial uses. **Policy**: ▪ Institute quiet zones for horn blowing by trains at grade crossings **Regulations**: ▪ N/A **Enforcement**: ▪ N/A **Educational**: ▪ N/A	Southwest Harbor Project – Seattle, WA http://www.holophane.com/hlp_library/case_histories/Seattle.asp Los Angeles World Airports – LAX Master Plan EIS/EIR – Light Emissions Technical Report – Los Angeles, CA http://www.laxmasterplan.org/docs/draft_eir_NE/T09_LR.pdf
Community Safety: ▪ Injury ▪ Accidents	Truck Rail	**TRUCK:** ▪ Mixing of truck and car traffic	Community	Death, injury, or amputation from collisions with heavy trucks and trains. Railroad accident injuries are much like other motorized vehicle accident injuries. These can	**ALL FREIGHT:** **Technological**: ▪ Integrate Intelligent Transportation System (ITS) Technologies.	Freight Action Strategy for Seattle-Tacoma-Everett Corridor (FAST Corridor)

Freight Impact	Freight Type	What Contributes to or Exacerbates the Impacts	Who is Impacted	Impacts on the Community and/or Environment	Prevention and Mitigation Methods	Best Practices and Case Studies
▪ Hazardous materials ▪ Security concerns		▪ Heavy truck volumes ▪ Mixing of truck traffic and pedestrians or bicyclists - 5% of pedestrian fatalities in the U.S. are associated with large trucks ▪ The movement, handling, and storage of hazardous materials ▪ Access issues - inadequate truck routes can lead to cut-through traffic which causes safety issues in terms of other motorists, pedestrians, and bicyclists ▪ Driver exhaustion **RAIL:** ▪ Safety of at-grade rail crossings ▪ Trespassing along rail corridors and in rail yards ▪ Theft or destruction of property/terrorist activities ▪ The movement, handling, and storage of hazardous materials		include brain and spinal cord injuries, concussions, sprains, fractures, abrasions, internal and soft tissue injuries, burn injuries, and just about every other injury associated with the operation of other motorized vehicles. Train crashes and derailments caused by defective equipment; human error, track and signal defects, accidents resulting from individuals walking on or near train tracks or trespassing in train yards, injuries to railroad employees in the course of their employment; vehicle-train accidents at railroad crossings, and terrorist activities. Unsafe pavement conditions as well as damage to sidewalks and curbs caused by road geometries inadequate for heavy trucks can be dangerous for bicyclists and pedestrians in addition to automobile drivers. Heavy truck volumes can make walking and biking unsafe.	**Operational**: ▪ Strengthen cargo inspection protocol and practices. ▪ Have a hazardous materials clean-up plan in place. **Planning & Design**: ▪ Cluster industrial uses. **Policy**: ▪ N/A **Regulations**: ▪ Develop truck-only access routes where appropriate. ▪ Retain and build-upon existing industrial areas. ▪ Require developers to enter into a Community Benefits Agreement with community groups as part of their agreement with the city. Such agreements specify the benefits that developers will provide the community as part of the development project in exchange for community support for the project. Benefits can include: mitigation and improvements of environmental concerns (noise, vibration, air quality, lighting, etc.), economic development/job opportunities, infrastructure improvements, buffering and landscaping, improvement/maintenance funds, community involvement. **Enforcement**: ▪ N/A **Educational**: ▪ Develop public education programs regarding freight safety. ▪ Develop educational programming regarding the shipment of hazardous materials. **TRUCK:** **Technological**: ▪ N/A **Operational**: ▪ Restrict trucks to certain routes. ▪ Improve maintenance practices. **Planning & Design**: ▪ Replace at-grade crossings with grade separated crossings to limit train/automobile interactions. ▪ Develop and designate routes for heavy weight trucks. ▪ Make spot improvements to transportation infrastructure where deemed inadequate for truck usage. Improvements include road geometry issues such as inadequate turning radii, lack of turn lanes, and ramp configurations. ▪ Keep abreast of new technologies and install upgraded rail crossing barriers and gates where appropriate. ▪ Identify and correct unsafe roadway and operational characteristics (modify speed limits, thorough signage system to indicate road hazards). **Policy**: ▪ N/A **Regulations**: ▪ Require developers to make necessary highway access improvements as a condition for project approval. **Enforcement**: ▪ N/A **Educational**: ▪ Develop driver training programs in part to teach drivers about automobile and pedestrian safety. ▪ Create a truck-based Highway Watch Program that trains truck drivers to spot and report highway safety incidents. ▪ Develop educational programming regarding the shipment of hazardous materials. **RAIL:** **Technological**: ▪ N/A **Operational**: ▪ Improve maintenance practices.	http://www.psrc.org/projects/freight/index.htm The Alameda Corridor – Long Beach and Los Angeles, CA http://www.acta.org/projects_completed_alameda.htm Educational: The *Share the Road Safely Program* for truck drivers and the *No-Zone Campaign* for car drivers by the Federal Motor Carrier Safety Administration (FMCSA) teach truck safety. ▪ http://www.sharetheroadsafely.org/ ▪ http://www.sharetheroadsafely.org/noZone/noZone.asp *Operation Lifesaver* - rail safety education program - http://www.oli.org/ The Federal Railroad Administration rail safety programs http://www.fra.dot.gov/us/content/1755 Community Benefits Agreements: Georgia Department of Community Affairs – Toolkit http://www.dca.state.ga.us/toolkit/ToolDetail.asp?GetTool=150 The Detroit Intermodal Freight Terminal – Detroit, MI – Community Benefits Agreement http://www.southwestdetroit.com/Community/cbawhitepaper.pdf

Freight Impact	Freight Type	What Contributes to or Exacerbates the Impacts	Who is Impacted	Impacts on the Community and/or Environment	Prevention and Mitigation Methods	Best Practices and Case Studies
					Planning & Design ▪ Replace at-grade crossings with grade separated crossings to limit train/automobile interactions. ▪ Where trespassing or pedestrian/train interaction is an issue, create barriers and walkways that create a separation. Look for opportunities to improve the pedestrian environment and direct people to safe crossings points. ▪ Keep abreast of new technologies and install upgraded rail crossing barriers and gates where appropriate. **Policy** ▪ N/A **Regulations** ▪ N/A **Enforcement** ▪ N/A **Educational** ▪ N/A	
Environmental Impacts: ▪ Ecosystems ▪ Air ▪ Water ▪ Soil ▪ Wetlands ▪ Historic, cultural, and archaeological resources	Truck Rail	**ALL FREIGHT:** ▪ The movement, handling, and storage of hazardous materials ▪ Contaminants are released both during construction and operation. ▪ Brownfields ▪ Imperious surfaces can cap pollutants in the ground but contribute to runoff of polluted water. ▪ Pollutants generated by the manufacturers that produce freight-related products. ▪ Vehicle and equipment fueling, maintenance and cleaning, and deicing are all sources of pollutants related to freight. ▪ Vegetation management practices particularly along rail lines.	Community Environment	**Impacts on air:** ▪ Diesel is the primary contributor to polluted emissions causing adverse health effects in people. Also decreases visibility. ▪ Polluted emissions also contribute to regional and atmospheric changes that contribute to global warming, acid rain, and reduced ultraviolet radiation because of stratospheric ozone depletion. **Impacts on water:** ▪ Water quality degradation from multiple point-source discharges. ▪ Water quality degradation from land uses that result in nonpoint-source pollution within the watershed. ▪ Sediment delivery into streams or estuaries from poor construction techniques or erosion. ▪ Deterioration of recreational uses from nonpoint-source pollutants, competing uses for the body of water, or overcrowding. ▪ Water quality degradation from nonpoint- and multiple-point source pollutants that infiltrate aquifers. ▪ Aquifer depletion and saltwater intrusion from overdrawing. ▪ The stormwater pollutants of most concern are total suspended solids (TSS), oil and grease, nutrients, pesticides, other organics, pathogens, biochemical oxygen demand (BOD), heavy metals, and salts (chlorides). ▪ Sedimentation caused by TSS can destroy the desired habitat for fish and can pollute drinking water. ▪ Oil and grease can be toxic to aquatic life. ▪ Phosphorous and nitrogen act as nutrients and can cause excessive aquatic plant growth. ▪ Growth of bacteria in water can lead to oxygen depletion affecting fish. ▪ Heavy metals in stormwater runoff can affect the reproductive systems of aquatic species and can also cause tumors and lesions in fish. ▪ Runoff can affect the pH of water and when out of balance can be toxic to aquatic species.	**ALL FREIGHT:** **Technological** ▪ Develop and utilize cleaner fuels. ▪ Pursue LEED certification for projects. **Operational** ▪ Develop and require regular systems of monitoring water and air conditions. ▪ Properly dispose of contaminated soil from dredging projects (Ports) ▪ Implement proper ballast discharge techniques (Ports). ▪ Water from the washing of trucks, trains, airplanes, etc. should be troughed and recycled rather than allowed to run into drains. ▪ Promptly contain and clean up solid and liquid pollutant leaks and spills, including oils, solvents, fuels, and dust on any exposed soil, vegetation, or paved area. ▪ Recycle oils, solvents, etc. to the greatest extent possible. ▪ Minimize use of toxic cleaning solutions. **Planning & Design** ▪ Cluster industrial uses. ▪ Incorporate detention and retention ponds, vegetated swales and filter strips, filtering systems, and porous pavements where appropriate and feasible. **Policy** ▪ Develop a construction site inspection checklist and monitoring procedures to ensure contractor compliance with environmental specifications during the construction period. ▪ Protect open and greenspace to act both as buffers and to perform necessary ecosystem functions such as stormwater run-off management. ▪ Where greenspace (farmland, forestland, undeveloped land) is still plentiful, establish a greenspace plan to protect these spaces in perpetuity. Look for ways to connect greenspaces to maintain or reestablish networks for wildlife movement/migration. ▪ Soil and groundwater should be monitored at regularly scheduled intervals. Mitigation should be required when needed. **Regulations** ▪ Require developers to enter into a Community Benefits Agreement with community groups as part of their agreement with the city. Such agreements specify the benefits that developers will provide the community as	The Port of Oakland– water, wildlife, and environmental management programs http://www.oaklandairport.com/noise/environmental.shtml#Water%20Q The Port of Portland Environmental Programs– Portland, OR http://www.portofportland.com/Env_Home.aspx Federal Highway Administration– *Addressing Freight in the Transportation Planning Process*– has good case studies http://trans.wpcog.org/downloads/freight/Addressing%20Freight.pdf Great Lakes, St. Lawrence Seaway System – Canada & U.S.– Ballast water program– http://www.greatlakes-seaway.com/en/navigation/ballast_water.html Alameda Corridor – Ports of Long Beach and Los Angeles- http://www.acta.org/ The Port of Long Beach- Green Port Policy http://www.polb.com/environment/green_port_policy.asp hs 55-58- Federal Review of fecting Intermodal cility Development and http://ops.fhwa.dot.gov/freight/freight_analysis/env_factors/env_fact_app_e6.htm

Freight Impact	Freight Type	What Contributes to or Exacerbates the Impacts	Who is Impacted	Impacts on the Community and/or Environment	Prevention and Mitigation Methods		Best Practices and Case Studies
				▪ Stormwater can contain disease-causing bacteria and viruses that can be unsafe for human consumption. **Impacts on soil:** Contaminants in the soil, particularly around brownfields, can become airborne in dust or leach into the water table potentially coming in contact with humans. Chemical leaching can render soils less fertile and productive. Such contaminants and their associated health impacts are as follows: ▪ Arsenic o Breathing high levels can cause a sore throat and irritated lungs o Ingesting high levels can result in death o Ingesting low levels can cause: ▪ nausea and vomiting ▪ abnormal heart rhythm ▪ decreased production of red and white blood cells ▪ damage to blood vessels ▪ the feeling of "pins and needles" in the hands and feet o Long-term exposure can cause a darkening of the skin and an increased risk of some cancers ▪ Lead o Lead is damaging to almost every organ and system in the body o The central nervous system is particularly vulnerable to lead poisoning o It can also damage the kidneys and reproductive system ▪ Boron o Short-term exposure can cause irritation of the nose, throat, and eyes o Ingesting large amounts over a short period can result in damage to the stomach, intestines, liver, kidneys, and brain o Birth defects can occur in women exposed during pregnancy ▪ Copper o Copper is stored in the liver, brain, heart, kidneys, and muscles o Copper poisoning is associated with nausea, loss of appetite, vomiting, and an enlarged liver o Long-term exposure in the air can irritate the nose, mouth and eyes, and cause dizziness, headaches, and diarrhea ▪ Nickel o Ingestion of large amounts of nickel can result in nausea, vomiting, abdominal pain, headache, cough, and shortness of breath o Causes an allergic reaction of the skin ▪ Zinc o Zinc is an essential element in our diet but must be ingested in moderation. o Ingesting large amounts can cause gastrointestinal upset		part of the development project in exchange for community support for the project. Benefits can include: mitigation and improvements of environmental concerns (noise, vibration, air quality, lighting, etc.), buffering and landscaping, improvement/maintenance funds, community involvement. **Enforcement**: ▪ N/A **Educational**: ▪ Develop education programs (workshops, training, etc.) on pollution prevention, environmental stewardship best practices, technology innovations, and environmental laws and regulations. ▪ Train employs on pollution identification and clean-up procedures.	

Freight Impact	Freight Type	What Contributes to or Exacerbates the Impacts	Who is Impacted	Impacts on the Community and/or Environment	Prevention and Mitigation Methods	Best Practices and Case Studies
				o Ingesting too much over a long period of time can cause anemia, pancreas damage, and too little lipoprotein cholesterol ▪ Phenol o Phenol is a manufactured substance and can cause vomiting, difficulty swallowing, salivation, diarrhea, weakness, headache, fainting, distances, and mental disturbances ▪ Sulphide o Exposure at high levels can result in loss of consciousness and death o Exposure to lower levels can cause eye irritation, sore throat and cough, and shortness of breath o Long-term, low level exposure can result in fatigue, loss of appetite, headaches, irritability, poor memory, and dizziness **Impact on wetlands:** ▪ Habitat fragmentation caused by a variety of factors including the construction or expansion of freight facilities. ▪ Degradation of fragile ecosystems due to stressors of over-use or misuse. ▪ Loss of fish and wildlife populations due to barriers to migration (e.g. dams and highways). **Impact on historic, cultural, archaeological resources:** ▪ Fragmentation or destruction of resources because of poor zoning, bad construction practices, and poor monitoring and enforcement of projects. ▪ Compromised historical structures or settings via proximity to noxious land uses.		
Visual & Aesthetic Concerns	Truck Rail	**ALL FREIGHT:** ▪ New freight-based construction projects. ▪ Retrofitting, expansions, additions to existing freight facilities. ▪ New freight routes such as rail corridors. ▪ Corridor improvements can alter the viewshed (e.g. construction of a bridge or interchange). ▪ Increased traffic and rail-usage.	Community	Diminished enjoyment of the public environment. Compromised character or quality of place. Can result in loss of social capital and community cohesion. Impacts on economic development in the community if visual/aesthetic impact is significant. Stress-related health effects: ▪ Increased blood pressure ▪ Headaches ▪ Increased stomach acids ▪ Increased metabolism (e.g. heart rate, breathing) ▪ Suppressed immune system ▪ Decreased intestinal movement and protein synthesis ▪ Increased cholesterol and fatty acids in blood for energy production ▪ Fatigue or insomnia ▪ Anxiety ▪ Mood swings ▪ Depression	**ALL FREIGHT:** **Technological**: ▪ N/A **Operational**: ▪ N/A **Planning & Design**: ▪ Utilize siting and design that does not diminish or obstruct the viewshed. ▪ Implement W&D zoning classification or cluster industrial development. ▪ Mitigation strategies include: o Screening: natural (vegetation and berms) or artificial (fences and walls). Successful screening must have its own aesthetic qualities. o Relocation o Camouflage/disguise o Low profile – reducing the height of the object in the viewshed o Downsizing – reducing the number, density, or area of the offending object o Alternate technologies o Non-specular materials – use objects that are not shiny reducing glare o Lighting o Decommissioning obsolete structures o Proper maintenance procedures	New Mexico Department of Transportation – I-40/Coors Design-Build Reconstruction Project: Aesthetics Public Involvement Project http://www.nmgrip.com/projects.asp?project=14912 City of Reno, NV - *Reno Railroad Corridor* – Aesthetics, *Final EIS* http://www.cityofreno.com/gov/retrac/library/pdfs_feis/f_3-11.pdf

Freight Impact	Freight Type	What Contributes to or Exacerbates the Impacts	Who is Impacted	Impacts on the Community and/or Environment	Prevention and Mitigation Methods		Best Practices and Case Studies
					Policy	▪ Assess the potential impact of a project prior to implementation and invite public input. ▪ Visually assess the viewsheds, aesthetic quality, and significance of a site prior to construction. ▪ Involve the community in aesthetic decisions (noise barriers, overpasses, etc.) regarding transportation improvements. Such improvements would benefit both freight and the community.	
					Regulations	▪ Implement a Visual Assessment Policy that requires a visual impact assessment as part of project approval process.	
					Enforcement	▪ N/A	
					Educational	▪ N/A	